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Training Material Outline - 1/2

- **This training material consists of the following:**
  - Product Overview
    - » Basic introduction to this machine, including Target User information and Product Positioning information.
  - Installation
    - » Installation procedures are gone over. Note that this and every section should be looked at in conjunction with Operating Instructions (OI) and the service manual (FSM - Field Service Manual), as well as any other relevant documentation.
  - Service Mode
    - » Entering Service Mode, etc., is covered.
  - Updating the Firmware
    - » Firmware update procedures and cautions are gone over.
  - Maintenance
    - » Maintenance procedures gone over

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OI – Operator's Instruction

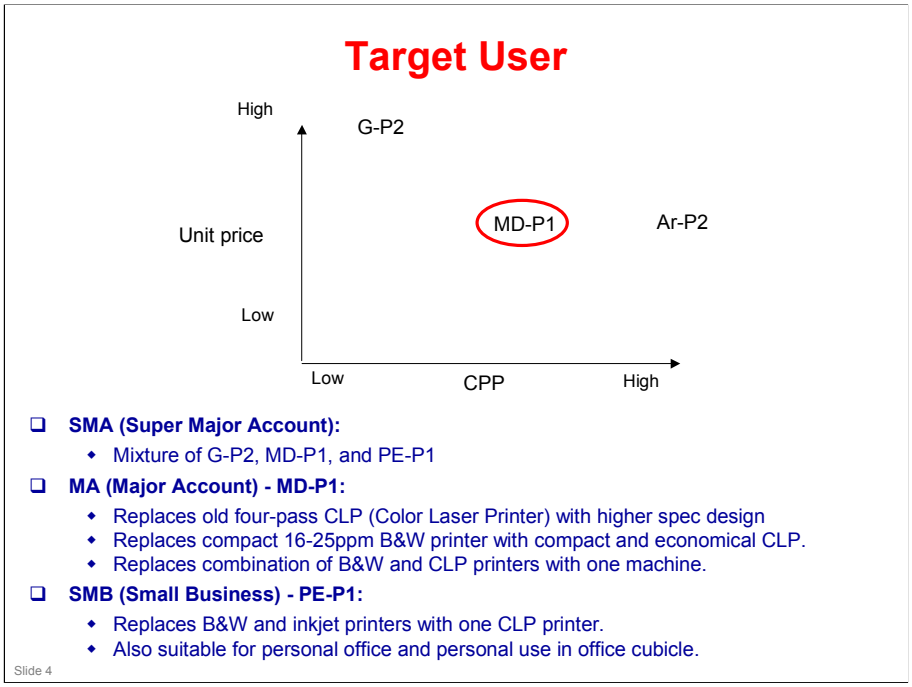
FSM – Field Service Manual

Training Material Outline - 2/2

- Machine Overview
  - » Specifications, Optional Equipment, various mechanical procedures covered.
- Laser Exposure
  - » Laser unit parts, optical path, etc. covered.
- AIO (All-In-One) Cartridge
  - » Detailed explanation of how the AIO cartridge works.
- Paper Feed
  - » Paper feed details (one-sided output, duplex, etc.)
- Image Transfer
  - » Color image transfer process
- Fusing
  - » New type belt-fusing is explained
- Optional Paper Tray Unit
  - » Optional Paper Tray unit explained
- Trouble-Shooting

Slide 3

AIO – All-In-One cartridge



SMA – Super Major Account

MA – Major Account

SMB – Small Business

Product Positioning

- **Price**
  - The MD-P1 falls between the AR-P2 and the G-P2
- **Performance**
  - The MD-P1 falls between the AR-P2 and the G-P2
- **MD-P1 Sales Points:**
  - Machine compactness
  - Reasonably low TCO
  - Workgroup use

Slide 5

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More on the Machine

- The picture shows the machine without the optional paper tray units attached. Do a full circle check of the machine and locate the various sockets, handles, peripheral units and operation panel.
- The standard paper tray unit and the output tray both have a 500 sheet capacity.
- The machine has a 1-tray optional paper feed bank, which holds 500 sheets of paper.
- The by-pass tray can hold 100 sheets.

Operation Panel

Go to the machine and have a look at the operation panel and familiarize yourself with the various keys.

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The recommended 70 cm front space is to allow sufficient space for the paper tray to be pulled out. Note that additional front space is required to allow operators room to stand in front of the machine.


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Installation
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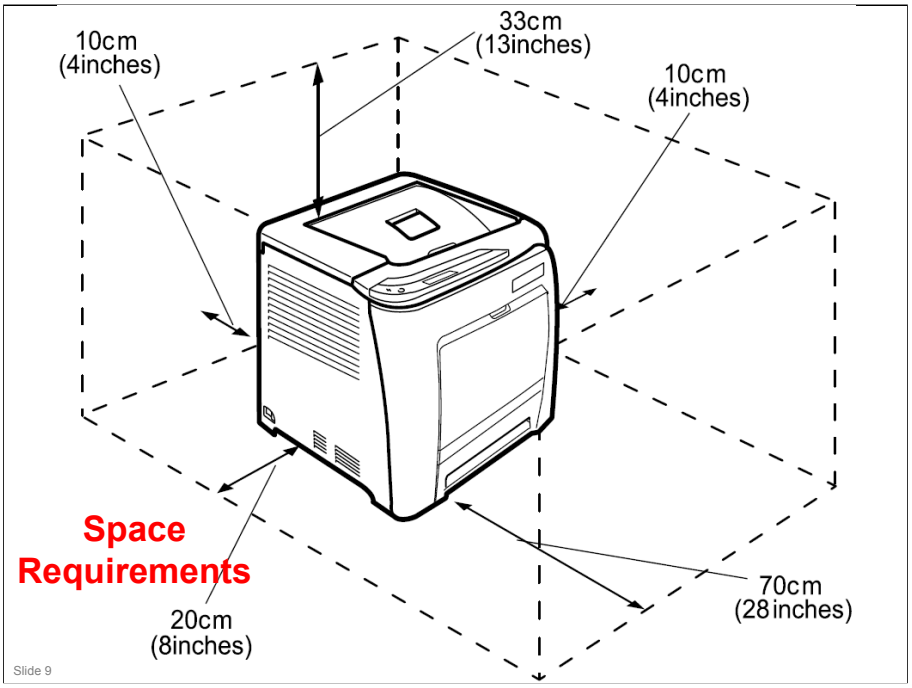
10cm
(4inches)
33cm
(13inches)
10cm
(4inches)
Space
Requirements
20cm
(8inches)
70cm
(28inches)
Slide 9

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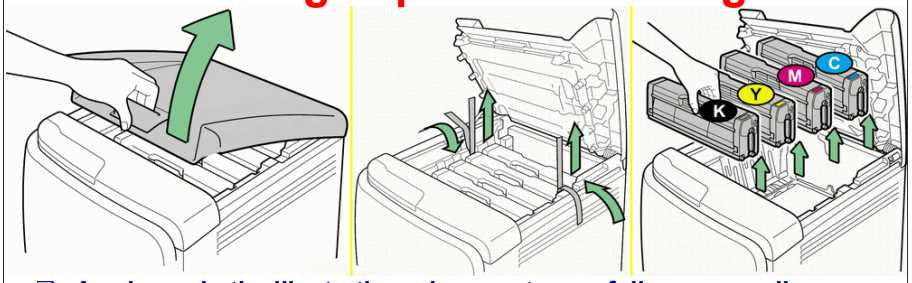
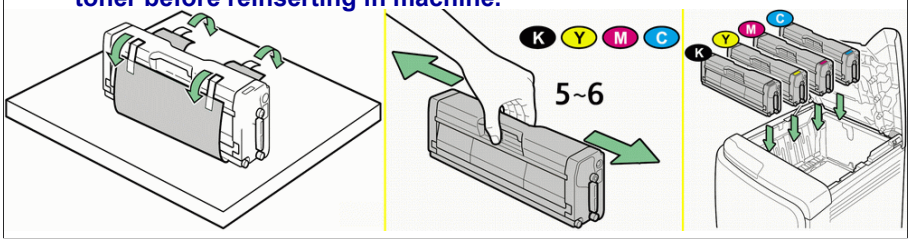
Removing Tape from Cartridges



- As shown in the illustrations, be sure to carefully remove all strips of tape from each of the four AIO cartridges.
- Move each AIO cartridge from side-to-side to evenly distribute toner before reinserting in machine.



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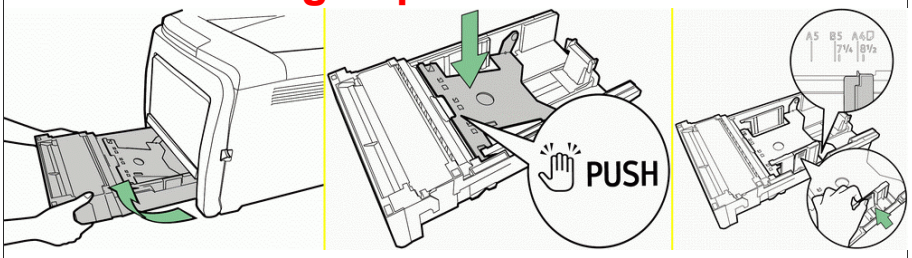
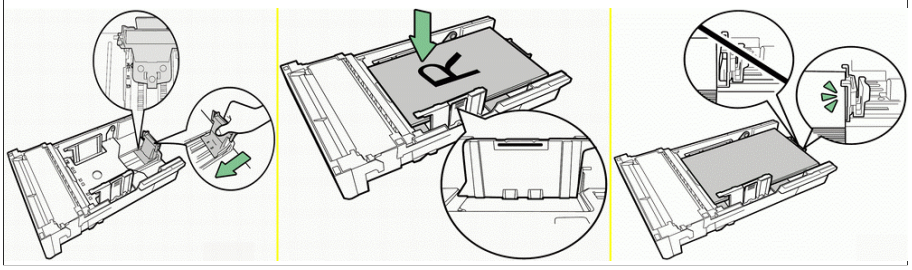
Setting Paper Guides - 1/2



- As shown in the illustrations, push the bottom of the paper tray down until it locks flat, then insert paper and correctly set each of the paper guides.



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Setting Paper Guides - 2/2

- The above set of illustrations are on the inside of the paper drawer.

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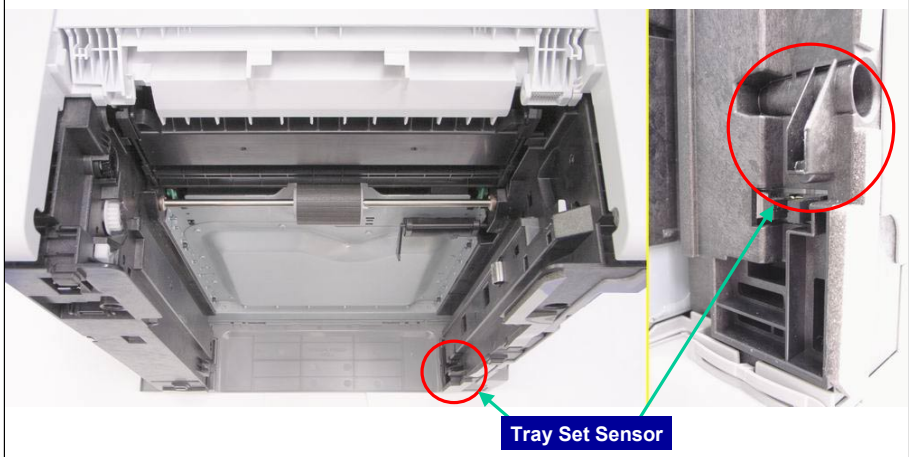
Tray Set Sensor - 1/2



- New to this version of the machine, the Tray Set Sensor detects when the paper drawer is inserted into the machine.

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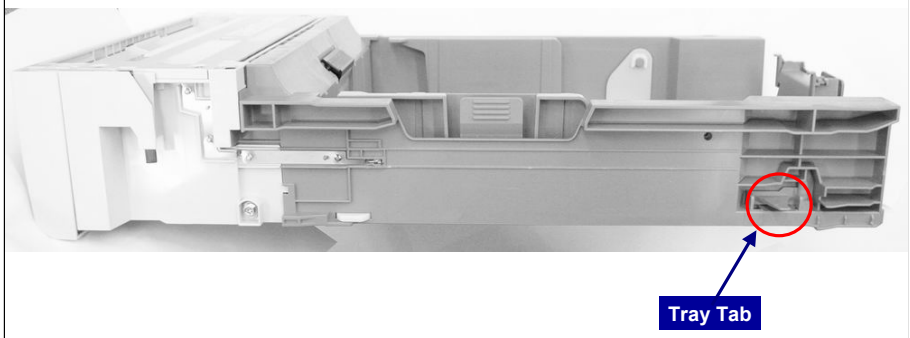
Tray Set Sensor - 2/2



- The Tray Tab interacts with the Tray Set Sensor for Paper Tray detection.

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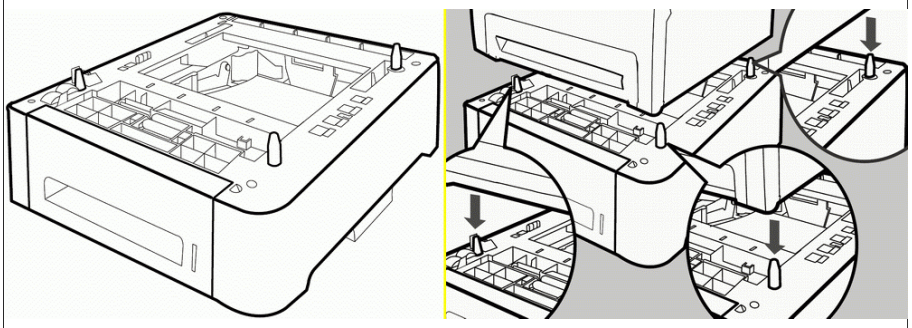
Optional Paper Tray



- When installing the optional paper tray, carefully line up the pins (as shown in the above illustration).

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Hardware Installation Procedure

- **This is a customer-installed machine.**
- **However, please install the machines, and see what types of errors the customers could make.**
  - See:
    - » OI manuals and previous slides
    - » M040/M041 Printers: Quick Installation Guide

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Installing the Options

- **The customer installs the options.**
  - Paper tray unit
  - Memory
- **Install the optional memory and paper tray unit:**
  - M040/M041 Printers: Hardware Guide. Installing the Printer and Options – Installing the Options

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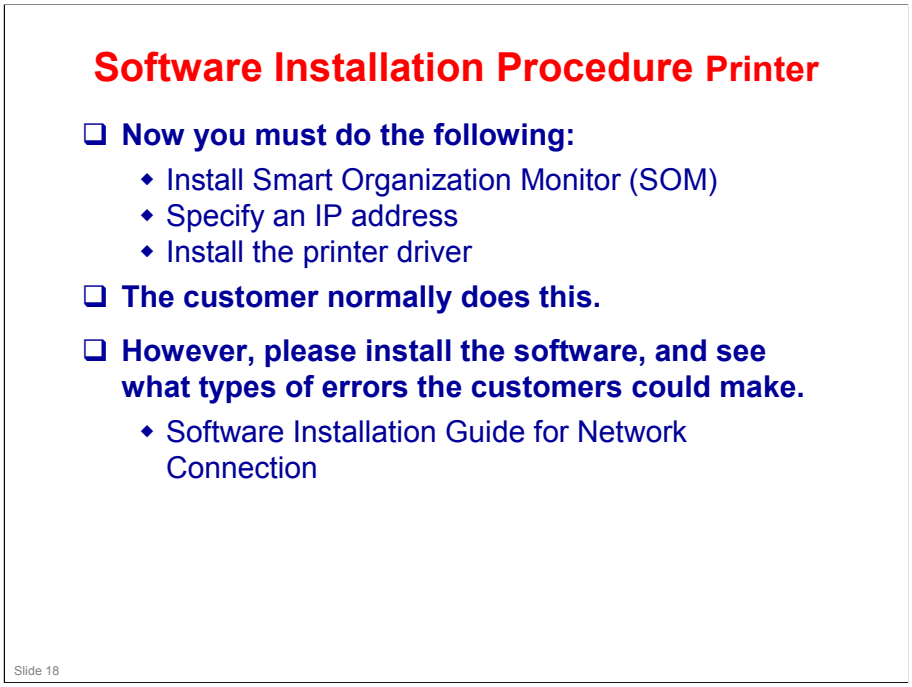

- The customer normally does this.
- However, you need to know how to install the software, because SOM (Smart Organization Monitor) is needed for field service adjustments.
- When installing the printer driver, SOM is automatically installed (with the printer driver).
- Normal settings can be input via the operation panel.
- SOM can be used to make setting changes via a computer.

Software Installation Procedure

- **Now you must install the drivers and software.**
  - Software Guide

- **The customer normally does this, but it's a good idea to practice installing the software, in order to see possible errors that the customers might make.**

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Service Training
Service Mode
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Overview

- **Printer Model**
  - To use service mode, you must connect a PC to the printer.
    - » USB
    - » Ethernet (use a normal Ethernet cable if connecting through a network, or use a crossover Ethernet cable if connecting directly to the printer).
  - To enter the service program mode, start the SOM (Smart Organizing Monitor) utility from your computer.
- **OS compatible with SOM:**
  - Windows 2000/XP/Vista, Windows Server 2003/2003 R2, or Mac OS-X

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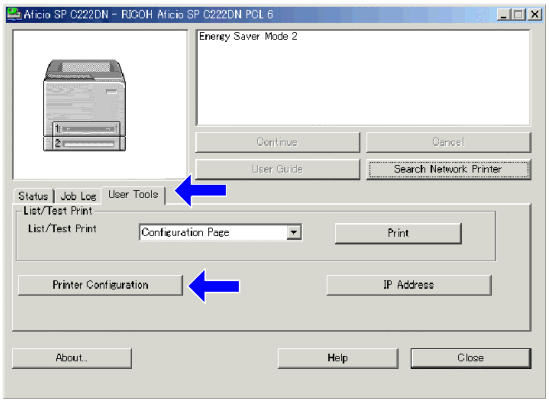
Printer Model - SOM (1/3)



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- Start SOM on your PC. You will see the above screen.
- In the User Tools tab, click Printer Configuration.

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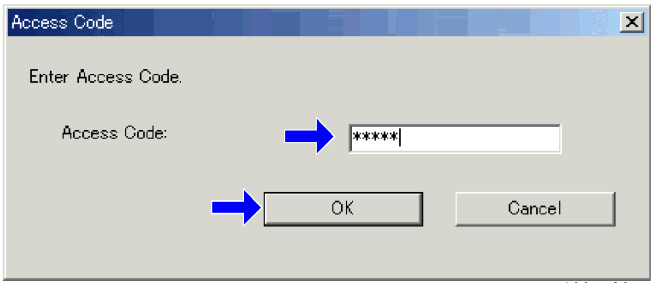
Printer Model - SOM (2/3)



- **Input Admin074 and click OK.**

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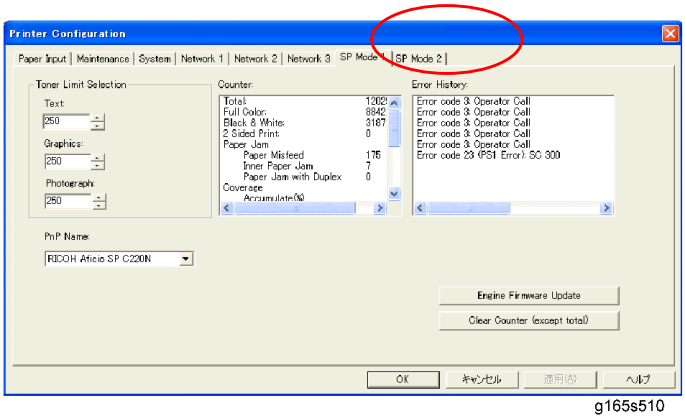
- Admin074 gets access to the SP modes.
- The default password of 'Admin' is for the customer's administrator. This password does not give access to SP modes.
  - The user should change this password.
  - To change the password, the user must log on as an Administrator, and then make the necessary settings. For details, see Smart Organizing Monitor Help.

Printer Model - SOM (3/3)



g165s510

- **There are two tabs of SP modes.**

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Entering SP Mode

- **The machine has the following two SP Modes.**
  - SP Mode (Service Program Mode): The SP Mode includes the programs that are necessary for standard maintenance work.
  - SSP Mode (Special SP Mode): The SSP Mode includes SP Mode programs and some special programs. Consult your supervisor before you enter this mode.

Practice entering and using the SP mode (see Service Manual for details).

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Service Program with Operation Panel

- **Some service programs can be accessed via the LCD-equipped operation panel of this machine, in addition to the SOM.**
- **Start Service Program (via Operation Panel):**
  - Press both the Start/Stop key and Escape key together.
  - (While holding down these two keys), turn on the printer.
  - Continue holding keys down for about ten seconds
  - During the ten seconds, the LED and LCD will indicate printer status
  - The machine will indicate that user input has been accepted with the 'Ready' LED steadily on, and the 'Alert' LED blinking.
    - » For more details, see the FSM

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Service Training
Updating the Firmware
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Procedures

- **Printer Model: Start SOM and follow the procedures in the manual.**
  - You must connect a PC to the printer to use SOM.
    - » USB
    - » Ethernet (use a normal Ethernet cable if connecting through a network, or use a crossover Ethernet cable if connecting directly to the printer).
- **There are two procedures.**
  - One for engine firmware, and one for controller firmware.

Note: The printer driver (and SOM - Smart Organization Monitor, which installs simultaneously with the printer driver) should be installed before you start this procedure.

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Cautions - 1/2

- **Do not turn off the main power of the machine during firmware updating.**
  - If you switch the power off, the engine board and/or controller board may be damaged.
- **If power failed during the download, try again. If you still cannot download the firmware, it may be necessary to change the engine board and/or the controller board.**

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Cautions - 2/2

- **The machine displays a message to indicate that download is complete.**
  - This message appears on the SOM on the connected PC, as well as on the machine's operation panel.
- **If this message does not appear, the download failed. Try again.**
  - You can also switch from an Ethernet connection to a USB connection (or the other way around) and see if that works.
- **If you still cannot download the firmware, it may be necessary to change the engine board and/or the controller board.**

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Download the Firmware

- **Do the procedures in the service manual:**
  - Service Manual – Service Tables – Firmware Updating – Printer Model
    - » Controller Firmware
    - » Engine Firmware
- **Follow all notes and cautions in the manual.**

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Service Training
Maintenance
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Procedures

- **The following maintenance procedures are done by the user.**
  - Replacing the Print Cartridges
    - » There are two types of print cartridges: Short Life & Long Life
  - Replacing the Waste Toner Tank
    - » Yield is about 55k prints per tank (depending on percentage of usage of color and black & white))
- **To see the current status of the consumables:**
  - SOM - Status tab
- **There are no PM procedures for the technician to do.**

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Study the Procedures

- **Hardware Guide:**
  - Replacing Consumables

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Machine Overview
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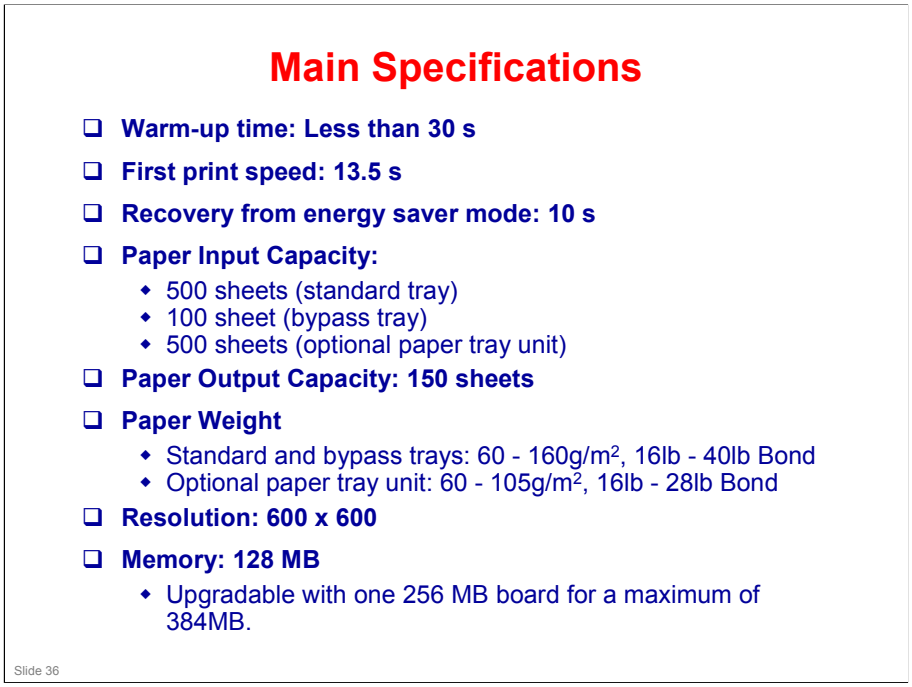

- Duplex printing cannot be done for thick paper (more than 105 g/m^2, 28 lb Bond).
- Printing on OHP transparencies is not possible.
- Resolution settings: There are three settings (600 x 600 1-bit, 600 x 600 2-bit [also called 1200 x 600], 600 x 600 4-bit [also called 2400 x 600 dpi])
  - Without 256 MB of extra memory, 2400 x 600 dpi duplex LG size cannot be printed.
- Other specs:
  - Printer Language

    M040/M041: PJL, PCL 5c/6, PostScript Level 3

    M041 only: PictBridge
  - Paper sizes, paper types, paper weights: See the Operating Instructions (Hardware Guide - 4. Paper and Other Media)

Black Over Print feature (default: off)

- This feature improves performance when printing black over color in some cases.

Optional Equipment

- Memory Unit Type F 256MB G891
- TK1010 Paper Feed Unit G849

- Both of these options are in common with model PE-P1

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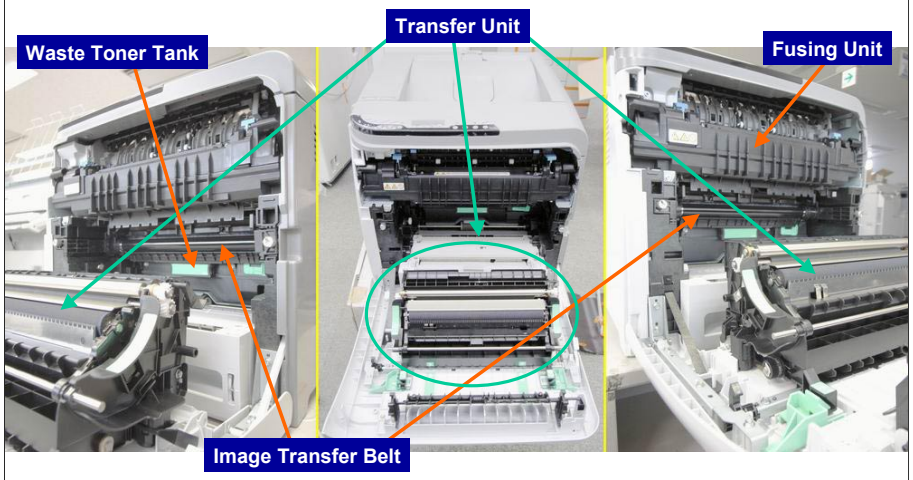
View of Machine - Front Door Open



- The Transfer Unit, Fusing Unit, Image Transfer Belt, and Waste Toner Tank are all easily removed from the front of the machine - as illustrated in the following slides.

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Print Cartridges

The four AIO (All In One) toner cartridges are shown above.

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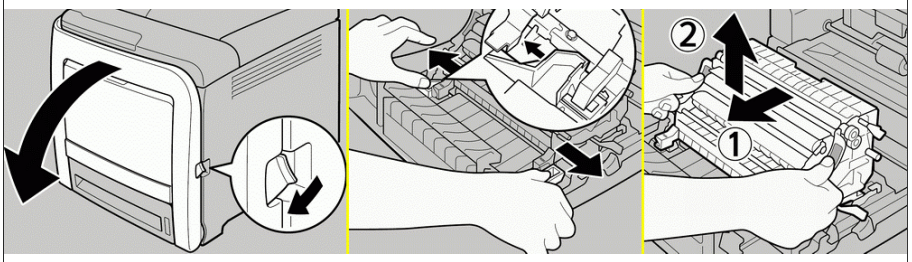
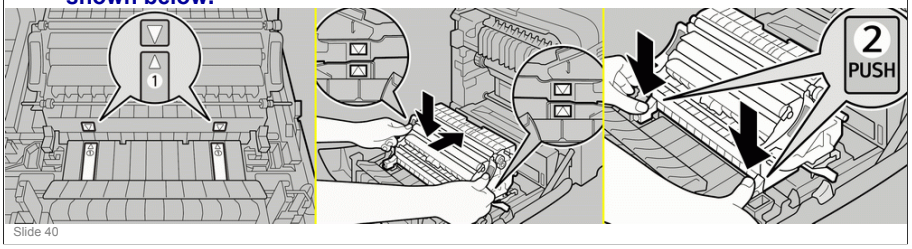
Removal & Installation of Transfer Unit



- The Transfer Unit is easy to remove and to install - as shown in the above illustrations.
- When reinstalling the Transfer Unit, carefully align with guide marks, as shown below.



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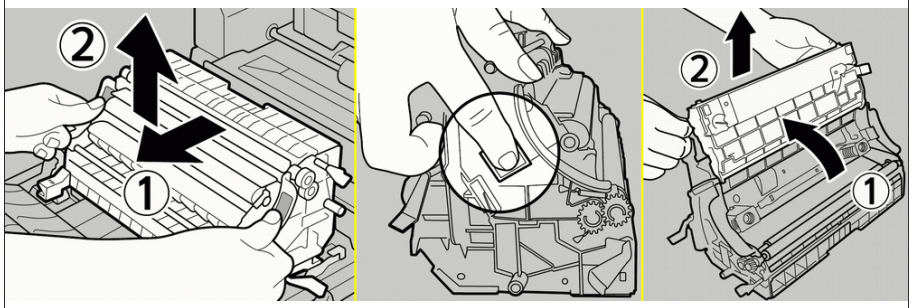
Removing and Opening the Transfer Unit



- The Transfer Unit can be opened by pushing buttons on both sides of the unit (as shown above).

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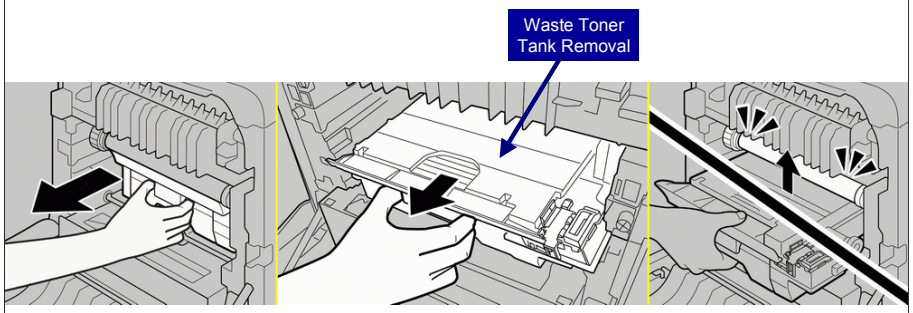
Waste Toner Tank Removal



- When removing (and also installing) Waste Toner Tank, be careful not to let it come into contact with Image Transfer Belt, which could damage the belt.

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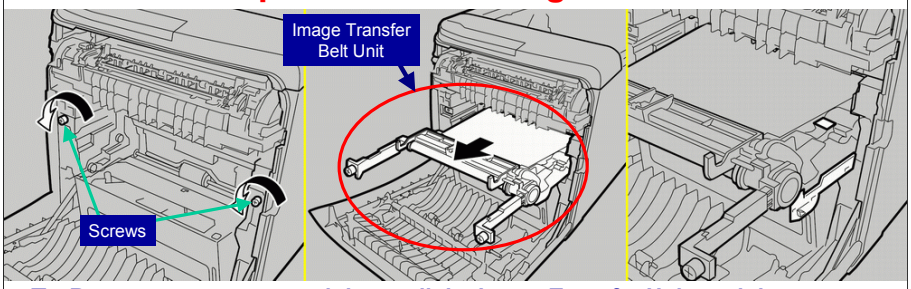
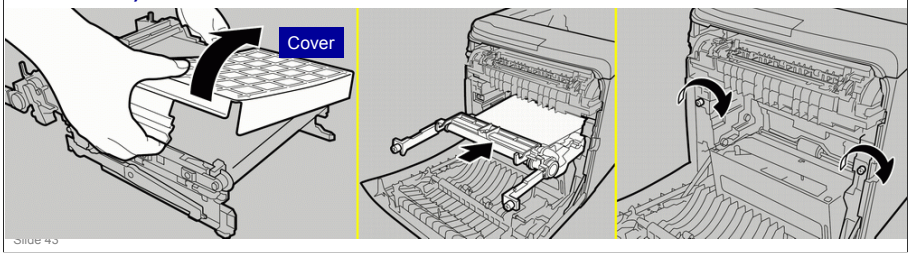
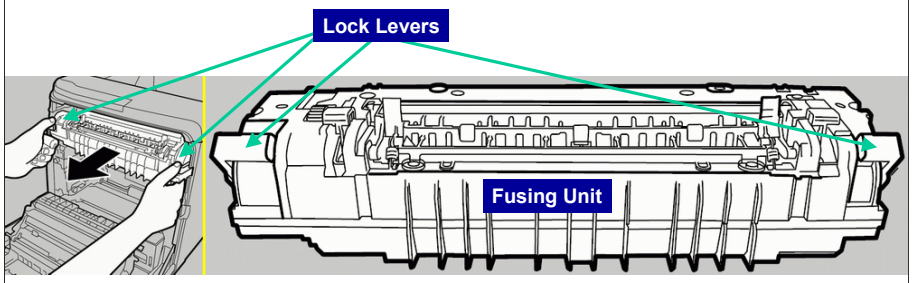
Removal & Replacement of Image Transfer Belt Unit



- Remove two screws and then pull the Image Transfer Unit straight out.
- First remove the cover of the new unit before reinstalling (as shown below).



Fusing Unit Removal



- Removal of the Fusing Unit is easy and straightforward.
- Pull the Lock Levers down with thumbs (as shown in illustration), and then pull straight back.
- Caution: Allow fusing unit to cool for several minutes before removing. Also hold the unit firmly to handle the weight (the Fusing Unit is heavy).

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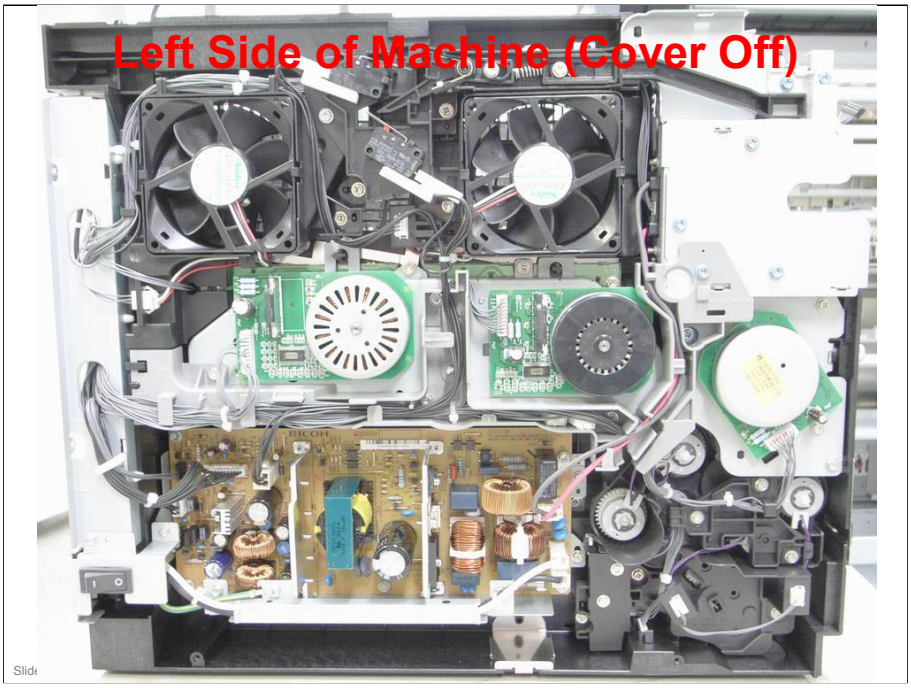
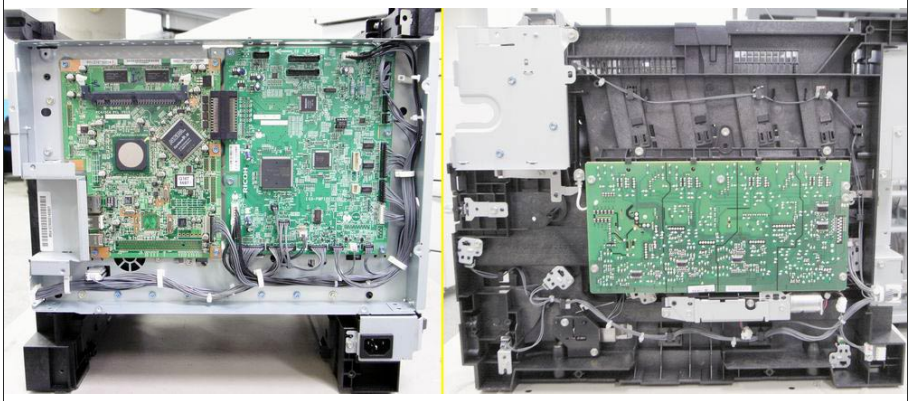


Note that there is one less motor than the previous machine. The same functionality is achieved via a solenoid and gearing.

Rear & Right Sides (Cover Off)



- View of the inside of the machine (rear & right sides)
- For view of left side of machine with the cover off, see previous slide.

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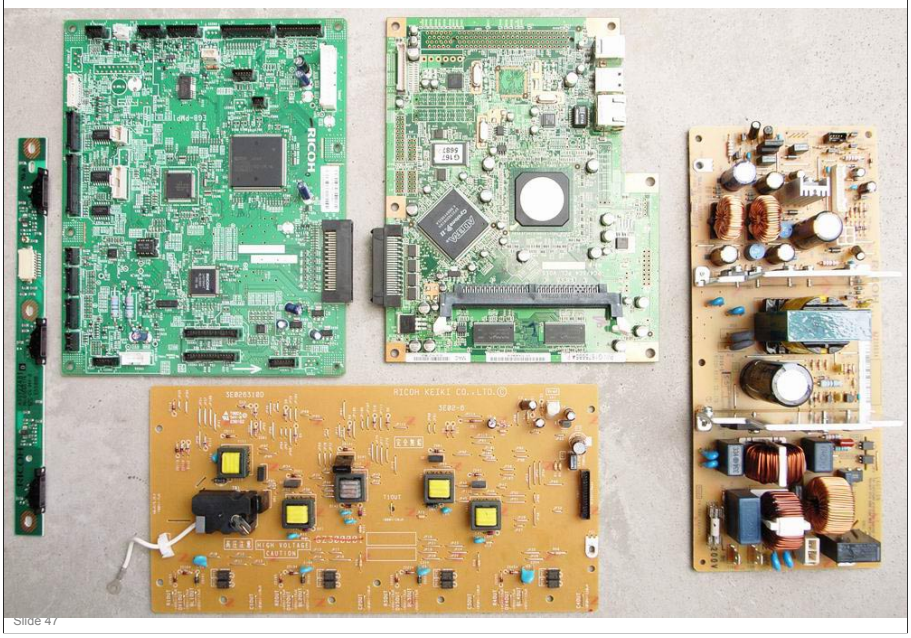
Circuit Boards



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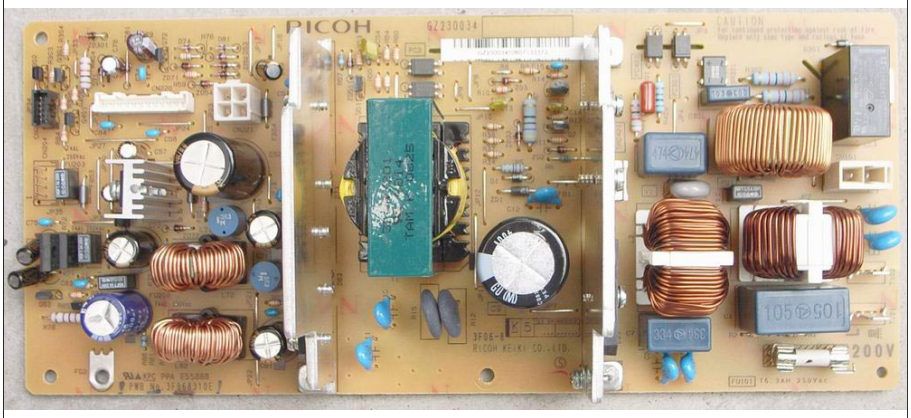
Power Supply Board



❑ View of power supply after removal from machine.

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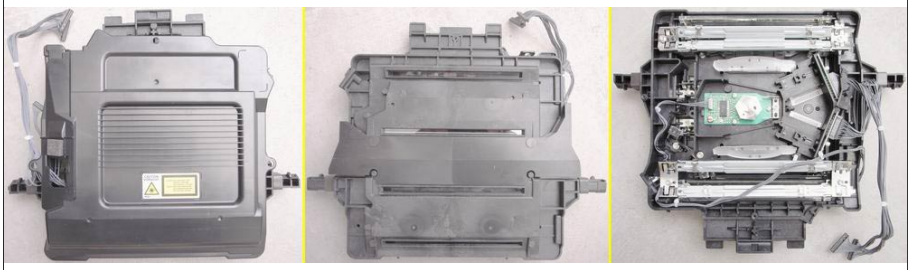
Laser Unit

Top | Bottom | Top (Cover Removed)



- Laser Unit - upper view, bottom view, and upper view with cover removed.

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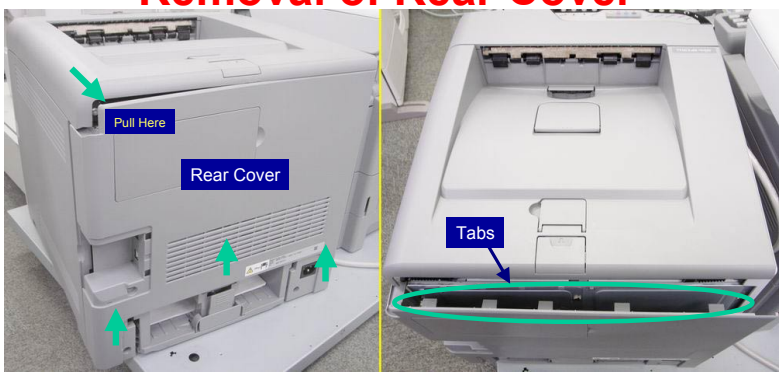
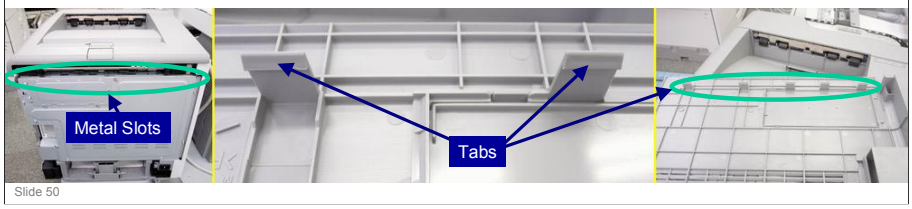
Removal of Rear Cover



- Push up on lower edge of cover, and - starting with the left upper cover - carefully pull the tabs out of the metal slots.



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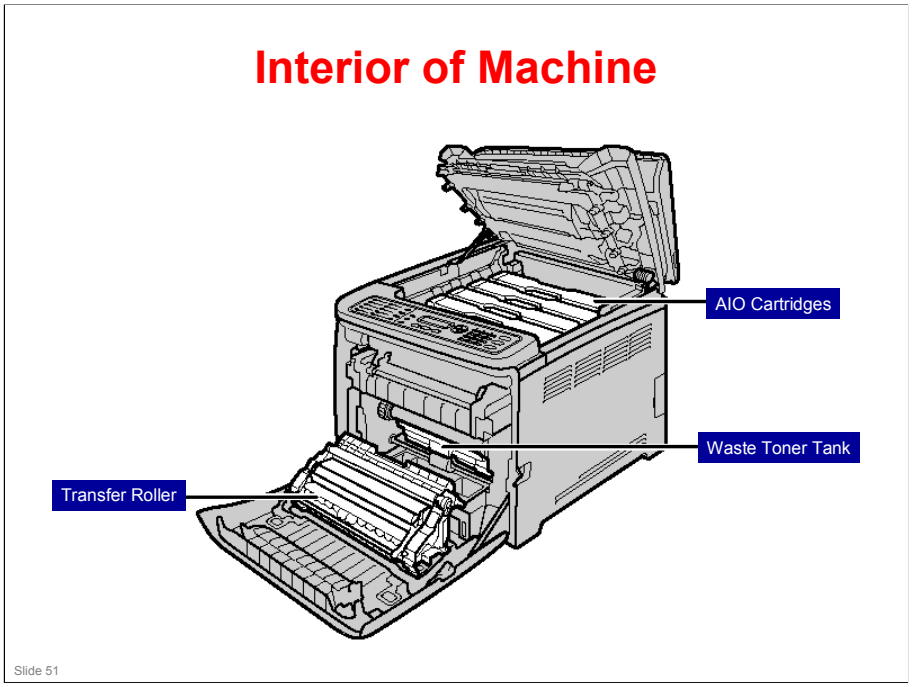
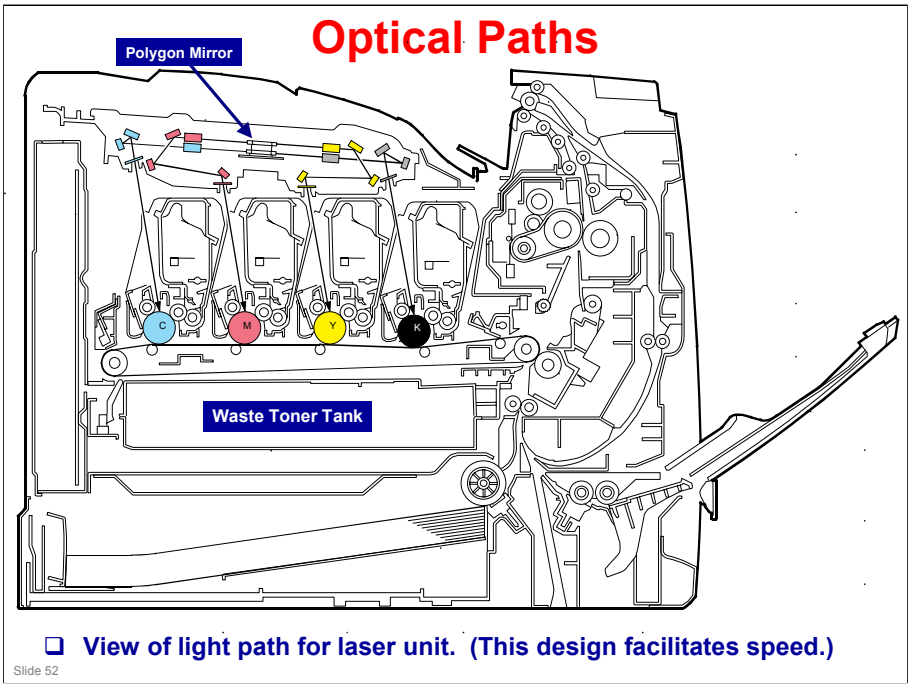
Note that the top cover must be closed in order to remove the rear cover.



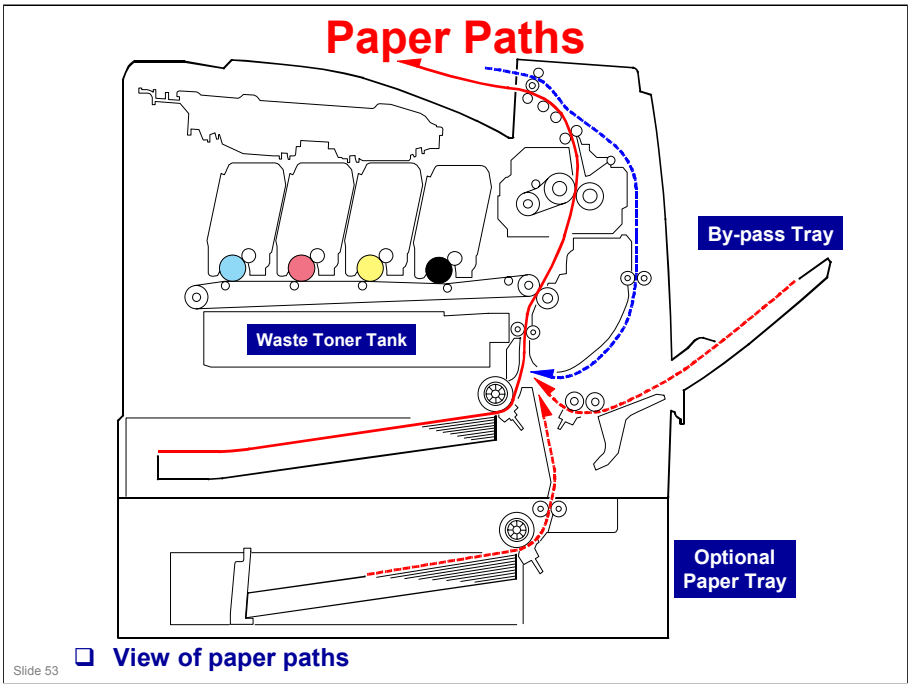
- 1. AIO Print Cartridges: Load from the machine rear, in the order of cyan (C), magenta (M), yellow (Y), and black (K). Messages appear on the screen on the operation panel when print cartridges need to be replaced.
- 2. Waste Toner Tank: Collects excess toner during printing. Messages appear on the screen) or on the SOM (Smart Organization Monitor) when the waste toner tank needs to be replaced.
- 3. Transfer Unit: Remove this unit when replacing the waste toner tank.



Optical Path:

- The laser beams for magenta and yellow are sent to the upper part of the polygon mirror.

- The laser beams for cyan and black are sent to the lower part of the polygon mirror.



❑ View of paper paths

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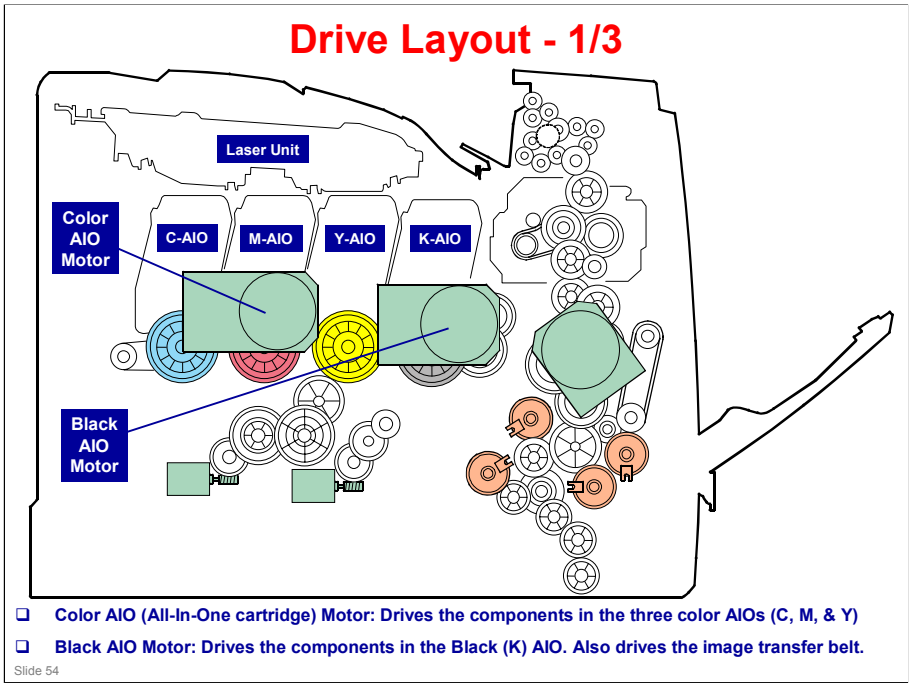
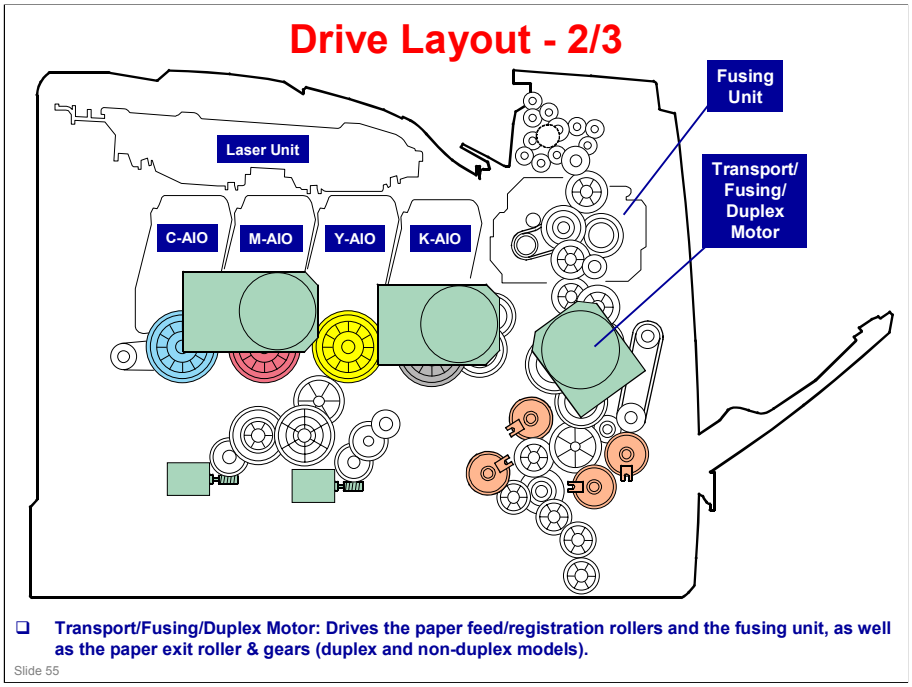
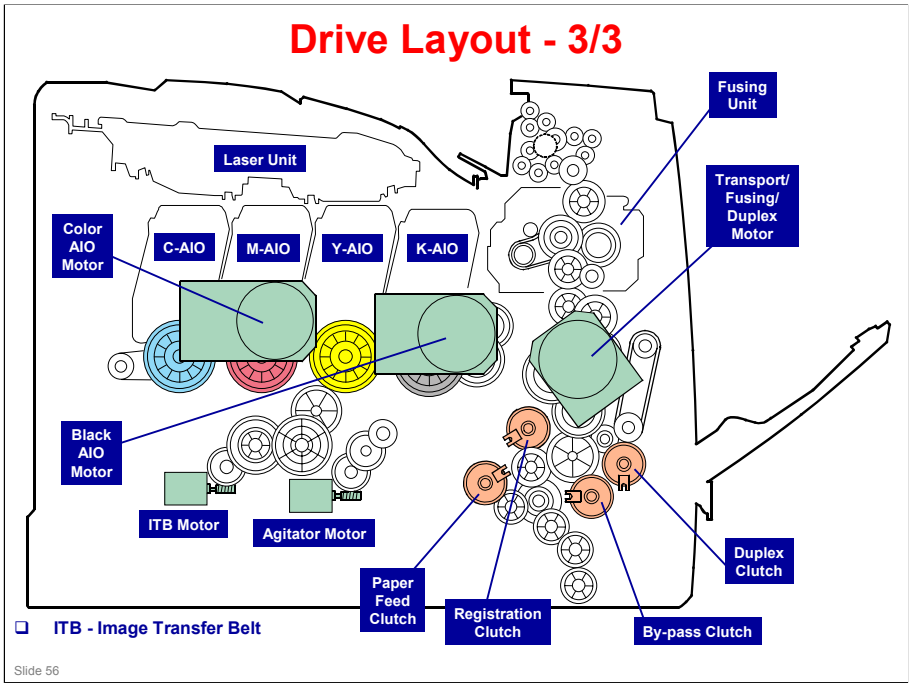


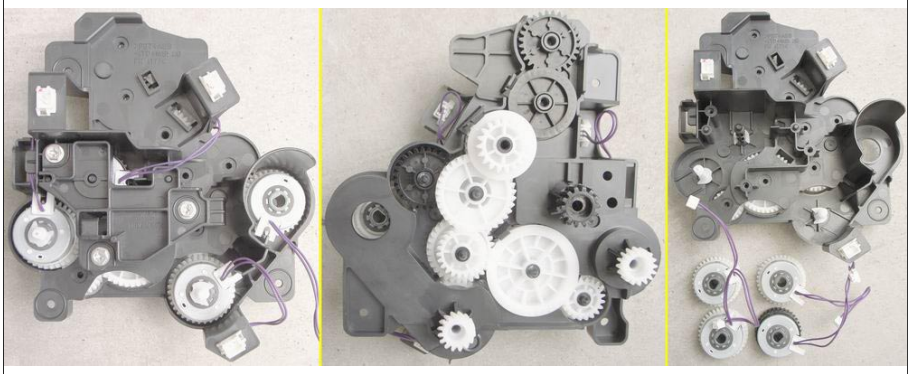
- The diagram shows the most important motors. For others, see the service manual.



- The diagram shows the most important motors. For others, see the service manual.


Drive Layout - 3/3
Fusing Unit
Laser Unit
Transport/ Fusing/ Duplex Motor
Color AIO Motor
C-AIO
M-AIO
Y-AIO
K-AIO
Black AIO Motor
ITB Motor
Agitator Motor
Paper Feed Clutch
Registration Clutch
By-pass Clutch
Duplex Clutch
ITB - Image Transfer Belt
Slide 56

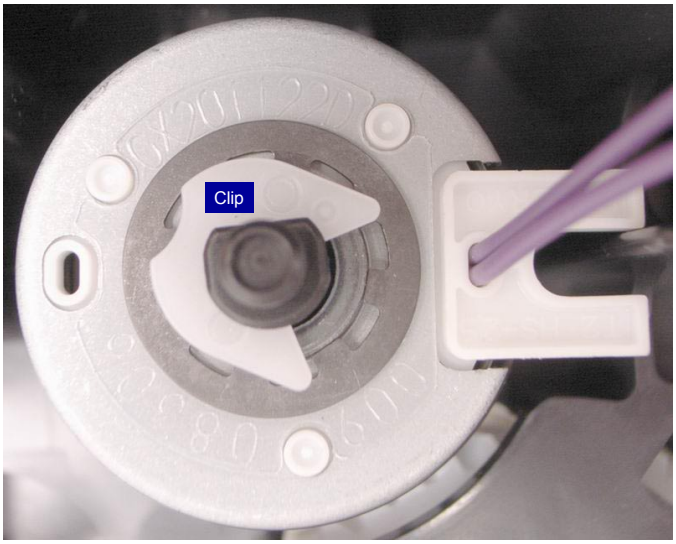
Clutch Assembly Unit



- Front & Rear views of Clutch Assembly Unit.
- (Right) - Four clutches removed from Clutch Assembly Unit.

Slide 57

Clutch Clips



- When removing plastic clips to remove clutches, use caution not to misplace.

Slide 58

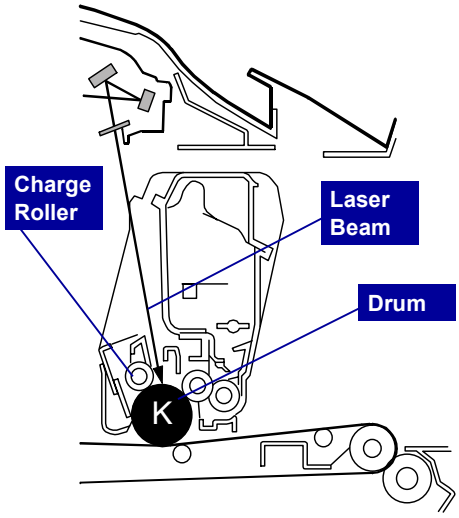
Electrical Component Defects

Examine the following electrical component defects. (See Service Manual for details.)

- Sensors
- Switches
- Blown Fuses

Slide 59

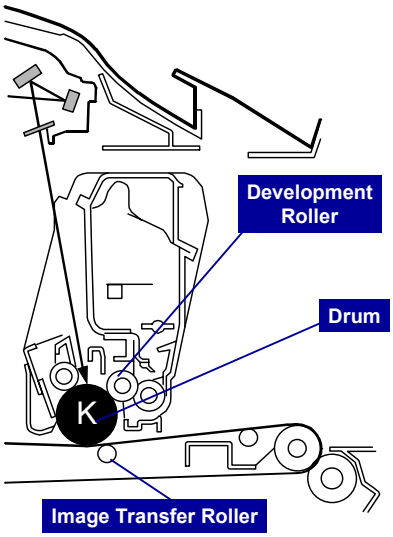
Printing Process - 1



- The charge roller gives the drum a negative charge.
- The laser beam writes the latent image on the drum.

Slide 60

Printing Process - 2



- The development roller applies toner to the latent image on the drum.
- The image transfer roller pulls the developed toner image onto the image transfer belt.

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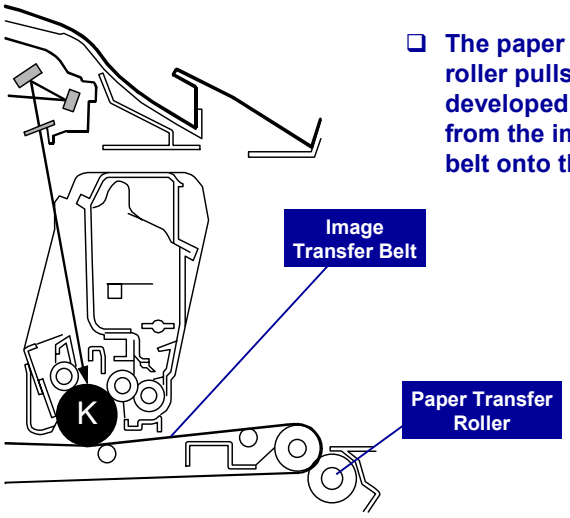
Printing Process - 3



- The paper transfer roller pulls the developed toner image from the image transfer belt onto the paper.

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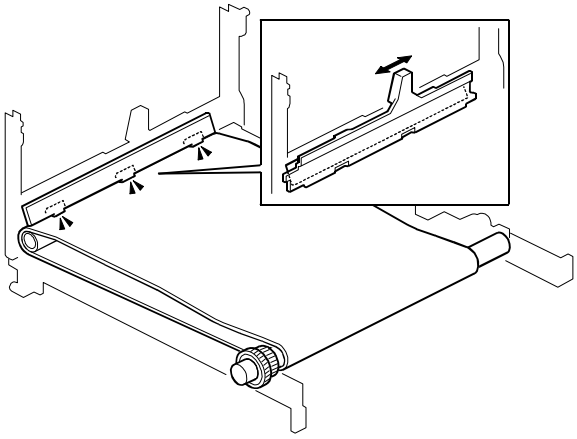
TM Sensors



- The central TM sensor is used for process control.
- The other two TM sensors are used for MUSIC and other internal adjustments.

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- For more about process control, read this section of the manual.
- MUSIC: This is the internal process used by the machine to automatically correct for color registration errors (to make sure that the colors are deposited in the exact positions on the transfer belt).

Process Control Summary

- **What is done?**
  - The machine calibrates the TM sensors
  - The machine makes a 9-grade pattern on the belt, and the central TM sensor scans these patterns.
  - The machine can then calculate the correct development bias and laser diode power.
  - MUSIC: The machine then checks for color registration errors. To do this it makes lines at the left, center, and right of the transfer belt and scans these lines with the TM sensors.

Slide 64

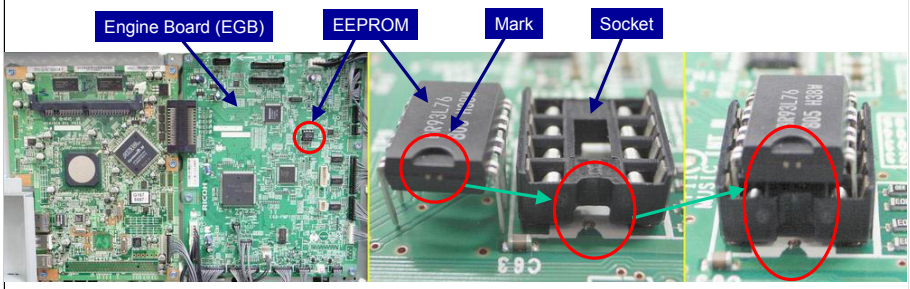
Boards

- The engine board (also referred to as the "EGB") controls the engine. This is the machine's main board.
- Controller: Controls the interface with the operation panel, and controls applications
- ID Chip Board: Relays data about the AIOs to/from the engine board.

Slide 65

Replacing Boards

- The EEPROM on the controller cannot be removed.
- However, the EEPROM on the engine board can be removed.
- When replacing the engine board, take the EEPROM from the old board and install it on the new one. The mark must align with the mark on the socket, as shown below.



Slide 66

Replacing the EEPROM

- **After you replace the EEPROM, do the procedure in the service manual.**
- **What does Transfer Belt Adjust do?**
  - A new transfer belt may not be exactly same length as old one. With this SP mode, machine calibrates motor speed for new belt (speed is checked with a TM sensor pattern).
- **Fuser SC Detect:**
  - This is normally OFF.
  - If you turn this ON, machine will issue SC559 and stop working if three consecutive paper jams occur in fusing unit. Then, technician must visit machine and reset SC code and check fusing unit.
  - If a sheet of paper feeds correctly, counter is cleared - the SC only appears if there are three consecutive jams on three successive sheets.
- **2nd Transfer Front/Back:**
  - Normally all settings are 0.
  - You may need to change settings in unusual environmental conditions, for example if humidity is low.

Slide 67

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Power Supply Unit (PSU)

- The PSU contains a fuse.
- This fuse can be replaced. Always use the correct type of fuse, or the machine could be damaged.
- See the service manual for the correct type of fuse to install.

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Error Codes

- **Error codes can be seen with SOM (printer models) or on the operation panel (MF models).**
- **Fusing related SCs: To prevent damage, the machine cannot be operated until the SC has been reset by a technician.**
  - Enter SP mode.
  - Printer models: Click "Fuser SC" in SOM, and then turn the main power switch off and on.

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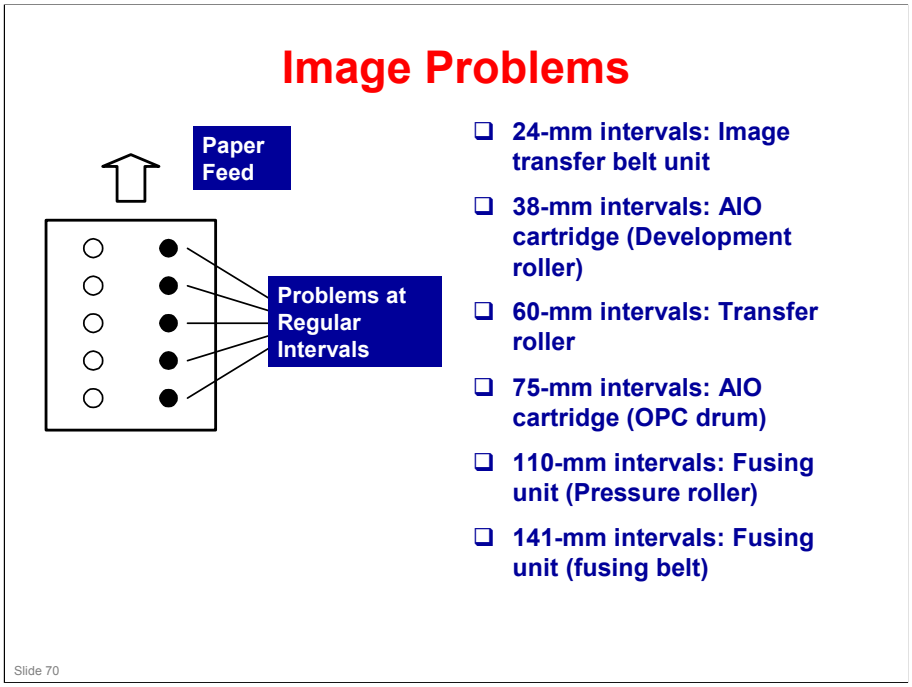

- Why 24 mm for the image transfer belt?
- This is the circumference of the image transfer rollers. See the Transfer section of the course for information on these rollers.

Removals - Covers

Practice removing the following according to Service Manual procedures.

- Rear Cover
- Operation Panel
- Right Cover
- Left Cover
- Front Cover Unit
- Laser Optics Housing Unit

Slide 71

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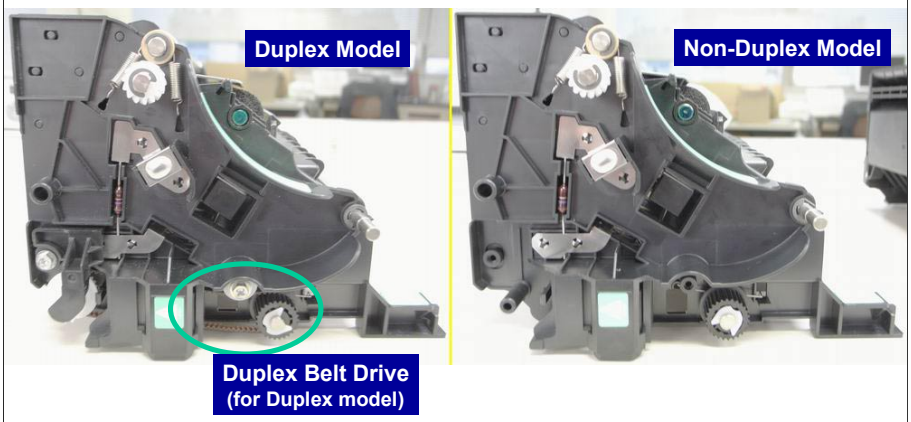
Transfer Unit



- Note that Transfer Unit for duplex model has a belt drive (for reverse direction) not on non-duplex model.

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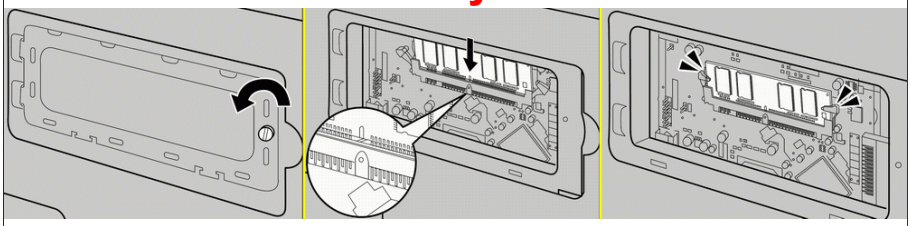
Memory Slot



The machine has one memory expansion slot, accessed from the rear of the machine, as shown above (illustration) and below (photo).

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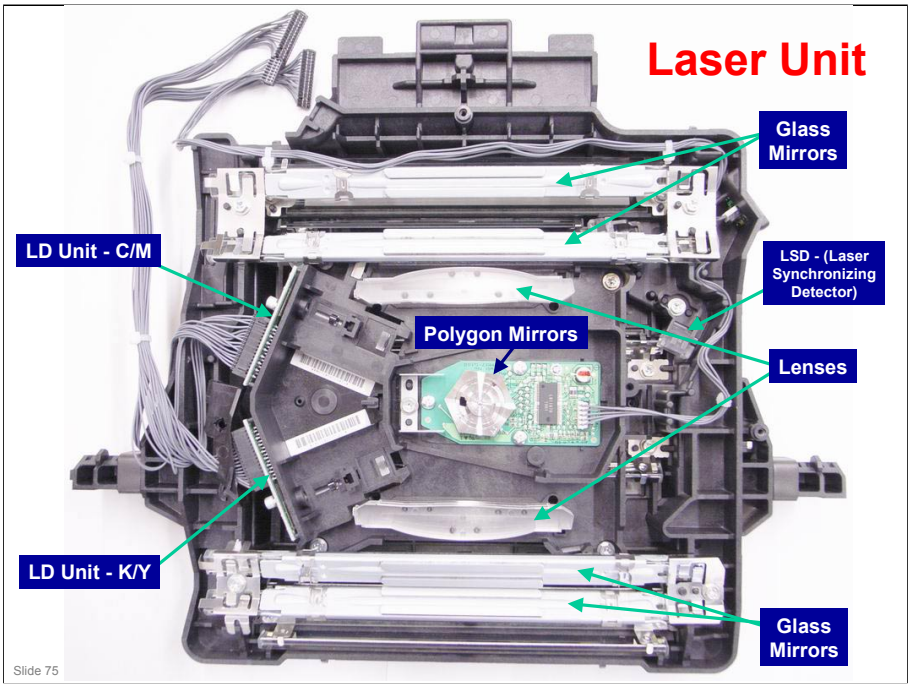
Most recently updated October 2008


Laser Unit
Glass Mirrors
LD Unit - C/M
LSD - (Laser Synchronizing Detector)
Polygon Mirrors
Lenses
LD Unit - K/Y
Glass Mirrors
Slide 75

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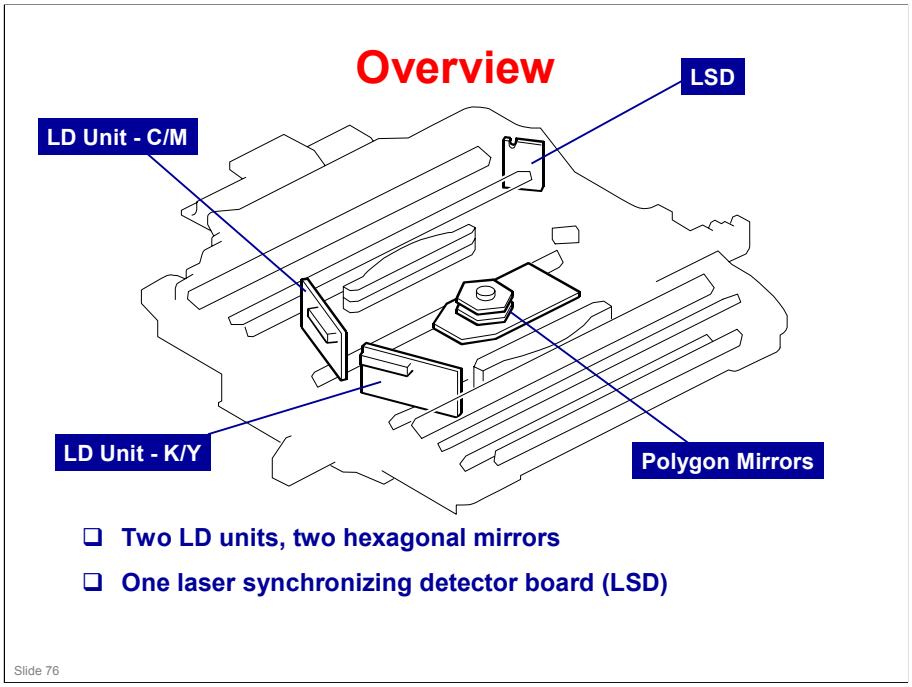
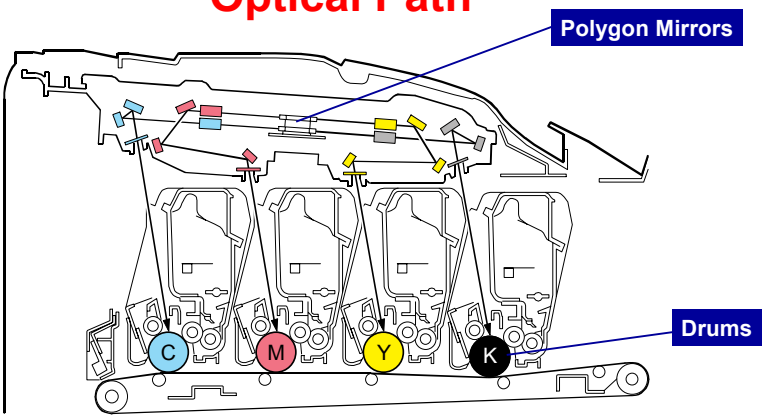


- Laser exposure for magenta and cyan starts from the left side of the drum, but for yellow and black it starts from the right side of the drum.
- This is because the units for magenta and cyan are on the other side of the polygon mirror from the units for yellow and black.

Optical Path



- The laser beams for magenta and yellow are sent to the upper part of the polygon mirror.
- The laser beams for cyan and black are sent to the lower part of the polygon mirror.

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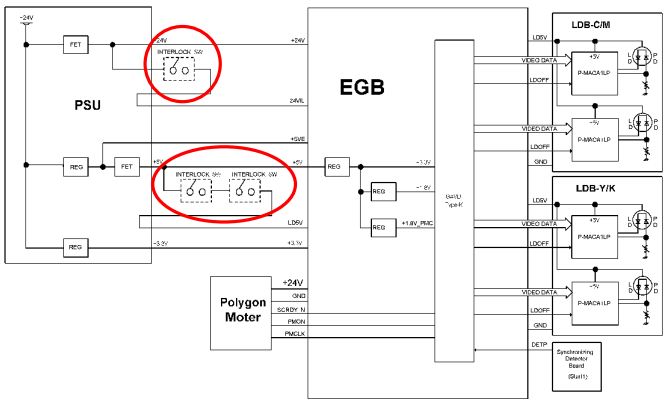
Safety Switches



g165d505

- A safety switch disconnects power to the laser diodes when the front cover or the top cover is opened.

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General Caution

- Turn off the main power switch and unplug the printer before you start to work on the laser unit. Laser beams can cause serious eye injury.

Slide 79

Laser Optics Housing Unit

g165r519

- Always use two hands when carrying the laser optics housing unit, exercising care not to drop it.

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After Replacing Laser Optics Housing Unit

- **Important: First, open the front cover and turn on the machine.**
- **Then, input the setting values for the laser optics housing unit with "LSU Adjustment".**
  - "SP Mode 2" tab
- **Close the front cover**
- **Execute "Color Registration"**
  - "SP Mode 2" tab
- **Adjust the registration settings for each tray and for the front and rear side of the paper if necessary.**
  - “Registration” in the "SP Mode 2" tab
- **LSU Adjustment:**
  - See RTB for procedures when EEPROM must be reset even though the laser optics housing unit has not been changed. (New machines are not shipped with sheet of paper containing values, and there is no known procedure to print values on a list.

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Replacement

- **Do the procedures in these sections of the service manual.**
  - Replacement and Adjustment – Laser Optics
- **Follow all notes and cautions in the manual.**

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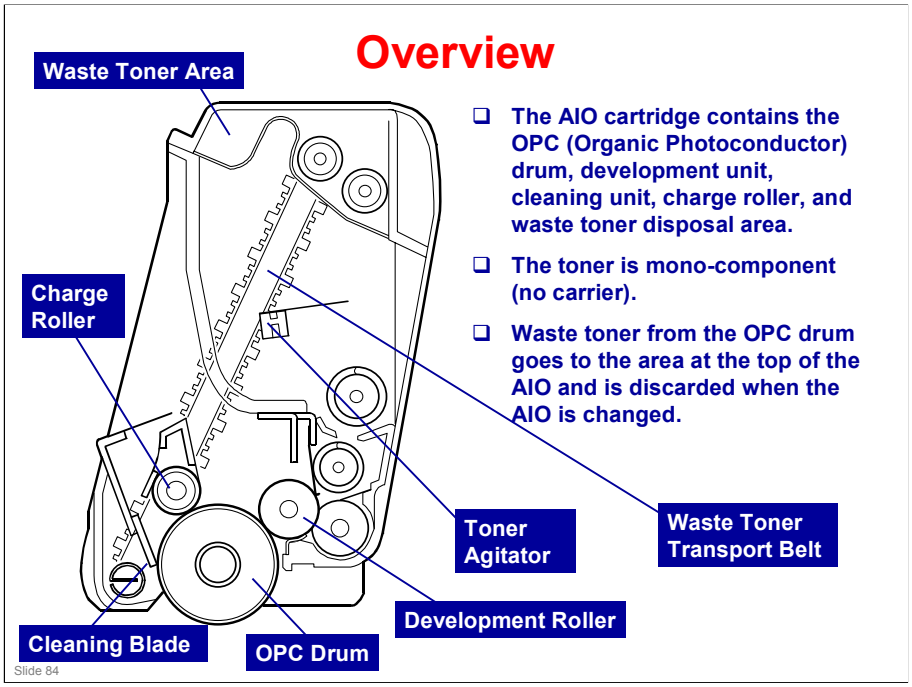
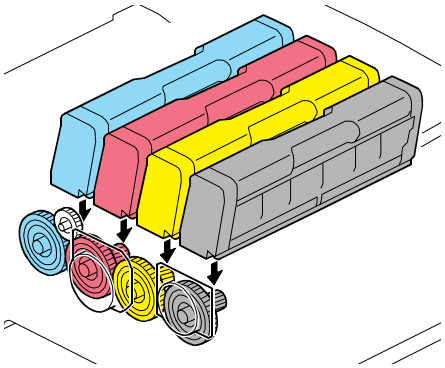
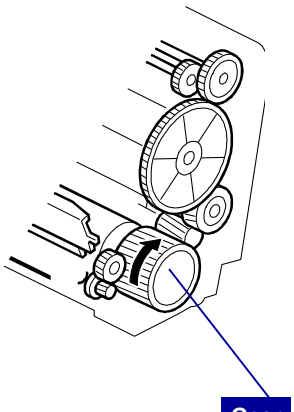
RICOH
M040/M041
Service Training
AIO Cartridge
Slide 83



- The term AIO means 'All-in-One'. All image creation components are in one easily-replaceable unit.

Drive





- The black AIO is driven by the black AIO motor.
- The three color AIOs are driven by the color AIO motor.
- A gear transmits drive from the motor to the other gears and rollers in the AIO.
- No adjustment is needed if you replace the motors.

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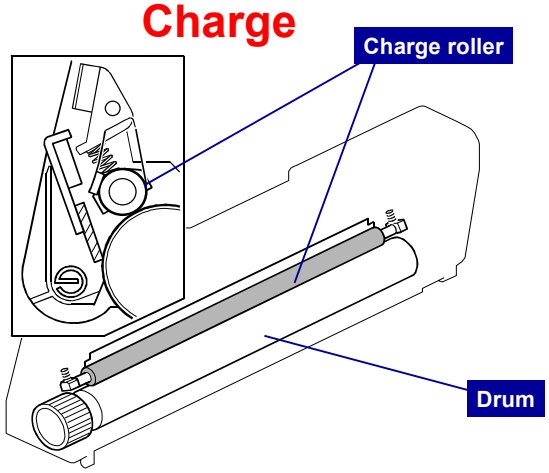
Charge



- The charge roller gives the drum a negative charge.

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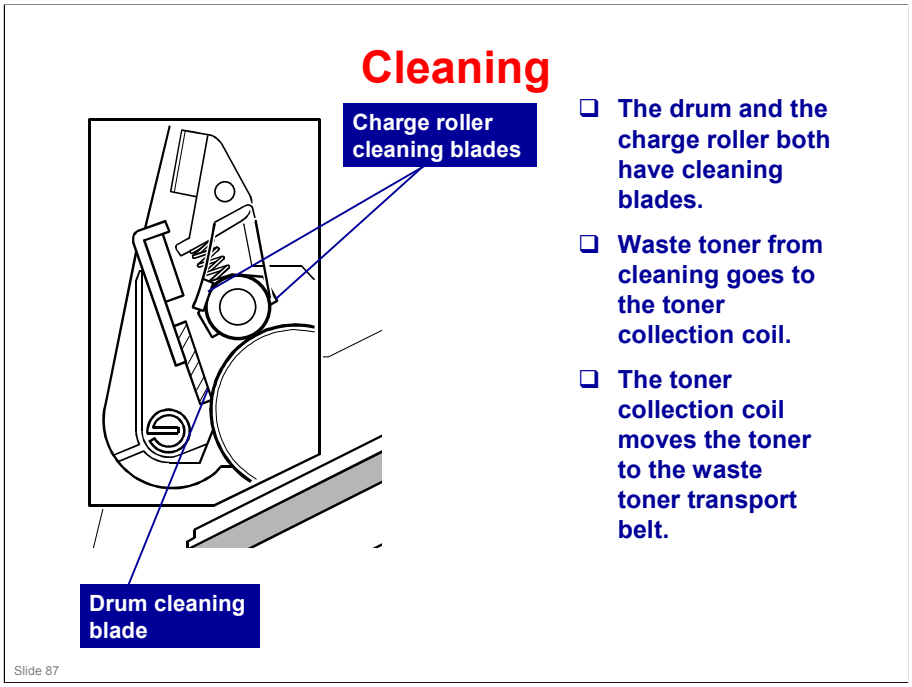
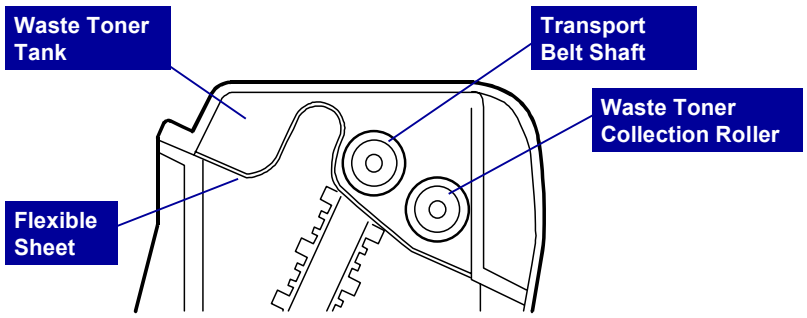


- We will see the toner transport belt on the next slide.

- See the next slide for more about the waste toner tank.
- There is another toner collection mechanism for the image transfer unit, and a separate collection tank. This is explained in another section.

Waste Toner Collection - 2



- A flexible sheet separates the unused toner area from the waste toner area.
- The waste toner area becomes larger when toner is consumed.
- This toner is not recycled.

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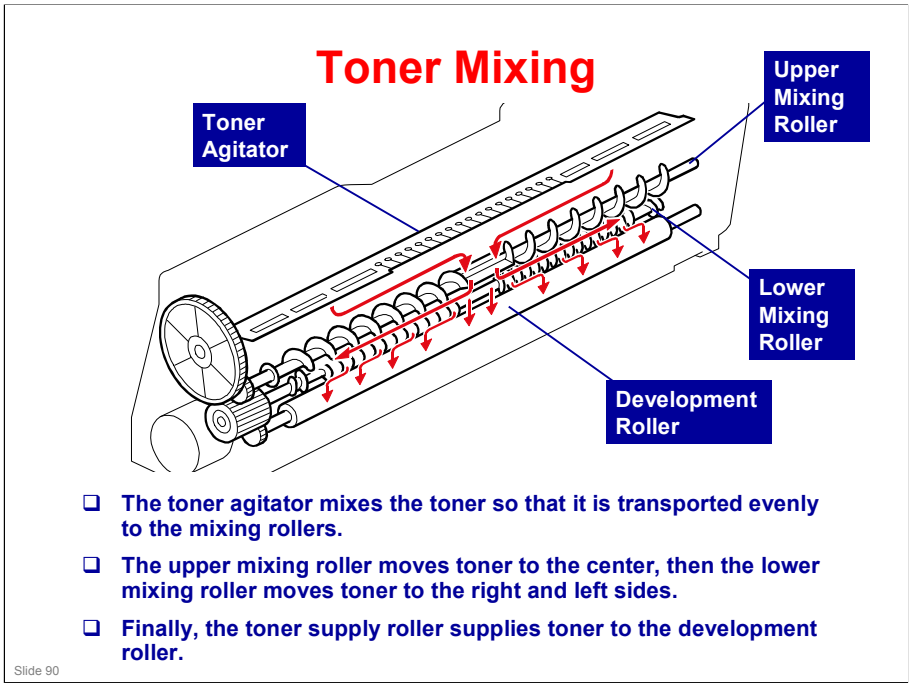
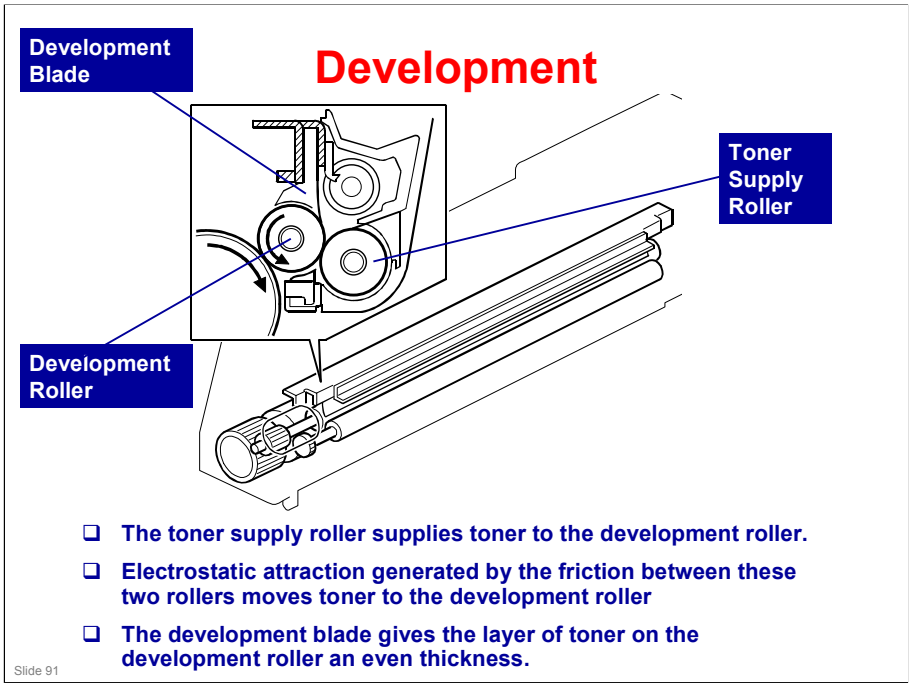
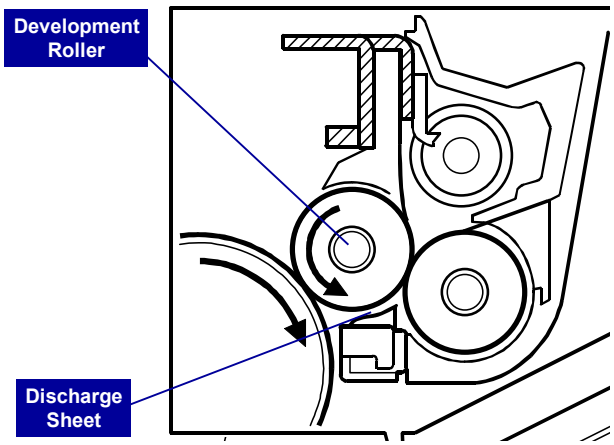


- This mixing mechanism prevents toner hardening and uneven image density in the outputs.



- This machine uses mono-component toner, with no carrier, so a TD sensor is not necessary.

Development Roller Discharge



- The discharge sheet removes charge from the development roller after it has turned past the drum.

Slide 92

- This system is used instead of a quenching lamp.

Toner Near-end & End Detection

- **The machine uses the following to detect toner near-end and end:**
  - Pixel count since the new toner was installed.
  - AIO rotation distance (machine copy speed x rotation time)
- **After toner near-end, about 400 sheets can be printed (A4, 5% coverage) until toner end occurs.**

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- These two figures are stored in the memory chip in the AIO.

New AIO Detection

- There is a new unit detection mechanism for the AIO. It uses an ID chip that is built into each AIO.
- There are also new detection mechanisms for:
  - ITB (Image Transfer Belt)
  - Fusing Unit

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Replacement

- **Do the procedures in these sections of the service manual.**
  - Replacement and Adjustment – AIO Cartridge
- **Follow all notes and cautions in the manual.**

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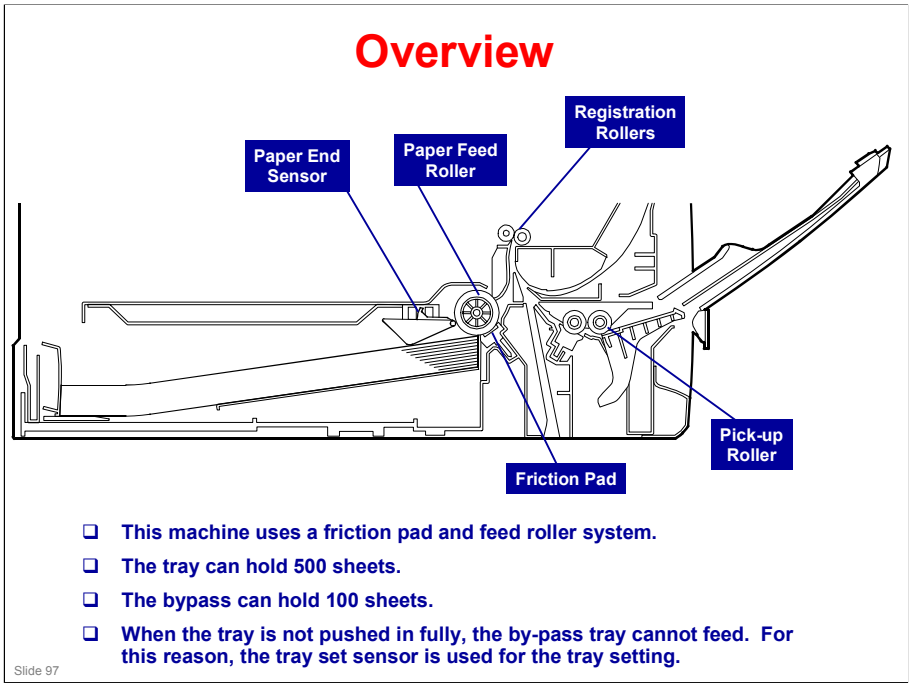
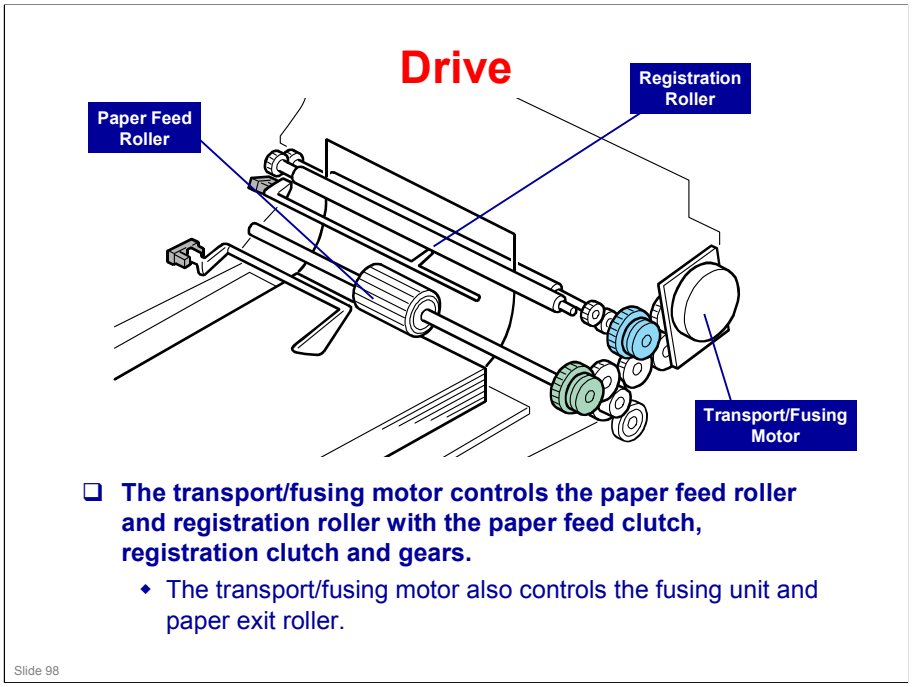
RICOH
M040/M041
Service Training
Paper Feed
Slide 96



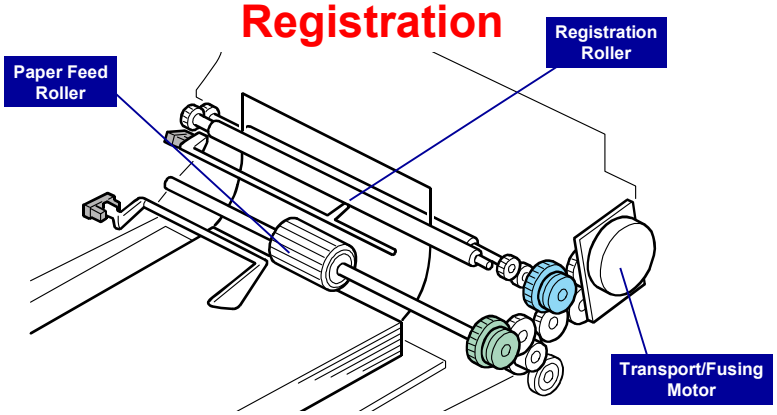
- The paper end sensor detects whether paper is installed in the tray and whether the tray is set in the machine.

- This machine also does not have automatic paper size detection.
  - The machine determines the paper size from the on-off timing of the registration sensor.
  - If the paper type which is selected at the PC does not match the paper size measured by the registration sensor, the machine issues a paper jam alert and stops the motors.



- The clutches are shown in blue.

Registration



- When the registration sensor detects paper, the machine makes paper buckle at the registration roller to correct paper skew.
- Then, the registration clutch turns on, and then the registration roller transports a sheet of paper to the transfer roller unit.
- There is no paper buckle adjustment.

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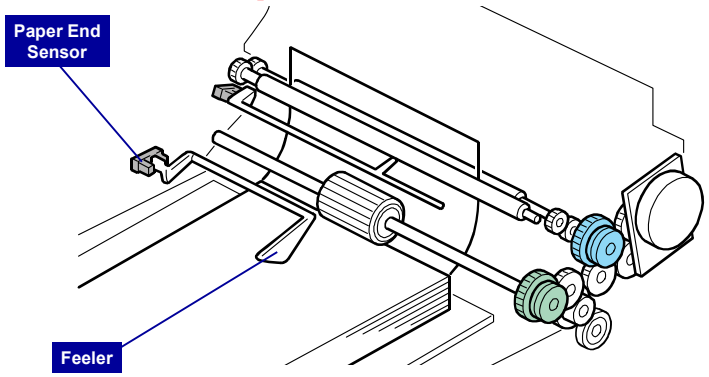
Paper End Detection



- When the paper is finished, the feeler falls through a cutout in the bottom of the tray, and the sensor detects paper end.

Slide 100

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Tray Lift

- Springs lift the bottom plate when the tray is installed in the machine.
- There is no mechanism to lower the tray. You must push the bottom plate down.

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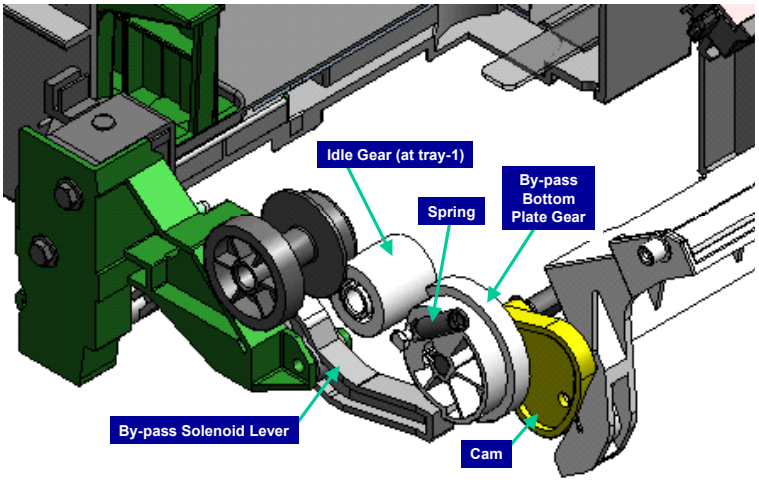
By-pass Tray - 1/3



- When not feeding paper from the by-pass tray, the By-pass Solenoid Lever holds the By-pass Bottom Plate Gear inactive, with the toothless flat section of the By-pass Bottom Plate Gear next to the (continually rotating) Idle Gear. When the By-pass Solenoid pulls the By-pass Solenoid Lever away from the By-pass Bottom Plate Gear, the By-pass Bottom Plate Gear Spring pulls the By-pass Bottom Plate Gear around to where the By-pass Bottom Plate Gear teeth mesh with the Idle Gear teeth.

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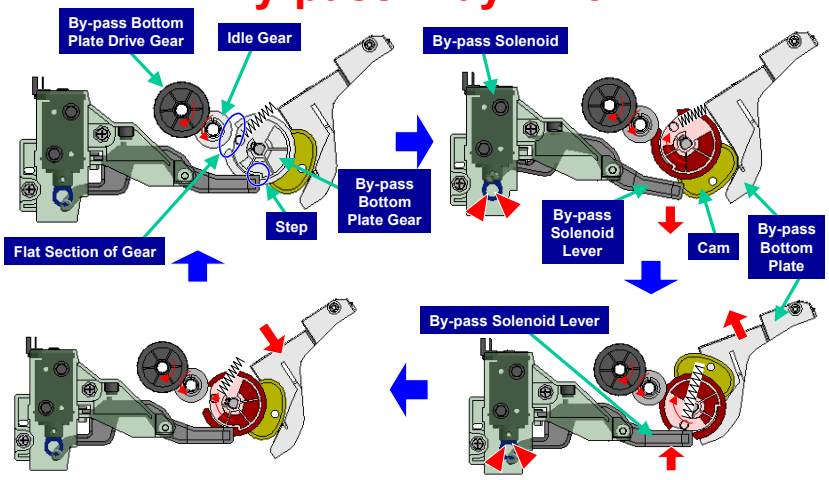
By-pass Tray - 2/3



- The rotating By-pass Bottom Plate Gear turns two cams (one on each side) which raise (and lower) the By-pass Bottom Plate. As the Bottom Plate comes down and the flat section of the By-pass Bottom Plate Gear comes next to the Idle Gear, the By-pass Solenoid Lever stops the By-pass Bottom Plate Gear. When it's time to feed the next sheet of paper from the by-pass tray, a new cycle begins.

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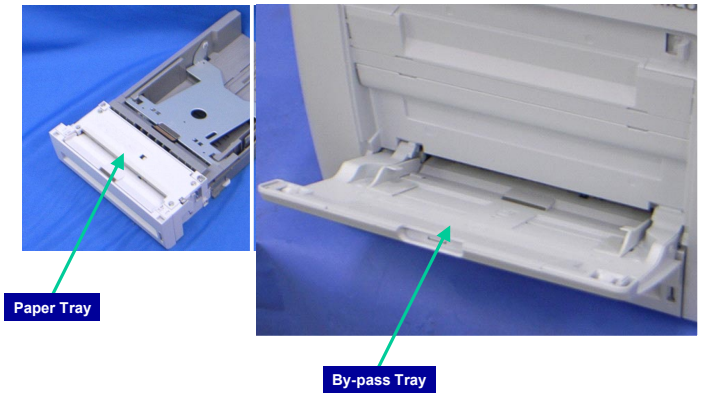
By-pass Tray - 3/3



- View of the paper tray and the by-pass tray.

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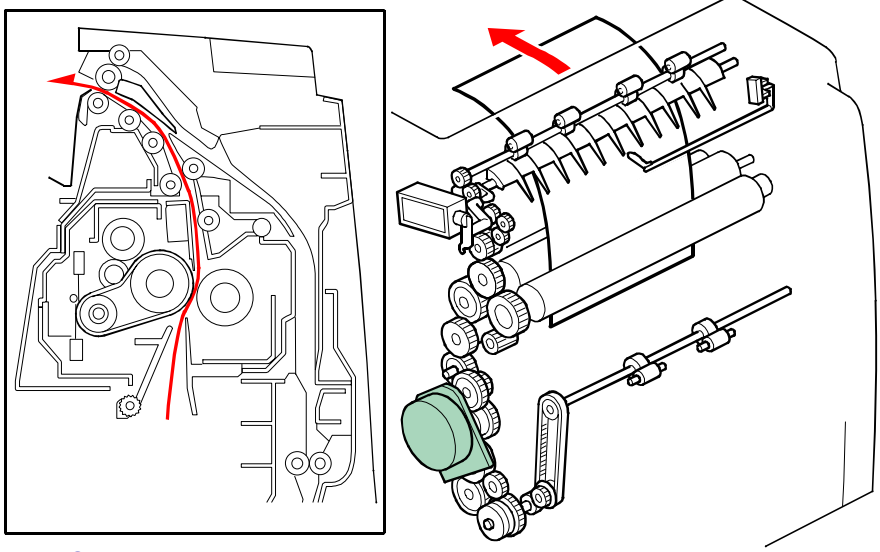
One-sided Output



- One-sided (printing output) paper path is as illustrated above.

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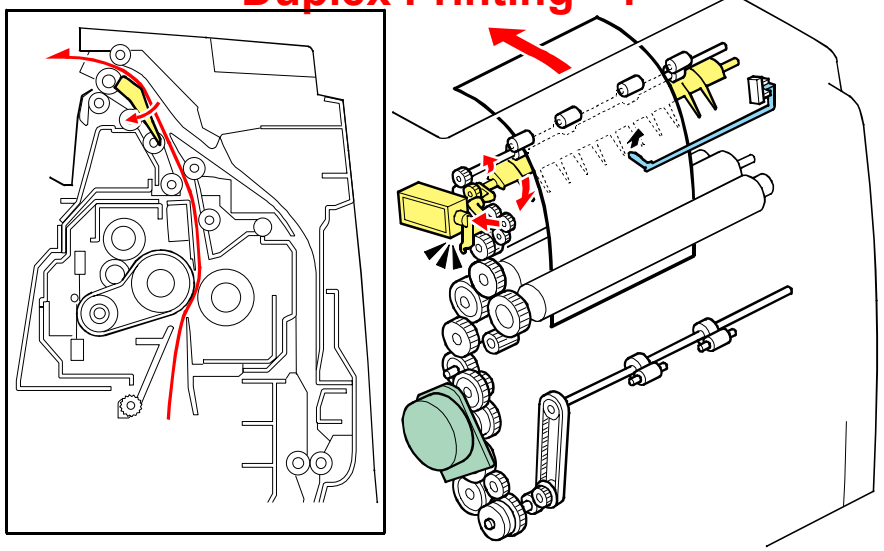
Duplex Printing - 1



- First stage of duplex printing: As bottom edge of paper triggers sensor... (see next slide)

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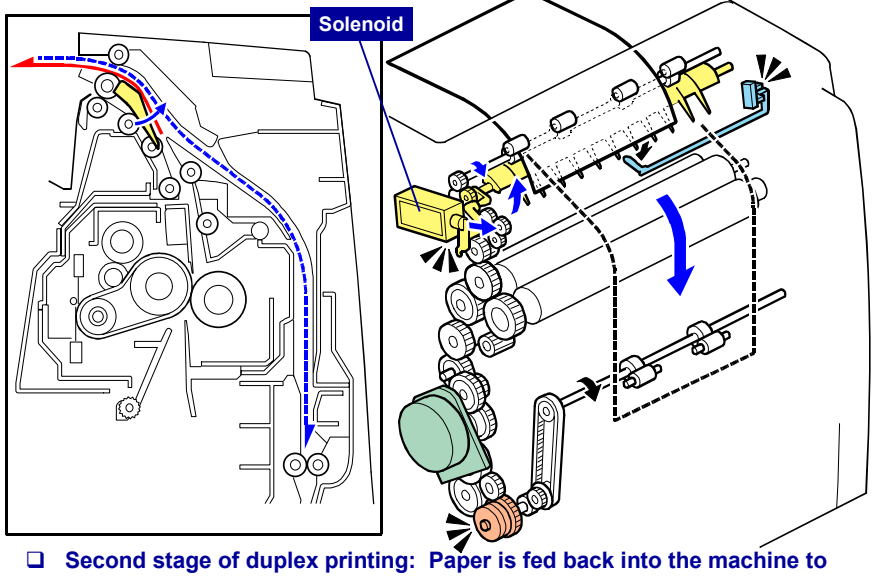
Duplex Printing - 2



- Second stage of duplex printing: Paper is fed back into the machine to print second side (via solenoid-activated gear change).

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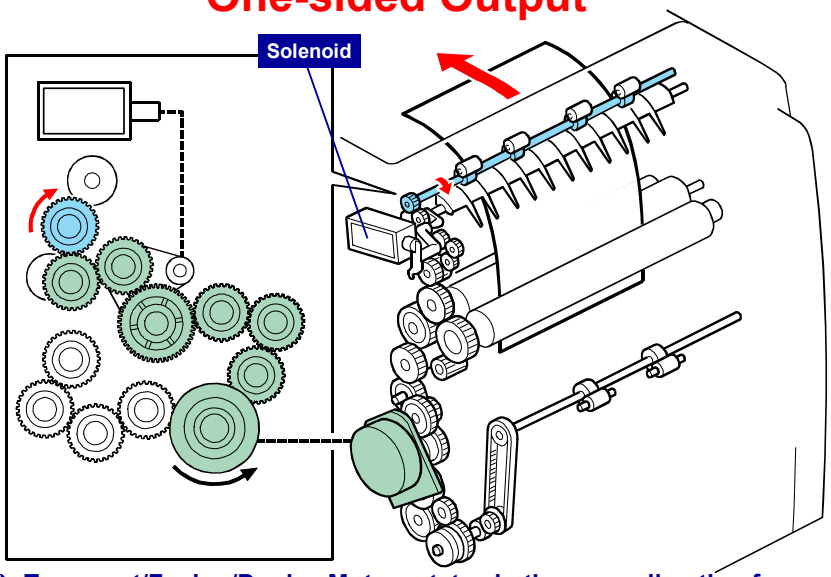
One-sided Output



- Transport/Fusing/Duplex Motor rotates in the same direction for both one-sided and duplex output.

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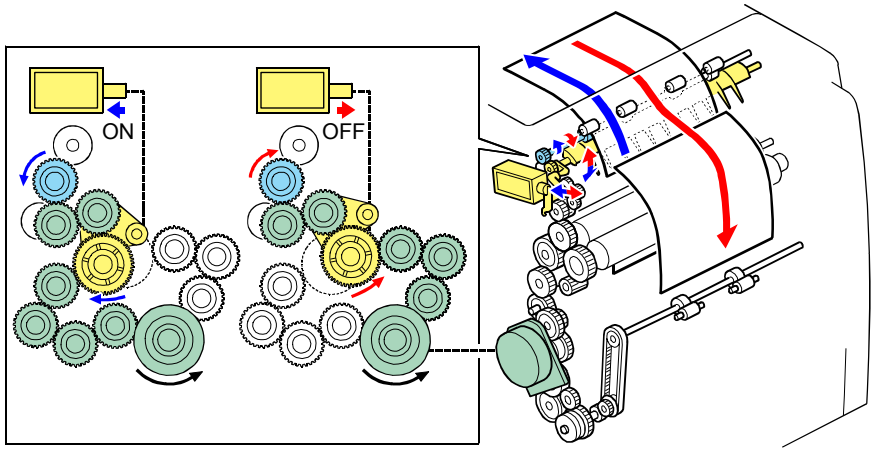
Duplex Output



- Transport/Fusing/Duplex Motor always rotates in the same direction. Gear change (via solenoid) determines paper direction.

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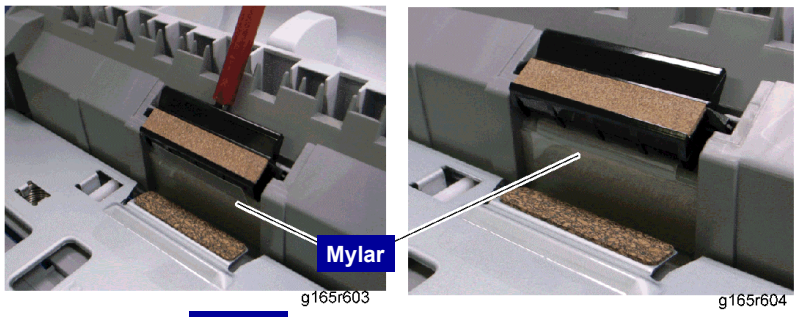
Replacing the Separation Pad



Correct

Incorrect

- When reinstalling the separation pad, make sure that the mylar is not placed under the separation pad.

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RICOH
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Service Training
Image Transfer
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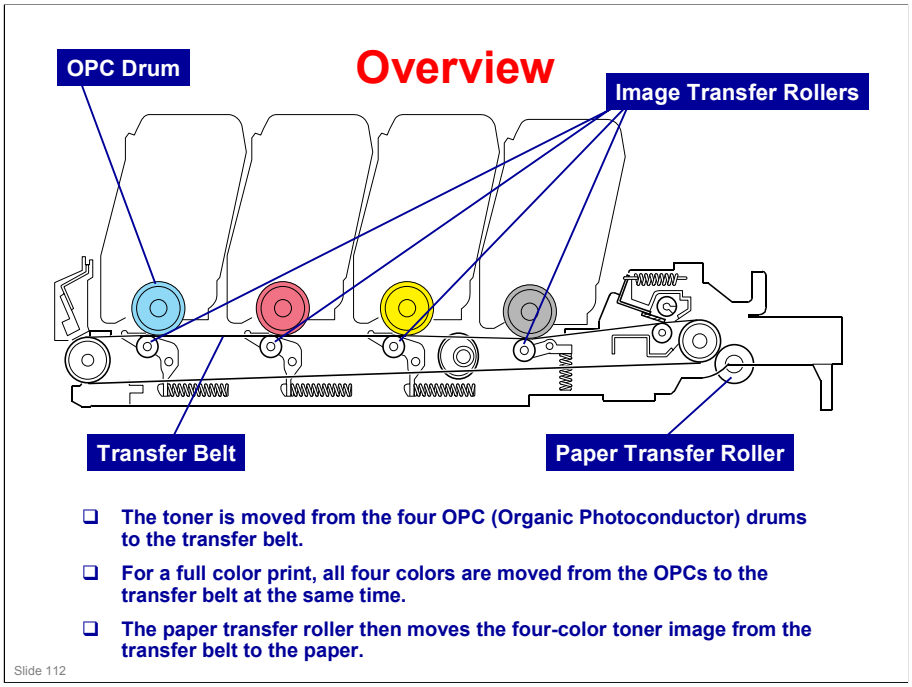
Overview
OPC Drum
Image Transfer Rollers
Transfer Belt
Paper Transfer Roller
The toner is moved from the four OPC (Organic Photoconductor) drums to the transfer belt.
For a full color print, all four colors are moved from the OPCs to the transfer belt at the same time.
The paper transfer roller then moves the four-color toner image from the transfer belt to the paper.
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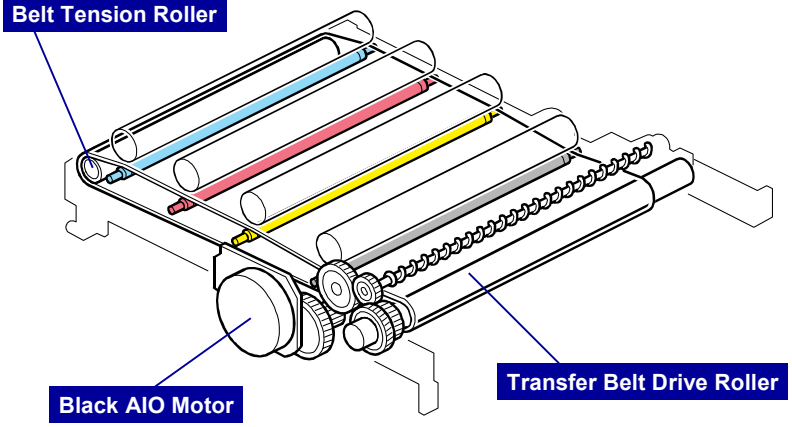
Drive



- The black AIO motor controls the transfer belt drive roller.
- The belt tension roller adds tension to the transfer belt to help to turn this belt.

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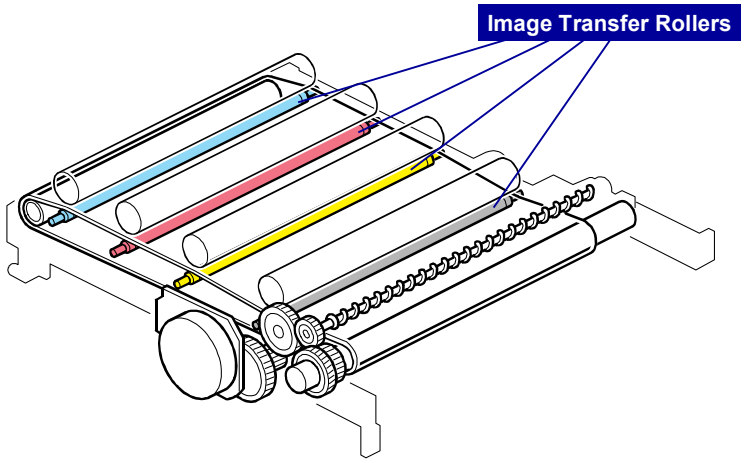
Transfer Voltage



- The image transfer rollers move the toner from the OPCs to the image transfer belt.

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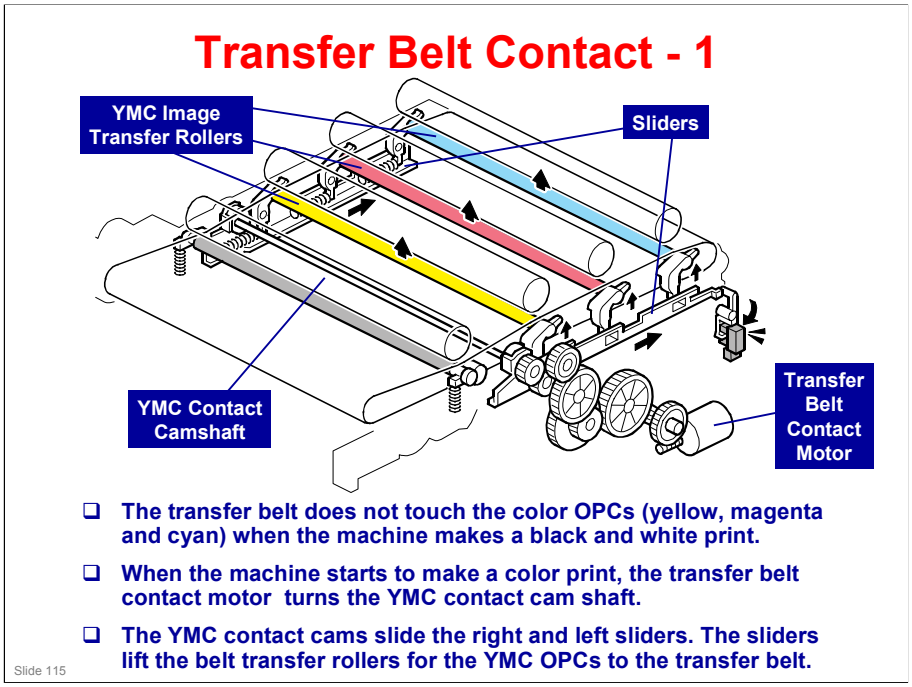
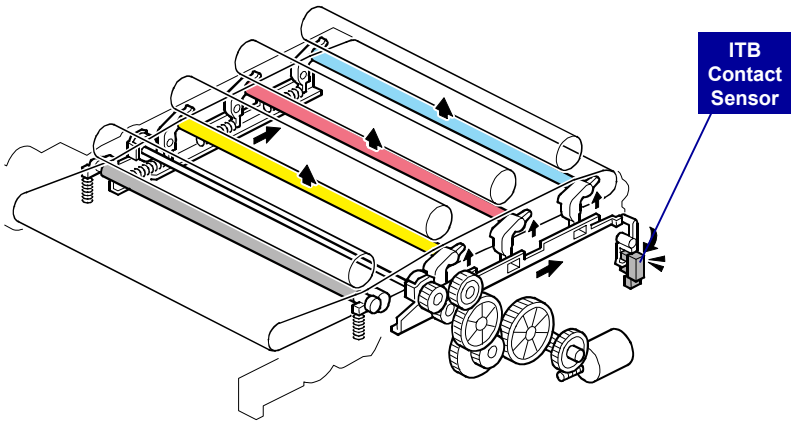


- Because of this mechanism, the life of the transfer belt is longer (it is not necessary for the transfer belt to touch the color OPCs when the machine makes a black and white print).
  - However, if the customer selects "Off" with the "ACS" (Auto Color Sensing) setting, the four OPC drums always touch the image transfer belt.

Transfer Belt Contact - 2



- The ITB contact sensor detects if the transfer roller unit for each OPC (YMC) touches the transfer belt.
- If it does not touch the transfer belt during color printing, the machine stops and shows SC 445, 446, or 447.

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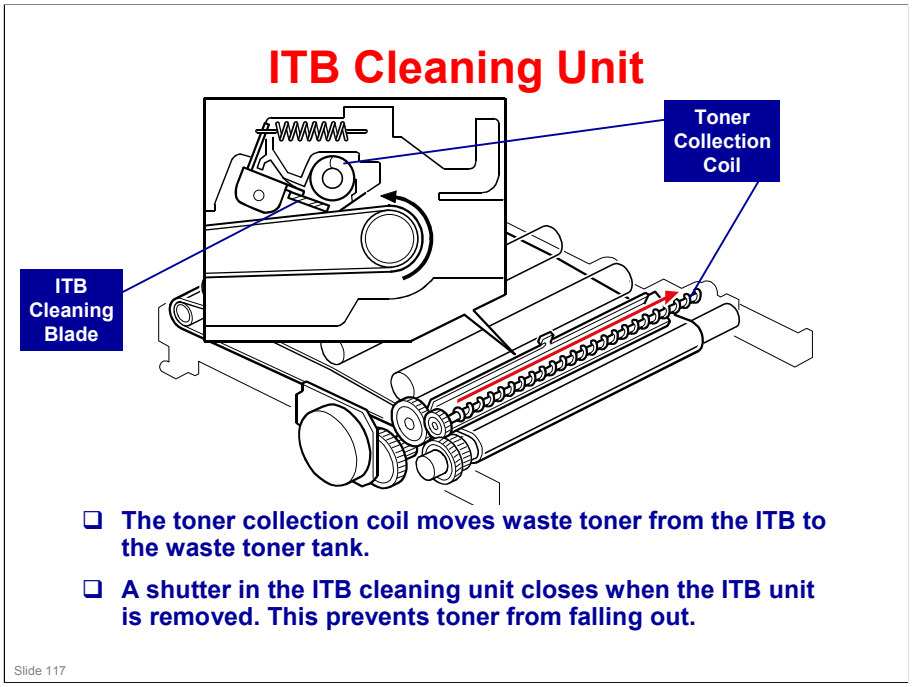
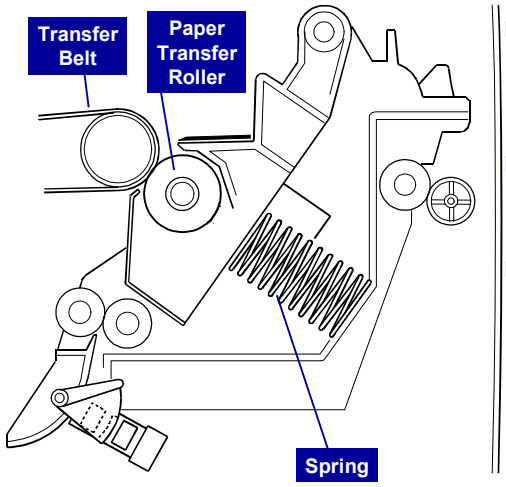


- There will be more about the waste toner collection mechanism for the ITB later in this section.

Paper Transfer Roller



- The transfer roller is always pressed against the image transfer belt by pressure from a spring.
- The transfer roller moves the toner image from the transfer belt to the paper.
- When a sheet of paper goes between the transfer roller and the transfer belt, the transfer roller turns with the paper.

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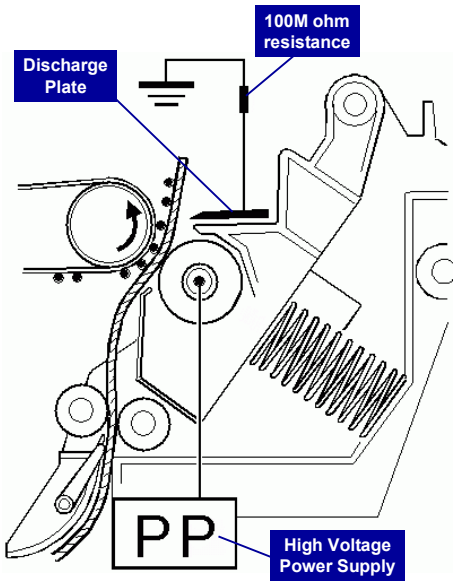
- In some places, you will see the term '2nd Transfer'. This refers to what the transfer roller does (transfer from belt to paper).

Paper Transfer and Discharge



- The transfer roller receives a positive charge from high voltage power supply.
- The discharge plate removes charge that was applied to paper during paper transfer. This helps paper move away from transfer roller.
- 100M ohm resistance between discharge plate and ground prevents humidified paper from returning charge from discharge plate to paper under high temperature and humidity conditions.

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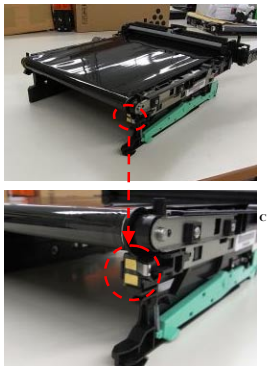
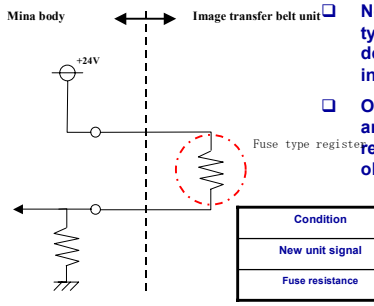
New Detection Mechanism for Image Transfer Belt Unit





- New unit incorporates fuse type register. When machine detects low resistance, it is interpreted as a new unit.
- Once used, the fuse opens, and if reinstalled, the machine recognizes that there is an older unit being reinstalled.

Condition	Old	New
New unit signal	L	H
Fuse resistance	High	Low

- New unit detection is performed when machine is powered on. After replacing the ITB unit (after H signal is detected), image transfer belt counter is cleared.
- Fuse type register is open due to current in the circuit. L signal is detected as new unit signal, and counter for ITB begins. Thus SP-code "Reset Transfer Unit Life Counter" is not necessary.
- "Near end" is indicated when transfer unit counter reaches 89.2 k. Machine stops after 90 k.

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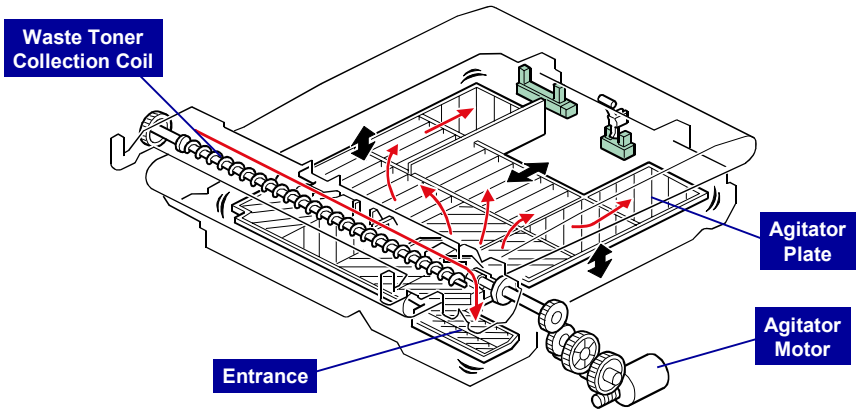
Waste Toner Collection - 1



- The waste toner collection coil moves waste toner from the transfer belt to the entrance of the waste toner tank.
- The agitator plate makes sure that the waste toner is evenly distributed. The agitator motor controls this plate.

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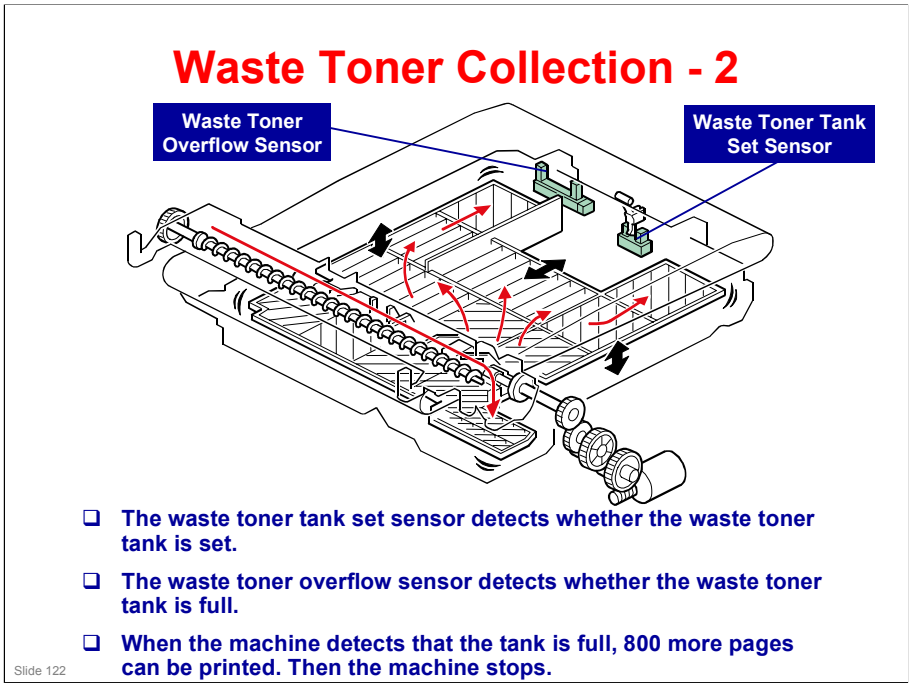
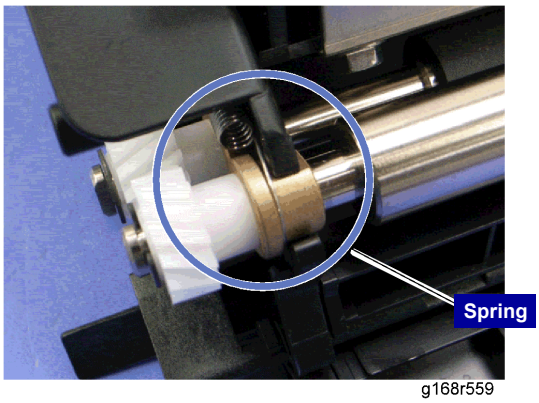


- If the tank is not set or if it is full, an error message appears on the LCD for the MF model, or on the SOM display on the computer for the printer model.

Installing the Registration Roller



g168r559

- Make sure that you hook the spring correctly.

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Other Notes

- **The ITB (Image Transfer Belt) cleaning unit contains waste toner. When you remove the ITB cleaning unit, put it on a sheet of paper.**
  - A shutter mechanism inside the unit should prevent toner from falling out. But a small amount may already be on the exterior.
- **Waste toner tank set sensor, waste toner overflow sensor: make sure to connect these up to the correct connectors, as explained in the manual.**

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Fusing
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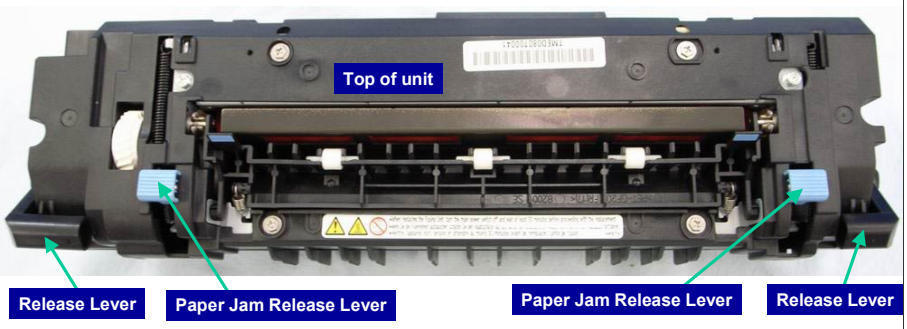
Fusing Unit



- View of Fusing Unit as it appears when pulled out from the rear of the machine.

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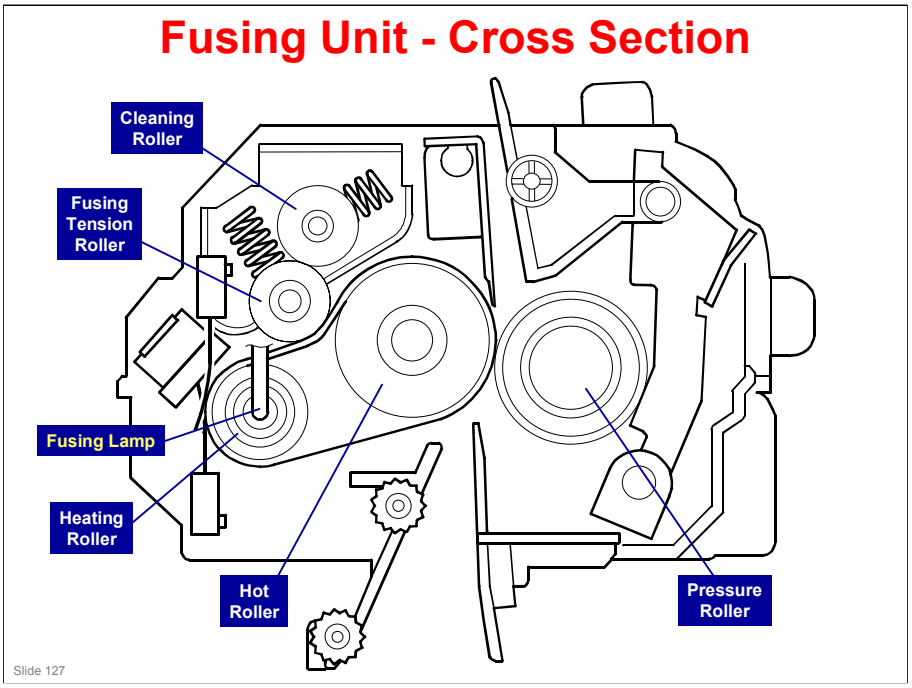
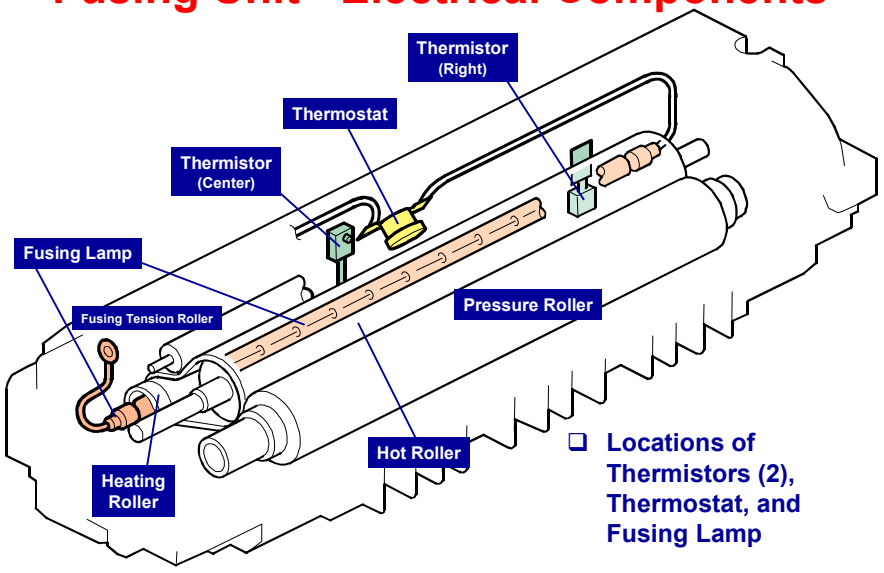


This design, utilizing a belt between the Heating Roller and the Hot Roller, enables quick heating with the Fusing Lamp in the aluminum Heating roller, and a wider nip with the sponge Hot Roller.

Fusing Unit - Electrical Components



- Locations of Thermistors (2), Thermostat, and Fusing Lamp

- Note: The Fusing Lamp is within the Heating Roller, not the Hot Roller

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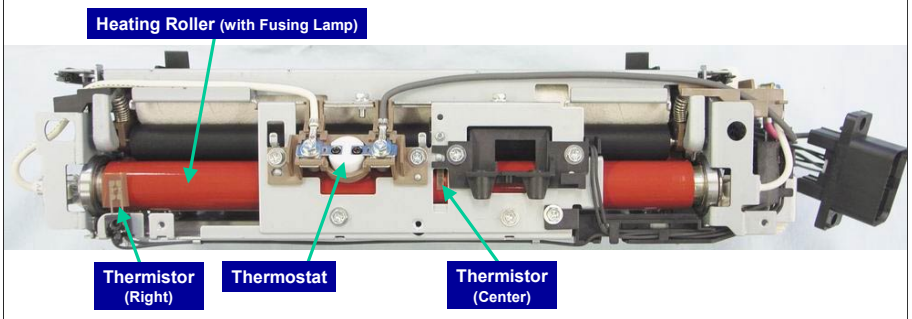
Fusing Unit - 1/7



- View of Fusing Unit with covers removed.

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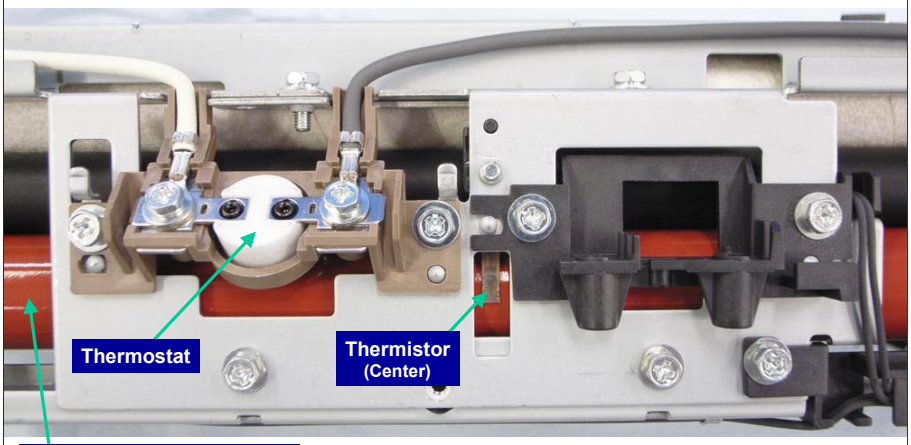
Fusing Unit - 2/7



- Close-up view of thermostat and central thermistor, mounted near the Heating Roller.

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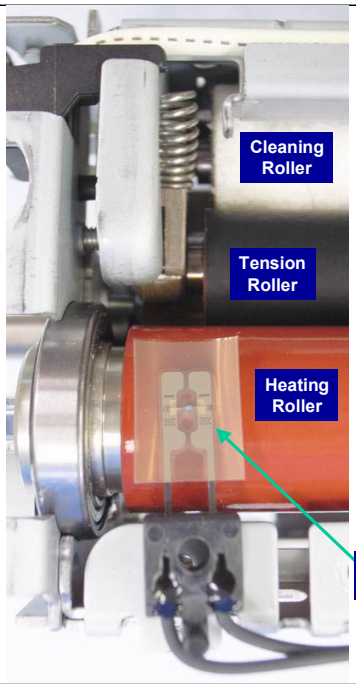

Fusing Unit - 3/7

- Halogen heating element is inside Heating Roller.
- Heat is transferred from the Heating Roller to the Hot Roller via the Fusing Belt.
- The combination of the aluminum Heating Roller and the Fusing Belt produces a faster warm-up time.
- Note that new belt type fusing system results in lower temperatures than the previous type.

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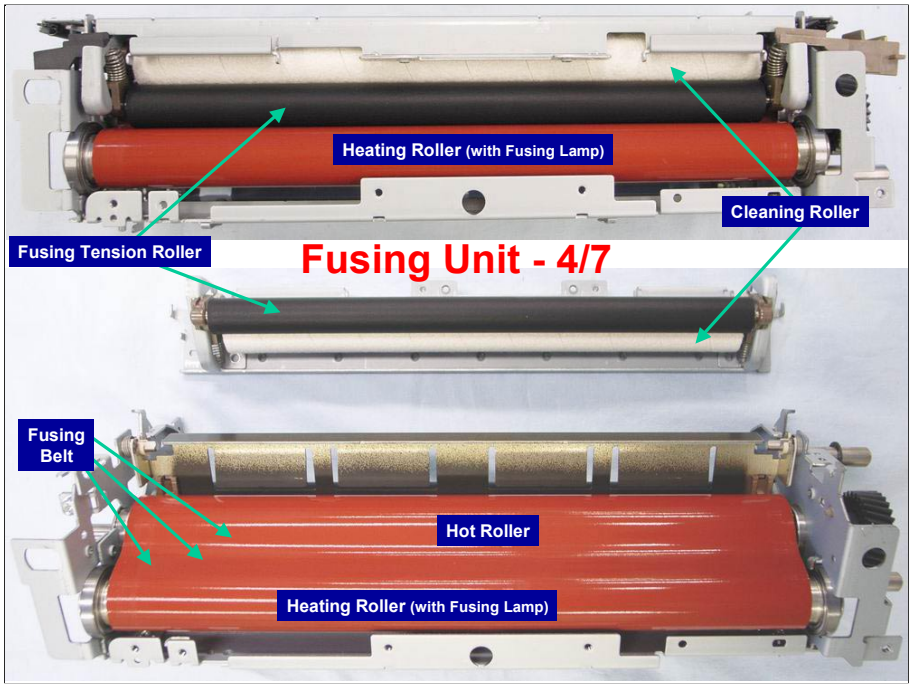
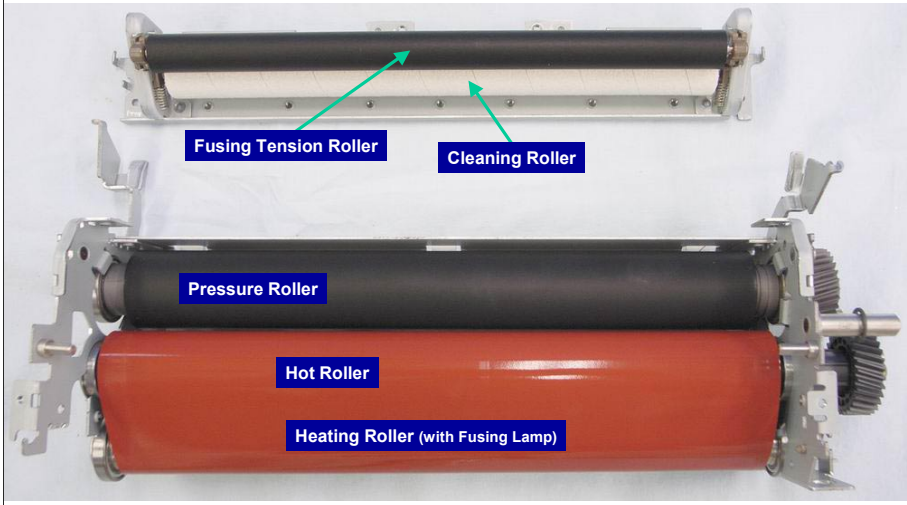

Heating Roller (with Fusing Lamp)
Cleaning Roller
Fusing Tension Roller
Fusing Unit - 4/7
Fusing Belt
Hot Roller
Heating Roller (with Fusing Lamp)

.

Fusing Unit - 5/7



- The five rollers within the Fusing Unit.

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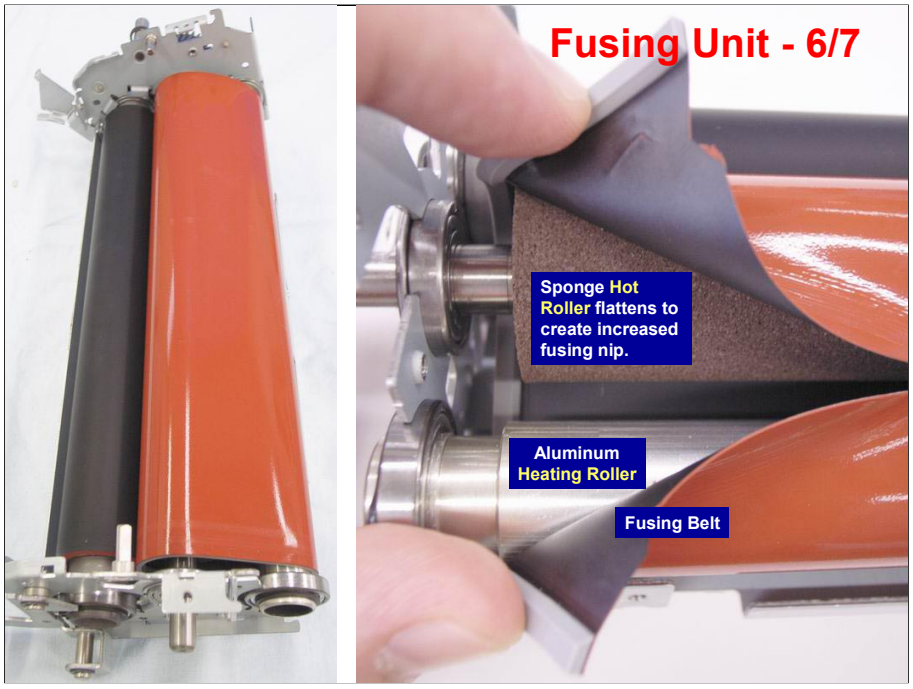
Fusing Unit - 6/7
Sponge Hot Roller flattens to create increased fusing nip.
Aluminum Heating Roller
Fusing Belt

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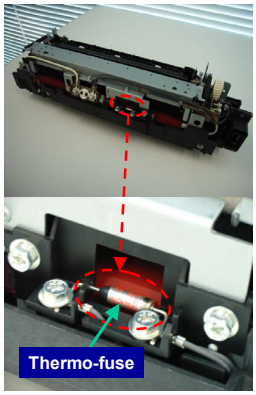
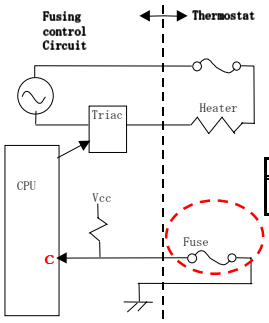
Fusing Unit - 7/7

New Detection Mechanism (Maintenance Kit)





- Thermo fuse in the new fusing unit opens when the fusing temperature reaches 72 degrees centigrade.

Conditon	Old	New
New unit signal C	H	L

- When the machine reaches operating temperature, new unit detection is performed.
- After an "L' signal is detected, the fusing unit counter is cleared when the fusing unit is replaced.
- The thermo fuse opens after the fusing temperature reaches the target temperature.
- The machine indicates "near end" when the fusing unit counter reaches 90 k, but continues to operate.

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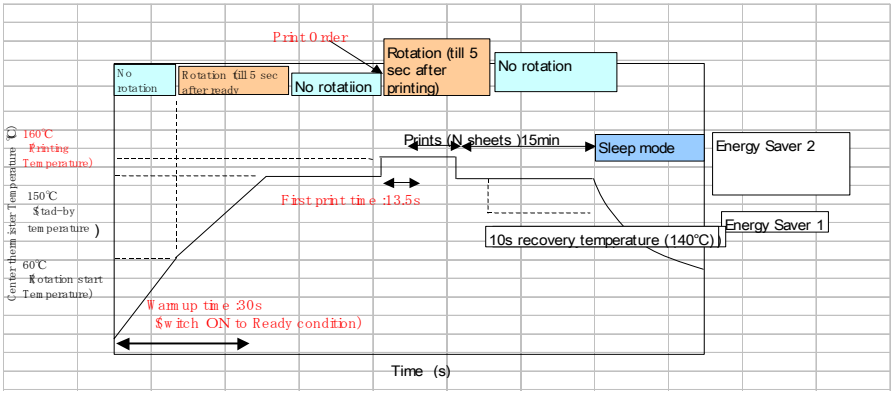
Fusing Temperature Control - 1/2



- **Center thermistor controls fusing temperature. This chart indicates relationship between temperature and fusing belt rotation.**

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Fusing Temperature Control - 2/2

Paper, fusing speed, and fusing printing temperature		
Paper	Speed	Temp.
Thinner	1	157°C
Thin	1	160°C
Plain 1	1	170°C
Recycled	1	170°C
Plain & Recycled	1	170°C
Color Paper	1	170°C
Preprinted	1	170°C
Prepunched	1	170°C
Plain 2	1/2	164°C
Thick 1	1/2	164°C
Cardstock	1/2	164°C
Bond	1/2	164°C
Envelope	1/2	164°C
Thick2	1/2.5	160°C

- **This chart indicates fusing printing temperatures & speeds at each mode setting.**

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Fusing Unit SCs

- **SC541, 542, 543, 544, and 545**
- **To prevent damage to the machine, the machine cannot be operated until the fusing related SC has been reset by a technician.**
- **To reset the machine, do one of the following in SP mode:**
  - Click "Fuser SC Reset" in SOM, and then turn the main power switch off and on

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Humid Environments

- **To reduce paper curl in high temperature and humidity environments, the fusing unit does idle rotation before a job, if the customer enables this function in the user mode.**
  - Mode 1: No fusing idling, transfer roller voltage is increased
  - Mode 2: Fusing unit rotates for 30 seconds before a job, transfer roller voltage is increased.
  - Mode 3: Fusing unit rotates for 60 seconds before a job, transfer roller voltage is increased.

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- Lab tests: Fusing idling mode 2 should be enough in most cases

- Printer model: SOM – System tab – Anti-Humidity

Replacement

- **Do the procedures in these sections of the service manual.**
  - Replacement and Adjustment – Image Fusing
- **Follow all notes and cautions in the manual.**
- **Make sure that the fusing unit is cool before you touch it.**
- **Make sure to restore the insulators, shields, etc after you service the fusing unit.**

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Fusing Unit Jams

- Normally, the user will remove fusing unit jams.
- But, if the service program 'Fuser SC Detect' is changed to 'on', the machine stops if a jam occurs in the fusing unit for three consecutive paper feeds. Then, SC559 appears. The technician must remove the jam.

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Service Training
Optional Paper Tray Unit (G849)
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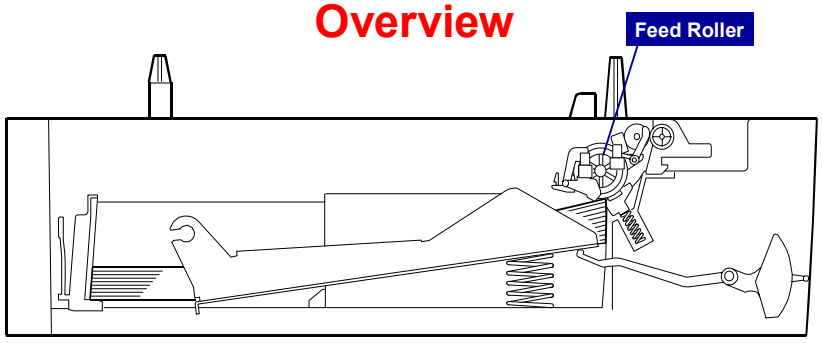
Overview



- Capacity: 500 sheets
- Feed roller and friction pad

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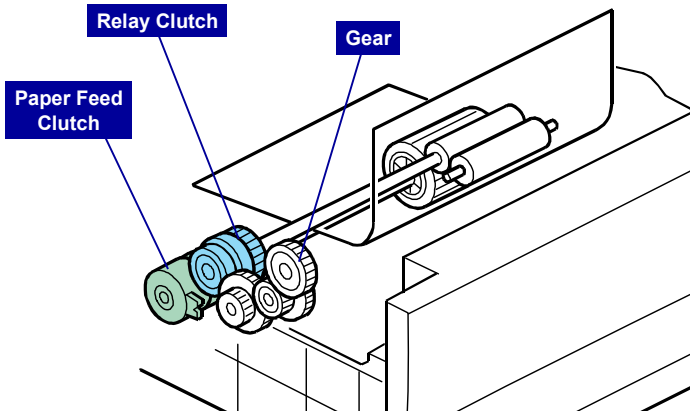
Feed



- The transport/fusing motor in the main machine drives the gear.
- The clutches transfer drive to the rollers at the correct times.

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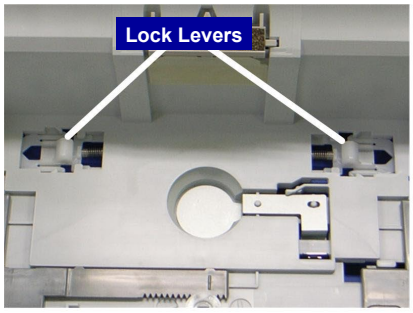
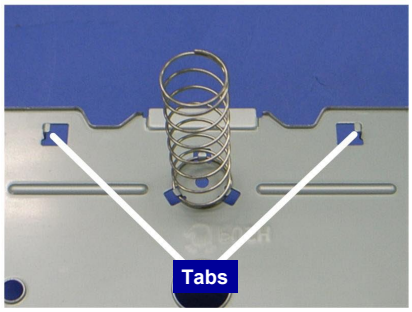
Paper Lift - 1





- The spring pushes the bottom plate up. So, you must press the bottom plate down before you put the tray in the machine.
- After the bottom plate is pressed down, the tabs hold the lock levers.

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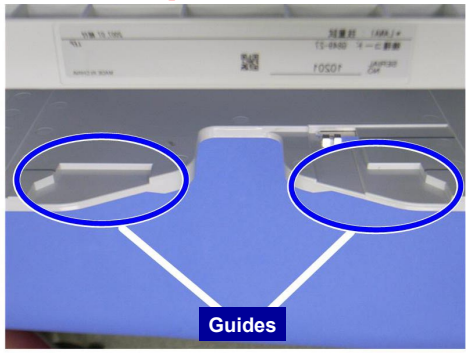
- The next slide shows what happens after you put the tray in the machine.

Paper Lift - 2



- When you put the tray in the machine, the guides in the main body of the paper tray unit push the lock levers, and the lock levers release the tabs.
- Then, the spring lifts the bottom plate.

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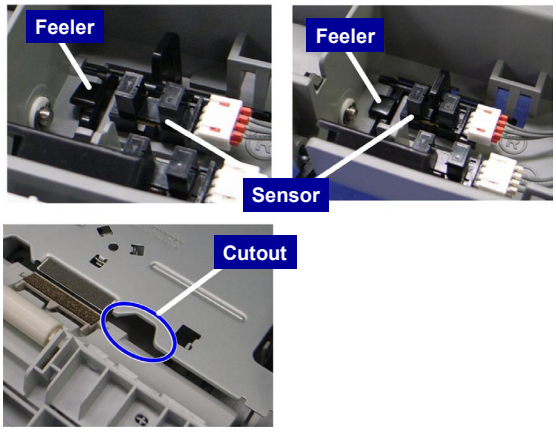
Paper End Detection



- When there is no paper in the tray, a feeler drops through a cutout in the bottom plate, and the actuator attached to the feeler enters the paper end sensor.

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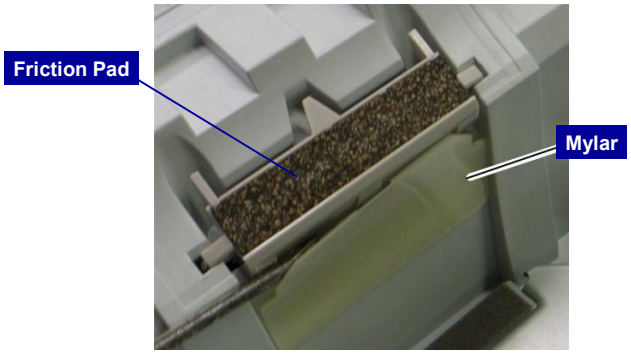
Reinstalling the Friction Pad



- When re-installing the friction pad, make sure that the Mylar does not go under the friction pad.

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Replacement

- **Do the procedures in this section of the M040/M041 service manual.**
  - Replacement and Adjustment
- **Follow all notes and cautions in the manual.**

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Before You Start

See the Service Manual for installation requirements before you install the machine. You can find this information in the Service Manual.

- Environment
- Space requirements
- Power requirements

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Familiarization

Examine how to access user tools and settings - noting the options and adjustments possible with this machine. Practice making some of these changes if you are not already familiar with them. (See User's Guide)

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General Troubleshooting

Read the following in the Service Manual for general Troubleshooting guidelines:

- Poor image quality
- Poor print quality
- Unusual noises

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Service Training
Specifications
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Specifications - 1/3

- **Technology**
  - Laser beam scanning & electro-photographic printing
  - Mono-component toner development
  - Four-drum tandem method
- **Resolution (dpi, bit/pixel)**
  - 600 x 600 dpi (Speed Mode)
  - 1200 x 600 dpi equivalent (Standard Mode)
  - 2400 x 600 dpi equivalent (Fine Mode)
- **Printing speed: 25ppm (LT: 26ppm)**
- **First print speed: 13.5 seconds or less**
- **Dimensions (WxDxH): 400 x 480 x 387 mm**
  - (16.0 x 19.2 x 15.4 inches)

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Specifications - 2/3

- **Weight: 28.0 kg (61.73 lb) or less**
  - (Including consumables)
- **Interface**
  - Ethernet 10/100 T
  - USB 2.0
  - PictBridge (model-c)
- **Power Consumption**
  - Maximum: 1300 W or less
  - Energy Saver: 15 W or less

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Specifications - 3/3

- **Paper handling**
  - Standard tray - 500 sheets
  - Bypass tray - 100 sheets
  - Built-in duplex
    - » Model-b: manual
    - » Model-c: auto
- **Options**
  - Optional paper tray
  - 500-sheet tray
    - » (One optional tray can be attached)
  - Memory - 256MB (model-c)

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End of Course

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