RICOH

MODEL Di-C1LL TRAINING
Machine Code: D112

INTRODUCTION

Slide 1

HOW TO USE THIS PRESENTATION

This TTP (Technical Training package) will help you train service technicians on the model Di-C1LL.

You can use this guide in three ways:

- ❒ As a check list to make sure you have covered all the important points
- ❒ As a set of ordered notes taken from the service manual, operation manual, and other sources. Sometimes, the ideas from other manuals have been reworded or reorganized for clarity.
- ❒ As a source of information that is not included in any of the other manuals. This may include technical details of the machine's hardware or software, or background knowledge of technologies used in the machine. This information can be taught to the trainees if you feel that they will benefit from it, but some of it may be too technical for routine field use. This information may also help you answer questions from the class.
- ❒ Caution: Do NOT give copies of this TTP to anyone other than trainees, technical training staff, technical support staff, and management personnel. In particular, do not reveal this information to competitors.

Date of change	Version History	Description
7-Sep-10	1.01	Slide 143 – unclear toner near end description fixed.

Description	Quantity	Remarks
Field Service Manual	1 per trainee	Give copies to the trainees
Operation Manual	1 per trainee	Give copies to the trainees
Training Schedule	1 per trainee	Give copies to the trainees
Training machines	1 for every 3 trainees	Have the trainees completely install these during class.
Special Tools	1 set per machine	As necessary
Computer	1 per student	Used for testing the printing and document storage. The operating system should be one of the following: 2000/XP/Vista/2003/2008
Network	1	The computers must connect to the copier via a TCP/IP network, or a Wireless LAN network and Wireless LAN board.

PREPARATION CHECK LIST

- ❒ Provide the relevant manuals and any additional handouts you feel are necessary. Special tools are listed in the Replacement and Adjustment section of the service manual.

Objectives

- Install the machine and its peripherals in the field.
- Understand and perform routine maintenance.
  - Understand the PM table.
  - Understand the important SP codes.
- Troubleshoot and repair this product in the field.

Slide 3

ORIENTATION

Provide the trainees with information about the training course procedures, facilities, objectives and rules.

Introduction of instructors

- Introduce yourself to the class, and any other instructors who will be taking part. Tell them who to talk to if they have any problems.

Introduction of trainees

- Distribute a list of those attending the course.
- Try to generate a friendly and relaxed atmosphere, and encourage the class to get to know each other.
- If it will help, have the trainees introduce themselves (name, company, work experience).

Explanation of curriculum

- Pass out copies of the training schedule
- Impress the importance of getting to the class on time
- Go over the course objectives (key points listed on the slide).

Explanation of training center rules

- Explain the general rules of your training center (smoking, breaks, use of facilities, etc.)
- Explain the tools and equipment available at the facility.
- Impress on the trainees that they should not touch the machines until the instructor says so, and that they are responsible for replacing tools and keeping the classroom in order.

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COPIER ENGINE

COURSE OVERVIEW

Slide 4

- The course is broken up into several modules. This section outlines these modules.
- The course covers the copier and the optional peripherals. Connectivity is not covered in this course.

Course Overview - 1

- Product Outline
- Specifications
- Installation
- Machine Overview
- Scanner
- Laser Exposure

Slide 5

- PRODUCT OUTLINE
  - The model will be introduced to the class.
  - The optional peripherals will be introduced to the class.
  - The product concept, sales points, and targets will be presented.
- SPECIFICATIONS
  - The main specifications will be outlined. Significant items will be stressed.
- INSTALLATION
  - The class will install their machines and the peripherals.
  - The class will learn how to access SP modes and user tools.
  - The class will study how to upgrade the firmware.
- MACHINE OVERVIEW
  - The components will be discussed.
  - The paper feed path and copying process will be outlined.
  - The machine's organization and overall PCB structure will also be covered.
- SCANNER
  - The scanner mechanism will be discussed.
- LASER EXPOSURE
  - The laser diode circuits and laser optics will be described.

Course Overview - 2

- PCDU
- Process Control
- Toner Supply
- Transfer
- Paper Feed
- Fusing
- Paper Exit

Slide 6

- PCDU
  - This section explains the components of the PCDU.
  - All the image-creation processes around the drum, including development, are covered in this section.
- PROCESS CONTROL
  - This section explains the basic points about how the machine controls the copy process to compensate for changes in operating conditions.
  - Toner supply control, and toner near-end/end detection are covered in this section.
- TONER SUPPLY
  - The toner supply mechanism will be described.
  - Toner supply control, and near-end/end detection are covered in the process control section.
- TRANSFER
  - Image transfer, paper transfer, and paper separation will be described.
- PAPER FEED
  - The paper feed mechanism for the main body will be described. The optional tray units will be dealt with in later sections.
- FUSING
  - Fusing will be described.
- PAPER EXIT
  - The paper feed out mechanisms will be described.

Course Overview - 3

- **Options**
  - Platen Cover
  - ARDF
  - Accessibility Handle
  - Paper Tray Unit (2-tray)
- **Maintenance**
- **Troubleshooting**

Slide 7

OPTIONS

- The options listed above will be described in the indicated order.
- ARDF: Same as used with R-C5, AT-C2

MAINTENANCE

- PM is described briefly.

TROUBLESHOOTING

- Basic points concerning service codes, diagnostics, and other troubleshooting tools will be covered.

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PRODUCT OUTLINE

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- ❒ The model will be introduced.
- ❒ The optional peripherals will be introduced.
- ❒ The product concept, sales points, and targets will be presented.

INTRODUCTION

Slide 9

No additional notes

Comparison to Di-C1L

- **The Di-C1LL has one model and two brands.**
  - D112-21: Ricoh
  - D112-25: Gestetner
- **Differences from Di-C1L**
  - No fax option
  - No 1-Bin tray
  - No duplex function
  - No side tray
  - No internal shift tray
  - One internal paper feeding tray in main unit
  - ID copy function
  - CustomRed function (See "Appendix: Setting CustomRed“ for detail.)

Slide 10

No additional notes.

Appearance – Di-C1LL (1)

Slide 11

❒ The ARDF (DF3030) is optional. (The alternate is Platen Cover Type 3800C.)

Appearance – Di-C1LL (2)

Slide 12

No additional notes.

SALES POINTS

Slide 13

No additional notes

Main Sales Points

- **High performance (close to black-and-white models)**
  - Short Warm Up time: Less than 30 seconds
  - Short First Copy Output Time:
    - » Black-and-white 6.5 seconds
    - » Full color: 9.5 seconds
- **Productivity**
  - High speed color output: 20 cpm
  - High Speed Scanning (from ARDF): 41 pages/minute (monochrome), 26 pages/minute (color): A4 LEF, 200 dpi
  - Thick paper (up to 256 g/m^2) can be fed from the first tray or bypass tray
- **Small footprint**
  - 587 mm x 655 mm (w x d)
  - Smallest in this range of the market
- **ID Copy Function**
  - The ID Copy function allows copying of both sides of an ID card or other small document onto one sheet.
- **CustomRed Function**
  - Adjusts the brightness of red. Do this if requested by the customer. (See "Appendix: Setting CustomRed".)

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No additional notes.

Easy Jam Removal

- Simple paper path
- The cover can be opened without paper falling off the bypass tray.
- All jams can be removed from the right side of the machine.

Slide 15

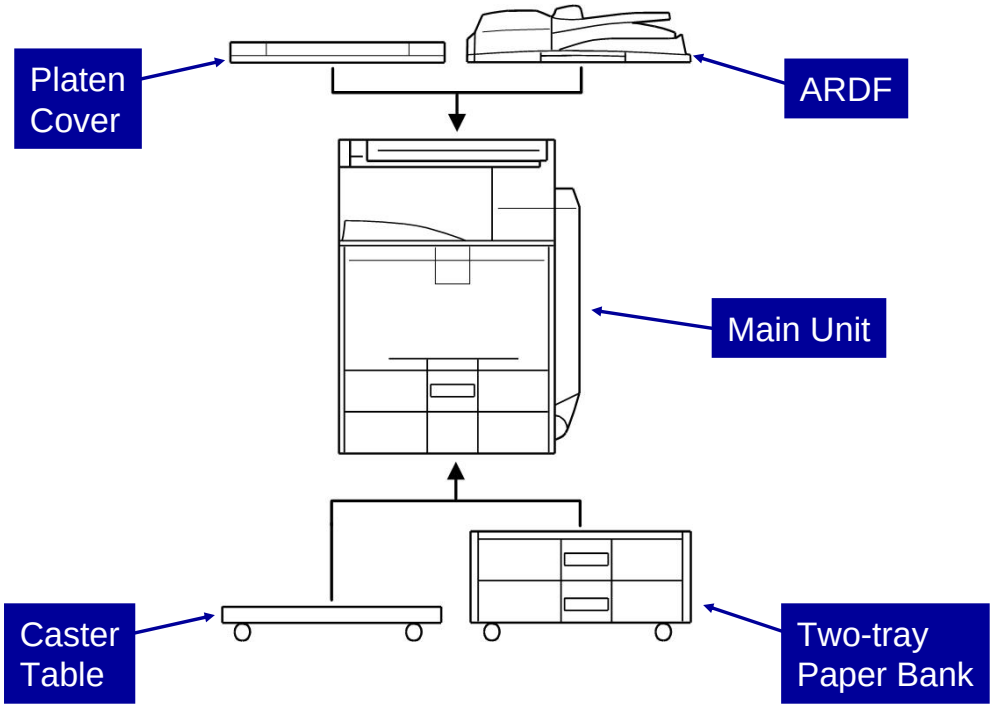
No additional notes

EQUIPMENT

Slide 16

No additional notes

Machine Configuration



Slide 17

No additional notes.

Mainframe, with No Options

- **The machine has this equipment built in.**
  - Bypass tray
  - 250-sheet tray
  - 500-sheet output tray
  - Printer/Scanner, with USB and Ethernet
  - 512 MB Memory
  - USB Host Interface
  - PCL5c
  - 10Base-T/100BaseTX
  - PictBridge: Same as Di-C1L (enables direct printing from a digital camera)

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- This slide shows what you get with the base machine.
- Note that the printer/scanner is standard equipment for this model.

Options

- **ARDF (DF3030)**
  - Accessibility Handle (ARDF handle type B) can be used with the ARDF
- **Platen Cover Type 3800C**
  - This option must be used if the ARDF is not used.
- **2-Tray Paper Bank (PB3030)**
- **Caster Table Type B**
- **Copy Data Security Unit Type F**
- **Optional Counter Interface**
- **Key Counter Bracket**
- **Basil-S1 (Remote Communication Gate Type BN1)**

Slide 19

- These options are also available for the Di-C1L.
- The optional counter interface is a 20-pin interface. It is required when you attach a key counter.
- Printer/scanner is a standard part of the machine, not an option. USB and Ethernet are built in.

No additional notes

Reliability Targets

- **Unit life (2 prints per job): 600K or 5 years**
- **Average Copy Volume (copy + print): 3K/month**
- **Duty: 40K**
- **PM cycle:**
  - 60K (drum unit, PCDU toner collection bottle, transfer belt cleaning unit assembly [includes a waste toner bottle])
  - 150K (fusing rollers and fusing belt)
  - Target Color Ratio: 25% (up from 20% for Di-C1L)

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- There are two waste toner bottles: drum unit, and image transfer belt. Replace both at the same time.

Yield Targets

- **Toner**
  - Target Yield (A4/LT, 5% coverage)
    - » Black: 10K outputs/cartridge
    - » Cyan / Magenta / Yellow: 5.5K outputs/cartridge
- **Developer**
  - Pre-installed in the machine at the factory, and pre-installed in each development unit spare part.
  - Under normal conditions, the life of the developer is the same as the machine, so it is not necessary to replace.
  - No SP needed at installation. Initialization is done automatically after power is switched on for the first time.

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- The toner bottles are not compatible with other products.
  - The toner is the same as the AT-C2, but the shape of the cartridge is different.

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SPECIFICATIONS

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No additional notes

General Specifications 1

- **Resolution:**
  - Scan: 600 dpi
  - Copy/Print: 600 dpi
- **Maximum Original Size: A3/11" x 17"**
- **Print Paper Size:**
  - Standard Tray: Min A5 (LEF)/8.5" x 5.5", Max A3/11" x 17"
  - By-pass: Min 90 x 148 mm, Max 305 x 600 mm/12" x 23.62"
  - Optional Trays: Min A5 (LEF)/8.5" x 5.5", Max A3/11" x 17"

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- The next few slides show the basic engine specifications.
- For more detailed specifications (for example, scanner, printer), see the FSM.

Print Paper Size

- For details, refer to “Supported Paper Sizes” in the FSM.

General Specifications 2

- **Printing Paper Weight:**
  - Standard tray: 60 to 256 g/m^2 (16 to 68 lb.)
  - Optional paper trays: 60 to 105 g/m^2 (16 to 28 lb.)
  - By-pass tray: 52 to 256 g/m^2 (14 to 68 lb.)
- **Print Paper Capacity (80 g/m^2, 20 lb):**
  - Standard tray: 250 sheets x 2
  - By-pass tray: 100 sheets
  - Optional paper trays: 500 sheets x 2
- **Output Paper Capacity:**
  - 500 sheets (A4/LT, 80 g/m^2 face down)

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Paper Weight

- The standard tray supports thick paper (the same paper weight as AT-C2). Paper weight is a key spec for low segment color MFP users.
- Why is there such a big difference between the trays for paper weight?
  - The standard tray (tray 1) has a belt mechanism that assists feed for heavy paper.

General Specifications 3

- **Copy speed**
  - Normal (LT/A4 LEF): 20 cpm
  - OHP/Thick paper: 12.5 cpm
- **First copy:**
  - Color: 9.5 seconds or less (A4/LT LEF)
  - Black & white: 6.5 seconds or less (A4/LT LEF)
- **Warm-up time: Less than 30 seconds (20˚C, 50% RH)**
- **Memory: 512 MB**

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See the FSM for detailed specefications.

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COPIER ENGINE

INSTALLATION

Slide 27

- Install at least one machine with all options as a complete system.
- Follow all notes and cautions in the procedures.

COPIER

Important Points

Slide 28

No additional notes

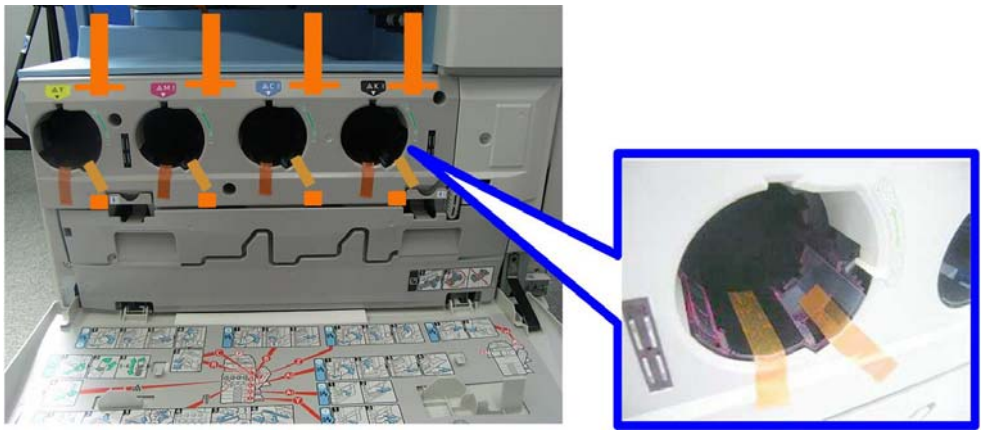
Shipping Retainer for Scanner

- Remove the scanner unit stay and keep it in the cutout in the internal tray.

Slide 29

No additional notes.

Development Unit



- **Remove the tape from all four development units and toner hoppers.**
  - IMPORTANT: Remove the tape from all four development units before you turn the main switch on.
  - The development units can be severely damaged if you do not remove the tape.

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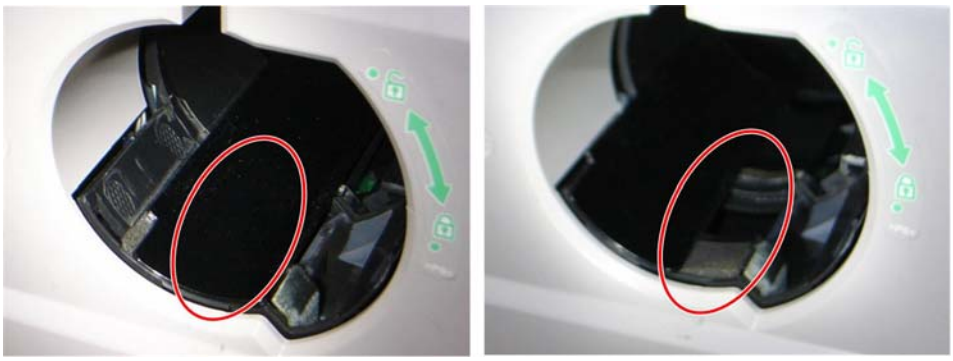
No additional notes.

Check the Toner Hopper Shutter



- The toner hopper shutter must be fully closed (as shown on the left).
- If the toner hopper shutter is not fully closed and the inlet of the toner hopper unit is visible (as shown on the right), the toner bottle cannot be installed properly.

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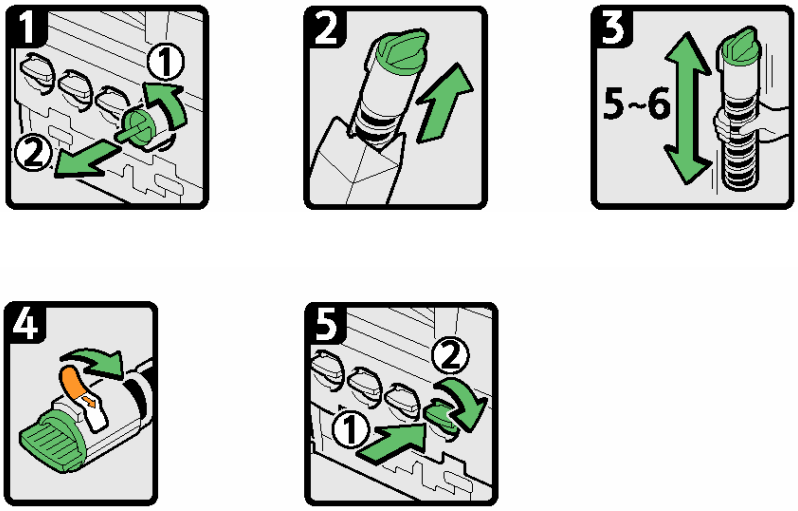
No additional notes

Toner Bottles



- **Shake each bottle 5 or 6 times before you install it.**
- **When the toner bottle is installed, the bottle must be turned to the right (clockwise).**
  - This opens the bottle, and toner can leave the bottle.
  - AT-C1/C2: It is not necessary to turn the bottle to the right.

Slide 32

No additional notes

Initializing the Developer

- **This is done automatically after you turn the power on for the first time.**
- **When it is finished, the LED on the Start key goes green.**
  - If the initialization does not finish correctly, you can use SP 3014 001 to see what the problem is.
- **Make some test copies.**
- **Then do the ACC procedure.**
  - User tools > Maintenance > ACC > Start
  - There are 4 test patterns in this menu: one for copier mode and three for printer mode. Do all four of these tests.

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- When you turn on the machine, it is not necessary to check if the cover is open or closed.

Appendix, Process Control Error Conditions

- SP 3014 001: A code is displayed. See the above section of the service manual for details.

SP Settings (1)

- **Counting method: SP5-045-001**
  - Specifies whether the counting method used in meter charge mode is based on developments or prints.
    - » The default setting is ‘developments’.
- **A3/11" x 17" double counting: SP5-104-001**
  - The default setting is ‘single counting’. When you have to change this setting, contact your supervisor.
- **Supply name: SP 5-841**
  - Input the product name of the toner.
  - This name appears on the screen when the user presses the Inquiry button in the user tools screen.

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- SP5-045-001: You must select one of the counter methods (developments/prints) in accordance with the service contract.

SP Settings (2)

- **Service Tel. No. Setting: SP5-812-001 through 004**
  - 001: Service station telephone number
  - 002: Service station fax number. This number is printed on the counter list when meter charge mode is selected. This lets the user fax the counter data to the service station.
  - 003: Supplier of consumables
  - 004: Sales representative

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No additional notes

PAPER TRAY UNIT and CASTER TABLE

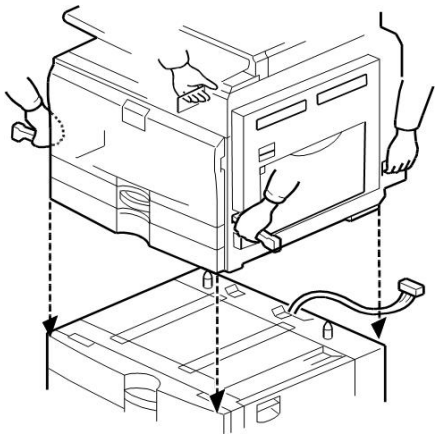
Important Points

Slide 36

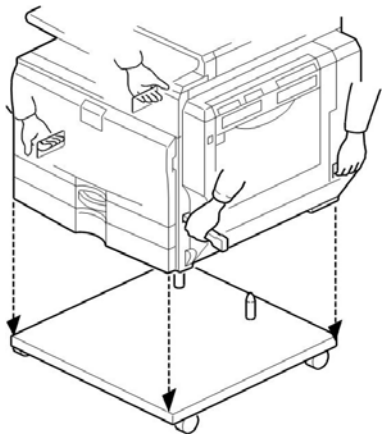
No additional notes

Important Notes

- The copier must be installed on either the two-tray paper feed unit or the caster table.
- This is a two-person job.



On the two-tray paper feed unit



On the caster table

Slide 37

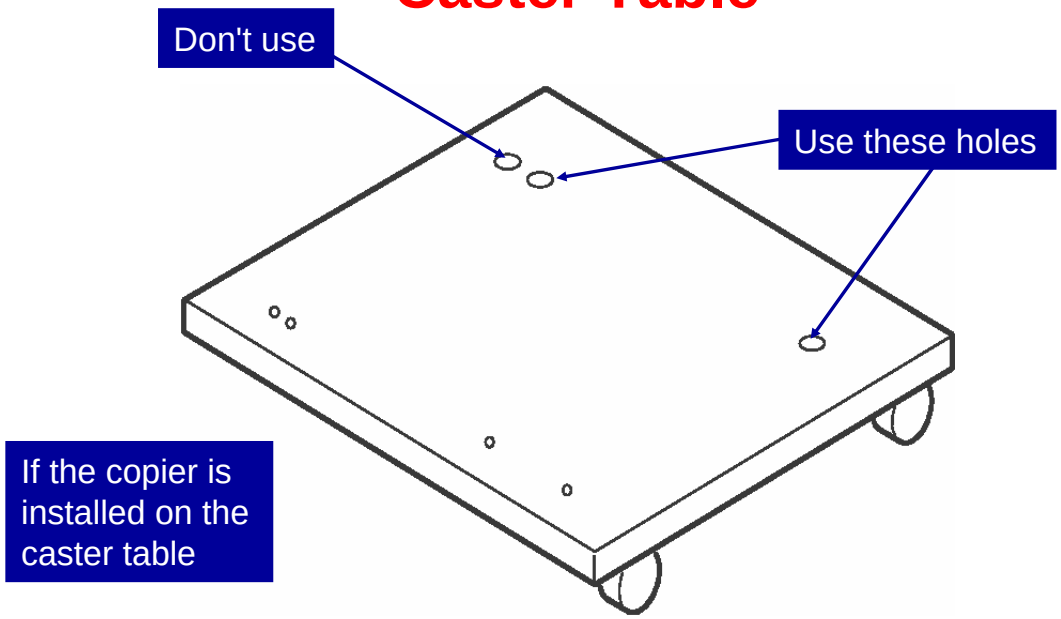
Follow the procedures in the FSM.

ALSO

Two people must lift the copier and put it on top of the paper tray unit or caster table .

- Two people must lift – **always**. The copier is too heavy for one person.
- Do not try to lift the copier with the paper tray unit attached. You will damage the lifting handles.

Caster Table



- **Use the correct screw holes when installing on the caster table.**

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No additional notes

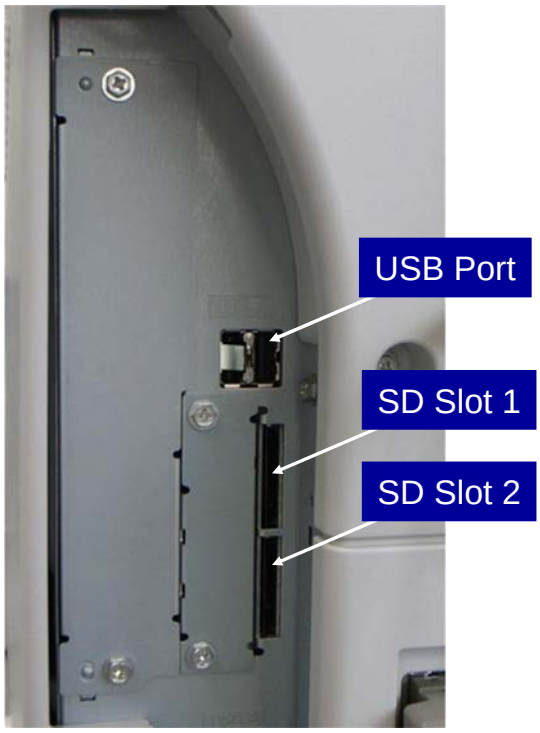
CONTROLLER OPTIONS

Important Points

Slide 39

No additional notes

USB Port and SD Card Slots



- **SD Card Slots**
  - Slot 1 is used for installing:
    - » PCL Module
    - » PictBridge
  - Slot 2 is used for:
    - » Installing new firmware.
    - » Copying NVRAM data.
- **One USB Port**
  - Can connect a digital camera (to copy photos, if the PictBridge option is already installed).

Slide 40

No additional notes

Moving Applications

- If you want to use more than one of the 'slot 1 applications', you must move the application from the original card to another SD card.
- See the service manual for the detailed procedure.
- Basic points:
  - Put the source card in slot 2, and copy it to the card in slot 1.
  - Do not copy the PostScript application. This card must stay in slot 1.

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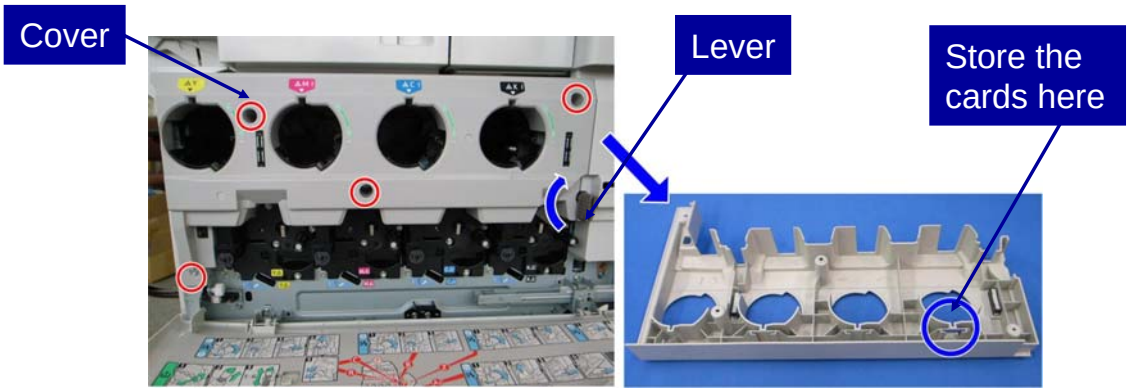
No additional notes

Storing the Original SD Cards



- Remove the cover and store the SD cards as shown.

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No additional notes

TRANSPORTING THE MACHINE

Slide 43

No additional notes

Moving the Machine a Short Distance

- **Remove both trays from the optional paper tray unit.**

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Field Service manual, Installation, Copier Installation, Moving the Machine

Moving the Machine a Long Distance

- **Move the scanner carriage from home position.**
  - Use SP 4806 001.
  - This prevents dust from getting into the scanner.
- **Remove the paper from the paper trays, and secure the bottom plates with tape.**
- **Install the scanner unit stay.**
- **Attach shipping tape to the covers, or tightly wrap the machine with shrink-wrap.**

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No additional notes

After Moving the Machine a Long Distance

- **Do the "Auto Color Registration" as follows. This optimizes color registration.**
  - First, do "Forced Line Position Adj. Mode c" (SP2111-3).
  - Then, do "Forced Line Position Adj. Mode a" (SP2111-1).
- **To check if SP 2111-1 was successful, watch the screen during the process. A message is displayed at the end.**
  - Also, you can check the result with SP 2194-007 (0: Completed successfully, 1: Failed).
- **Make sure that the side fences in the trays are correctly positioned.**

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- SP 2111-1 and –3 are used at other occasions, after replacing certain parts. We will see this again.
- For more information, see these sections of the field service manual.
  - FSM → Appendix → Process Control Error Conditions
  - FSM → Appendix → Troubleshooting Guide

INSTALL THE MACHINE AND OPTIONS

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No additional notes

Install the Following

- **Install the Following**
  - Copier
  - Two-tray paper feed unit (or caster table)
  - ARDF (or platen cover)
  - Accessibility handle (with ARDF, optional)
  - Key counter bracket
  - Key counter interface unit
  - Copy data security unit
  - PCL module
  - PictBridge
  - Scanner anti-condensation heater (optional)
  - Tray heaters (standard tray, optional paper tray unit)
- **Refer to the procedures in the field service manual.**
- **Obey all warnings and cautions in the procedures.**

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No additional notes

UPDATING FIRMWARE

Slide 49

❒ Install the latest firmware in the machine.

Updating Firmware

- **All firmware is on SD cards.**
- **The firmware SD card plugs into SD card slot 2.**
- **Update the firmware.**
  - Verify the update was successful

Slide 50

Service manual, System Maintenance Reference, Firmware Update

- Read the 'Before you Begin' section of the procedure in the service manual, which explains how to handle SD cards.
- The 'Updating Firmware' section has the main firmware download procedure. Try it on your machine.
  - If an error occurs, an error code appears. A table in the manual explains these codes ('Handling Firmware Update Errors' section).
  - If power fails during the update, insert the card once again and switch on the machine to continue the firmware download automatically from the card. The menu will not appear on the screen, because an error message will be displayed.

Backing Up NVRAM Data

- **Copy the data to an SD card.**
- **The SD card plugs into slot 2.**
- **Use SP5824 001**
  - SP 5825 001 copies the data from the SD card to the machine.
- **The data is copied to a folder in the SD card, into a file with the filename taken from the machine's serial number**
  - Example, Serial Number "B2340017", filename is NVRAM¥B2340017.NV
  - This ensures that data from a different machine is not copied back by accident.
  - An SD card can hold NVRAM data from more than one machine.
- **Write the machine's serial number on the card for reference when you wish to copy the data back.**

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Service manual, System Maintenance Reference, NVRAM Data Upload/Download

- Write the serial number of the machine on the card, so that you will be able to copy the correct data back to the machine.
- Data cannot be copied back to the machine if the machine's serial number does not match the file name on the card.

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COPIER ENGINE

MACHINE OVERVIEW

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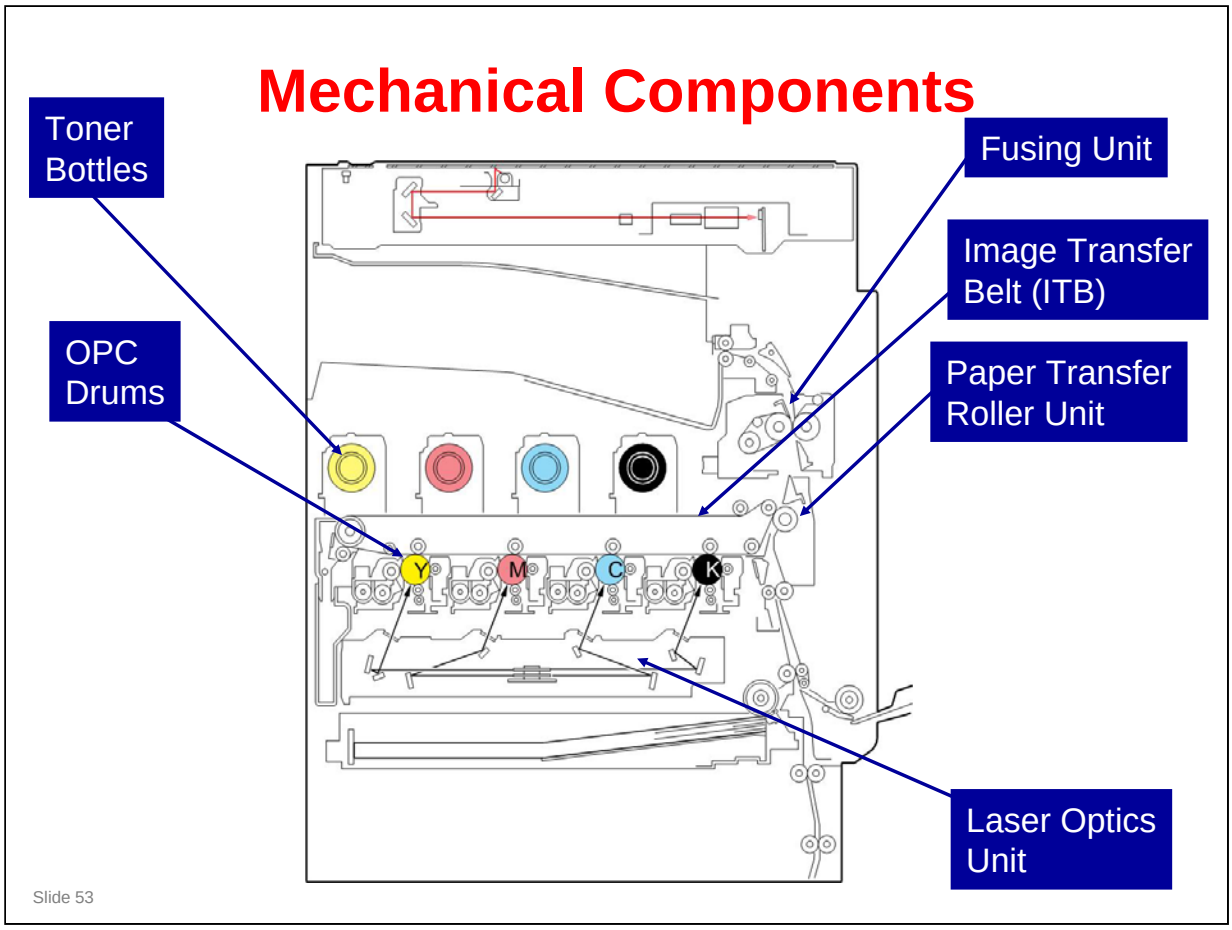
No additional notes



- This is a view of the internal structure of the machine.
- There are 4 OPC drums.
- Laser beams write latent images on the drums. There is one laser beam for each drum.
- Four toner images are transferred from the OPC drums to the image transfer belt on one rotation of the belt, thus building a four-color image.
- At the paper transfer roller unit, the four-color image is pushed off the belt onto the paper.
- The paper feeds up to the fusing unit, and out of the machine.

Mechanical Component Overview (1)

- **Laser optics unit**
  - There are four lasers, and four sets of optics. One for each toner color (KYCM). Each polygon mirror reflects light from two laser diodes.
- **PCDU (Photoconductor and Development Unit)**
  - There are four units, one for each toner color. Each PCDU includes a drum unit and a development unit.
- **Toner bottles**
  - Toner is supplied from the toner bottles to each development unit through a hopper
    - » The bottle rotates, and toner passes to the hopper.

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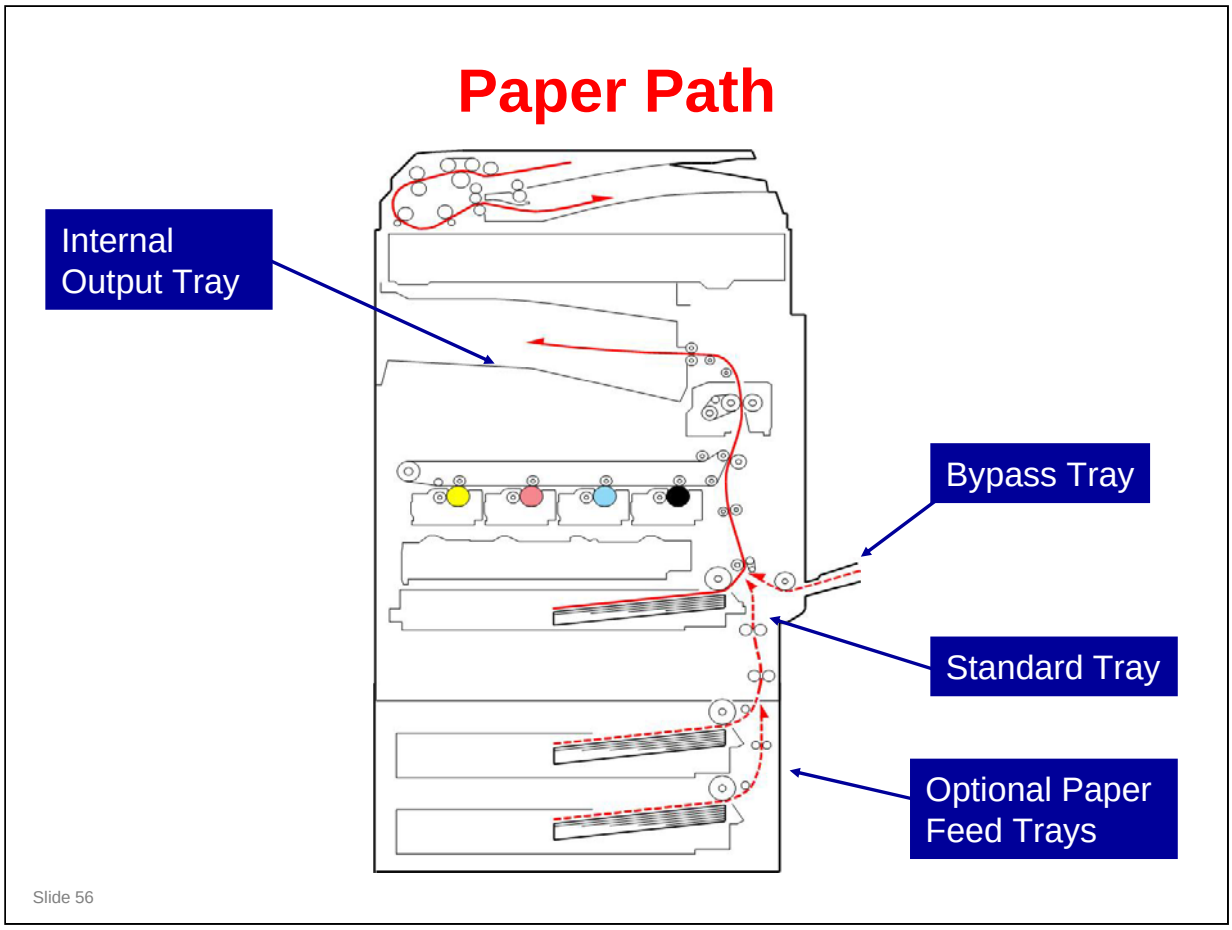
No additional notes

Mechanical Component Overview (2)

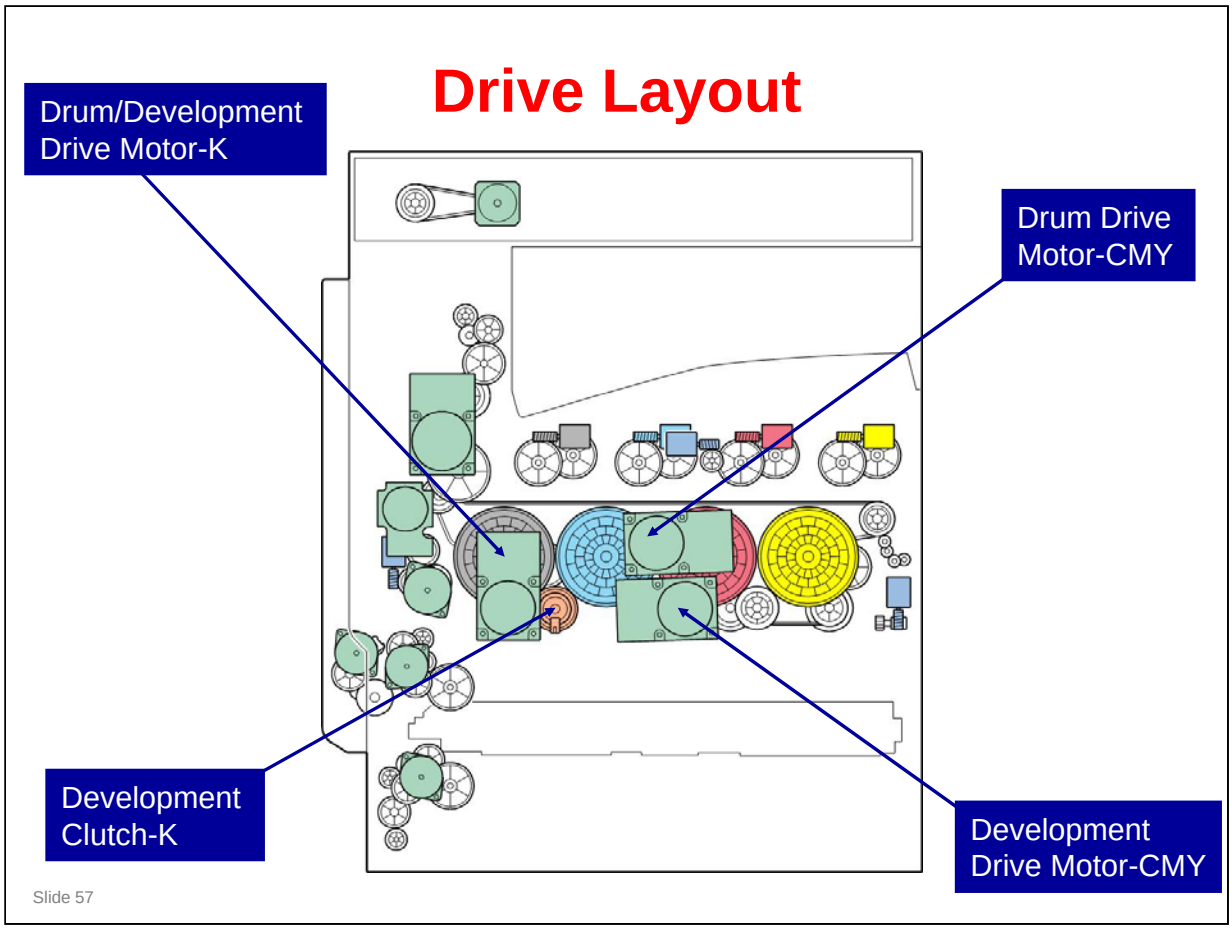
- **Image transfer unit**
  - Bias rollers opposite the OPC drums transfer toner from the drums to the transfer belt. Four toner images are super-imposed onto the belt.
- **Paper transfer roller unit**
  - The ITB drive roller pushes the toner from the transfer belt to the paper (the transfer roller is an idle roller).
- **Fusing unit**
  - This is a belt-type fusing unit. A heating roller, out of the paper feed path heats a belt. Then the belt heats the hot roller. This type of unit warms up the rollers more quickly than a conventional two-roller system.

Slide 55

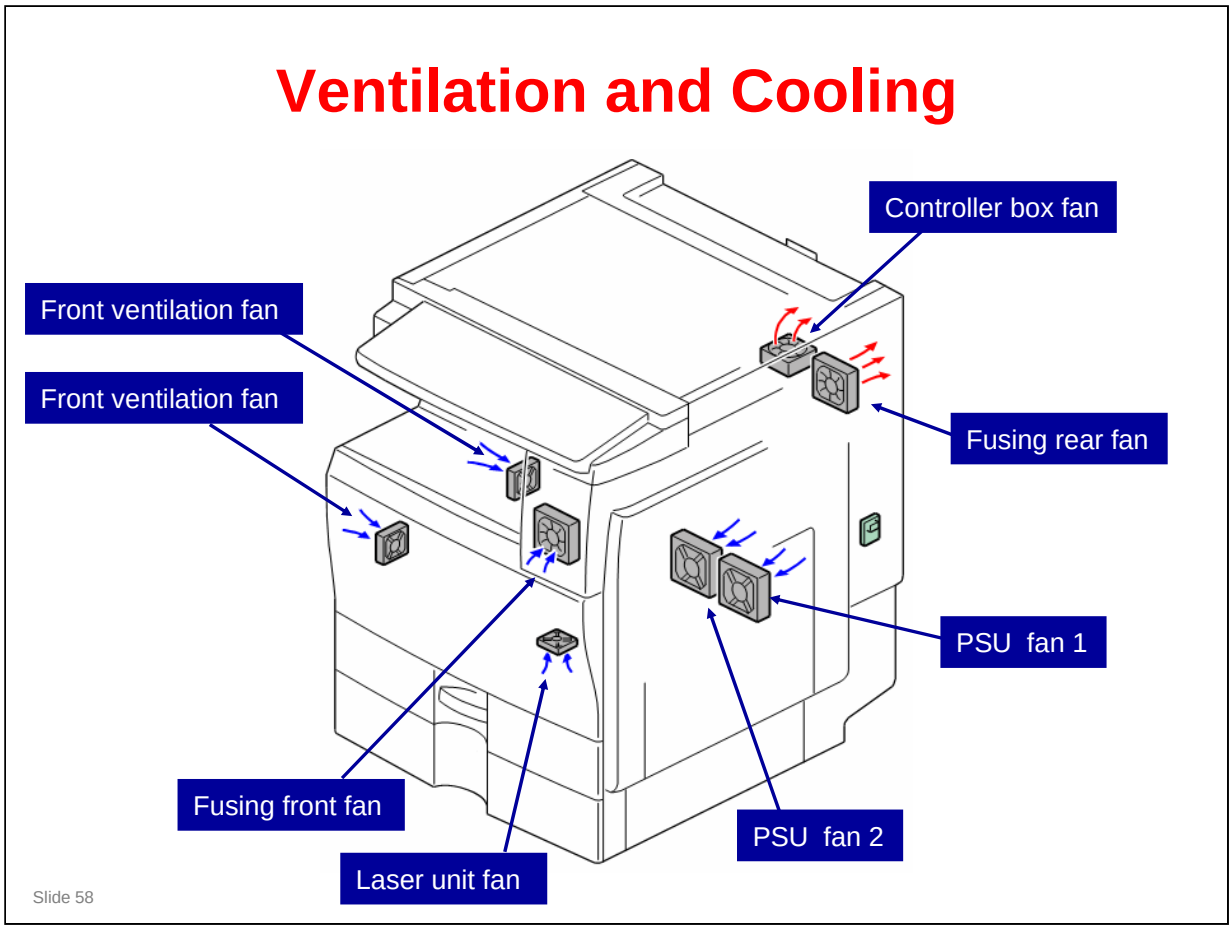
No additional notes



- This shows the path of paper through the machine.
- Demonstrate the following feed paths on the diagram.
  - Up from the paper feed trays
  - In from the bypass tray
  - Out at the top of the machine (to the internal tray)

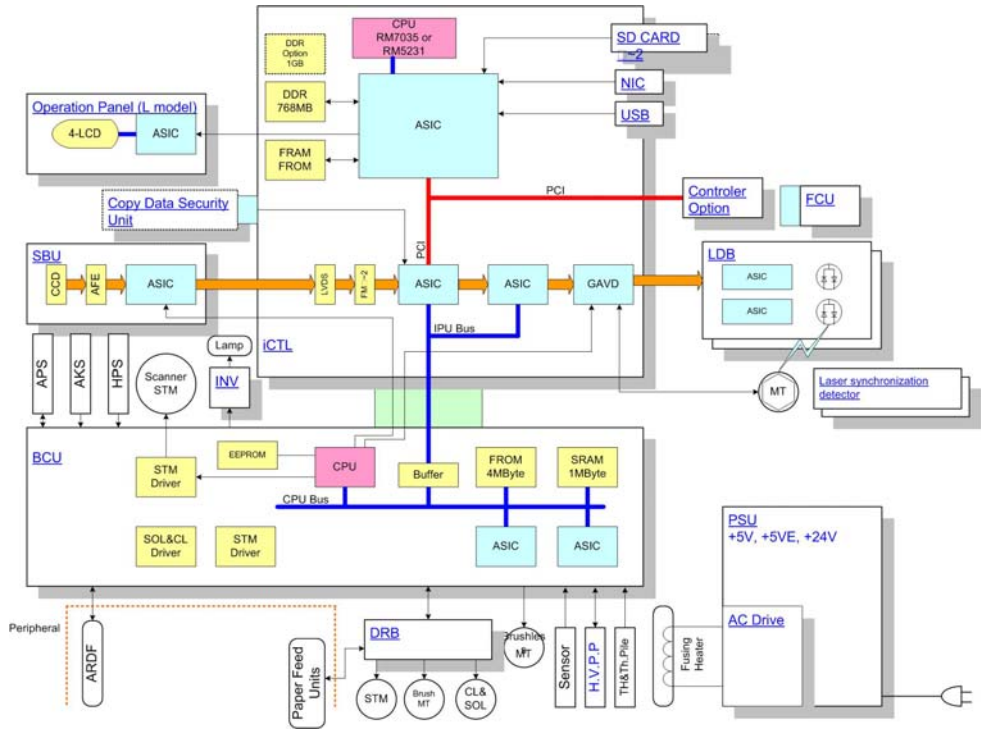


- This shows the main motors in the machine.
- Notes:
  - The PCDU for K has one motor to drive the drum and development unit. Because of this, there is a clutch to start/stop the development unit for K.
  - For CMY, the drum drive motor CMY drives the three drums, and the development drive motor CMY drives the three development units. There are no development clutches for the three colors.



No additional notes

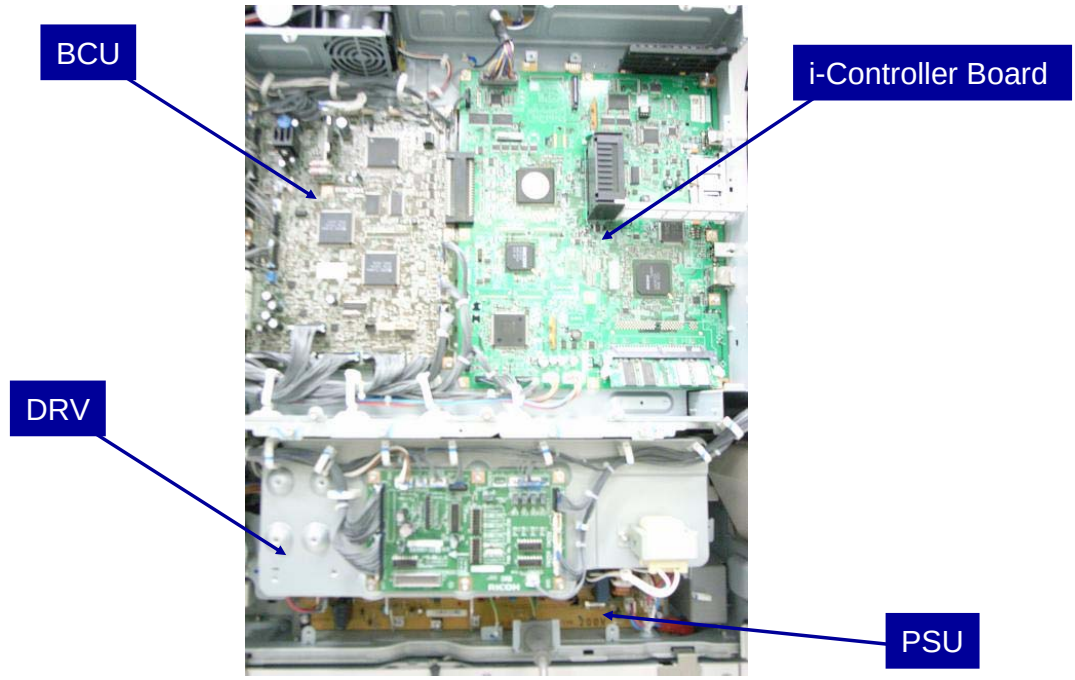
Board Structure



Slide 59

- This shows a schematic of the electrical layout of the machine.
- The orange line through the centre from the SBU to the LDB is the flow of image data through the machine.
  - The CCD (Charged Coupled Device) generates analog RGB signals.
  - The SBU (Sensor Board Unit) converts the analog RGB signals to digital signals. It sends these signals to the iCTL board.
  - The iCTL board processes the image. Then the CMYK image data goes to the laser diode drivers.

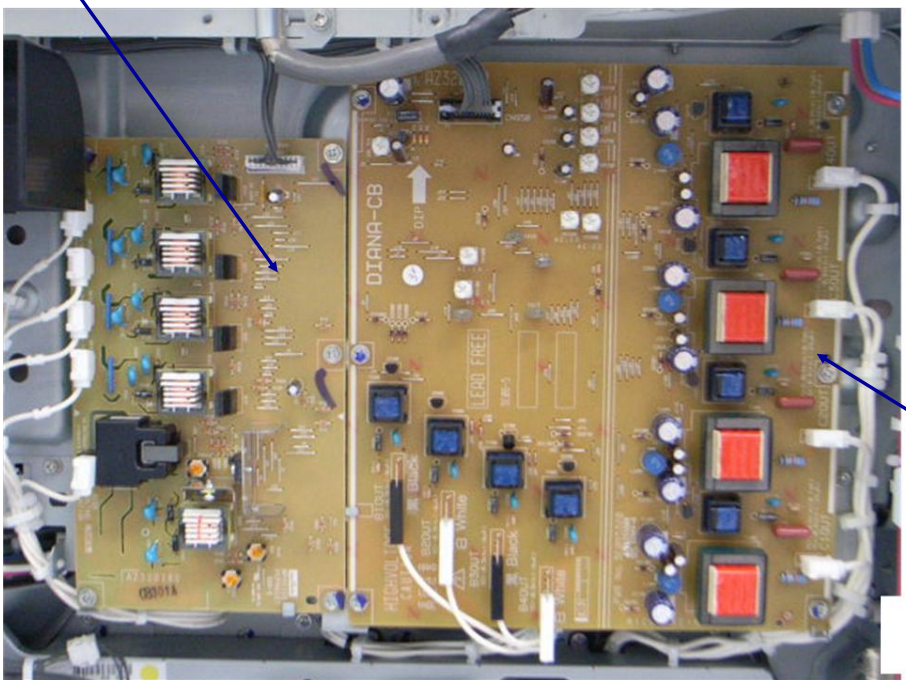
Board Layout (1)



Slide 60

❒ Here, the controller box is closed.

Board Layout (2)



Slide 61

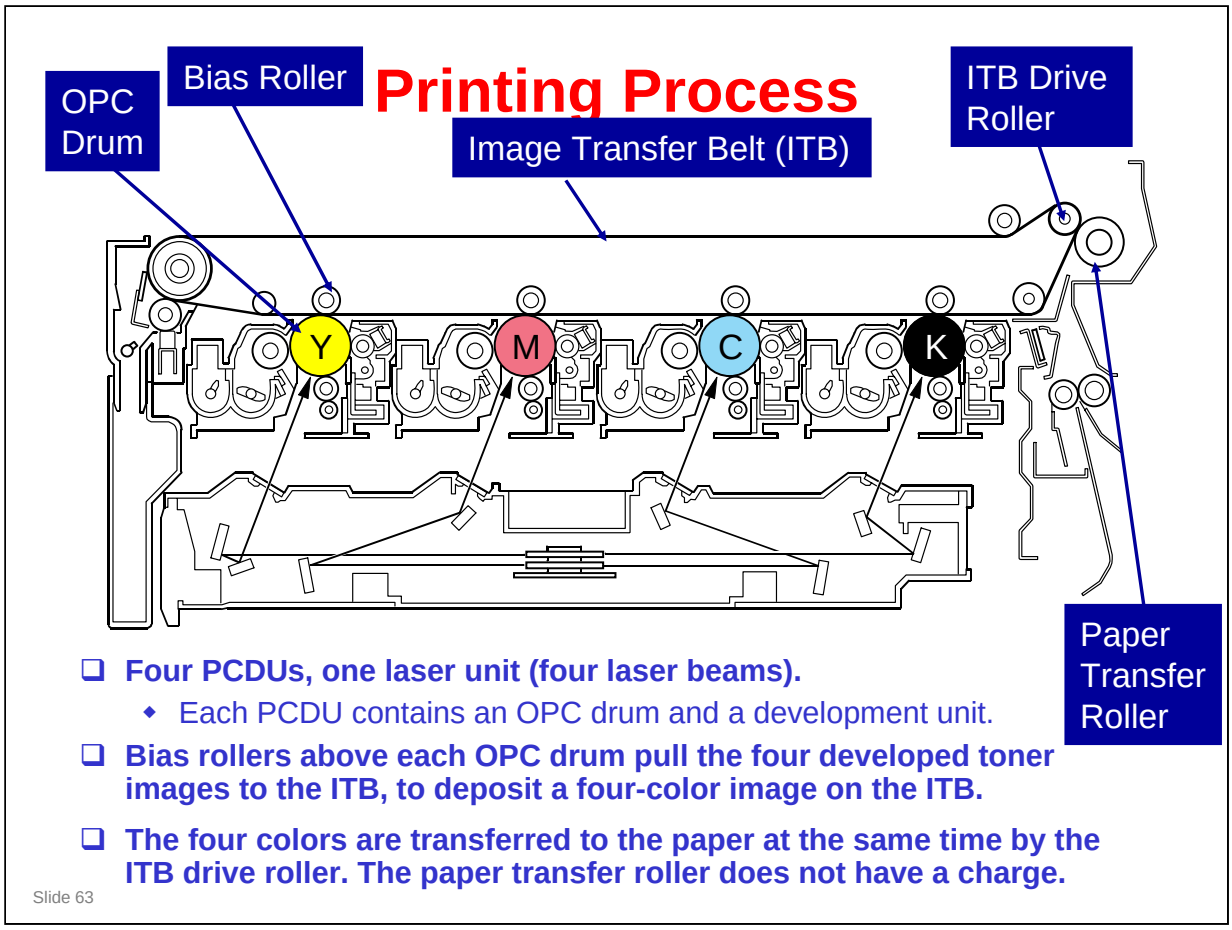
- Here, the controller box is open.
- HVPS: CB – Drum charge and development bias
- HVPS: TTS – Image transfer

Main Boards

- The BCU controls the engine.
- The controller (called iCTL) handles the network and printer interfaces, and the operation panel. It also contains the image processing circuits.
- The SBU contains a CCD.
- The DRB contains driver circuits for motors.

Slide 62

- iCTL: IPU + Controller



❒ Here is a close-up of the main print engine.

❒ The ITB drive roller pushes the toner from the ITB onto the paper. The paper transfer roller does not have a charge to attract the toner.

Process Speeds

- **There are two process speeds, as follows:**
  - Thin, Plain, or Middle Thick Paper: 120 mm/s
    - » Print speed: 20 ppm
  - OHP/Thick Paper: 60 mm/s
    - » Print speed: 12.5 ppm

Slide 64

- The process speed is the feed speed from registration roller to the fusing unit.
- The process speed affects various machine parameters, as can be seen if you take a quick look through the SP tables.
- "Middle thick paper' is 82 – 105 g/m^2 (22 – 28 lb).

New Unit Detection Mechanisms

- **PCDU, Development Unit**
  - The development unit (as part of the PCDU, or as a separate development unit) contains an ID chip.
  - The ID chip contains information that tells the machine that the unit is new.
- **PCDU Toner Collection Bottle**
  - The machine uses the 'bottle full sensor' to determine if the bottle was replaced.
  - This only works if the bottle is in a 'full' or 'near-full' condition.

Slide 65

- The ID chip in the development unit contains all the counters for the PCDU (drum unit counters, development unit counters).
- If we replace the development unit as a separate unit, the new ID chip does not contain the drum counters for the drum unit that is still in the machine.

Replacement of Electrical Components

- **Take care when replacing these parts. Follow the instructions in the manual.**
  - BCU
  - NVRAM
- **Drum Motor: CMY**
  - Do not remove the PCDUs when you replace this motor.
- **Gear unit**
  - Do SP1902-001 (Drum Phase Adjustment) after you replace the gear unit.

Slide 66

- The next few slides will go over the important points.

Replacing the BCU

- **Remove the NVRAM from the old BCU and install it on the new one.**
- **Turn the machine on.**
  - SC995-01 appears. This means that the serial number is not stored.
- **Store the serial number with SP 5811-004.**
- **Cycle the main power off/on.**

Slide 67

No additional notes

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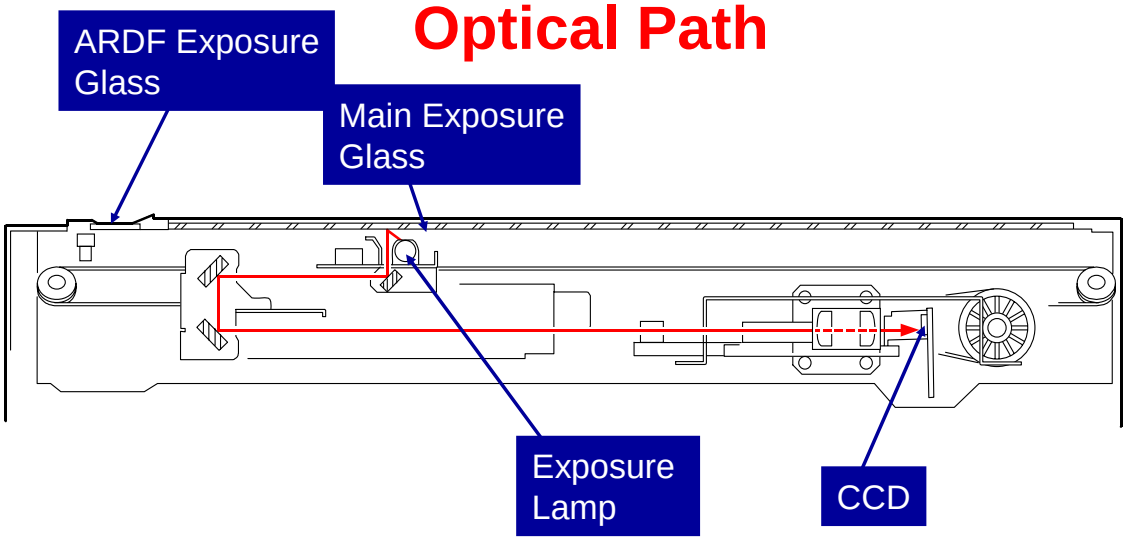
SCANNER

Slide 68

- In this section, the mechanical components of the scanner will be described.
- The optional ARDF is described in a separate section.

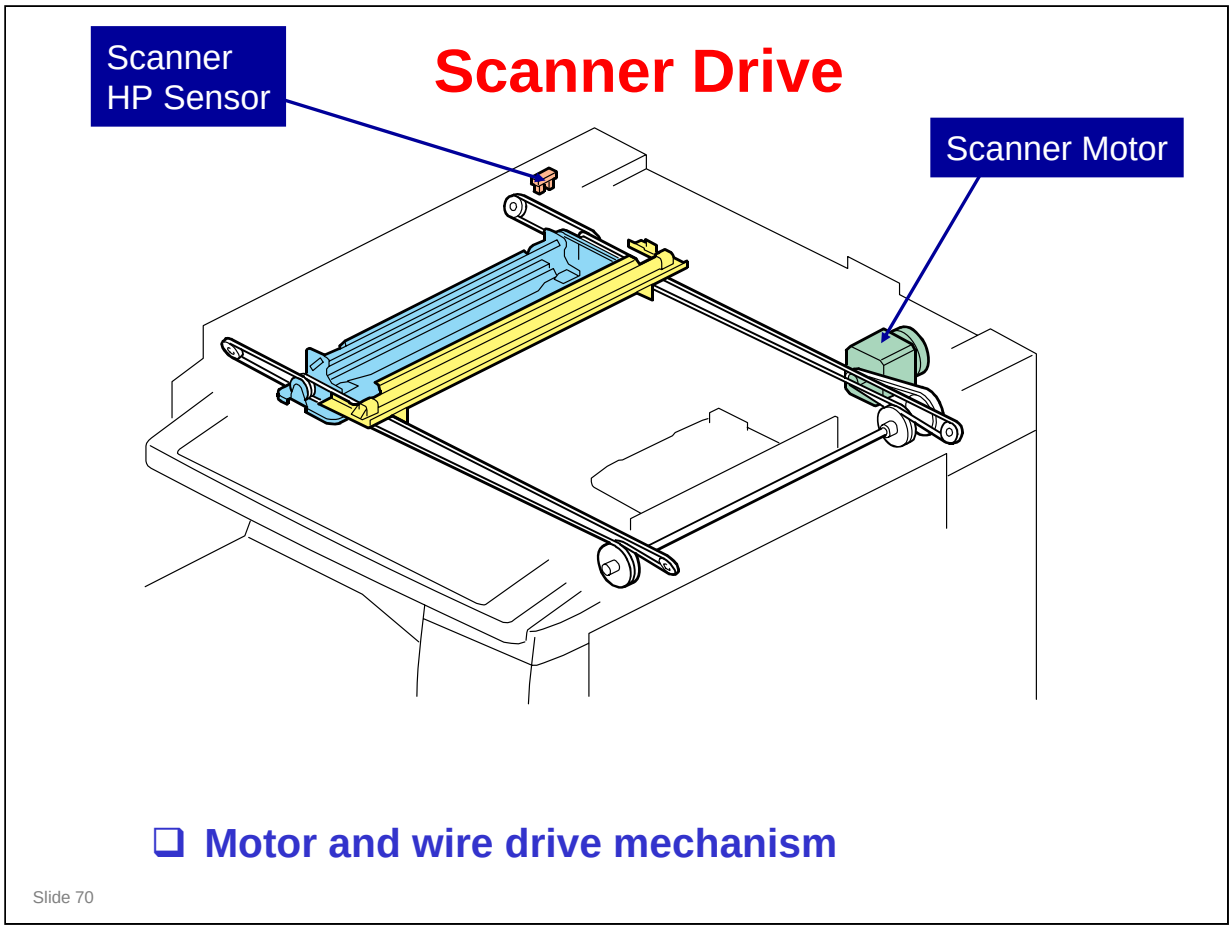
Optical Path



- One exposure lamp
- 3-line color CCD
- Anti-condensation heater is optional
- No adjustments required in the field for the CCD and lens block

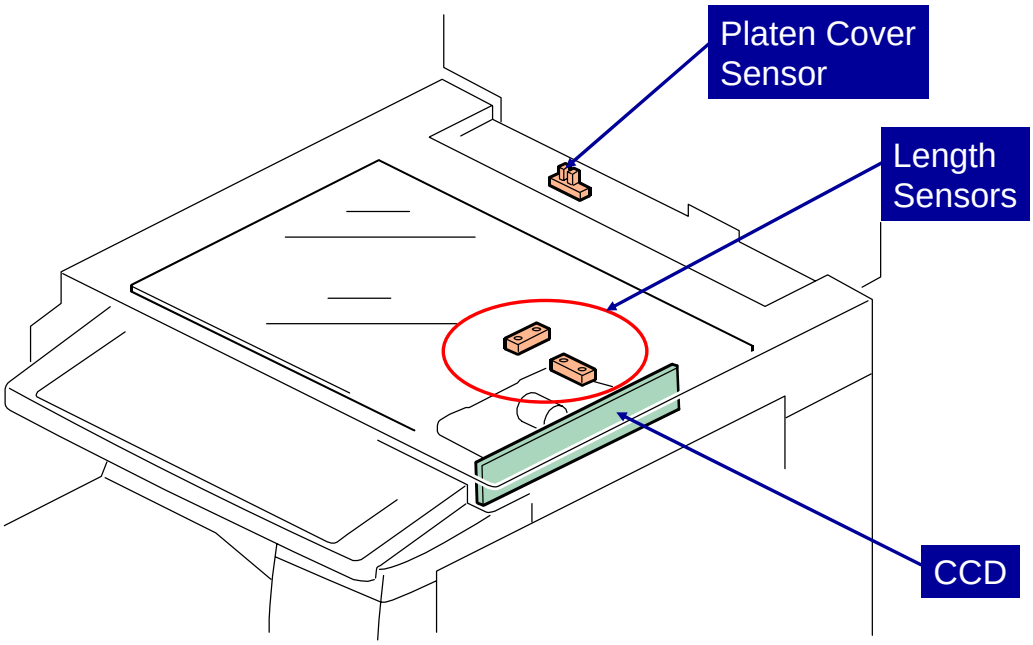
Slide 69

- In platen mode, the original is put on the main exposure glass, and the scanner moves down the original during scanning.
- In ARDF mode, the scanner stays at the home position, and the original is fed past the ARDF exposure glass.
- The optics anti-condensation heater is an option. It prevents condensation on the mirrors, which will cause image problems.



- The same motor drives the first and second scanners.
  - The first scanner contains the exposure lamp, reflectors, the 1st mirror, and the lamp regulator. The second scanner contains the 2nd and 3rd mirrors.
  - The regulator is mounted on the scanner to reduce the wiring between the lamp and the regulator.
  - The second scanner moves at half the speed of the first scanner. This is to maintain the focal distance between lens and original.
- In this machine, wires are used instead of timing belts. These are more difficult to replace, but copy quality is better (less jitter).
- Note that the operation in ARDF mode is different from platen mode (as shown on the previous page).
  - In ARDF mode, the scanner goes to home position (detected by the home position sensor), and stays there during scanning.
- The scanner motor speed and image processing control the magnification.

Original Size Detection – Platen Mode



- **Reflective photosensors detect the length. The CCD detects the width.**

Slide 71

- When the ARDF is opened, the scanner carriage moves 30 mm from the home position.
- Then, when the ARDF is closed, the exposure lamp turns on and the CCD detects the paper width.
  - The lamp turns on when the platen cover sensor detects that the cover is being closed.
  - If the cover stays open during copying, the CPU checks the original size when the Start key is pressed.
- When feeding with the ARDF, the width and length sensors in the ARDF detect the original size.

Replacement and Adjustment

- **FSM → Replacement and Adjustment → Image Adjustments**
  - Do these adjustments after you replace one of these parts: Original Length Sensors, Lens Block, Scanner Motor, Scanner Wires
- **Main Exposure Glass**
  - Position the marker at the front-left corner.
- **ARDF Exposure Glass**
  - Position the white marker at the rear-left corner.
- **Exposure Lamps**
  - Do not touch the new lamp directly by hand. Grease spots will cause poor scanning quality.

Slide 72

No additional notes

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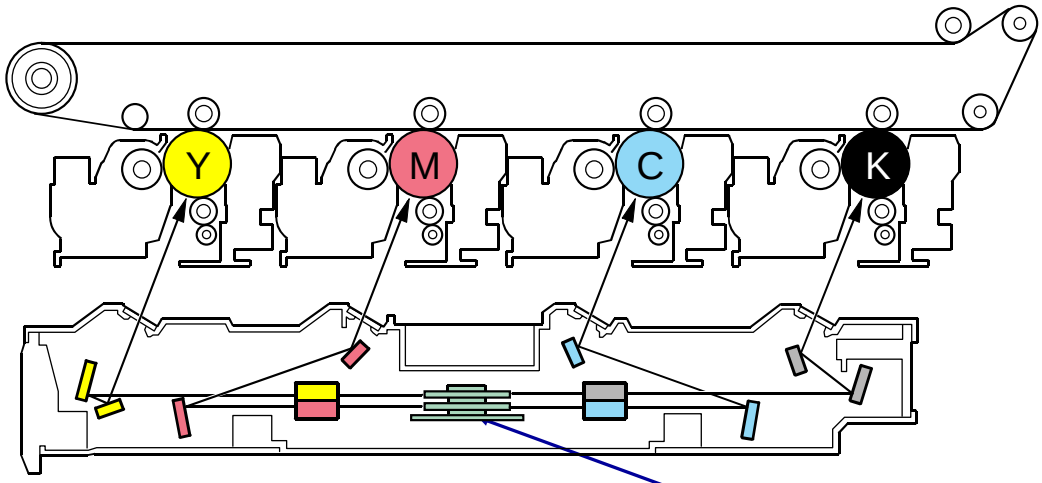
LASER EXPOSURE

Slide 73

❒ The optics and electronics in the laser unit will be described in this section.

Overview

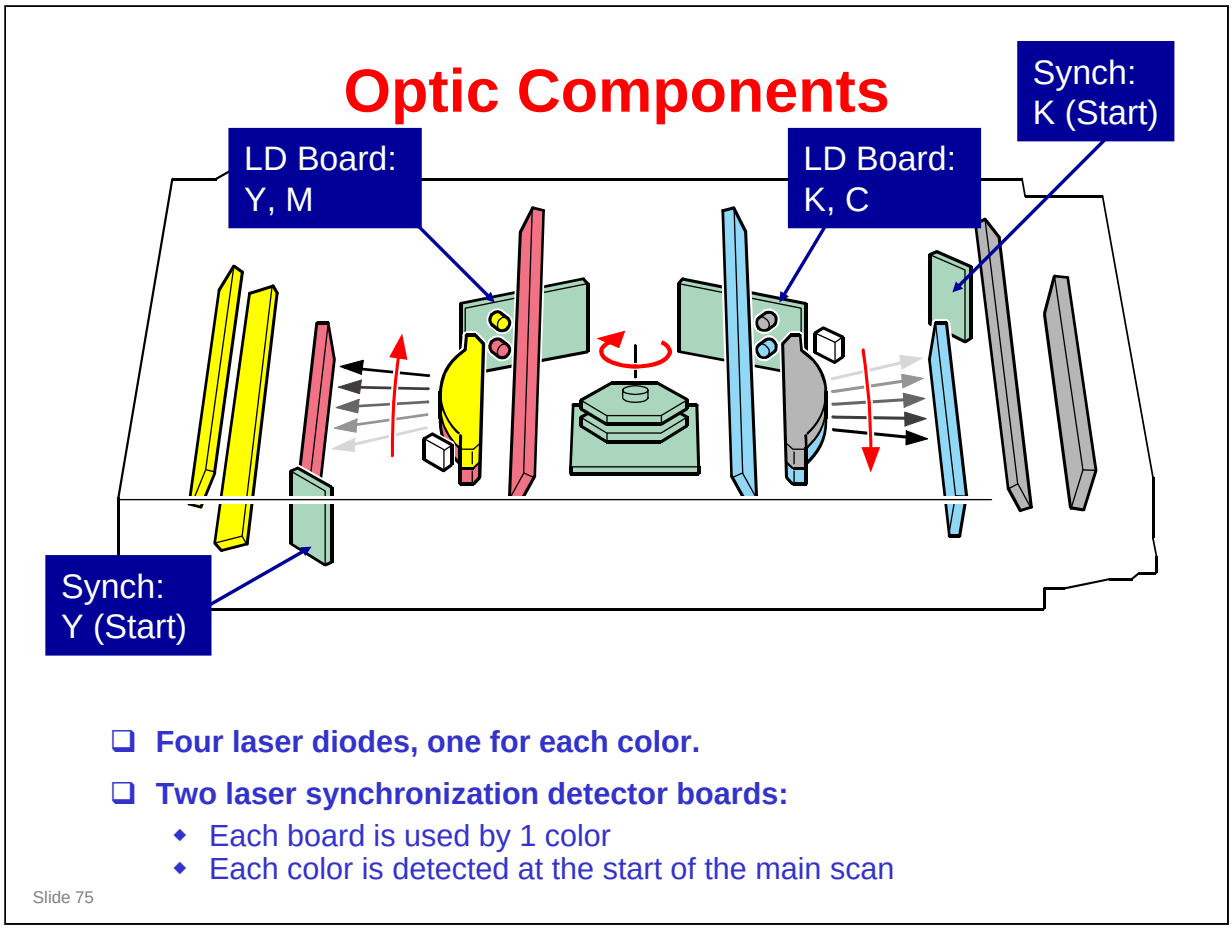


- **One laser beam for each color.**
- **Two polygon mirrors attached to the same motor.**
  - The upper mirror reflects yellow and black.
  - The lower mirror reflects magenta and cyan.

Polygon Mirrors

Slide 74

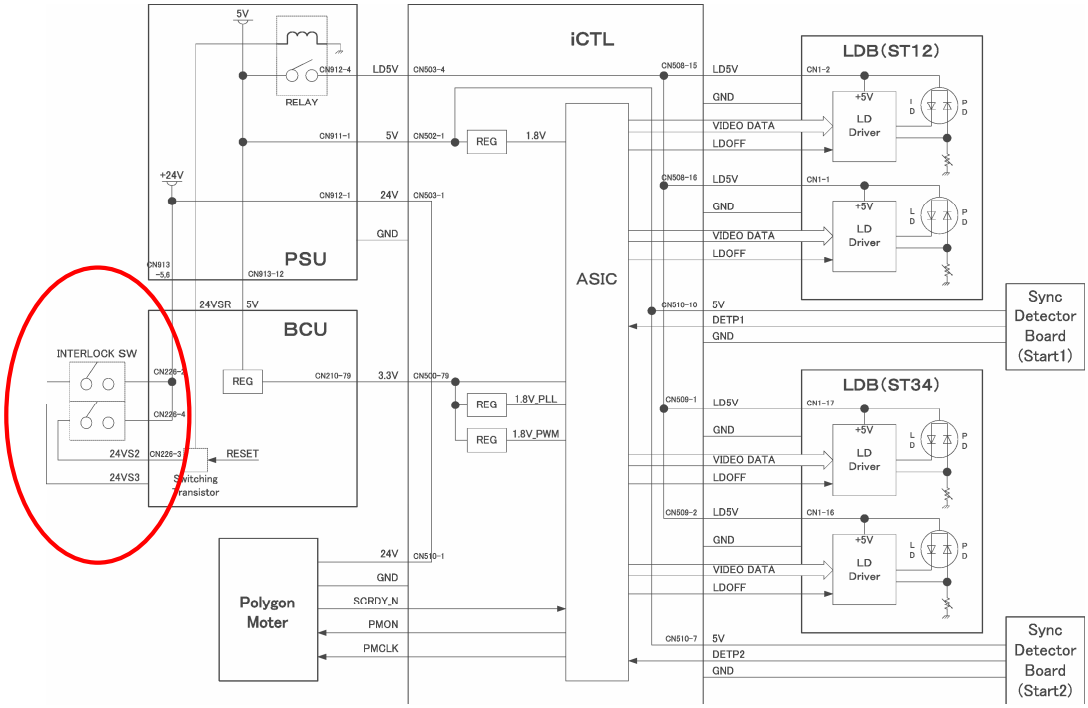
- This diagram does not show the LD units. A more complete diagram of the optics is on the next slide.



❒ Main scan synchronization for cyan is calculated by the CPU, based on the reading for K (black).

❒ Main scan synchronization for magenta is calculated by the CPU, based on the reading for yellow.

LD Safety Switches



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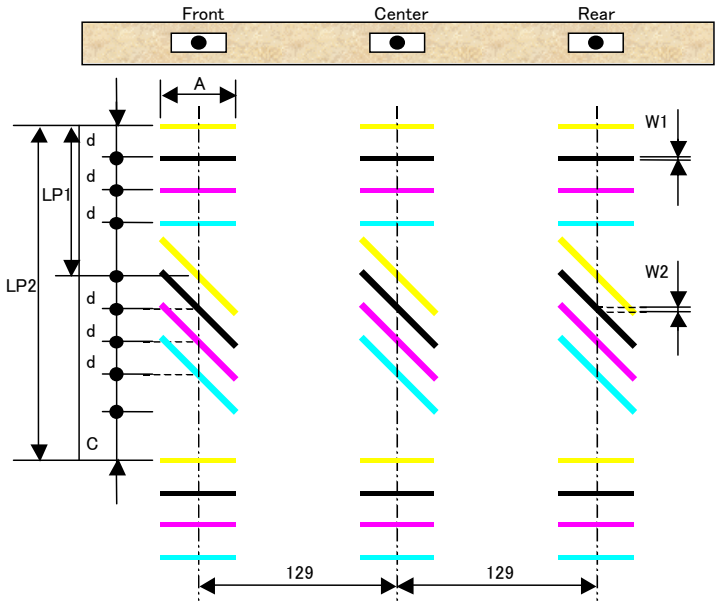
❒ Make sure that you understand how the cover switches cut the laser power.

Automatic Line Position Adjustment



❑ **During automatic line position adjustment, the line patterns above are created on the transfer belt.**

Slide 77

❒ The spaces between the lines are measured by the front, center, and rear ID sensors. The controller takes the average of the spaces. Then it adjusts the following positions and magnification.

- ➢ Sub scan line position for CMY
- ➢ Main scan line position for CMY
- ➢ Magnification ratio for CMY
- ➢ Skew for CMY

❒ The transfer belt-cleaning unit cleans the transfer belt after the patterns are measured. SC 285 shows if an error is detected three times consecutively.

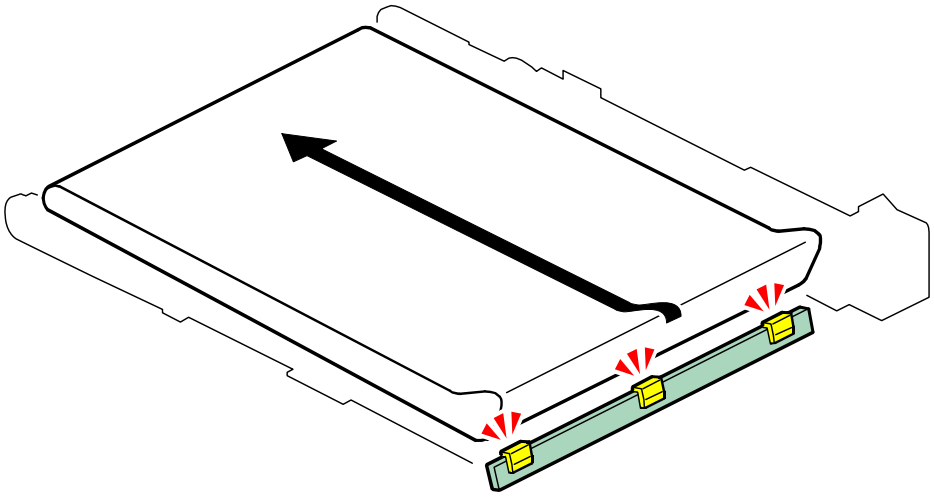
Automatic Line Position Adjustment

- **The spaces between the lines are measured by the front, center, and rear ID sensors. The controller takes the average of the spaces. Then it adjusts the following positions and magnification.**
  - Sub scan line position for CMY
  - Main scan line position for CMY
  - Magnification ratio for CMY
  - Skew for CMY
- **This process prevents:**
  - Color registration errors
  - Skew

Slide 78

- Color registration errors: These are when the four color toner images (CMYK) are not written exactly on top of each other)
  - Sometimes, this type of error is called ‘color shift’. This is not the correct term. Color shift is a change in the actual color.
  - In this model, the improved mechanisms have reduced color registration errors a lot. This means that the default setting for ‘black overprint’ is changed to ‘off’.
  - When black overprint is on, if there is black superimposed on a color image, the black toner is superimposed on the color toner image. This means that a lot of toner is deposited on the paper and scattering can occur.
  - When black overprint is off, if there is black superimposed on a color image, color toner is not deposited on the places where black toner will be. This reduces the quantity of toner. But, if color registration is not good, a white gap could appear at the border between the color toner area and the black toner area.
- Skew: The main scans of the four laser beams across the OPCs must be parallel. If not, the four color toner images will be skewed in relation to each other.

ID Sensors



- **Three ID sensors, on the ID sensor board:**
  - All three are used for line position adjustment
  - The one in the center is also used for process control
- **Do not wipe the sensors with a dry cloth. Use a cloth moistened with alcohol.**

Slide 79

No additional notes

More about the Adjustments

- **Sub scan line position for CMY**
  - The adjustment of the sub-scan line position for CMY is based on the line position for K (color registration).
    - » The machine measures the gaps between the lines of each color in the pattern on the transfer belt.
    - » If the gaps for a color are not correct, the machine moves the image of the color up or down the sub scan axis.
    - » To do this, it changes the laser write timing for that color.
- **Main scan line position for CMY**
  - If the machine detects that the image is out of position in the main scan direction, it changes the laser write start timing for each scan line.
- **Magnification adjustment for CMY**
  - If the machine detects that magnification adjustment is necessary, it changes the LD clock frequency for the required color.
- **Skew for CMY**
  - The adjustment of the skew for CMY is based on the line position for K.

Slide 80

No additional notes

Adjustment Conditions (1)

- **Initial:**
  - Immediately after the power is turned on, if one of the following conditions are met.
    - » Time after drum motor stops (SP3522-002)
    - » Temperature change since the previous line position adjustment (SP2193-008/011)
    - » Number of prints (SP2193-016) since the previous line position adjustment
  - When the machine recovers from the energy saver mode, if one of the following conditions are met.
    - » Time after drum motor stops or main power on (SP3522-002)
    - » Temperature change since the previous line position adjustment (SP2193-008/011)
    - » Number of prints (SP2193-016) since the previous line position adjustment
  - Done either once or twice (or not done), depending on temperature change since the previous line position adjustment.
  - The machine checks the above conditions at power on/recovery. Then, line position adjustment is done if one of the conditions occurs.

Slide 81

No additional notes

Adjustment Conditions (2)

- **During a job:**
  - The job is interrupted and the adjustment is done once, depending on:
    - » Time since the previous line position adjustment
    - » Temperature change since the previous line position adjustment
    - » Number of prints since the previous line position adjustment
  - The machine checks the above conditions every 5 pages (SP 3512 001). Then, line position adjustment is done if one of the conditions occurs.

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No additional notes

Adjustment Conditions (3)

- **At the end of a job:**
  - The adjustment is done once, depending on:
    - » Time since the previous line position adjustment
    - » Temperature change since the previous line position adjustment
    - » Number of prints since the previous line position adjustment
  - The machine checks the above conditions at the end of each job. Then, line position adjustment is done if one of the conditions occurs.

Slide 83

No additional notes

Adjustment Conditions (4)

- **When the front door is opened and closed:**
  - The adjustment is done once (or twice), depending on:
    - » Time since the previous line position adjustment
    - » Temperature change since the previous line position adjustment
  - The machine checks the above conditions after the front door is opened/closed. Then, line position adjustment is done if one of the conditions occurs.

Slide 84

No additional notes

Adjustment Conditions (5)

- **In standby mode (but not in energy saver mode):**
  - The adjustment is done once, depending on:
    - » Time since the previous line position adjustment
    - » Temperature change since the previous line position adjustment
    - » Number of prints since the previous line position adjustment
  - The machine checks the above conditions in standby mode every 10 minutes (SP 3512 002). Then, line position adjustment is done if two of the conditions occurs.
    - » Time and number of prints, or temperature and number of prints
- **New PCDU**
  - When the machine detects a new PCDU, line position adjustment is automatically done twice.

Slide 85

No additional notes

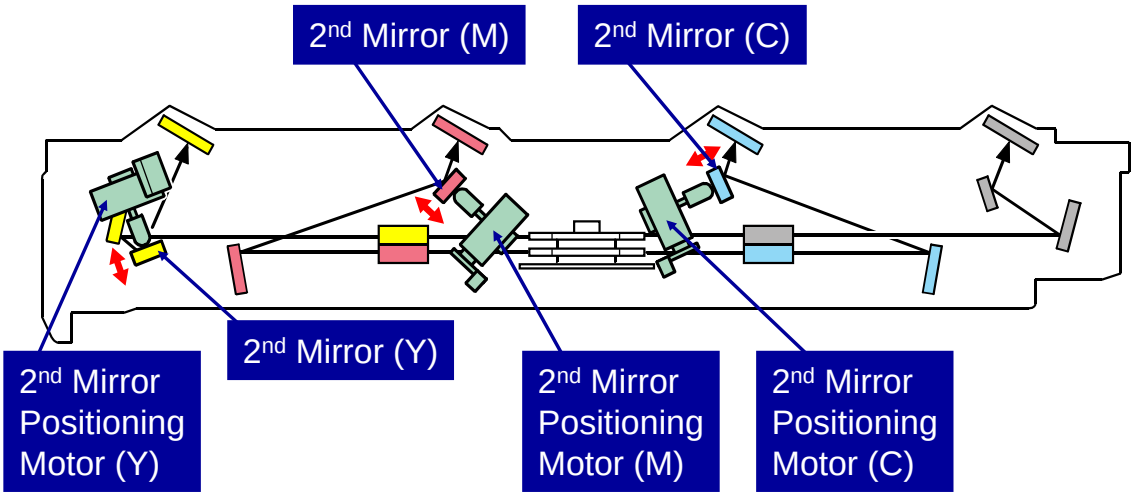
Adjustment Conditions (6)

- **Forced line position adjustment:**
  - You can do this at any time with SP 2111.
    - » It must be done after installing a new laser optics unit or polygon mirror, or after moving the machine.
  - There are three adjustments.
    - » 2111 001: Fine adjustment, twice
    - » 2111 002: Fine adjustment, once
    - » 2111 003: Rough adjustment, once
  - Normally, do SP 2111 003 first. Then do SP 2111 001.
    - » The screen displays the results of SP 2111 001. Also, you can see SP 2194 007 (0: Completed successfully, 1: Failed).
    - » If you do the rough adjustment, then you must follow immediately with the fine adjustment.

Slide 86

- If the error is more than 1.4 mm, the fine adjustment cannot correct it. The rough adjustment must be done, followed by the fine adjustment.

MUSIC - Main Scan Skew Correction

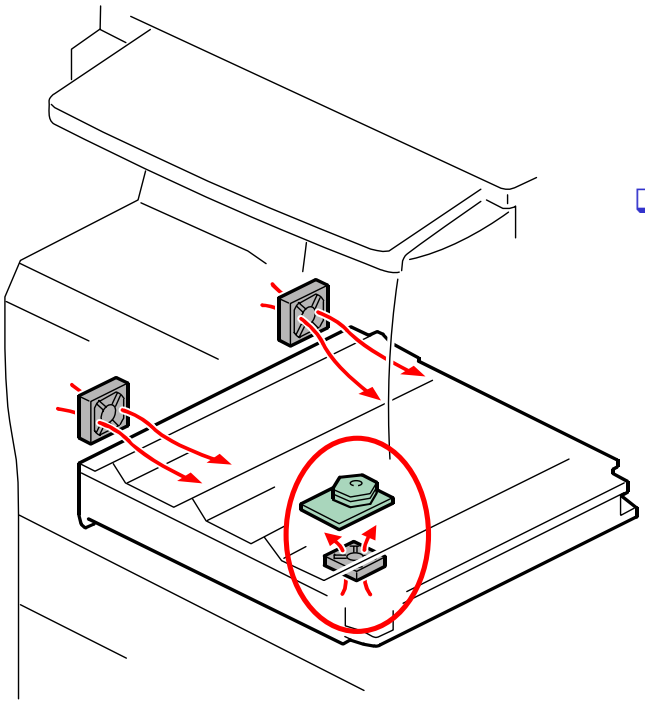


- **The 2nd mirrors for C, M, and Y each have a motor.**
  - The angle of each 2nd mirror can be adjusted by these motors.
  - The angle of the 2nd mirror for black is not changed.
- **AT-C1: The angle of the WTL lens is adjusted, not the 2nd mirror**

Slide 87

- The 2nd mirror positioning motors for magenta, cyan, and yellow adjust the angle of the 2nd mirror for these three colors, based on the 2nd mirror position for black.

Laser Unit Cooling



- One fan blows cool air into the laser unit.

Slide 88

- The other two fans in this diagram are for the development units.

Service Remarks

- SWITCH THE POWER OFF AND UNPLUG THE POWER CORD BEFORE STARTING WORK ON THE LASER UNIT
- Do not loosen the LD board securing screws.
- Do not adjust any of the VRs.
- Do not open the optical housing unit except when absolutely necessary for servicing.
- Do not touch the surfaces of the polygon mirrors.
- To avoid damage to the polygon motor, switch the machine off and wait 3 minutes to allow the motor to stop rotating before removing it.

Slide 89

No additional notes

Laser Optics Housing Unit Replacement (1)

- **First, prepare the new laser optics housing unit.**
- **Then, before you switch the machine off, you must make some SP adjustments.**
  - These adjustments move the 2nd mirror positioning motors back to home position.
  - If this is not done, the motors in the new unit will be at the home position, but the SP setting could be different. This could cause errors in skew correction.
  - After you install the new unit, you will do the forced line position adjustment, and this will set up the motors and SPs correctly.
- **Note: If you forget to do these SP adjustments, there is a recovery procedure in the manual.**
- **Then you can remove the old unit and install a new one.**
- **After you install the new unit, do the SP adjustments, and the line position adjustment, as explained in the manual.**

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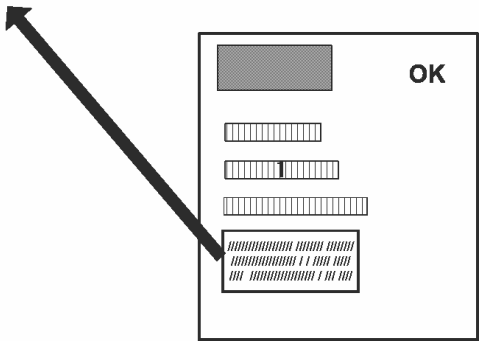
FSM, Replacement and Adjustment, Laser Optics

- This is a bit tricky, so make sure that you understand the points on this slide before you start the procedures.

Laser Optics Housing Unit Replacement (2)

Input data for SP modes
Color Regist Adjust Bk:Main Scan:Dot SP 2-101-001:xxx
Color Regist Adjust C:Main Scan:Dot SP 2-101-002:xxx



- The sheet that is packed with the new laser optics housing unit clearly shows which numbers to store in the SP modes.
- If that is not enough, look at the replacement procedure in the service manual for a full explanation.

Slide 91

No additional notes

Polygon Mirror Motor

- After you install a new unit, you must do the forced line position adjustment (SP 2111 003, then 2111 001).

Slide 92

No additional notes

Image Adjustments

- **FSM → Replacement and Adjustment → Image Adjustments**
  - These image adjustments must be done after replacing the laser optics housing unit or the polygon mirror motor.

Slide 93

No additional notes

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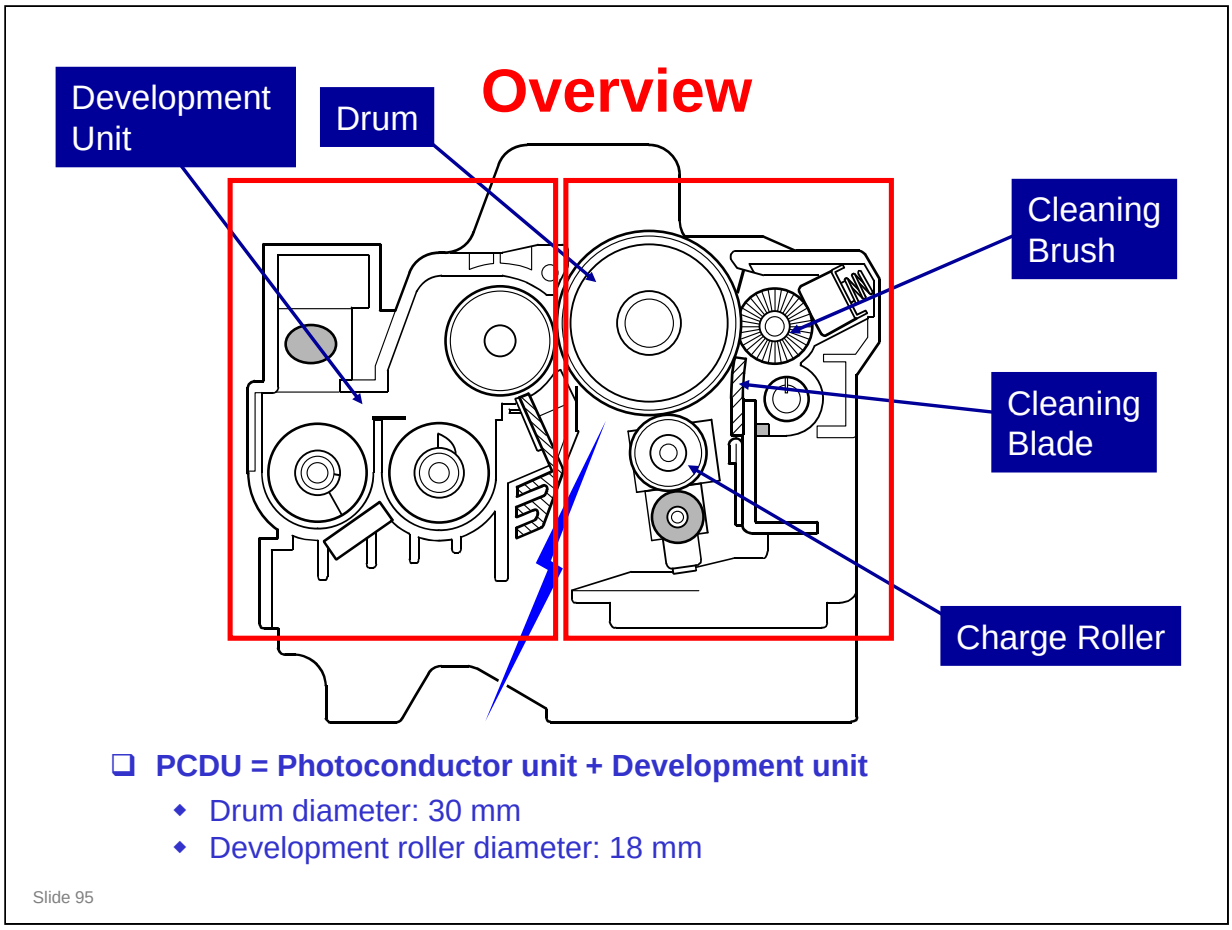
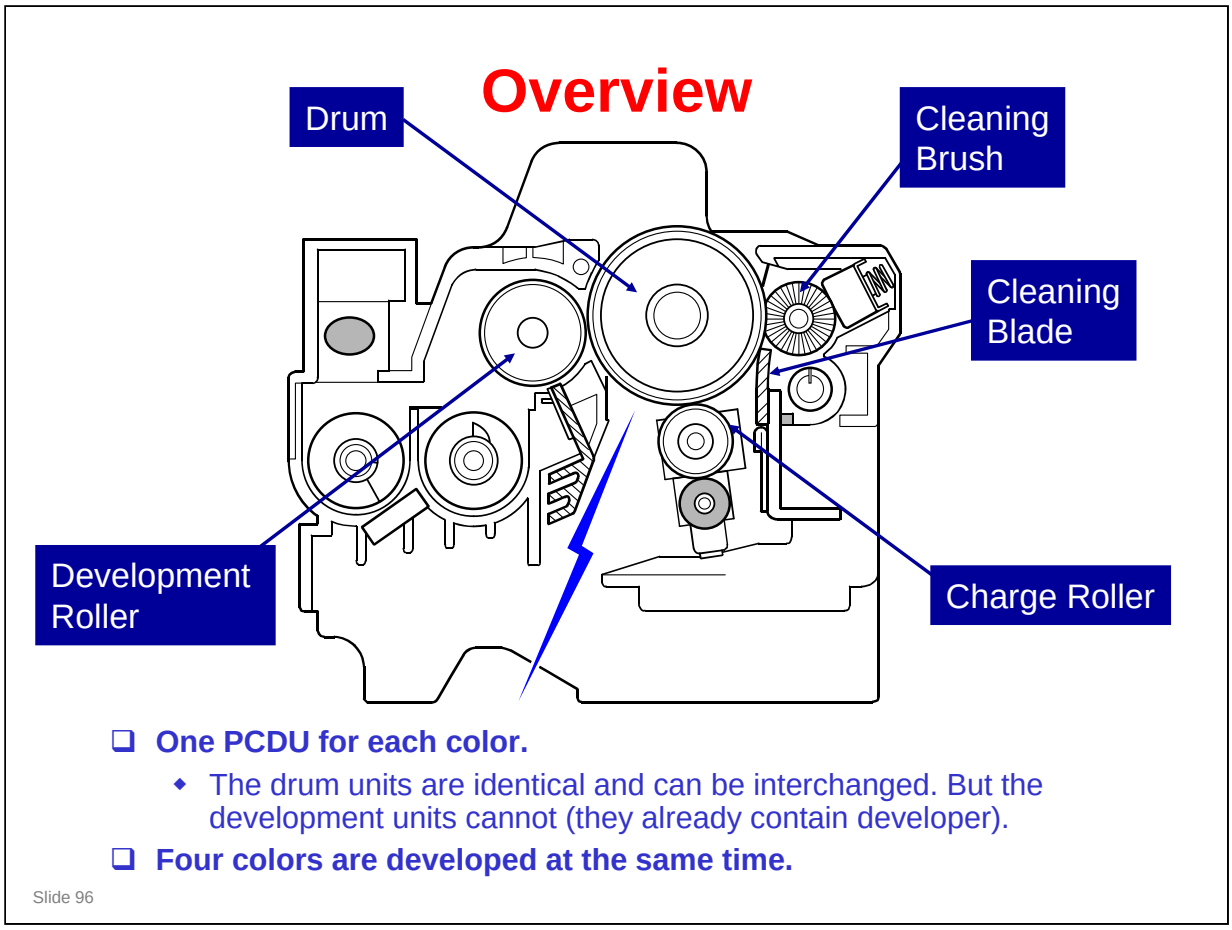
PCDU

Slide 94

No additional notes



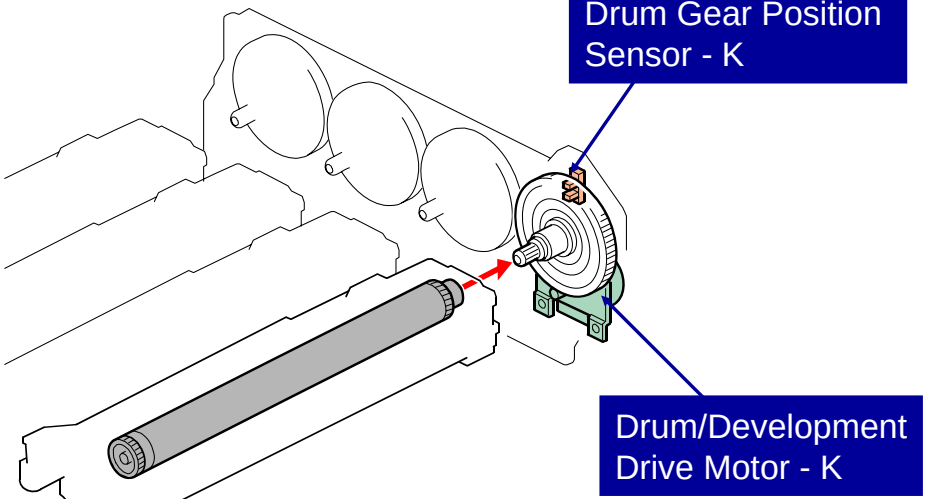
- The PCDU is divided into two parts, as shown by the red boxes on this slide. These two parts are the development unit (on the left) and the drum unit (on the right).
- The drum units are the same for each color. However, the development units already contain developer, so they are not interchangeable.



❒ This shows the most important components of the PCDU.

❒ The image transfer roller (not shown here) pulls the toner off the drum and onto the transfer belt.

Drum Drive - K

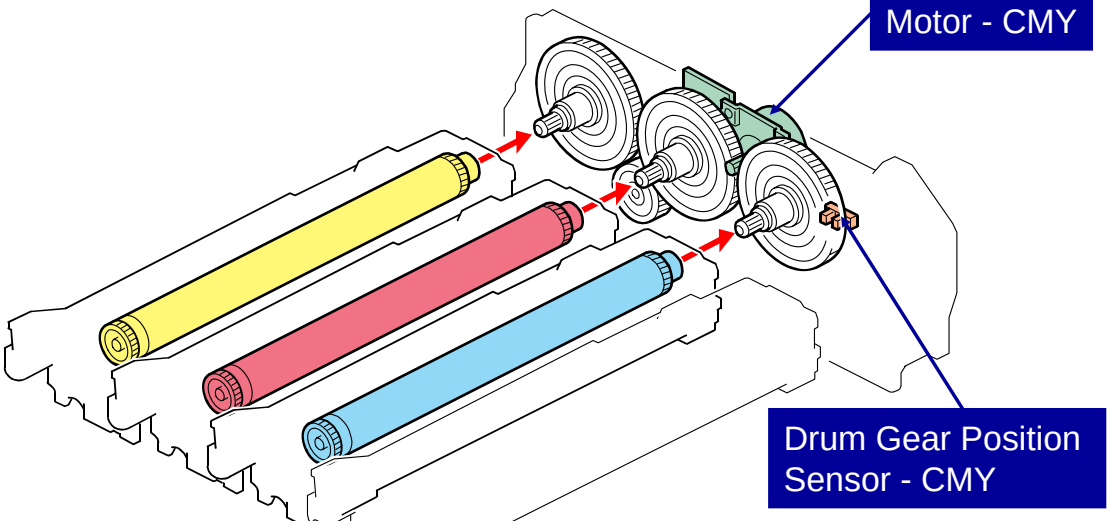


- **The same motor drives the drum and development units for K.**
- **The drum gear position sensor detects when the motor is not working.**
  - It also makes sure that the drum gear is at the correct angle when printing starts.
  - This prevents variations in print quality caused by incorrect gear meshing at the start of the job.

Slide 97

- SC380 occurs if the sensors detect that the drums are not turning.

Drum Drive - CMY

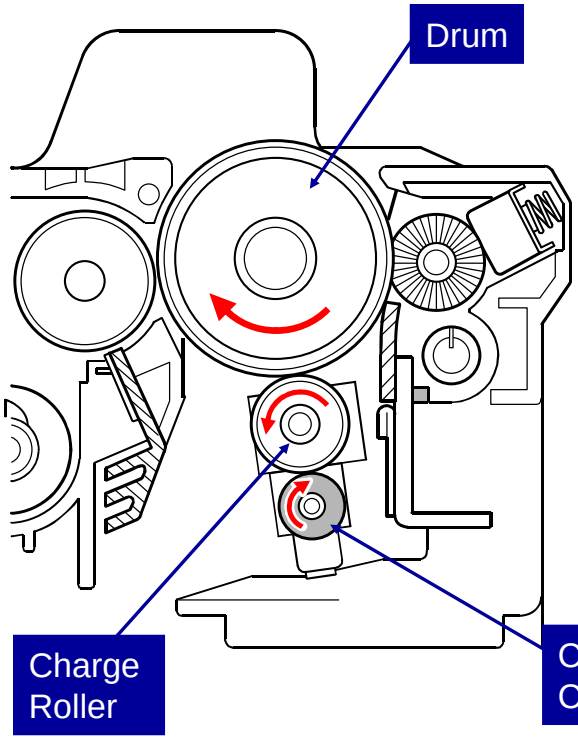


- **This motor drives three drums.**
  - It does not drive the development units.
- **The drum gear position sensor detects when the motor is not working.**
  - It also makes sure that the drum gear is at the correct angle when printing starts.

Slide 98

- The function of the gear position sensor is similar to the sensor for black.
- The motor drives all three color drums. This reduces color alignment errors.
- The two gear position sensors (K, CMY) work together. Both gears must be at home position at the start of the job. If there is an error, the position of the black gear is corrected to match the position of the CMY gear.
  - The mechanism is initialized after every 30 jobs.

Charge Roller



- The charge roller does not contact the drum. There is a very small gap between the charge roller and drum.
- The cleaning roller always contacts the charge roller.

Slide 99

No additional notes

Charge Roller Voltage

- The charge roller gives the drum surface a negative charge.
- An ac voltage is also applied to the charge roller, at a constant current.
  - The ac voltage helps to ensure that the charge given to the drum is as uniform as possible.
- The high voltage supply board - C.B, at the rear of the machine, supplies the ac and dc to the charge roller.
- The machine automatically controls the charge roller voltage if automatic process control is enabled.

Slide 100

No additional notes

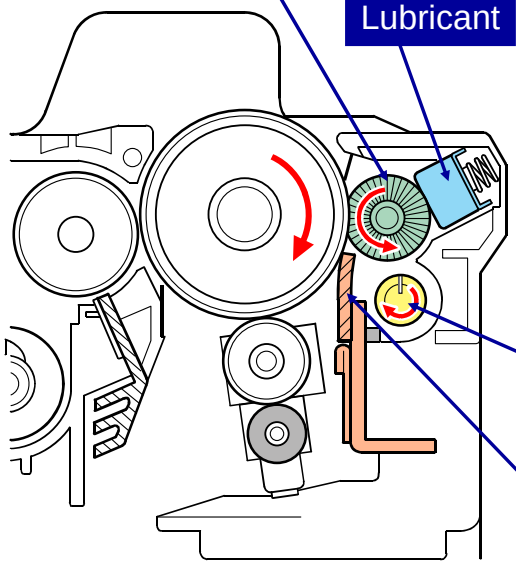
Quenching

- The laser exposes all areas of the drum at the end of each job.
- This removes any charges remaining on the drum.

Slide 101

No additional notes

Drum Cleaning

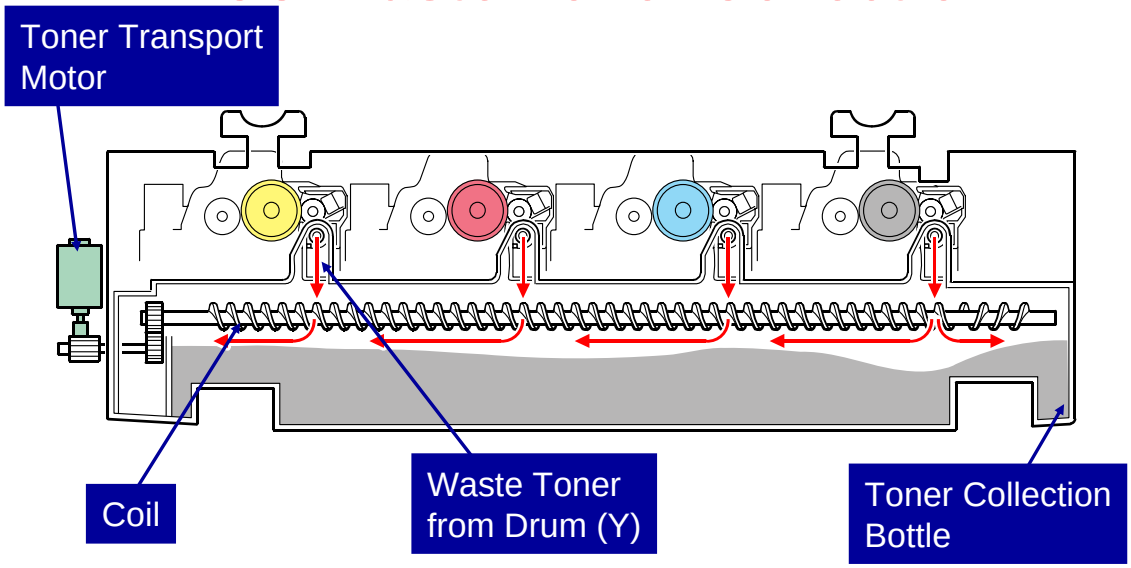


- **The cleaning blade removes remaining toner from the drum.**
  - This toner falls onto a collection coil, and is discarded.
- **The cleaning brush applies lubricant to the drum.**
  - The cleaning blade spreads this lubricant.

Slide 102

- The waste toner collection mechanism from the drum is on the next slide.
- The waste toner from the transfer belt goes to a different bottle.

PDCU Waste Toner Collection

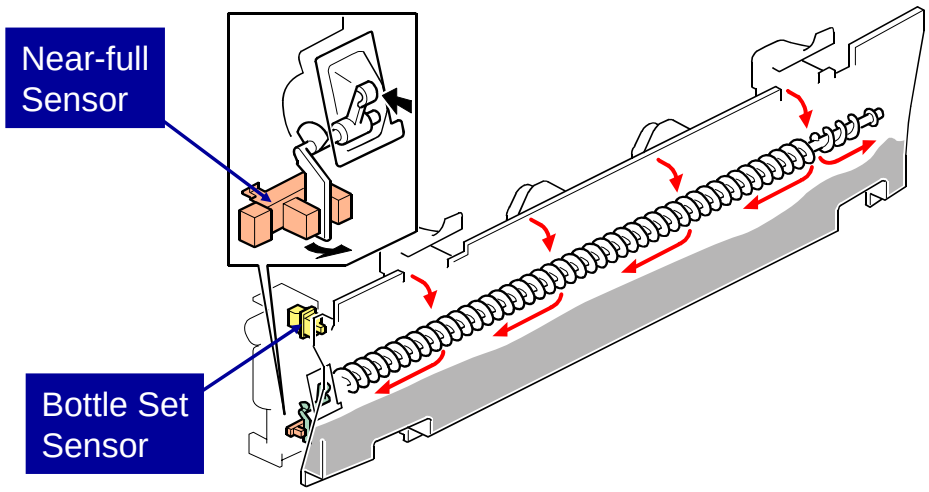


- **Waste toner from the four drums falls onto a coil.**
  - The toner transport motor drives this coil.
- **The coil distributes the toner evenly inside the toner collection bottle. This makes sure that toner does not pile up unevenly.**

Slide 103

- The gears at the end of the drum drive the toner collection coil inside each drum unit.
- The image transfer unit has a separate bottle for collecting waste toner.
- The mechanism is similar to the G-P3.
  - In the AT-C1, toner from all four drums is collected in one coil before it goes to the bottle. In the G-P3/Di-C1, there are four openings in the bottle, and toner goes directly from the drum into the bottle, and is distributed by coils inside the bottle.

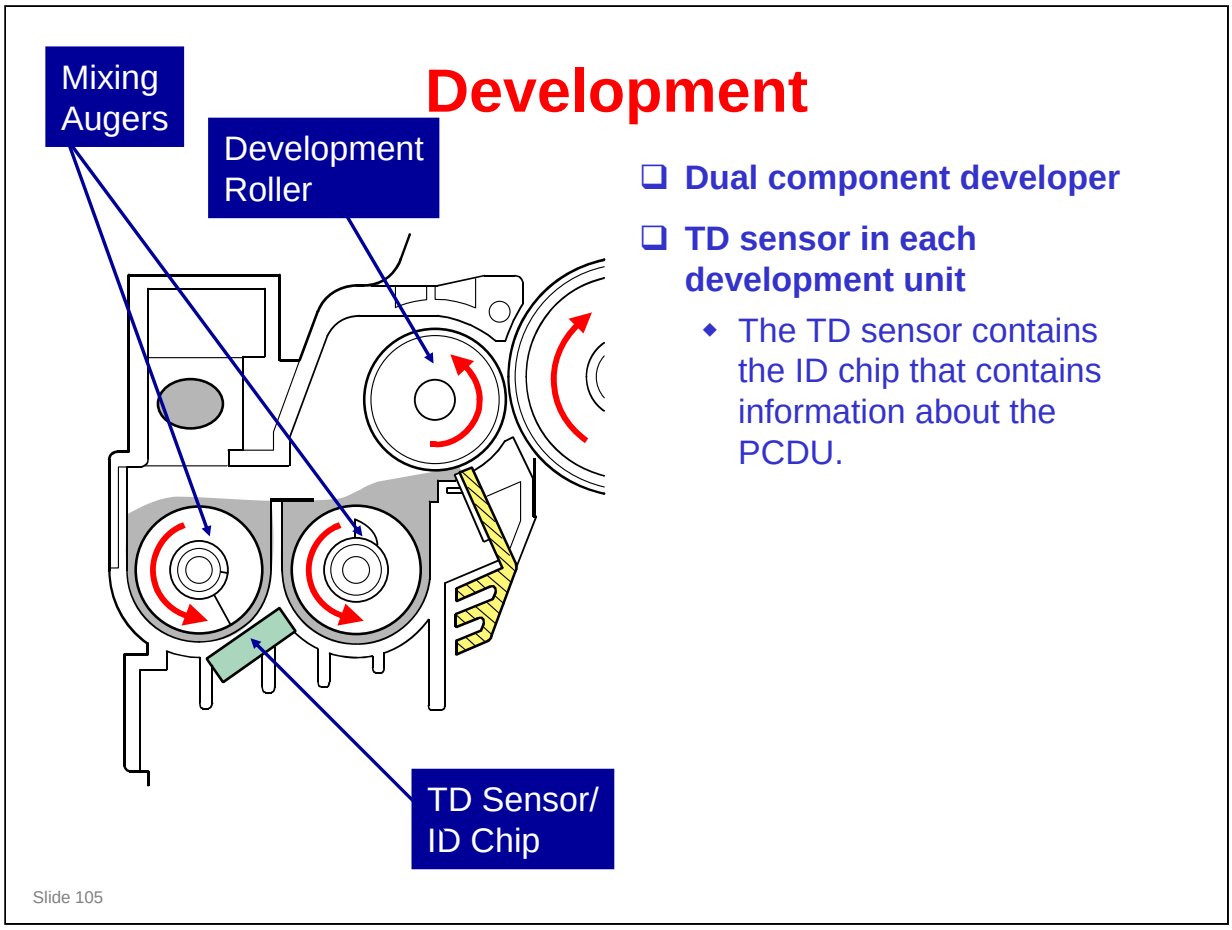
Toner Bottle Detection/Full Detection



- When the waste toner sensor detects the actuator, the 'near-full' condition occurs.
- The machine can make about 2000 more copies (2 prints/job, 20% color ratio, 5% coverage). Then the 'full' condition occurs and the machine stops.

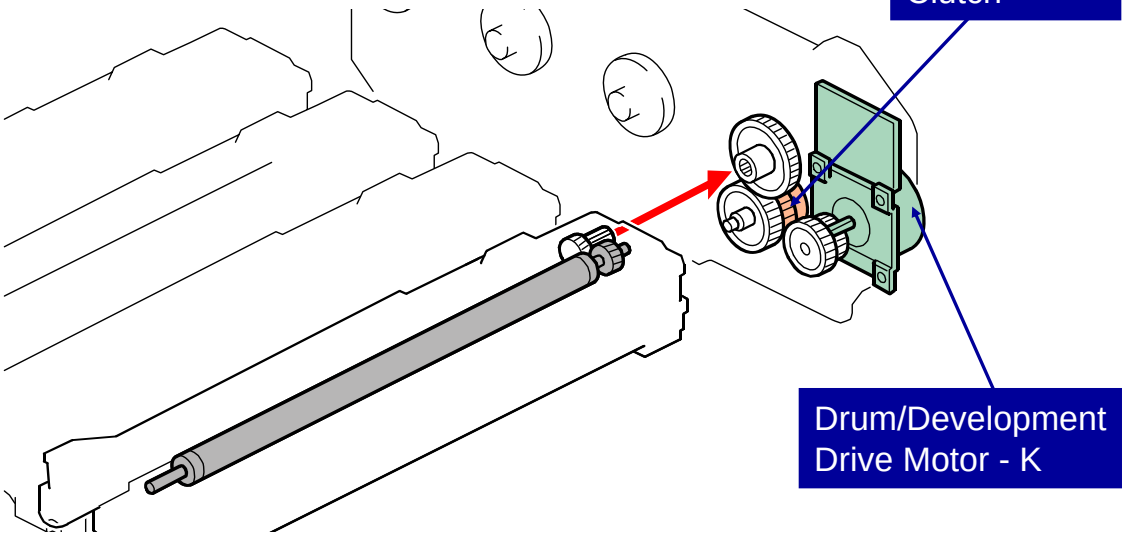
Slide 104

- Bottle full is detected by estimating toner coverage since near-full was detected. It does not count 2000 sheets.



No additional notes

Development Drive - K

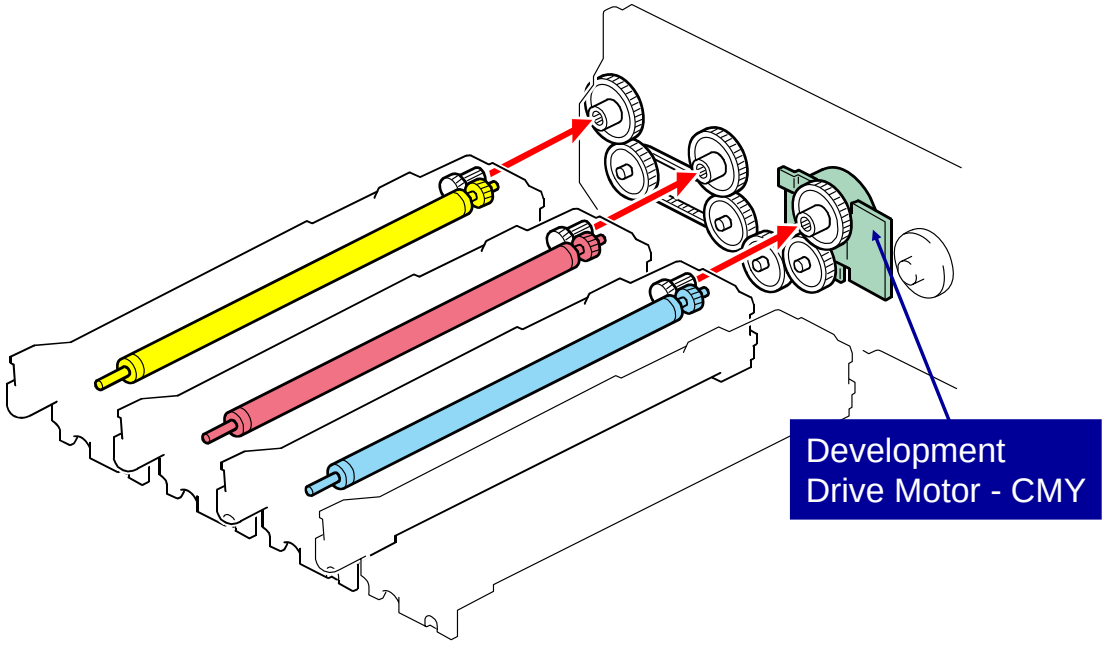


- **The drum/development drive motor controls the K development unit.**
  - This motor also controls the K drum, so a clutch is necessary.

Slide 106

No additional notes

Development Drive - CMY

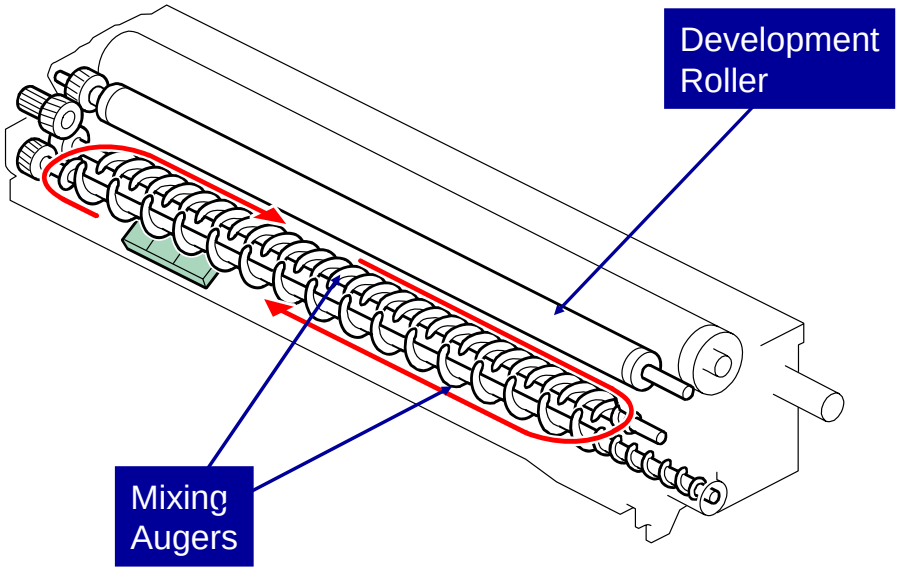


❑ **This motor drives the C, M, and Y development units.**

Slide 107

❒ This motor does not control the drums, so no clutch is necessary.

Developer Agitation



- **Two augers circulate the toner in the development unit during development, during toner supply, and during process control self checks.**

Slide 108

- This diagram shows how the augers move the toner around inside the development unit.

Development Unit Storage

- If the development unit was stored at more than 40°C, the developer can become solid.
- If this occurs, you will get a developer initialization error at installation.
- At this time, you must do the following procedure:
  - You should also do this procedure when you install a new development unit.
- 1. Remove the (old) development unit.
- 2. Hold the (new) development unit level and shake it several times from side to side.
- 3. Install it in the machine.

Slide 109

No additional notes

Refresh Mode

- While making prints with low coverage, the developer is agitated with less toner consumption and the toner carrier attraction tends to increase. This may cause low image density or poor transfer (white dots).
- To prevent this, the coagulated toner or overcharged toner must be consumed. To do this, 'refresh mode' is done when the total number of prints with low coverage gets to a certain level.
- In 'refresh mode', the machine makes a band for each color to consume some of the toner in the development unit and add fresh toner from the cartridge.

Slide 110

- SP 3516 controls this feature. Do not adjust.

New Unit Detection (1)

- **The TD sensor assembly contains the ID chip. This chip tells the machine if the PCDU or development unit is new or not.**
- **When the machine detects a new PCDU or development unit, the machine automatically does the following:**
  - PM counter clear for items related to the PCDU
  - Developer initialization
  - Charge roller voltage control
  - Process control
  - Line position adjustment

Slide 111

- SP 3901: Turns new PCDU detection off

New Unit Detection (2)

- **If you install a new drum unit only, the machine does not detect it automatically.**
  - Then, you must reset the PM counter for the drum unit.
  - To do this, set SP 3902 009 (K), 010 (C), 011 (M), or 012 (Y) to 1 before you start to work on the machine.
- **If you install a new development unit only, the machine detects it automatically and resets the PM counter. But, the ID chip in the new development unit will also reset the PM counter for the drum if you do not do the following:**
  - Set SP 3902 001 (K), 002 (C), 003 (M), or 004 (Y) to 1 before you start to work on the machine.
- **If you install a new PCDU, the machine detects it automatically. Do not change SP 3902.**

Slide 112

Summary

- If you replace the PCDU, do not change SP 3902
- If you change only the drum unit, set SP 3902 009 (K), 010 (C), 011 (M), or 012 (Y) to 1 before you start to work on the machine.
- If you change only the development unit, set SP 3902 001 (K), 002 (C), 003 (M), or 004 (Y) to 1 before you start to work on the machine.

ID Chip

- The ID chip is part of the TD sensor assembly.
- The ID chip contains counters and other data about the PCDU, drum unit, and development unit.

Slide 113

No additional notes

Replacement and Adjustment

❑ Development Unit

- Do the ACC procedure after the developer initialization is finished.
  - » User tools → Maintenance → ACC → Start

Slide 114

- ❒ Under normal conditions, the life of the developer is the same as the machine, so it is not necessary to replace.
- ❒ Do the ACC procedure after developer initialization. This ensures that the machine's color characteristics are maintained.
- ❒ An explanation of the codes displayed by SP3014 001 is in the Process Control Error Conditions appendix of the FSM.

Replacement and Adjustment

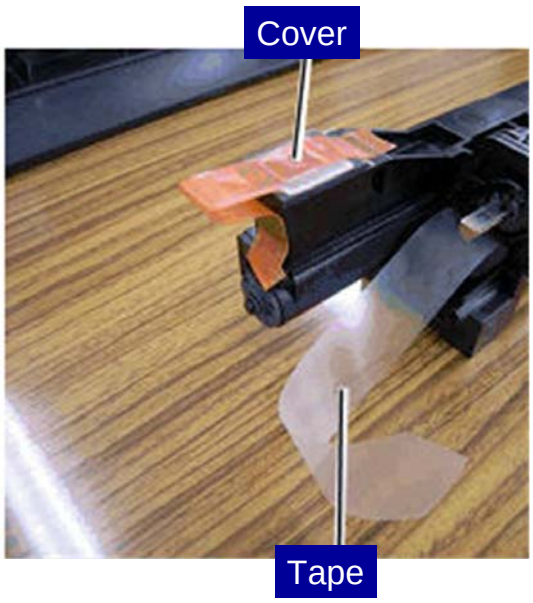
❑ PCDU Toner Collection Bottle

- If you replace the bottle after the machine detects that it is full or near-full, the machine automatically resets the PM counter for the bottle after replacement.
- But, if you replace a bottle that is not full or near-full, then you must reset the PM counter for this unit. To do this, set SP 3902 -1 to -19 before you start to work on the machine.

Slide 115

No additional notes

Replacement and Adjustment



- **When installing a new PCDU**
  - Remove the cover on the toner inlet and pull out the tape from the new development unit before installing a new PCDU in the machine.

Slide 116

No additional notes

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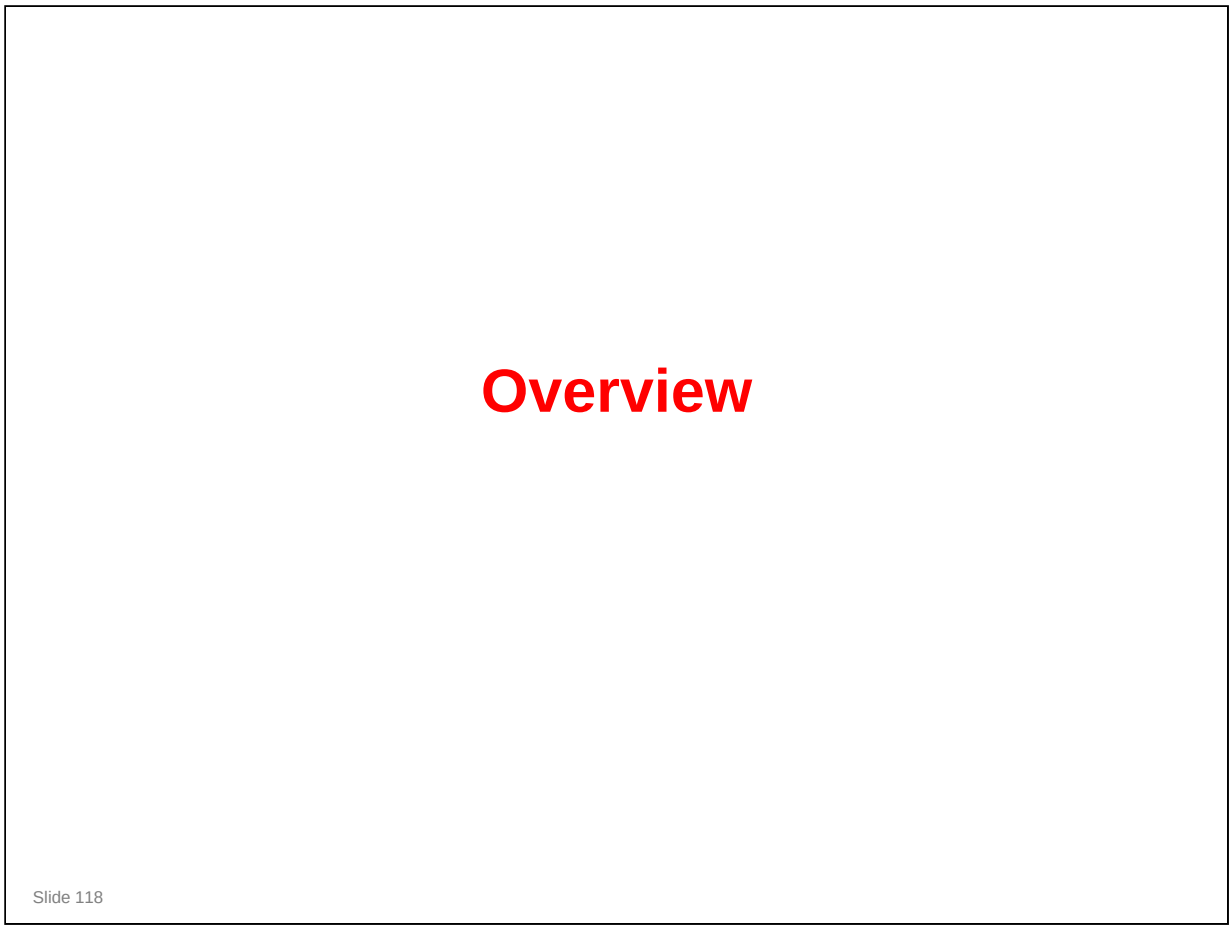
PROCESS CONTROL

Slide 117

❒ Process control will be described briefly in this section.



No additional notes

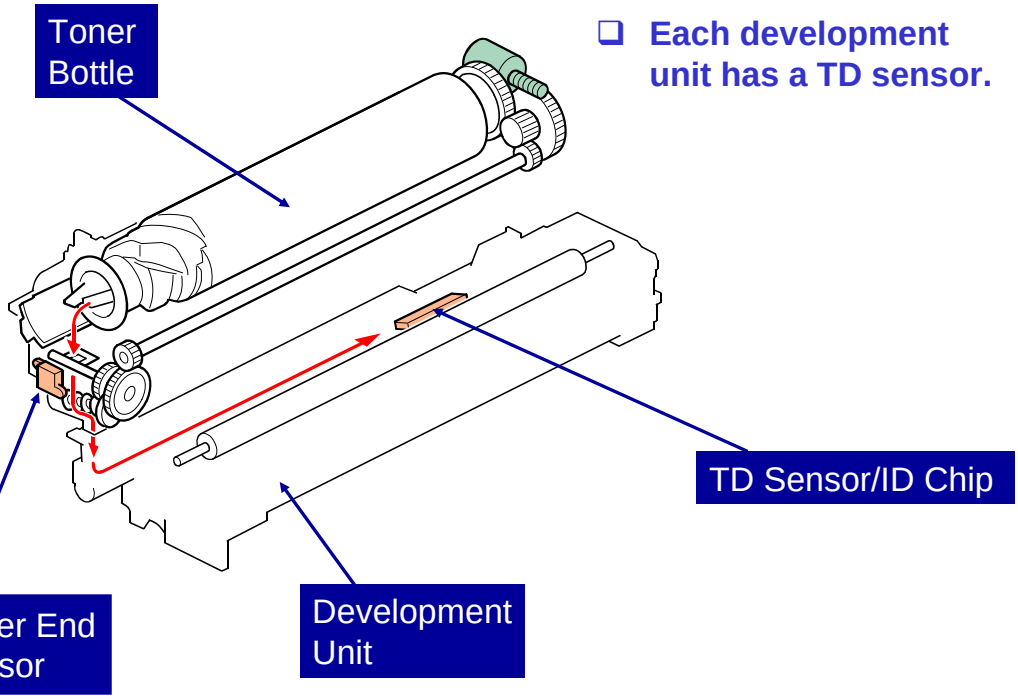
What is Done?

- **This machine has two forms of process control.**
  - Potential control
  - Toner supply control
- **Process control uses these components:**
  - The central ID sensor
    - » There are three ID sensors. Only one is used for process control
  - Toner density sensor

Slide 119

- Line position adjustment: This process prevents color registration errors and skew. It is described in the Laser Exposure section.

TD Sensor



Slide 120

No additional notes

Potential Control

Slide 121

No additional notes

Overview

- **The machine determines the best possible V_D, V_B, and V_L, based on current machine conditions.**
  - V_D: Drum potential without exposure – to adjust this, the machine adjusts the charge roller voltage.
  - V_B: Development bias
  - V_L: Drum potential at the strongest exposure – to adjust this, the machine adjusts the laser power
- **At the same time, the machine also determines V_{TREF}: Reference TD sensor output, used for toner supply control.**

Slide 122

No additional notes

When is it Done? (1)

- **Initial:**
  - Immediately after the power is turned on, or when the machine recovers from the energy saver mode.
  - Done if one of these conditions occurs:
    - » Temperature has changed by more than a certain amount after the drum motor stopped.
    - » Humidity has changed by more than a certain amount after the drum motor stopped.
    - » 250 b/w or 100 full color prints were made since the previous adjustment (SP 3511 005/006).
      And
      The machine was not used for more than 6 hours (SP 3522 002).

Slide 123

- The threshold levels are set by SP modes.
- No process control before or after ACC.

When is it Done? (2)

- **At the end of a job:**
  - Done if 250 b/w or 100 full color prints were made since the previous adjustment (SP 3515 001/002).
- **During a job:**
  - Done if 500 b/w or 200 full color prints were made since the previous adjustment (SP 3515 003/004).
    - » The machine checks the above condition every 5 pages (SP 3512 001). Then, potential control is done if the condition occurs.
  - Done every 20 pages (A4) or every 10 pages (A3) if the following two conditions both occur:
    - » Temperature is higher than 30 ° C (SP 3-520-010) or lower than 15 ° C (SP 3-520-011)
    - » Pixel coverage is more than 20% for any one color (SP 3-224-017 [high temperature]/018 [low temperature])
  - Done every 10 pages (A4) or every 5 pages (A3) if the following two conditions both occur:
    - » 60 mm/s mode (1200 dpi, OHP/Thick Paper)
    - » Pixel coverage is more than 10% for any one color (SP 3-224-022)

Slide 124

- During a job: This process control is longer than other process controls; it takes 40 seconds
  - At 14 pages, a flag is set. This flag is checked every 5 pages. Then, if a condition occurs that requires process control, and the flag happens to be set, process control is done.

    If the flag is checked every 5 pages, why is the first check at 20 pages and not 15 pages? The machine does not have time to prepare for process control between page 14 and page 15. So process control is done at the next 5-page interval (page 20).
  - AT-C1: The flag is checked every 30 sheets.
- You cannot adjust the intervals with SP 3515 001 to 004. These SPs only show the current settings. To change the current settings, you must adjust SP 3511 001 to 004 (base value) and SP 3511 022 to 029 (coefficients)

When is it Done? (3)

- **After replacing the development unit:**
  - Process control occurs automatically
- **After replacing the following units, process control must be done manually with SP 3-902 (PM counters are reset then process control is done)**
  - ITB unit
  - ITB cleaning unit (if the waste toner bottle is not detected as full or near-full)
  - Drum unit
- **Forced (manual execution):**
  - Use SP 3011 001
  - Process control counters (SP 3510-003/004) are not reset after a forced execution

Slide 125

No additional notes

Toner Density Adjustment Mode

Overview

- Process control adjusts the toner density so that the density of each color in the image is correct.
- But, sometimes, process control adjusts the toner density too slowly, and the first few copies after process control have incorrect toner densities.
- Toner density adjustment mode brings toner concentrations to the correct values much more quickly.

Slide 126

No additional notes

Toner Density Adjustment Mode

What is Done?

- **The machine makes sensor patterns and checks the current development gamma.**
- **Development gamma too low: If the following condition occurs, the machine increases the toner density. To do this, it supplies toner to the development unit.**
  - Current gamma < Target gamma - 0.15 (SP3-239-012)
- **Development gamma too high: If the following condition occurs, the machine decreases the toner density. To do this, it consumes some of the toner in the development unit.**
  - Current gamma ≥ Target gamma + 0.15 (SP3-239-009)

Slide 127

- These two methods of toner density adjustment are called ‘toner supply mode’ (confusing!), and toner consumption mode.

Toner Density Adjustment Mode

When is it Done?

- **After power-on (toner supply mode only, no consumption)**
- **Before ACC**
  - In this way, the customer can execute the toner density adjustment mode, if they think that color balance is not good. It becomes part of the ACC process.
- **At end of job (toner supply mode only, no consumption)**
- **The machine has a forced toner density adjustment mode (SP 3011 002).**

Slide 128

- SP 3043 can be adjusted to control when toner density adjustment mode is done, or disable the feature at each of the times listed on the slide.
- In addition to the times stated on the slide, it is possible to do toner density adjustment in standby mode (3043 003).

Time Required for Process Control

- **The customer may ask why the machine stops for a significant time.**
  - Initial start-up
    - » Process control: about 30 seconds
  - During a job
    - » Process control: about 30 seconds
  - At the end of a job
    - » Full color Job end Process control: about 11 seconds
    - » B&W Job end Process control: about 6 seconds

Slide 129

- For 1200 dpi/OHP/Thick paper mode, it is always approx 30 seconds.
- Toner adjustment mode can add anything up to an extra minute, depending on the conditions.

Comparison with AT-C1:

- For process control that is done just after a print job, note that the time is reduced to 11 seconds (for full color) or 6 seconds (for black-and-white jobs). For the AT-C1 it was always 20 seconds.
- Why is it quicker? The sensor pattern is made while the last page of the job is still feeding out of the machine. In the AT-C1, the machine waits until the paper is completely fed out before the patterns are made. Also, for black and white, the Di-C1 only makes the black sensor pattern.

Toner Supply Control

Slide 130

No additional notes

Overview

- **Uses these components:**
  - TD sensor: Detects how much toner there is in the developer
  - ID sensor: Measures the density of standard sensor patterns during process control.
  - Pixel counter: Counts pixels to determine how much toner for each color is used on the page
- **The result of toner supply control determines how long the toner supply motor turns on for.**
  - This determines the amount of toner supplied.
- **This is done before every development for each color.**

Slide 131

No additional notes

Toner Supply Control Modes

- **This machine uses 5 toner supply modes. The mode used depends on SP3-044-001 to -004.**
- **These are the five modes:**
  - PID control mode
  - PID control mode with fixed VTREF
  - Fixed supply mode
  - MBD control mode: This is the default mode.
  - MBD control mode with fixed VTREF
- **You can select a different mode for each color, if necessary.**
  - Use SP 3-044 if the TD sensor and/or ID sensor breaks and no spare part is available.
  - After replacing the part, return the SP setting to the default.
  - See the next slide for details.

Slide 132

- MBD control mode is a new one. It was not used in Athena-C1/C2. For more, see the next slide.

Toner Supply Control

- **PID control mode**
  - Uses the TD sensor, ID sensor, and pixel count.
  - VTREF is adjusted by process control.
- **PID control mode with fixed VTREF**
  - Change to this mode if the ID sensor breaks.
  - This mode uses only the TD sensor.
  - VTREF is fixed at the value stored in SP3-222-001 to –004.
- **Fixed supply mode**
  - Change to this mode if the TD sensor breaks.
  - The amount of toner supplied depends on SP3-401-001 to –004.
  - The default is 70% of normal supply, to prevent excessive supply of toner.
- **MBD control mode: This is the default mode.**
  - Uses the TD sensor, ID sensor, and pixel count.
  - VTREF is adjusted by process control.
- **MBD control mode with fixed VTREF**
  - Change to this mode if the ID sensor breaks.
  - This mode uses only the TD sensor.
  - VTREF is fixed at the value stored in SP3-222-001 to –004.

Slide 133

- Use SP 3-044 if the TD sensor and/or ID sensor breaks and no spare part is available.
- After replacing the part, return the SP setting to the default.
- MBD (Model Based Differential) is similar to PID mode, except the formula is different, and tuned for each model. PID uses the same formula for each model, so MBD is more accurate in theory.

Other SP Modes

Slide 134

- A lot of SPs were already discussed. Here are other SPs related to process control.

Potential Control – Others

- **Enable/disable**
  - 3041 001: Potential control, enable/disable
  - 3041 002: LD power control, enable/disable
  - 3041 004: What type of process control is done before ACC (default: TD adjustment only)
- **Forced process control**
  - 3011 001: Normal process control, manual execution
  - 3011 002: Toner density adjustment mode, manual execution
  - 3321: ID sensor initialization
- **Results**
  - 3012: Process control results (YMCK)
  - 3014: Developer initialization results (4 digits, YMCK)
  - 3325: ID sensor initialization result (Front, Center, Rear)

Slide 135

- In this machine, the TD sensor is not initialized, except during developer initialization. This is because the sensor is in a place where it does not get dust/toner on it.

What Values are used if Potential Control is Disabled?

- **If potential control is disabled (SP3-041-001 is set to 0), V_D and V_B are fixed by SP mode settings.**
  - SP2-005 for V_D , SP2-229 for V_B
- **If LD power control is disabled (SP3-041-002 is set to 0), the LD power is fixed by an SP mode setting.**
  - SP2-221 for V_L

Slide 136

No additional notes

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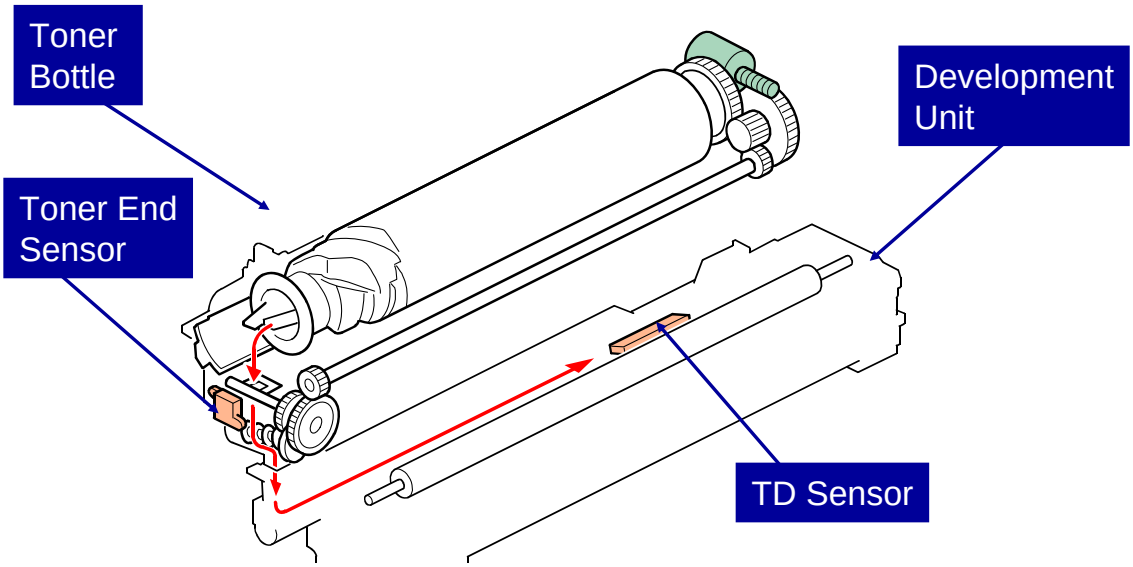
TONER SUPPLY

Slide 137

- In this section, the mechanical components of the toner supply system will be described.
- Toner supply control was explained in the Process Control section of the course.

Overview

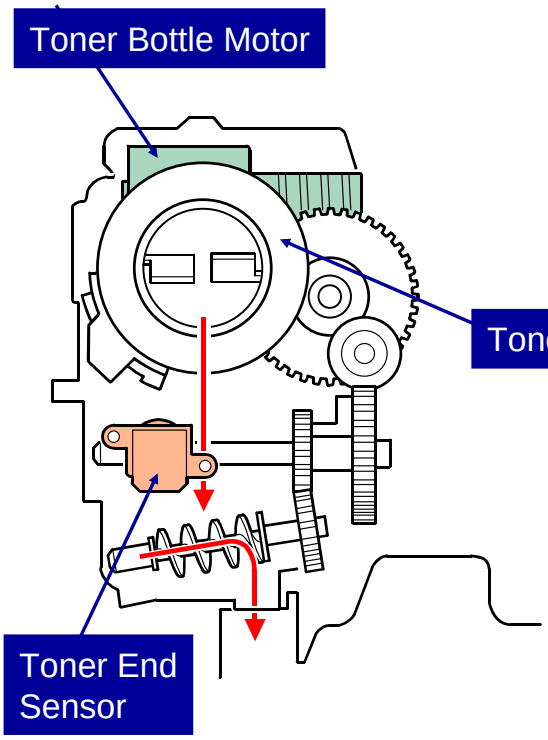


- To supply toner, the toner bottle is rotated.
- The toner goes down a tube, and goes into the sub hopper.
- The toner end sensor is attached to the sub hopper.

Slide 138

- This mechanism is the same for each of the four toner bottles in the machine.
- The TD sensor contains an ID chip that contains information about the PCDU, development unit, and drum unit, such as counters.
  - We discussed this in the PCDU section.
- The RFID chip in the toner bottle contains data on the amount of toner consumed from the bottle, and is used for toner bottle detection (the machine uses it to detect if the bottle installed or not).

Toner Bottle Rotation

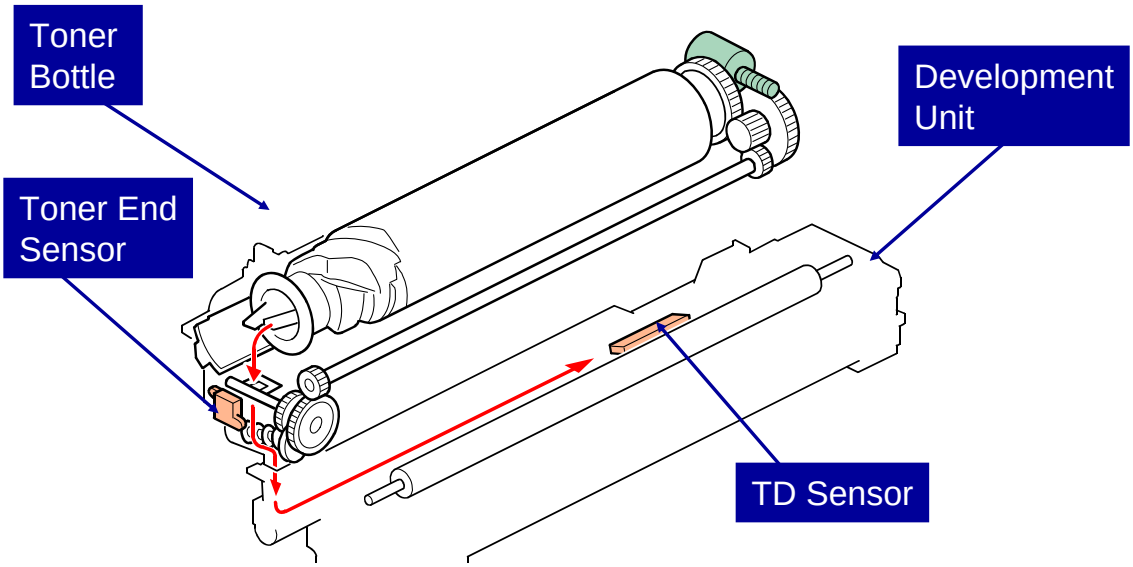


- Each bottle is controlled by a separate motor.
- There are no clutches

Slide 139

No additional notes

Toner Bottle

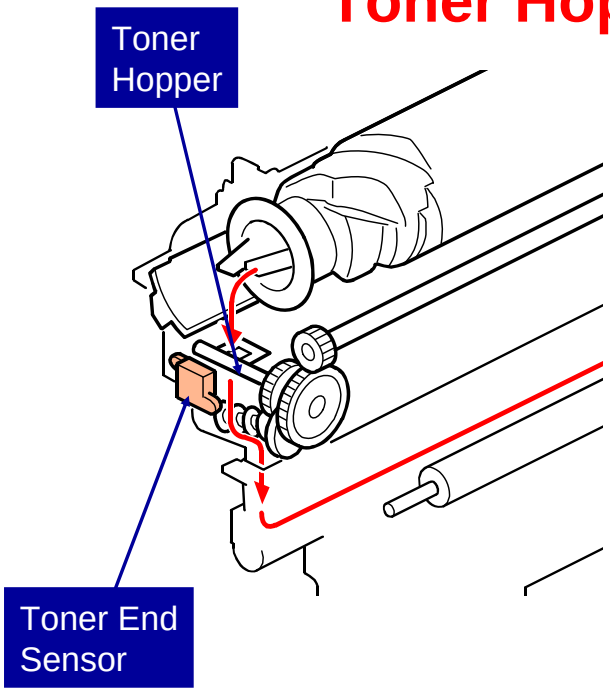


- When the toner bottle is installed, the bottle must be turned to the right (clockwise). This opens the bottle, and toner can leave the bottle.
- The spiral grooves in the bottle help to feed toner out of the rotating bottle.
- The toner goes through the toner end sensor.

Slide 140

- This slide shows how toner is supplied from the toner bottle.

Toner Hopper Unit

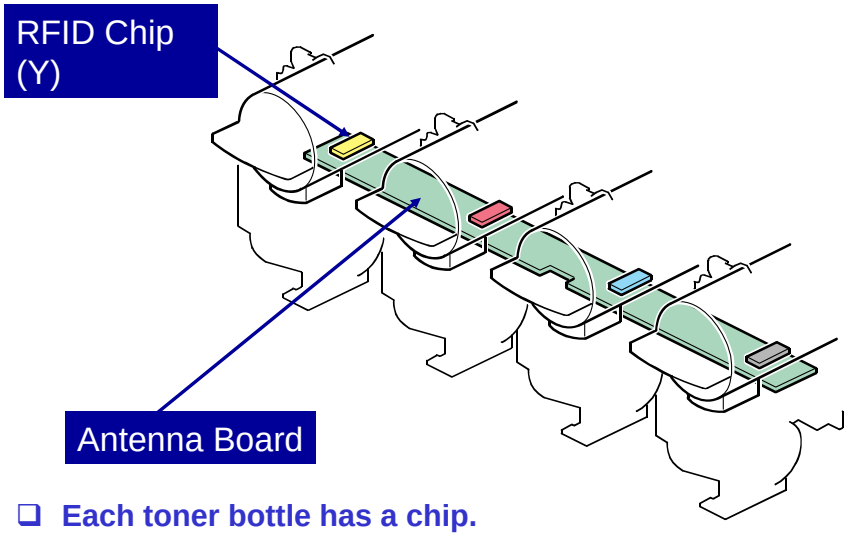


- The toner hopper contains a small amount of carrier.
- This prevents large amounts of toner from entering the development unit during a long job with high image coverage.
- If a lot of toner is allowed to enter, toner scattering may occur.
- The carrier is held in the hopper by magnets.
- If the toner hopper unit is replaced, carrier must be added to the new hopper unit.
- Carrier is provided with each spare toner hopper unit in a small bottle.

Slide 141

No additional notes

Radio Frequency ID Chip



- **Each toner bottle has a chip.**
  - This chip contains data on the amount of toner consumed from the bottle, and is used for toner bottle detection (the machine uses it to detect if the bottle installed or not).
- **It sends its data to the RFID antenna board.**
- **There is no electrical contact. The data is sent by wireless communication.**

Slide 142

No additional notes

Toner Near-end Detection

- **To detect toner near-end, the machine uses the following data:**
  - Toner supply motor rotation counter
  - Pixel counter
  - Toner end sensor
- **If one (or both) of the counters detect that the remaining toner amount is less than a set value (see below), the machine enters the near-end condition.**
  - K: 13 g (600 sheets at 5% coverage)
  - CMY: 3 g (120 sheets at 5% coverage)
- **The toner end sensor detects the near-end condition when the bottle is empty, but a small amount of toner remains in the sub hopper.**
  - Approximately 100 sheets can still be printed.

Slide 143

- The two counter values on the slide are stored in the RFID chip on the toner cartridge, and copied to the NVRAM on the BCU.
- The toner end sensor is a fail-safe in case the two counters do not detect near-end correctly. However, 100 sheets is not much time before the toner runs out.

Toner Near-end Detection Method

- **3045 002**
  - 0: Pixel counter, motor rotation counter, and toner end sensor
  - 1: Toner end sensor only

Slide 144

- If set to 1, there is no toner in the toner cartridge at the near end condition. The customer can change the bottle immediately.
- If the setting is 0, there may still be toner in the bottle when near-end occurs. Some toner is wasted if the customer changes the bottle immediately. However, the customer has some time to get a new toner cartridge.

Toner End Detection

- **To detect toner end, the machine uses the TD sensor (there is one below each toner bottle).**
  - Toner end is detected if both of these conditions occur:
    - » $V_T - V_{TREF} \geq 0.5$
    - » $SUM(V_T - V_{TREF}) \geq 10$
- **The toner end sensor continues to check for toner in the hopper, and if it detects toner, the toner end condition is cancelled.**

Slide 145

No additional notes

What Happens if Toner End is Detected?

- **If toner end is detected for black, the toner bottle must be replaced or the machine cannot print.**
- **If toner end is detected for C, M, or Y, the machine can print in black and white only. Color print jobs cannot be started.**
  - If C, M, or Y toner ends during a color-printing job, the job is suspended until toner is supplied.
  - If new color toner is not installed, the user can print black-and-white jobs only.

Slide 146

No additional notes

Toner End Recovery

- The machine assumes that the toner cartridge was replaced if either of the following occurs when the near-end or end status exists:
  - The front door is opened and closed.
  - The main switch is turned off and on.
- Then the machine starts to supply toner to the development unit.
- Then, the machine clears the toner near-end or end status if the toner end sensor detects that toner was supplied.
- The machine tries to supply toner for a maximum of 50 times. If the sensor still does not detect toner, there is no recovery from toner end.

Slide 147

No additional notes

Replacement

- **Toner hopper unit**
  - During reassembly, pour some carrier (8g) into the hopper.
    - » A small bottle of carrier is provided with the new toner hopper spare part as an accessory. It contains 8g of carrier.
    - » Follow the procedure in the manual carefully. The shutter comes off easily after the inner cover has been removed.
- **Toner end sensor**
  - Do not replace this in the field. Replace the toner hopper unit.

Slide 148

- Do not replace the toner end sensor in the field.
  - This sensor is part of the toner hopper unit. Replace the complete toner hopper unit instead. Otherwise, carrier will spill out onto the floor, and will not be present in the hopper after reassembly.
  - The sensor is not supplied as a spare part anyway.

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COPIER ENGINE

TRANSFER

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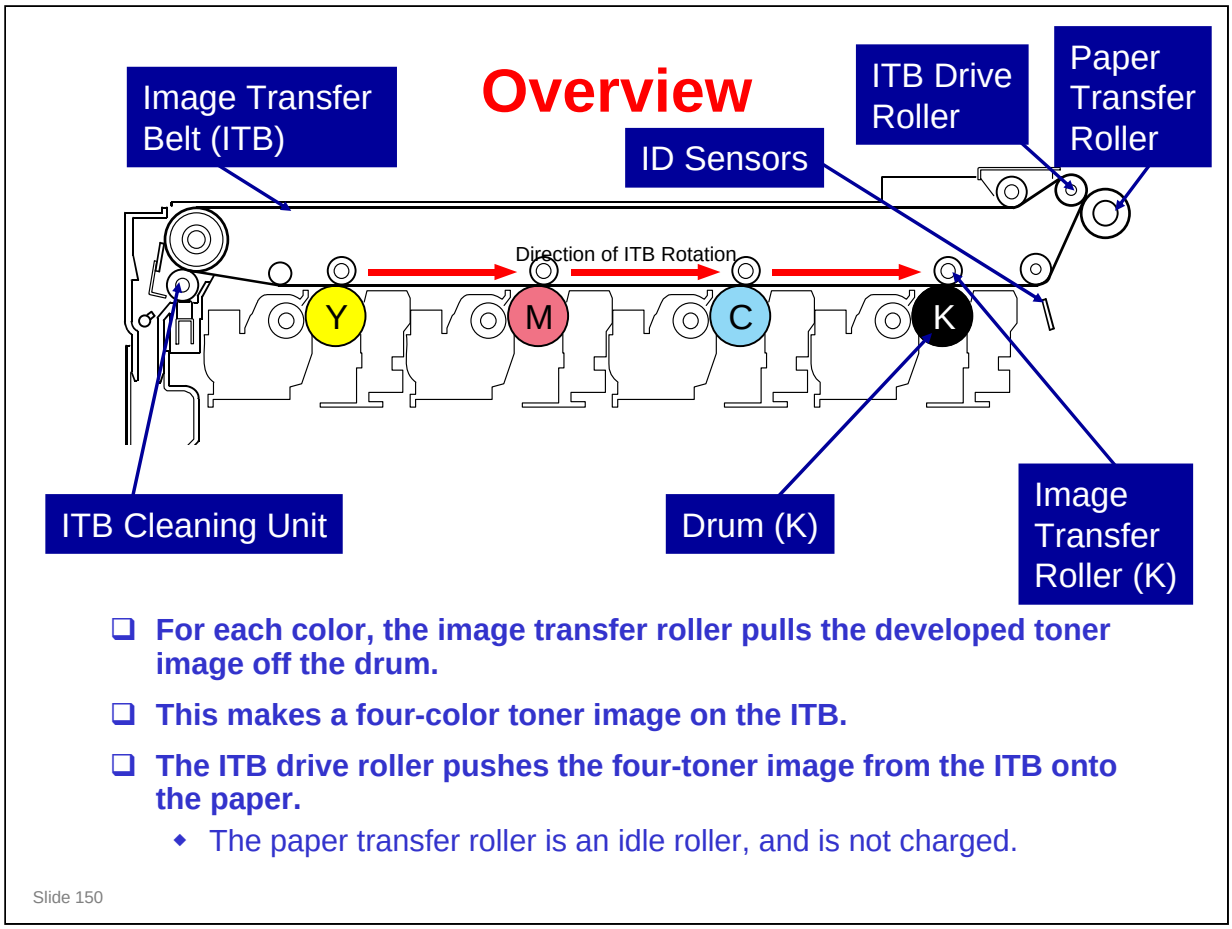
- In this section, the image transfer, paper transfer, and paper separation mechanisms will be described.



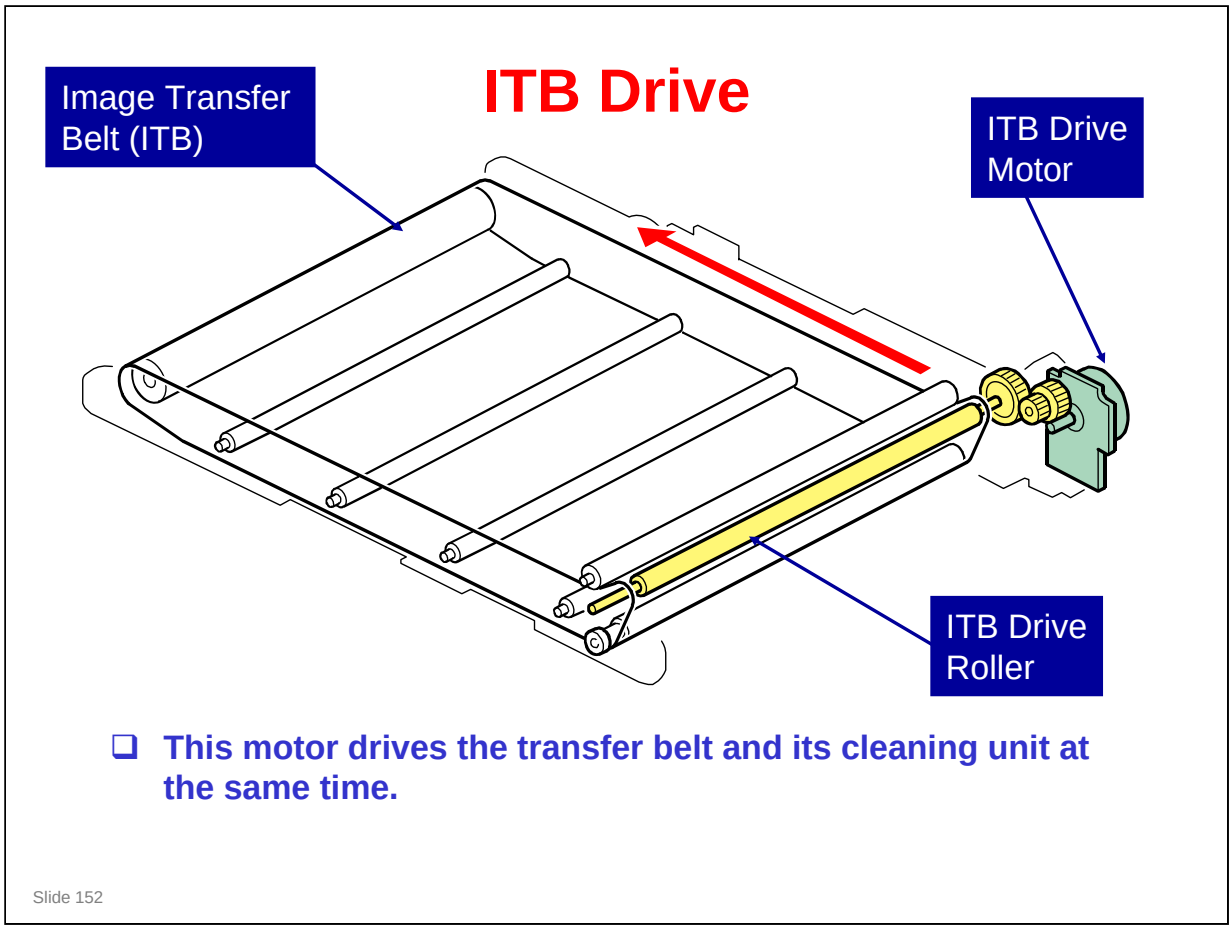
- All four color toners are pulled onto the ITB on the same rotation of the ITB.
- The paper transfer roller does not pull the toner off the ITB. In this machine, the ITB drive roller pushes the toner off the ITB and onto the paper.
- Used toner collected by the ITB cleaning unit goes to the used toner collection bottle in the ITB unit. This is separate from the bottle that is used for the drums.

ITB Lock Lever

- To release the ITB from the K drum, you must turn the image transfer belt unit lock lever clockwise before you remove the unit. If you do not do this, you will damage the K drum.

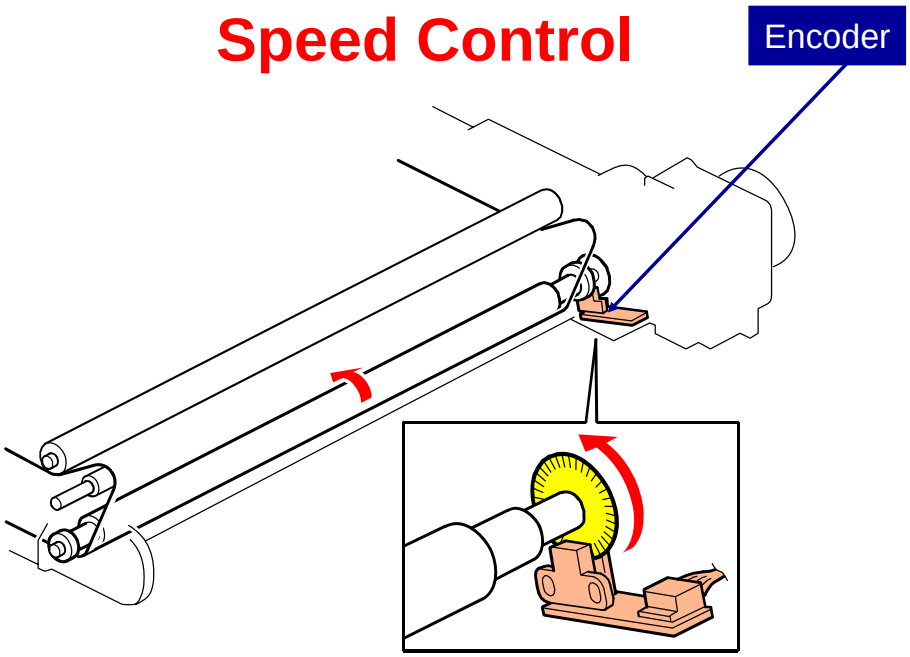
Slide 151

No additional notes



❒ Drive for the transfer belt cleaning unit is shown in more detail later in this section.

Speed Control



- **The encoder monitors the belt speed.**
- **The machine adjusts the motor speed, based on the output from the encoder.**

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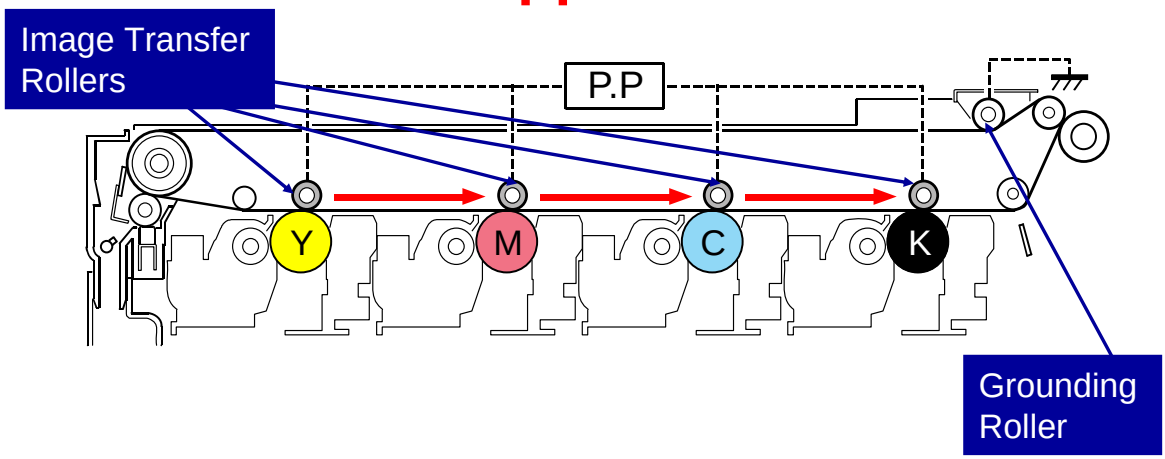
- The speed of the belt depends on the process speed (see 'Process Speeds' in the Machine Overview section of the course).
- The machine ignores unusually high or low readings from the encoder that exist only for a short time.

Current Supplied to the ITB



- The image transfer rollers pull the toner off the drum.
- The grounding roller grounds the transfer belt.
- The terminals from the high voltage supply board (HVPS-TTS) come in at the rear of the ITB unit.
- The current is automatically corrected for temperature and humidity.

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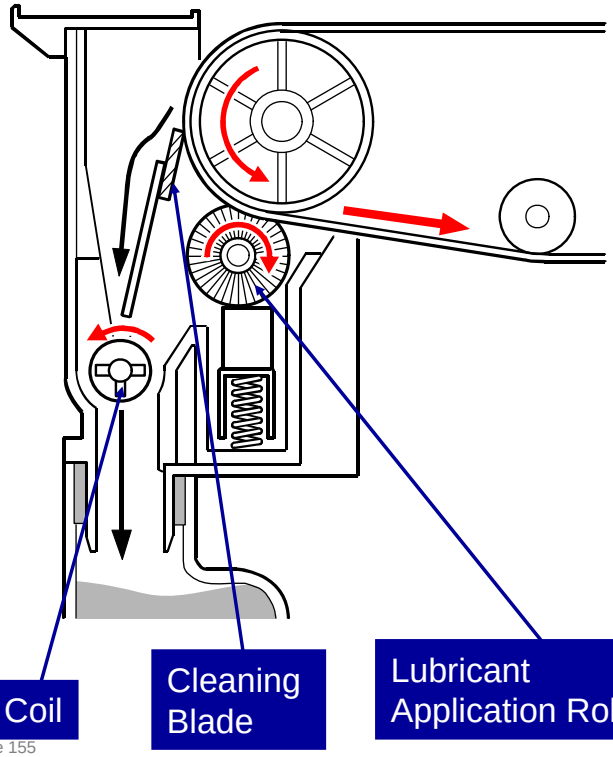
- The temperature/humidity sensor is at the rear lower right side of the machine.
- The grounding roller is also called the ‘press roller’.

Transfer Belt Cleaning



- **The lubricant application roller applies lubricant to the belt.**
- **The blade scrapes this toner off the belt.**
  - This toner falls onto a coil in the collection bottle.
- **At 0.5 second after the end of the job, the image transfer belt motor reverses for 50 ms.**
  - This removes toner at the edge of the cleaning blade.

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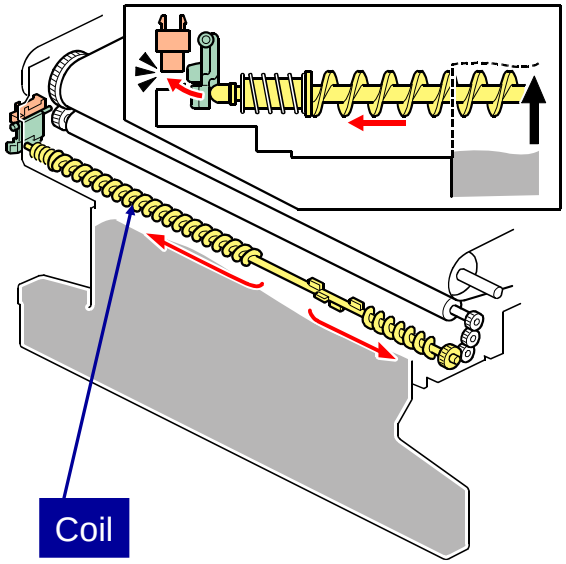
- The waste toner collection bottle in the ITB unit is separate from the bottle for the drums.
- The reverse rotation at the end of the job is also done for the OPCs at the same time, for the same purpose.

Waste Toner Collection From the Image Transfer Belt



- **Waste toner from the transfer belt falls into a coil.**
  - The ITB drive motor drives this coil through some gears at the front of the ITB unit.
- **This coil moves the waste toner to the toner collection bottle.**
- **This is a separate bottle from the one that collects waste toner from the drums.**

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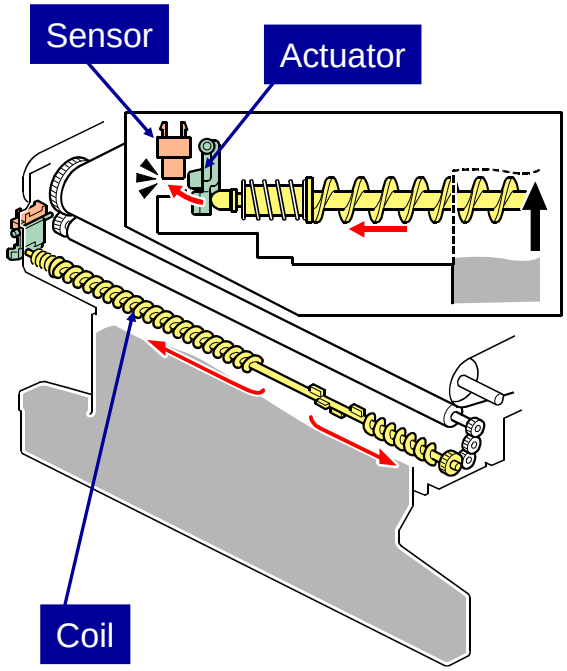
No additional notes

Waste Toner Bottle Near-Full



- When the bottle is almost full, the screw pushes against the toner while it turns, and this causes the end of the coil to push the actuator into the sensor.
- At this time, the machine detects 'near-full'.
- Then after about 2k prints (for 5% coverage), the machine stops and the bottle must be emptied.

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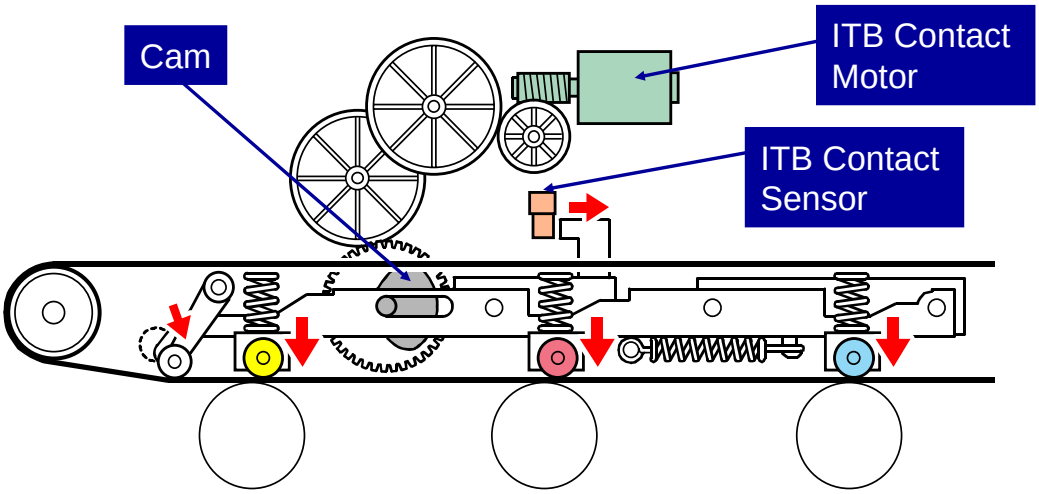
No additional notes

ITB Contact and Release - 1

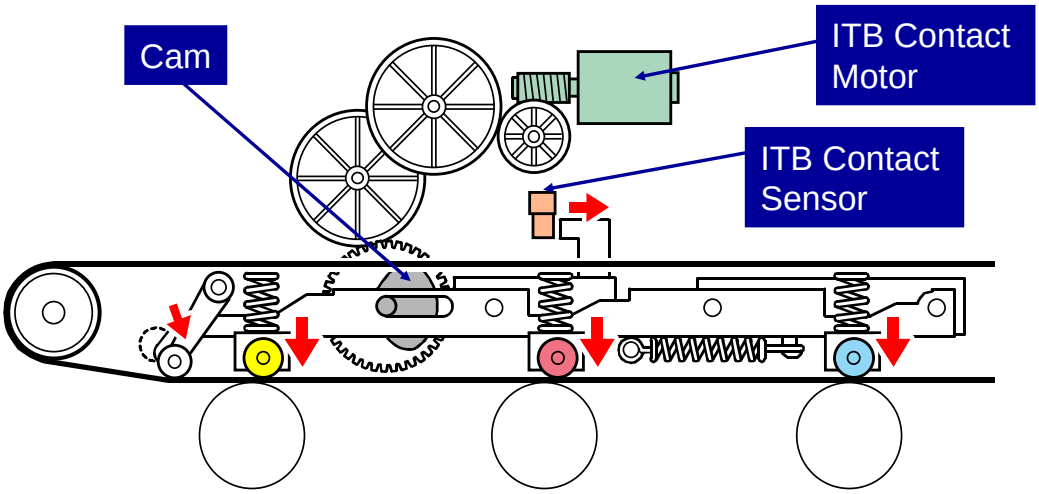


- **The belt always contacts the K drum.**
  - To move the belt away from the K drum, turn the release lever clockwise. Do this to remove the transfer belt unit, or you will damage the K drum.
- **The belt contacts the CMY drums for color printing only.**
  - If a black-and-white page comes in the middle of a color job, the belt does not move away from the CMY drums.

Slide 158

- This mechanism makes the drums and transfer belt life longer.
- If a black-and-white page comes in the middle of a color job, the belt does not move away from the CMY drums.
  - This keeps the printing speed at the maximum, because it takes time for the motor to move the belt up and down.
- If a color page appears in the same job after black-and-white pages, the machine waits until the previous page has left the transfer unit. Then it moves the belt up against all four drums.
- The ITB contact sensor detects the status of the ITB (contacting K only, or contacting all four drums).

ITB Contact and Release - 2



- **The motor moves the left end of the belt up and down, through a cam.**
  - Up: The belt contacts the K drum only
  - Down:The belt contacts all four drums
- **The sensor detects when the belt contacts all four drums.**
  - Sensor off: ITB contacts all drums

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- The following explains how the sensor and motor operate to initialize the machine, and during different types of printing.
  - The ITB contact sensor operates as a detection sensor during machine initialization, and as a position sensor during machine operations.
  - Before machine initialization, the left side of the image transfer belt is in the home position. When initialization starts, the ITB contact motor lowers the left side until the actuator has passed the sensor. Then ITB contact motor lifts up the left side to its home position. This action actuates the sensor in a certain pattern.
  - The sensor actuation patterns are as follows.

    Initialization: On - Off - On - Off - On

    Operation - Standby (Default): On

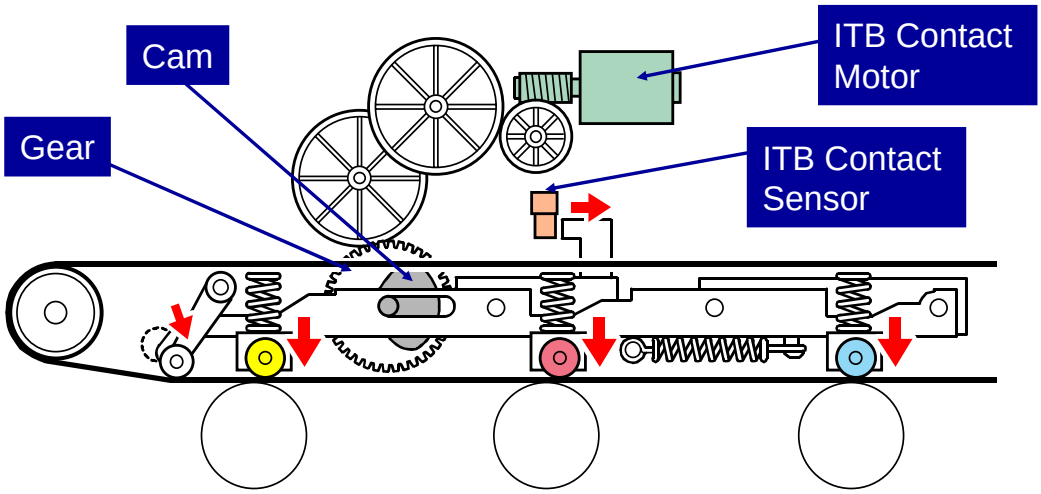
    Operation - B/W printing: On

    Operation - Color Printing: Off

    On: The actuator is out of the sensor.

    Off: The actuator is interrupting the sensor.

ITB Contact and Release - 3



- If a power failure occurs with the belt touching all 4 drums, the belt stays in this position, and you cannot remove the ITB.
- Remove the internal output tray, then turn the gear or cam of the transfer belt unit until the belt is fully raised.

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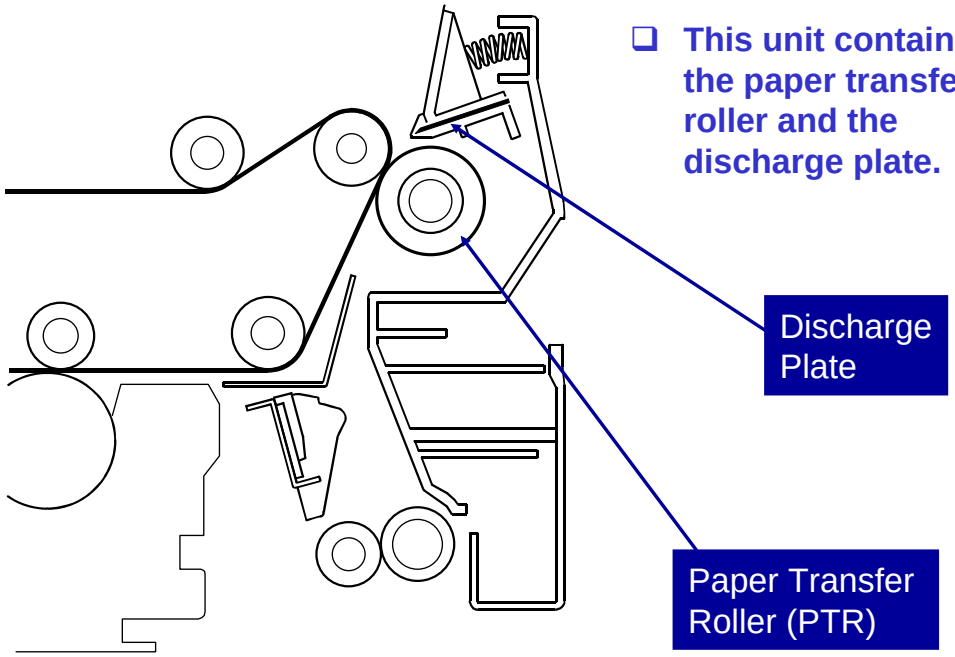
No additional notes

Paper Transfer Unit



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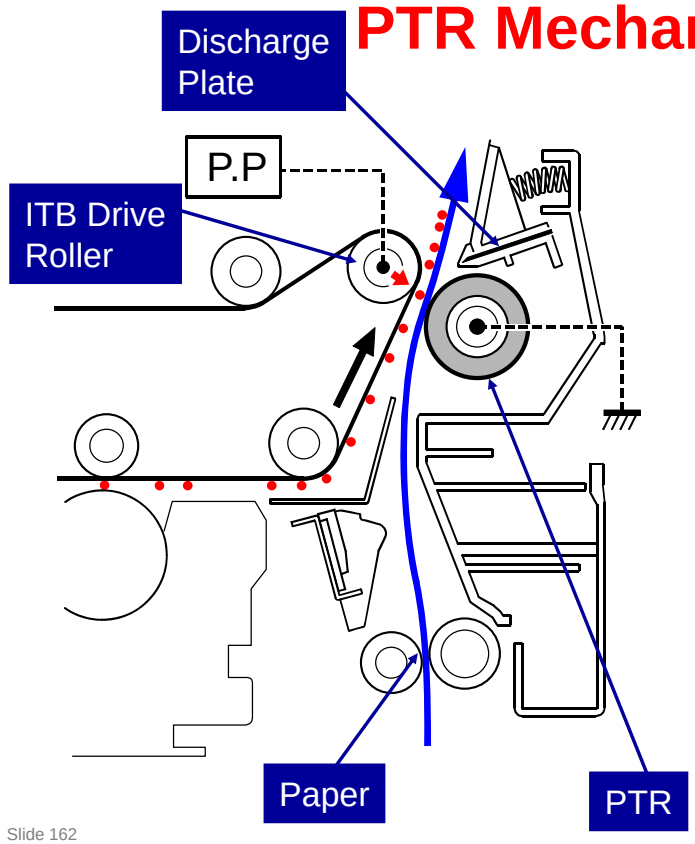
- The discharge plate removes charges from the paper, and this makes it easier to separate from the transfer belt.

PTR Mechanism



- **The PTR rotates by friction with the transfer belt.**
- **The ITB drive roller pushes the toner off the belt, and onto the paper.**
  - The PTR is grounded. It does not pull the toner off the belt, like in some models.
- **The discharge plate removes charge from the paper after it goes past the PTR.**

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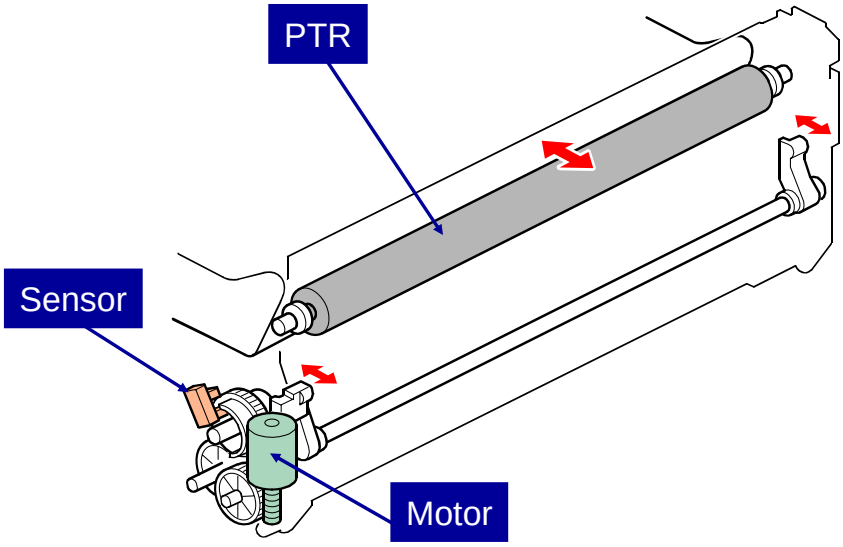
No additional notes

PTR Contact Mechanism



- Paper transfer roller contact motor: Moves the PTR into contact and away from the transfer belt, through a lever.
- Paper transfer roller HP sensor: Detects when the PTR contacts the transfer belt.

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No additional notes

PTR Contact Mechanism

- **The PTR contacts the transfer belt at all times, except**
  - During line position adjustment (MUSIC)
  - During process control
  - Sleep mode
    - » In standby mode, the PTR still contacts the transfer belt.
  - When the power switch on the operation panel is off
    - » NOTE: Always turn off the power with the operation panel switch first.
    - » If you turn off the power with the main switch, the PTR and transfer belt are still in contact.
    - » If they stay like this for a long time, the belt will have a dent in it, and this will cause insufficient transfer at that point, causing a white line on outputs.

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- When the machine is not being used, the PTR moves away from the transfer belt. If this is not done, the belt becomes damaged (bent, stretched, warped) where the PTR contacts it. This causes copy quality problems, such as horizontal white lines.
- During line position adjustment and process control, patterns are developed on the transfer belt. The PTR is moved away from the belt at this time, or the PTR will remove the patterns before they get to the ID sensors. This also means that the PTR will get dirty.

Replacement – Image Transfer Unit (1)

- **Image Transfer Belt Unit**
  - The ITB is in contact with the K drum before you turn the switch off. Take care not to damage the K drum.
    - » To release the ITB from the K drum, you must turn the image transfer belt unit lock lever clockwise before you remove the unit. If you do not do this, you will damage the K drum.
  - If the power failed in the middle of a color job, with the ITB in contact with all four drums, then the belt touches all 4 drums, and you cannot remove the ITB.
    - » Remove the internal output tray, then turn the gear until the belt is fully raised. After that, the ITB contacts the K drum only.
  - Remove the ITB unit motor from the old ITB unit and install it in the new one. The new ITB unit does not have an ITB unit motor.

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No additional notes

Replacement – Image Transfer Unit (2)

- **Image Transfer Belt Unit, Image Transfer Belt**
  - If you will install a new ITB unit, set SP 3902-013 to 1 before you turn off the power switch.
    - » If you do this, then the machine will reset the PM counter for the unit automatically, after you turn the power on again.
    - » The machine cannot automatically detect that a new ITB unit has been installed.
- **Image Transfer Belt Cleaning Unit**
  - If you replace the cleaning unit after the machine detects that it is full or near-full, the machine automatically resets the PM counter for the bottle after replacement.
  - But, if you replace a cleaning unit that is not full or near-full, then you must reset the PM counter for this unit. To do this, set SPs 3902-017 and -020 to 1 before you turn off the power switch.
    - » If you do this, then the machine will reset the PM counter for the units automatically, after you turn the power on again.
    - » SP 3902-017 is for the cleaning unit and SP 3902-020 is for the waste toner collection bottle.

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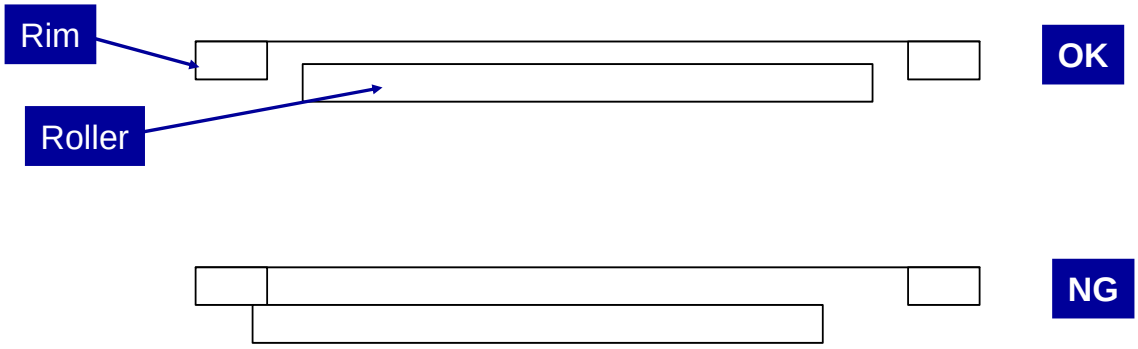
- Normally, the waste toner collection bottle is replaced at the same time as the ITB cleaning unit. But a separate SP has been provided.

Replacement – Image Transfer Unit (3)

- **Image Transfer Belt**
  - The belt has a rim at the front and a rim at the rear. All the rollers in the ITB unit must be between these two rims. The rims must not be riding on the rollers.



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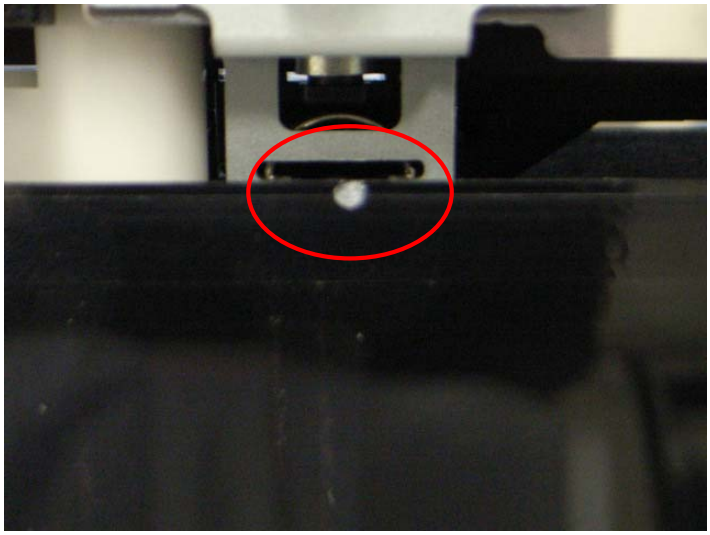
- The diagram gives you a general idea – it isn't particularly accurate.

Replacement – Image Transfer Unit (4)

- **Image Transfer Belt (continued)**
  - The white mark on the belt must be at the rear side.



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No additional notes

Replacement – Paper Transfer Unit

❑ Paper Transfer Roller Unit or Paper Transfer Unit

- If you will install a new unit, set SP 3902-018 to 1 before you turn off the power switch.
  - » If you do this, then the machine will reset the PM counter for the unit automatically, after you turn the power on again.

❑ ID Sensor Board

- If you install a new board, input the values from the decal into SP mode as shown in the service manual.
- Clean the ID sensor every EM. Use cloth moistened with alcohol.
  - » Do not use a dry cloth. Otherwise, the ID sensors may get more dirty due to static electricity.

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❒ It is not necessary initialize the ID sensor with SP 3321 after a new ID sensor is installed.

SP Modes – Paper Transfer Current for OHP

- **SP2603-001**
  - OHP current for black-and white
  - Default setting: -13 μA
- **SP2608-001**
  - OHP current for full color
  - Default setting: -20 μA

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No additional notes

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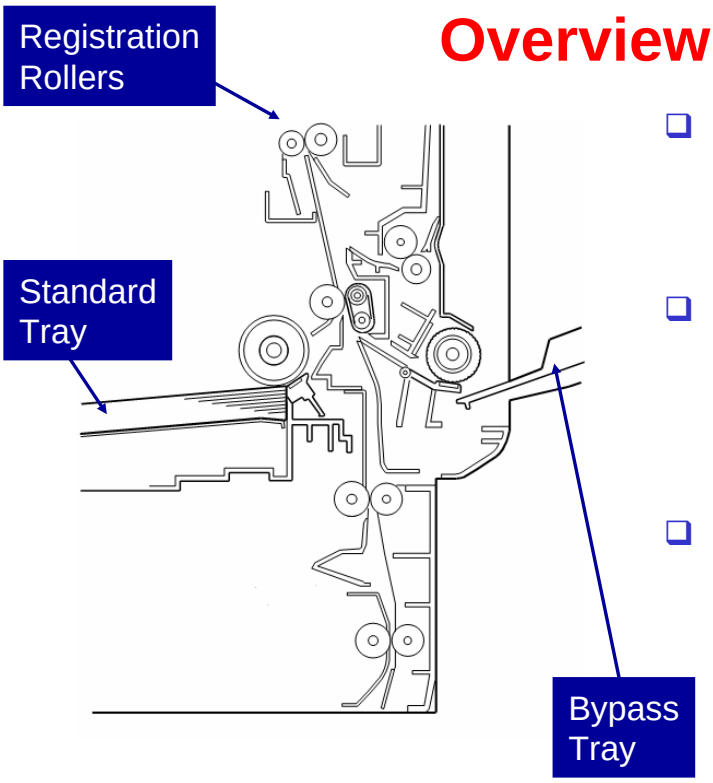
PAPER FEED

Slide 171

- In this section, the paper feed mechanisms in the copier will be described.
- The optional paper feed units will be described in separate sections.

Overview



- **Standard tray and bypass tray: Feed roller and friction pad system**
- **Standard tray has belt assisted feed.**
  - Allows thick paper (up to 256 g/m^2) to be fed.
- **Capacity**
  - Standard tray: 250 sheets
  - Bypass: 100 sheets

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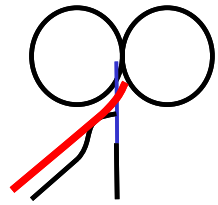
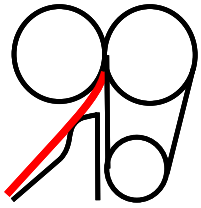
❒ Belt assisted feed: See the next slide.

Belt-Assisted Feed for Thick Paper



Previous design

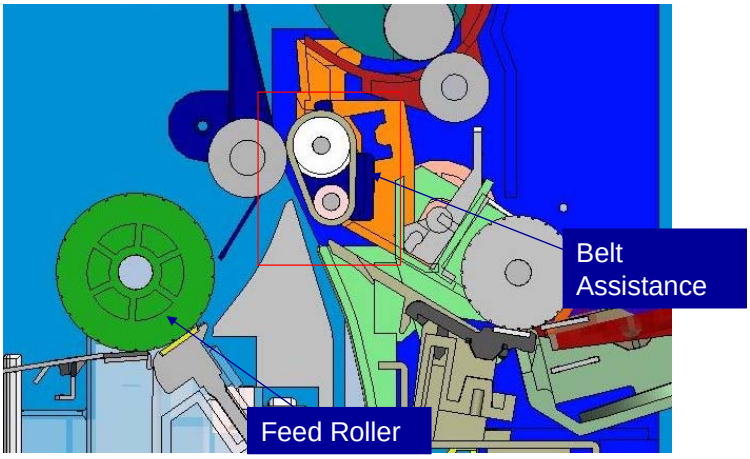


Belt Assistance

Belt-assisted feed enables paper to feed though the sharp bend in the paper path.

Previous design: Without belt assistance, the edge of the paper hits the roller and creates a paper jam.

With belt assistance: The belt guides the paper to the rollers to take the paper smoothly.



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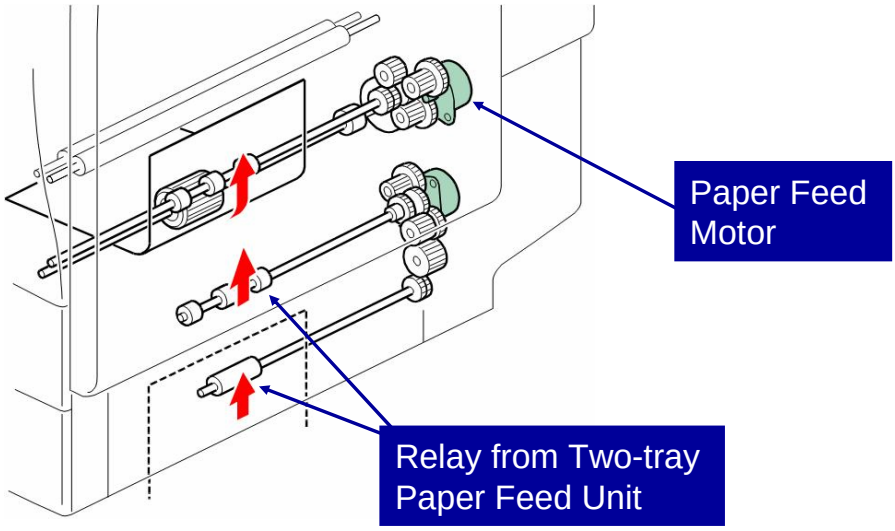
No additional notes

Drive – Standard Tray



- The standard tray has a motor. There are no paper feed clutches.
- If the tray is in the machine, the feed roller always touches the top sheet of paper.

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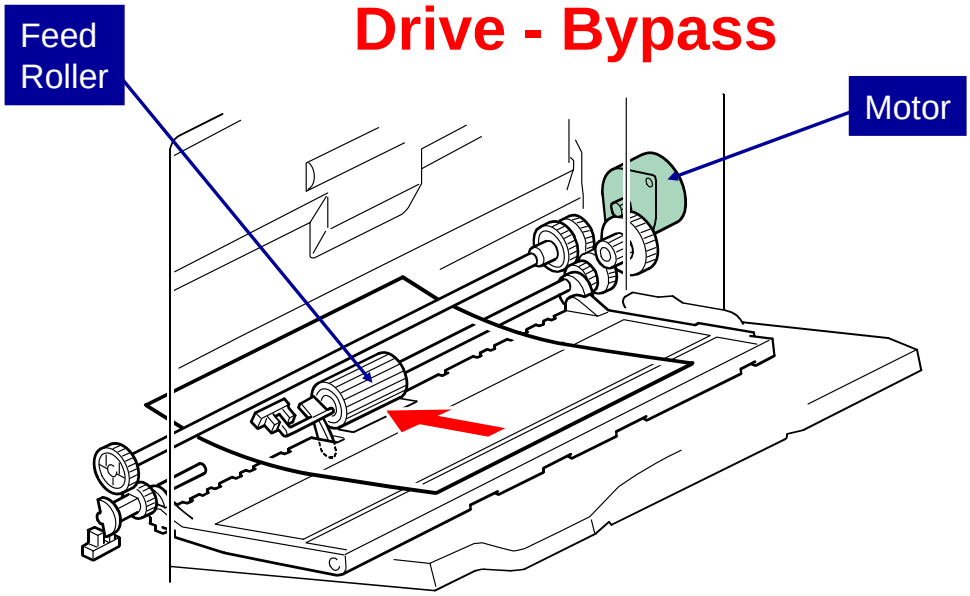
No additional notes

Drive - Bypass



- **The bypass motor drives the feed roller, through some gears.**
  - The cam at each end of the shaft moves the bottom plate up. This pushes the paper up against the feed roller.

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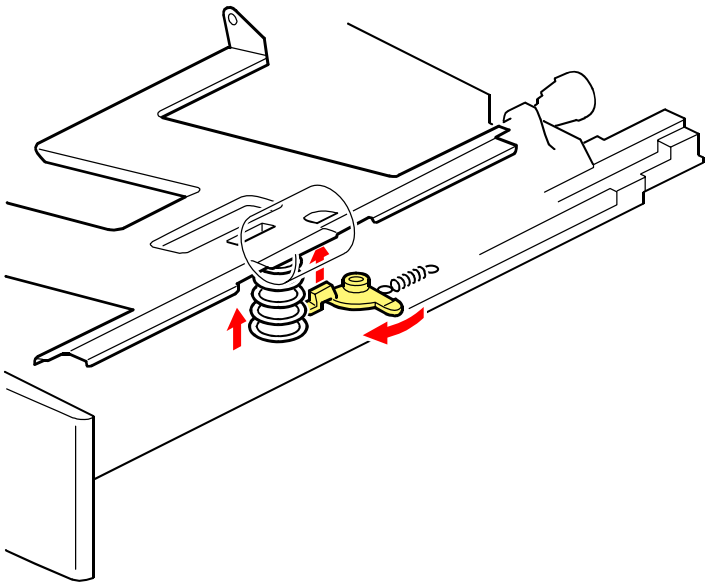
No additional notes

Tray Lift – Standard Tray



- A spring pushes up the tray bottom plate.

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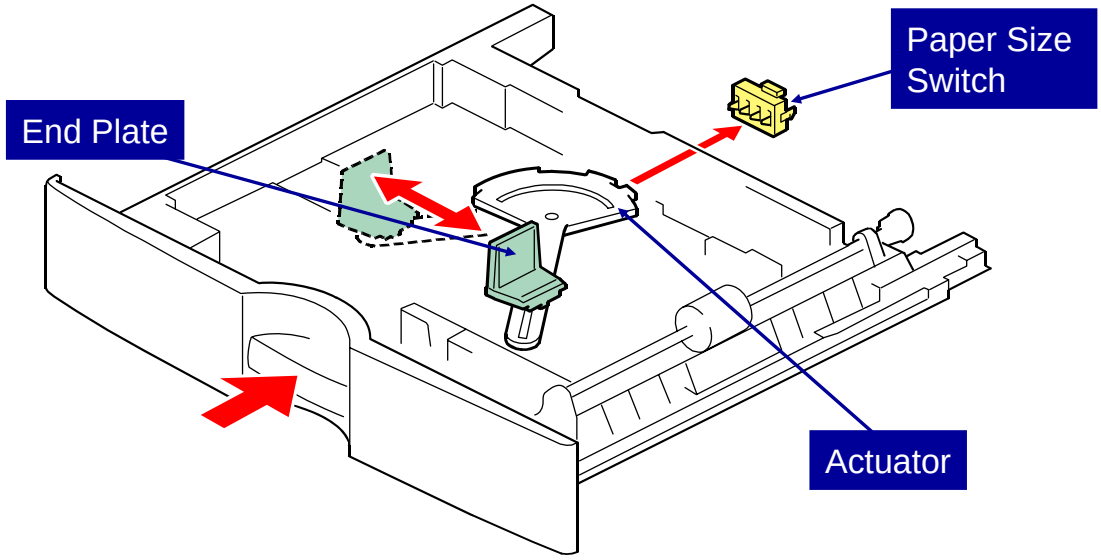
No additional notes

Paper Size Detection – Standard Tray



❑ **The sensor detects the paper size. The actuator position depends on the end plate position.**

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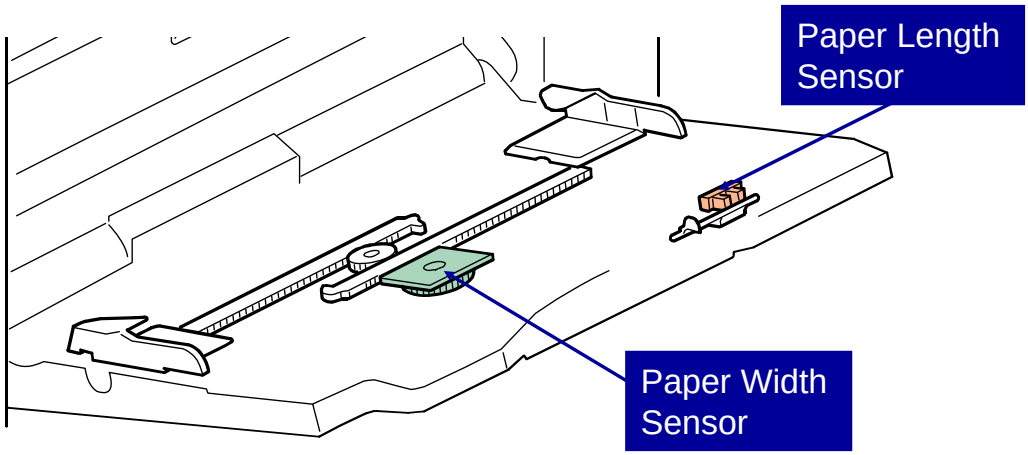
- ❒ The sensor functions as a tray set switch and a size detector.
  - ➢ The three switches on the left detect paper size. The switch on the right is a tray set sensor.
- ❒ Only the length is detected directly.
- ❒ The actuator has patterns of studs on the rear.
- ❒ These studs turn the paper size switches on/off.
  - ➢ This also tells the cpu that the tray is in the machine.
  - ➢ The settings of SP 5181 determine how the machine interprets the sensor readings for paper sizes that are almost the same.
  - ➢ If other paper sizes are used, they must be selected with a user tool: System Settings → Tray Paper Settings → Tray Paper Size.
- ❒ If the fence is moved, a different set of studs moves to the switches, and the machine detects a different paper size.

Paper Size Detection – Bypass Tray



- **A length sensor is added.**
- **This helps the machine to distinguish between these pairs of paper sizes, which have the same width**
  - A4 SEF and A5 LEF
  - A3 SEF and A4 LEF
- **The sensor cannot distinguish between LT and LG SEF.**
  - This must be pre-set with SP 1007-1

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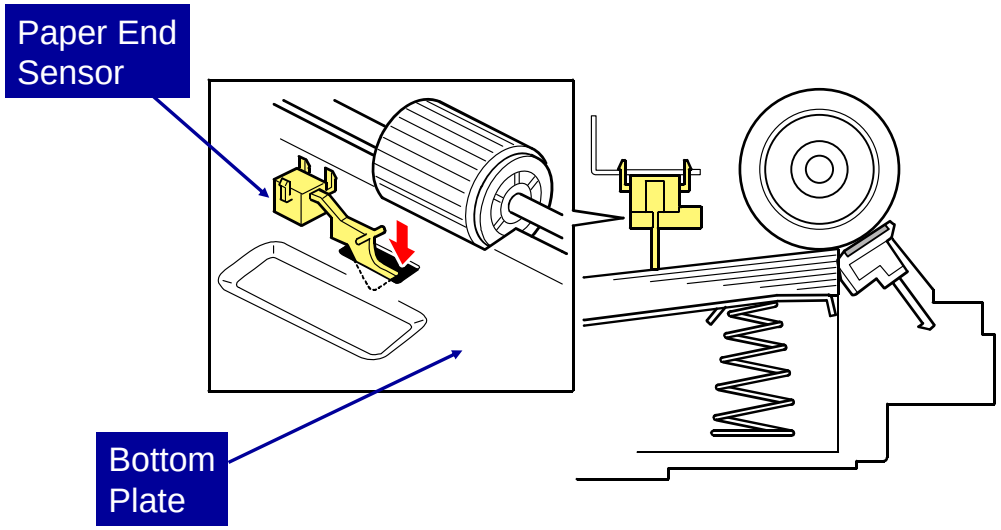
No additional notes

Paper End Detection – Standard Tray



- When there is no paper, the feeler drops into the slot in the bottom plate. Then the actuator enters the paper end sensor.

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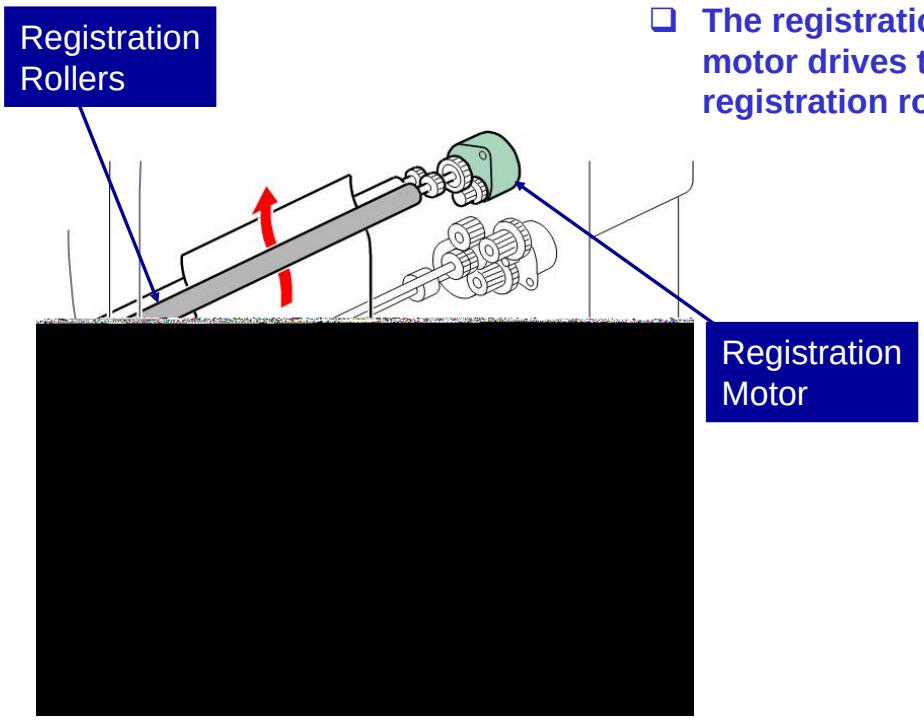
No additional notes

Registration



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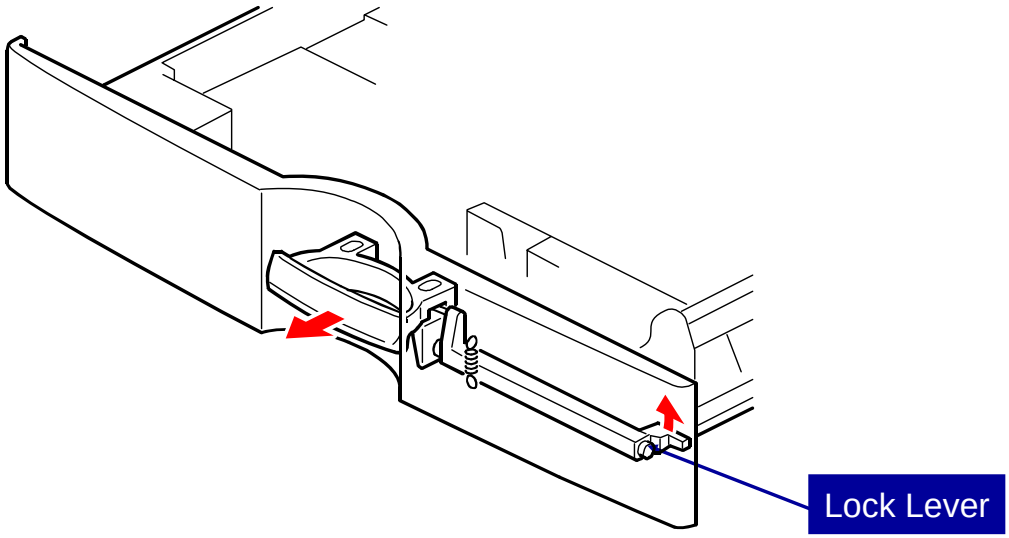
No additional notes

Tray Lock - Front



- **This lock prevents the tray from coming out during shipping.**
- **Pull the handle to release the lock.**
  - The lock lever is lifted when you pull the handle.

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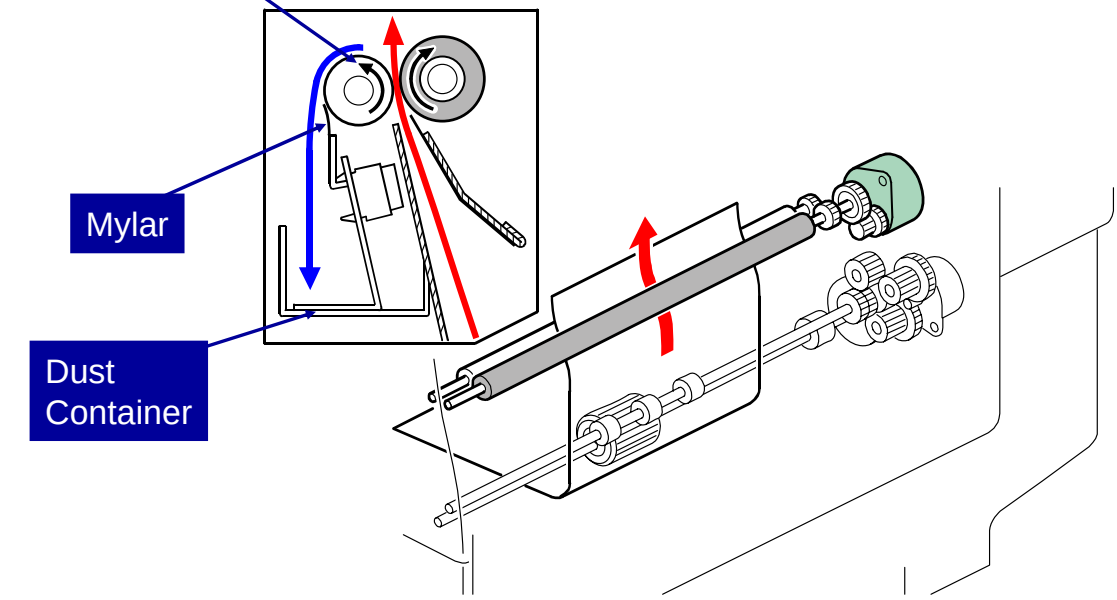
No additional notes

Paper Dust Collection



- The mylar removes paper dust from the registration idle roller.

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No additional notes

Replacement

- Bypass paper width switch: Take care to install the switch correctly. After installation, test that the switch was installed correctly. There is a procedure in the manual.
- Friction pad: Make sure that the mylar does not go under the friction pad when reinstalling the friction pad.

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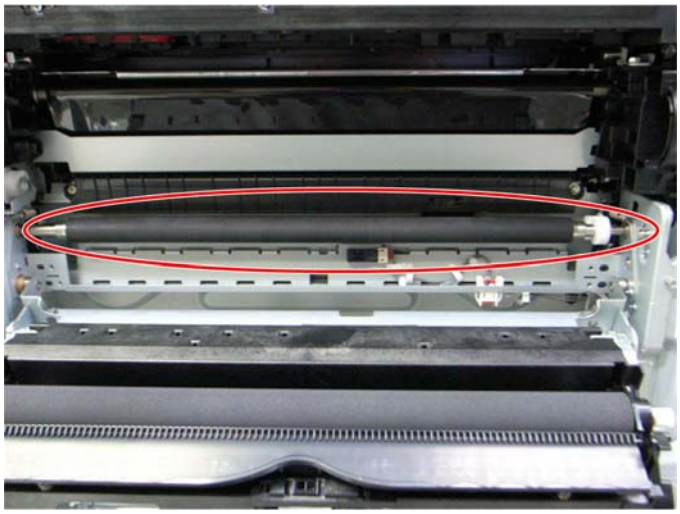
No additional notes

Cleaning the Registration Roller



- Clean the registration roller and registration idle roller with a damp cloth every 60 K.
- Never use alcohol to clean the registration roller.

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No additional notes

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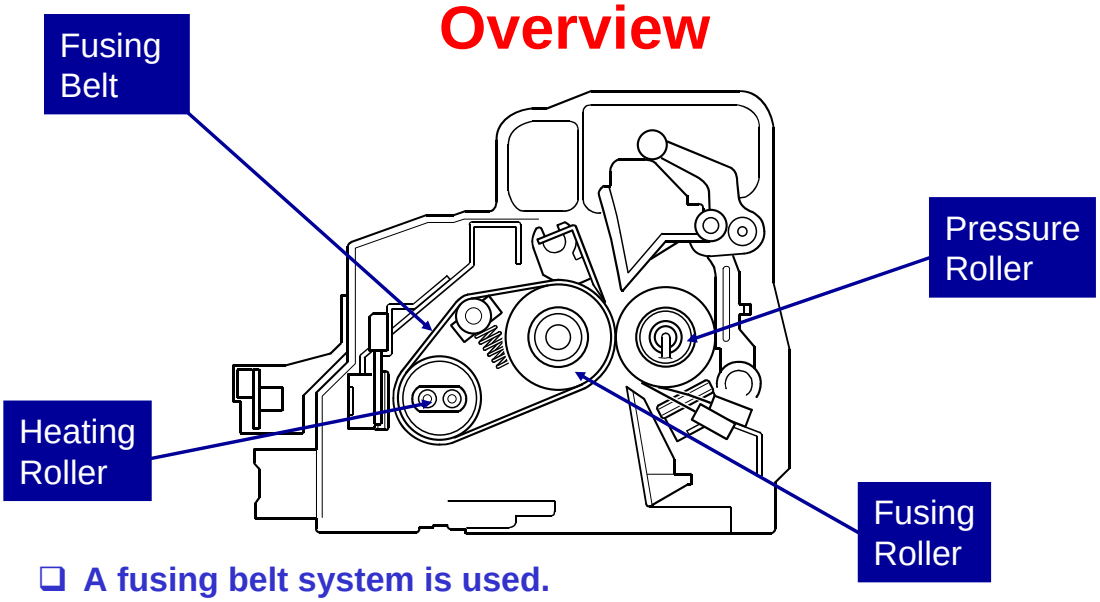
FUSING

Slide 185

❒ In this section, the fusing unit will be described.

Overview



- **A fusing belt system is used.**
- **The heating roller and pressure roller contain lamps.**
  - The two lamps in the heating roller are in one assembly, and are removed together. One lamp heats the center and the other lamp heats the ends.
- **No lubricant roller**

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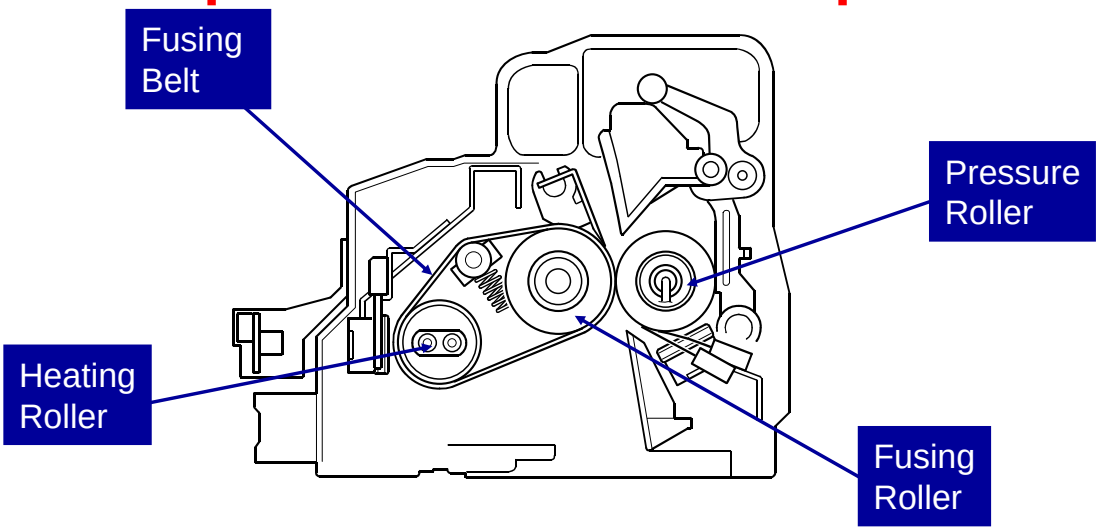
- The two lamps in the heating roller are in one assembly, and are removed together.
  - In the heating roller, one lamp heats the center and the other lamp heats the ends.

Temperature Control Components

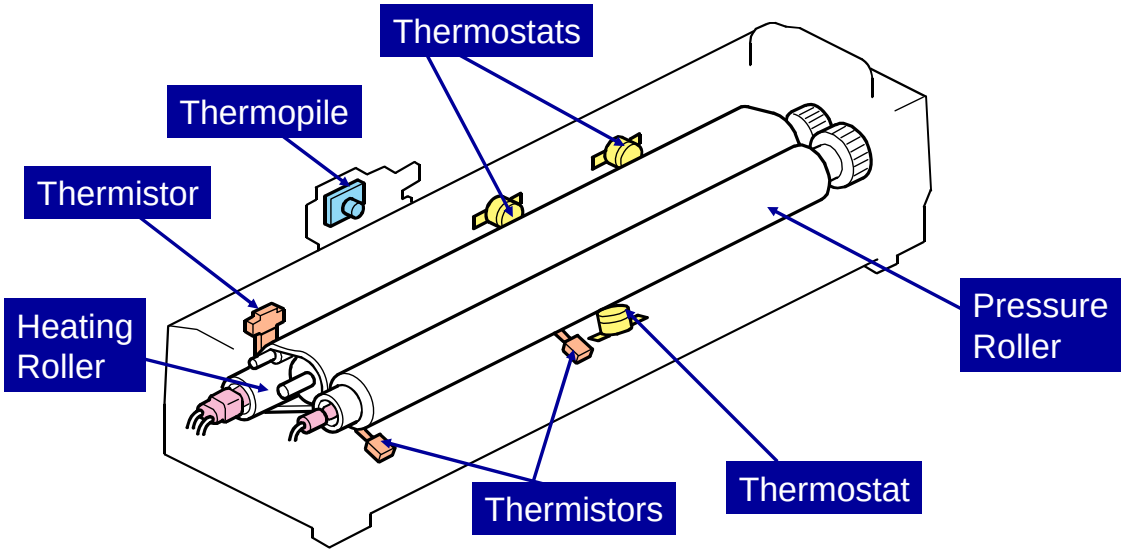


- **The following components control the temperature:**
  - Heating roller: One thermistor and two thermostats
  - Pressure roller: Two thermistors and one thermostat
  - At the front of the fusing unit: Thermopile

Slide 187

- The thermopile detects the temperature at the center of the fusing unit, and the thermistor detects the temperature at the end.

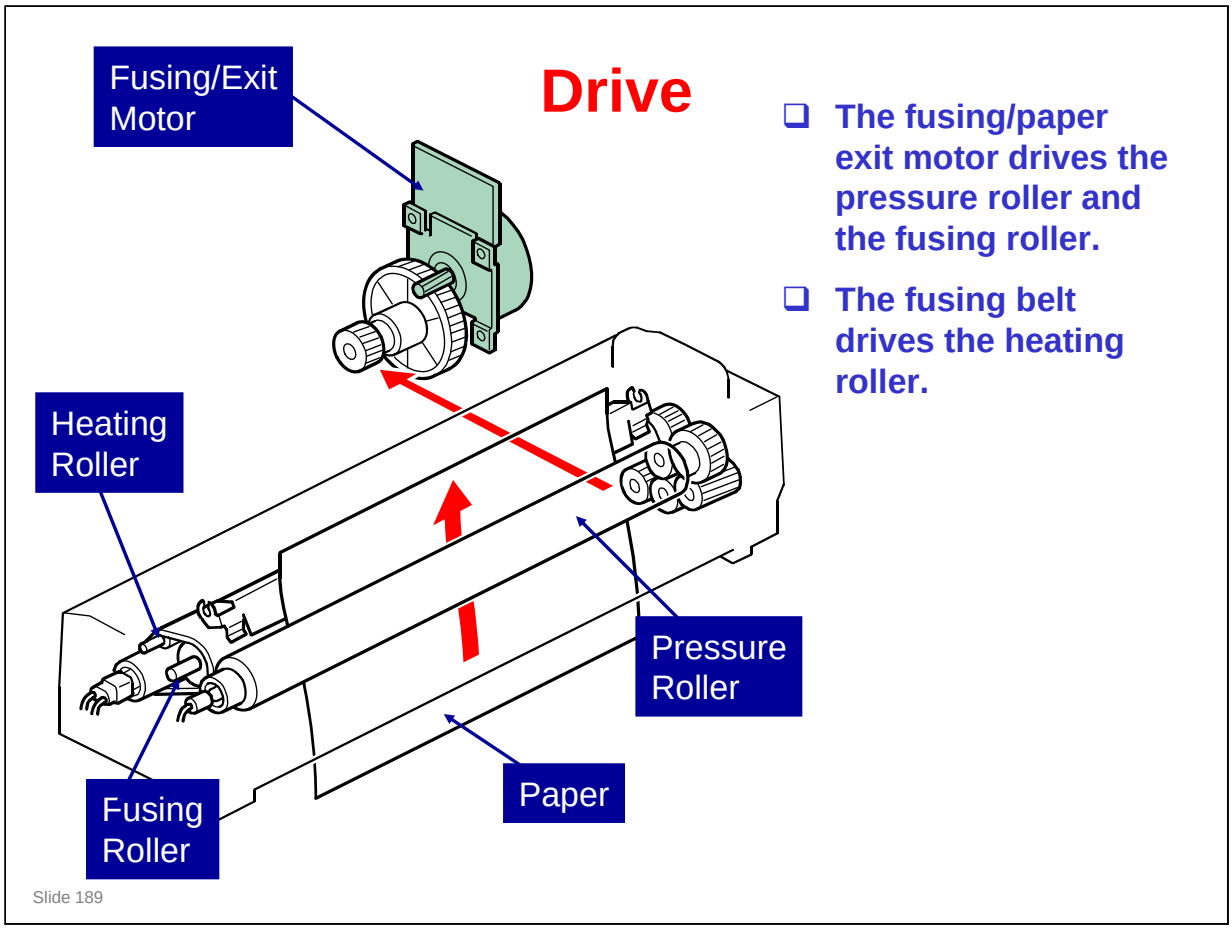
Temperature Control Components



- **The following components control the temperature:**
  - Heating roller: One thermistor and two thermostats
  - Pressure roller: Two thermistors and one thermostat
  - At the front of the fusing unit: Thermopile

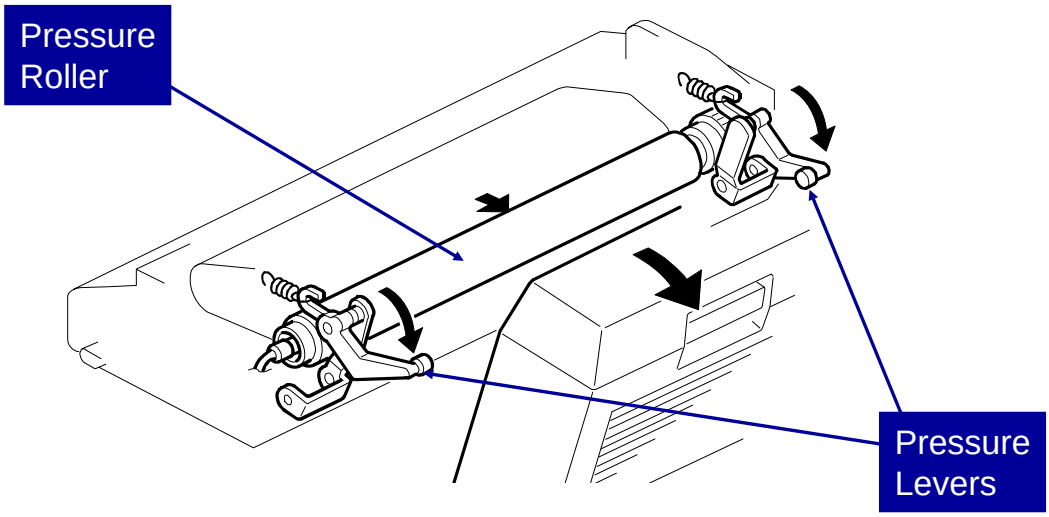
Slide 188

- Here is a three-dimensional drawing of the fusing unit.
- The thermopile detects the temperature at the center of the fusing unit, and the thermistor detects the temperature at the end.



❒ Paper passes vertically through the right side of the fusing unit, as shown in the diagram.

Pressure Release



- The pressure levers apply the correct pressure from the pressure roller.
- When the cover is opened, the pressure is released, and paper jams can be removed easily.

Slide 190

No additional notes

Fusing Temperature Control

- The fusing temperatures for each paper type and operating mode are set with SP 1105.

Slide 191

No additional notes

Fusing Temperature Corrections

- **Corrections for ambient temperature (SP 1112)**
  - If the room temperature is below 17 °C, the heating roller temperature is increased by 5 °C.
  - If the room temperature is above 30 °C, the heating roller temperature is decreased by 5 °C.

Slide 192

No additional notes

Overheat Protection

- **Power to the fusing lamp is cut if the machine detects that the temperature at the heating roller or pressure roller is 250°C or more.**
  - SC 544, 554, 564, or 574 will occur.
- **SC codes related to overheat protection**
  - SC 54x: Thermopile (heating roller: center)
  - SC 55x: Thermistor (heating roller: side)
  - SC 56x: Thermistor (pressure roller: center)
  - SC 57x: Thermistor (pressure roller: side)

Slide 193

No additional notes

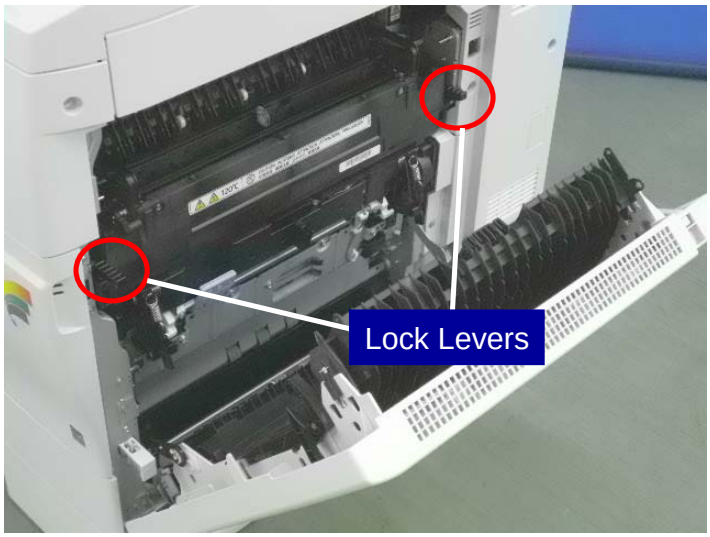
Fusing Unit Replacement (1)

- **If you will install a new fusing unit, set SP 3902-014 to 1 before you turn off the power switch.**
  - If you do this, then the machine will reset the PM counter for the unit automatically, after you turn the power on again.
  - The machine cannot automatically detect that a new fusing unit has been installed.
- **If you change the following parts, and not the complete fusing unit, you must set the following SPs to 1 before you turn the machine power off.**
  - Fusing Roller: 3902-015
  - Fusing Belt: 3902-016

Slide 194

No additional notes

Fusing Unit Replacement (2)



- **When installing the fusing unit:**
  - Make sure that the both lock levers are locked before closing the right cover. Otherwise, these lock levers can be broken.

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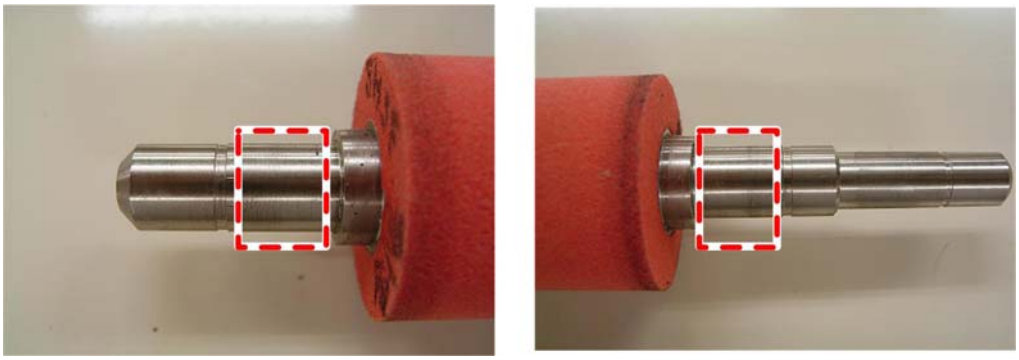
No additional notes

Lubrication

- **When reassembling the fusing unit**
  - When replacing the fusing roller, you have to apply Barrierta S552R to the following places.



Slide 196

No additional notes

Replacement

- **Turn off the main switch and wait until the fusing unit cools down before beginning any of the procedures in this section of the machine. The fusing unit can cause serious burns.**
- **When cleaning the thermopile, wait until the fusing unit has completely cooled down. Otherwise, you may get a serious burn.**

Slide 197

- The fusing lamps are designed so that it is very difficult to install them incorrectly.
  - The lengths of the wires from the two lamps are different. It is difficult to connect them to the incorrect terminals.

Cleaning at 60k

- **The following must be cleaned every 60k.**
  - Entrance guide plate (cloth moistened with alcohol)
  - Stripper plate (cloth moistened with alcohol)
  - Exit guide plate (cloth moistened with alcohol)
  - Pressure roller (cloth moistened with alcohol)
  - Heating roller thermistor (dry cloth)
  - Pressure roller thermistors (dry cloth)

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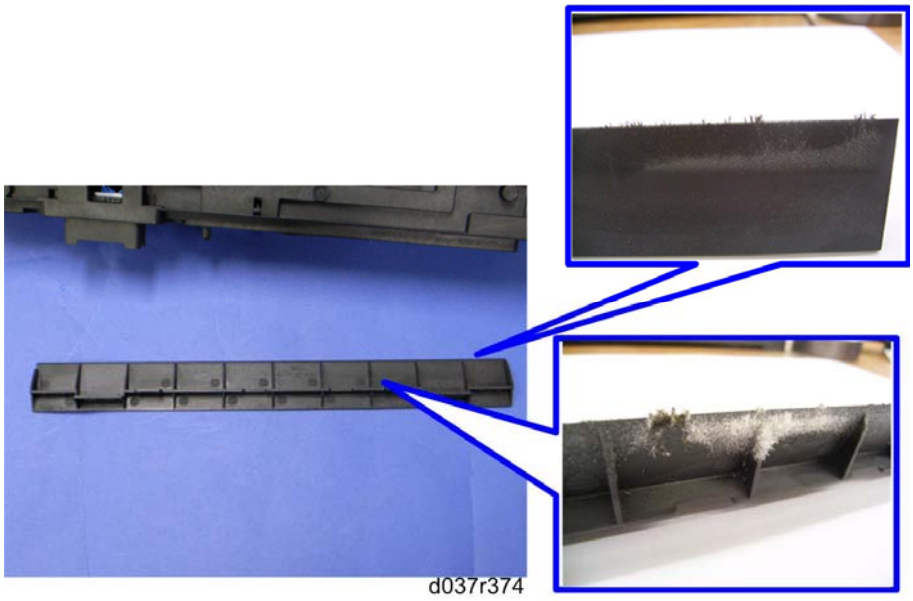
No additional notes

Cleaning the Entrance Guide Plate



- Clean at these locations.

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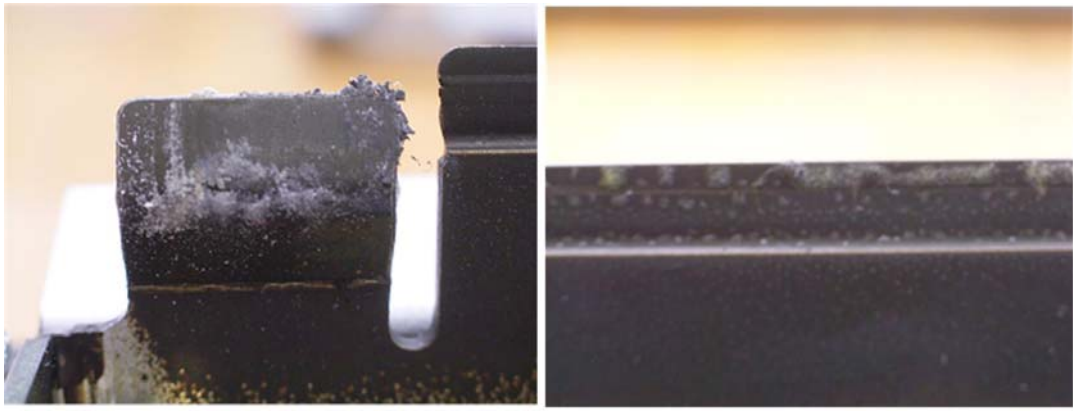
No additional notes

Cleaning the Stripper Plate

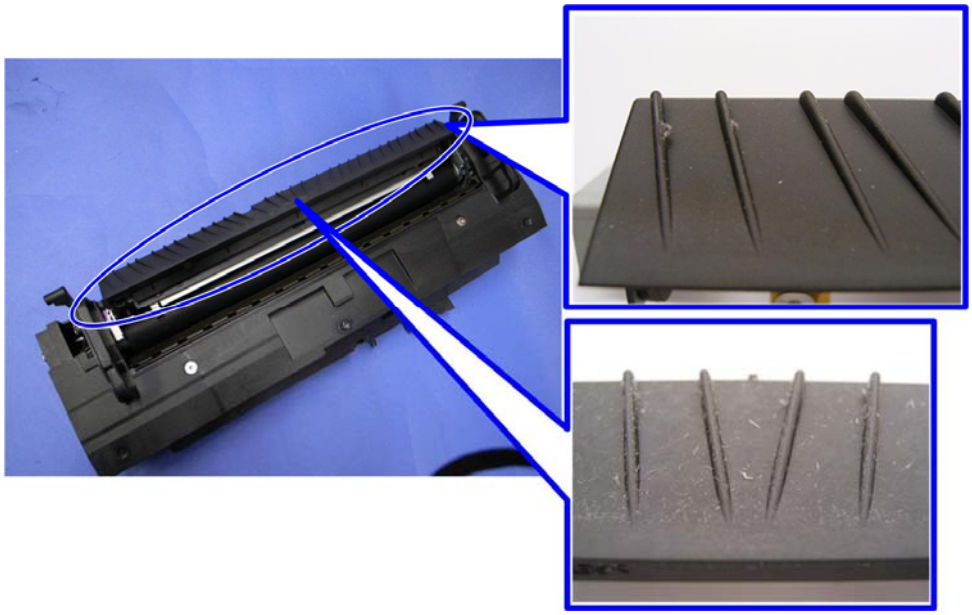


- Paper dust attaches to the stripper plate, as shown above.

Slide 200

No additional notes

Cleaning the Exit Guide Plate



- Clean at these locations.

Slide 201

No additional notes

SP Modes

- **1106: Displays the temperatures inside the fusing unit**
- **1801-007: Fusing motor speed adjustment**
  - Fusing motor speed can be adjusted in 0.01% steps.
  - Normally, it is at –0.4%.
  - The fusing motor normally turns slower than the transfer roller, so there is some slack between the fusing unit and the PTR.
  - If the paper is too slack, when the trailing edge leaves the transfer roller, the sudden release of the trailing edge causes the paper to spring outwards. Then, toner particles will move around, causing the image at the trailing edge to be fuzzy.
  - If this problem occurs, increase the speed of the fusing motor (the designers suggest a setting of –0.25%, but it depends on paper thickness; stiff paper will vibrate more, causing more movement of toner).

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- It is recommended that a setting lower than –0.25% should not be used. Otherwise. some types of thin paper could become creased, and there are no separate settings for different paper types.

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COPIER ENGINE

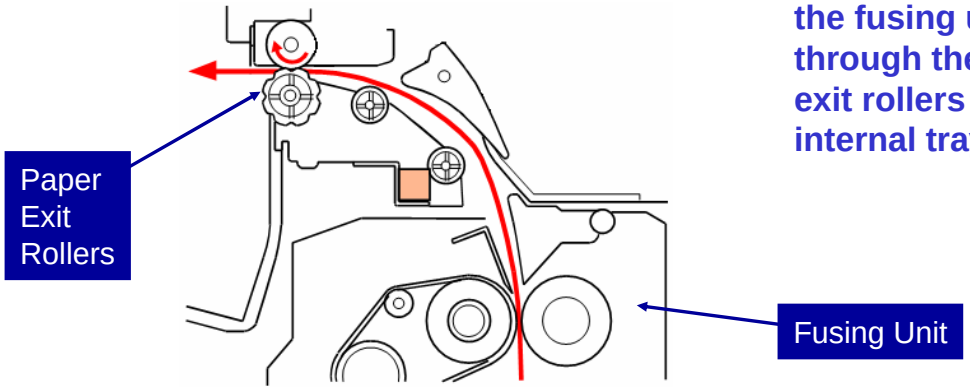
PAPER EXIT

Slide 203

❒ In this section, the paper exit mechanism will be described.

Paper Exit

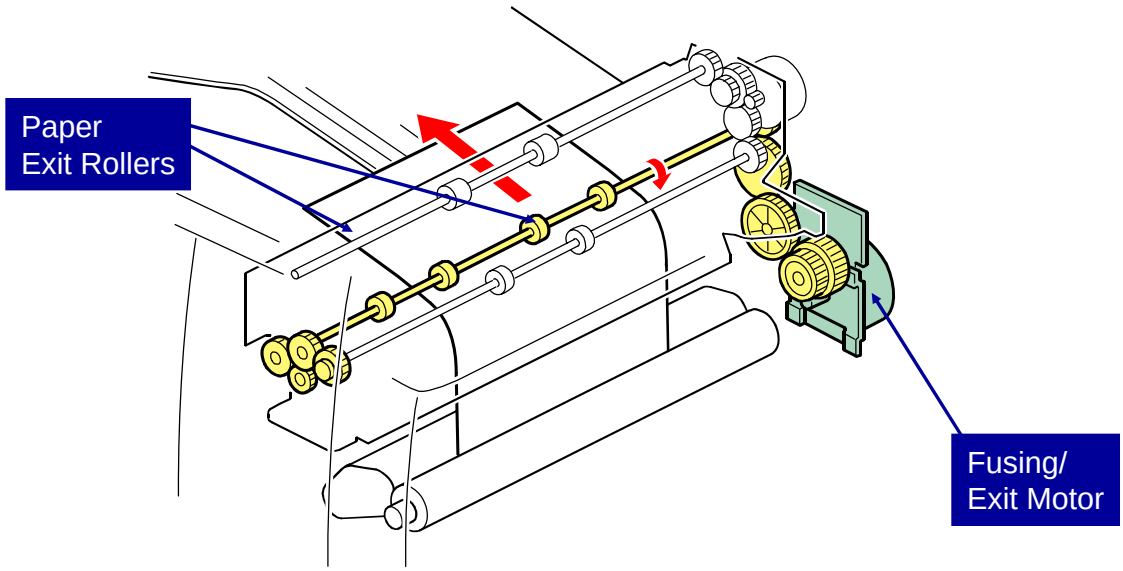
- Paper feeds from the fusing unit through the paper exit rollers to the internal tray.



Slide 204

No additional notes.

Fusing and Paper Exit Drive



- The fusing/exit motor drives the paper exit rollers.
- There is no tray full sensor for the internal tray.

Slide 205

No additional notes.

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OPTIONAL AUTOMATIC DOCUMENT FEEDER (D366)

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PURPOSE OF THIS SECTION

- ❒ This optional unit will be described. It is similar to the ARDF used with the D023 series copiers.

Overview

- **It feeds originals above the main copier's ARDF exposure glass during scanning.**
  - The ARDF exposure glass is a narrow glass to the left side of the exposure glass. The ARDF does not use the main exposure glass. The main glass is only used when the user selects book mode, and puts the originals on the glass.
- **The inverter unit lets the user make copies of two-sided originals. It stacks the originals in the correct order after scanning.**

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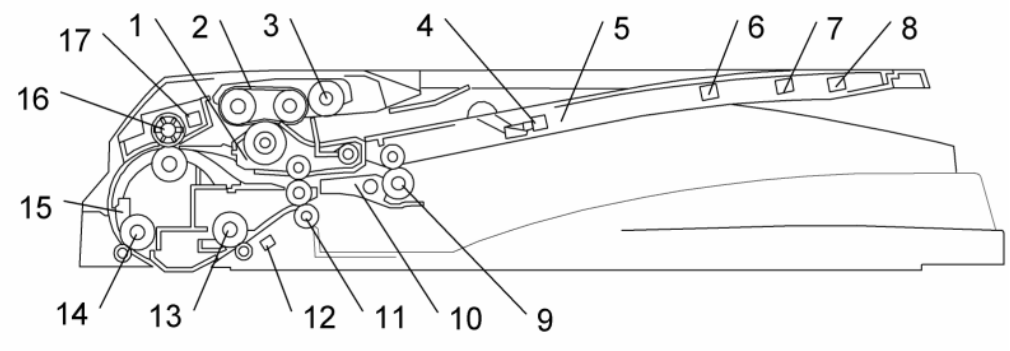
- The ARDF includes a stamp function. However, it is not used in the Di-C1LL as there is not fax or scan to email function.

Components

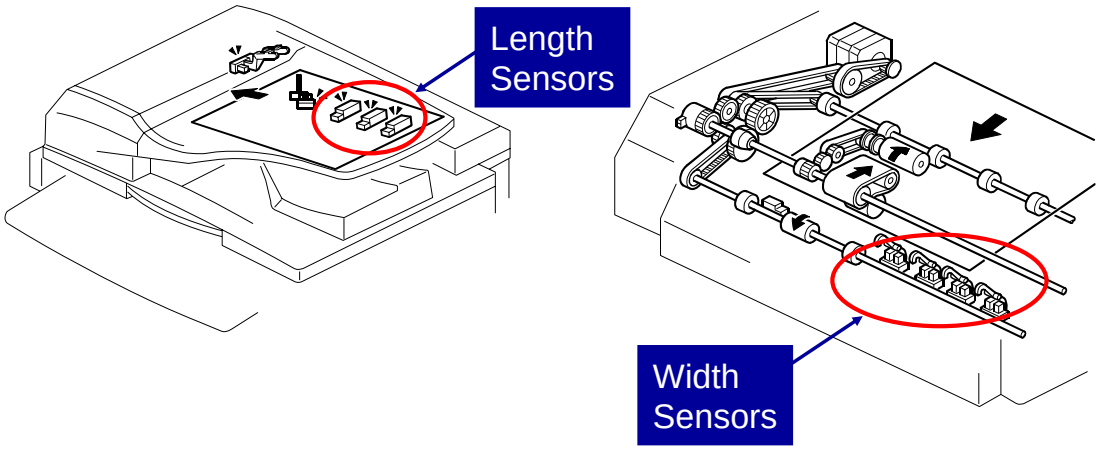


1. Separation roller	10. Junction Gate
2. Paper feed belt	11. Exit Roller
3. Pickup roller	12. Original Exit Sensor
4. Original trailing edge sensor	13. Transport Roller
5. Original Tray	14. Registration Roller
6. Original Length Sensor 1	15. Registration Sensor
7. Original Length Sensor 2	16. Skew Correction Roller
8. Original Length Sensor 3	17. Skew Correction Sensor
9. Inverter Roller	

Slide 208

- Study the component layout diagrams. In addition to the above diagram the, D366 service manual has two electrical component layout diagrams and drive layout diagrams.
- Note the functions of the following components:
  - Original Trailing Edge Sensor: During one-to-one copying, copy paper is fed to the registration roller before scanning, to increase the copy speed. The sensor monitors the stack of originals in the feeder, and detects when the trailing edge of the last page is fed in. This stops paper feed before the next sheet is fed.
  - Original Width Sensors: Uses an electrode plate, with terminals attached to the document guides. The sensor output changes when the user moves the guides to align with the document width. Because of this, the incorrect width is detected if the user does not put the guides in the correct position.
  - The ARDF position sensor only detects when the ARDF is opened. The platen cover sensor triggers the APS sensors.

Original Size Detection



- **Four width sensors, and three length sensors**
  - Width sensor: Photointerrupters
  - Length sensors: Reflective photosensors

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D366 Service Manual, Detailed Section Descriptions, Basic Operation, Original Set and Size Detection

- The table in the service manual shows the sizes that the machine detects for each output. There is also some more information about how the sensors operate.
- The machine cannot detect more than one original width in the same job. But there is a mixed original-length mode, as explained later in this presentation.

Original Size Detection – SP Modes

- 5126: Determines which F size is detected
- 6016: Determines how the machine interprets width/length sensor output for paper sizes that are almost the same.

Slide 210

- Make sure that the class is familiar with the table of sensor output vs original size.

SP 5126

- Use SP 5126 to control the size that is detected for the 'F' sizes, which are very similar (8½ x" 13", 8¼" x 13", 8" x 13"), and cannot be distinguished by the sensors.

SP 6016

- There are 7 bits. Each bit represents two paper sizes that are almost the same. Select 0 or 1 to decide which paper size the machine detects from that pair.

Mixed Original-Length Mode

- **Width detection: Same as for normal mode**
- **Length detection: Done for each sheet**
  - As a result, scanning is slower if the user selects mixed size mode
- **To detect length, the machine counts transport motor pulses from registration-sensor-on until registration-sensor-off**

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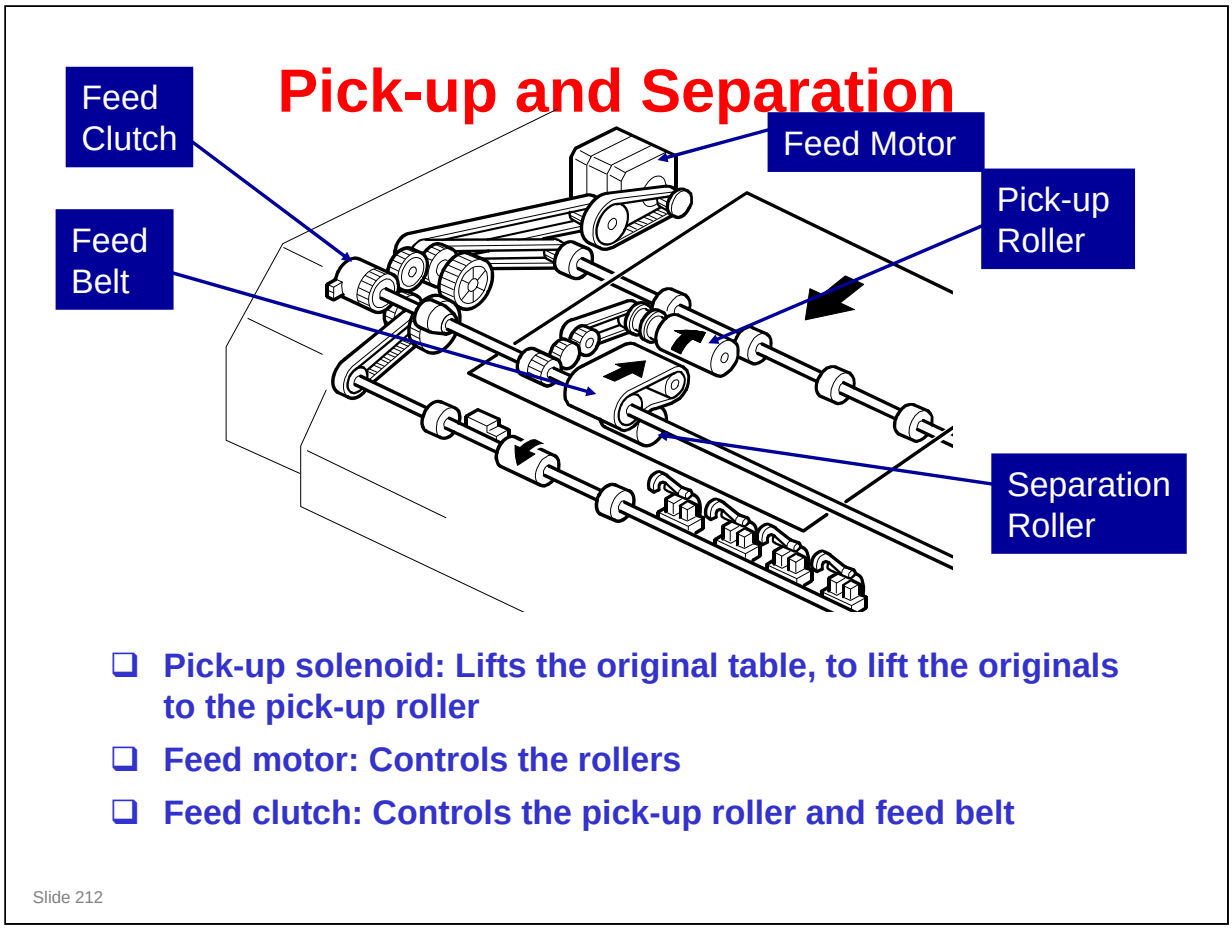
D366 Service Manual, Detailed Section Descriptions, Basic Operation, Mixed Original Size Mode

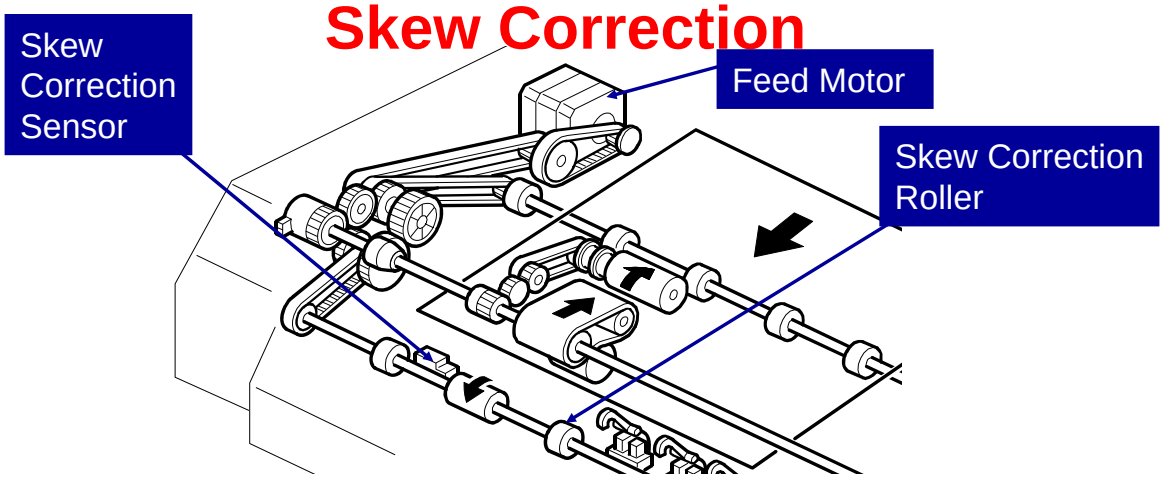
- This explains what occurs if the user selects mixed original-length mode.
- Normally, in mixed original-length mode, original length is detected as shown below:
  - The width is detected with the same procedure that is used when all originals are the same size.
  - The machine keeps an area in memory that is sufficient for an original of the detected width and 432 mm length.
  - Printing is done after length detection, and only the part of the memory that contains data up to the detected original length is printed.
- But, if some functions are selected (for example, Auto Reduce/Enlarge), the length must be detected before image scanning starts. Because of this, the machine must measure the length before scanning.
  - It must also make sure that the originals are in the correct sequence before scanning. Because of this, the 3 steps in the manual are done.
  - If the original is duplex, the original is inverted again after scanning the first side. Then the second side is scanned, and the paper is fed out.
- Why must the machine measure length first when we use Auto Reduce/Enlarge, Centering, and other functions?
  - With these functions, the machine must know the length of the original accurately.
  - For example, with centering, the image is centered on the copy paper. This cannot be done if the machine does not know the length of the original accurately.
  - Also, with Auto Reduce/Enlarge, the size of the original's image is decreased to fit on the copy paper. This cannot be done if the machine does not know the length of the original accurately.



D366 Service Manual, Detailed Section Descriptions, Basic Operation, Pick-up and Separation

- Main points about the mechanism
  - The feed motor has two speeds. It feeds the first original to the glass quickly, but is slower for scanning (the speed during scanning is set by the reproduction ratio).
  - The original sensor detects the trailing edge of the last original, before the original set sensor does.
- The original set sensor detects if an original is in the feeder. Why not use that sensor? Why is one more sensor necessary?
  - In this machine, the copier feeds copy paper into the machine first, to increase the copy speed. The original sensor tells the copier that there are no more pages to be scanned. The copier can then stop paper feed.
  - Look at the component diagram. The original set sensor is near the scan line, to tell the cpu that an original is in the feeder and is ready to be scanned. This is too far into the machine to tell the cpu sufficiently early to stop the next sheet of copy paper.
  - The original sensor is much nearer to the trailing edge of the stack. This gives sufficient warning to the cpu when the last page of the original is fed in.

Skew Correction



- **First, the feed motor rotates forwards: The feed belt feeds the original, but the skew correction roller does not turn.**
  - The leading edge of the original hits the skew correction roller, and this removes any skew in the original.
- **Then, soon after the skew correction sensor detects the original, the feed motor stops.**
- **Then, the feed motor turns in reverse: The feed belt and skew correction roller both turn. The feed belt stops when the feed clutch turns off.**

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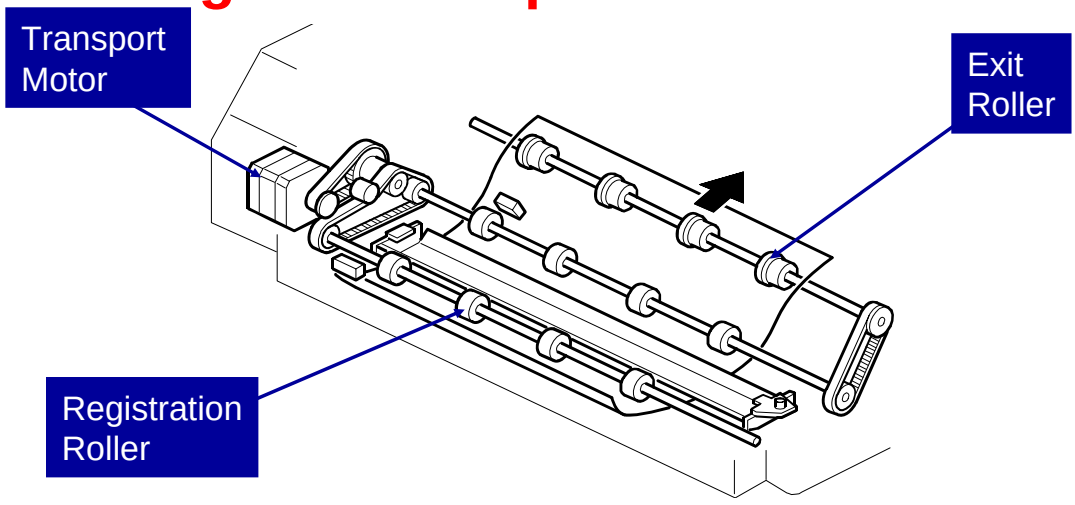
D366 Service Manual, Detailed Section Descriptions, Basic Operation, Skew Correction

- The one-way clutches in the ARDF mechanism allow the feed motor to have different effects when rotating forwards and in reverse.

Original Transport and Feed-out

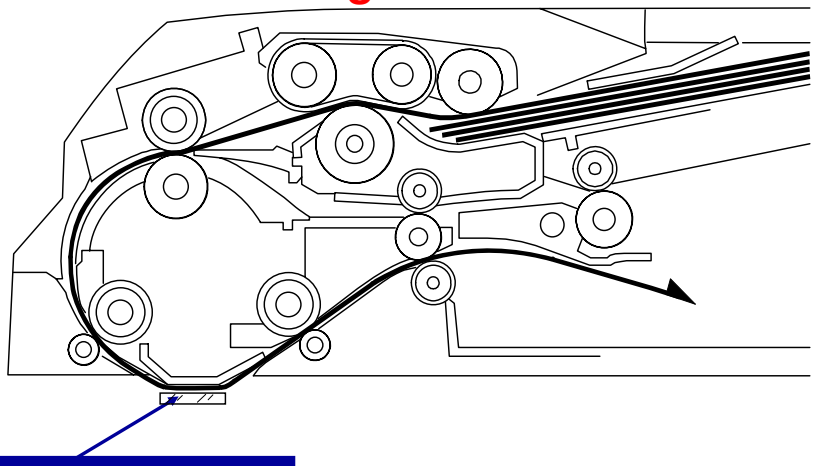


- The transport motor drives the registration and exit rollers.

Slide 214

No additional notes

Original Transport and Feed-out Single-sided



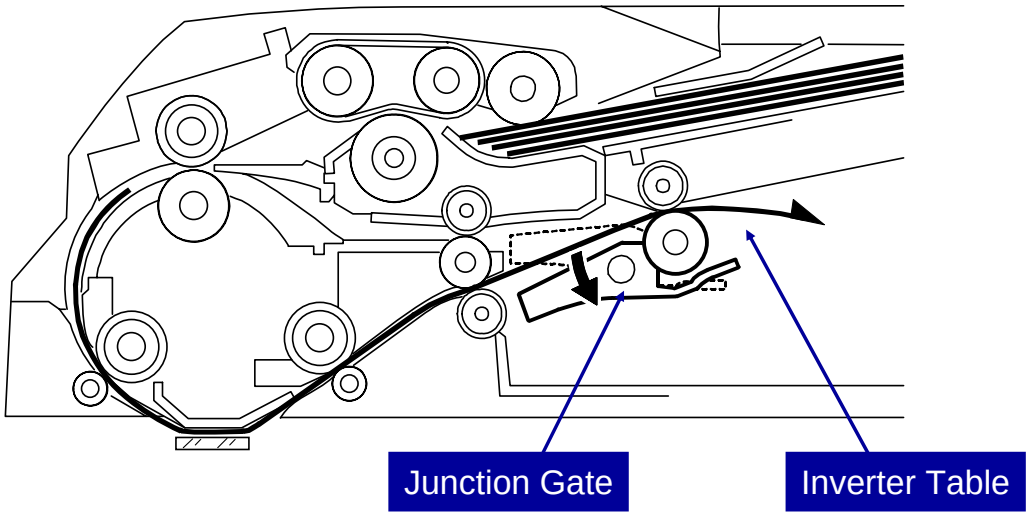
- **Transport motor: Feeds the original through the scanner**
- **Motor speed is set by the reproduction ratio**

Slide 215

D366 Service Manual, Detailed Section Descriptions, Basic Operation, Original Transport and Exit

- The machine scans the original through the ARDF exposure glass.
- The original stops at the registration sensor. But, there is no skew correction at this time (this is because the feed motor in the ARDF stops). The original stops here for timing, to feed the original at the correct time to synchronize with the remaining part of the copy process.

Original Transport and Feed-out Double-sided 1

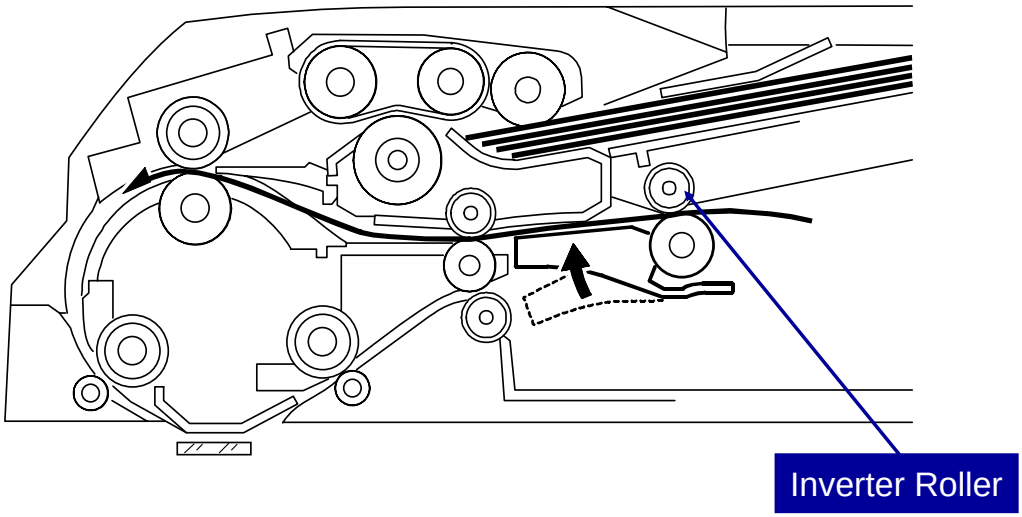


- **When the original exit sensor detects the leading edge, the junction gate opens and the original goes to the inverter table.**

Slide 216

- The main points are on the next 4 slides.

Original Transport and Feed-out
Double-sided 2



- When the paper is in the inverter table, the feed motor changes direction and the inverter roller feeds the original into the ARDF again.

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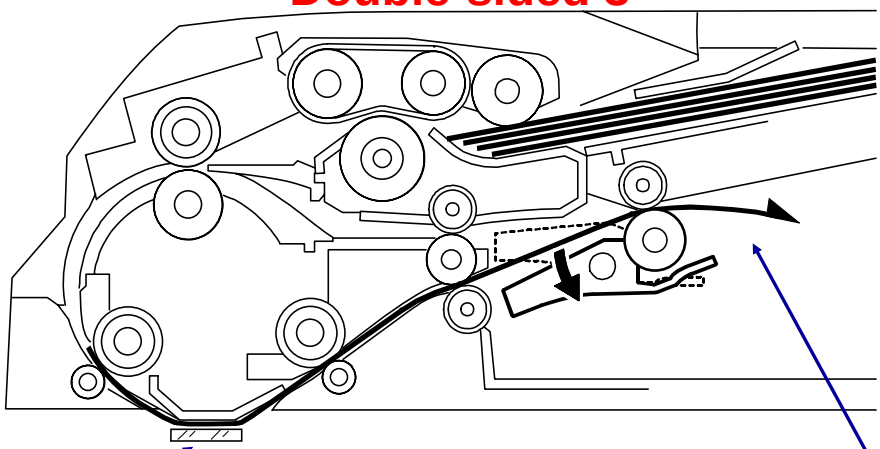
No additional notes

Original Transport and Feed-out
Double-sided 3



- **The rear side is scanned**
- **The original is fed to the inverter table again**
  - The page goes to the inverter mechanism again. This stacks the pages of the original in the correct order.

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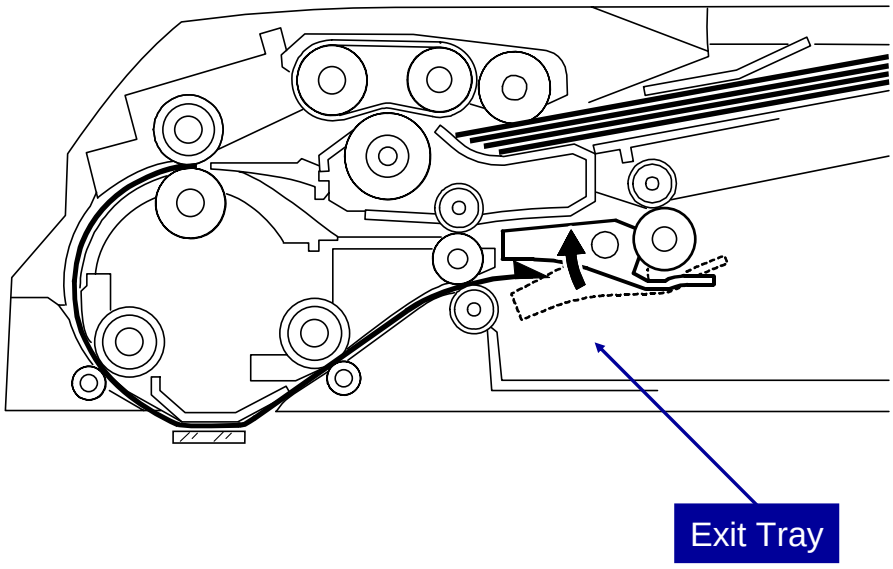
No additional notes

Original Transport and Feed-out Double-sided 4



- The page is fed in from the inverter table and out to the exit tray.

Slide 219

No additional notes

Dust Detection (SP 4020)

- **This function checks the ARDF exposure glass for dust that can cause black lines in copies.**
- **If dust is detected, a message is shown on the operation panel, but the machine does not stop.**
- **SP 4020 001: Enable/disable (default – disabled)**
- **SP 4020 002: Sensitivity adjustment**
- **SP 4020 003: Adjusts image processing parameters to remove thin vertical lines that are caused by dust (default – disabled)**
  - A piece of dust on the ARDF exposure glass causes a thin vertical line on the scanned image. This is because the ARDF feeds the paper above the exposure glass during scanning. Dust on the glass is shown on each line of the scanned image, and the result is a thin vertical line.
- **SP 7852: Shows the number of times that the machine detected dust on the ARDF.**

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No additional notes

SP Modes

- **4-020: Dust check**
  - This was covered on the previous slide.
- **6-006: Registration**
  - Adjusts the side-to-side and leading registration of originals
- **6-007: Input check**
  - Displays the signals received from the sensors and switches of the ARDF.
- **6008: Output check**
  - Activates the electrical components for a function check.
- **6-009: ARDF free run**
  - Performs an ARDF free run.
- **6-016: Original Size Detection Priority**
  - Specifies the original size for a size detected by the original sensor, since original sensors cannot recognize all sizes.
- **6-017: DF Magnification Adjustment**
  - Adjusts the magnification in the sub-scan direction for the ARDF.

Slide 221

No additional notes.

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TWO-TRAY PAPER FEED UNIT (D331)

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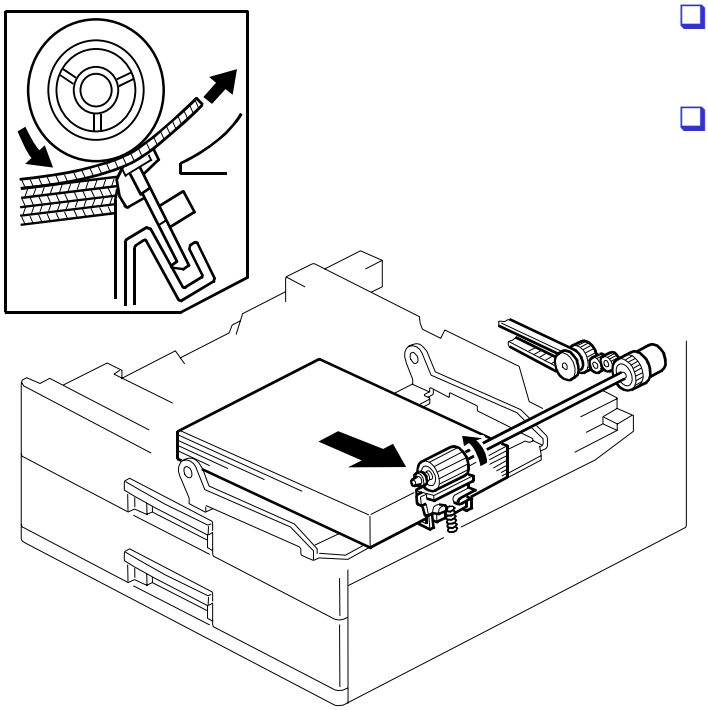
- In this section, you will study the mechanisms of the optional paper feed unit.
- This is the same as the paper tray unit that is used with the Pr-C1.

Paper Feed and Separation

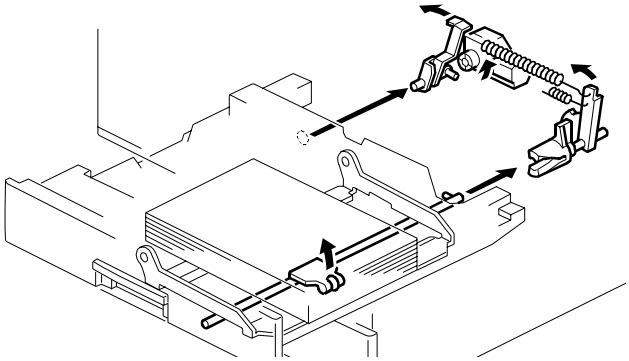


- **Feed roller and friction pad**
- **Paper feed motor: Drives the feed roller**
  - The appropriate paper feed clutch turns on to transfer drive from the motor to the rollers in the required tray.
  - The relay clutch drives the relay roller, which feeds paper up from the lower tray.

Slide 223

No additional notes

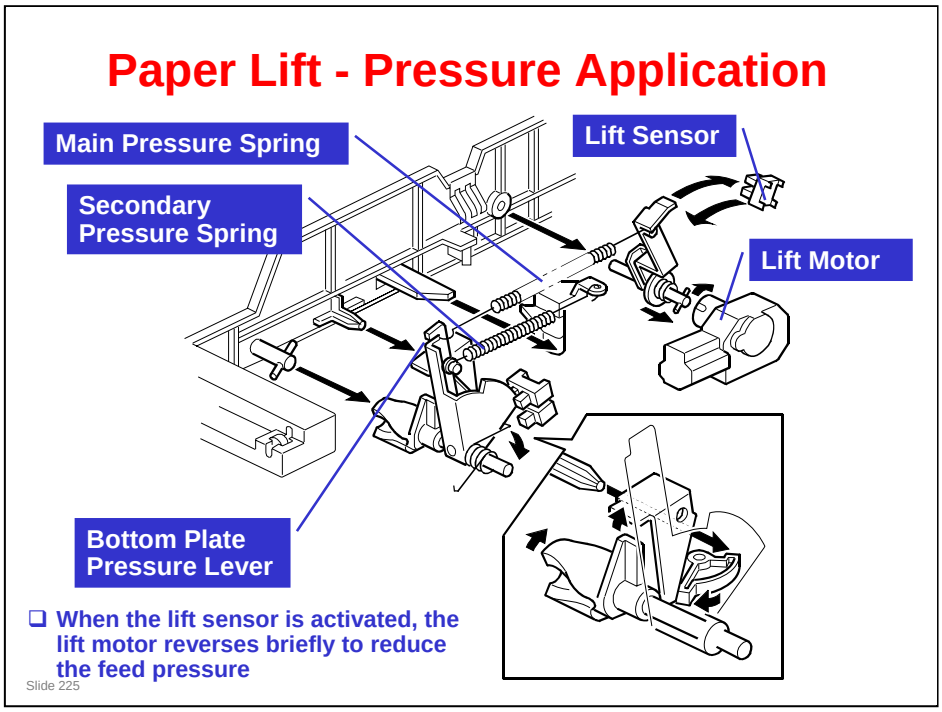
Paper Lift - Engaging the Shafts



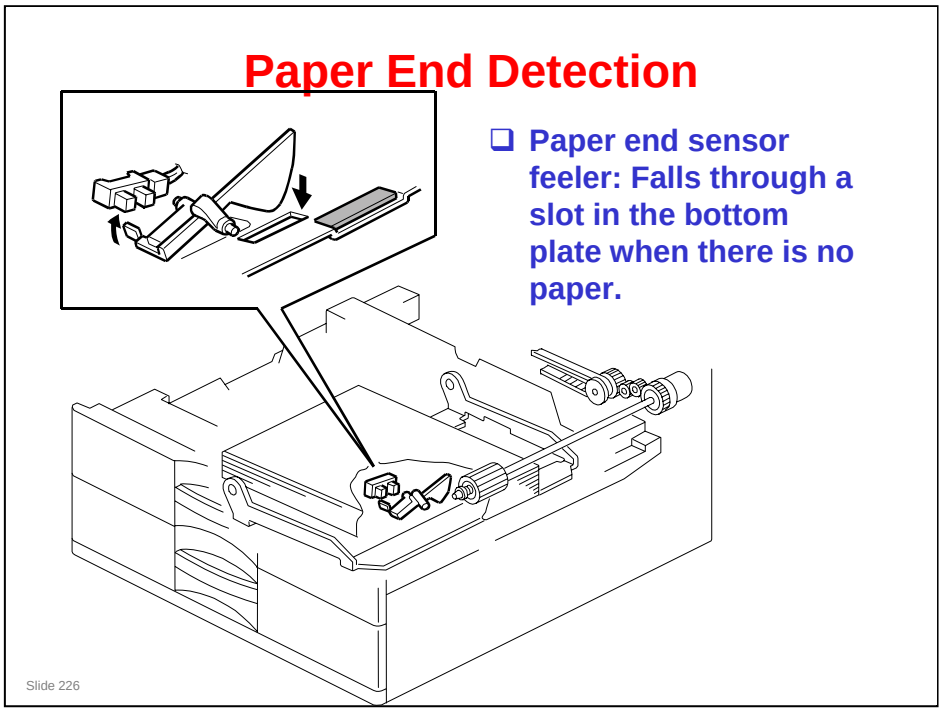
- **The two shafts engage when the tray is pushed into the machine.**
  - One shaft lifts the stack
  - The other shaft controls the paper feed pressure

Slide 224

- This mechanism has two purposes:
  - To lift the stack to the paper feed height.
  - To apply a suitable paper feed pressure.
- This slide shows how the shafts engage when the tray is pushed into the machine.

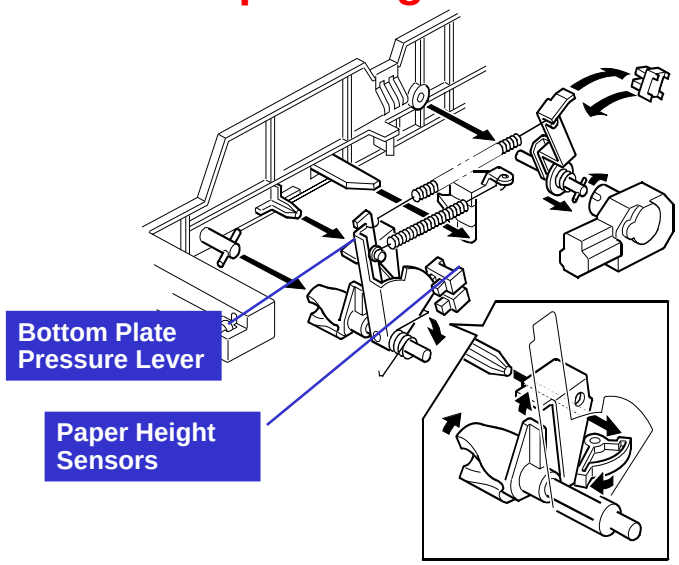


- This slide shows how the tray is lifted.
- The lift motor turns on, and turns clockwise as viewed on the diagram.
  - The main pressure spring pulls the bottom plate pressure lever, and this lifts the tray bottom plate.
- When the top of the stack touches the feed roller, the motor cannot pull up the plate any more, so it pulls the actuator into the lift sensor.
  - The pressure of the feed roller on the paper is now too high, so the lift motor now reverses to reduce this pressure. It reverses for 200 ms or 600 ms, depending on the paper size. For smaller paper, it reverses the larger amount (600 ms) to reduce the pressure more.
  - For A4-LEF, A3-SEF, and B4-SEF paper, a projection on the side fence engages the secondary pressure spring, to ensure that extra pressure is applied to wider paper.
- Finally, when the tray is pulled out, the lift motor reverses for 1.7 ms. This makes it easier to put the tray back.



No additional notes

Paper Height Detection



❑ **Bottom plate pressure lever: Moves as paper is used up**

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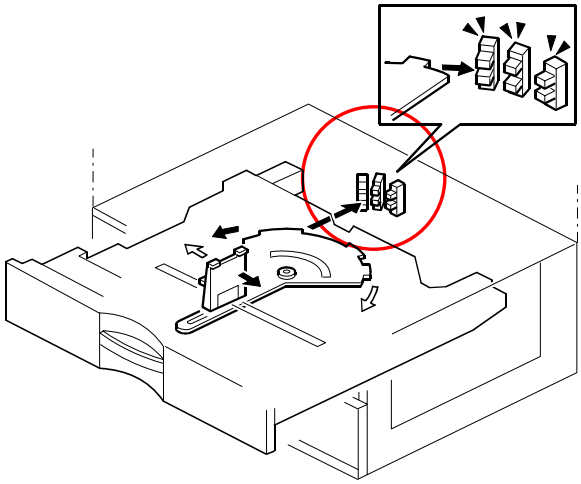
- Note that these sensors are not used unless the optional printer controller has been installed. Then the current status can be viewed from the driver. Note that this feature is only available for the optional paper tray units.
- The two paper height sensors detect the amount of paper in the tray.
- The actuator is attached to the bottom plate pressure lever.
- The lift motor rotates to increase the feed pressure when the remaining paper falls below a certain amount.
  - When the tray contains paper of a small width, the paper feed pressure may become too low when the thickness of the remaining stack of paper has decreased. To counteract this, the lift motor rotates forward for a short while after the remaining paper falls below a certain level. This increases paper feed pressure, simulating the pressure generated by a full tray.

Paper Size Detection



- **Both the trays are universal trays.**
- **Paper size sensors: Detect the paper length**
  - The position of the sensor actuator is controlled by the position of the end fence

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- Only the length is detected directly.
- The actuator has patterns of studs on the rear.
- These studs turn the paper size sensors on/off.
  - This also tells the main unit that the tray is in the machine.
  - For a paper size detection table, see the service manual.

    If other paper sizes are used, they must be selected with a user tool: System Settings → Tray Paper Settings → Tray Paper Size (Tray 2, Tray 3).

Size Detection – SP Modes

- **SP 5181**
  - Some paper sizes are almost the same and cannot be distinguished by the sensors.
  - To select which size is detected, use SP 5181.
    - » Tray 2: SP 5181 004 to 008
    - » Tray 3: SP 5181 009 to 011

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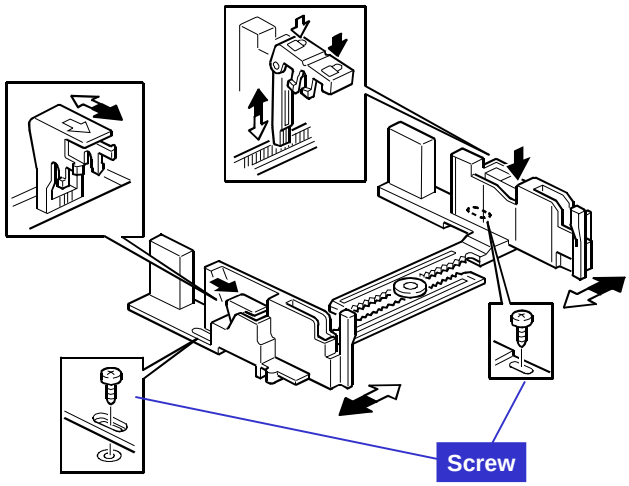
No additional notes

Side Fences



❑ **The side fences have stoppers to prevent them bending when a full tray is pushed in too strongly**

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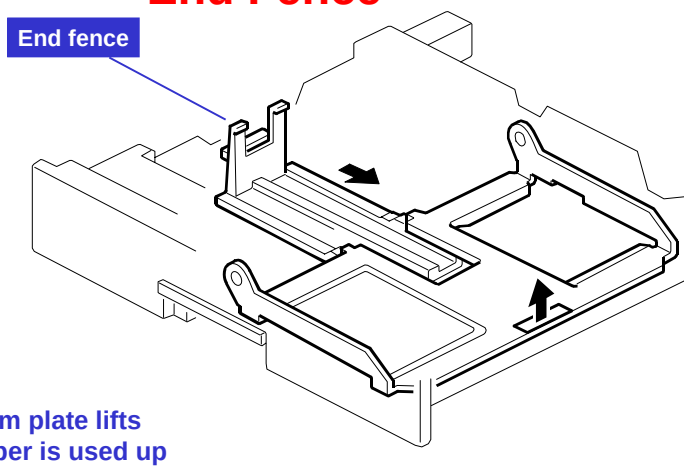
❒ If the tray is full of paper and it is pushed in strongly, the fences may deform or bend. This may cause the paper to skew or the side-to-side registration to be incorrect.

❒ Each side fence can be secured with a screw, for customers who do not want to change the paper size.

End Fence



- The bottom plate lifts as the paper is used up
- The fence is connected to the bottom plate, and it moves forward when the bottom plate lifts.
- This keeps the edges of the paper in the stack tidy.

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No additional notes

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MAINTENANCE

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No additional notes

PM

- **PM cycle: 60K and 150 K**
  - 60k: Drum unit, PCDU toner collection bottle, transfer belt cleaning unit assembly (includes a waste toner bottle)
    - » At the same time, clean the area around the entrance sheet of the development unit. Also, in the fusing unit, clean the entrance and exit guides, the stripper plate, and the pressure roller.
  - 150K: Fusing rollers and fusing belt
  - Refer to: FSM → Appendices → Appendix: Preventive Maintenance Tables
- **Peripherals: At EM only**

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No additional notes.

New Unit Detection

- **For the following units, there is a new unit detection mechanism. It is not necessary to reset PM counters.**
  - PCDU
  - Development unit only (not the complete PCDU)
  - PCDU Toner Collection Bottles (if full or near-full)
  - ITB Cleaning Unit with ITB Waste Toner Bottle (if full or near-full)

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PCDU

- This contains the drum unit and the development unit.
- The development unit contains the new unit detection mechanism for the PCDU.
  - It uses the ID chip.
- So, if you replace the PCDU, or the development unit only, the machine detects the new unit automatically and resets the counters.
  - If you replace the development unit only, set 3902 001 (K), 002 (C), 003 (M), or 004 (Y) to 1 before you switch off the machine. If you forget this, then the drum counters will be reset when you turn the machine on again.
- But if you replace the drum unit only, then you must reset the counters (see the next slide).

Toner Collection Bottles

- If the bottle is full or near-full, the counters are reset when the bottle is replaced or emptied.
  - The counters are reset after the cover is closed.
- But the counters are not reset if you replace a bottle that is not full or near-full. You must reset the counters manually (see the next slide).

PCDU, PCDU Toner Collection Bottle

- **PCDU**
  - This contains the drum unit and the development unit.
  - The development unit contains the new unit detection mechanism for the PCDU.
  - So, if you replace the PCDU, or the development unit only, the machine detects the new unit automatically and resets the counters.
    - » If you replace the development unit only, set 3902 001 (K), 002 (C), 003 (M), or 004 (Y) to 1 before you switch off the machine. If you forget this, then the drum counters will be reset when you turn the machine on again.
  - But if you replace the drum unit only, then you must reset the counters (see the next slide).
- **Toner Collection Bottles**
  - If the bottle is full or near-full, the counters are reset when the bottle is replaced or emptied.
  - But the counters are not reset if you replace a bottle that is not full or near-full. You must reset the counters manually (see the next slide).

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No additional notes

PM Counter Reset

- **If you change the following parts, you must set the following SPs to 1 before you turn the machine power off.**
  - Development Unit only: 3902-001 (K), -002 (C), -003 (M), -004 (Y)
  - Drum Unit only: 3902-009 (K), -010 (C), -011 (M), -012 (Y)
  - Fusing Unit: 3902-014
  - Fusing Roller: 3902-015
  - Fusing Belt: 3902-016
  - Image Transfer Belt: 3902-013
  - Image Transfer Belt Cleaning Unit: 3902-017
  - Paper Transfer Roller: 3902-018
  - PCDU Toner Collection Bottle (if not full or near-full): 3902-019
  - Image Transfer Belt Toner Collection Bottle (if not full or near-full): 3902-020
- **Then, after you replace the parts, the PM counters will be reset automatically when you turn the main power switch on again.**
- **Check that the PM counters were reset correctly (SP 7-803).**
  - If a PM counter was not reset, you can reset it manually (SP 7-804).

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- FSM → Preventive Maintenance → PM Parts Settings
  - Study the 'Before removing the old PM parts' and 'After installing the new PM parts' procedures in this section of the manual.

After PM

- **Do the ACC procedure.**
  - User Tools > Maintenance > ACC > Copier > Start
  - User Tools > Maintenance > ACC > Printer > Start > Test Patterns 1, 2, and 3
- **Do the forced line position adjustment**
  - First do SP2-111-3 (Mode c).
  - Then do SP2-111-1 (Mode a).
  - To check if SP 2-111-1 was successful, watch the screen during the process. A message is displayed at the end.
    - » Also, you can check the result with SP 2-194-007 (0: Completed successfully, 1: Failed).

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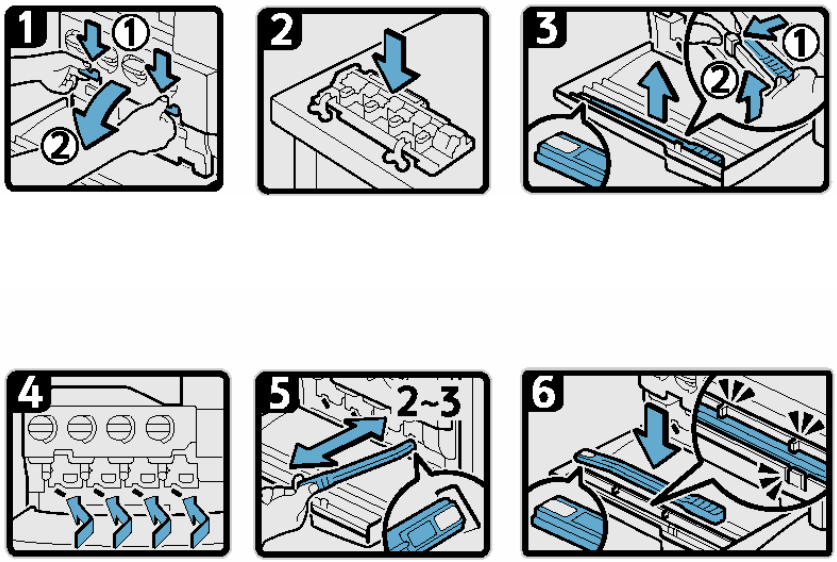
- FSM → Preventive Maintenance → PM Parts Settings
  - Ask the class to study the 'Preparation before operation check' procedure in this section of the manual.

Service Maintenance - Cleaning

- The service manual shows which parts of the machine and optional equipment must be cleaned when you visit the machine.
- In addition to those items, the dust shield glass for each development unit should be cleaned at every visit.
- The cleaning tool for the dust shield glass is stored in the front cover, as shown below.



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No additional notes.

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TROUBLESHOOTING

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- This section goes over the troubleshooting tools built into the machine.
- Explain that the troubleshooting section does not cover all possible problems. In the field, technicians will have to think for themselves and draw on their own experiences. However, the procedures in the manual will give some ideas for where to start to look when a particular problem occurs.

Process Control Results

- **ID sensor test: SP 3325**
  - **000 = Front, Center, Rear**
    - e.g. 111 → Successfully completed
- **Process Control Self-Check Result: SP3012**
  - **YY CC MM KK: 11 11 11 11 ~ 99 99 99 99**
    - e.g. 11 → Successfully completed
- **Line Position Adjustment Result: 2194-10~12**

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Service manual, Troubleshooting, Process Control Error Conditions

- Each of these SPs gives a result code.
- For the meanings of each code, and how to proceed, see the above section of the service manual.

Service manual, Troubleshooting, Troubleshooting Guide

- This section gives more details on how to solve problems that occur with line position adjustment.
- Some steps ask you to use SPs. See the SP tables for details on each SP.
- Some of the SP adjustment have ‘dot’ and ‘subdot’ settings. These let you adjust the position of the lines. Adjust the ‘dot’ setting first, for a rough adjustment. Then, adjust the ‘subdot’ setting for a fine adjustment.

Image Defects at Regular Intervals

- **If a defect occurs in the image at one of these intervals, the related component may be defective.**
  - Drum: 94.2 mm
  - Fusing belt: 157.1 mm
  - Development roller: 32 mm
  - Paper transfer roller: 75 mm

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No additional notes

Reset Procedures

- **Software Reset**
  - Either
    - » Operation panel power switch off/on
    - » Hold the # and . keys for 10 seconds
- **User Tool Settings Reset**
  - Press ‘User Tools’.
  - To reset the system settings user tools: Hold # and press ‘System Settings’, then press ‘Yes’.
  - To reset the copy/doc server feature user tools: Hold # and press ‘Copy/Document Server’, then press ‘Yes’.

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Service manual, System Maintenance Reference, Reboot/System Setting Reset

- Note the two ways to reset the machine if the software hangs up.
- Point out the procedures to reset the user tool settings to their defaults.

Paper Jam History

- **Paper Jams**
  - SP 7504 shows details on jams that occur in each section of the machine.
  - SP 7506 shows details on jams by paper size.
  - SP 7507 shows details on the 10 most recent jams.
- **Original Jams**
  - SP 7505 shows details on original jams that occur in each section of the ARDF.
  - SP 7508 shows details on the 10 most recent original jams.

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Service manual, Troubleshooting, Jam Detection

Service Mode Lock

- **If the customer uses the security functions on the machine, the technician has two problems:**
  - The technician cannot get into SP mode
  - If the technician turns the machine power off and on frequently during servicing, a user name and password must be input each time.
- **To make it easy to do work on the machine, you must ask the administrator to switch Service Mode Lock to Off.**
  - You must ask the **Machine Administrator** to do this.
  - User Tools > System Settings > Administrator Tools > Service Mode Lock
  - The administrator will change it back to On after you finish.

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No additional notes

Error Codes

- **SC Codes**
  - 4 levels of SC condition.
  - Use SP 5810-1 to clear level A service call codes, then turn the main power off/on.
- **Level B SC codes**
  - The machine can be set with SP 5875 to reboot automatically after 30 seconds if a level B SC code occurs.
    - » If the same SC occurs again, the machine does not reboot.

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Service manual, Troubleshooting, Service Call Conditions

Card Save (1)

- **This feature allows you to send print data files to an SD card in the service slot (slot 2 in this machine).**
  - The data is not printed.
- **Card Save mode must be turned on with printer bit switch 1, bit 4.**
  - Card Save will remain enabled until the SD card becomes full, or until all file names have been used.
- **Files are stored on the SD card in the folder /prt/cardsave.**
  - File names are assigned sequentially from PRT00000.prn to PRT99999.prn.
  - An additional file PRT.CTL will be created. This file contains a list of all files created on the card by the card save function.
- **Card Save cannot be used with PJL Status Readback commands.**

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No additional notes

Card Save (2)

- **Previously stored files on the SD card can be overwritten or left intact.**
- **After you enable this function with the printer bit switch, the following two user tools are added to the List/Test Print tab of the Printer Features user tools menu.**
  - Card Save (Add):
    - » Appends files to the SD Card.
    - » Does not overwrite existing files.
    - » If the card becomes full or if all file names are used, an error will be displayed on the operation panel. Subsequent jobs will not be stored.
  - Card Save (New)
    - » Overwrite files in the card's /prt/cardsave directory.

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- Study the procedure in the service manual.

FSM - System Maintenance Reference - Card Save Function

- Note that there is no message on the screen to indicate that a file was copied to the SD card successfully. But there are some error messages that appear if things go wrong.
- If an error occurs, press “OK”. The device will discard the job and return to the ready state.

SP Modes - Tests

- 2-109: Test pattern printing
- 4-301: APS sensor output test
- 5-803: Input tests
- 5-804: Output tests
- 6-007: ARDF input tests
- 6-008: ARDF output tests

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No additional notes

SP Modes - Counters

- 7-401: SC counter
- 7-403: SC history
- 7-502 to 7-506: Jam counters
- 7-507: Printer engine jam history
- 7-508: Original jam history
- 7-807: SC code and jam counter reset

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No additional notes

SP Modes - Others

- 5-990: Parameter lists (SMC list printing)
- 7-801: ROM version display

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No additional notes

Appendix

Setting CustomRed

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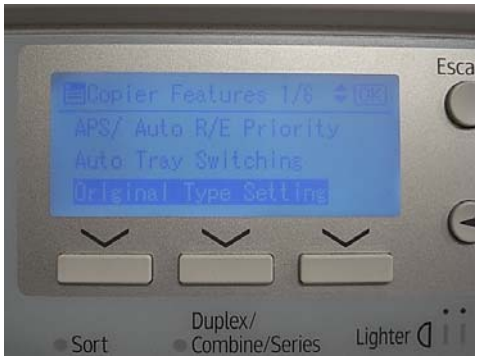
Setting CustomRed – 1

- Press User's tool and choose *Copier Features*.

- Choose *Original Type Setting* and press OK.



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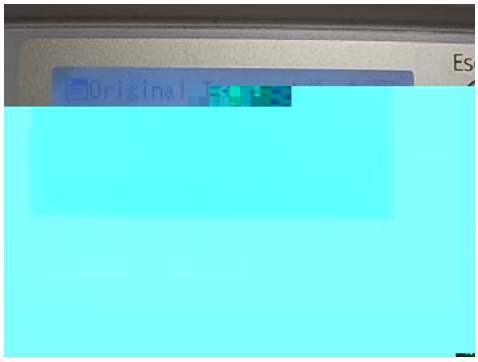
Setting CustomRed – 2

- Choose *Full colour 3 (Text/Photo)* and press OK.



- Choose *T/P, CopiedPhot, ImagDens=On* and press OK.

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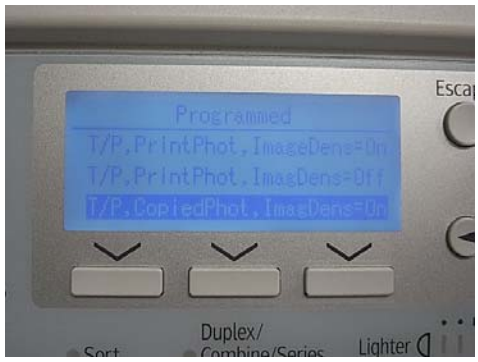
Setting CustomRed – 3

- "Programmed" appears if setting is done successfully



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