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MODEL Di-C1.5 TRAINING
Machine Codes: D104/D106

INTRODUCTION

HOW TO USE THIS PRESENTATION

This TTP (Technical Training package) will help you train service technicians on the model Di-C1.5.

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
28 October 2010	V1.0	First release
24 November 2010	V1.0	Some slides reformatted for easier Chinese translation. (No content changes.)

Introduction

- **The Di-C1.5 is a low-range network multi-functional color copier.**
  - Based on the GW Architecture.
  - Provides the following:
    - » Network Scanning (color originals can be scanned)
    - » Local Storage (with the HDD)
    - » Copying
    - » Printing

Slide 2

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 field service manual.

Description	Quantity	Remarks
Field Service Manual	1 per trainee	Give copies to the trainees
Operation Manuals	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	Used for testing the printing and document storage.
Computer	1 per trainee	For testing and document storage.
Network	1	TCP/IP or wireless network

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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COURSE OVERVIEW

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

Course Overview - 1

- Product Outline
- What's New
- Specifications
- Installation
- Machine Overview
- Scanner
- Laser Exposure
- PCDU

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.

What's New

- Changes from the Di-C1 will be listed.

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.

PCDU

- This section explains the components of the PCDU.
- All the image-creation processes around the drum, including development, are covered in this section.

Course Overview - 2

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

Slide 6

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.

DUPLEX

- The duplex mechanisms will be described.
- The duplex unit is a standard component of this model.

Course Overview - 3

- Options
  - ARDF
  - Paper Tray Units (1-tray, 2-tray)
  - Shift Tray
  - One-bin Tray
  - Side Tray
  - Internal finisher
- Maintenance
- Troubleshooting
- Fax Option
- Environmental Conservation
- Supplement: Coverage Counter

Slide 7

OPTIONS

- The options listed above will be described in the indicated order.

MAINTENANCE

- PM is described briefly.

TROUBLESHOOTING

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

FAX

- Basic information about the fax unit will be explained.

Environmental Conservation

- Technologies that have been implemented for environmental conservation will be explained.

Supplement: Coverage Counter

- Supplemental information about coverage counter calculations.

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PRODUCT OUTLINE

Slide 8

- ❒ 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

How many models?

- **Two models:**
  - Di-C1.5a (D104): 20 cpm
  - Di-C1.5c (D106): 25 cpm
- **Copy speed is the only difference between the two models.**
- **All models have the following equipment built-in:**
  - Printer/scanner unit.
  - USB host
  - 10-baseT/100-baseTX
  - Java VM
  - App2Me (must be installed by the technician during the machine's installation procedure)
  - Data Overwrite Security Unit
  - HDD Encryption Unit
- **SD cards**
  - Slot 1 (upper slot): Security SD Card (contains the Data Overwrite Security Unit and HDD Encryption Unit)
    - » Already installed at the factory; the technician does not have to do anything when installing the machine. However, the customer must activate them with user tools.
  - Slot 2 (lower slot): Empty when shipped from factory
    - » VM card with App2Me must be inserted during the machine's installation procedure.

Slide 10

- App2Me: More about this later.
- In the previous models, no SD cards were installed at the factory, and the Data Overwrite Security Unit and HDD Encryption Unit were options.

Di-C1.5 Appearance (1)

WVGA Display

Mainframe
+
Internal Finisher
+
ARDF
+
Paper Bank

Envelope Feeder (new option)

Slide 11

- Here is a view of the full system with the internal finisher installed.
- The envelope feeder is a new option.
- ADF is standard equipment

Di-C1.5 Appearance (2)

Mainframe
+
Side Tray
+
ARDF
+
Paper Bank

Slide 12

❒ Here is a view of the full system with the side tray installed.

SALES POINTS

Slide 13

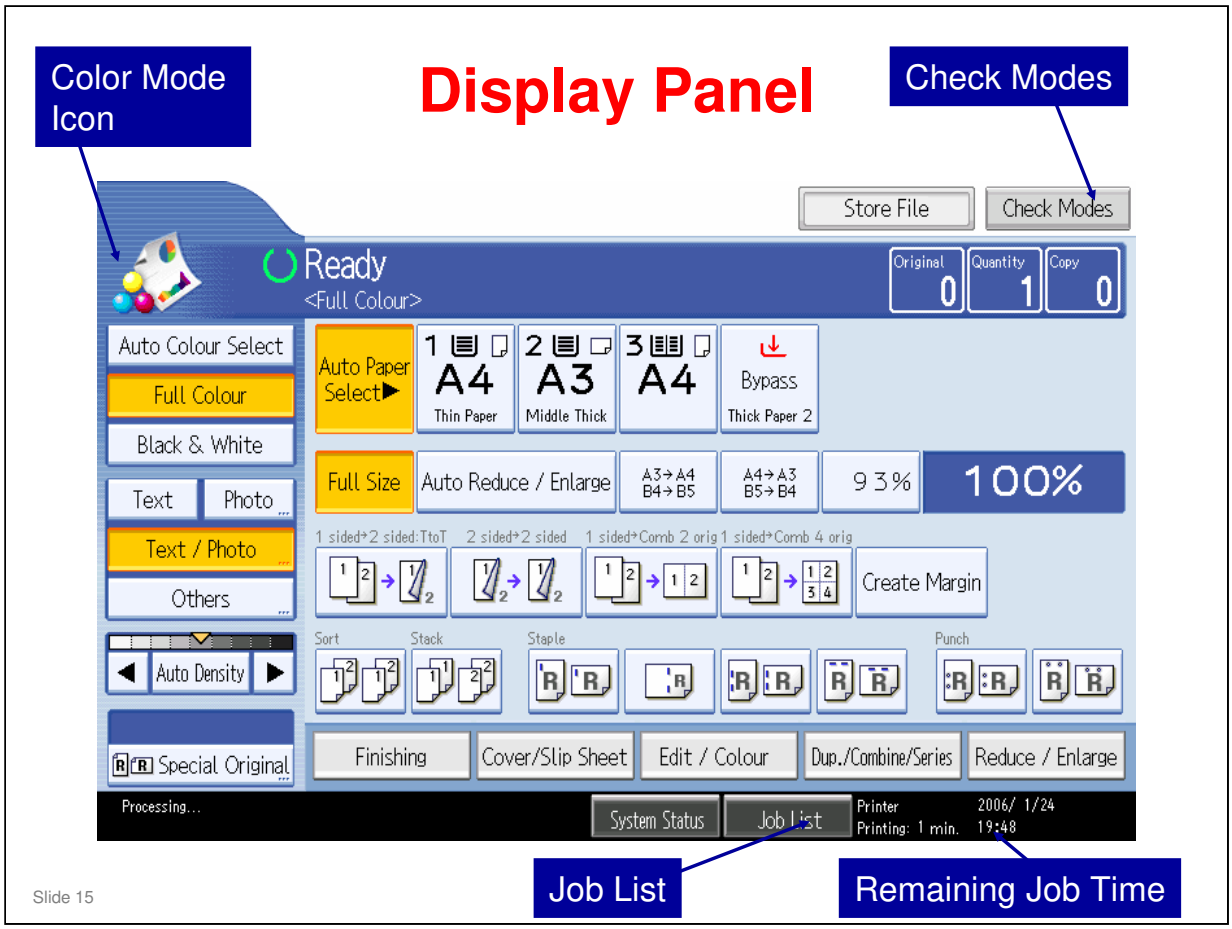
No additional notes

Main Sales Points

- **High performance (close to black-and-white models)**
  - Short Warm Up time: Less than 30 sec.
  - Short First Copy Output Time:
    - » Black-and-white 6.5 sec
    - » Full color: 9.5 sec
- **Productivity**
  - High speed color output
    - » Di-C1.5a: 20 cpm, Di-C1.5c: 25 cpm
  - Internal 500-sheet finisher
  - High Speed Scanning (from ADF): 41 pages/minute (monochrome), 26 pages/minute (color): A4 LEF, 200dpi
  - Multiple scanning resolutions: 100, 200, 300, 400, 600, 1200 dpi
    - » 1200 dpi via TWAIN only
    - » Default is 200 dpi
  - Thick paper (up to 256 g/m^2) can be fed from the first tray or bypass tray
  - Optional envelope feed tray can replace the first tray.
- **Solution Features**
  - Quota Setting
  - DataOverWrite + HDD Encryption and Java VM are now standard. (on SD cards)
- **Improved Eco Specifications**
  - Downsized fusing unit heats quickly and uses less energy.
- **Small footprint**
  - 587 mm x 676 mm (w x d)

Slide 14

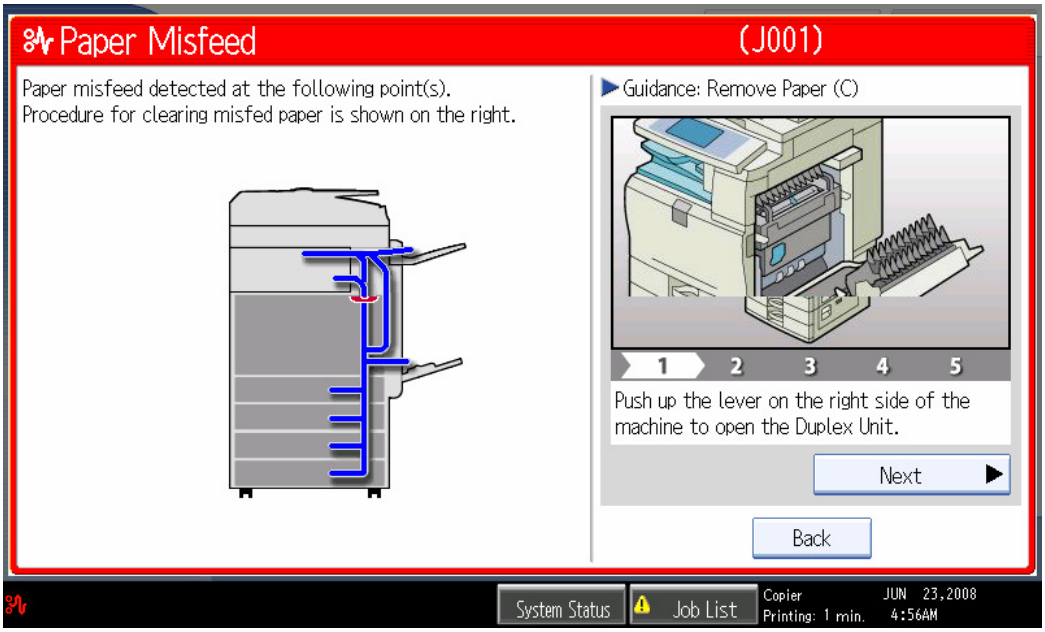
- The quota setting function allows an administrator to set limits on the amount of outputs of each individual user.
- There are also a lot of connectivity features, which we will not explain in this class. We will limit ourselves to the engine in this course.



Slide 15

- ❒ The color mode icon changes when you select Auto Color Select, Full Color, or Black and White. Ask the class to try it on the machine, if you have one set up already.
  - ➢ Other modes, such as two-color mode, can also be shown as options on the display by adjusting SP modes.
- ❒ The Check Modes button is part of the LCD display.
- ❒ The Job List button is a new feature (from Di-C1).
- ❒ You can also see an estimate of the remaining time for the job, at the bottom of the screen. (Does not work for fax communication.)

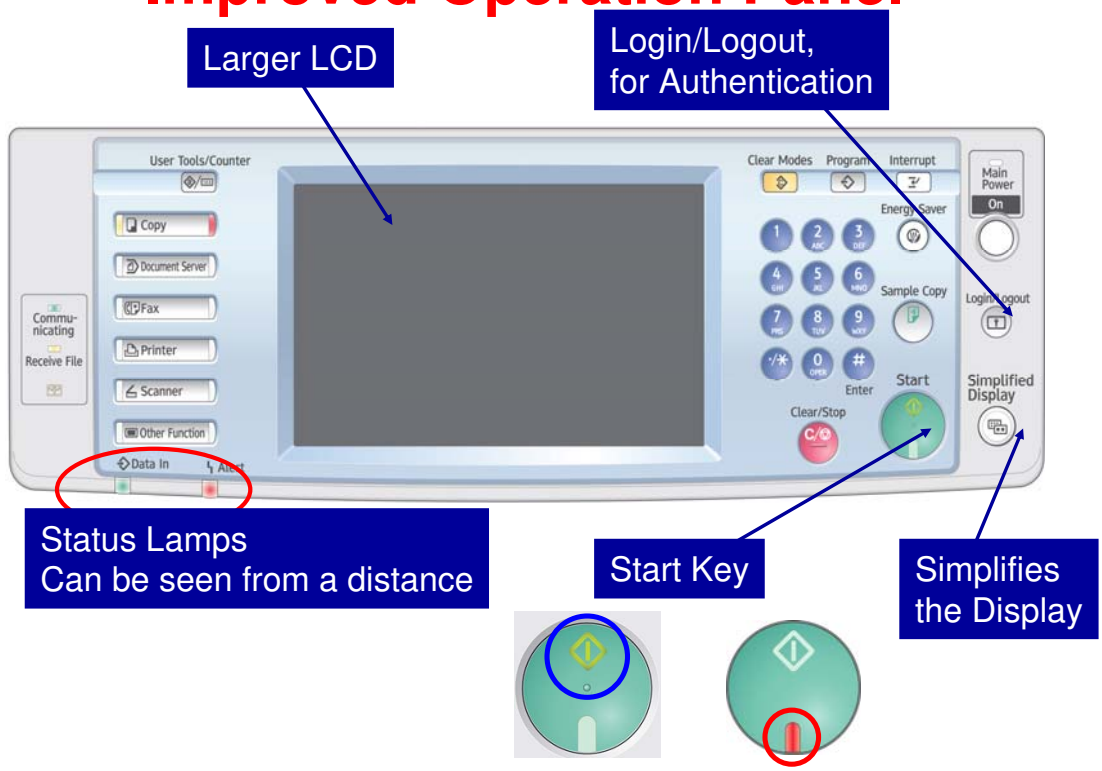
Animated Guidance



Slide 16

❒ For some functions, such as removing jams and replacing toner, an animated guidance appears on the screen.

Improved Operation Panel



Slide 17

- This type of operation panel has been used for higher-end models for some time now. But if you have not worked with this type of model, this panel may be new for you.
- The login/logout button makes authentication a bit easier.
- The ‘simplified display’ button reduces the amount of information on the LCD panel. Try it and see. The next slide gives an example.
- The red and green lamps on the Start key show clearly when the machine will or will not start.

Display

Normal Display

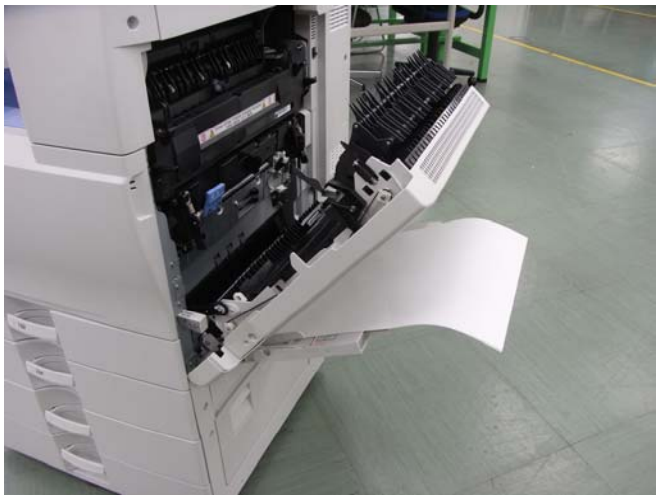
Simplified Display

- **The simplified display appears when you push the Simplified Display button.**

Slide 18

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.

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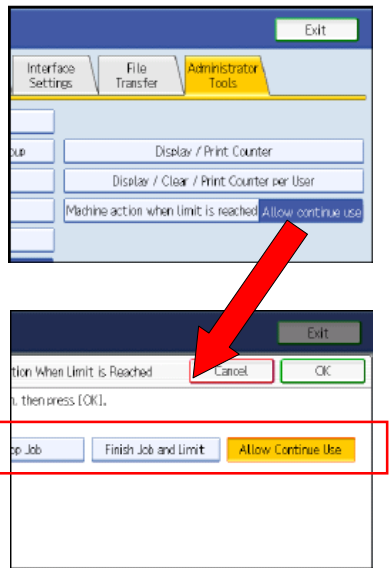
No additional notes

User Account Limiting

- **This function allows the customer to set limits on the number of outputs for each individual user or group.**
- **The following applications can be managed with this function.**
  - Copy
  - Print (including "Print from USB/SD")
  - Document Server
  - SDK
  - Fax related jobs and "Mail to Print" jobs can't be limited.
- **User authentication must be enabled.**
- **Possible Settings**
  - Stop Job: When the maximum print volume is reached, both the current job and waiting jobs are canceled.
  - Finish Job and Limit: When the maximum print volume is reached, the current job is allowed to finish, but waiting jobs are canceled.
  - Allow Continue Use (Default setting): Print volume is not limited.
- **You can also set a 'count-per-page' setting for large paper sizes such as A3.**



Slide 20

No additional notes

Scan to Web Mail (SSL over SMTP)

- **This function gives improved security for scan to e-mail.**
  - Gives better security when scanning to web mail.
- **Uses SSL encryption.**

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- If this is enabled, internet fax to Ricoh GW models is not available because GW models do not comply with SSL reception at this time.

Print from USB/SD

- In previous models, the optional USB/SD card slot can only be used for scanning data to an SD card or USB device.
- However, in this new series, it is also possible to print from data stored on an SD card or USB device.
- If the customer wants to print PDF files from the USB/SD card slot, the PDF Direct option or Postscript 3 option must be installed.
  - The PDF Direct option is supplied with the USB/SD card slot option.

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No additional notes

High Compression PDF with JPEG 2000

- **Images are processed with MMR compression for text areas and JPEG 2000 compression for image areas.**
- **JPEG 2000:**
  - The image is less noisy
  - There is also less noise around text, making it better for OCR use

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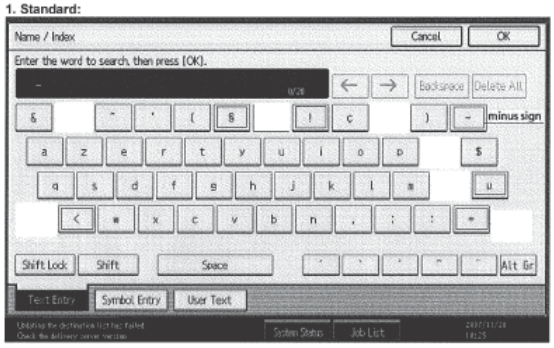
Another Maker

Slide 23

No additional notes

AZERTY Keyboard

1. Standard:



- **If the language is changed to French, the keyboard changes as shown above.**

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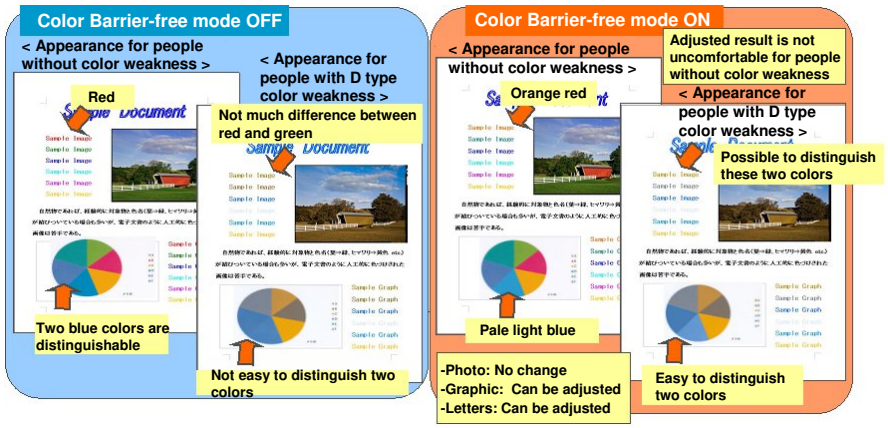
- It is possible to switch to a QWERTY keyboard.
- This feature is for Europe only. The North American model will use the QWERTY keyboard, which is widely used in Quebec.

Color Weakness Management Mode



- This mode can be selected at the printer driver to help people with color weakness to distinguish between red and green.

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- Color weakness is also known as partial color blindness. For example, some people cannot distinguish red from green; both colors appear as a yellowish brown, as shown on the slide.
  - It is said that between 5 and 10% of Caucasian males are red-green color blind.
  - There is another form of color weakness, involving yellow and blue, but this is more rare.
- This feature is available with PCL6 or PS3, operating on MS Office 2007.

Safe Shutdown

- In this machine, SDVDB (shut down and voltage detection board) protects the HDD unit.
- After the main power switch of the machine has been turned off, the SDVDB keeps the power supply to the controller until the HDD unit has been shutdown safely.
- If the safe shutdown takes more than 2 minutes when shutting down from normal stand-by mode, there is a problem with the controller board. It may be necessary to replace this board.

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❒ If the safe shutdown takes more than 2 minutes, unplug the power cord.

Mode	Status	Details	Time to Shut Down
Stand-by	Stand-by	Stand-by Panel off Low power	Less than 10 s
		Operation SW off	0 s
Operation	Scanning Copying/Printing HDD deleting	-	Less than 20 s
	Firmware updating HDD encrypting	-	Less than 360 s
Error	SC issued	SC level A, D	Less than 360 s
		SC level B, C	Less than 10 s
	Application error	Application SD Removed	Less than 360 s
Starting up	Starting up	During 1 min. after application screen is displayed	Less than 80 s

EQUIPMENT

Slide 27

No additional notes

Mainframe, with No Options

- **The machine has the following functions and equipment built in.**
  - Duplex
  - Bypass tray
  - Two 250-sheet trays
  - 500-sheet output tray
  - 8.5-inch W-VGA touch panel
  - Printer/Scanner, with USB and Ethernet
  - 1.5GB Memory
  - USB Host Interface
  - 160GB HDD
  - PCL5c/6
  - 10Base-T/100BaseTX
  - SD Cards (Data encryption SD and JAVA VM SD)

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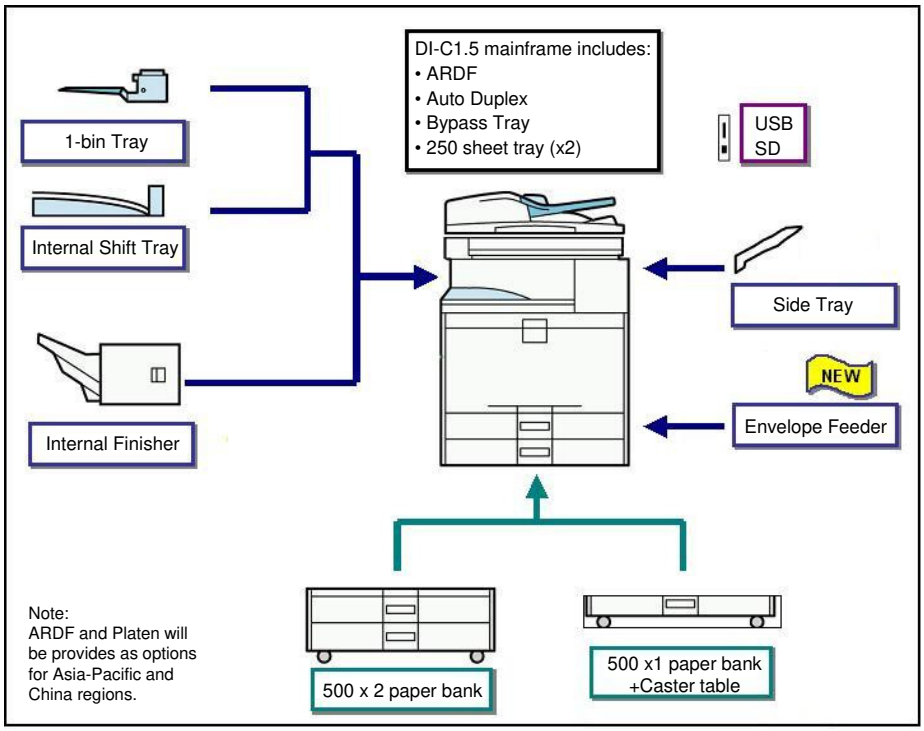
- This slide shows what you get with the base machine.
- Note that the printer/scanner functions are standard for this model.
- Data encryption includes:
  - Data Overwrite Security
  - HDD Encryption

Hardware Options



Slide 29

- You can install one of the following paper feed options
  - One-tray paper feed unit (requires the caster table, or the machine cannot be moved around)
  - Two-tray paper feed unit
  - Envelope feeder can be installed in place of the top 250 sheet tray of the mainframe.
- You can install the following finishing/output options:
  - Shift tray and/or one-bin tray (you can install both of these if you wish)
  - Internal finisher

    If you install the internal finisher, you cannot install the one-bin tray or shift tray.

    If you install the internal finisher, you can install the side tray to receive fax outputs, instead of the one-bin tray.
  - The side tray can be installed with any of the other finishing options at the same time.

    Paper feeds out to the side tray face down. First the paper goes out towards the standard tray, then it switches back to the right side of the machine and out to the side tray, face down.

Paper Handling Options

- **ARDF: Same as the AT-C2.5**
- **Envelope feeder (EF3010) can replace the first feed tray. (New with this product.)**
- **Two-tray paper feed unit: Same as Pr-C1, R-C5**
- **The one-bin tray and shift tray cannot be installed in the same machine as the finisher.**
  - If you install the finisher, you can install the side tray to receive fax outputs, because you cannot install the shift tray or the one-bin tray.
- **If the one-tray paper feed unit is installed, you must also install the caster table. If not, you cannot move the machine around.**
  - If no optional paper feed unit is installed, you can also install the caster unit as an option.

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No additional notes

Fax Options

- Fax Option: New
- Expansion memory (28 MB): Same as AT-C2.5
- Handset: Same as AT/AP-C2, R-C5, AL-C1
- Fax Stamp Ink: Same as AT/AP-C2, R-C5, AL-C1
- There is no optional extra G3 Interface unit.

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No additional notes

Printer/Scanner Options

- **Printer/scanner is a standard part of the machine, not an option.**
  - USB and Ethernet are built in.
- **PictBridge: Same as G-P3 (enables direct printing from a digital camera)**
- **Wireless LAN (IEEE 802.11g, a/g): Same as AT-C2**
- **IEEE 1284: Same as AT-C2**
- **Bluetooth: Same as AT-C2**
- **Gigabit Ethernet: Same as V-C2, AT-C2**
- **PostScript3 option:**
  - » Required to use the PDF Direct Print and Mail to Print functions

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No additional notes.

Other Options

- **Optional counter interface: Also used with AP/AT-C2**
  - This is a 20-pin interface. It is required when you attach a key counter.
- **Key Counter Bracket: Also used with AP/AT-C2**
- **File Format Converter: Also used with V-C2, AL-C1, R-C5**
- **Web Browser Option: Also used with AP/AT-C2**
- **USB2.0/SD Card Slot: New (See next slide.)**
  - Required to use the *PDF Direct Print* and *Mail to Print* functions.
- **Card Reader Bracket: Also used with AP/AT-C2.5 (Also, see notes below.)**
- **Mechanical Counter (North America only)**

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- The Card Reader Bracket is used with a "card authentication package", which is procured locally. (Not supplied by Ricoh.)
  The card reader must be placed on the card reader tray, or there may be interference between the card reader and an antenna or transmitter in the main machine.

Optional USB 2.0/SD card slot (1)

- **This optional unit allows use of the new *Scan to USB* and *Scan to SD* features.** (1)
- **This allows users to scan documents and save them in electronic format on an SD card or USB memory device.**
  - If the USB device or SD card is then connected to a computer, the scanned files can then be viewed, printed, or processed.
- **You can directly print data in your USB memory device or SD card.** (2)
- **This USB slot cannot be used as a printer interface, except for PictBridge.**

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- (1) Scan Features
  - Files saved on a removable memory device will not appear in the list of stored files.
  - Files saved on a removable memory device cannot be printed or sent using the machine's operation panel. To perform operations on files saved on a removable memory device, you must use an application on a client computer.
  - You cannot specify where the data is saved. Files are saved in the root directory of the removable memory device.
  - If the removable memory device is partitioned, files are saved on the first partition.
- (2) Directly printing data
  - In previous models, the optional USB/SD card slot can only be used for scanning data to an SD card or USB device.
  - However, in this new series, it is also possible to print from data stored on an SD card or USB device.
  - If the customer wants to print PDF files from the USB/SD card slot, the PDF Direct option and Postscript 3 option must be installed.

    The PDF Direct option is supplied with the USB/SD card slot option.

Optional USB 2.0/SD card slot (2)

- **Up to 2 GB of data can be saved.**
  - However, depending on the number of files already stored on the removable memory device, new files might not be saved, even if there appears to be sufficient free space.
- **This machine supports FAT16 format USB memory devices and SD cards. Other forms of removable memory device are not compatible.**
- **Saving might fail if the USB memory device has password protection or other security features.**
- **File formats that can be used:**
  - Single page TIFF/JPEG/PDF (including high compression PDF)
  - Multipage TIFF/PDF (including high compression PDF)

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No additional notes

No additional notes

Reliability Targets

- **Unit life (2 prints per job): 600K or 5 years**
- **Average Copy Volume per month (copy + fax + print):**
  - Di-C1.5a: 3K
  - Di-C1.5c: 4K
- **PM cycle:**
  - 60K (drum unit, PCDU toner collection bottle, transfer belt cleaning unit assembly [includes a waste toner bottle])
  - The yield of fusing unit components is increased from 150K to over 180K. (See details for all components in the FSM PM table.)
  - Target Color Ratio: 20%

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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 it.
  - No SP needed at installation. Initialization is done automatically after power is switched on for the first time.
- **Staples**
  - 5,000 staples per cartridge

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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.
- The staple refill cartridges are not compatible with other models.

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WHAT'S NEW

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No additional notes

New and Changed (1)

- **Envelope Feeder Tray**
  - New option that can replace the 1st tray.
  - See Envelope Feeder Tray for details.
- **New Fusing Unit**
  - First use of the free-belt fusing system.
  - Provides QSU (quick start up) and reduces energy consumption.
  - See Free-Belt Fusing System for details.
- **ARDF changed to DF3050 (same as used on the AT-C2.5).**
- **The iCTL board has been separated into IPU and CTL boards.**
  - See Board Structure and Board Layout.
- **The SDVDB Board is new (= Shut down and voltage detection board)**
  - See Board Structure and Board Layout.

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- The Di-C1 used DF3030. DF3030 (LHOTSE-B) and DF3050 (LHOTSE-C) are functionally the same.

New and Changed (2)

- **Print RAM increased: 768 MB → 1.5 GB.**
- **HDD capacity increased: 60 GB → 160 GB**
- **Security Card (SD)**
  - Combines Data Overwrite Security and HDD Encryption functions on one SD card.
  - Preinstalled in slot 1, but user must enable using User Tools.
- **Java VM is now standard.**
  - On SD card. (Includes App2Me)
  - Inserted in slot 2 during machine installation.
  - See Java VM SD Card Installation.
- **Gigabit Ethernet board – New with this product (installation procedure is different).**
  - See Gigabit Ethernet.

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❒ Gigabit Ethernet board Type G is used in the DI-C1.5.

New and Changed (3)

- **New Fax option (Type C2551, Functionally the same as for the AP-C2.5)**
- **New USB/SD Card Slot option (Type G)**
  - Has built in direct print capability.
- **The following are new connectivity options. (The other options are the same as in the previous series.)**
  - PostScript
  - IPDS
  - PictBridge
  - Browser unit
- **Card Reader Bracket: Also used with AP/AT-C2.5 (See notes below.)**
- **Mechanical Counter (North America only)**

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- Card Reader Bracket details:
  - The official part name is "Card Reader Bracket Type C5501"; however, what is actually installed is a small tray.
  - The Card Reader Bracket is used with a "card authentication package" (includes a card reader), which is procured locally. (Not supplied by Ricoh.) The card reader must be placed on the tray, or there may be interference between the card reader and an antenna or transmitter in the main machine.
  - FSM → Installation → Card Reader Bracket Type C5501

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SPECIFICATIONS

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No additional notes

General Specifications 1

- **Resolution:**
  - Scan: 600 dpi
  - Print: 600 x 600 dpi, 1200 x 1200 dpi
- **Maximum Original Size: A3/11" x 17"**

Slide 44

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

General Specifications 2

- **Print Paper Size:**
  - Trays 1 and 2: 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 Tray: Min A5 (LEF)/8.5" x 5.5", Max A3/11" x 17"
- **Printing Paper Weight:**
  - Tray 1: 60 to 256 g/m^2 (16 to 68 lb)
  - Tray 2: 60 to 169 g/m^2 (16 to 45 lb)
  - Optional paper tray: 60 to 105 g/m^2 (16 to 28 lb)
  - By-pass tray: 52 to 256 g/m^2 (14 to 68 lb)
  - Duplex unit: 60 to 105 g/m^2 (16 to 28 lb)

Slide 45

Print Paper Size

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

Paper Weight

- From tray 1, DI-C1 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?
  - Tray 1 has a belt mechanism that assists feed for heavy paper.

General Specifications 3

- **Print Paper Capacity (80 g/m², 20 lb):**
  - Standard tray: 250 sheets x 2
  - By-pass tray: 100 sheets
  - Optional paper feed tray: 500 sheets x 2
- **Output Paper Capacity:**
  - Standard exit tray: 500 sheets (A4/LT, 80 g/m² face down)
  - Side Tray: 50 (A4/LT, 80 g/m²)
  - 1-bin Tray: 100 (A4/LT, 80 g/m²)
  - Shift tray: 250 (80 g/m²)
  - 500-sheet finisher: 500 sheets (80 g/m²)

Slide 46

❒ Standard exit tray: There is no tray full sensor.

General Specifications 4

- **Copy speed**
  - Normal (LT/A4 LEF):
    - » C1.5a: 20 cpm (color or black & white)
    - » C1.5c: 25 cpm (color or black & white)
  - 1200 dpi, OHP/Thick paper
    - » Both models: 12.5 cpm (color/black & white)
- **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**
  - RAM: 1.5 GB
  - Hard disk: 160 GB

Slide 47

- Warm-up time: The new toner melts at a lower temperature, so warm-up is quicker.
- Copy speed: Middle thick also 20/25 cpm.

Thick Paper Productivity

Mode	Paper Thickness (g/m^2)	BK CPM C1.5a	FC CPM C1.5a	BK CPM C1.5c	FC CPM C1.5c
Thin Paper	52-59.9	20	20	20	20
Plain Paper 1	74	20	20	20	20
Plain Paper 2	81	20	20	20	20
Middle Thick	105	20	20	20	20
Thick Paper 1	169	12.5	12.5	12.5	12.5
Thick Paper 2	210	12.5	12.5	12.5	12.5
Thick Paper 3	256	12.5	12.5	12.5	12.5
OHP, 1200dpi printing	-	12.5	12.5	12.5	12.5

Slide 48

No additional notes

RICOH

Di-C1.5 TRAINING

INSTALLATION

Slide 49

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

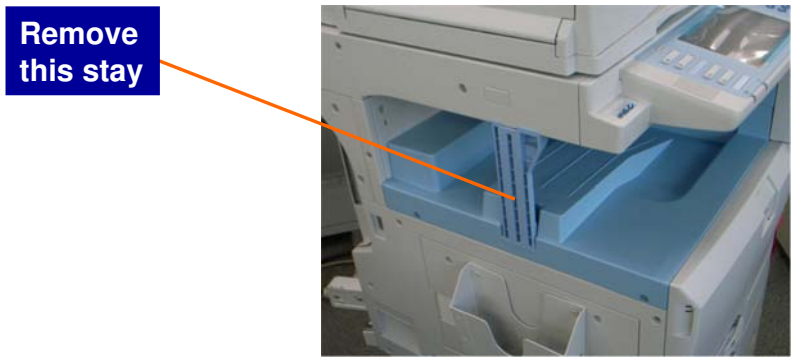
COPIER

Important Points

Slide 50

- The next few slides cover only some important points related to copier installation.
- The full procedure is covered in detail in the FSM.

Shipping Retainer for Scanner

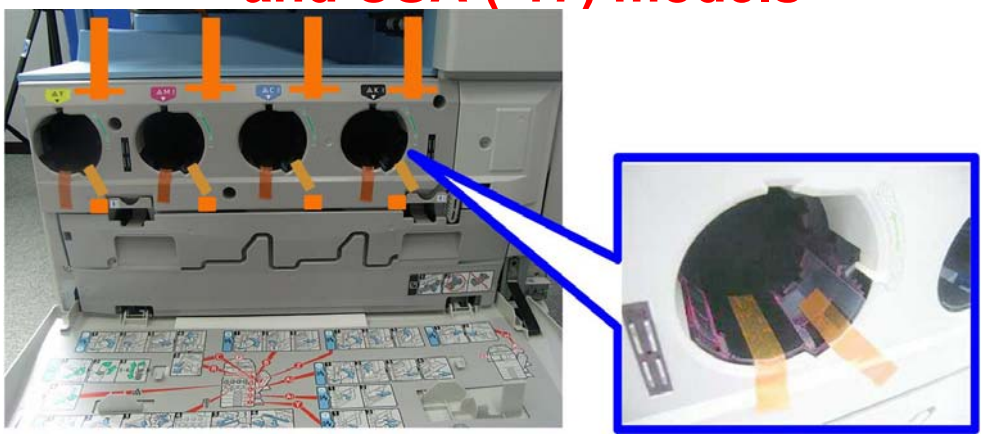


- **Remove the scanner unit stay and keep it in the cutout in the inner tray.**
  - Europe models: The scanner unit stay cannot be inserted in the cutout on the inner tray. You must bring it back to your depot.

Slide 51

No additional notes

Development Unit: Except Europe (-27) and USA (-17) models

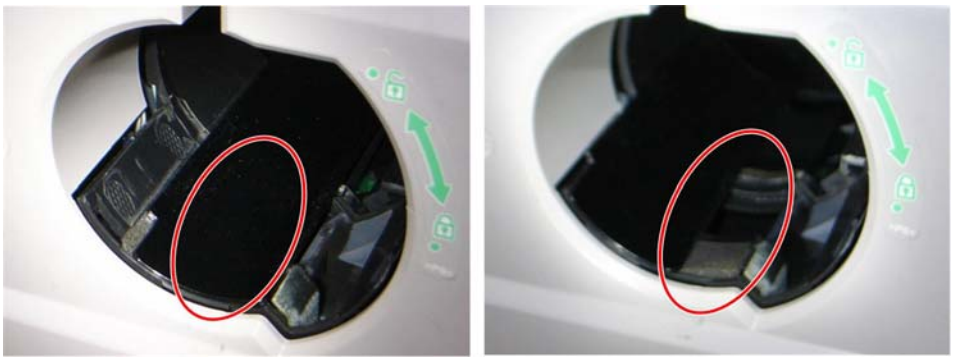


- **Remove the tape from all four development units and toner hoppers.**
  - IMPORTANT: Remove the tape from all four development units before you turn the main switch on.
  - The development units can be severely damaged if you do not remove the tape.

Slide 52

- In Europe and USA, the tape is removed at the factory.

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.

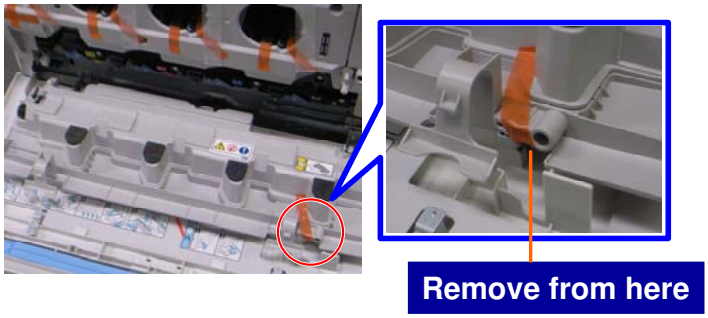
Slide 53

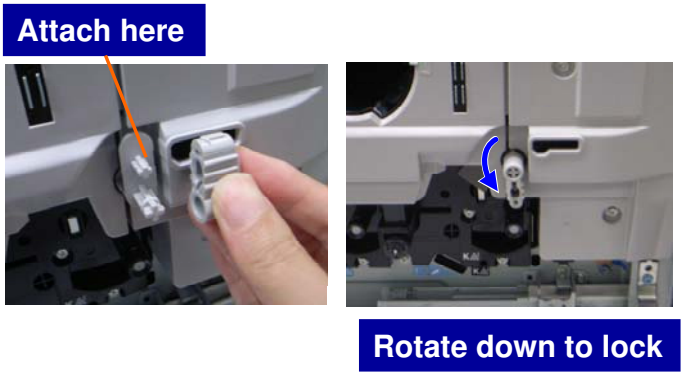
No additional notes

ITB Lock Lever

- The ITB Lock lever must be removed from the PDCU toner collection bottle.
- Several steps later, it must be attached to the ITB contact arm and rotated down to lock the ITB.
- See: FSM → Installation → Copier Installation → Developer and Toner Bottles

  (These steps are new with the Di-C1.5.)

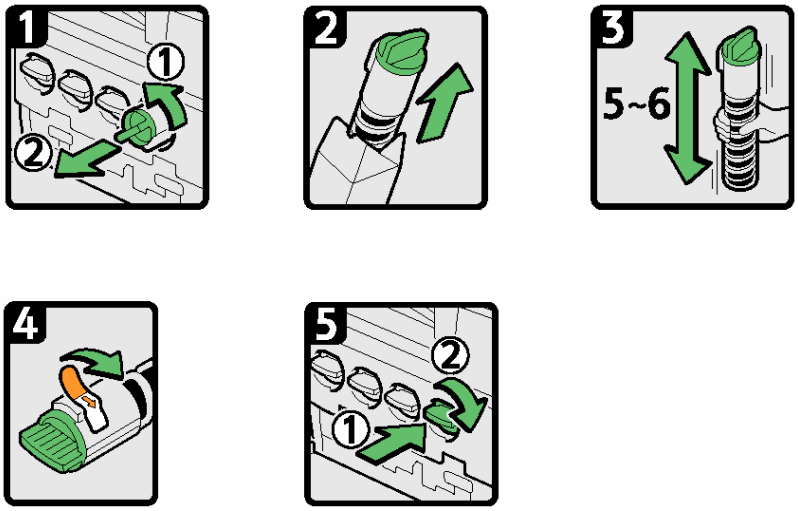




Slide 54

No additional notes.

Toner Bottles

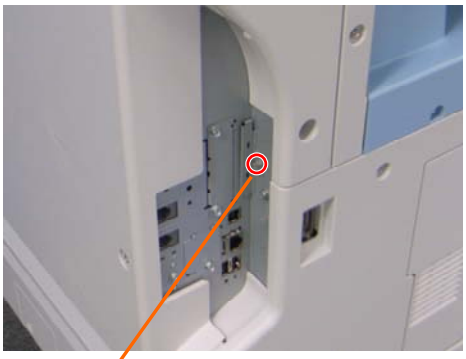


- **Shake each bottle 5 or 6 times before you install it.**
- **When the toner bottle is installed, the bottle must be turned to the right (clockwise).**
  - This opens the bottle, and toner can leave the bottle.

Slide 55

No additional notes

Java VM SD Card Installation



Remove the SD card cover

Insert Java VM card in slot 2

- **Install the Java VM SD card after installing the toner bottles, but before turning on the machine.**
  - Details: FSM → Installation → Copier Installation

Slide 56

- Must use slot 2. The Security Card is in slot 1.
- Reinstall the SD card cover after inserting the Java VM card.
- Slot 2 is empty when shipped because it is used by a final checking tool at the factory.

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.

Slide 57

- When you turn on the machine, it is not necessary to check if the cover is open or closed.
- SP 3014 001: A code is displayed. (FSM → Appendices → 5. Appendix: Process Control Error Conditions)

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 names: SP 5-841**
  - Input the product name of the toner, staples, and fax stamp.
  - These names appear on the screen when the user presses the Inquiry button in the user tools screen.

Slide 58

❒ 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
- **Hard disk: At installation, it is not necessary to format the hard disk or transfer the stamp data.**
  - After the hard disk is replaced, you must transfer the stamp data (SP 5853), but hard disk formatting is not necessary.

Slide 59

No additional notes

PAPER TRAY UNITS

Important Points

Slide 60

No additional notes

Important Notes

- **The one-tray paper feed unit must be installed with the caster table.**

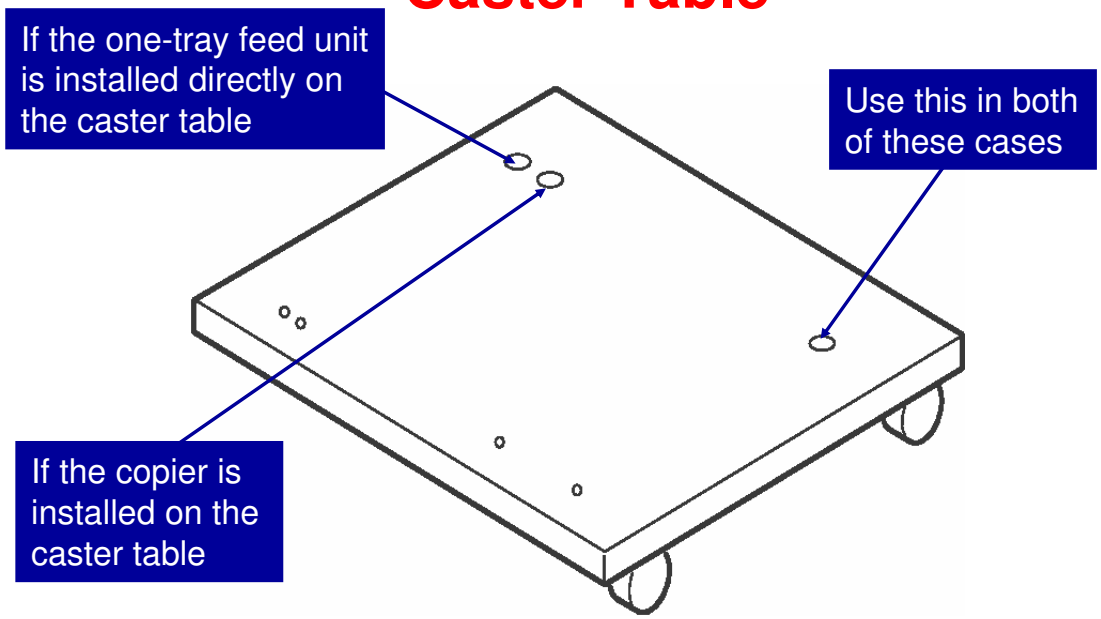
Slide 61

ALSO

You must lift the copier and put it on top of the paper tray unit.

- Always lift with two persons. The copier is too heavy for one person.
- Do not try to lift the copier with the paper tray unit installed. You will damage the lifting handles.

Caster Table



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

Slide 62

No additional notes

SHIFT TRAY, ONE-BIN TRAY

Important Points

Slide 63

No additional notes

Install in This Order

- **Install the shift tray unit first.**
  - Installing the shift tray unit after the 1-bin tray unit may be difficult.

Slide 64

No additional notes

FINISHER AND PUNCH UNIT

Important Points

Slide 65

No additional notes

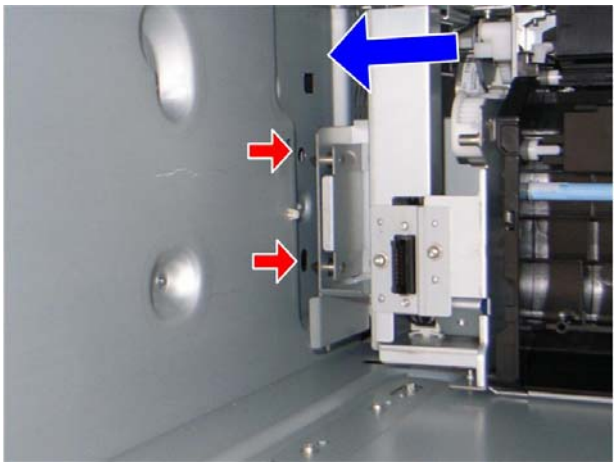
Service Manual Procedures

- **Internal Finisher: This procedure explains how to install the internal finisher, without installing the punch unit at the same time.**
- **Punch Unit: There are procedures for**
  - A) Installing the punch unit if the internal finisher has already been installed
  - B) Installing the punch unit if the internal finisher has not already been installed

Slide 66

No additional notes

Inserting the Joint Pins



- Insert the two joint pins before attaching the front side of the inverter unit to the paper exit unit of the mainframe.
- Otherwise, paper jams may occur between the paper exit unit and inverter unit.

Slide 67

- Joint pins: Two red arrows

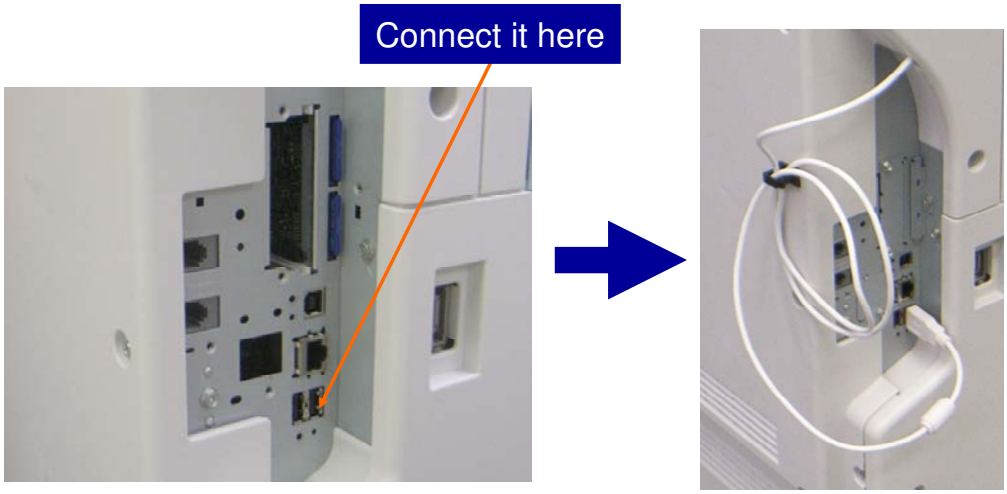
USB/SD CARD SLOT

Important Points

Slide 68

No additional notes

Connect to the Right-hand Slot



- If you connect the USB/SD option to the left-hand slot, the cable will prevent the user from connecting a camera to the other slot.
- Note:
  Carefully follow the procedures for installing and testing the USB/SD option.
  FSM → Installation → USB2.0/SD Slot Type G (D556)

Slide 69

No additional notes.

USB/SD Slot

- **After you install this unit, it must be enabled with an SP mode (see the installation procedure for details).**
- **Test the operation of this device after installation.**
  - Try to scan a document and store it to the SD card or USB memory device.

Slide 70

Procedure for storing a file on an SD card/USB device

1. 1.Insert an SD card or USB memory device in the slot.
   - You can connect only one removable memory device at a time.
2. 2.Close the media slot cover.
   - If you leave the cover open, static electricity conducted through an inserted SD card could cause the machine to malfunction.
3. 3.Make sure that no previous settings remain.
   - If a previous setting remains, press the [Clear Modes] key.
4. 4.Place originals.
5. 5.Press [Store File].
6. 6.Press [Store to Memory Device].
7. 7.Press [OK].
8. 8.Press the [Start] key.
   - When writing is complete, a confirmation message appears.
9. 9.Press [Exit].
10. 10.Remove the memory device from the media slot.
    - Do not remove the memory device while writing is in process.

CONTROLLER OPTIONS

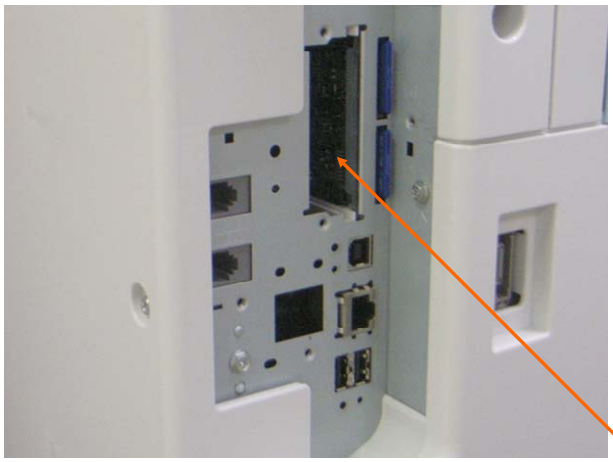
Important Points

Slide 71

No additional notes

Board and Card Slots (1)

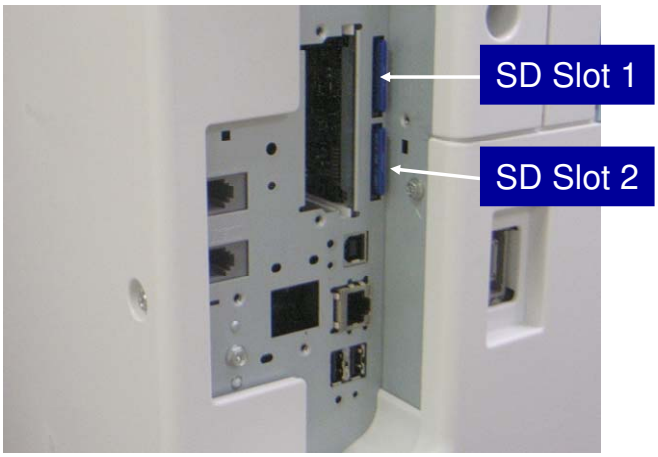
- **I/F Board slot: Install one of the following**
  - IEEE1284
  - IEEE802.11a/g, g
  - Bluetooth
  - File Format Converter



Slide 72

No additional notes

Board and Card Slots (2)

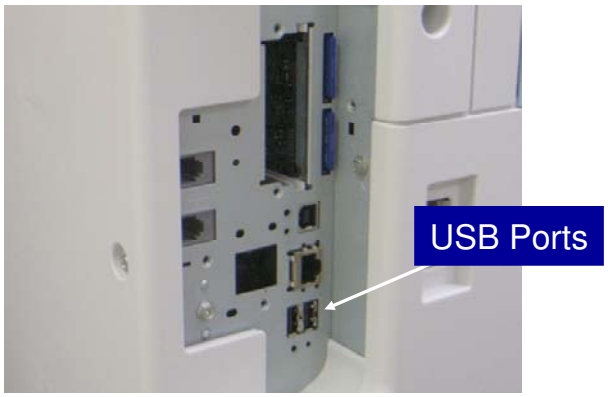


- **SD Card Slots**
  - Slot 1: Install one of the following
    - » PostScript 3; do not copy to another SD Card.
    - » PictBridge
  - Slot 2: Service (installing the Browser Unit, updating the firmware).
    - » After you install the browser unit, do not use the browser card on another machine.

Slide 73

- The browser unit SD card is linked to its machine (the machine serial number is registered on the SD card). So a card that has already been installed on one machine cannot be used on another.

USB Ports



- **The following can be connected to a USB port**
  - USB2.0/SD option
    - » Connects to the right-hand port during installation.
  - Digital camera (to copy photos, if the PictBridge option is already installed)

Slide 74

- The photograph shows the two USB ports. The ports are the same in function, but you should use the right-hand port for the USB/SD option.
- If you connect the USB/SD option to the left-hand port, the cable will prevent the user from connecting a camera to the other port.

SD Card Slots

- **Slot 1**
  - One of these can be installed.
    - » PostScript 3, Data Security, PictBridge
  - To install more than one, you must merge the software onto one card.
    - » Procedure: We will study later in this section
  - Do not copy the PostScript card onto another card. This violates Adobe's copyright.
- **Slot 2**
  - Used for installing new firmware.
  - Also used during the installation procedure for the browser unit.
    - » The machine copies firmware from the SD card to the hard disk during the procedure.
    - » You must remove the SD card from slot 2 after you install the browser unit.
    - » After you install the browser unit, do not use the browser card on another machine.

Slide 75

No additional notes

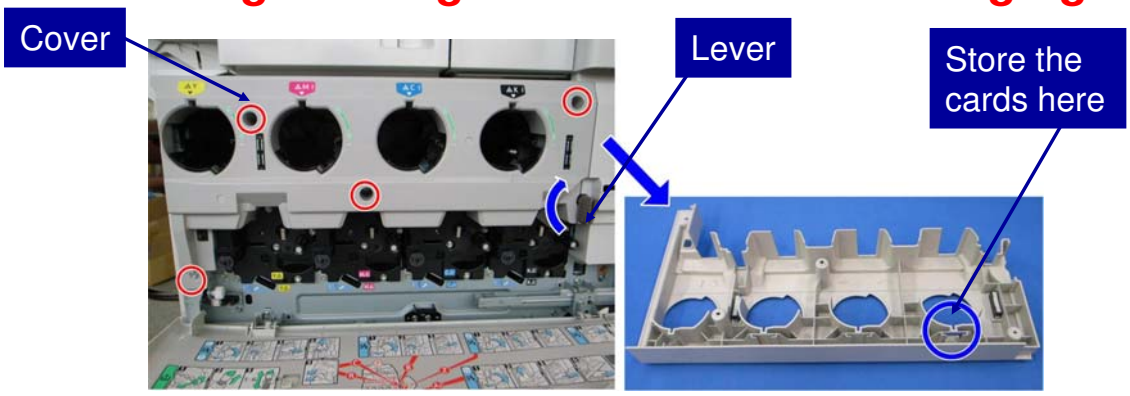
Moving Applications

- 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.

Slide 76

No additional notes

Storing the Original SD Cards after Merging

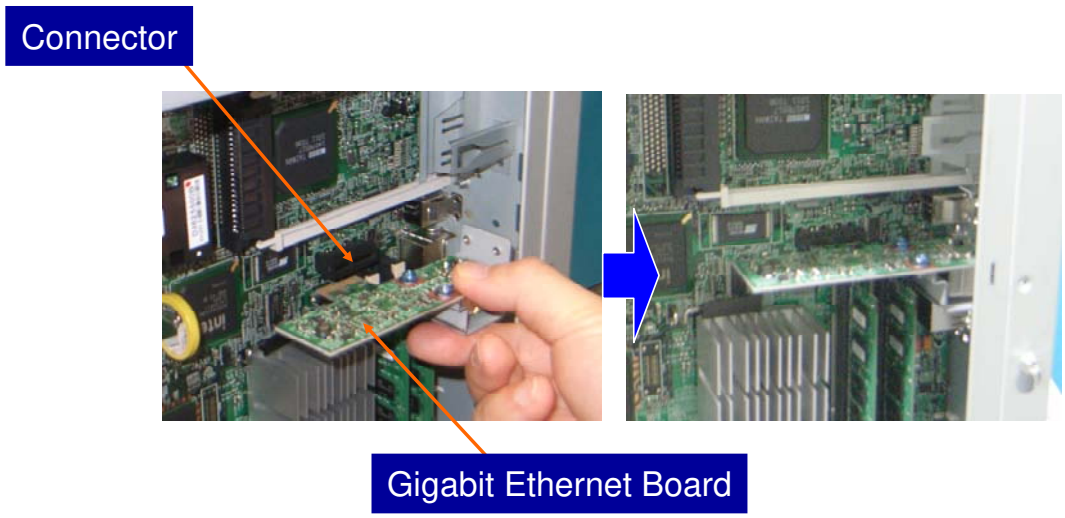


- **After you move an application, the original SD card is de-activated.**
  - It can be re-activated with the 'Undo Exec' procedure in the service manual.
    - » Put the original card in slot 2, and copy back from slot 1.
- **But the customer must keep it as a proof of purchase.**
- **The original cards can be stored in a compartment at the front of the machine.**
  - Hold down the lever and turn it in the arrow direction.
  - Remove the cover and store the SD cards as shown.

Slide 77

No additional notes

Gigabit Ethernet

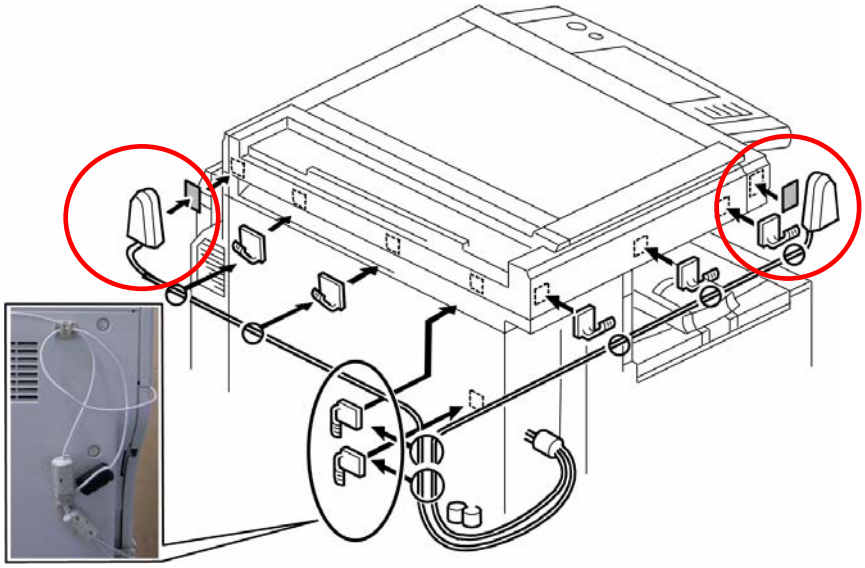


- Install the Gigabit Ethernet board following the procedure in the FSM.
- This procedure is different from that of the Di-C1.

Slide 78

No additional notes.

IEEE802.11a/g, g Interface (1)



- Make sure to install the antennas correctly, as described in the manual.
- "ANT1" is a transmission/reception antenna and "ANT2" is a reception antenna. Do not attach them at the wrong places.

Slide 79

No additional notes

TRANSPORTING THE MACHINE

Slide 80

No additional notes

Moving the Machine a Short Distance

- Remove all trays from the optional feed unit.

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Service manual, Installation, Copier Installation, Moving the Machine

Moving the Machine a Long Distance (1)

- **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.**
- **Reinstall the scanner unit stay.**
- **Attach shipping tape to the covers, or tightly wrap the machine with shrink-wrap.**

Slide 82

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" (SP2-111-3).
  - Then, do "Forced Line Position Adj. Mode a" (SP2-111-1).
- **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).
- **Make sure that the side fences in the trays are correctly positioned.**

Slide 83

- SP 2111-1 and –3 are used at other occasions, after replacing certain parts. We will see this again.
- For SP 2194: see these sections of the field service manual.
  - FSM → Appendices → Process Control Error Conditions
  - FSM → Appendices → Troubleshooting Guide

INSTALL THE MACHINE AND OPTIONS

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No additional notes

Install the Following

- **Install the Following**
  - Copier
  - Paper Handling Options
    - » Paper feed units
    - » Caster table (for the one-tray paper feed unit)
    - » ARDF and/or platen cover
    - » Side tray
    - » One-bin tray
    - » Shift tray
    - » Internal finisher and punch unit
    - » Side tray
    - » USB2.0/SD card slot
  - Controller Options
- **Refer to the procedures in the FSM.**
- **Obey all warnings and cautions in the procedures.**

Slide 85

No additional notes

Other Options

- **Mechanical counter (NA only)**
  - After you install the mechanical counter and enable it with SP 5987, then SC611 occurs if you try to remove it. This is to prevent falsification of the counter setting.
- **Key counter interface**
- **Scanner anti-condensation heater**
- **Tray heaters (main unit, optional paper tray units)**

Slide 86

❒ If there is time, install these items.

UPDATING THE FIRMWARE

Slide 87

❒ Install the latest firmware in the machine.

Downloading New Software

- **All firmware is on SD cards.**
- **The firmware SD card plugs into SD card slot 2.**
- **Update the firmware.**
  - Verify the update was successful
- **Update the operation panel firmware.**
  - Controller firmware and operation panel firmware cannot be updated at the same time.

Slide 88

- FSM → 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.**

Slide 89

- FSM → 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.

Backing Up the Address Book Data

- **Copy the data to an SD card.**
  - FSM → 5. System Maintenance Reference → Address Book Upload/Download
- **The SD card plugs into slot 2.**

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No additional notes.

RICOH

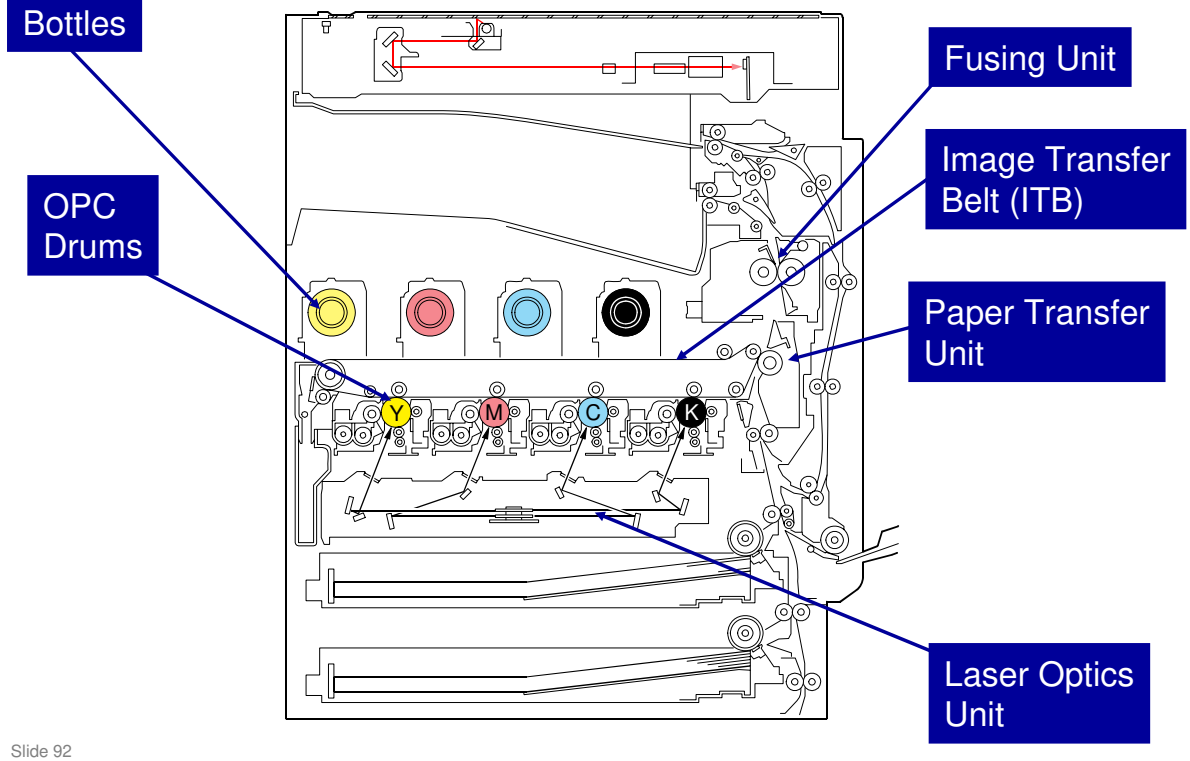
Di-C1.5 TRAINING

MACHINE OVERVIEW

Slide 91

No additional notes

Mechanical Components



Slide 92

- 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.
- At the paper transfer unit, the four toner images are 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.

Slide 93

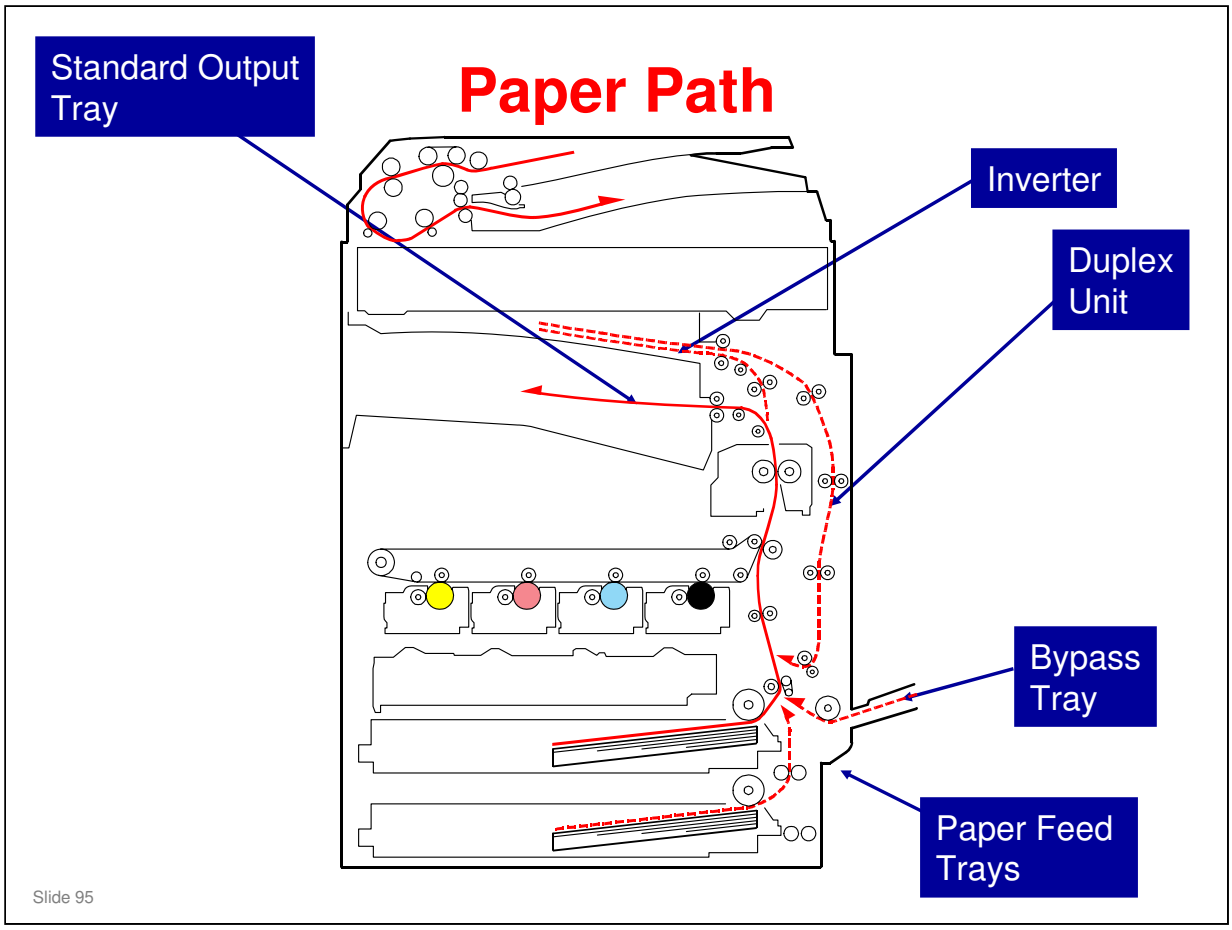
No additional notes

Mechanical Component Overview (2)

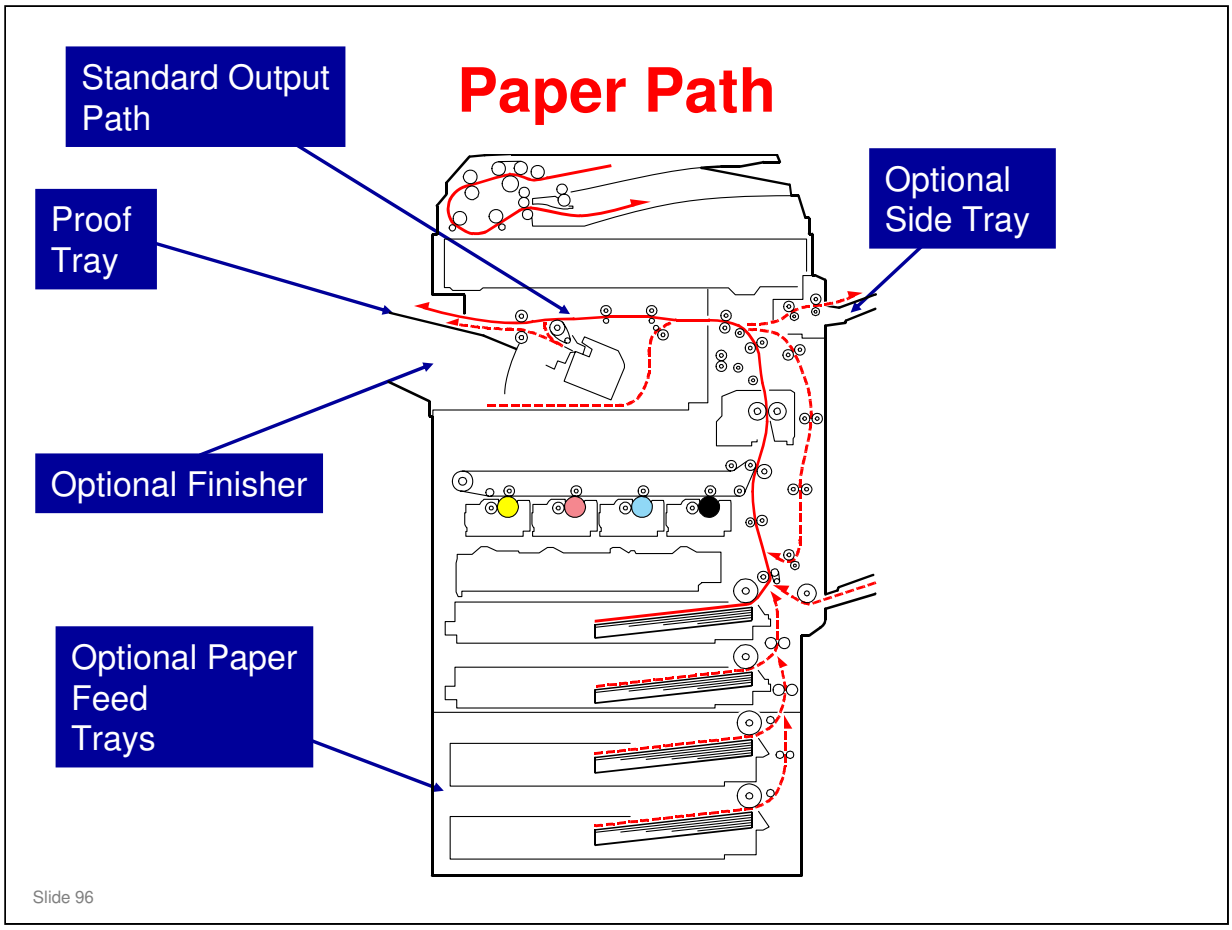
- **Image transfer unit**
  - Bias rollers opposite the OPC drums transfer toner from the drums to the transfer belt. Four toner images are super-imposed onto the belt.
- **Paper transfer roller unit**
  - The ITB drive roller pushes the toner from the transfer belt to the paper (the transfer roller is an idle roller).
- **Fusing unit**
  - The fusing unit applies heat and pressure to fuse the toner to the paper.
  - Quick start up (QSU) design
  - "Free-Belt" fusing system. (New with this product.)

Slide 94

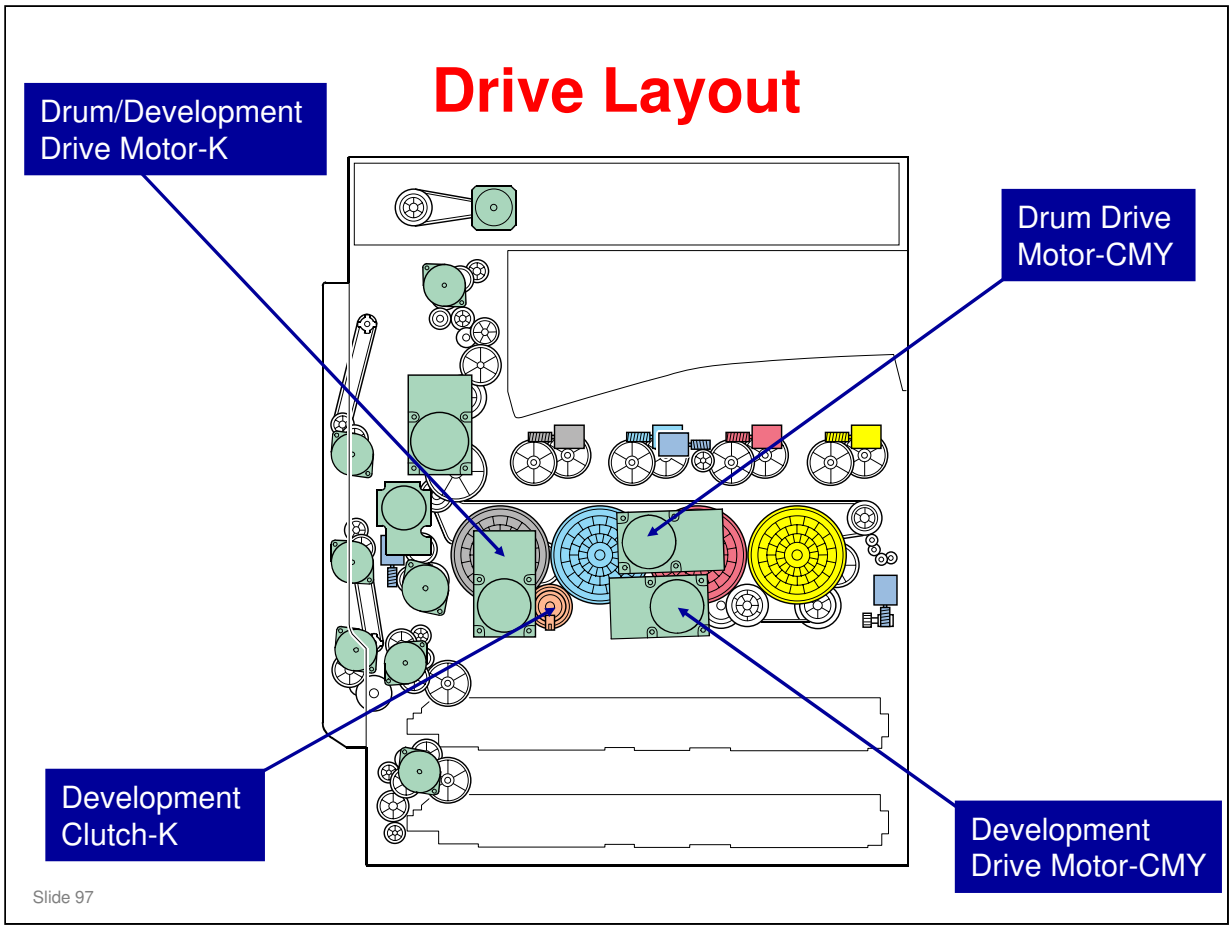
- This is the first use of the free-belt fusing concept. It will be covered in detail later.



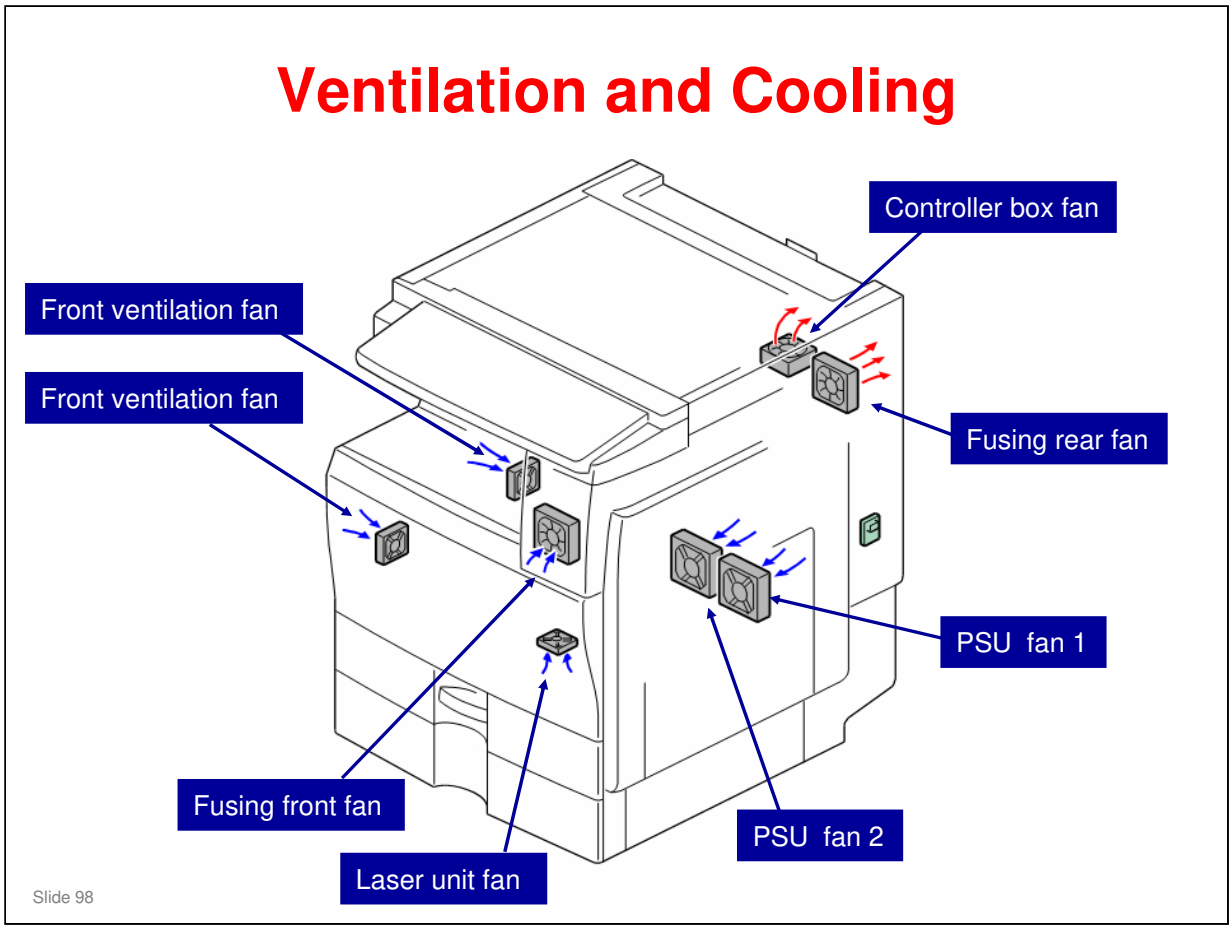
- This shows the path of paper through the machine, with no optional paper handling units installed.
- Demonstrate the following feed paths on the diagram.
  - Up from the paper feed trays
  - In from the bypass tray
  - Out at the top of the machine (to the standard output tray)
  - To the duplex unit, via the inverter



- This shows the path of paper through the machine, with the optional finisher, side tray, and paper feed unit (2-trays) installed.
- When the finisher is installed, paper feeds out through the top of the finisher to the proof tray, if finishing is not selected.
- If finishing is selected, paper follows the dotted line in the diagram, and feeds out to the proof tray also.
- If the finisher is installed, and duplex is selected, the paper goes below the finisher before it is fed to the duplex unit (see the dotted line below the finisher).

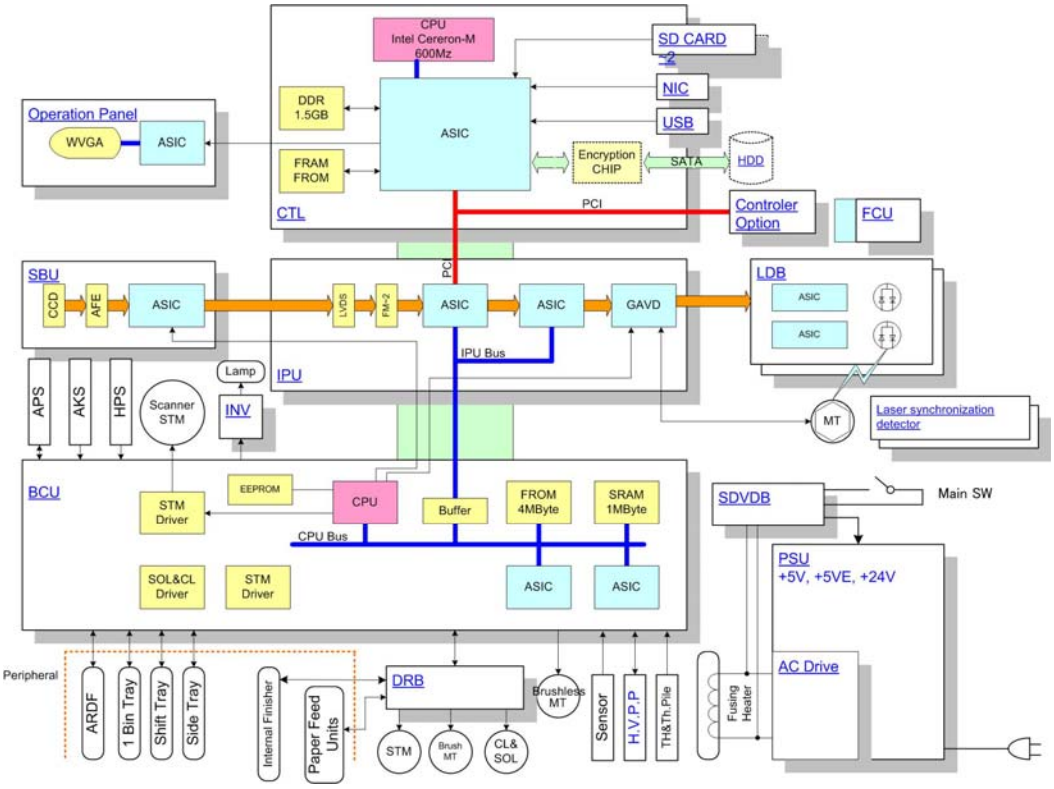


- This shows the main motors in the machine.
- Notes:
  - The PCDU for K has one motor to drive the drum and development unit. Because of this, there is a clutch to start/stop the development unit for K.
  - For CMY, the drum drive motor CMY drives the three drums, and the development drive motor CMY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



No additional notes

Board Structure



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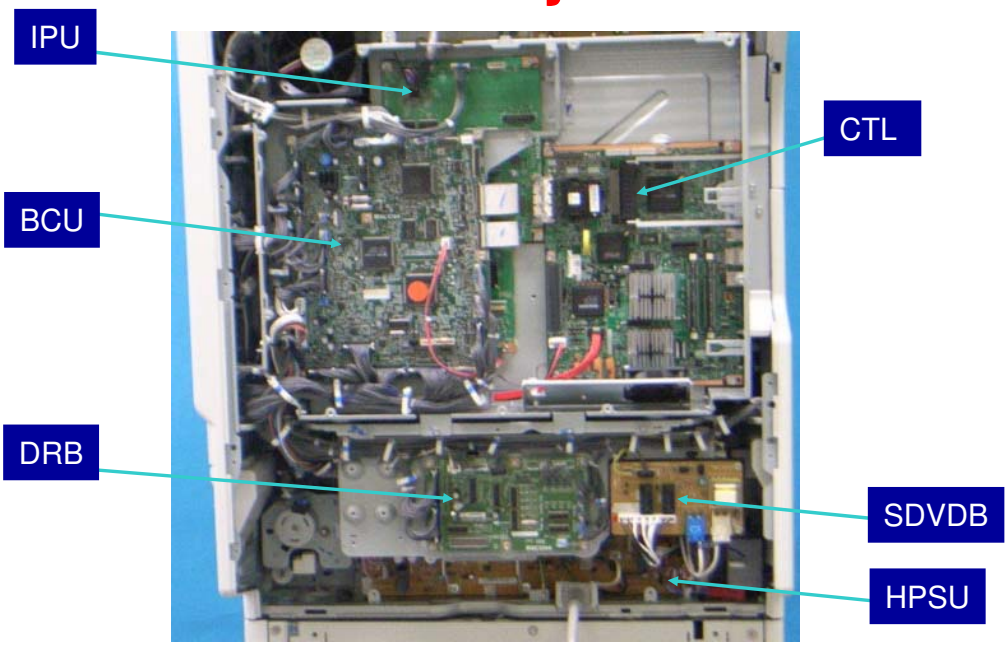
- This shows a schematic of the electrical layout of the machine.
- The orange line through the centre from the SBU to the LDB is the flow of image data through the machine.
  - The CCD (Charged Coupled Device) generates analog RGB signals.
  - The SBU (Sensor Board Unit) converts the analog RGB signals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

Board Layout

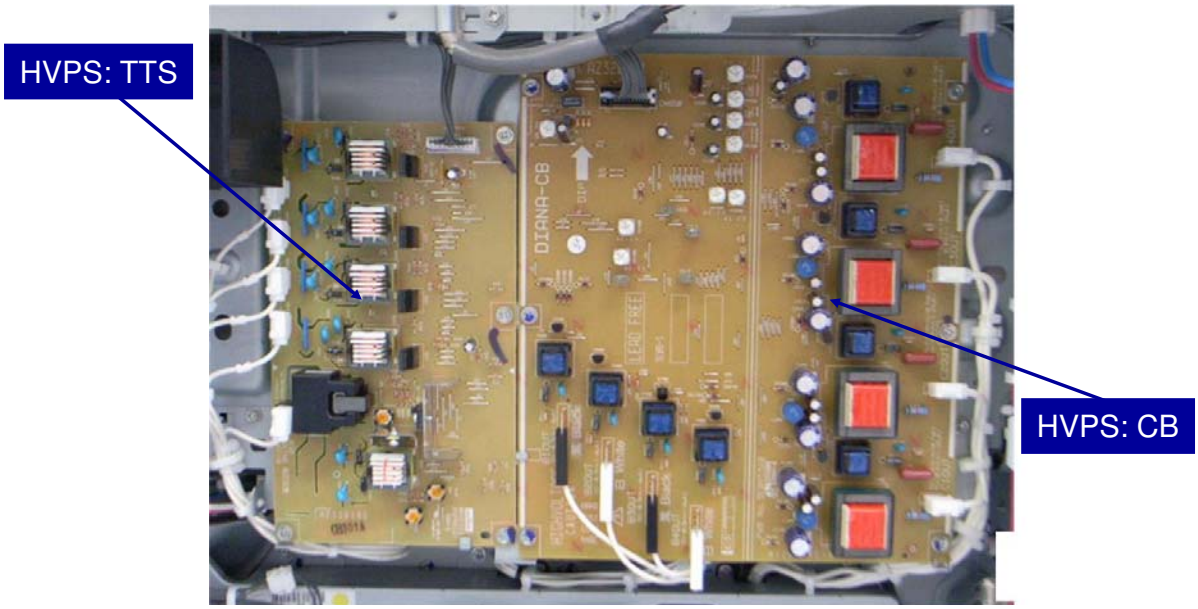


Rear view

Slide 100

- Board layout has changed from that of the Di-C1.
  - IPU = Image processing unit
  - CTL = Controller board
  - SDVDB = Shut down and voltage detection board
    1) Handles the shut down sequence
    2) Detects the fusing lamp voltage
  - DRB = Driver board
  - BCU = Base control unit
  - HPSU = High voltage power supply units

High Voltage Power Supply



Slide 101

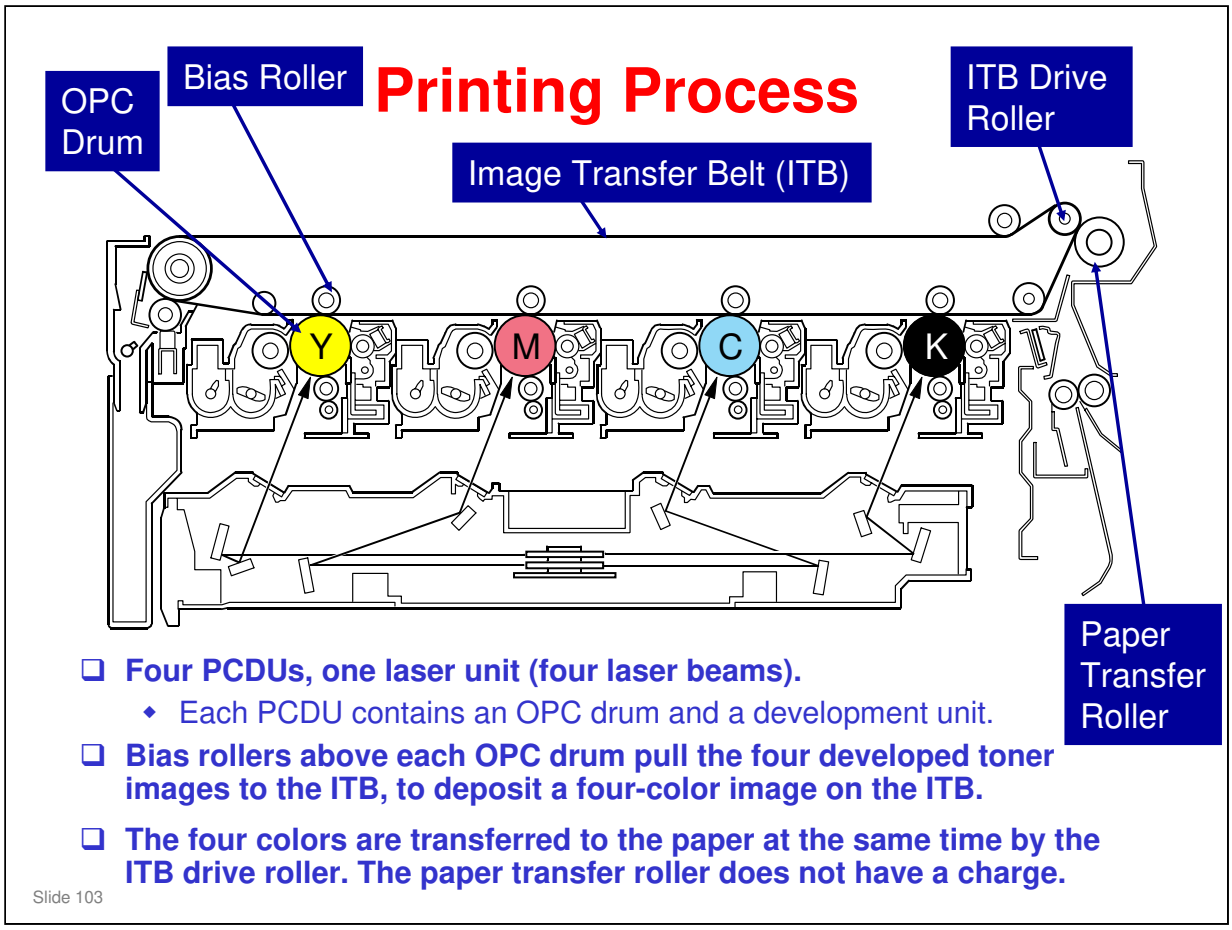
- HVPS: CB – Drum charge and development bias
- HVPS: TTS – Image transfer

Main Boards

- The BCU controls the engine.
- The controller board (CTL) handles the network and printer interfaces, and the operation panel.
- The IPU contains the image processing circuits.
- The SBU contains a CCD.
- The DRB contains driver circuits for motors.
- The HPSU boards supply high voltage power for charge, image transfer, and bias.
- The FCU (fax controller unit) controls the fax option.
- The SDVDB (Shut down and voltage detection board) handles the shut down sequence and detects the fusing lamp voltage.

Slide 102

No additional notes.



❒ 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 pull the toner.

Process Speeds

- **There are two process speeds, as follows:**
  - Thin, Plain, or Middle Thick Paper: 120 mm/s
    - » Print speed (ppm): C1.5a: 20, C1.5c: 25
  - 1200 dpi, OHP/Thick Paper: 60 mm/s
    - » Print speed (ppm): 12.5

Slide 104

- 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.
- The process speeds for the two models are the same, but the print speeds at 120 mm/s are different for each model. This is because the gap between sheets is shorter for the faster model.
- What is 'middle thick paper'? 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 105

❒ 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
  - CTL board
  - IPU
  - Hard disk
  - NVRAM
  - DRB
  - SDVDB
  - PSU
  - HVPS boards
- **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.

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❒ 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 107

No additional notes

Hard Disk Removal

- Remove the hard disk.
- Install the new hard disk as instructed in the FSM.
- After installing the new disk:
  - Copy the stamp data to the disks from the firmware: SP5853. Then switch the machine power off/on.
  - It is not necessary to format the hard disk.

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No additional notes

Hard Disk Removal (1)

- **Explain to the customer that the following information stored on the HDD is lost when the HDD is replaced:**
  - Document server documents
  - Custom-made stamps
  - Document server address book
- **The address book and document server documents (if needed) must be input again.**
  - If you previously backed up the address book to an SD card with SP5846 051, you can use SP 5846 052 to copy the data from the SD card to the hard disk.
- **Custom-made stamps must be re-made and stored again.**

Slide 109

No additional notes

Hard Disk Removal (2)

- **Security applications must be installed again.**
  - Do SP5-878-001 to install the Data Overwrite Security application. If the customer uses this application, it must be set up again.
  - Do SP5878-002 to install the HDD Encryption application. If this application is used, the user must copy the encryption key from the controller to the new hard disk.
- **Any SDK applications must be installed again.**
- **If the customer is using the optional Browser Unit, this option must be installed again. You must use the same SD card as when the browser unit was installed first.**

Slide 110

- The browser unit SD card is linked to its machine (the machine serial number is registered on the SD card). So a card that has already been installed on one machine cannot be used on another.

Hard Disk Removal (3)

- **Before you install a new unit:**
  - Do SP 5846 051 to copy the address book from the hard disk to an SD card (put the SD card in slot 1).
- **After you install a new unit:**
  - Do SP5853 001 to download the fixed stamps from the ROM to the HDD.
  - Switch the machine off and on to enable the fixed stamps for use.
  - Do SP 5846 052 to download the address book from the SD card to the hard disk (put the SD card in slot 1).

Slide 111

No additional notes

Disposal of HDD Units

- **Never remove an HDD unit from the work site without the consent of the client.**
- **If the customer has any concerns about the security of any information on the HDD, the HDD must remain with the customer for disposal or safe keeping.**
- **The HDD may contain proprietary or classified (Confidential, Secret) information.**
  - Specifically, the HDD contains document server documents and data stored in temporary files created automatically during copy job sorting and jam recovery.
  - Such data is stored on the HDD in a special format so it cannot normally be read but can be recovered with illegal methods.

Slide 112

No additional notes

Controller Board Removal

- **After installing the new controller board before turning the main power on:**
  - Disconnect the cables of the HDD from the controller board.
  - Disconnecting the cables of the HDD is very important. Otherwise, the HDD is automatically formatted and all data in the HDD is lost due to the security limitation.
  - Turn on the main power.
  - Connect the cables of the HDD to the controller board.
- **If the HDD Encryption application is used, restore the encryption key as instructed in the FSM.**

Slide 113

- The HDD ID information is stored in the flash ROM on the controller board and NVRAM. At the boot timing, the machine compare the HDD ID information with the data in the flash ROM on the controller board and NVRAM. If the data is mismatch, the machine automatically formatted.
- When installing the new controller board and disconnecting the HDD cables, the HDD ID information is automatically copied from NVRAM to the flash ROM on the controller board and NVRAM.

NVRAM (CTL) Removal

- **After installing the new controller board before turning the main power on:**
  - Disconnect the cables of the HDD from the controller board.
  - Disconnecting the cables of the HDD is very important. Otherwise, the HDD is automatically formatted and all data in the HDD is lost due to the security limitation.
  - Turn on the main power.
  - Connect the cables of the HDD to the controller board.
- **Install the new Security SD card as instructed in the FSM.**

Slide 114

- The Security SD card ID information is stored in the NVRAM on the controller board. If the NVRAM is replaced, the current Security SD card cannot be used. A new Security SD card must be installed.

RICOH

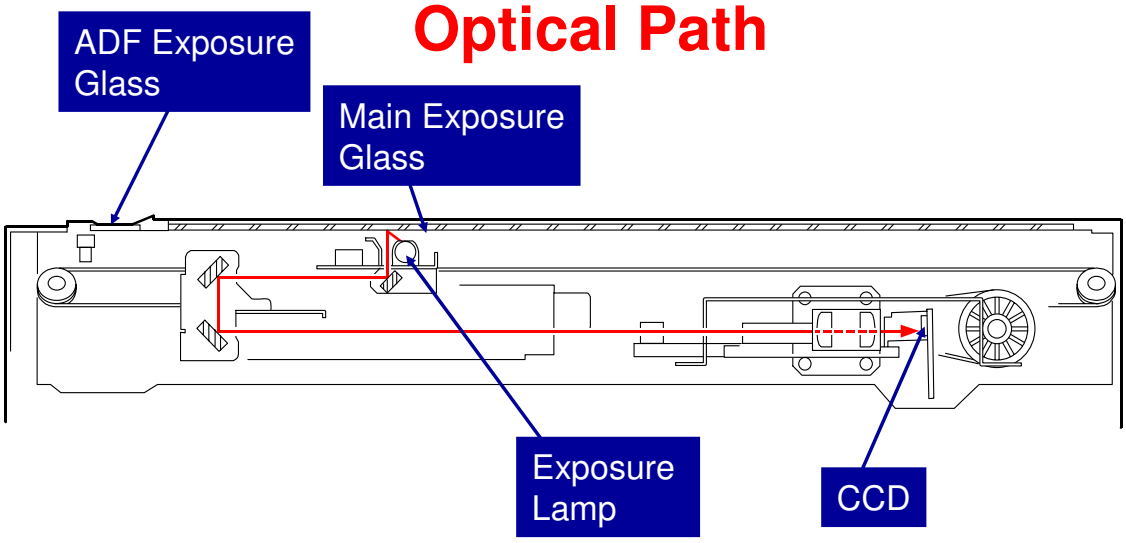
Di-C1.5 TRAINING

SCANNER

Slide 115

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

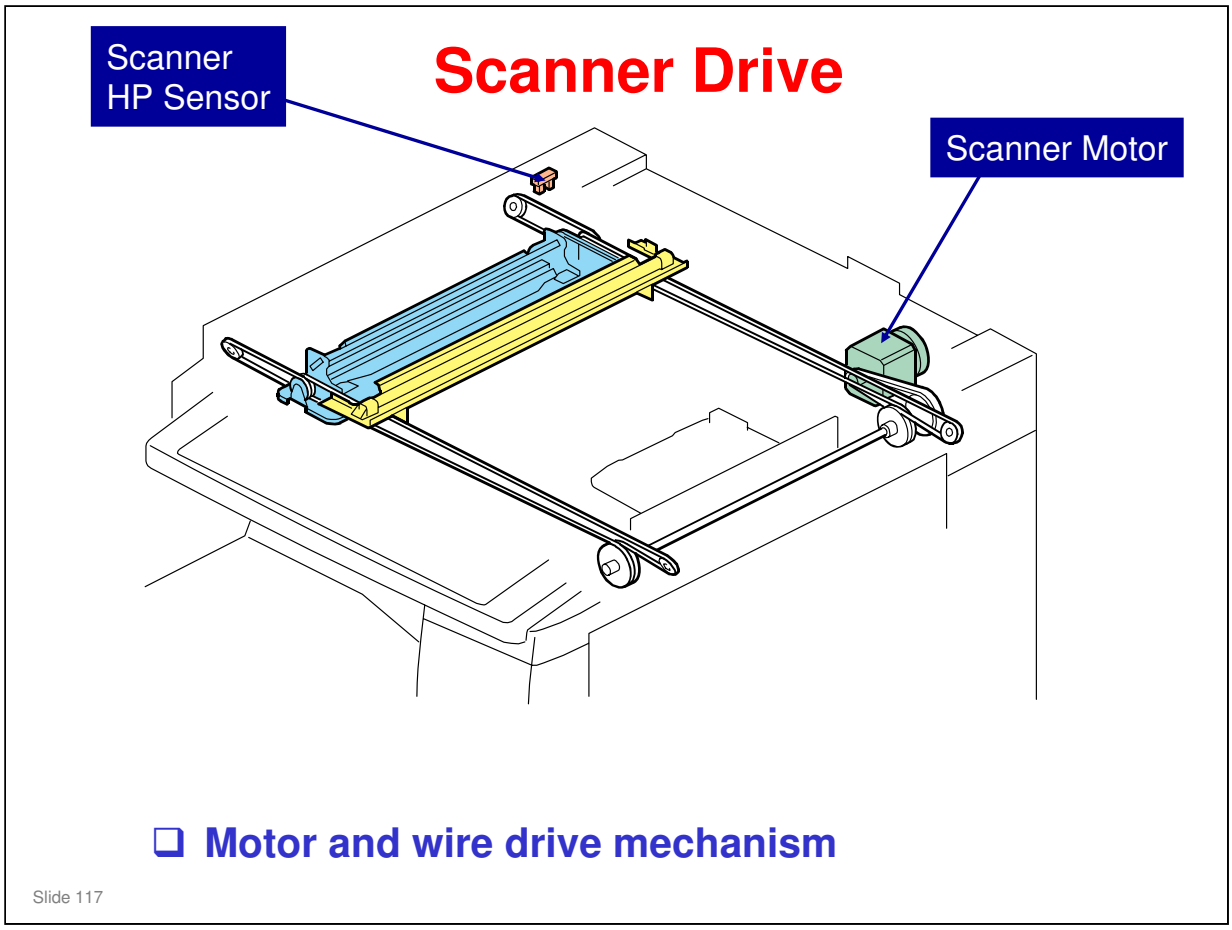
Optical Path



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

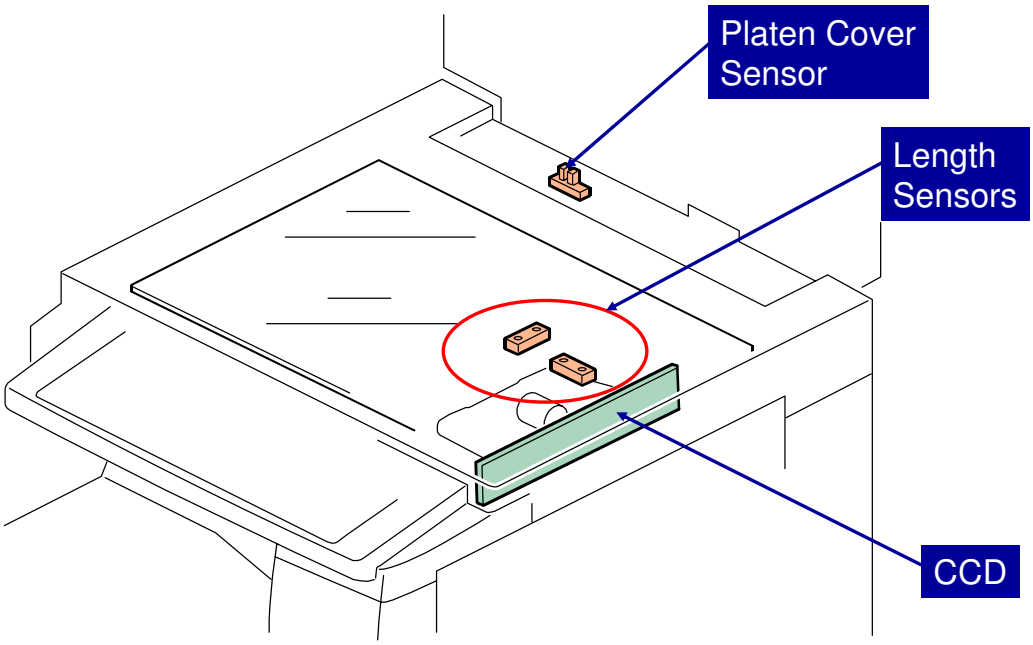
Slide 116

- In platen mode, the original is put on the main exposure glass, and the scanner moves down the original during scanning.
- In ADF mode, the scanner stays at the home position, and the original is fed past the ADF 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 ADF mode is different from platen mode (as shown on the previous page).
  - In ADF 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.**

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- When the ADF is opened, the scanner carriage moves 30 mm from the home position.
- Then, when the ADF 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 ADF, the width and length sensors in the ADF detect the original size.

Replacement and Adjustment

- **Service Manual, 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.
- **ADF 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.

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No additional notes

RICOH

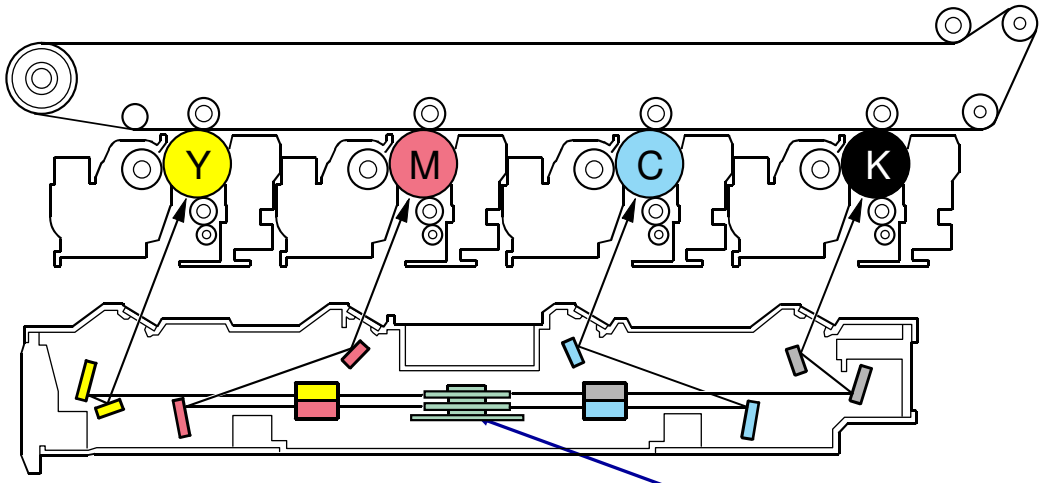
Di-C1.5 TRAINING

LASER EXPOSURE

Slide 120

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

Overview



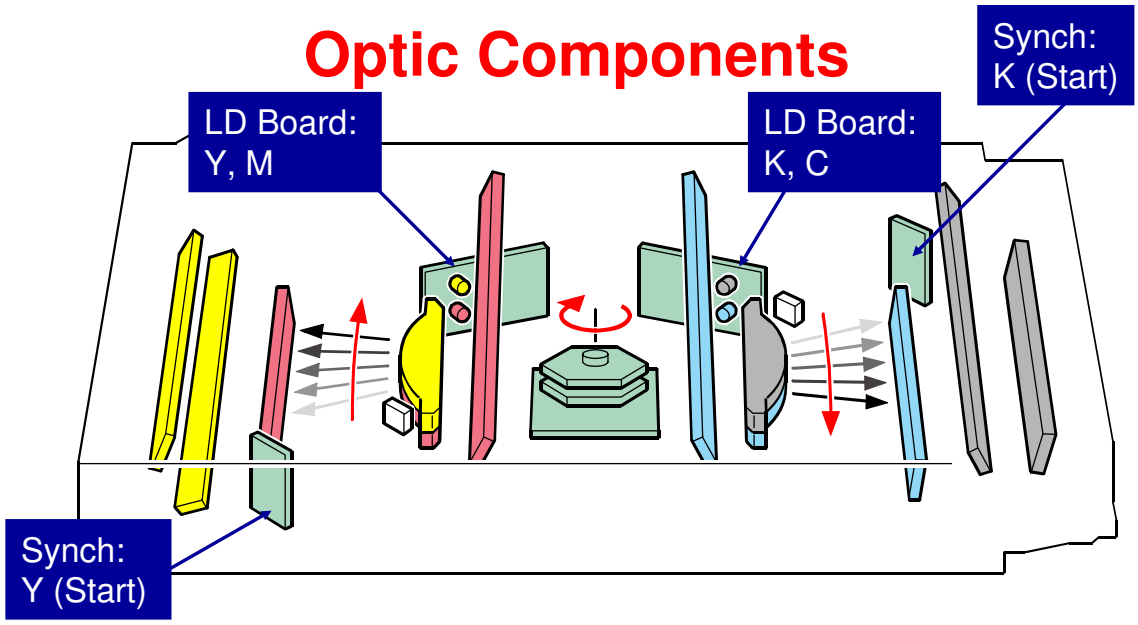
- **One laser beam for each color.**
- **Two polygon mirrors attached to the same motor.**
  - The upper mirror reflects yellow and black.
  - The lower mirror reflects magenta and cyan.

Polygon Mirrors

Slide 121

- Black also has one beam only.
- This diagram does not show the LD units. A more complete diagram of the optics is on the next slide.

Optic Components

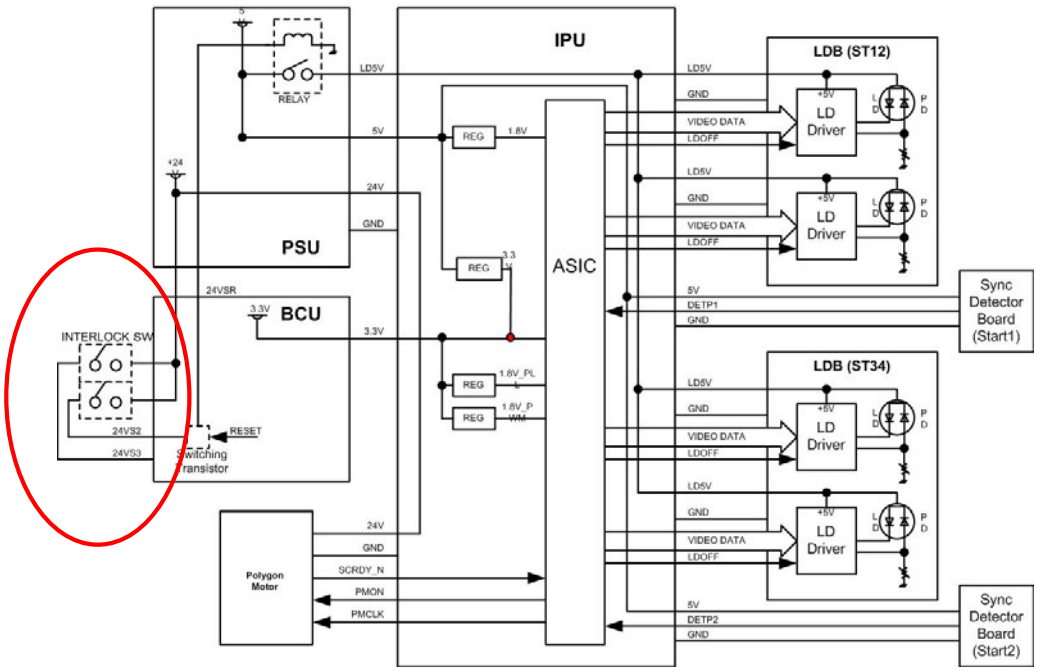


- **Four laser diodes, one for each color.**
- **Two laser synchronization detector boards:**
  - Each board is used by 1 color
  - Each color is detected at the start of the main scan

Slide 122

- 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.

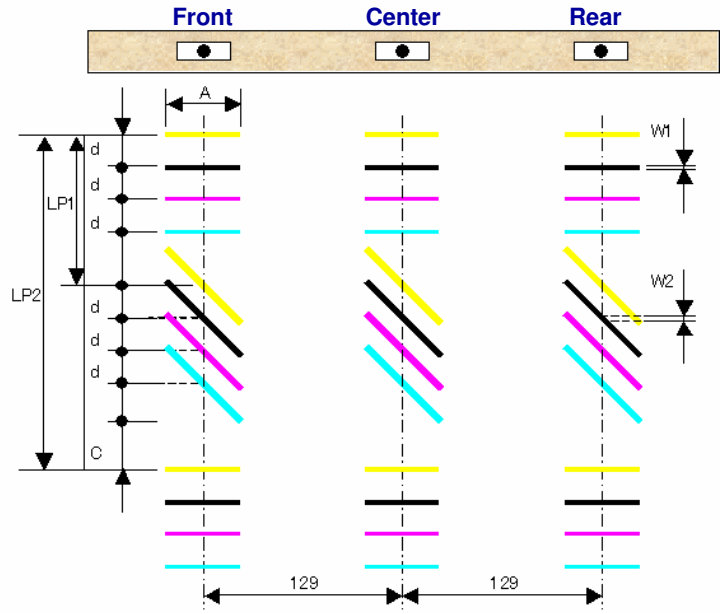
LD Safety Switches



Slide 123

- Make sure that you understand how the cover switches cut the laser power.
- The switches used are for the front cover and duplex unit.

Automatic Line Position Adjustment



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

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❒ 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.

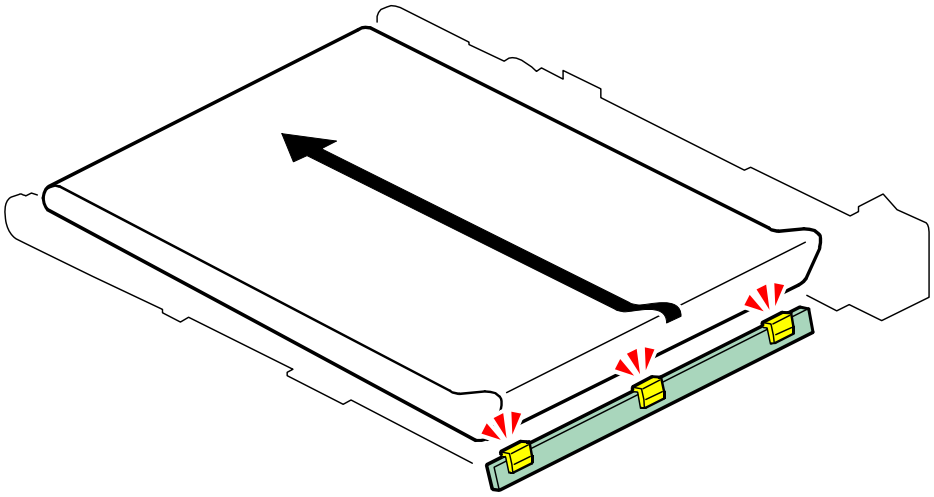
Automatic Line Position Adjustment

- **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 125

- 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 126

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.

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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.

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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.

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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.

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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.

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No additional notes

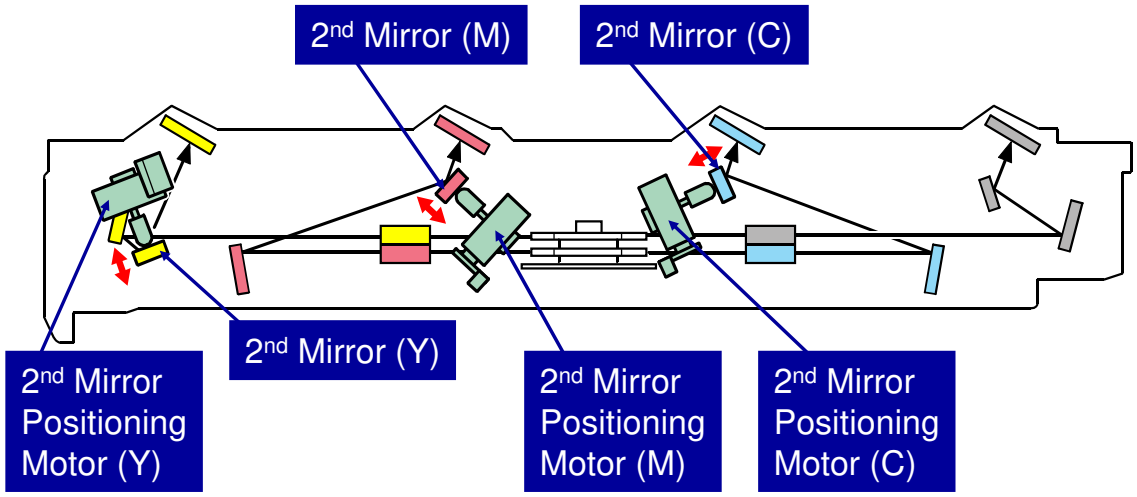
Adjustment Conditions (6)

- **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 133

- 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**

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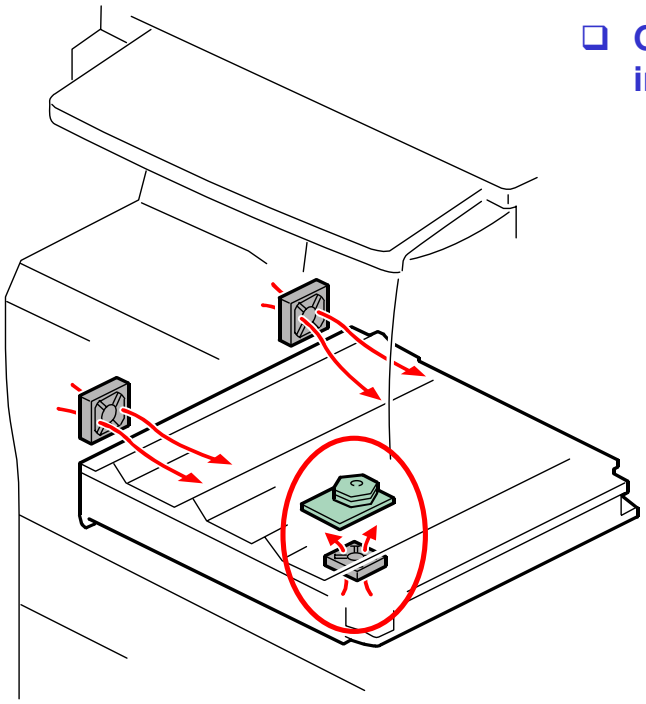
- The 2nd mirror positioning motors for magenta, cyan, and yellow adjust the angle of the 2nd mirror for these three colors, based on the 2nd mirror position for black.

Laser Unit Cooling

- One fan blows cool air into the laser unit.



Slide 135

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

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 136

No additional notes

Laser Optics Housing Unit Replacement (1)

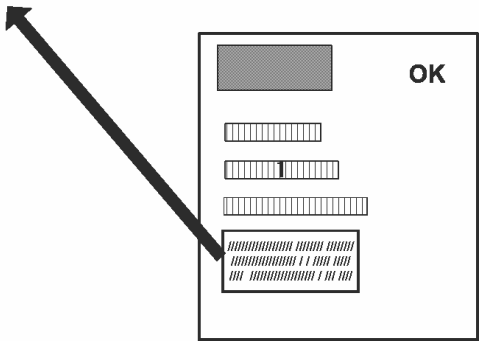
- **First, prepare the new laser optics housing unit.**
- **Then, before you switch the machine off, you must make some SP adjustments.**
  - These adjustments move the 2nd mirror positioning motors back to home position.
  - If this is not done, the motors in the new unit will be at the home position, 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.**

Slide 137

- 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 138

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 139

No additional notes

Image Adjustments

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

Slide 140

No additional notes

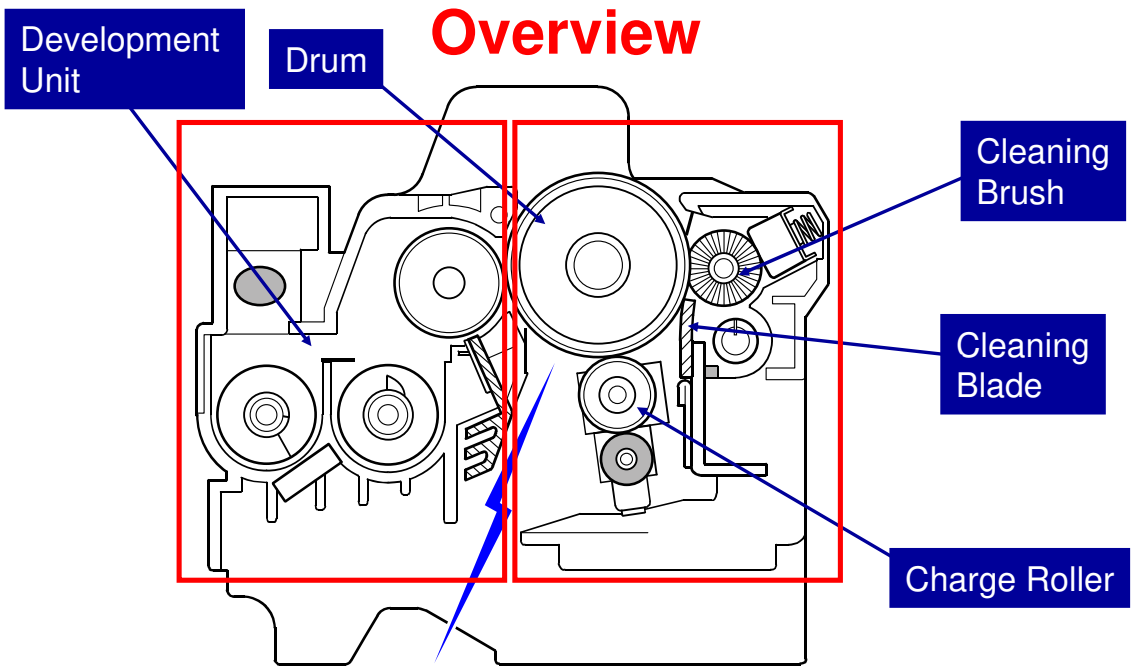
RICOH

Di-C1.5 TRAINING

PCDU

Slide 141

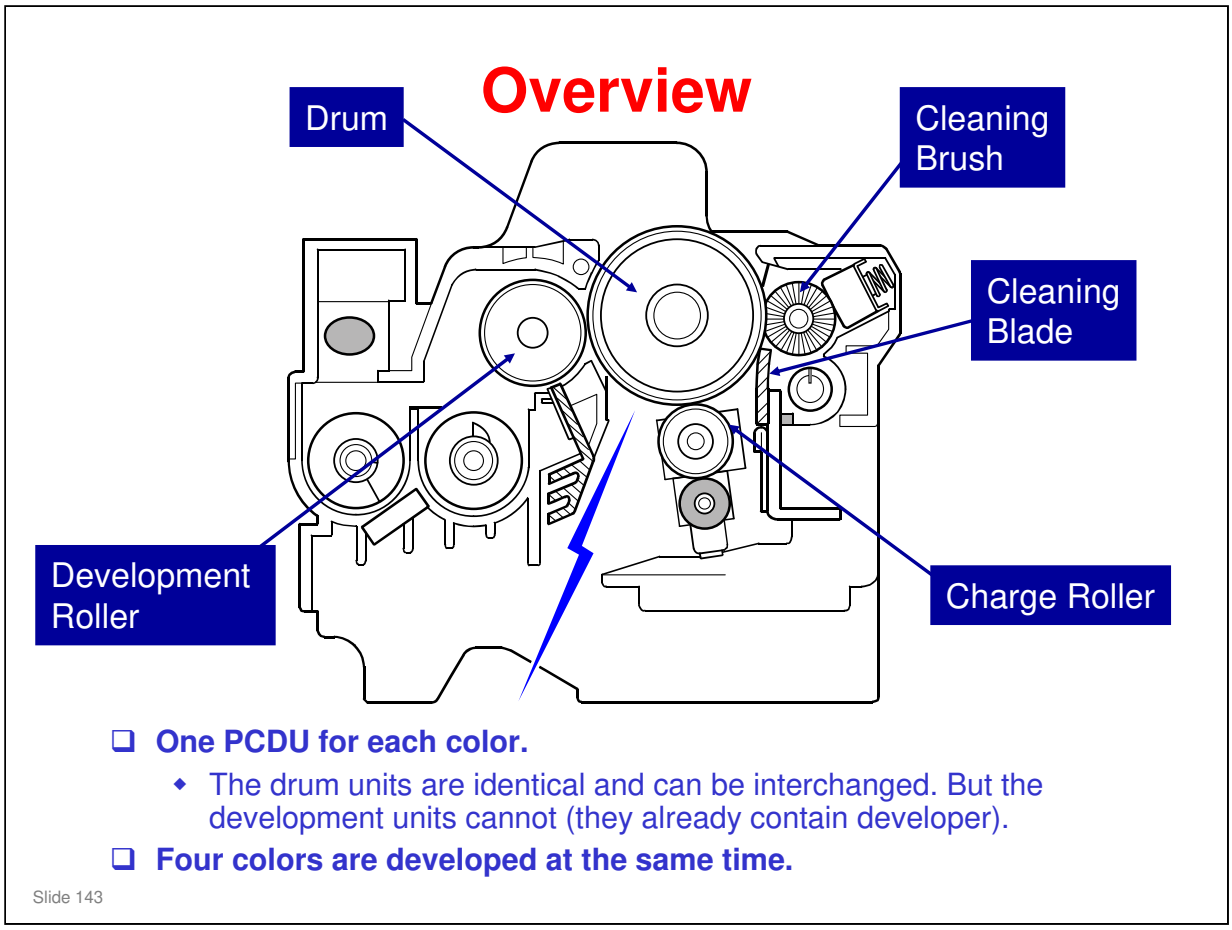
No additional notes



- **PCDU = Development unit + Drum unit**
  - Drum diameter: 30 mm
  - Development roller diameter: 18 mm

Slide 142

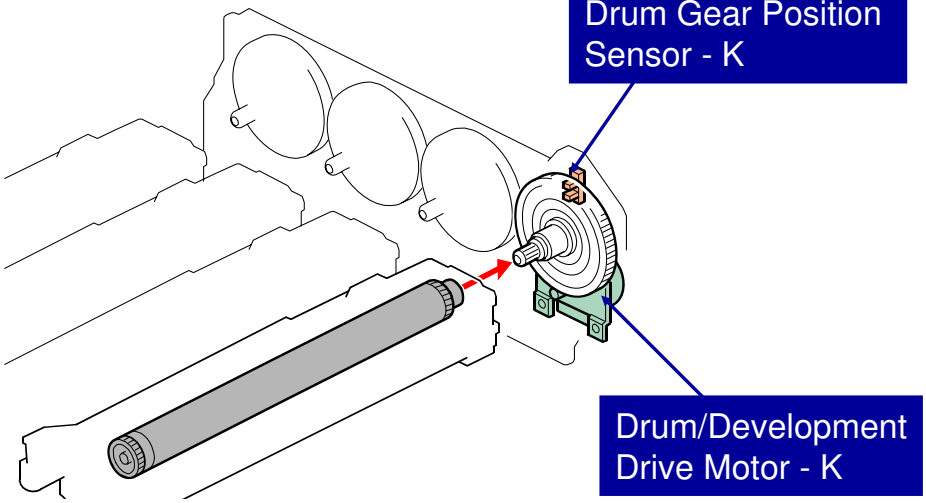
- The PCDU is divided into two parts, as shown by the red boxes on this slide. These two parts are the development unit (on the left) and the drum unit (on the right).
- The drum units are the same for each color. However, the development units already contain developer, so these are not interchangeable.



❒ 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

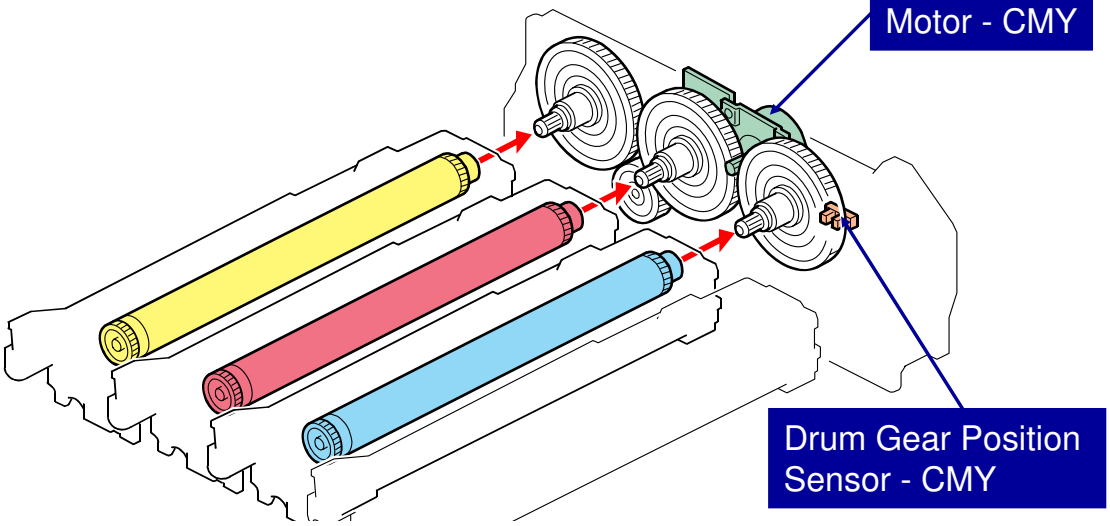


- **The same motor drives the development unit for K.**
- **The drum gear position sensor detects when the motor is not working.**
  - It also makes sure that the drum gear is at the correct angle when printing starts.
  - This prevents variations in print quality caused by incorrect gear meshing at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

Slide 144

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

Drum Drive - CMY

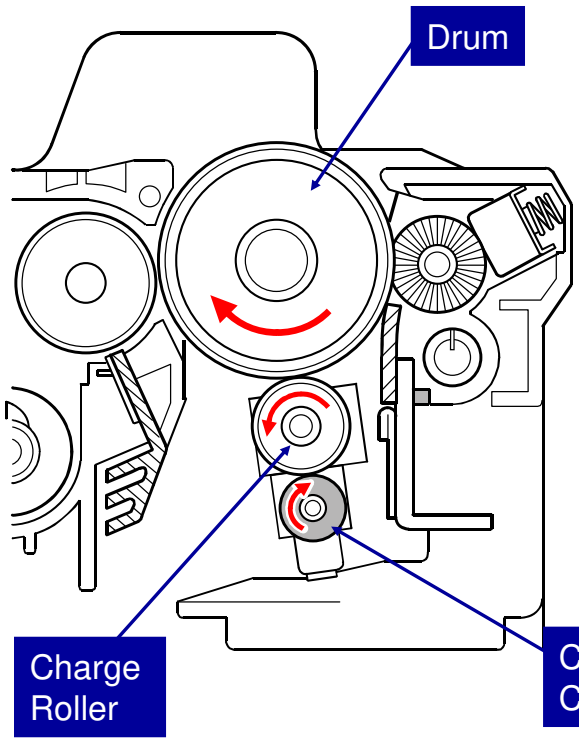


- **This motor drives three drums.**
  - It does not drive the development units.
- **The drum gear position sensor detects when the motor is not working.**
  - It also makes sure that the drum gear is at the correct angle when printing starts.

Slide 145

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

Slide 146

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 147

No additional notes

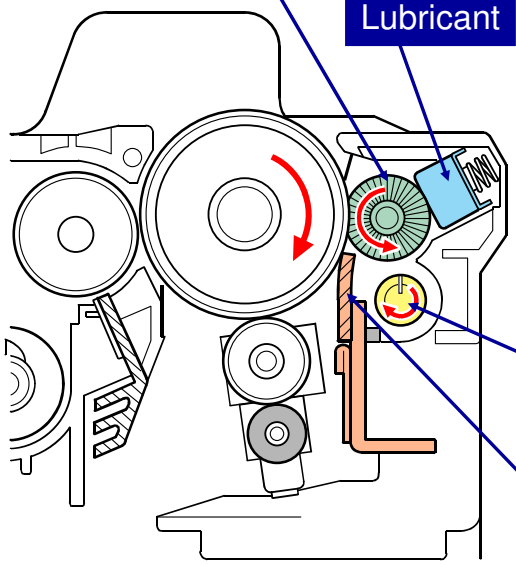
Quenching

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

Slide 148

No additional notes

Drum Cleaning

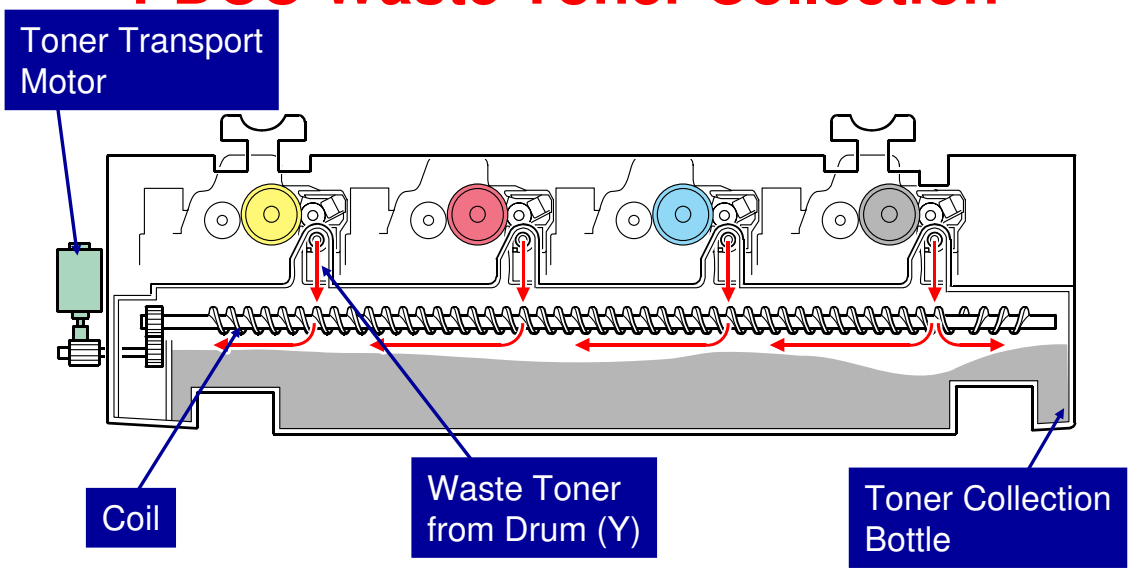


- **The cleaning blade removes remaining toner from the drum.**
  - This toner falls onto a collection coil, and is discarded.
- **The cleaning brush applies lubricant to the drum.**
  - The cleaning blade spreads this lubricant.

Slide 149

- 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

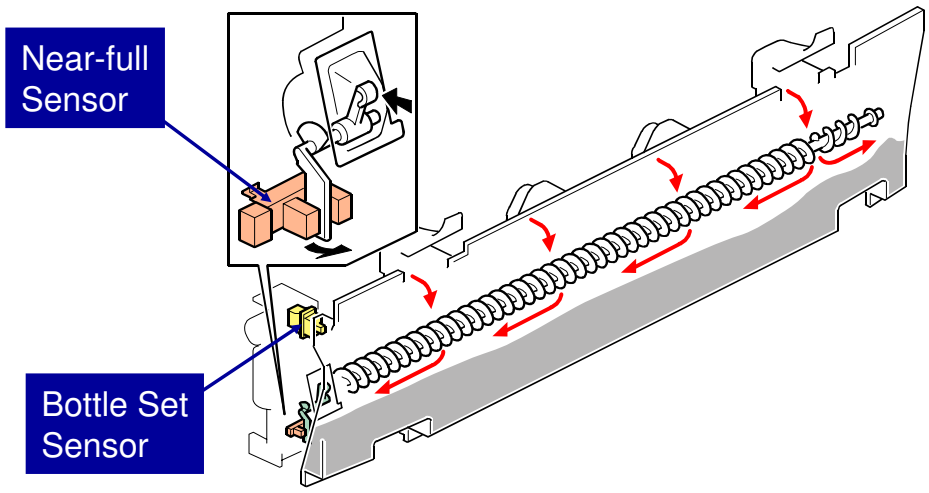


- **Waste toner from the four drums falls onto a coil.**
  - The toner transport motor drives this coil.
- **The coil distributes the toner evenly inside the toner collection bottle. This makes sure that toner does not pile up unevenly.**

Slide 150

- 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/Di-C1.5, 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.

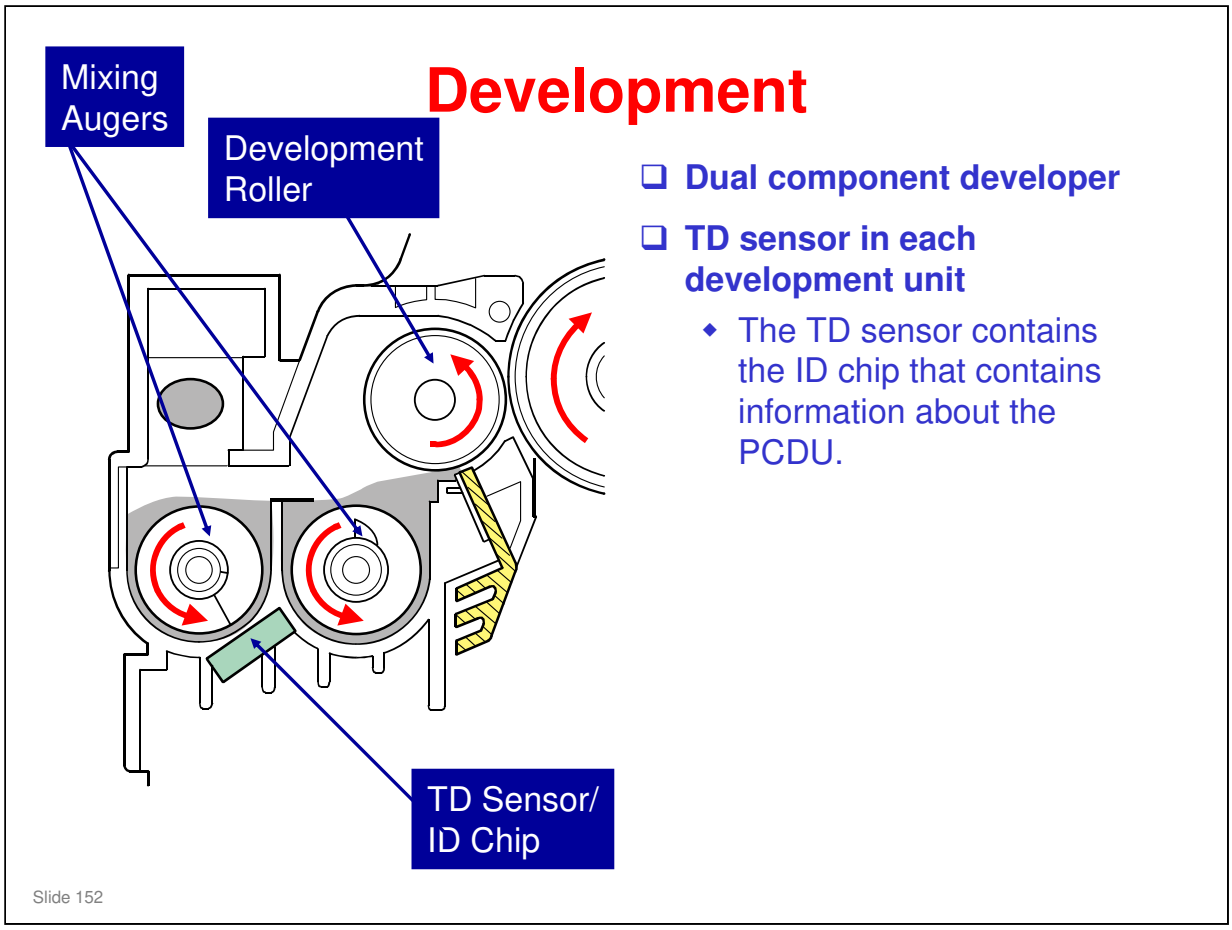
Toner Bottle Detection/Full Detection



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

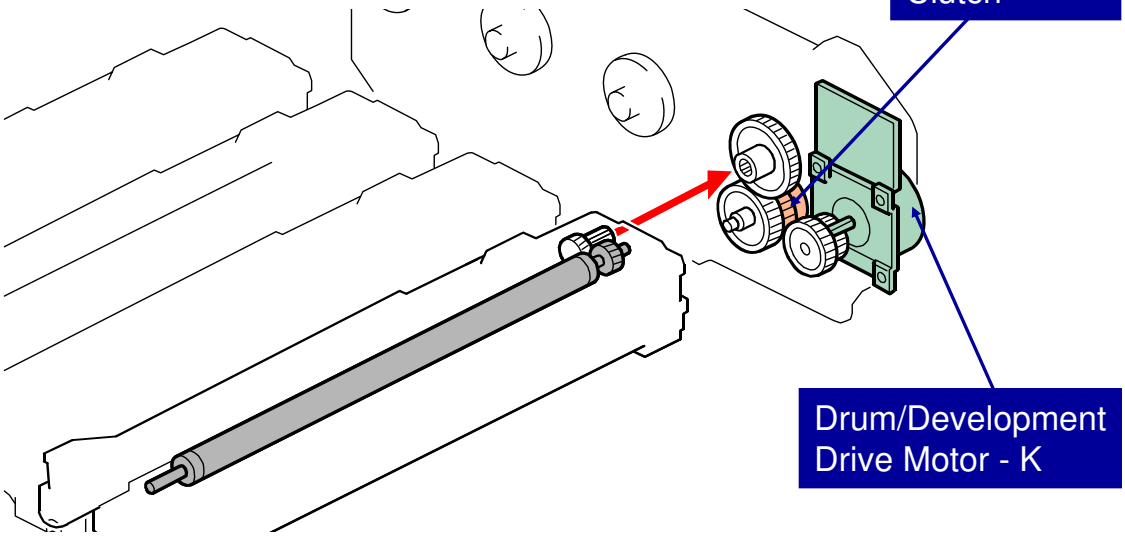
Slide 151

- 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

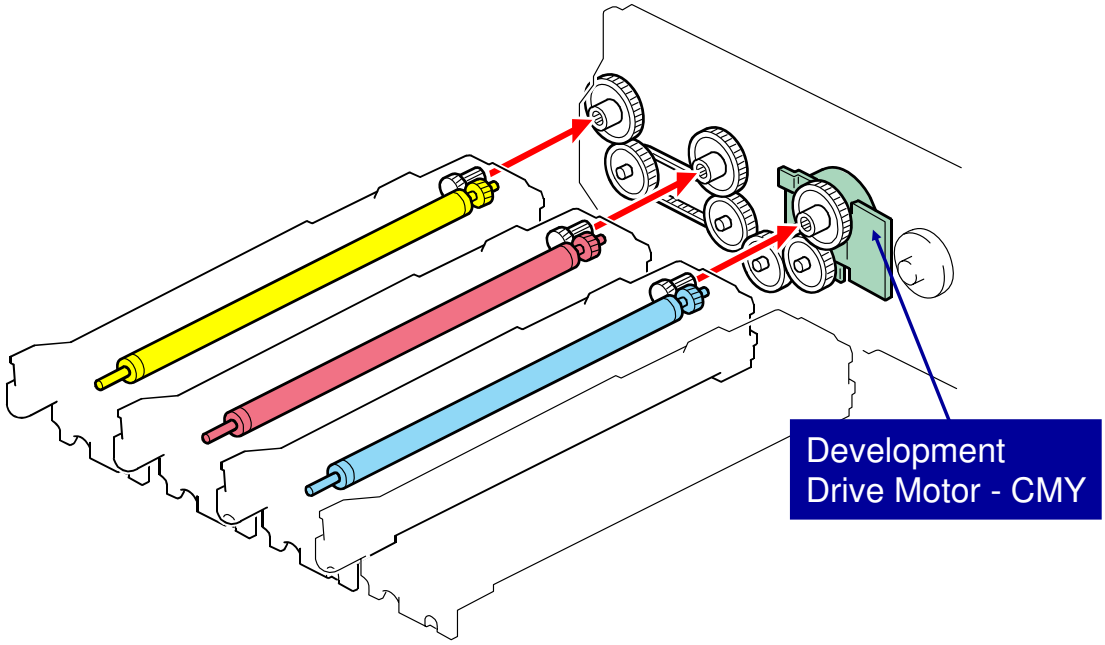


- **The drum/development drive motor controls the K development unit.**
  - This motor also controls the K drum, so a clutch is necessary.

Slide 153

No additional notes

Development Drive - CMY

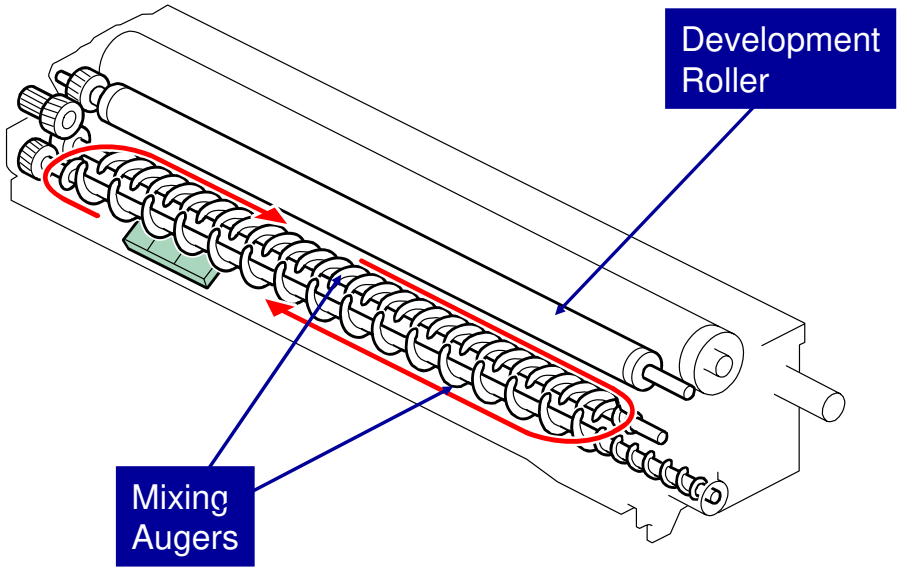


❑ **This motor drives the C, M, and Y development units.**

Slide 154

❒ 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 155

- 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. Keep the (new) development unit level and shake it several times from side to side.
- 3. Install it in the machine.

Slide 156

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 157

- 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 158

- 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 159

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 160

No additional notes

Replacement and Adjustment

❑ Development Unit

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

Slide 161

- ❒ 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.

Replacement and Adjustment

❑ PCDU Toner Collection Bottle

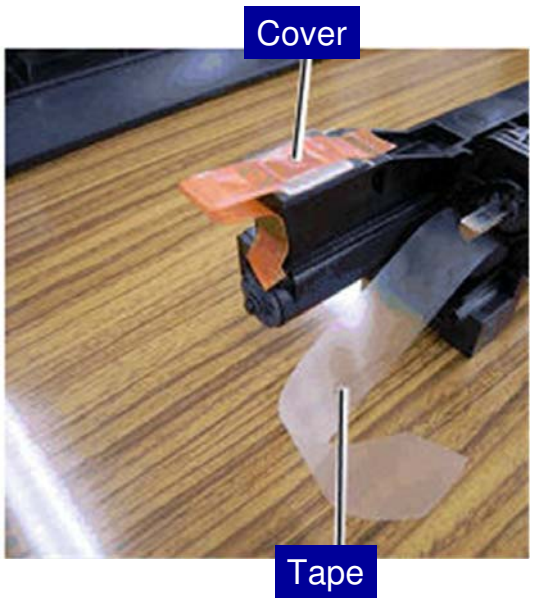
- If you replace the bottle after the machine detects that it is full or near-full, the machine automatically resets the PM counter for the bottle after replacement.
- But, if you replace a bottle that is not full or near-full, then you must reset the PM counter for this unit. To do this, set SP 3902 019 to 1 before you start to work on the machine.

Slide 162

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 163

No additional notes

RICOH

Di-C1.5 TRAINING

PROCESS CONTROL

Slide 164

❒ Process control will be described briefly in this section.

Overview

Slide 165

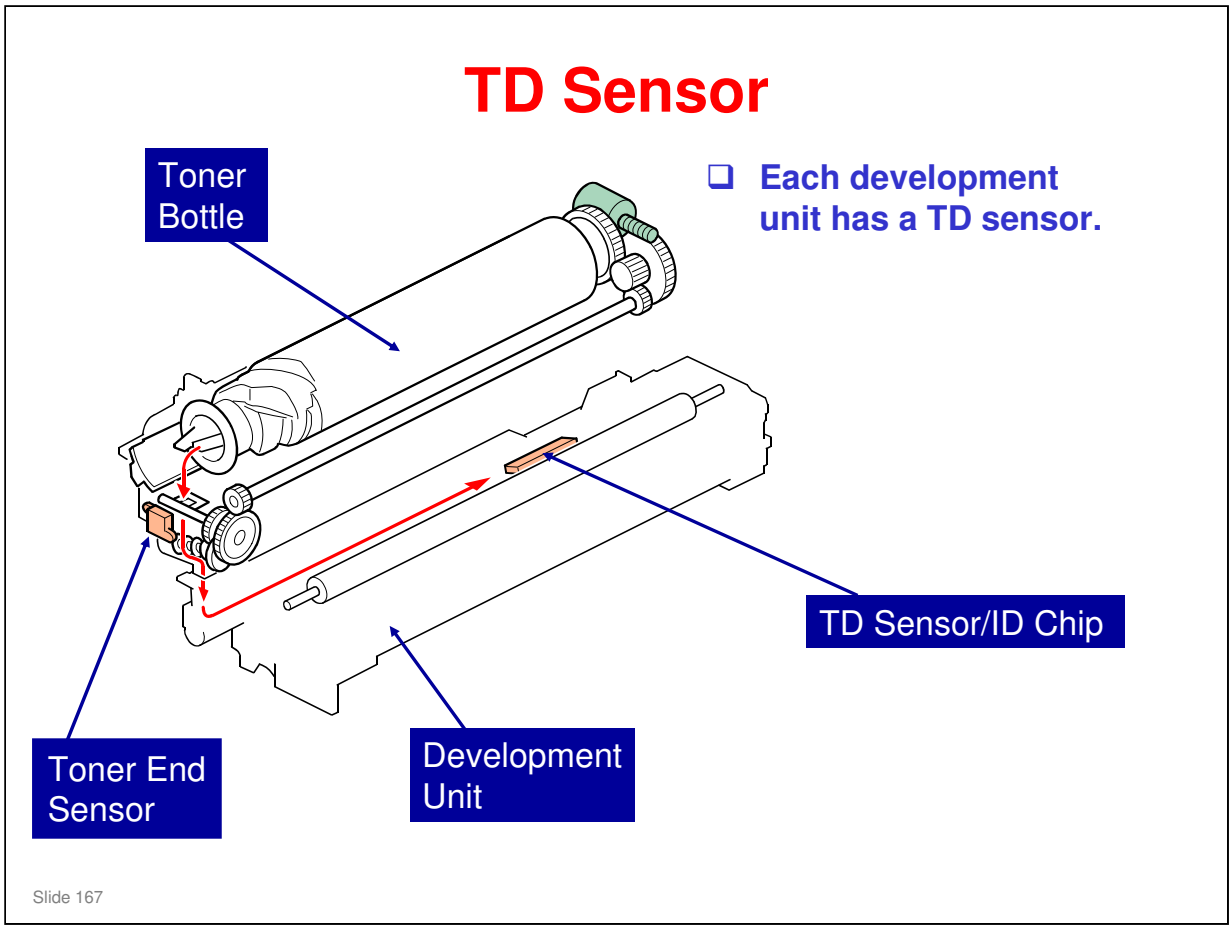
No additional notes

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 166

No additional notes.



No additional notes

Potential Control

Slide 168

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 169

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 170

- 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 171

- 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 172

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 173

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 174

- 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 175

- 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: approx. 30 seconds
  - During a job
    - » Process control: approx 30 seconds
  - At the end of a job
    - » Full color Job end Process control: approx. 11 seconds
    - » B&W Job end Process control: approx. 6 seconds

Slide 176

- 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/Di-C1.5 only make the black sensor pattern.

Toner Supply Control

Slide 177

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 178

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 179

No additional notes.

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 180

- 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 181

- 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 182

- 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 183

No additional notes

RICOH

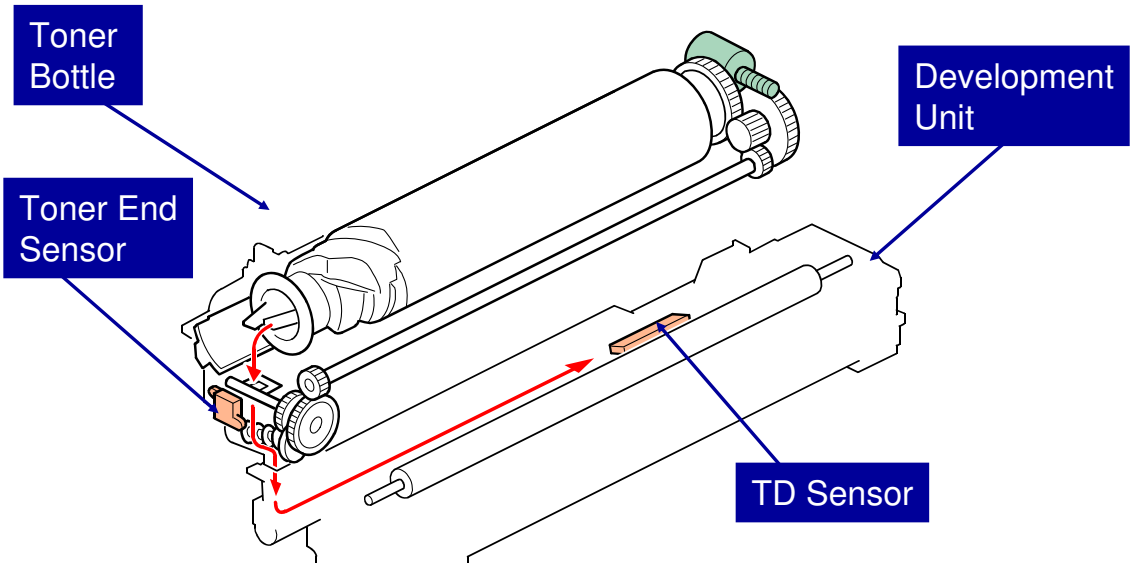
Di-C1.5 TRAINING

TONER SUPPLY

Slide 184

- 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

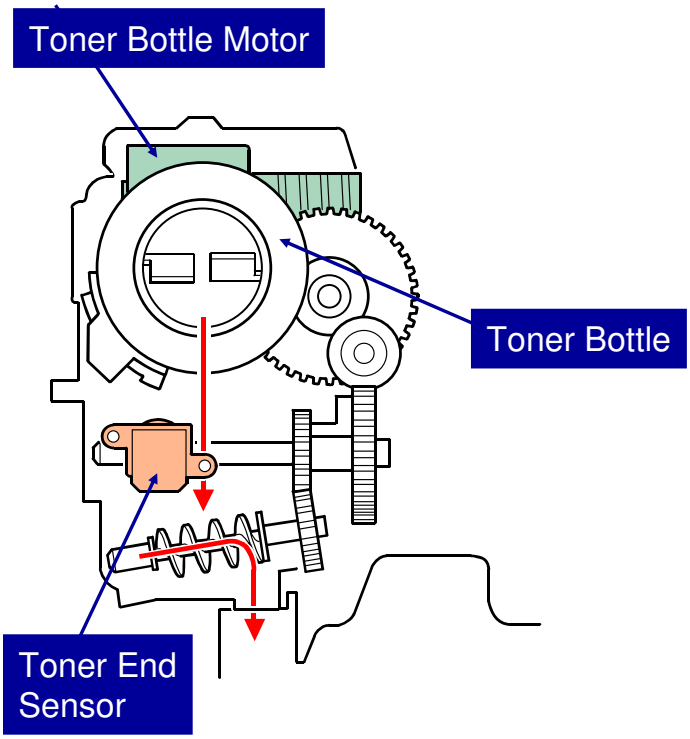


- To supply toner, the toner bottle is rotated.
- The toner goes down a tube, and goes into the sub hopper.
- The toner end sensor is attached to the sub hopper.

Slide 185

- 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

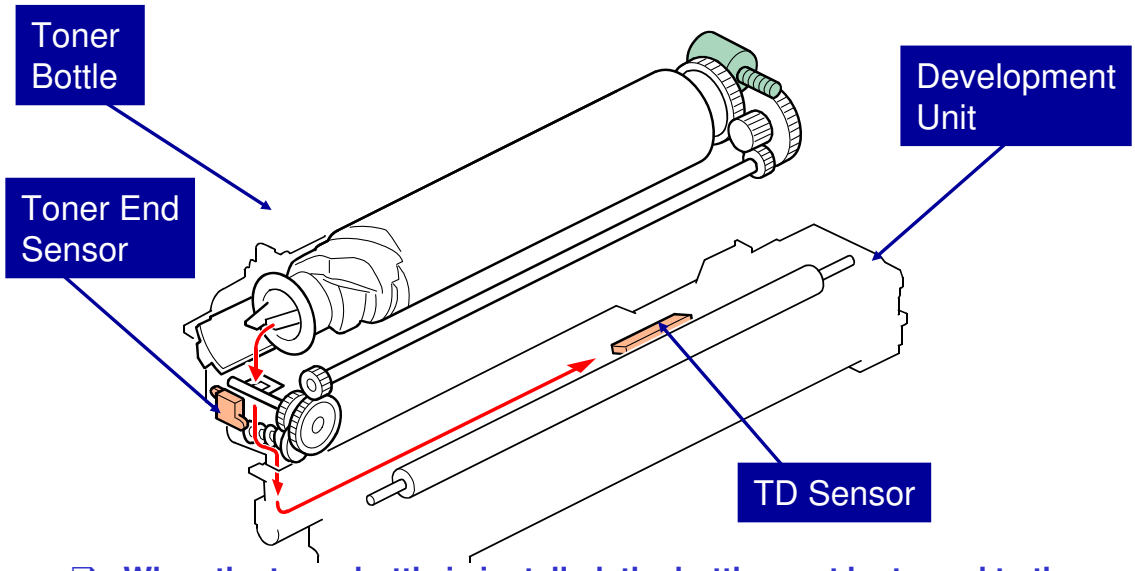


- Each bottle is controlled by a separate motor.
- There are no clutches

Slide 186

No additional notes

Toner Bottle

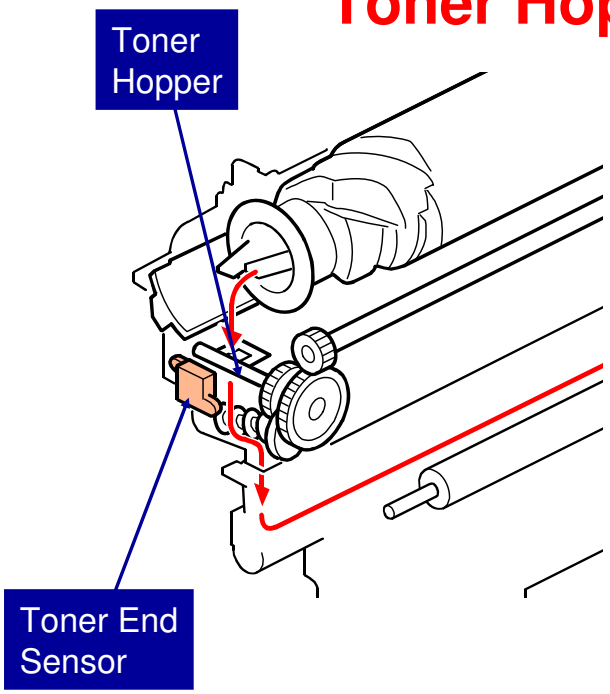


- When the toner bottle is installed, the bottle must be turned to the right (clockwise). This opens the bottle, and toner can leave the bottle.
- The spiral grooves in the bottle help to feed toner out of the rotating bottle.
- The toner goes through the toner end sensor.

Slide 187

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

Toner Hopper Unit

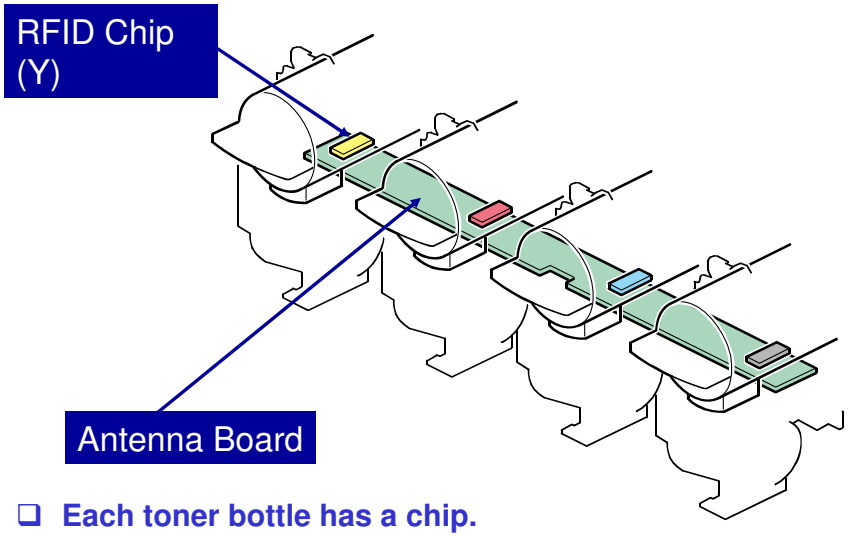


- The toner hopper contains a small amount of carrier.
- This prevents large amounts of toner from entering the development unit during a long job with high image coverage.
- If a lot of toner is allowed to enter, toner scattering may occur.
- The carrier is held in the hopper by magnets.
- If the toner 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 188

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 189

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 there are only 100 sheets left.**
  - This occurs when the bottle is empty, but a small amount of toner remains in the sub hopper.

Slide 190

- 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

- **SP3045 002**
  - 0: Pixel counter, motor rotation counter, and toner end sensor
  - 1: Toner end sensor only

Slide 191

- 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.
- Default is 0.

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 192

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 193

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 194

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 195

- 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.

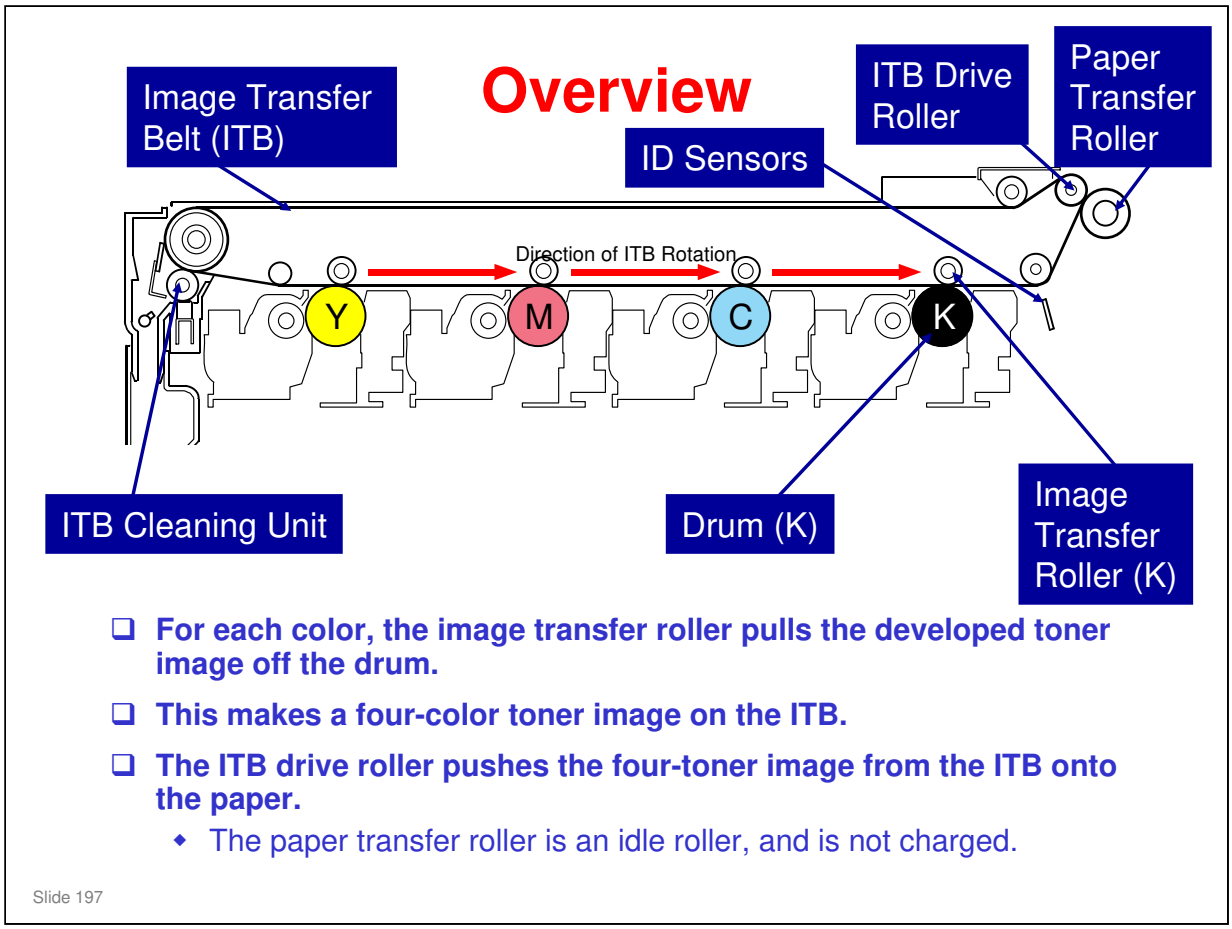
RICOH

Di-C1.5 TRAINING

TRANSFER

Slide 196

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



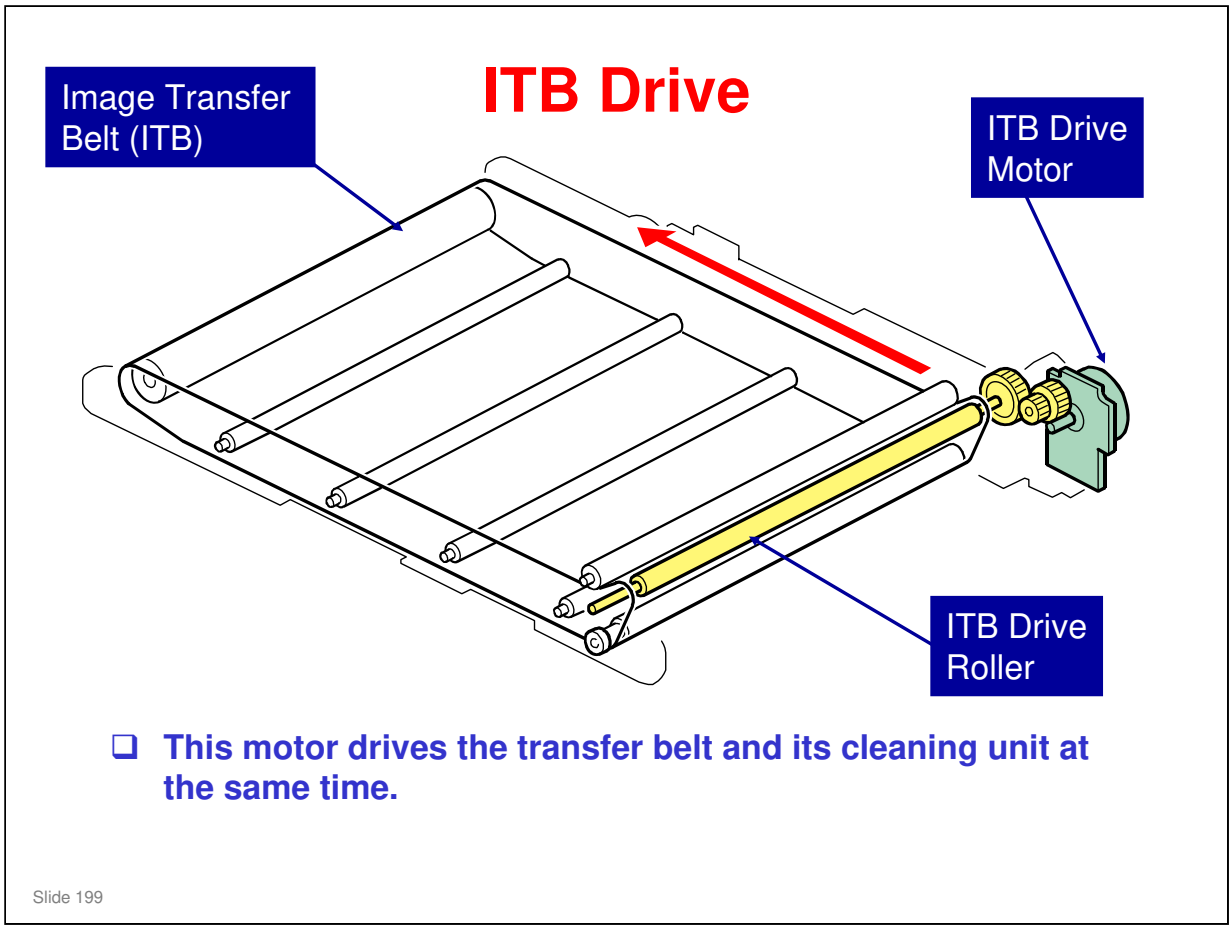
- All four color toners are pulled onto the ITB on the same rotation of the ITB.
- The paper transfer roller does not pull the toner off the ITB. In this machine, the ITB drive roller pushes the toner off the ITB and onto the paper.
- Used toner collected by the ITB cleaning unit goes to the used toner 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.

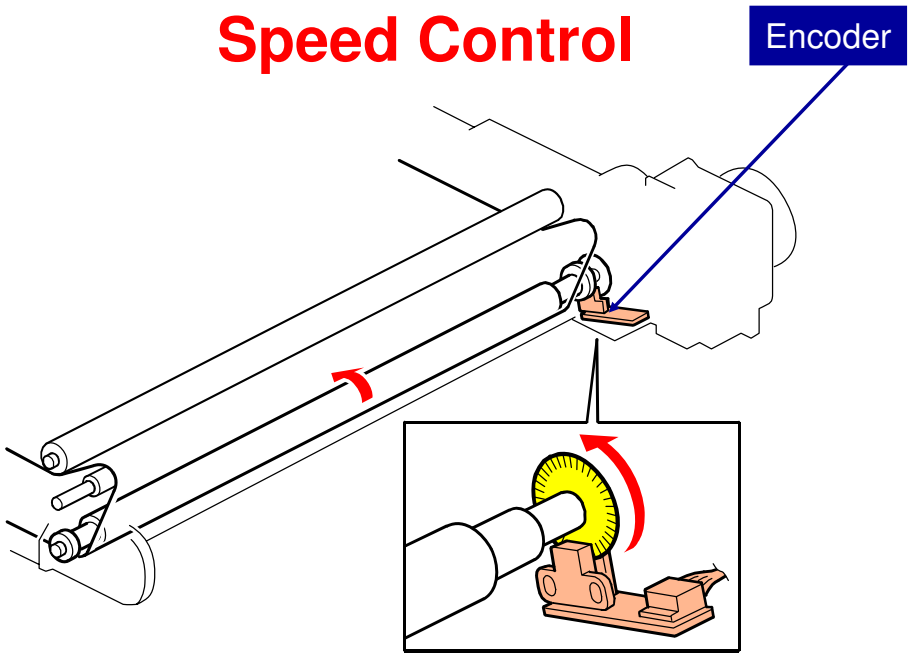
Slide 198

No additional notes



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

Speed Control

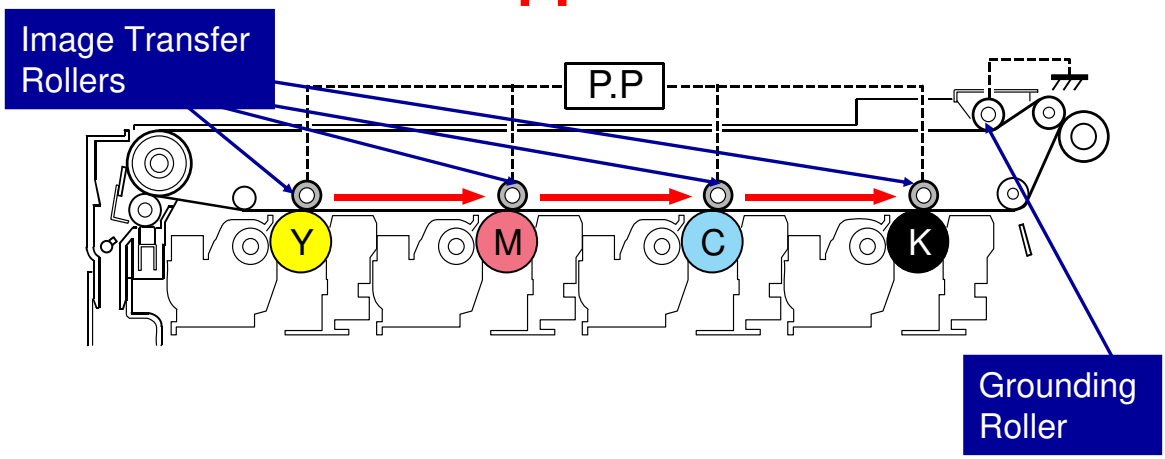


- The encoder monitors the belt speed.
- The machine adjusts the motor speed, based on the output from the encoder.

Slide 200

- 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

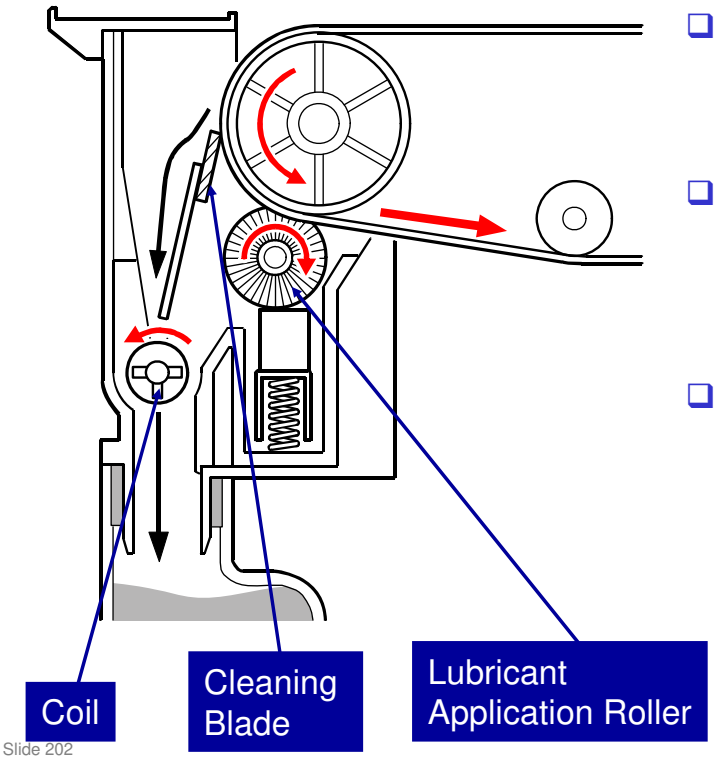


- The image transfer rollers pull the toner off the drum.
- The grounding roller grounds the transfer belt.
- The terminals from the high voltage supply board (HVPS-TTS) come in at the rear of the ITB unit.
- The current is automatically corrected for temperature and humidity.

Slide 201

- 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

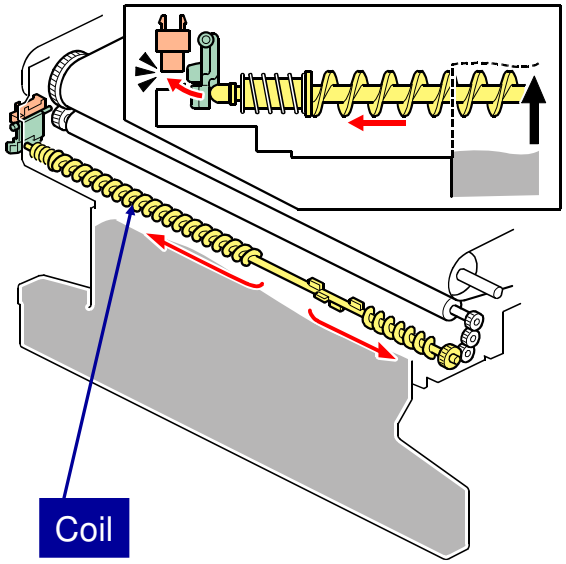


Slide 202

- **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 seconds 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.

- 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

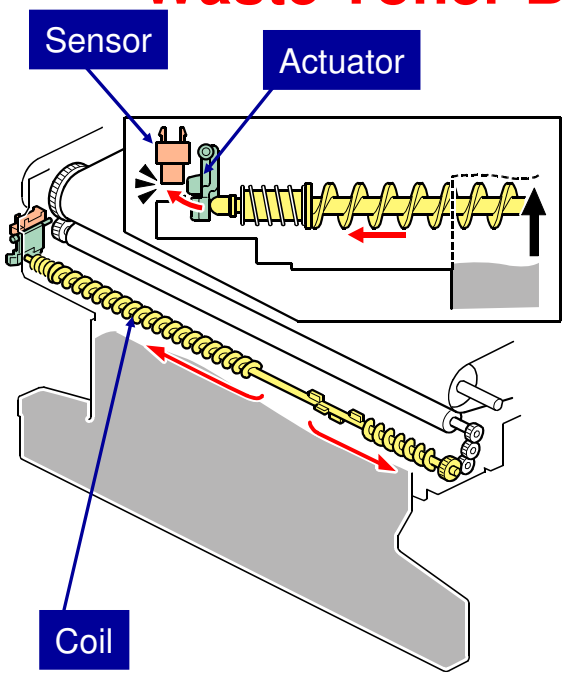


- **Waste toner from the transfer belt falls into a coil.**
  - The ITB drive motor drives this coil through some gears at the front of the ITB unit.
- **This coil moves the waste toner to the toner collection bottle.**
- **This is a separate bottle from the one that collects waste toner from the drums.**

Slide 203

No additional notes

Waste Toner Bottle Near-Full

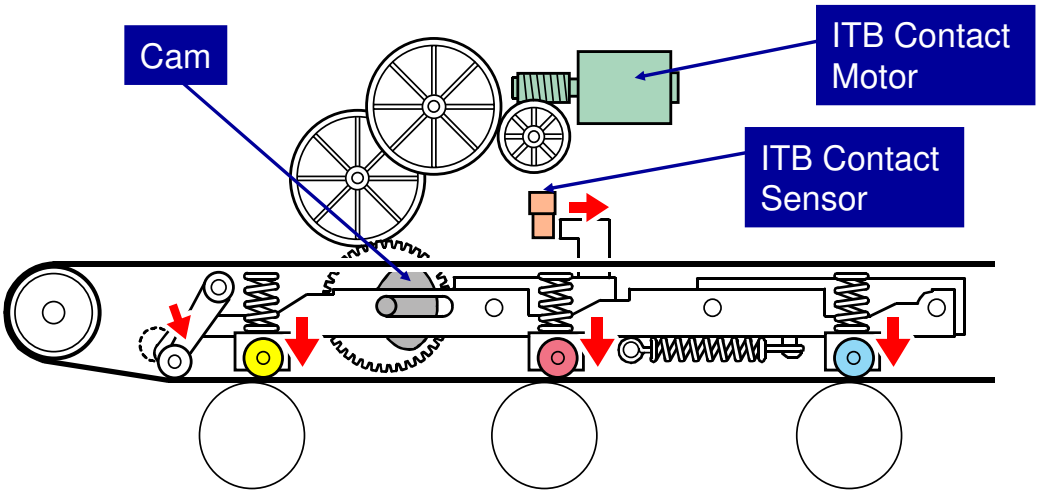


- When the bottle is almost full, the screw pushes against the toner while it turns, and this causes the end of the coil to push the actuator into the sensor.
- At this time, the machine detects 'near-full'.
- Then after about 2k prints (for 5% coverage), the machine stops and the bottle must be emptied.

Slide 204

No additional notes

ITB Contact and Release - 1

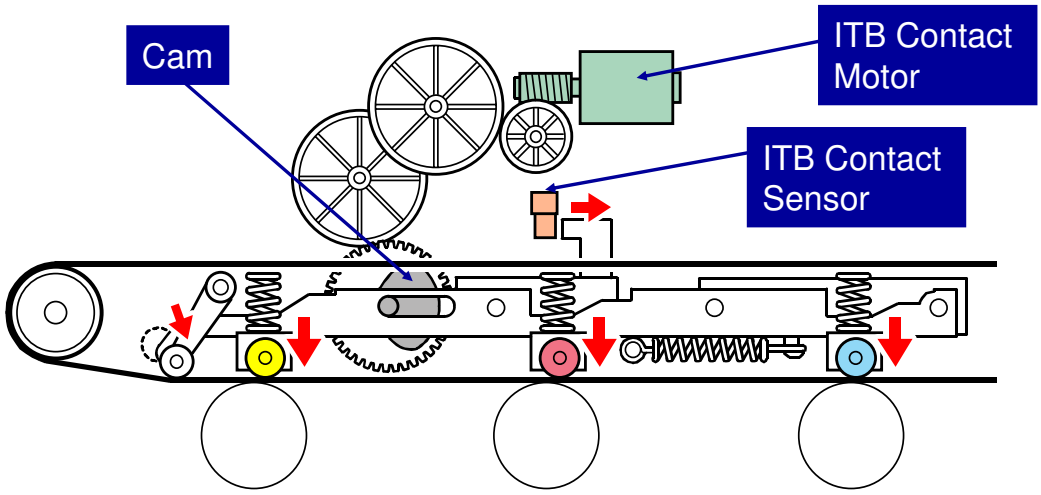


- **The belt always contacts the K drum.**
  - To move the belt away from the K drum, turn the release lever clockwise. Do this to remove the transfer belt unit, or you will damage the K drum.
- **The belt contacts the CMY drums for color printing only.**
  - If a black-and-white page comes in the middle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

Slide 205

- 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

Slide 206

- 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

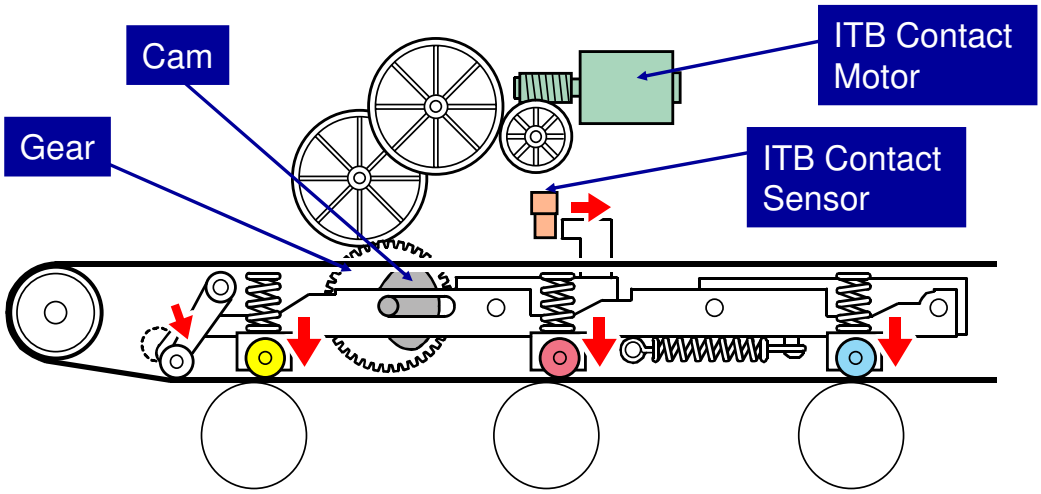
    Operation - B/W printing: On

    Operation - Color Printing: Off

    On: The actuator is out of the sensor.

    Off: The actuator is interrupting the sensor.

ITB Contact and Release - 3

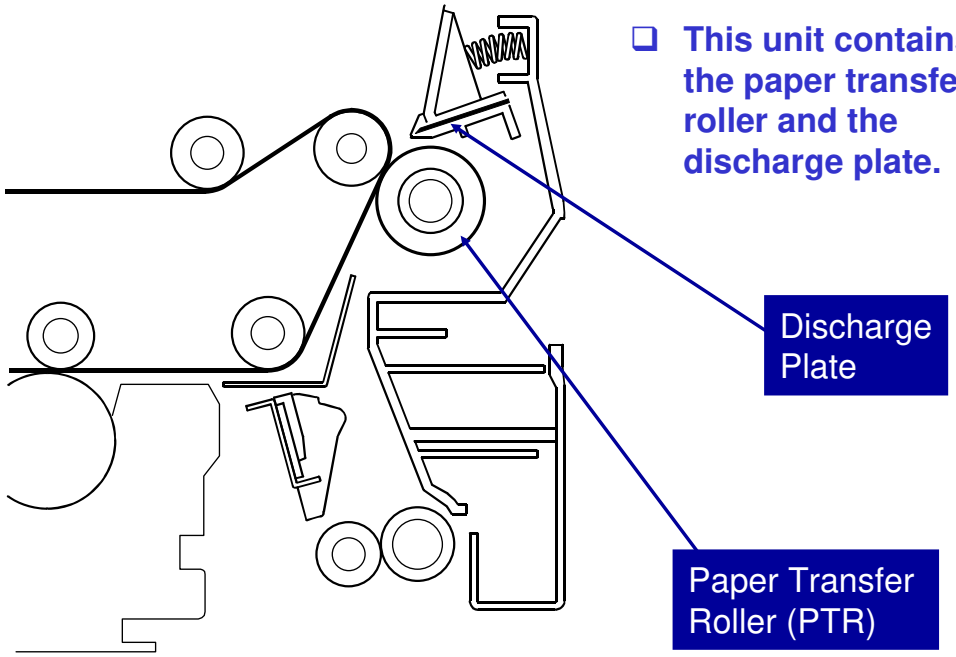


- If a power failure occurs with the belt touching all 4 drums, the belt stays in this position, and you cannot remove the ITB.
- Open the exit tray cover, then turn the gear or cam of the transfer belt unit until the belt is fully raised.

Slide 207

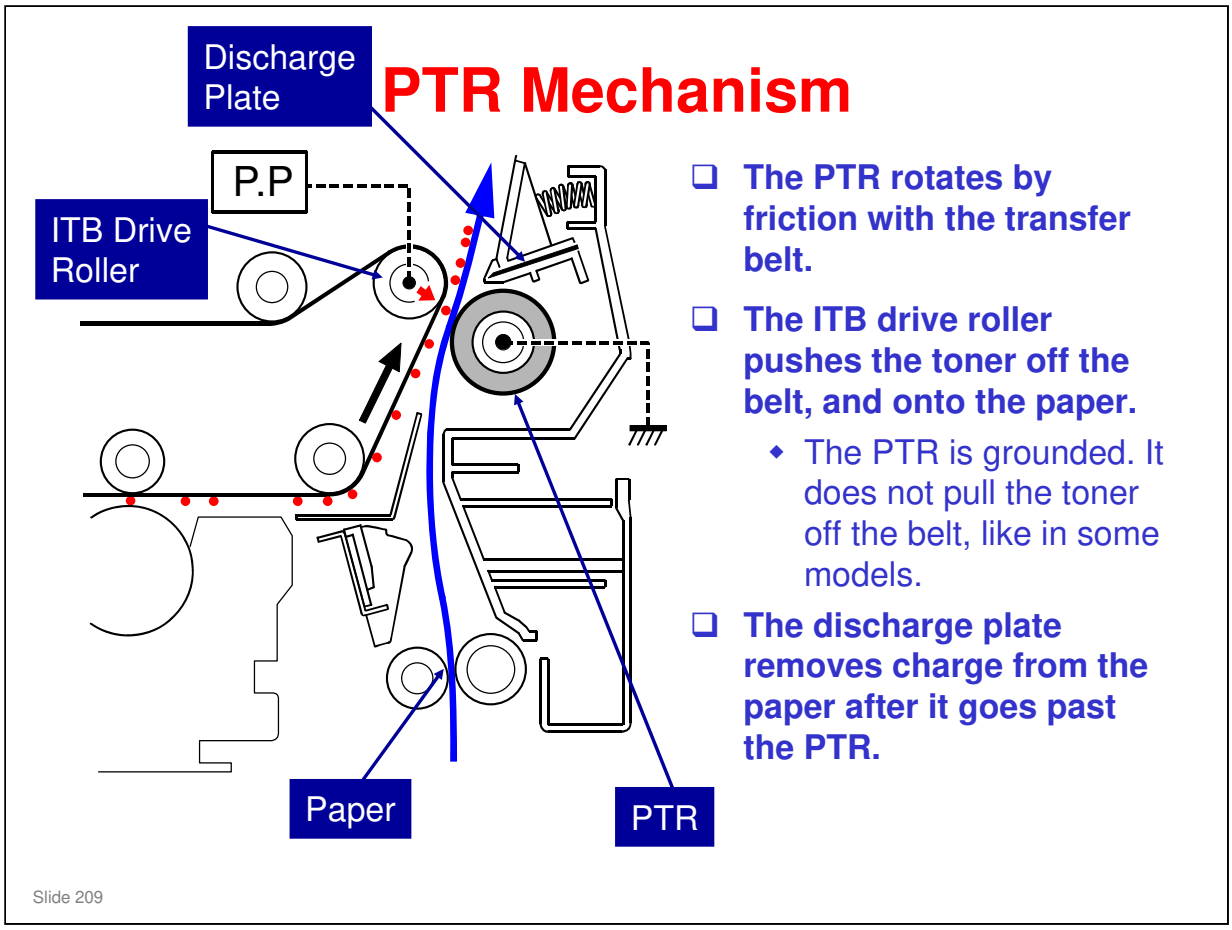
No additional notes

Paper Transfer Unit



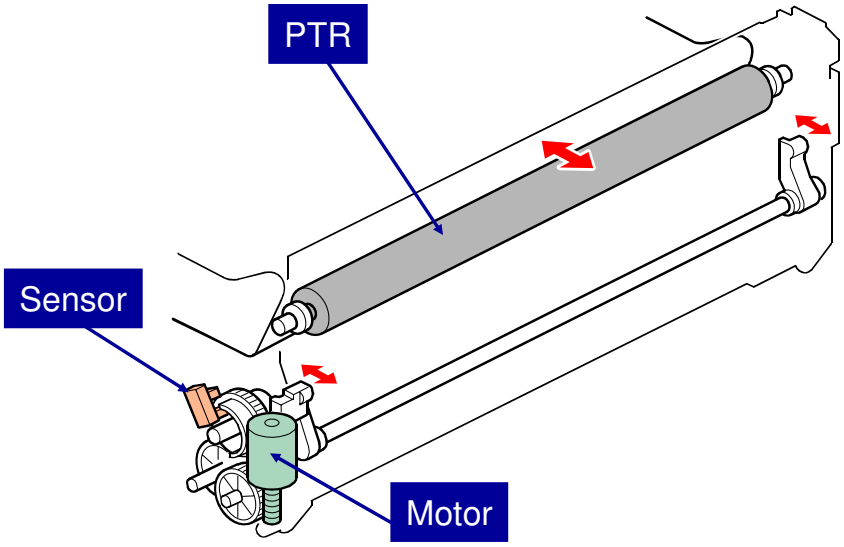
Slide 208

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



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.

Slide 210

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 were not done, the belt would become damaged (bent, stretched, warped) where the PTR contacts it. This would cause 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.
  If this were not done, the PTR would remove the patterns before they got to the ID sensors. (Also, the PTR would 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 fails in the middle of a color job with the ITB in contact with all four drums, you cannot remove the ITB.
  - » Remove the exit 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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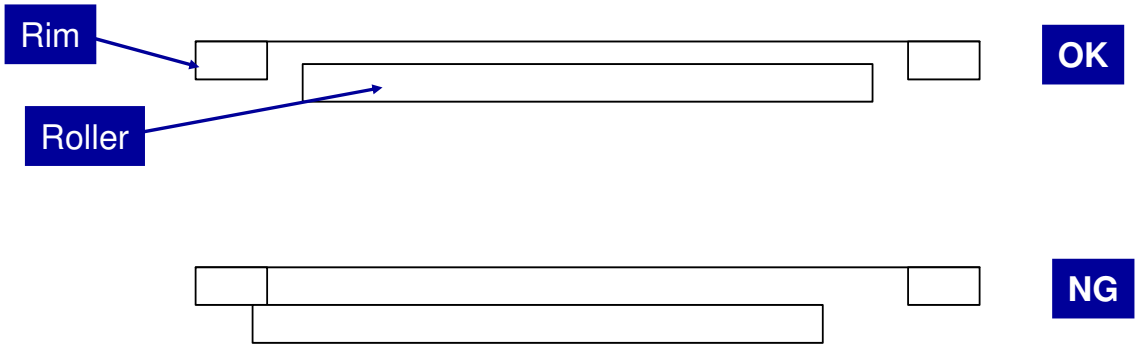
- Normally, the waste toner collection bottle is replaced at the same time as the ITB cleaning unit. But a separate SP has been provided.

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.

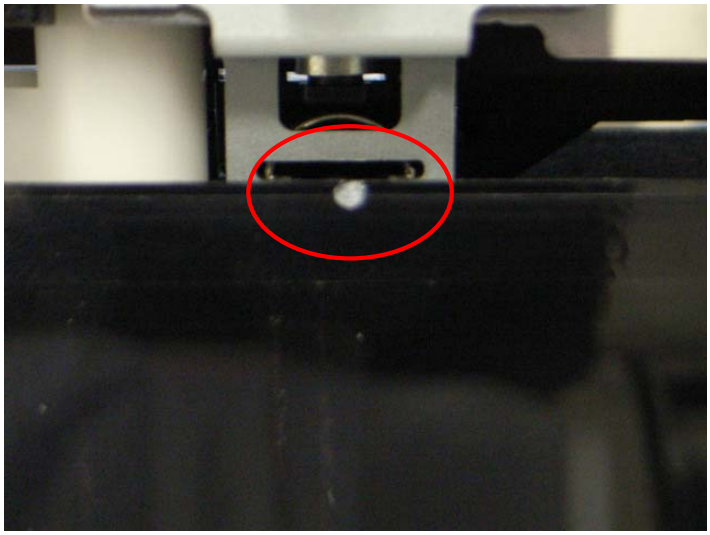


Slide 214

- 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.



Slide 215

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 a cloth moistened with alcohol.
  - » Do not use a dry cloth. Otherwise, the ID sensors may get more dirty due to static electricity.

Slide 216

❒ 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 settings: -15 μA (USA), -13 μA (other regions)
- **SP2608-001**
  - OHP current for full color
  - Default settings: -24 μA (USA), -20 μA (other regions)

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No additional notes

RICOH

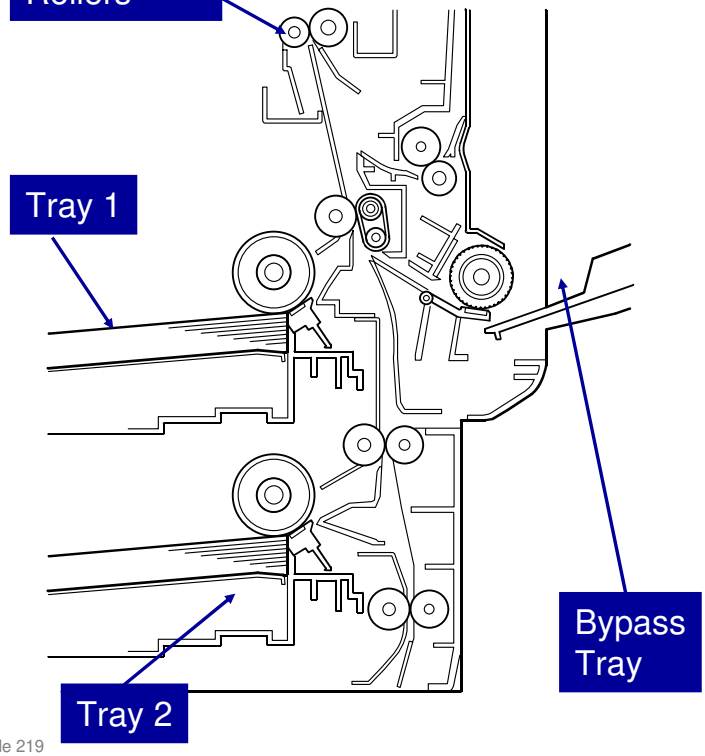
Di-C1.5 TRAINING

PAPER FEED

Slide 218

- 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



- **Trays 1 and 2, and bypass tray: Feed roller and friction pad system**
- **Tray 1 has belt assisted feed.**
  - Allows thick paper (up to 256 g/m^2) to be fed.
- **Capacity**
  - Tray 1 and 2: 250 sheets each
  - Bypass: 100 sheets

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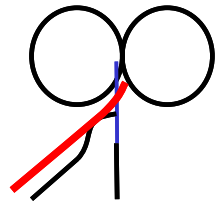
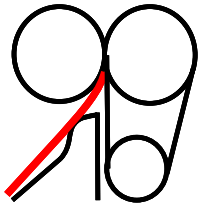
❒ Belt assisted feed: See the next slide.

Belt-Assisted Feed for Thick Paper



Previous design

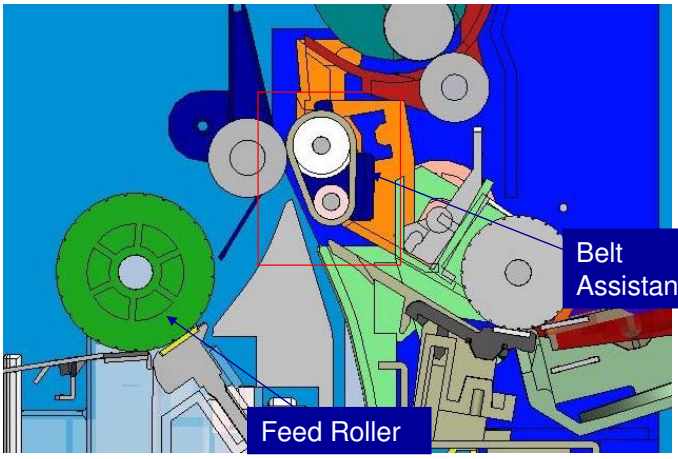


Belt Assistance

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.

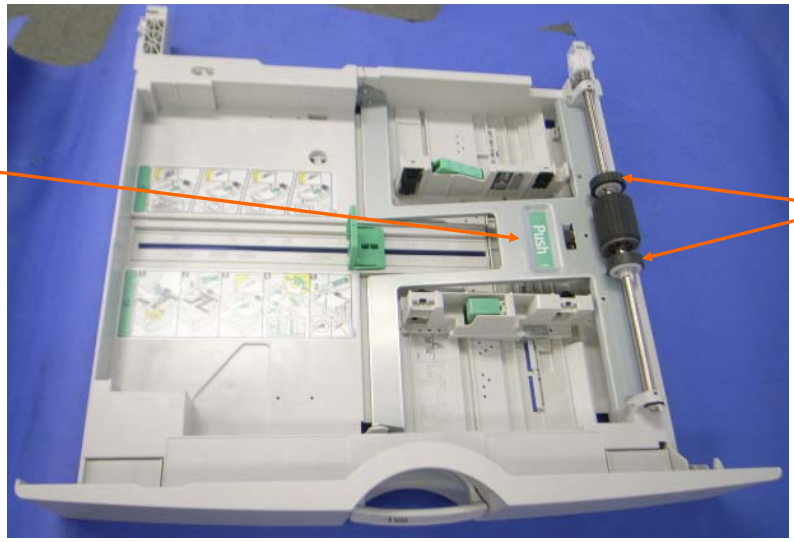
With belt assistance: The belt guides the paper to the rollers to take the paper smoothly.



Slide 220

No additional notes

Envelope Feeder Tray

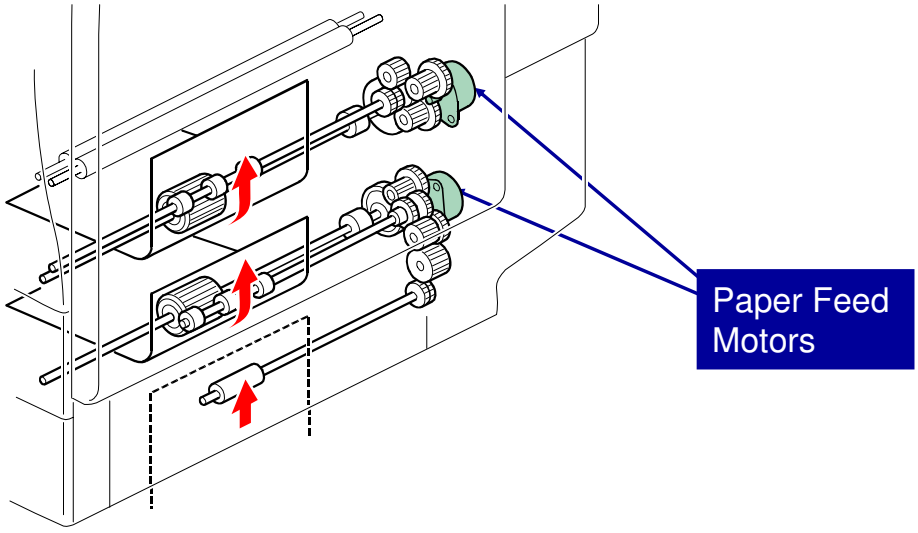


- Tray 1 can be replaced by an envelope feeder tray. (option)
- The envelope feeder tray can handle ordinary paper; however it is specially modified for smooth feeding of envelopes.

Slide 221

No additional notes.

Drive – Trays 1 and 2

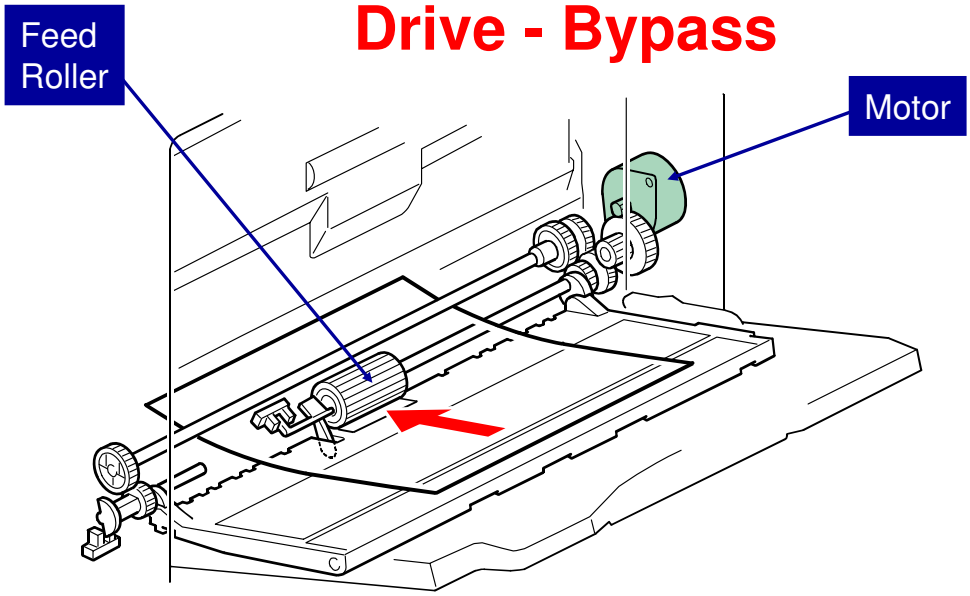


- Each tray has a motor. There are no paper feed clutches.
- If the tray is in the machine, the feed roller always touches the top sheet of paper.

Slide 222

No additional notes

Drive - Bypass

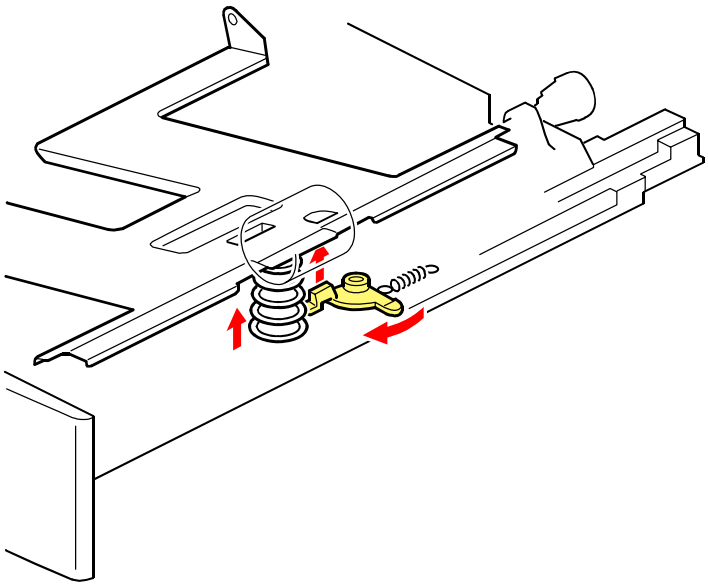


- **The bypass motor drives the feed roller, through some gears.**
  - The cam at each end of the shaft moves the bottom plate up. This pushes the paper up against the feed roller.

Slide 223

No additional notes

Tray Lift – Trays 1 and 2

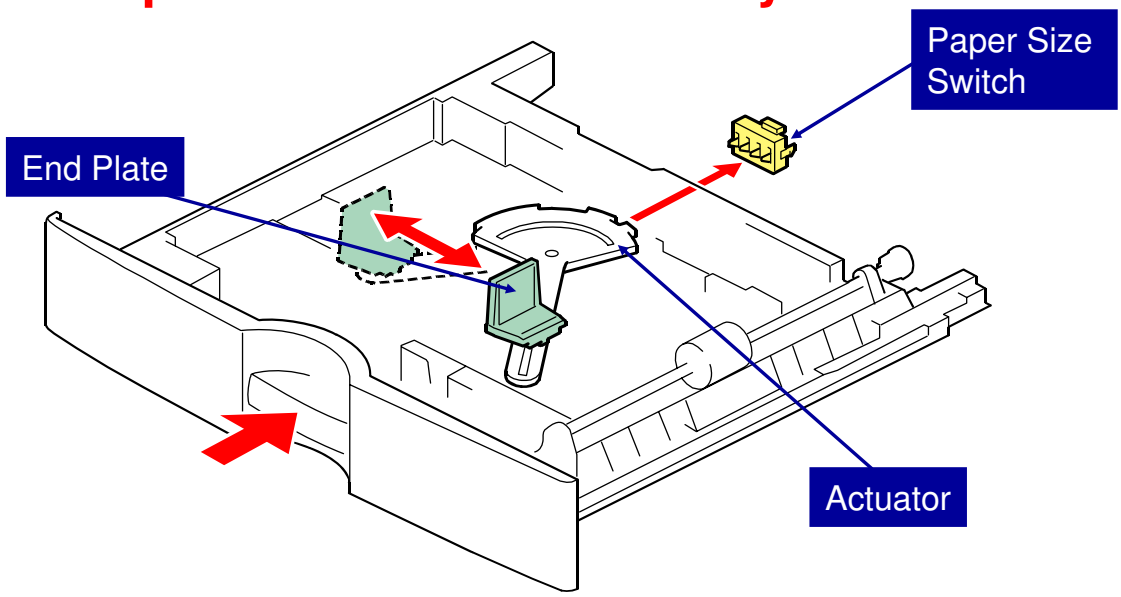


- A spring pushes up the tray bottom plate.

Slide 224

No additional notes

Paper Size Detection – Trays 1 and 2

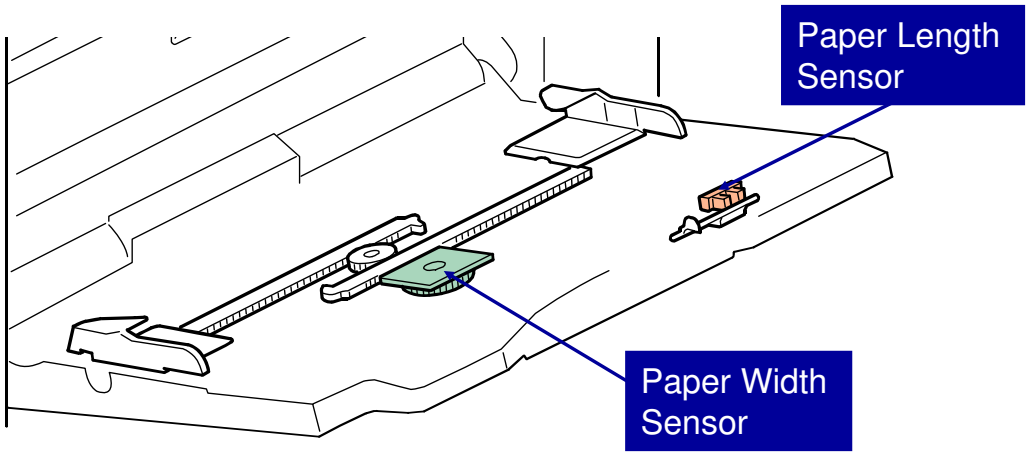


❑ **The sensor detects the paper size. The actuator position depends on the end plate position.**

Slide 225

- ❒ 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 5-181 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 (Tray 2).
- ❒ 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

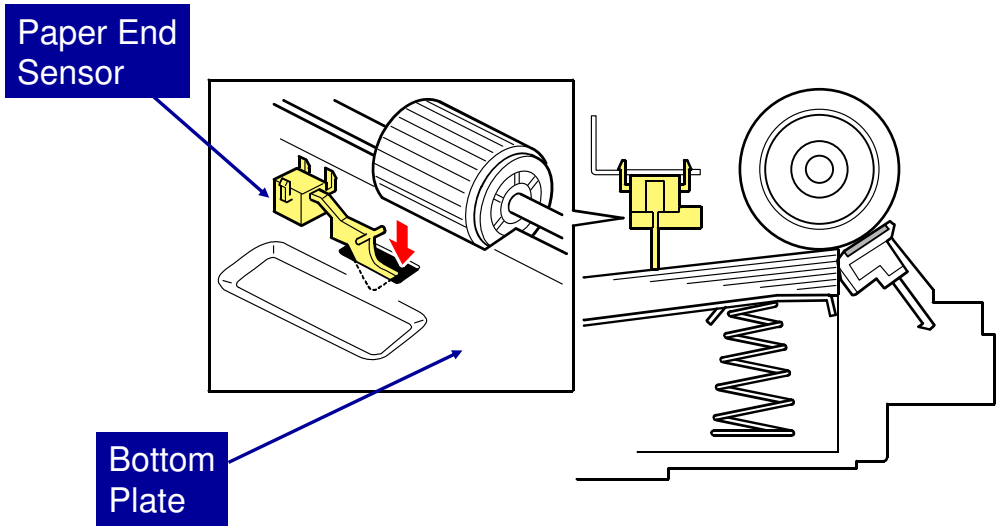


- **A length sensor is added.**
- **This helps the machine to distinguish between these pairs of paper sizes, which have the same width**
  - A4 SEF and A5 LEF
  - A3 SEF and A4 LEF
- **The sensor cannot distinguish between LT and LG SEF.**
  - This must be pre-set with SP 1007-1

Slide 226

No additional notes

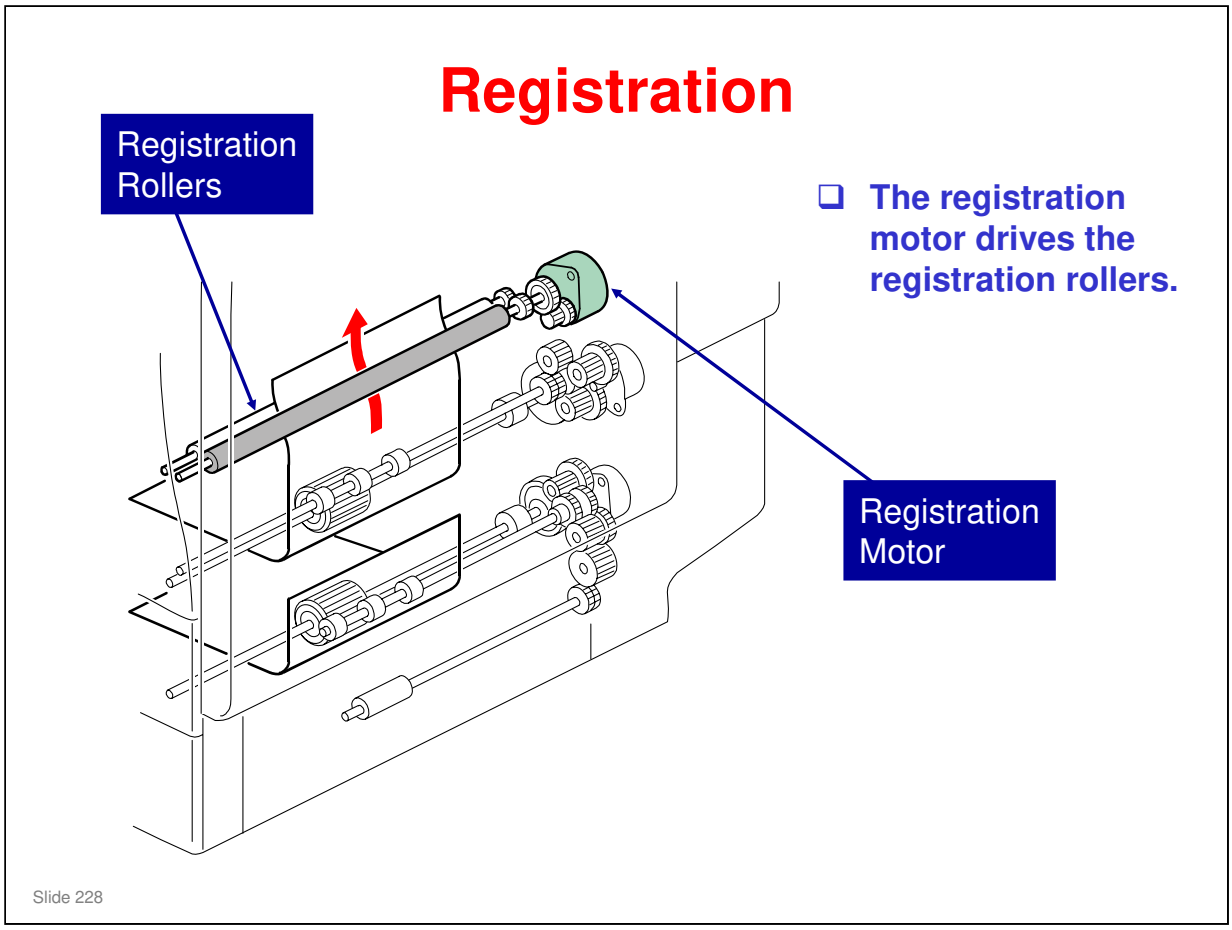
Paper End Detection – Trays 1 and 2



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

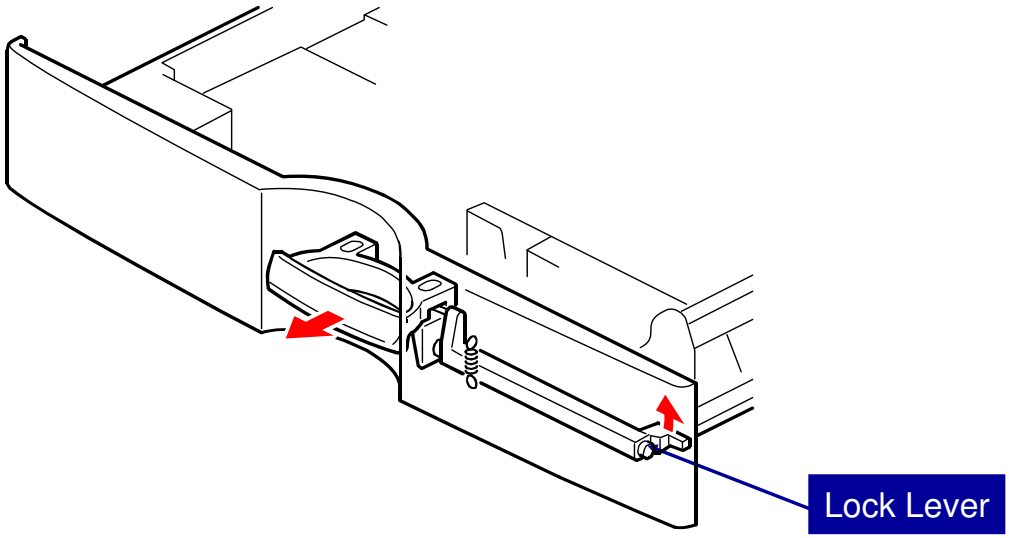
Slide 227

No additional notes



No additional notes

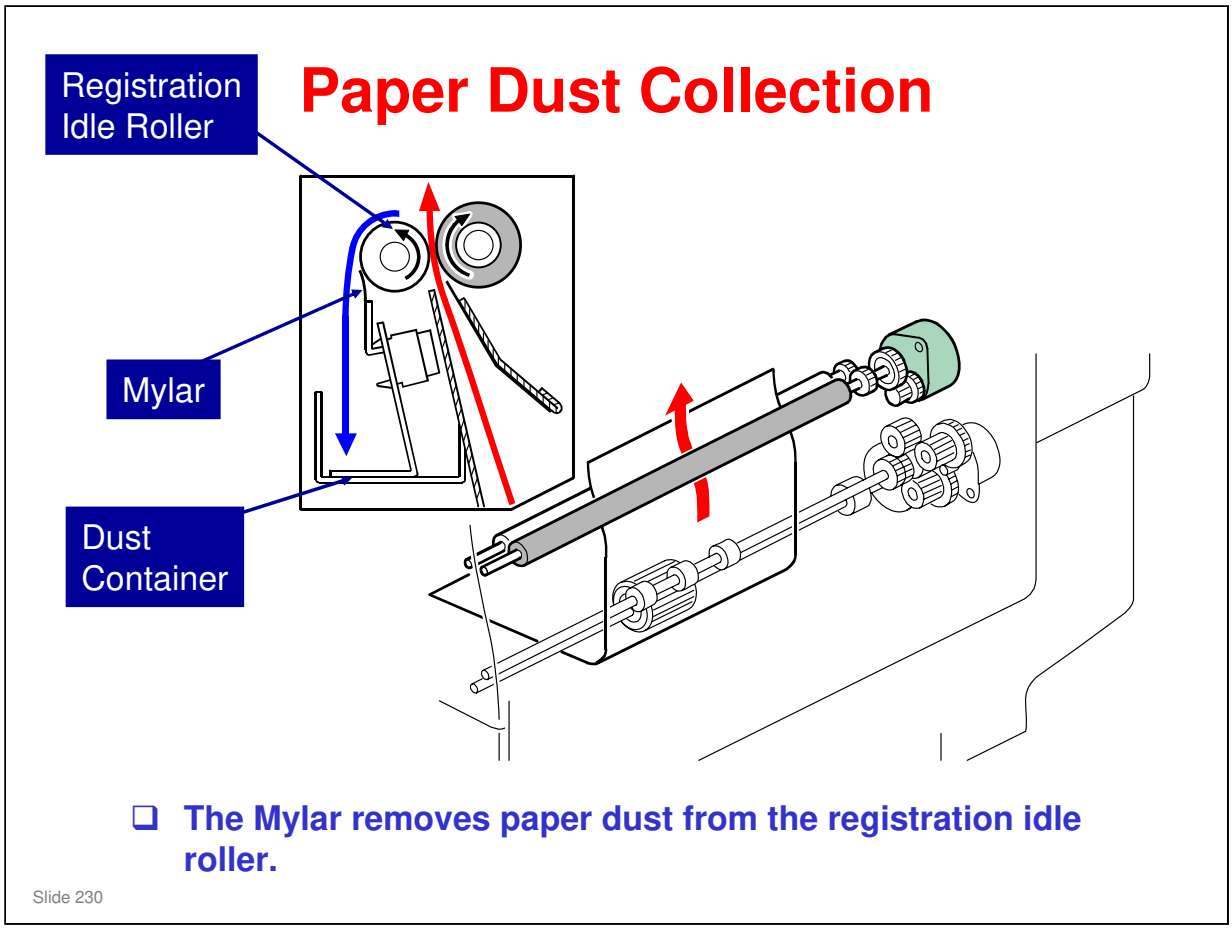
Tray Lock - Front



- **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.

Slide 229

No additional notes



No additional notes

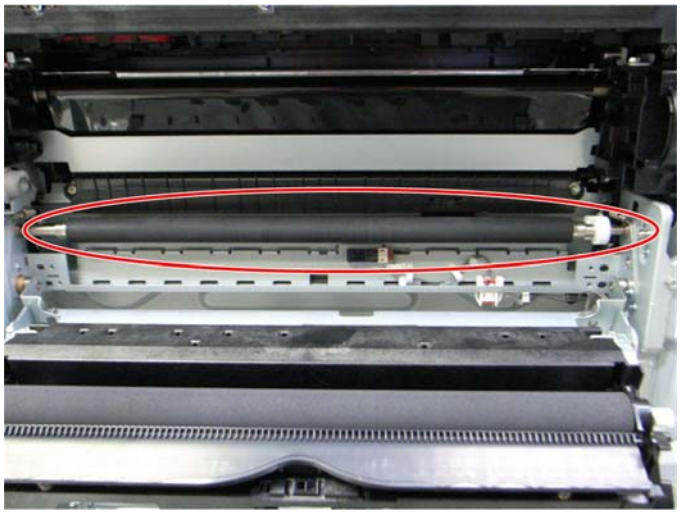
Replacement

- **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.

Slide 231

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.

Slide 232

No additional notes

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.
- **SP 5112**
  - Tray 2: If the user cannot select a non-standard paper size with the user tool, set this SP to 1.
  - Auto paper size detection is disabled if the user selects a non-standard paper size.
- **SP 1007-1**
  - Bypass paper size detected (USA)
  - 0: LT SEF, 1: LG

Slide 233

No additional notes

RICOH

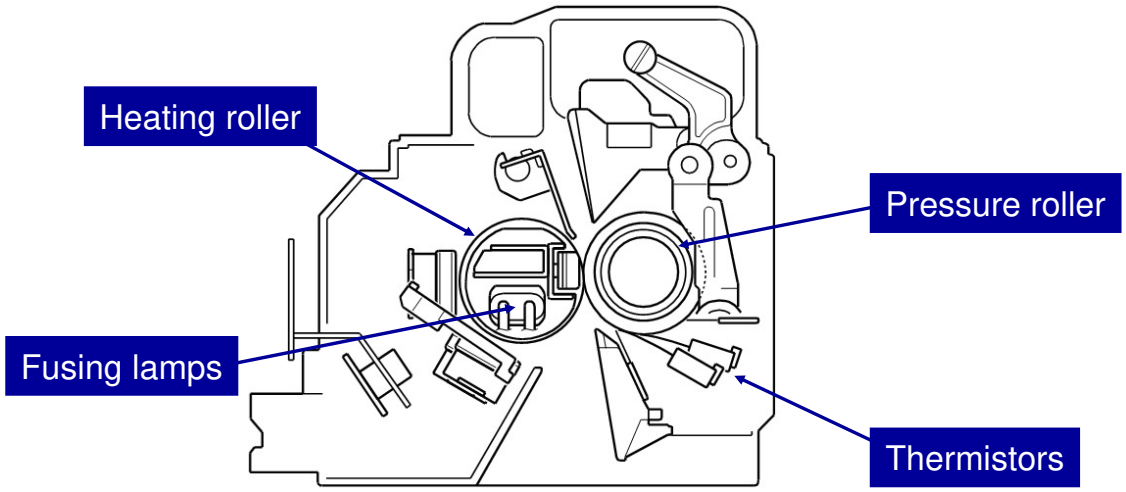
Di-C1.5 TRAINING

FUSING

Slide 234

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

Overview

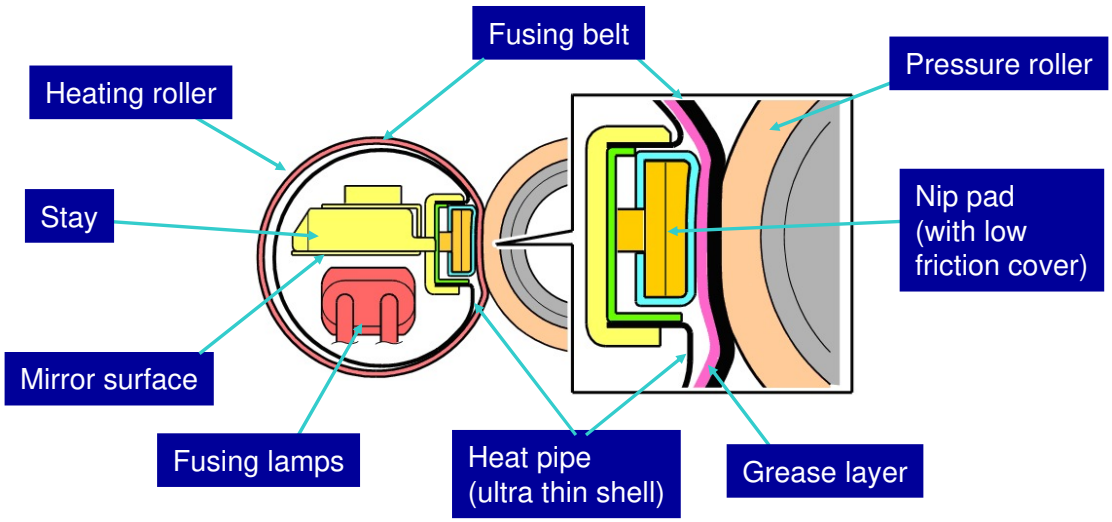


- **A free-belt fusing system is used.**
  - New with this product. (Details on next slide)
- **The heating roller contains two lamps.**
  - The two lamps in the heating roller are in one assembly, and are removed together. One lamp heats the center and the other lamp heats the ends.

Slide 235

- Unlike the Di-C1 fusing unit, the pressure roller is not heated internally.
  - There is no lamp in the pressure roller. (More simple design.)

Free-Belt Fusing System

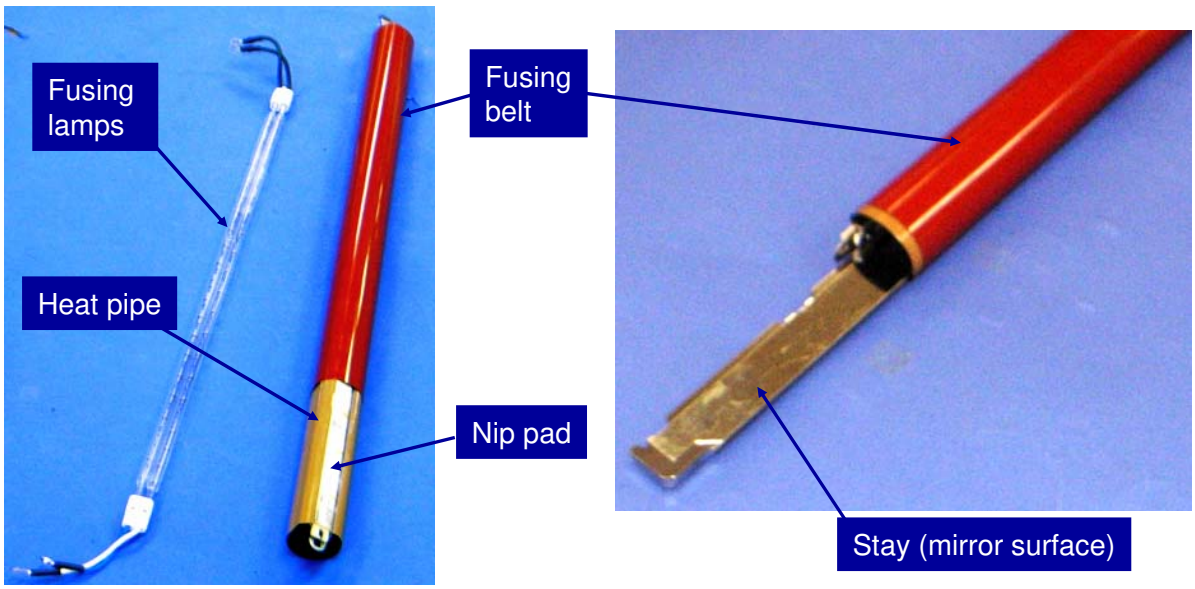


- **The "Free-Belt" fusing system is new with this product.**
- **Designed for quick start up (QSU).**
- **Uses a free turning fusing belt.**
  (More details below in the Notes section.)

Slide 236

- The fusing belt rotates freely on the heat pipe. It is driven by the pressure roller.
  - The heat pipe has a low friction surface, the fusing belt is lubricated internally with a layer of grease, and the nip pad has a low friction cover. These features enable the fusing belt to turn easily.
- The pressure roller presses against the nip pad to form the nip zone, where the image is fused to the paper by heat and pressure.
- The stay holds the nip pad in place.
- The stay has a mirrored surface facing the fusing lamps to concentrate the energy from the lamps directly on the inner surface of the heat pipe.

Heating Roller Components

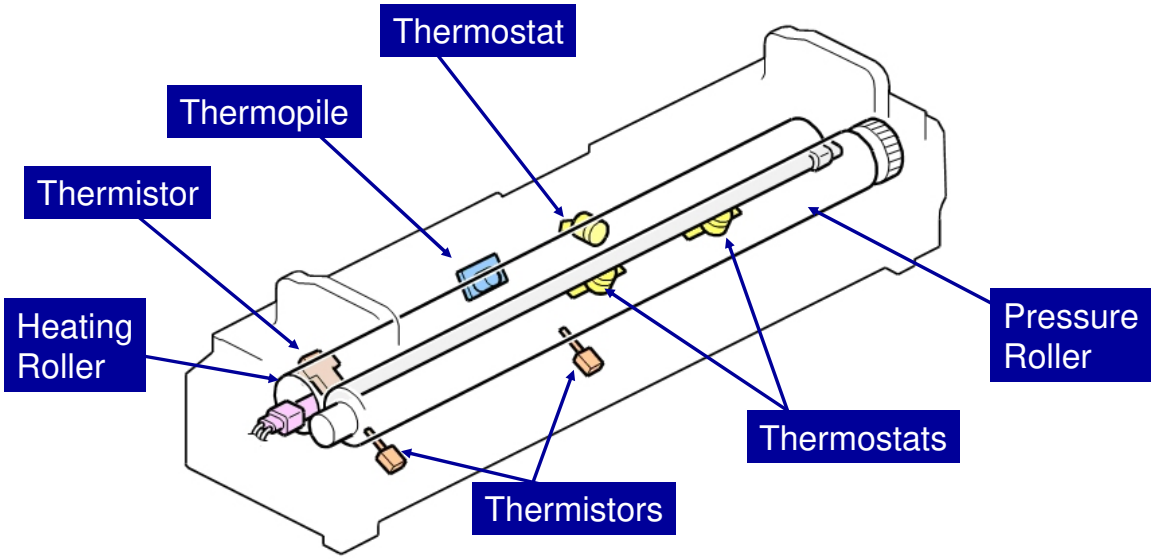


- Disassembled heating roller components are shown above.

Slide 237

No additional notes.

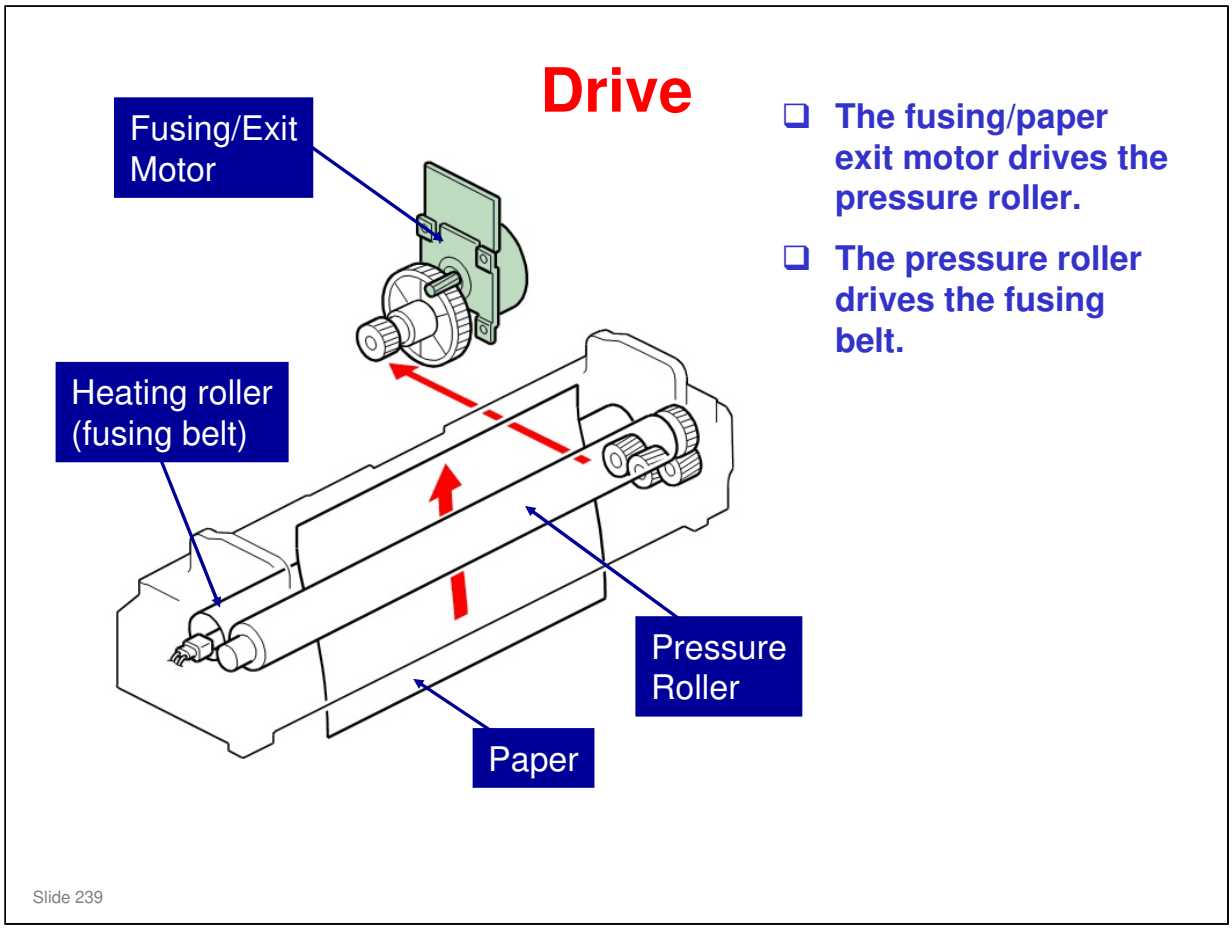
Temperature Control Components



- **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

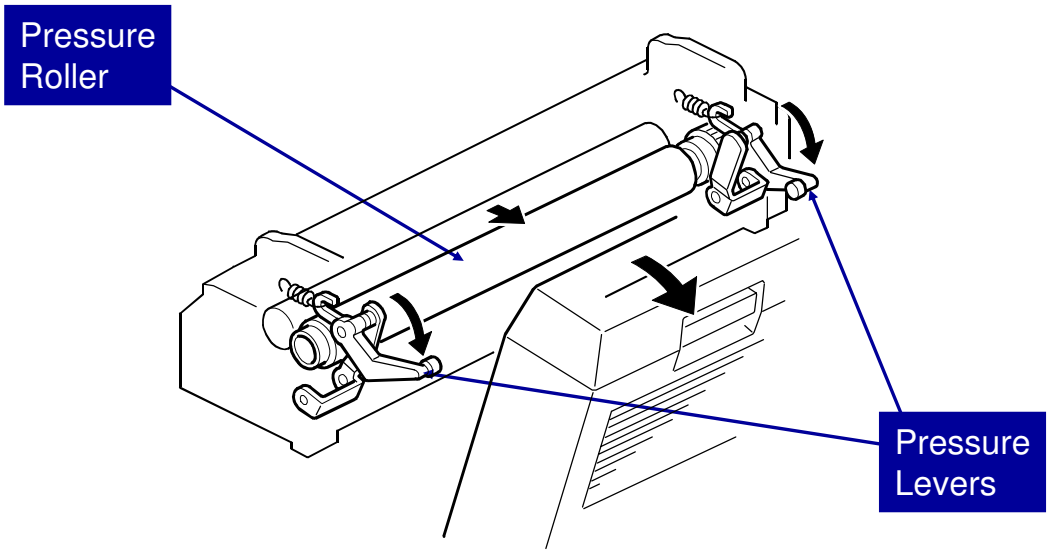
Slide 238

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



❒ Paper passes vertically through 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 240

No additional notes

CPM down mode

- If the temperature of the fusing unit is too low, this could cause offset (partially fused toner spots on the paper). To prevent this, CPM is reduced.
- When printing the small size papers, the both sides of the heating roller overheat. To prevent this, CPM is reduced.
- To do this, the machine adjusts the gaps between each sheet of paper.

Slide 241

- The detailed specification is not fixed at the writing time.

Fusing Temperature Control

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

Slide 242

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 243

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 244

No additional notes

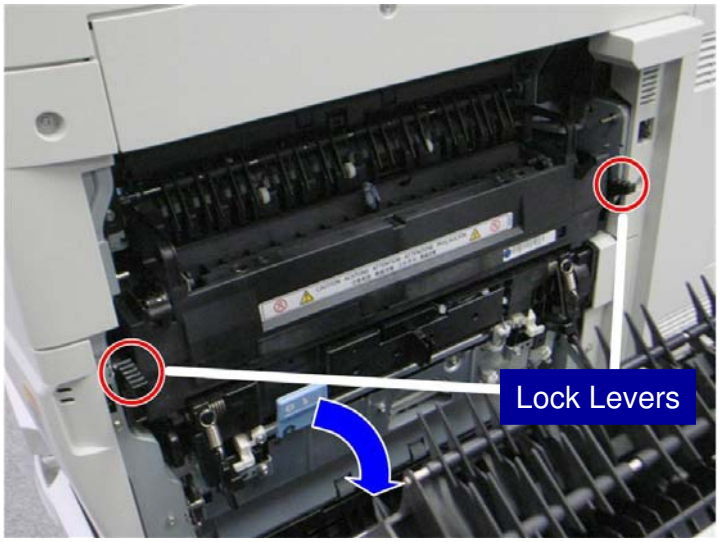
Fusing Unit Replacement (1)

- **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 heating belt unit, and not the complete fusing unit, you must set SP 3902-016 to 1 before you turn the machine power off.**

Slide 245

No additional notes

Fusing Unit Replacement (2)



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

Slide 246

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 247

- 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.

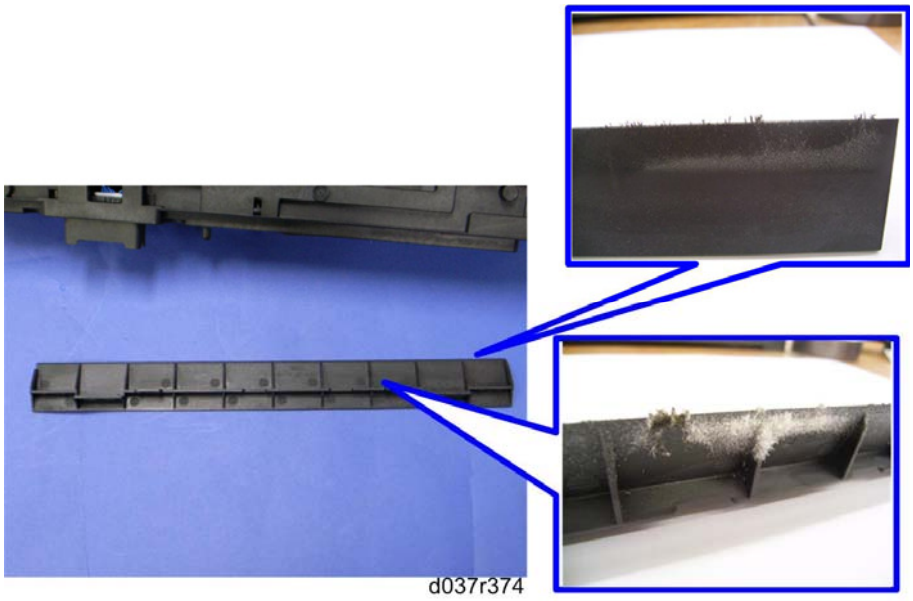
Cleaning at 60k

- **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)

Slide 248

No additional notes

Cleaning the Entrance Guide Plate

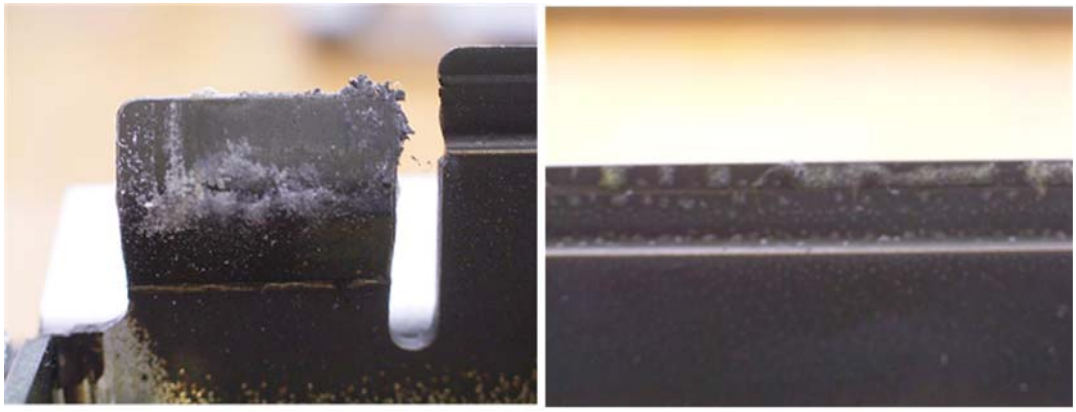


- Clean at these locations.

Slide 249

No additional notes

Cleaning the Stripper Plate

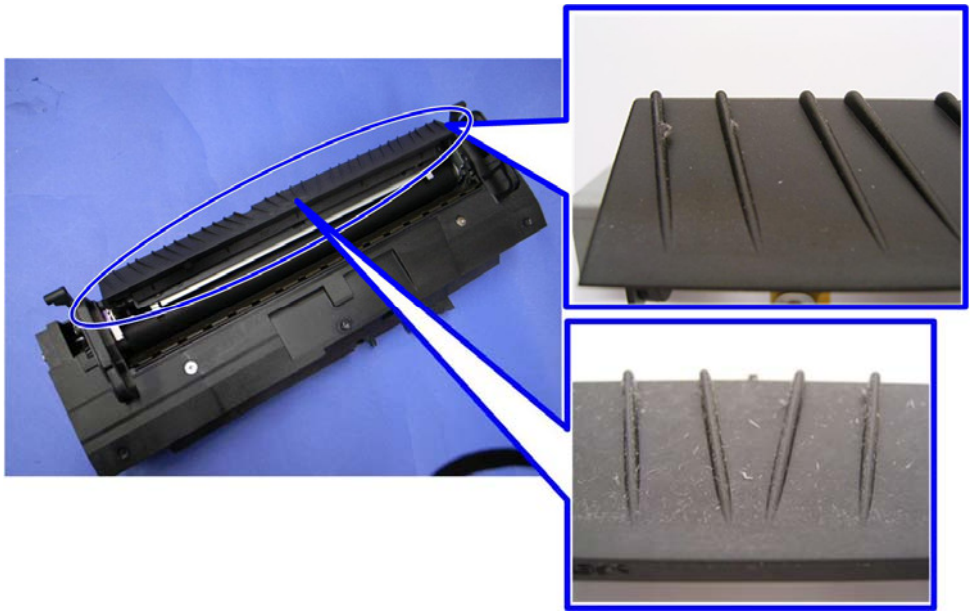


- Paper dust attaches to the stripper plate, as shown above.

Slide 250

No additional notes

Cleaning the Exit Guide Plate



- Clean at these locations.

Slide 251

No additional notes

SP Modes

- **1106: Displays the temperatures inside the fusing unit**
- **1801-007, -008: Fusing motor speed adjustment**
  - Fusing motor speed can be adjusted in 0.01% steps.
  - Normally, it is at –0.4% for normal paper and -0.05 for thick paper.
  - 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% for normal paper, but it depends on paper stiffness; stiff paper will vibrate more, causing more movement of toner).

Slide 252

- It is recommended that a setting lower than –0.25% should not be used. Otherwise. some types of thin paper could become creased.

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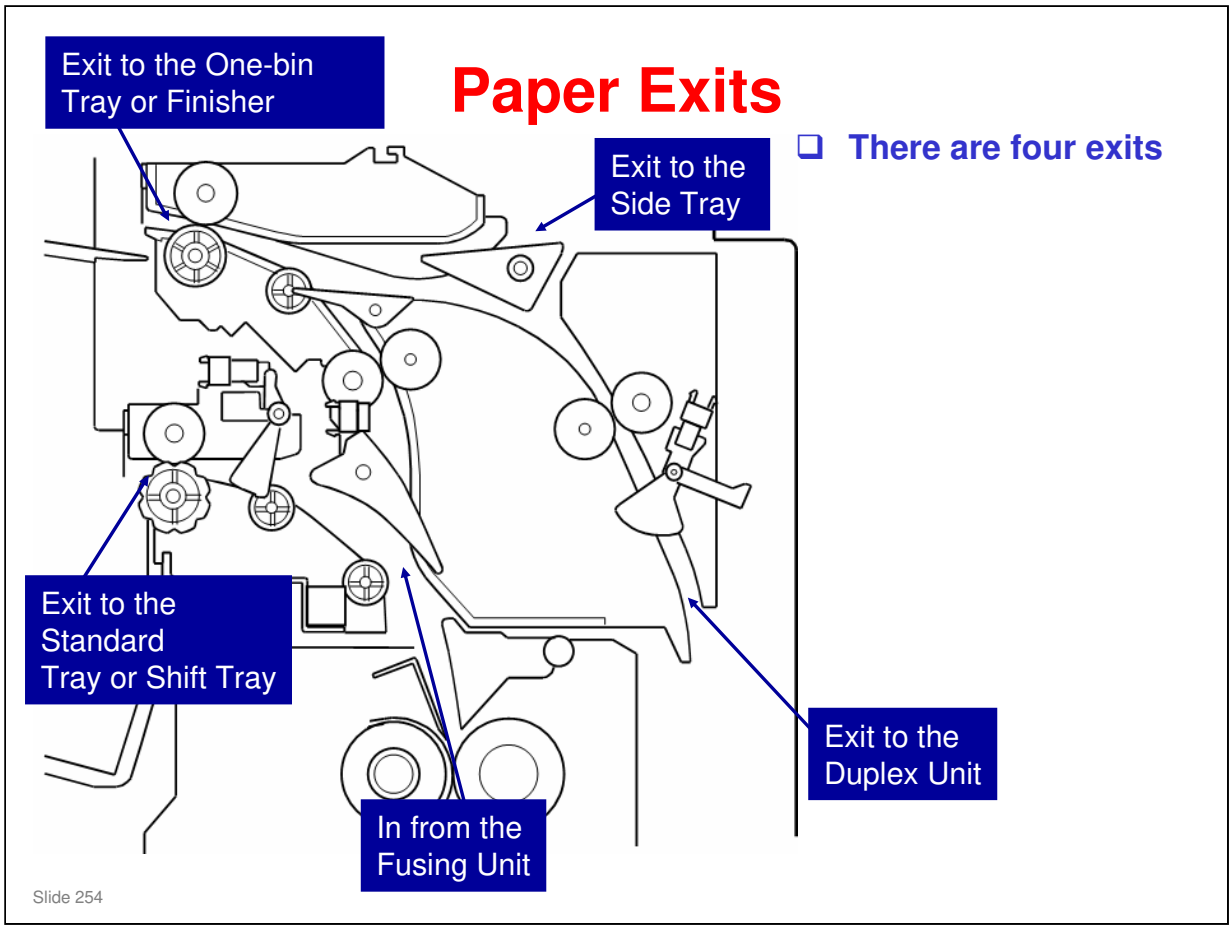
Di-C1.5 TRAINING

PAPER EXIT

Slide 253

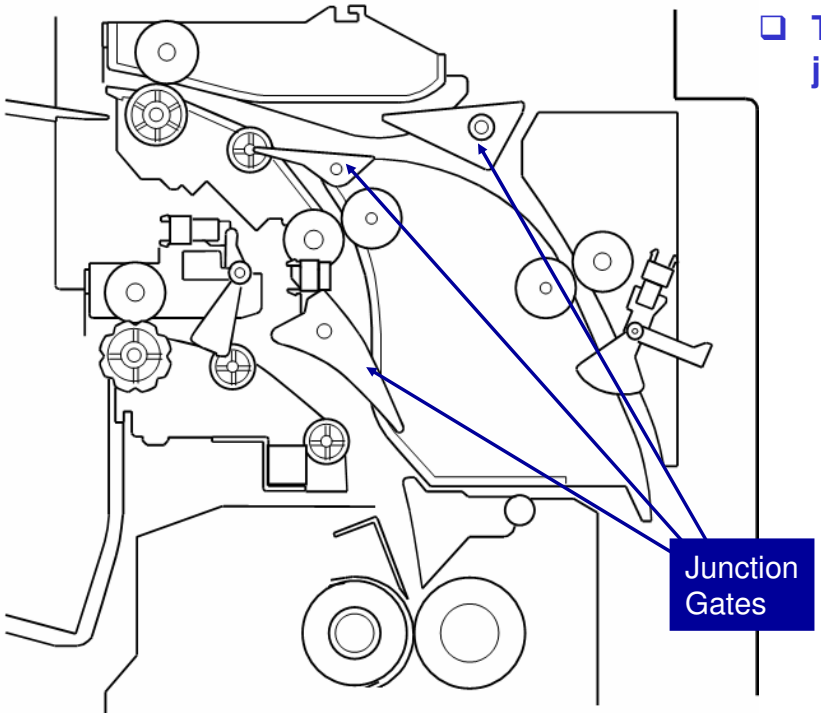
❒ In this section, the paper exit mechanism will be described.



❒ We will discuss the inverter in the Duplex section of the course.

Junction Gates

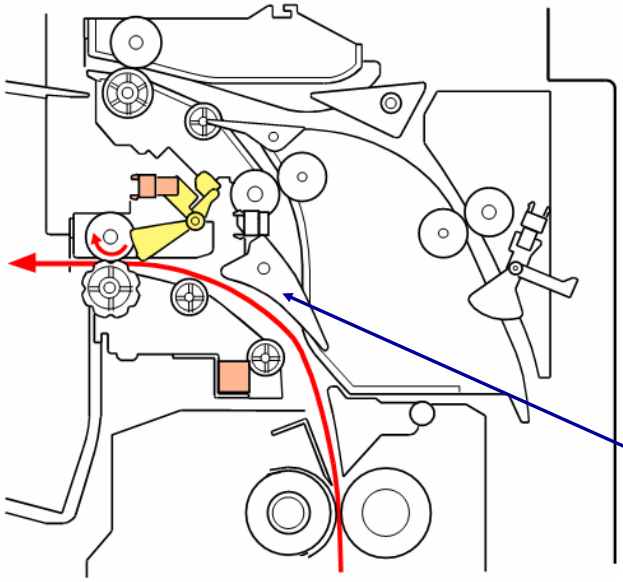
- There are three junction gates.



Slide 255

No additional notes

Junction Gate – To the Standard Tray

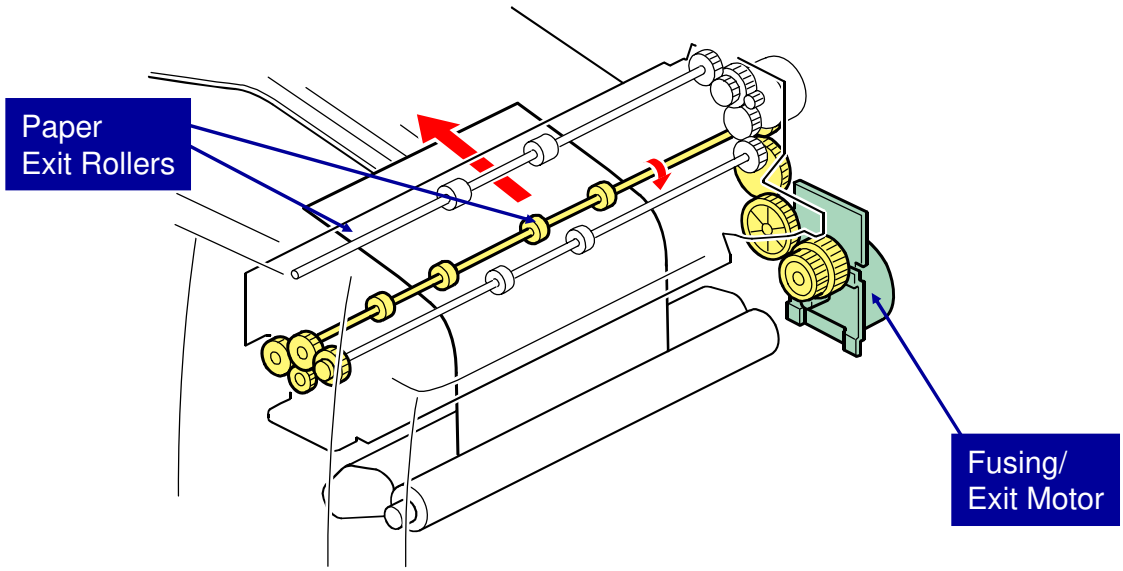


- **To feed paper to the standard tray, the solenoid for junction gate 1 is off.**
  - This is the default position.

Slide 256

- This diagram shows the junction gate configuration when paper goes to the standard tray.

Junction Gate – To the Standard Tray

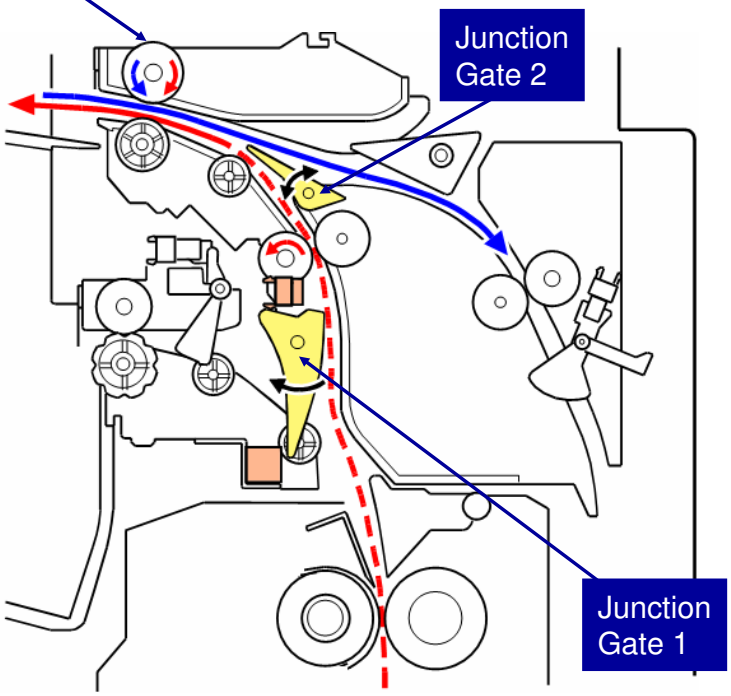


- The fusing/exit motor drives the paper exit rollers.
- There is no tray full sensor for the standard exit tray.

Slide 257

- Here is a three-dimensional view of the mechanism.

Junction Gate – To the Inverter

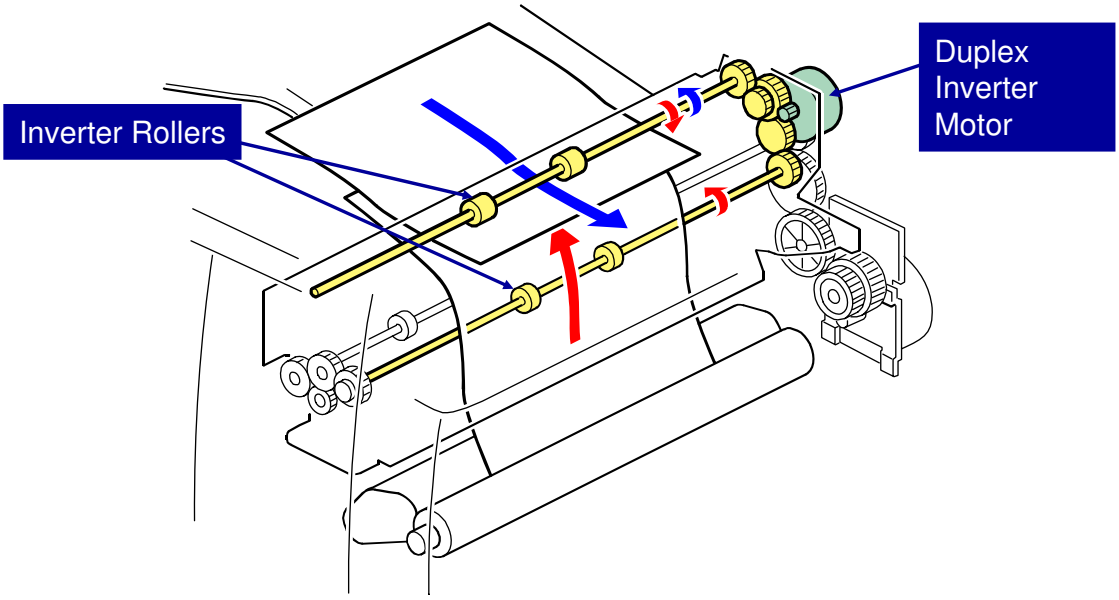


- **To feed paper to the inverter tray, junction gate 1 blocks the exit path to the standard tray.**
  - The inverter rollers feed the paper up to the inverter tray, then they rotate in reverse to send the paper to the duplex unit.
  - Junction gates 2 and 3 allow the paper to enter the inverter/duplex feed paths.

Slide 258

- Junction gate 2 does not have a solenoid.
- Normally, it is held closed by a spring.

Junction Gate – To the Inverter

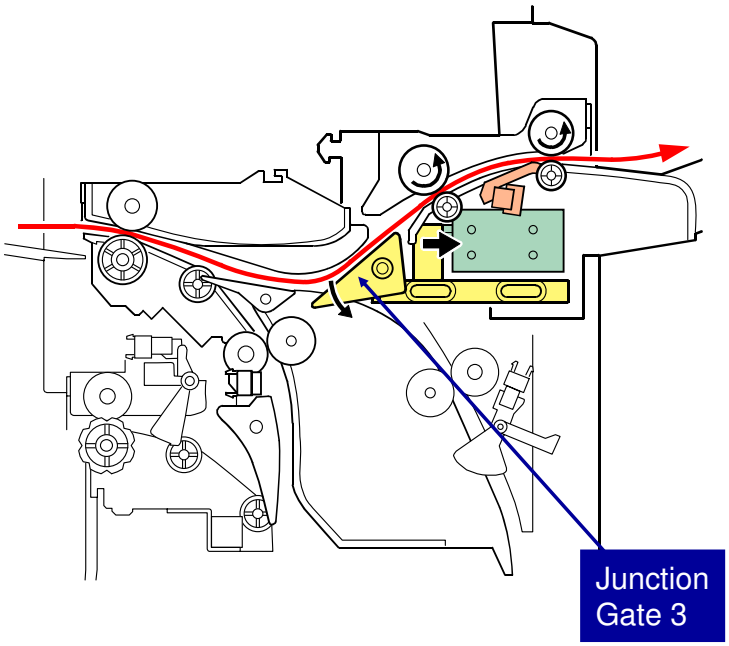


❑ **The inverter motor drives the inverter rollers.**

Slide 259

❒ Here is a three-dimensional view of the mechanism.

Junction Gate – To the Side Tray



- To feed paper to the side tray, junction gate 1 blocks the exit path to the standard tray.
- The paper goes to the inverter tray, in the same way as for duplex mode.
- But, junction gate 3 blocks the exit to the duplex unit, so the paper goes out to the side tray.

Slide 260

❒ Junction gate 3 is controlled by a solenoid in the optional side tray unit.

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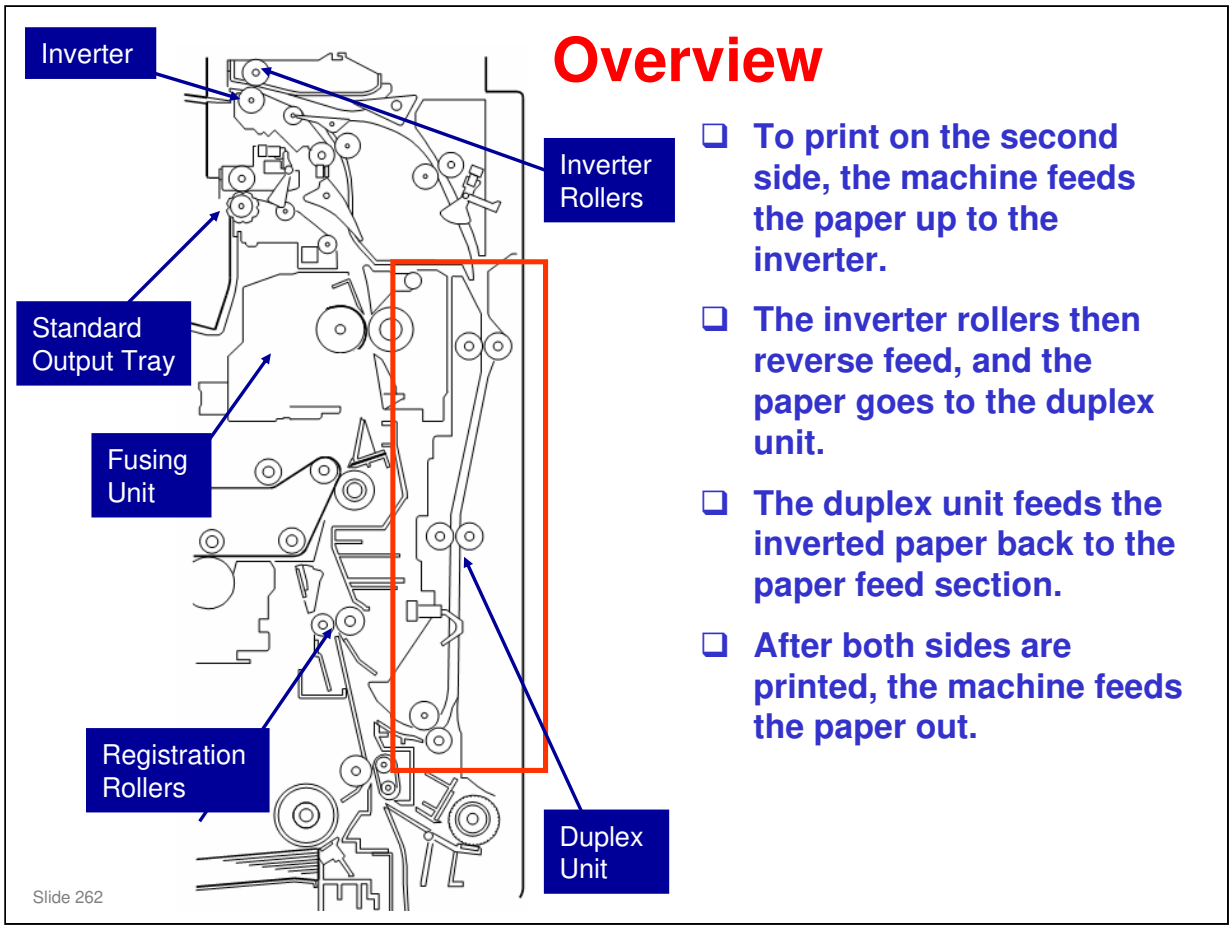
Di-C1.5 TRAINING

DUPLEX

Slide 261

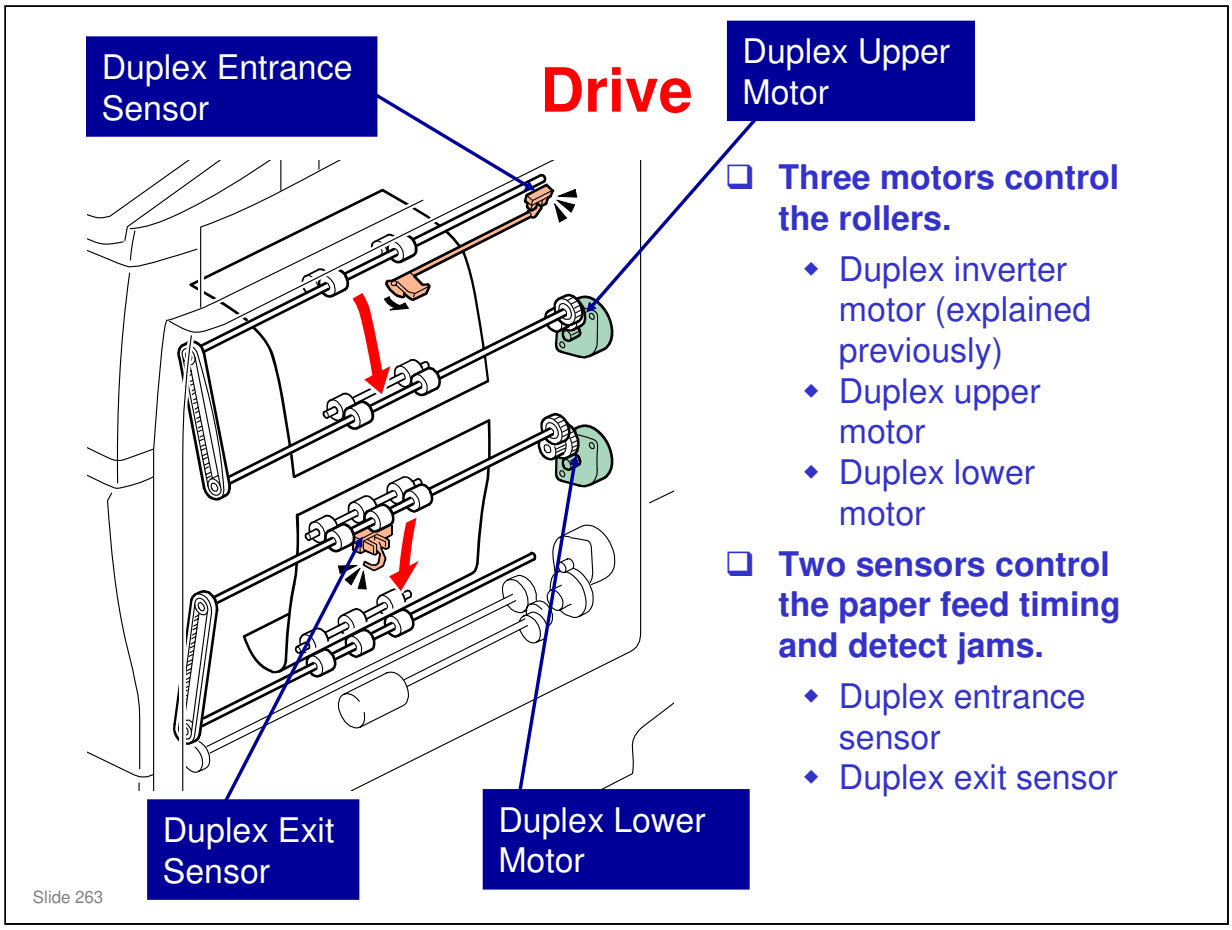
❒ In this section, the duplex mechanism will be described.



Overview

- To print on the second side, the machine feeds the paper up to the inverter.
- The inverter rollers then reverse feed, and the paper goes to the duplex unit.
- The duplex unit feeds the inverted paper back to the paper feed section.
- After both sides are printed, the machine feeds the paper out.

❒ The duplex unit is shown in a red box in the above diagram.



- **Three motors control the rollers.**
  - Duplex inverter motor (explained previously)
  - Duplex upper motor
  - Duplex lower motor
- **Two sensors control the paper feed timing and detect jams.**
  - Duplex entrance sensor
  - Duplex exit sensor

- With interleaving, there can be two sheets of paper in the machine at the same time.

Duplex Specifications

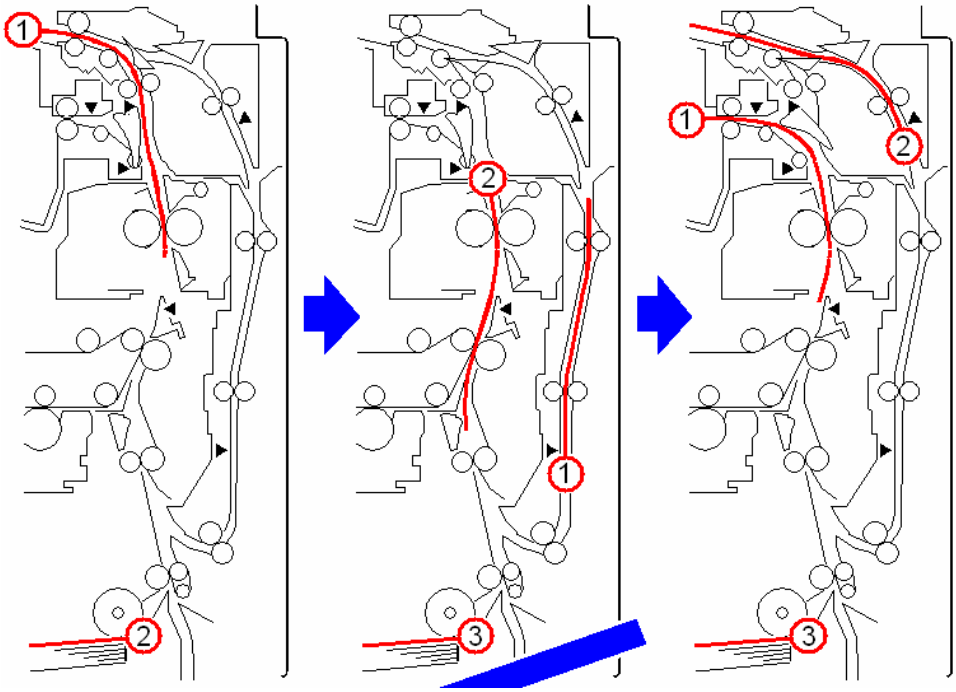
- Paper weight range: 60 – 105 g/m²
- Paper size range: A3/DLT – A5 LEF
- Duplex speed: 25 cpm (A4/LT LEF, BW/FC)
  - For the 20 cpm models, duplex speed is also 25 cpm
- Cannot make duplex outputs from the bypass tray.
- Cannot make duplex outputs on thick paper.
- Two sheets can be interleaved (A4/LT).

Slide 264

How can the 20cpm model achieve 25 cpm in duplex mode?

- The paper feed speed after leaving the fusing unit increases to about double during switchback and inverting.

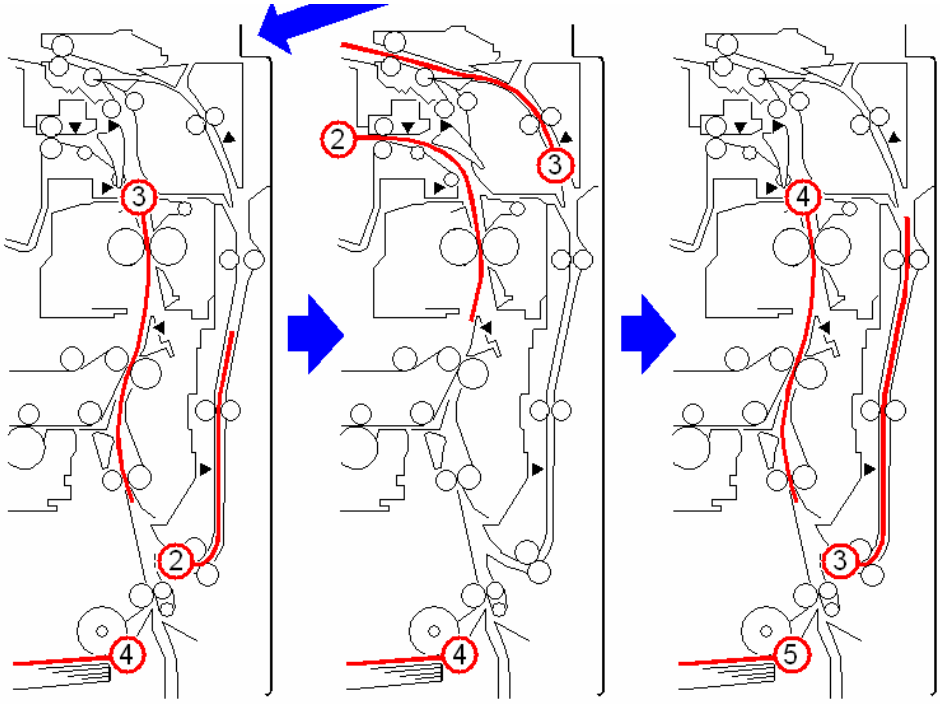
Interleaving (1)



Slide 265

❒ This slide and the next show how interleaving works in this machine.

Interleaving (2)



Slide 266

No additional notes

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Di-C1.5 TRAINING

OPTIONAL AUTOMATIC DOCUMENT FEEDER
DF3050 (D541)

Slide 267

PURPOSE OF THIS SECTION

- ❒ This optional unit will be described. It is the same as the ADF used with the AT-C2.5 and very similar to the one used by the AT-C1.

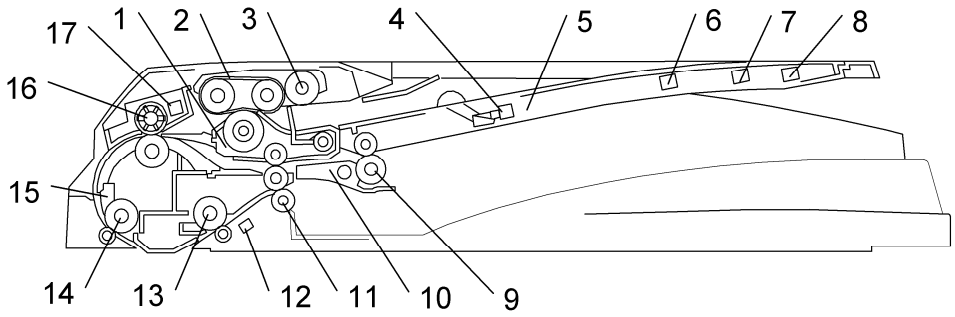
Overview

- **It feeds originals above the main copier's DF exposure glass during scanning.**
  - The DF exposure glass is a narrow glass to the left side of the exposure glass. The ADF 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.**
- **Component Overview**
  - The following four slides show the main components of the DF.

Slide 268

- There is a stamp for use with the fax unit or for scanning.
  - This stamp is built-in, not optional.

Mechanical Component Layout

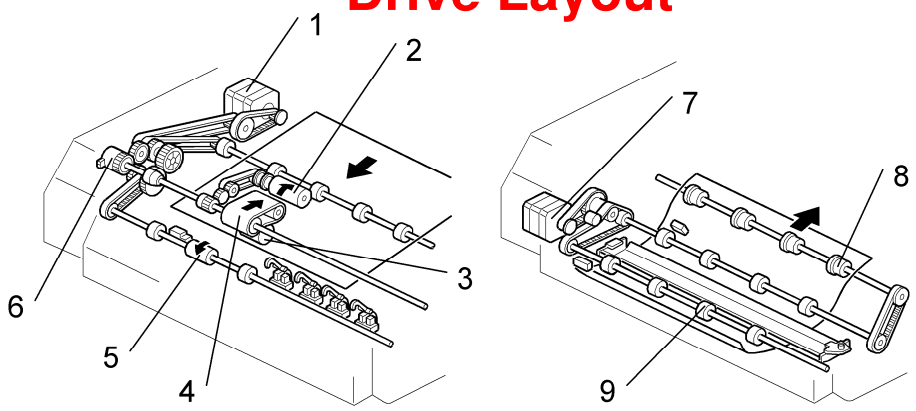


1. Separation Roller	10. Junction Gate
2. Paper Feed Belt	11. Exit Roller
3. Pick-up Roller	12. Original Exit Sensor
4. Original Trailing Edge Sensor	13. Transport Roller
5. Original Tray	14. Registration Roller
6. Original Length Sensor 1	15. Registration Sensor
7. Original Length Sensor 2	16. Skew Correction Roller
8. Original Length Sensor 3	17. Skew Correction Sensor
9. Inverter Roller	

Slide 269

No additional notes.

Drive Layout



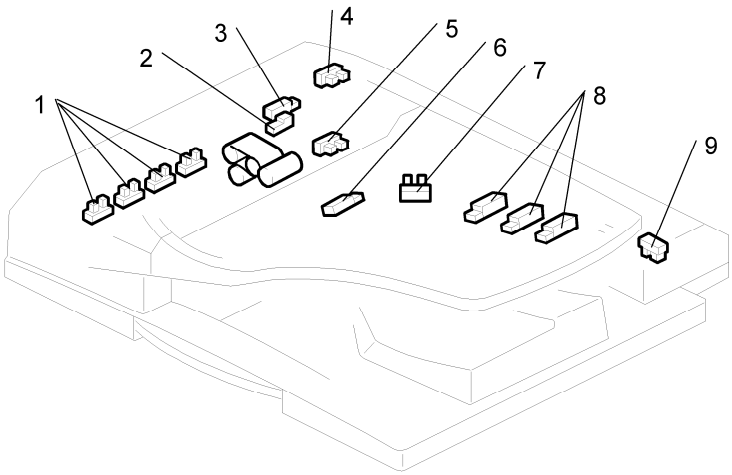
1. Feed Motor	6. Feed Clutch
2. Pick-up Roller	7. Transport Motor
3. Separation Roller	8. Exit Roller
4. Feed Belt	9. Registration Roller
5. Skew Correction Roller	

- Feed Motor: Drives the feed belt, separation, pick-up, and skew correction rollers.
- Transport Motor: Drives the registration and exit rollers.

Slide 270

No additional notes.

Sensors

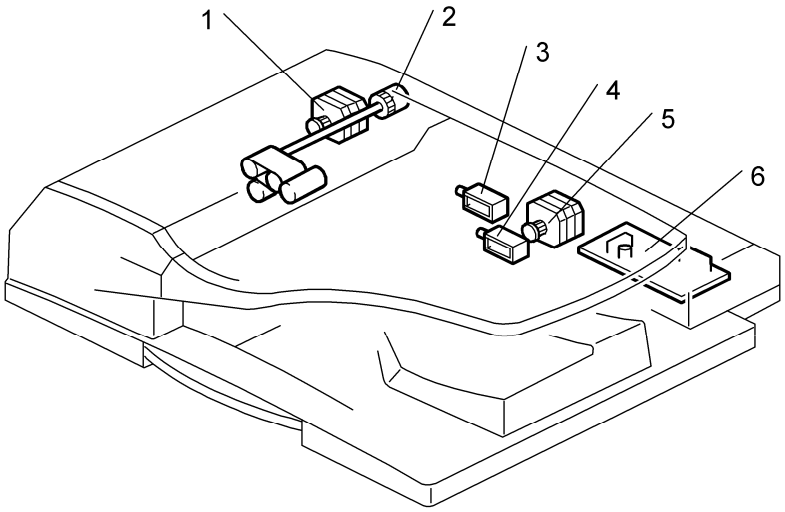


1. Original Width Sensor	6. Exit Sensor
2. Skew Correction Sensor	7. Original Sensor
3. Registration Sensor	8. Original Length Sensor
4. Cover Sensor	9. DF Position Sensor
5. Original Set Sensor	

Slide 271

- Original 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 sensor: 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 DF position sensor only detects when the DF is opened. The platen cover sensor triggers the APS sensors.

Electrical Drive Components



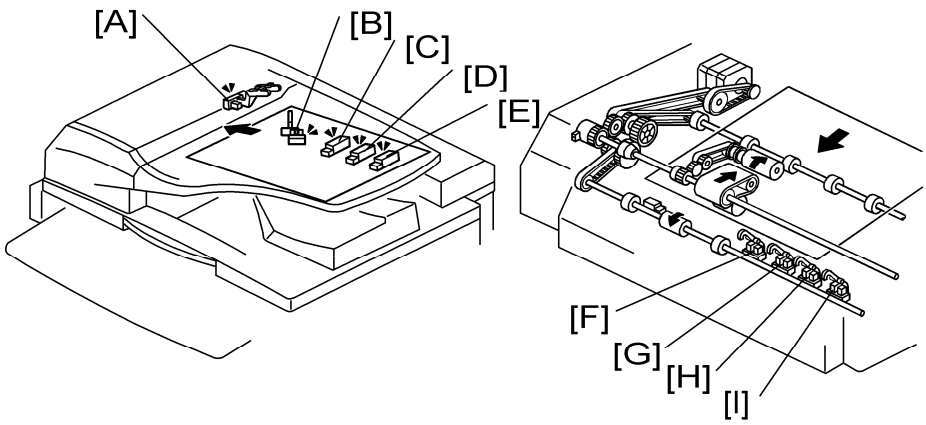
1. Transport Motor	4. Inverter Solenoid
2. Feed Clutch	5. Feed Motor
3. Pick-up Solenoid	6. Main Board

Slide 272

No additional notes.

Basic Operation

Original Set and Size Detection



- **There are four width sensors and three length sensors.**
  - Width sensors: Photointerrupters
  - Length sensors: Reflective photosensors
- **Details are in the notes section below.**

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- The original set sensor [A] detects if the original is set or not.
- The original sensor [B] detects if the original is on the original tray or not (this lets the machine know as early as possible, whether there is another original on the tray).
- The original size detection mechanism consists of the four original width sensors ([F]: Width Sensor S, [G]: Width Sensor M, [H] Width Sensor L, [I]: Width Sensor LL) and three original length sensors ([C]: Length Sensor S, [D]: Length Sensor M, [E]: Length Sensor L).
- Based on the combined output of the length sensors and the width sensors, the machine can detect the size of the original.
- The paper sizes detected by the various sensor combinations are given in the tables on the following two slides.

Original Size Detection Table – 1

Size	Width Sensor				Length Sensor			Area	
	S	M	L	LL	S	M	L	LT	A/B
A3/SEF (297 x 420)	ON	ON	ON	ON	ON	ON	ON	(D)	(D)
B4/SEF (257 x 364)	ON	ON	–	–	ON	ON	ON	–	(D)
A4/SEF (210 x 297)	ON	–	–	–	ON	ON	–	(D)	(D)
A4/LEF (297 x 210)	ON	ON	ON	ON	–	–	–	(D)	(D)
B5/SEF (182 x 257)	–	–	–	–	ON	–	–	–	(D)
B5/LEF (257 x 182)	ON	ON	–	–	–	–	–	–	(D)
A5/SEF (148 x 210)	–	–	–	–	–	–	–	–	(D)
A5/LEF (210 x 148)	ON	–	–	–	–	–	–	–	(D)
11" x 17"/SEF	ON	ON	ON	–	ON	ON	ON	(D)[1]	(D)[5]
11" x 15"/SEF	ON	ON	ON	–	ON	ON	ON	(S)[1]	–
10" x 14"/SEF	ON	ON	–	–	ON	ON	ON	(D)	–
8.5" x 14"/SEF (LG)	ON	–	–	–	ON	ON	ON	(D)[2]	–

Symbol meanings in notes

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Symbols

(D): Yes (Default), (S): Yes (Can select this with SP mode), ON: Paper present, LT: North America, A/B: Europe, Asia

Notes:

- For superscripted "(D)/(S)" symbols, it is possible to change the original detection size with SP6-016. For example, instead of LT (O3), the machine can be set up to detect 10” x 8” (3).
- The F size can be selected with SP5-126. The default is 8.5" x 13"
- The machine cannot detect more than one size of original in the same job.

Original Size Detection Table – 2

Size	Width Sensor				Length Sensor			Area	
	S	M	L	LL	S	M	L	LT	A/B
8.5" x 13"/SEF (F4)	ON	–	–	–	ON	ON	ON	(S)[2]	(D)
8.5" x 13"/SEF	ON	–	–	–	ON	ON	ON	–	–
8.5" x 13"/SEF (F)	ON	–	–	–	ON	ON	ON	–	–
8.5" x 11"/SEF	ON	–	–	–	ON	–	–	(D)[3]	(D)[6]
8.5" x 11"/LEF	ON	ON	ON	–	–	–	–	(D)[4]	(D)[7]
7.25" x 10.5"/SEF (US EXE)	ON	–	–	–	ON	–	–	(D)	–
7.25" x 10.5"/LEF (US EXE)	ON	ON	ON	–	–	–	–	(S)[4]	–
8" x 10"/SEF	ON	–	–	–	ON	–	–	(S)[3]	–
5.5" x 8.5"/SEF	–	–	–	–	–	–	–	(D)	–
5.5" x 8.5"/LEF	ON	–	–	–	–	–	–	(D)	–
267 mm x 390 mm	ON	ON	ON	–	ON	ON	ON	–	(S)[5]
195 mm x 267 mm	ON	–	–	–	ON	–	–	–	(S)[6]
267 mm x 195 mm	ON	ON	ON	–	–	–	–	–	(S)[7]

Symbol meanings in notes

Slide 275

Symbols

(D): Yes (Default), (S): Yes (Can select this with SP mode), ON: Paper present, LT: North America, A/B: Europe, Asia

Notes:

- For superscripted "(D)/(S)" symbols, it is possible to change the original detection size with SP6-016. For example, instead of LT (O3), the machine can be set up to detect 10” x 8” (3).
- The F size can be selected with SP5-126. The default is 8.5" x 13"
- The machine cannot detect more than one size of original in the same job.

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 276

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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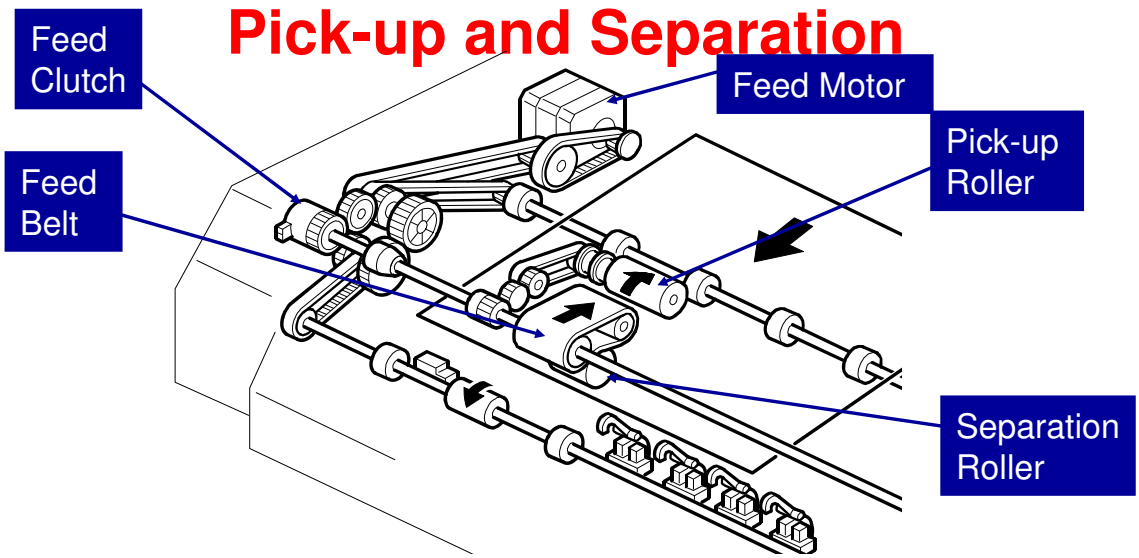
- Normally, in mixed original-length mode, original length is detected as shown below:
  - The width is detected with the same procedure that is used when all originals are the same size.
  - The machine keeps an area in memory that is sufficient for an original of the detected width and 432 mm length.
  - 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.

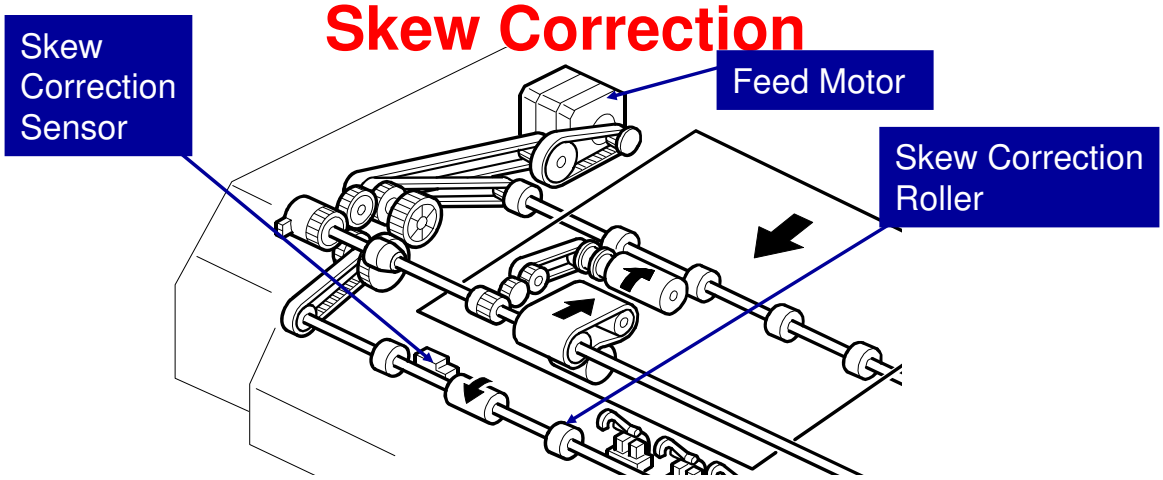


- **Pick-up solenoid: Lifts the original table, to lift the originals to the pick-up roller**
- **Feed motor: Controls the rollers**
- **Feed clutch: Controls the pick-up roller and feed belt**

Slide 278

- 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

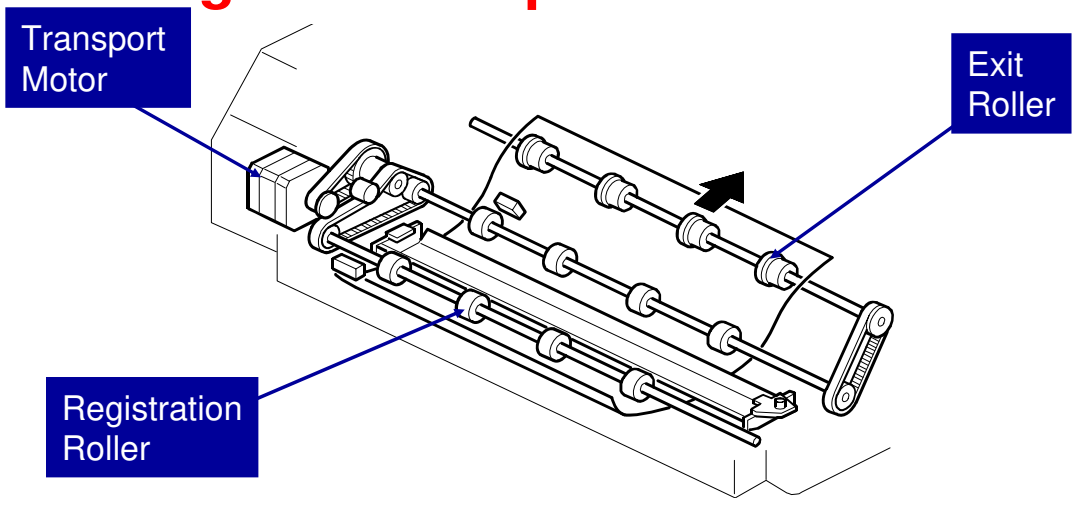


- **First, the feed motor rotates forwards: The feed belt feeds the original, but the skew correction roller does not turn.**
  - The leading edge of the original hits the skew correction roller, and this removes any skew in the original.
- **Then, soon after the skew correction sensor detects the original,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

Slide 279

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

Original Transport and Feed-out

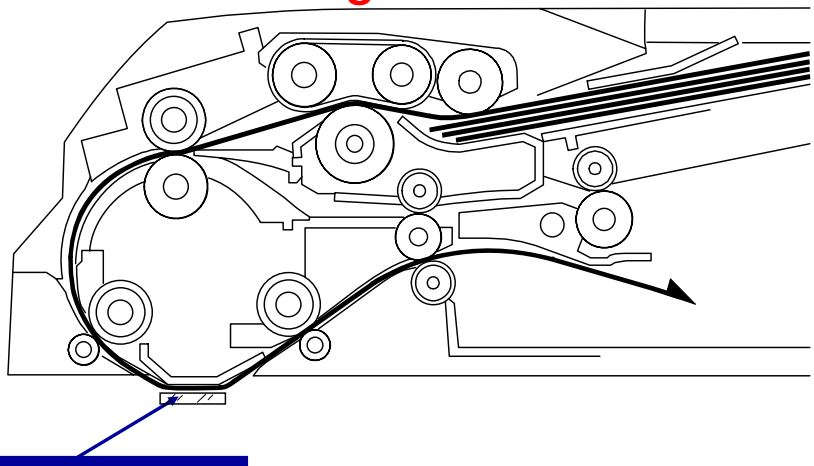


- The transport motor drives the registration and exit rollers.

Slide 280

No additional notes

Original Transport and Feed-out Single-sided

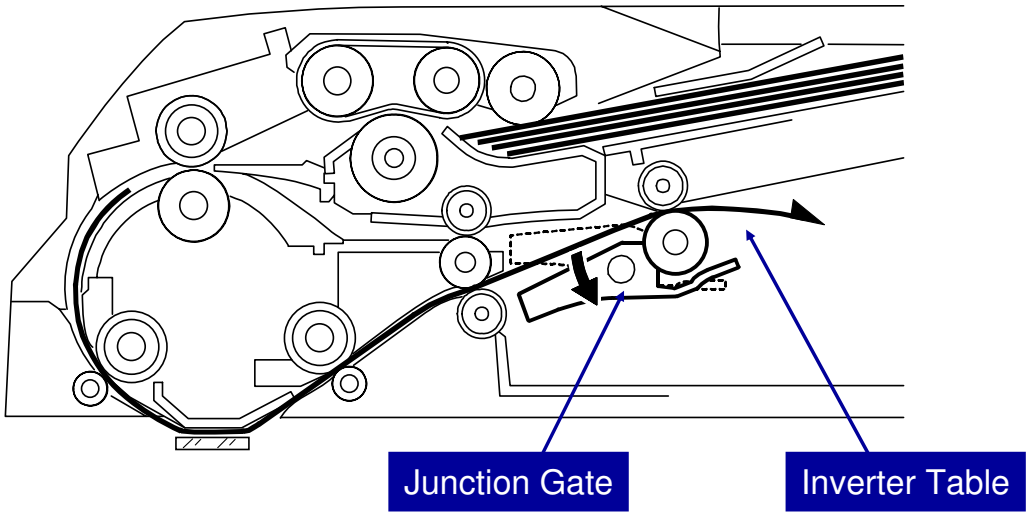


- **Transport motor: Feeds the original through the scanner**
- **Motor speed is set by the reproduction ratio**

Slide 281

- The machine scans the original through the DF 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 ADF 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

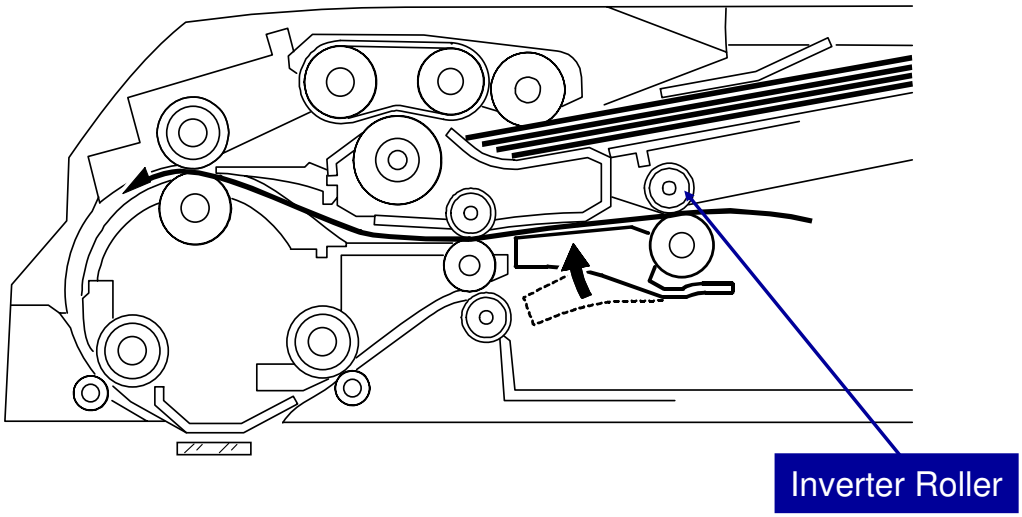


- When the original exit sensor detects the leading edge, the junction gate opens and the original goes to the inverter table.

Slide 282

- The main points are on the next 4 slides.

Original Transport and Feed-out
Double-sided 2

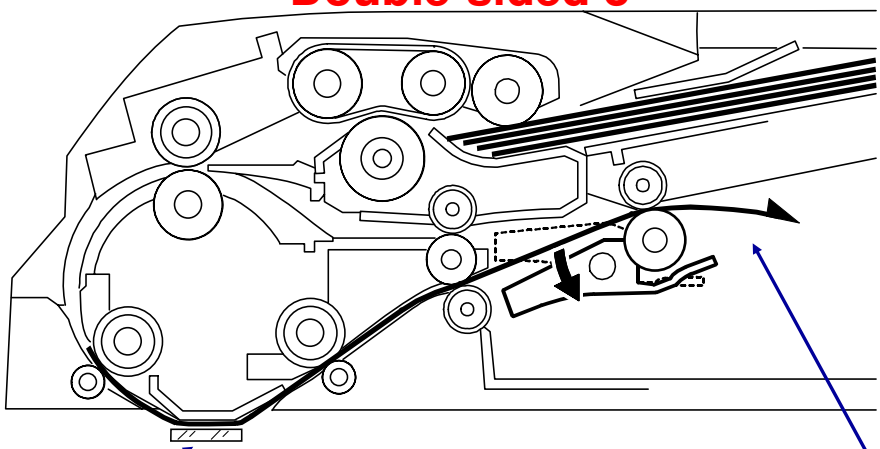


- When the paper is in the inverter table, the feed motor changes direction and the inverter roller feeds the original into the ARDF again.

Slide 283

No additional notes

Original Transport and Feed-out
Double-sided 3

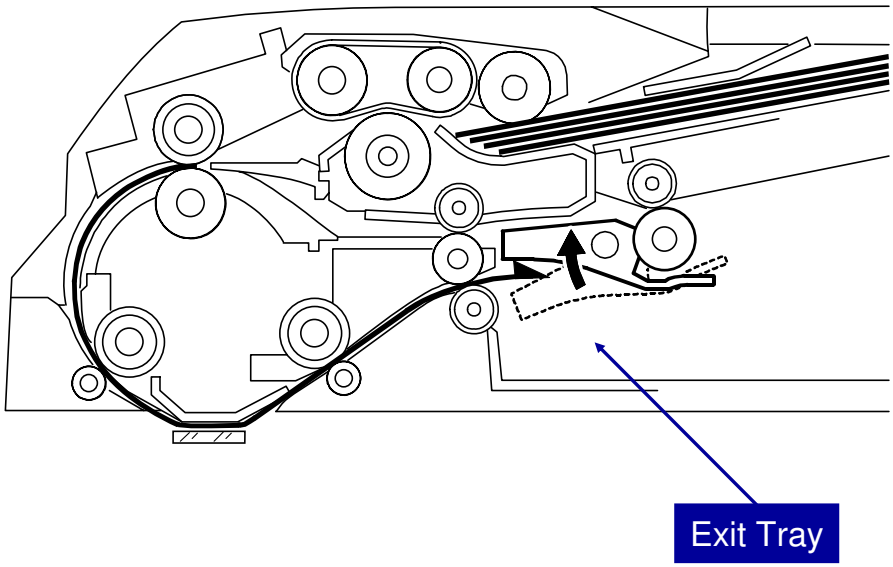


- **The rear side is scanned**
- **The original is fed to the inverter table again**
  - The page goes to the inverter mechanism again. This stacks the pages of the original in the correct order.

Slide 284

No additional notes

Original Transport and Feed-out Double-sided 4

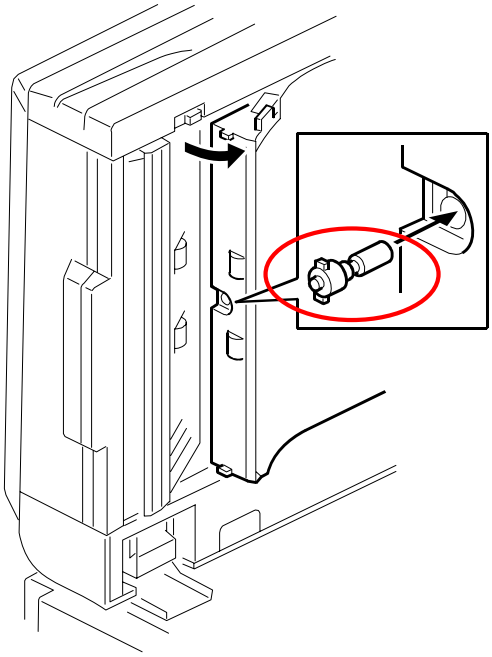


- The page is fed in from the inverter table and out to the exit tray.

Slide 285

No additional notes

Stamp (Fax and Scanner)



- **This is used in fax mode or in scanner mode.**
- **The original is stamped if the original was sent.**
  - For memory transmission and scanning, the original is stamped if it is stored successfully.
- **SP 6-010: This setting adjusts the stamping position. To do this, it detects when the transport motor stops.**

Slide 286

No additional notes

Dust Detection (SP 4020)

- This function checks the ADF 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 ADF exposure glass causes a thin vertical line on the scanned image. This is because the ADF 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 ADF.

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No additional notes

SP Modes

- **4-020: Dust check**
  - SP 7-852: Shows the number of times that the machine detected dust on the ADF.
- **6-006: Registration**
- **6-009: ADF free run**
- **6-010: Stamp position adjustment (in the sub-scan direction only)**

Slide 288

- 4-020: This function checks the narrow scanning glass of the ADF for dust that can cause black lines on copies. If dust is detected, a message is displayed, but scanning does not stop.

RICOH

Di-C1.5 TRAINING

ONE-TRAY PAPER TRAY UNIT (D425)

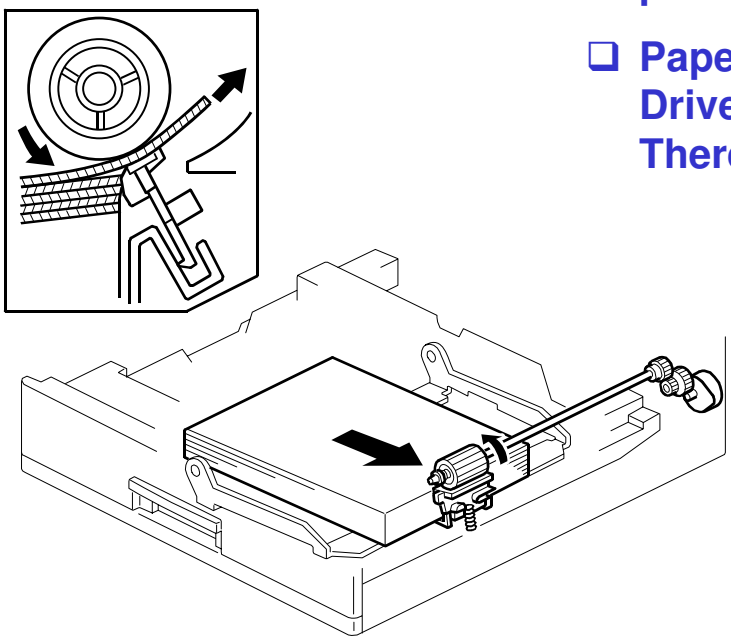
Slide 289

PURPOSE OF THIS SECTION

- ❒ The mechanisms in the optional one-tray paper feed unit will be described.
- ❒ It is similar to the paper tray unit used with the Kir-C3 series.

Paper Feed and Separation

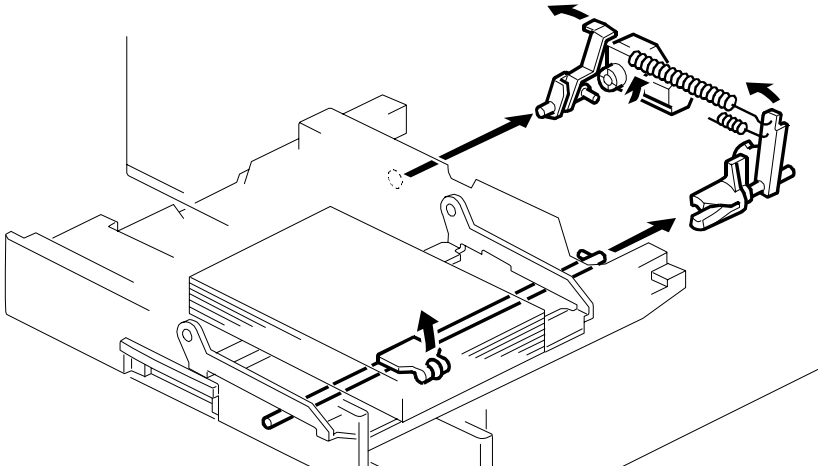
- Feed roller and friction pad
- Paper feed motor: Drives the feed roller. There is no clutch.



Slide 290

- There are two motors, one to lift the bottom plate and one to drive the rollers.
- There are no clutches.
- The feed roller is part of the tray.
  - When the user pulls out the tray, paper caught between the feed roller and friction pad does not remain jammed inside the machine.

Paper Lift - Engaging the Shafts

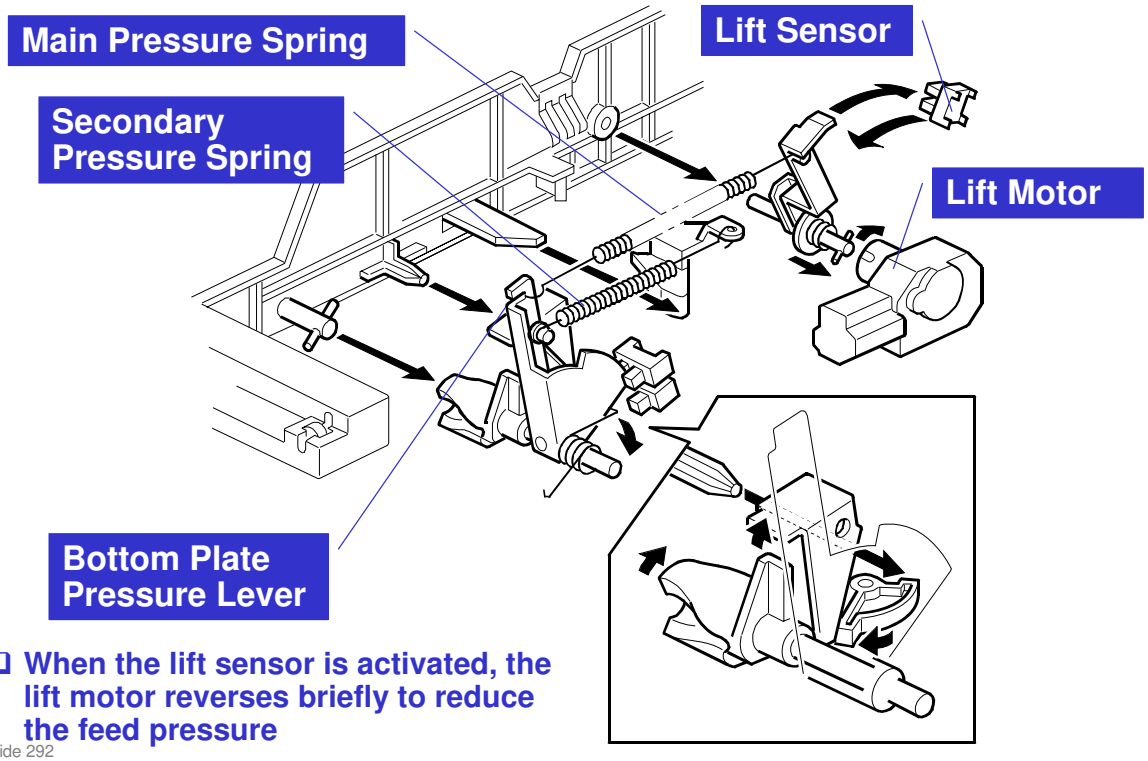


- **The two shafts engage when the tray is pushed into the machine.**
  - One shaft lifts the stack
  - The other shaft controls the paper feed pressure

Slide 291

- 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.

Paper Lift - Pressure Application

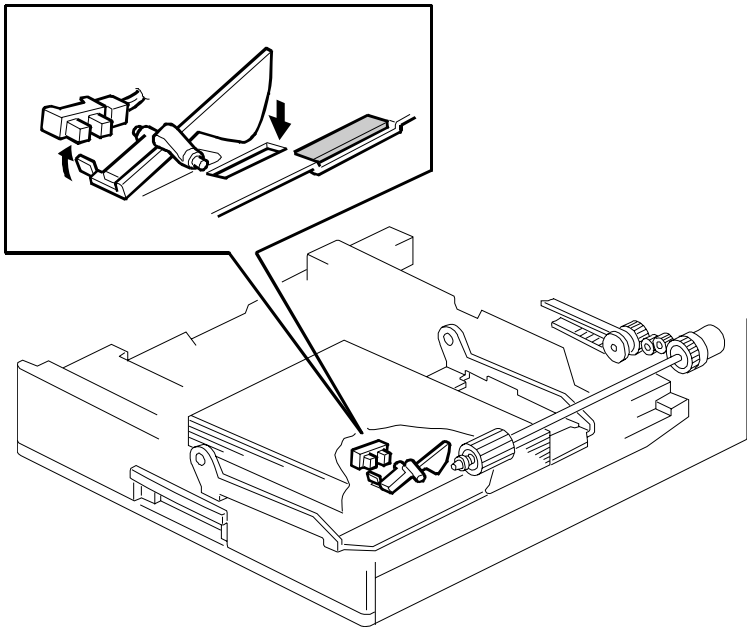


❑ When the lift sensor is activated, the lift motor reverses briefly to reduce the feed pressure

Slide 292

- ❒ 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.

Paper End Detection

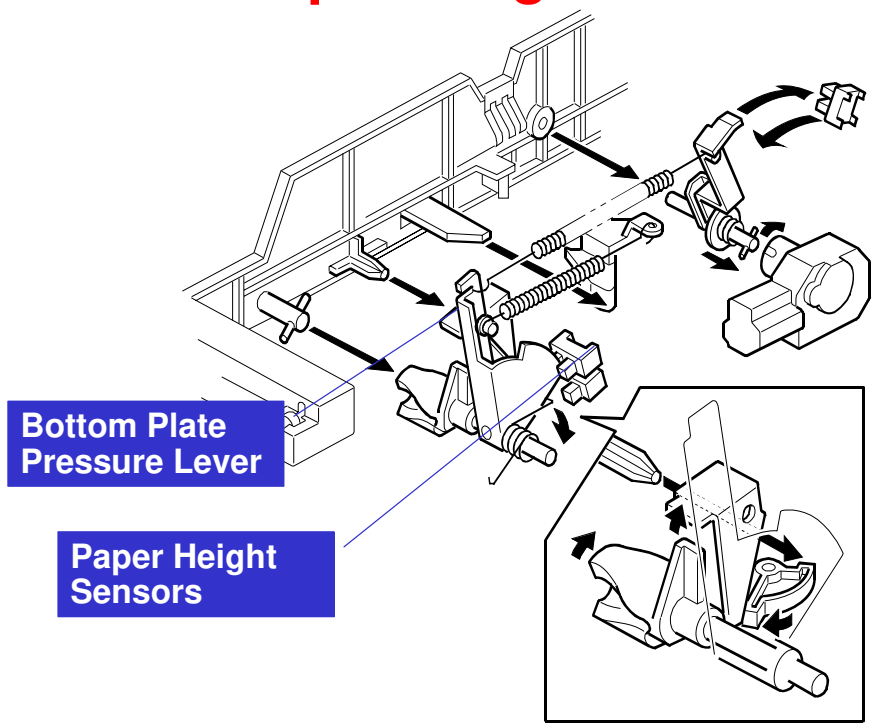


- Paper end sensor feeler: Falls through a slot in the bottom plate when there is no paper.

Slide 293

No additional notes

Paper Height Detection

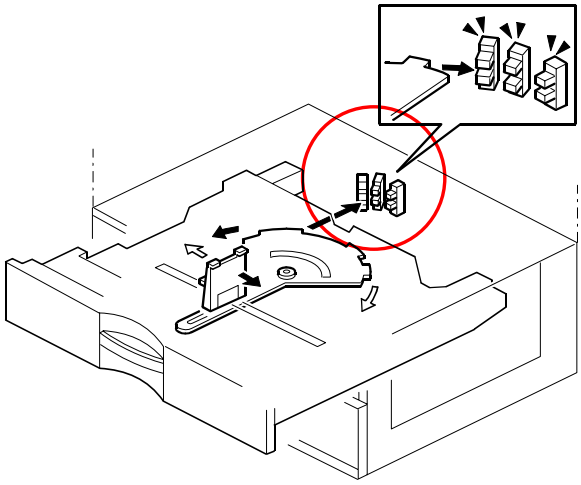


❑ **Bottom plate pressure lever: Moves as paper is used up**

Slide 294

- ❒ 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



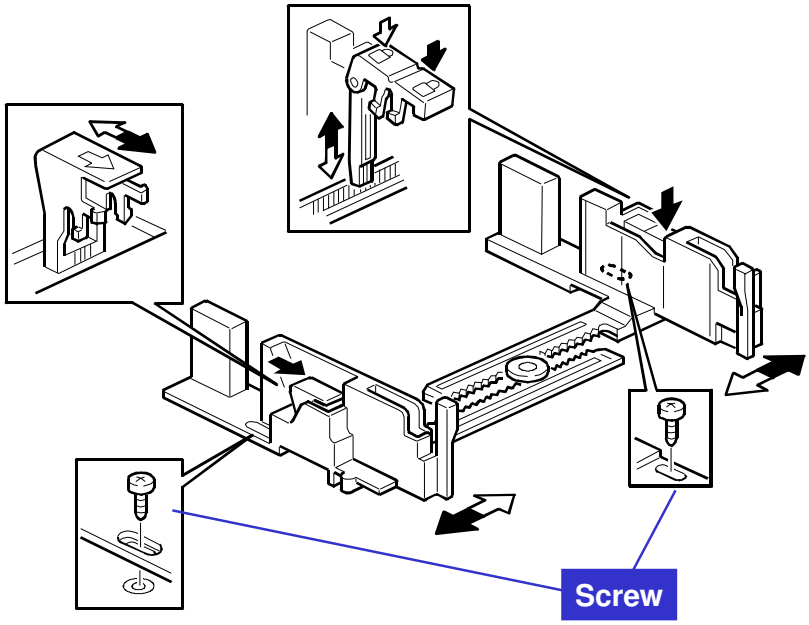
- **The tray is a universal tray.**
- **Paper size sensors: Detect the paper length**
  - The position of the sensor actuator is controlled by the position of the end fence

Slide 295

- 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 cpu that the tray is in the machine.
  - For a paper size detection table, see the D331 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 3, Tray 4).

Side Fences



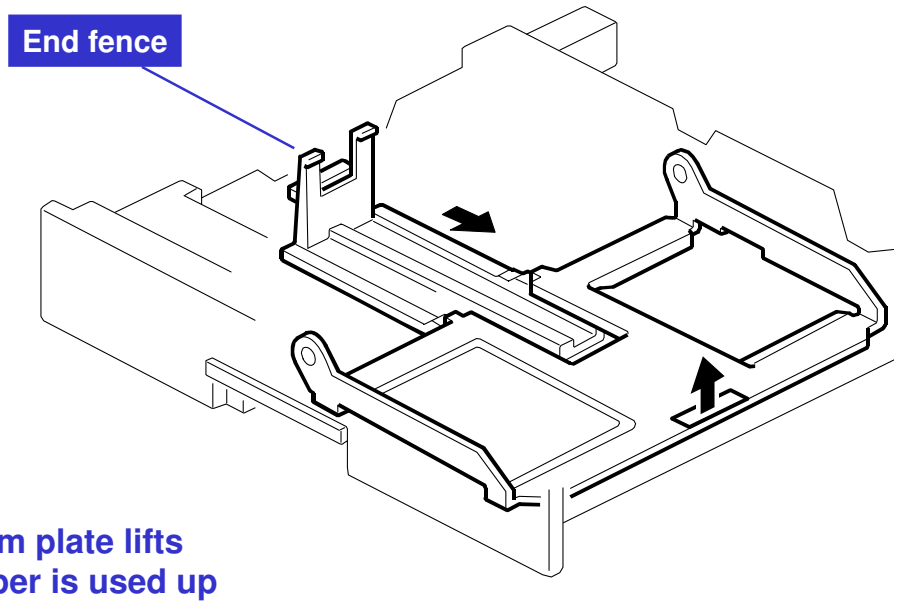
❑ **The side fences have stoppers to prevent them bending when a full tray is pushed in too strongly**

Slide 296

❒ 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.

Slide 297

No additional notes

RICOH

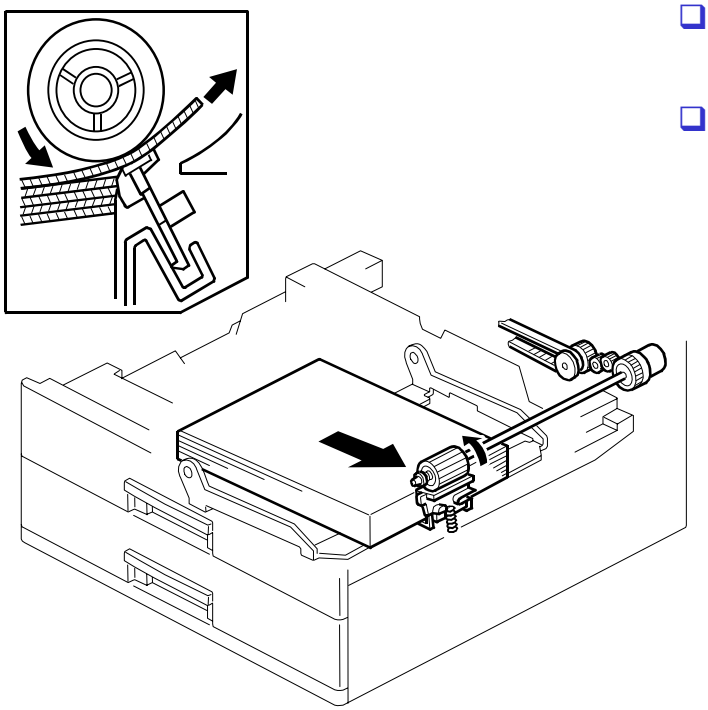
Di-C1.5 TRAINING

TWO-TRAY PAPER TRAY UNIT (D331)

Slide 298

- 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

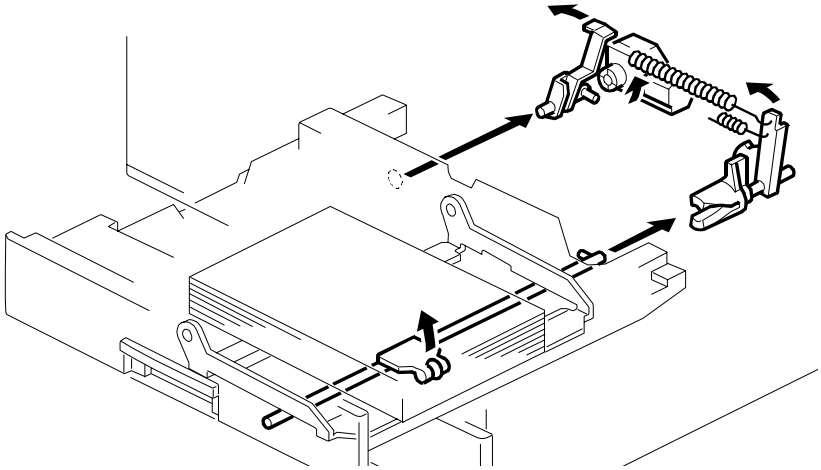


- **Feed roller and friction pad**
- **Paper feed motor: Drives the feed roller**
  - The appropriate paper feed clutch turns on to transfer drive from the motor to the rollers in the required tray.
  - The relay clutch drives the relay roller, which feeds paper up from the lower tray.

Slide 299

No additional notes

Paper Lift - Engaging the Shafts

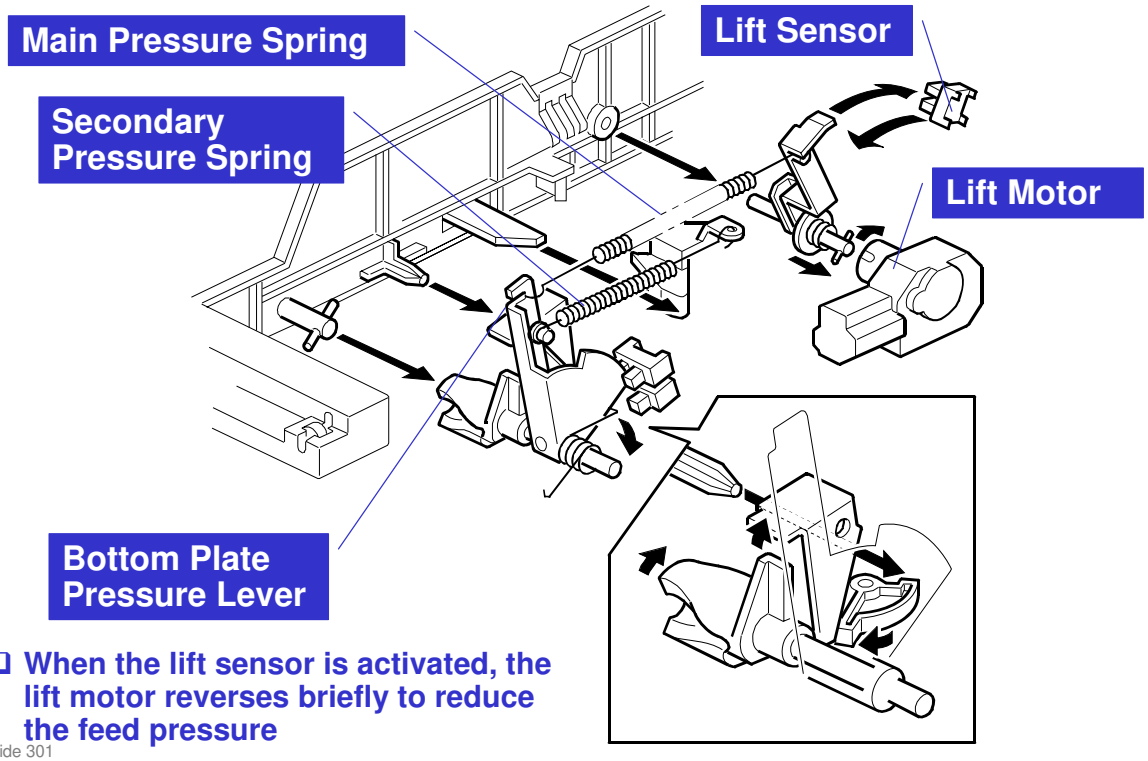


- **The two shafts engage when the tray is pushed into the machine.**
  - One shaft lifts the stack
  - The other shaft controls the paper feed pressure

Slide 300

- 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.

Paper Lift - Pressure Application

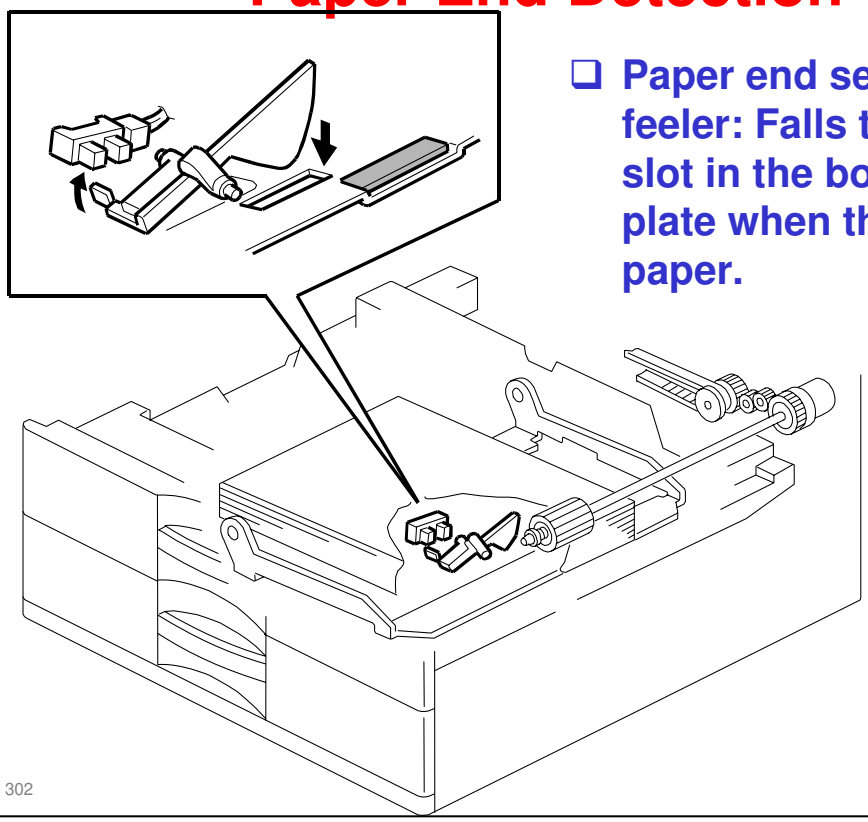


❑ When the lift sensor is activated, the lift motor reverses briefly to reduce the feed pressure

Slide 301

- ❒ 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.

Paper End Detection

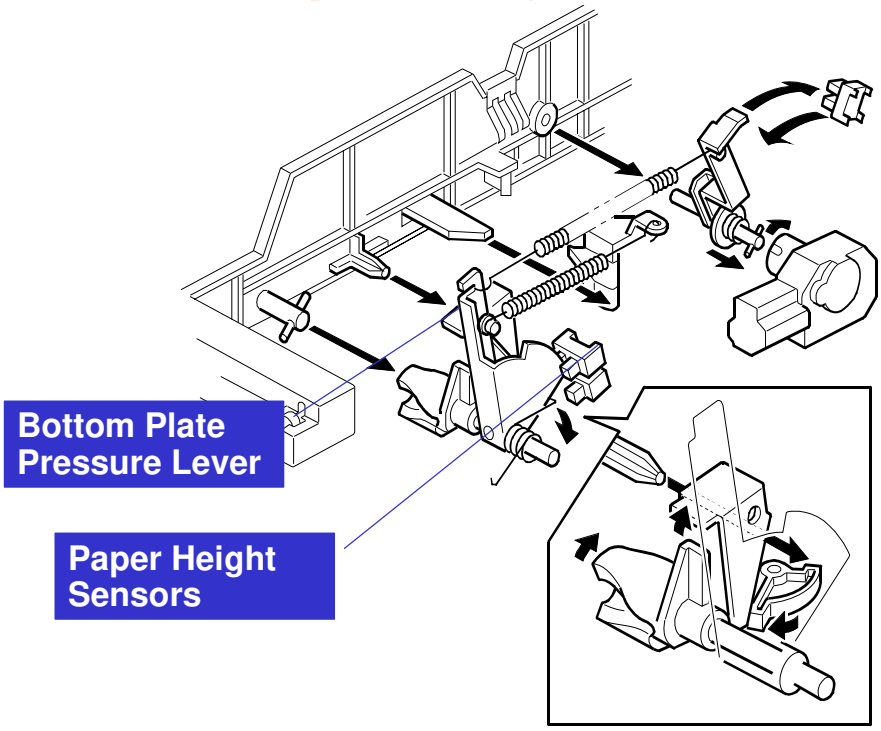


- Paper end sensor feeler: Falls through a slot in the bottom plate when there is no paper.

Slide 302

No additional notes

Paper Height Detection

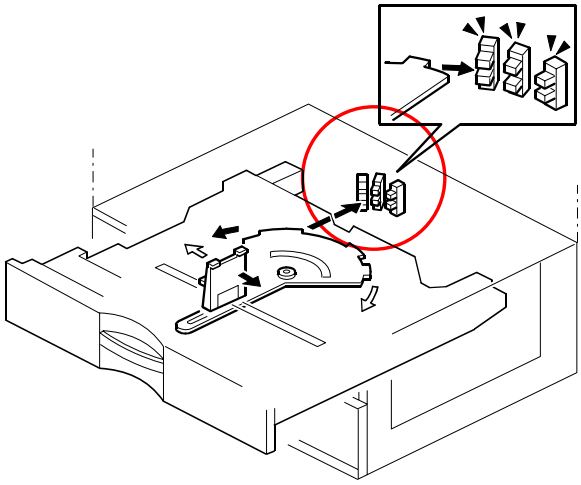


❑ **Bottom plate pressure lever: Moves as paper is used up**

Slide 303

- ❒ 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

Slide 304

- 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 cpu 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 3, Tray 4).

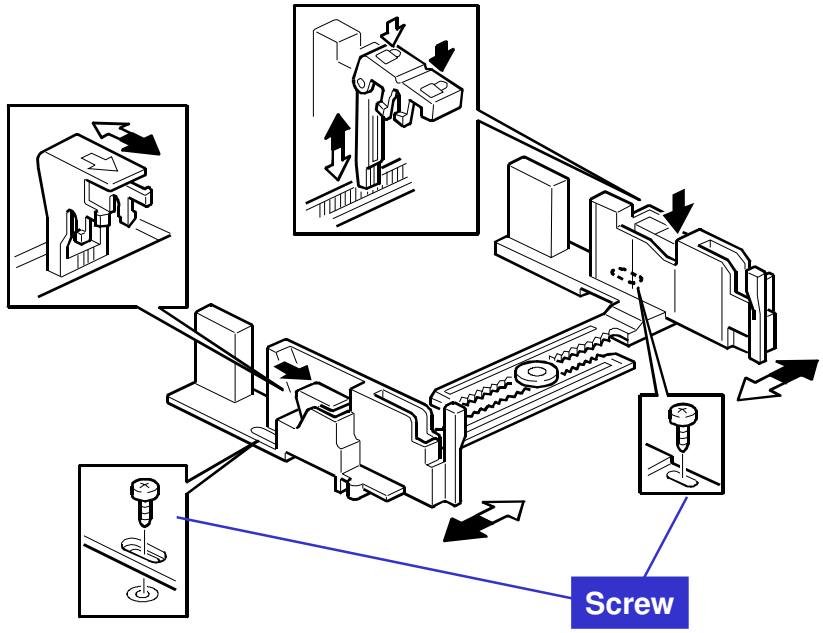
Size Detection – SP Modes

- **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 3: SP 5181 009 to 012
    - » Tray 4: SP 5181 013 to 016

Slide 305

No additional notes

Side Fences

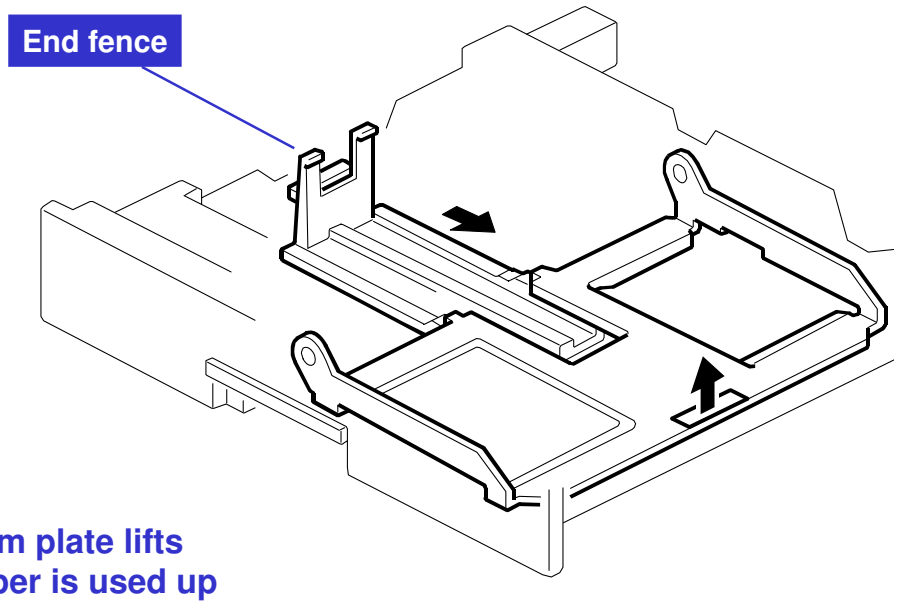


❑ **The side fences have stoppers to prevent them bending when a full tray is pushed in too strongly**

Slide 306

- ❒ 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.

Slide 307

No additional notes

RICOH

Di-C1.5 TRAINING

SHIFT TRAY (D428)

Slide 308

- In this section, you will study the mechanisms of the optional shift tray.
- This unit is similar to the unit that is used in the Athena-C1/C2.

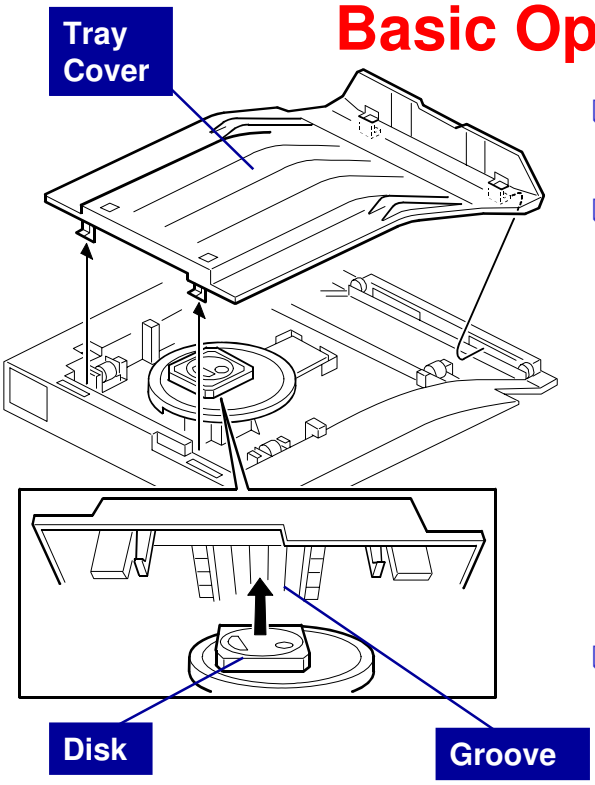
Overview

- **The shift tray is similar to an output tray, but it sorts outputs into different stacks**
- **To do this, it moves the tray from side to side. This is called 'shift sorting' and it is faster than rotation sorting.**
  - For rotation sorting, the image must be rotated in memory, and this is slow.
  - For shift sorting, the shift tray moves from side to side, to sort the sets of copies into different stacks.

Slide 309

No additional notes

Basic Operation

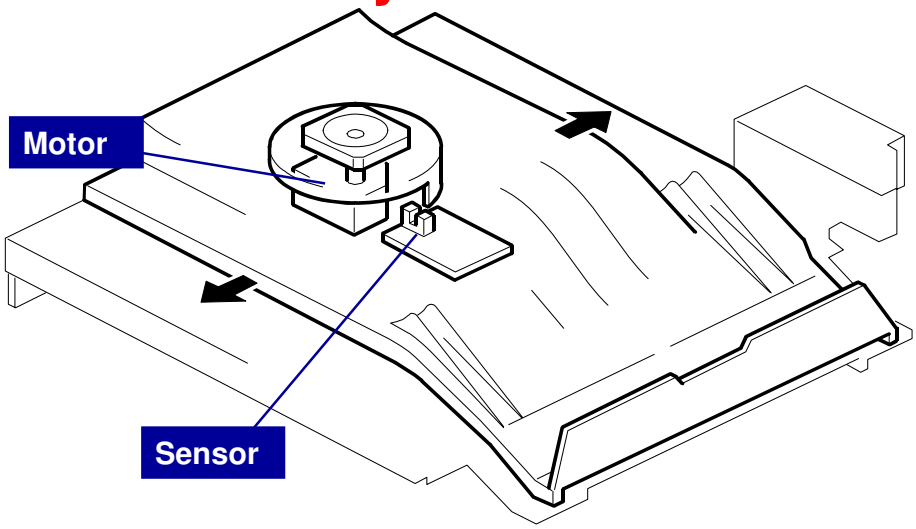


- The tray cover moves from side to side
- The square platform on the disk goes into the groove on the bottom of the tray
  - It is off centre and loosely connected, so the disk can rotate about the central shaft, and the square platform moves up and down the groove.
- The disk turns, and the square platform moves the tray across

Slide 310

No additional notes

Tray Shift



- **The tray shift motor turns the central disk**
  - The shaft is at the centre of the disk
- **The sensor on the control board detects when the tray is moved fully to the left or right**

Slide 311

- The tray motor moves the tray from side to side.
- The half turn sensor detects when the tray was fully moved to the left or to the right.

RICOH

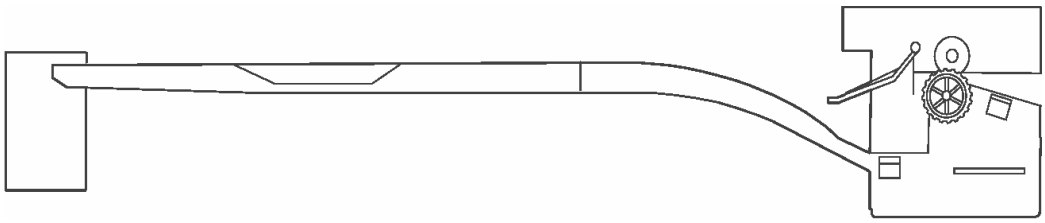
Di-C1.5 TRAINING

ONE-BIN TRAY (D426)

Slide 312

- In this section, you will study the mechanisms of the optional one-bin tray.
- This unit is similar to the unit that is used in the Athena-C1/C2.

Overview

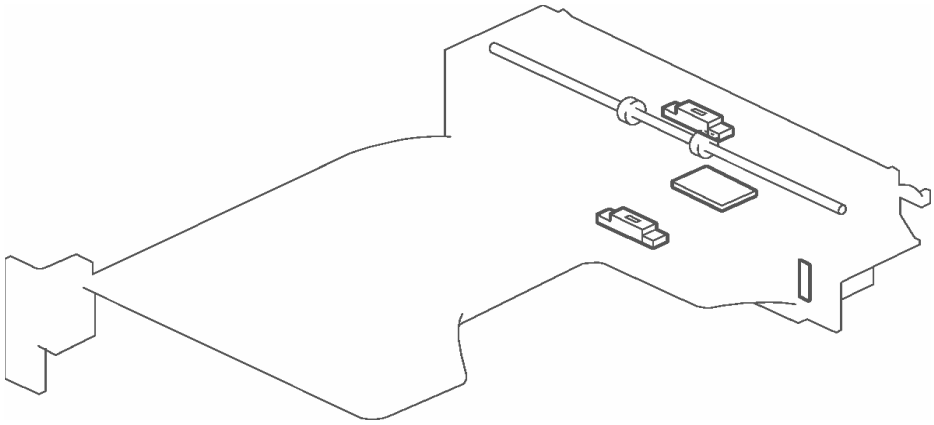


- **This unit adds an output tray. It does not replace the tray that is supplied with the machine.**
- **It is not a sorter, because the tray and/or the rollers do not move from side to side.**
- **With more than one output tray, the user can (for example) send copy-mode outputs to the standard output tray, and fax-mode outputs to the 1-bin tray.**

Slide 313

- To send output to a different output tray for each mode, the user adjusts this user tool: User Tools - System Settings - General Features - Output: Copier, Output: Facsimile, etc
  - The one-bin tray is called 'Internal Tray 2'.

Components



- The main motor in the copier operates the tray. There is no motor in the tray.
- The junction gate solenoid in the paper exit mechanism of the main copier sends paper to this tray.
- The paper sensor in the one-bin tray checks if there is paper in the tray. Then, if there is paper, the LED on the side of the tray lights.

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No additional notes

LED on the One-bin Tray

- **This LED lights when an output arrives on the one-bin tray.**
  - The one-bin tray is an optional device.
- **If the one-bin tray is set up to receive fax messages, then the LED tells the customer when a fax message has been printed.**

Slide 315

No additional notes

RICOH

Di-C1.5 TRAINING

SIDE TRAY (D427)

Slide 316

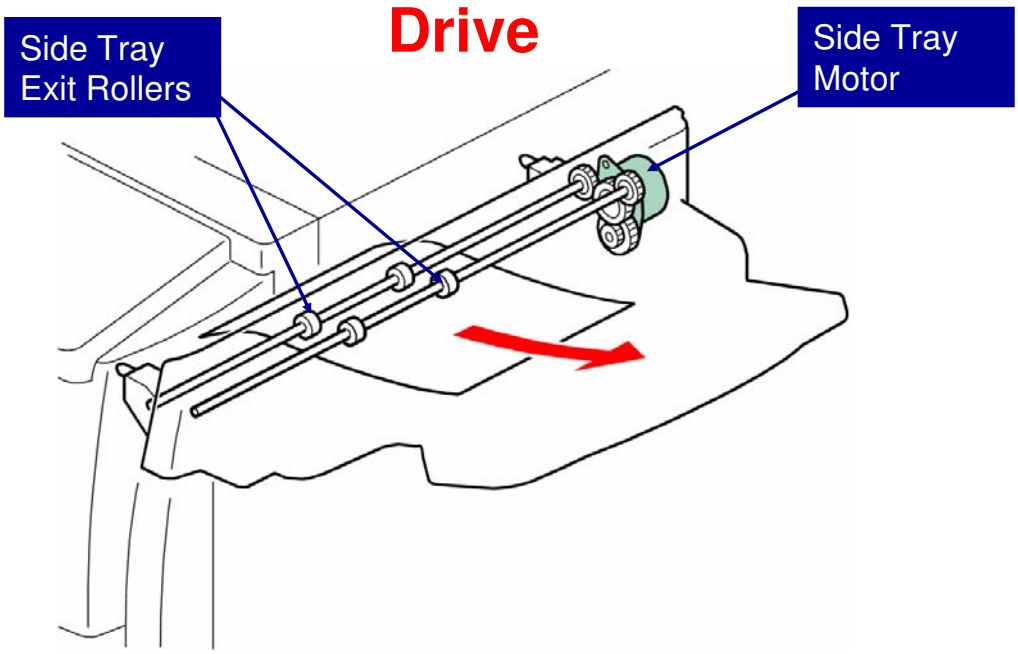
- In this section, you will study the mechanisms of the optional side tray.
- This unit is new.

Overview

- The side tray is an additional output tray.
- This can be installed when the 500-sheet finisher is installed, so that the user can (for example) send copy-mode outputs to the finisher tray, and fax-mode outputs to the side tray.
- This is because, when the finisher is installed, the one-bin tray cannot be installed.

Slide 317

No additional notes

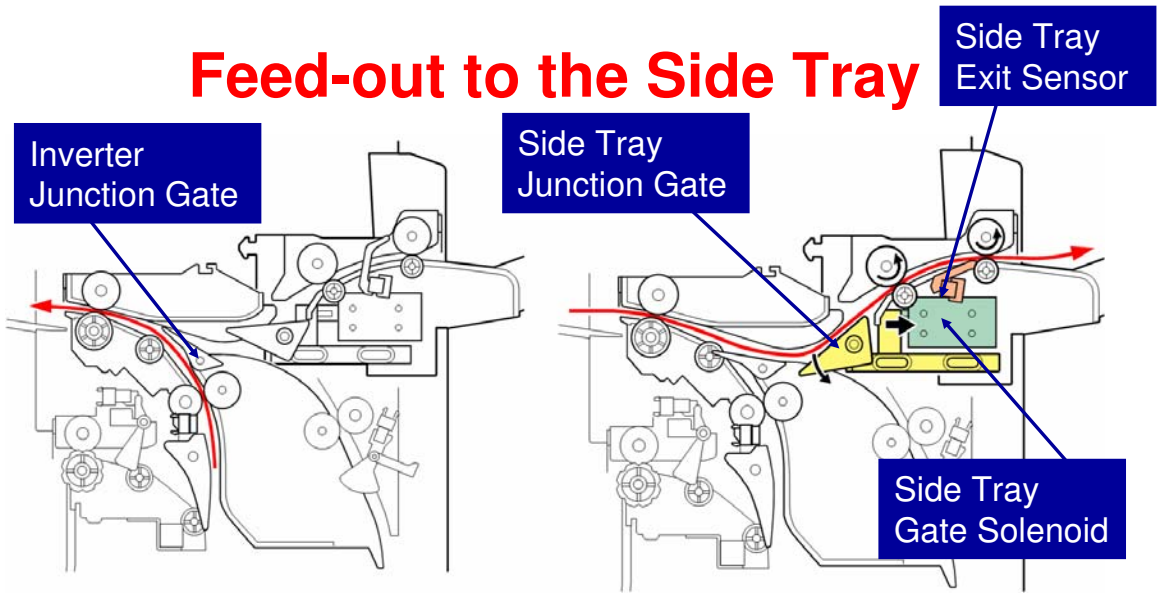


- The side tray motor drives the side tray exit rollers.

Slide 318

No additional notes

Feed-out to the Side Tray



- **The paper pushes the inverter junction gate open.**
  - The gate is normally closed by spring tension.
- **After the trailing edge of the paper passes the inverter junction gate, the gate closes.**
- **Then, the inverter roller rotates in reverse. At the same time, the side tray gate solenoid turns on and the side tray junction gate opens. The paper goes to the side tray, instead of the duplex unit.**

Slide 319

- The solenoid is at the rear of the tray, near the motor.
- When the side tray exit sensor detects the trailing edge of the paper, the side tray gate solenoid turns off and closes the path to the side tray. This sensor also detects paper jams.

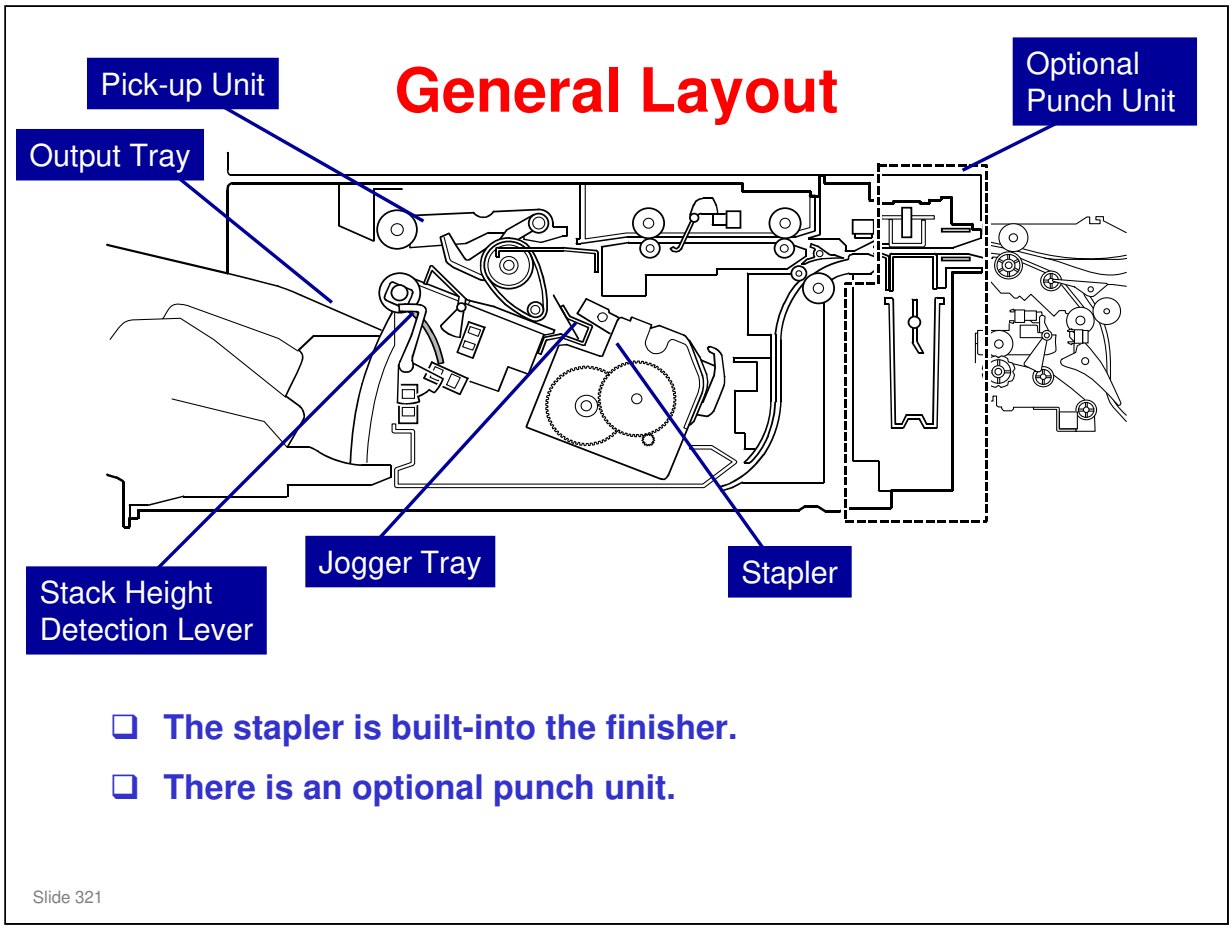
RICOH

Di-C1.5 TRAINING

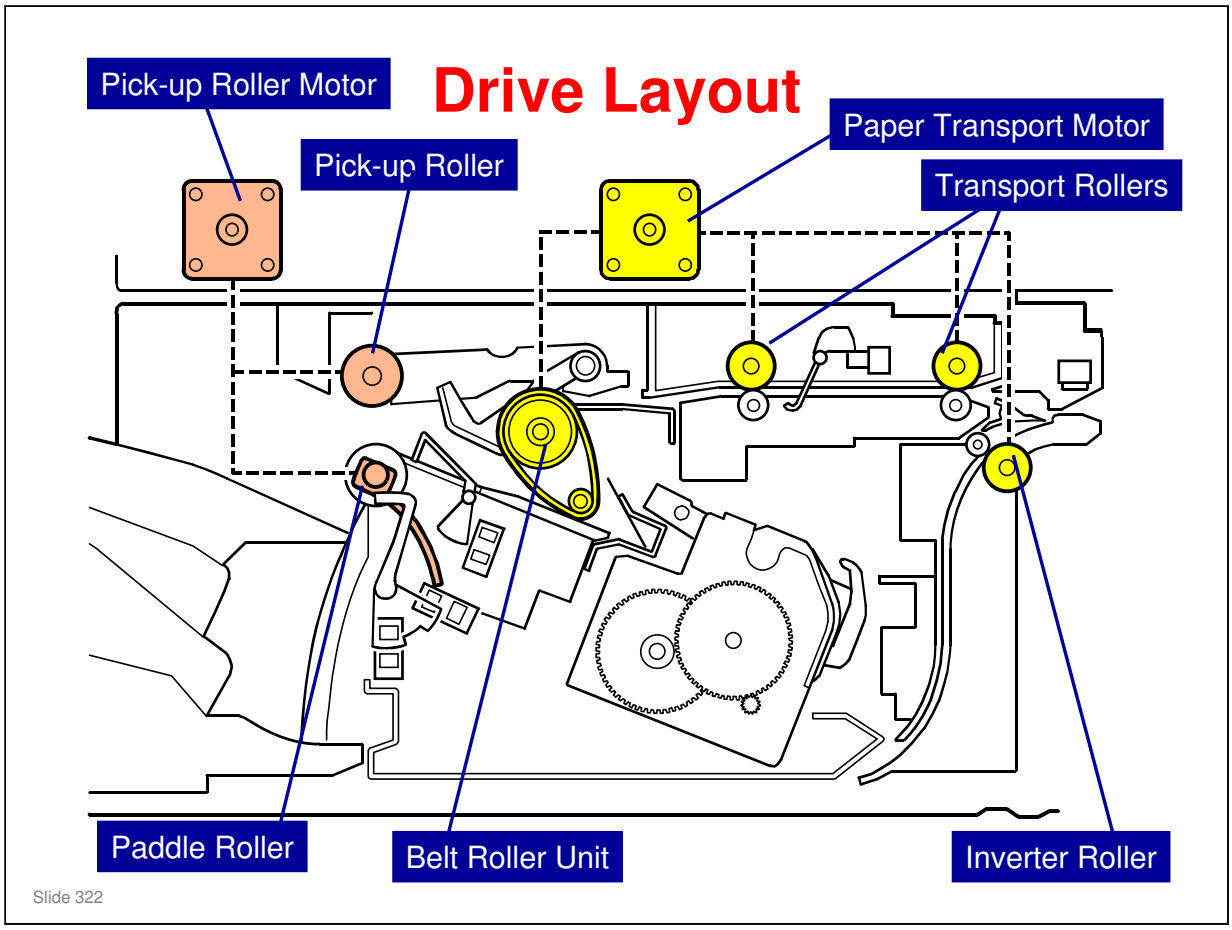
INTERNAL FINISHER (D429)

Slide 320

- In this section, you will study the mechanisms of the optional 500-sheet finisher.
- This finisher has some similarities with the finisher for the AT-C1, but a punch unit is added.



- The output tray moves down when the stack gets thicker.
  - The output tray does not move from side to side to sort the copies. Because of this, it should not be called a shift tray.
- The jogger tray moves even-numbered sets to one side before it feeds them to the output tray. That is how shift sorting is done with this finisher.
  - The jogger tray is also used for stapling. The stapler is attached to one side of the jogger tray. It is not shown in this diagram.
- The stack height detection lever turns on sensors that tell the machine to lift or lower the output tray.
- The pick-up unit moves up and down, controlled by the selected mode and the part of the job.
  - This is described later.



❒ The pick-up roller motor can turn forward or in reverse. This is necessary because the pick-up roller feeds paper back into the jogger tray, and forward to the output tray.

Finisher Modes

- **Straight feed-out**
  - Paper goes directly to the output tray without sorting or stapling
- **Shift sorting**
  - Odd-numbered sets (set 1, 3, 5, etc): The front fence jogs the output, and the printout moves to the rear.
  - Even-numbered sets (set 2, 4, 6, etc): The rear fence jogs the output, and the printout moves to the front.
- **Stapling**
  - Each set is stapled in the jogger tray before it is fed to the output tray.

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Straight feed-out (automatically selected if the paper type is outside the specified weight range for the finisher)

- Each page is fed out immediately after it comes from the copier.

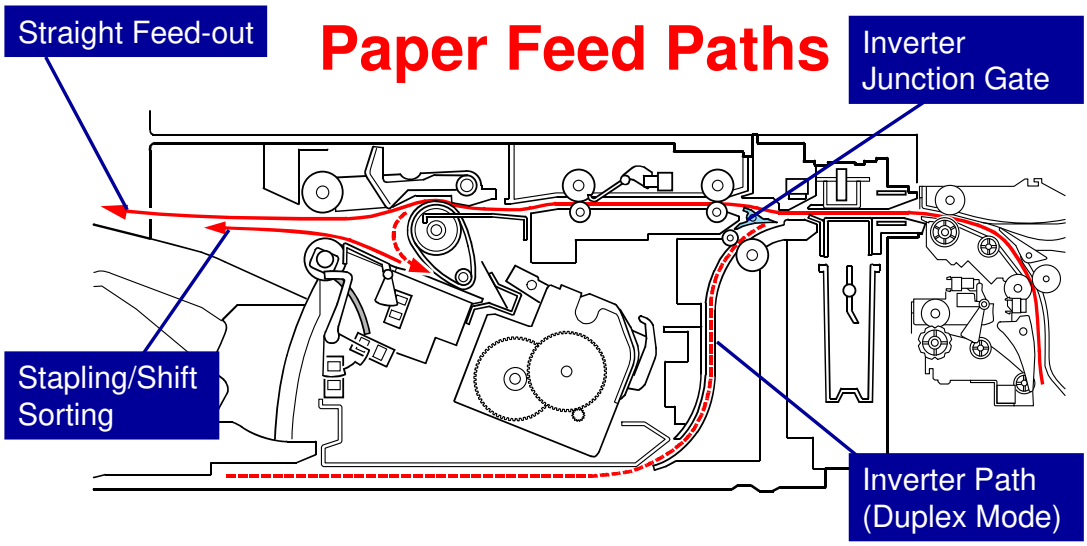
Shift sorting (if selected with the operation panel or printer driver)

- This lets the user separate the sets easily.

Stapling (if selected with the operation panel or printer driver)

- Each set is fed the same as even-numbered sets in shift sorting mode.
- But, the set is stapled in the jogger tray before it is fed to the output tray.
- All sets are moved to one side.

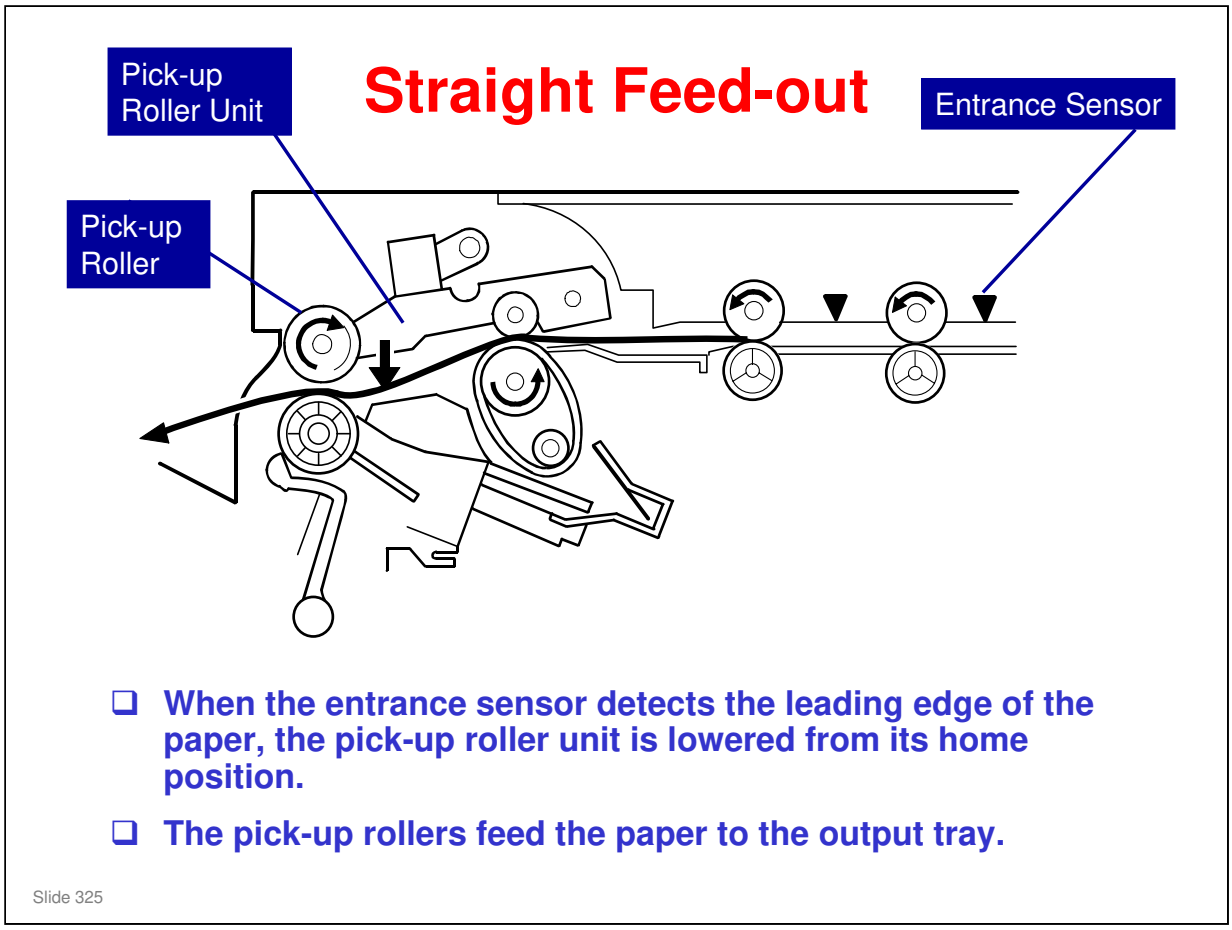
Paper Feed Paths



- There are three feed paths, as shown above.
- If duplex mode is selected, the paper is fed below the finisher, inverted, and fed back into the machine through the duplex unit.

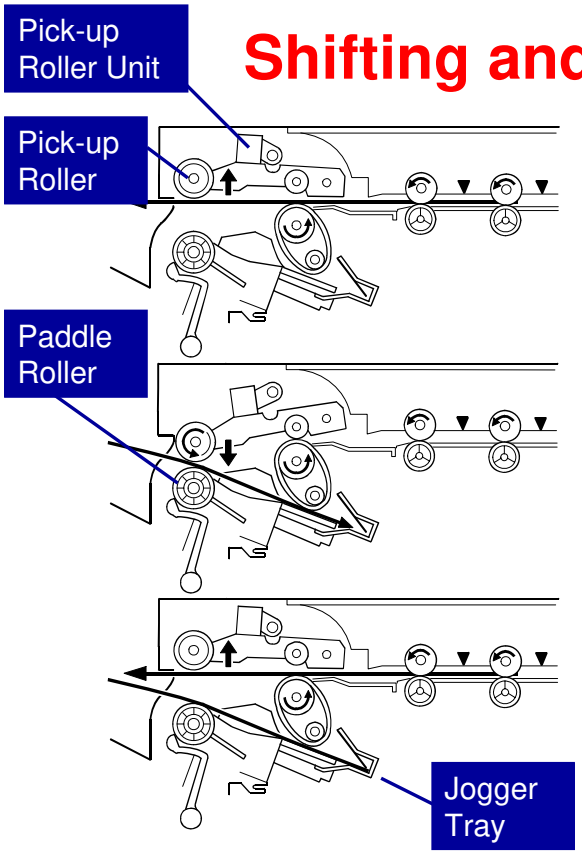
Slide 324

No additional notes



❒ The pick-up roller contact motor moves the pick-up roller unit up and down.
❒ The pick-up roller motor turns the pick-up rollers.

Shifting and Stapling (1)



- **Top diagram: At first, the pick-up roller unit stays up.**
- **Middle diagram: When the trailing edge is almost out of the finisher, the pick-up roller unit moves down until the pick-up rollers in the pick-up roller unit pushes the paper against the paddle roller.**
  - The pick-up roller changes direction.
  - The pick-up roller and paddle roller feed the paper to the jogger tray.
- **Bottom diagram: The pick-up roller unit moves up to receive the next sheet.**

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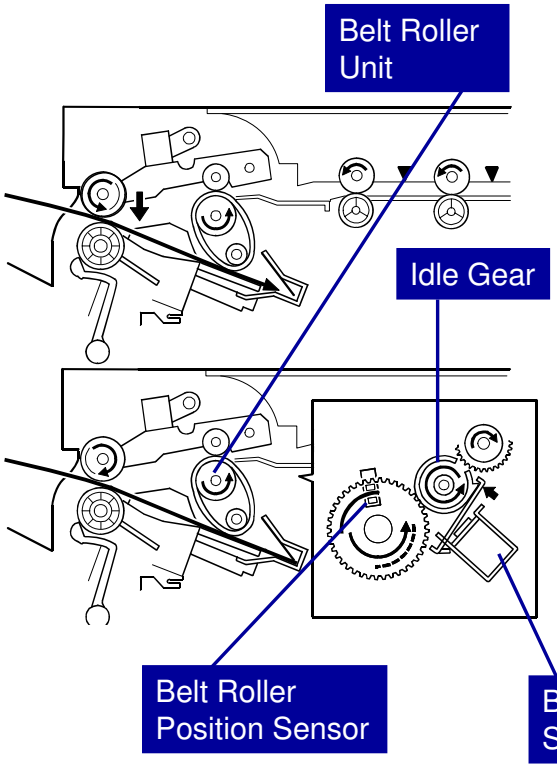
No additional notes

Shifting and Stapling (2)



- **Top diagram: The pick-up roller unit moves down to send the next sheet to the jogger tray.**
- **Bottom diagram: When the stack is complete, the belt roller solenoid releases the idle gear, and the belt roller unit lifts.**
  - Then the pick-up roller changes direction again and feeds the stack out.

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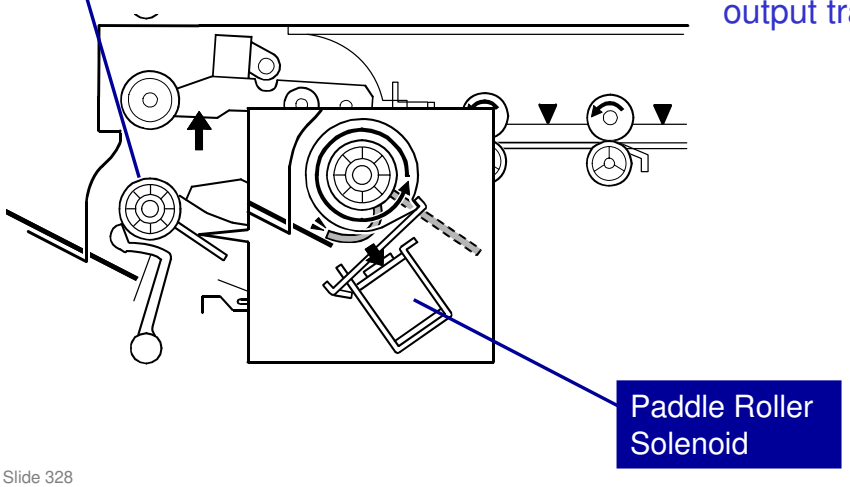
- The belt roller position sensor detects the position of the belt roller unit.
- When the belt roller solenoid releases the idle gear, the gear to the right turns. This has a cam and shaft attached to it, and this lifts the belt roller unit.

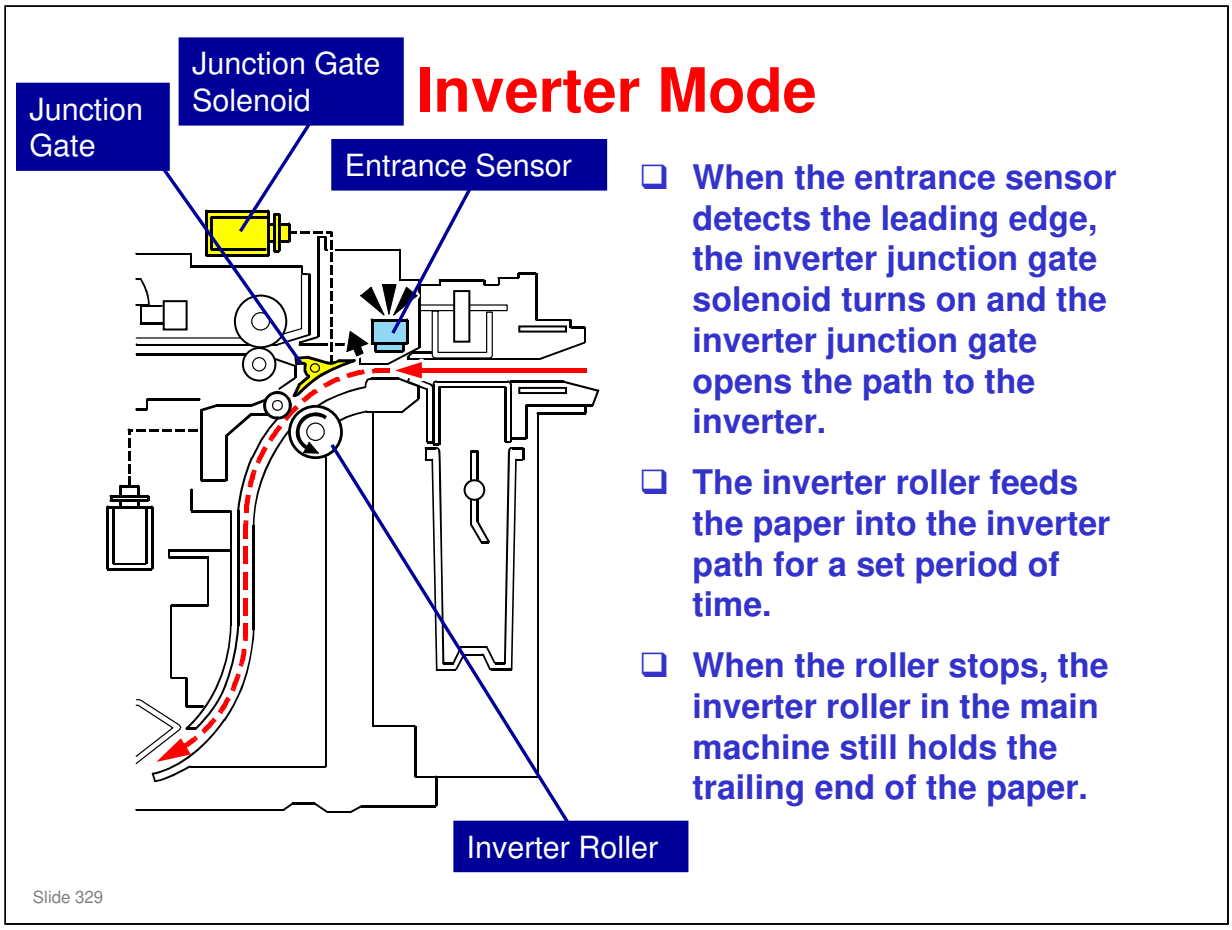
Shifting and Stapling (3)

- **After the stack is fed out, the belt roller unit returns to its home position (up).**
  - The paddles on the paddle roller adjust the paper stack on the output tray.



Slide 328

- The paddle roller solenoid controls the paddle roller.
- The pick-up roller turns forward or in reverse. The other rollers do not change direction, and are controlled by the paper transport motor.

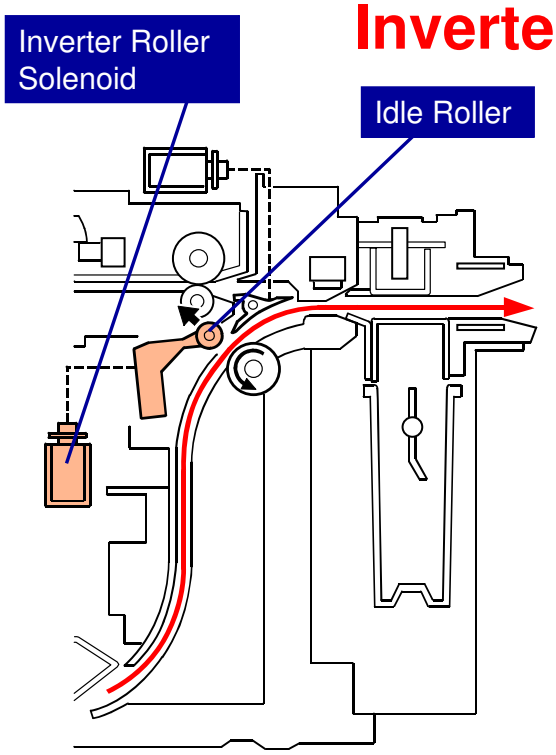


Inverter Mode

- When the entrance sensor detects the leading edge, the inverter junction gate solenoid turns on and the inverter junction gate opens the path to the inverter.
- The inverter roller feeds the paper into the inverter path for a set period of time.
- When the roller stops, the inverter roller in the main machine still holds the trailing end of the paper.

❒ This shows what happens when duplex is selected, if the finisher is installed.

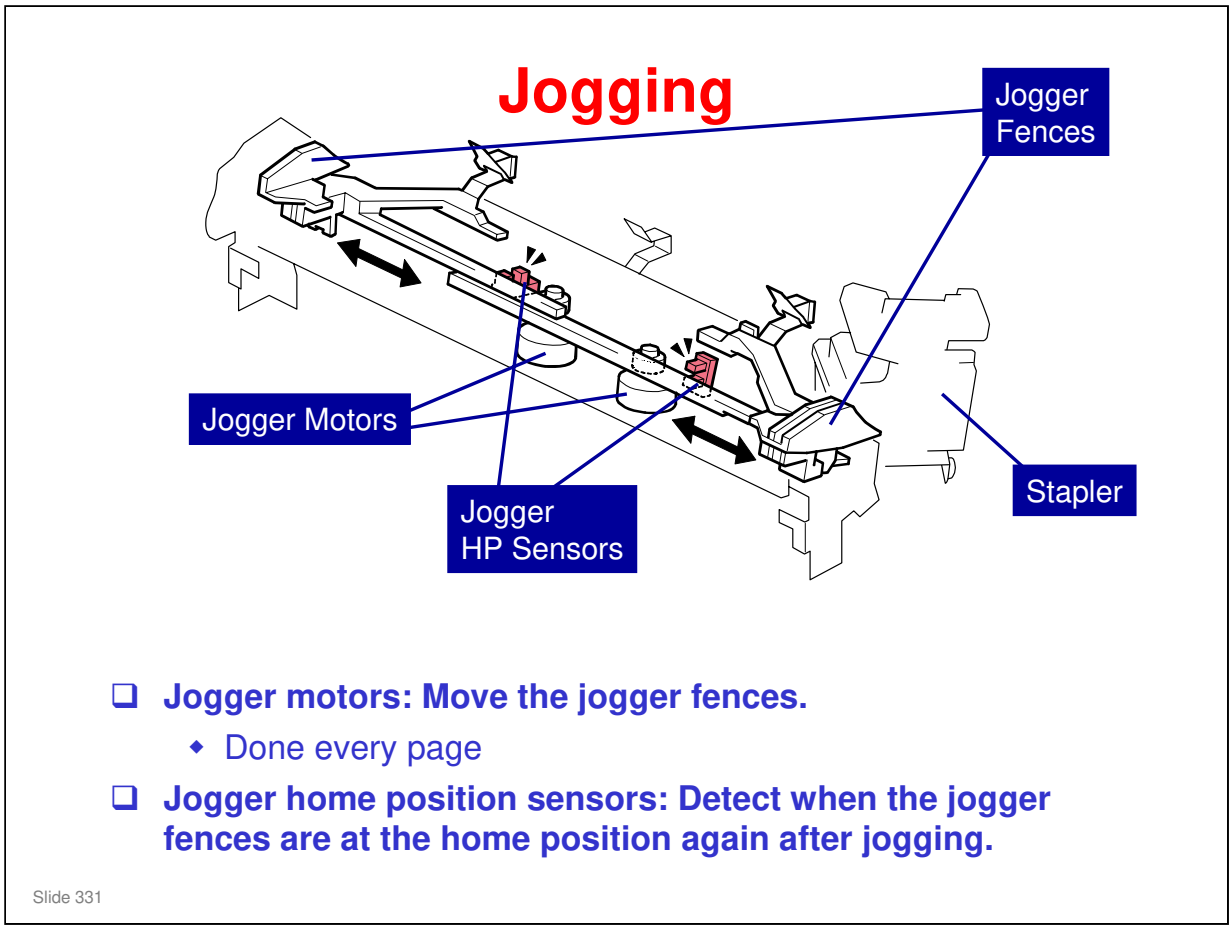
Inverter Mode



- **The inverter roller in the main machine feeds the paper to the duplex unit.**
  - The inverter roller in the finisher cannot rotate in reverse
  - Because of this, the inverter roller solenoid moves the idle roller away from the inverter roller of the finisher.
- **The inverter junction gate solenoid turns off to close the inverter junction gate after the trailing edge of the paper passes the entrance sensor.**

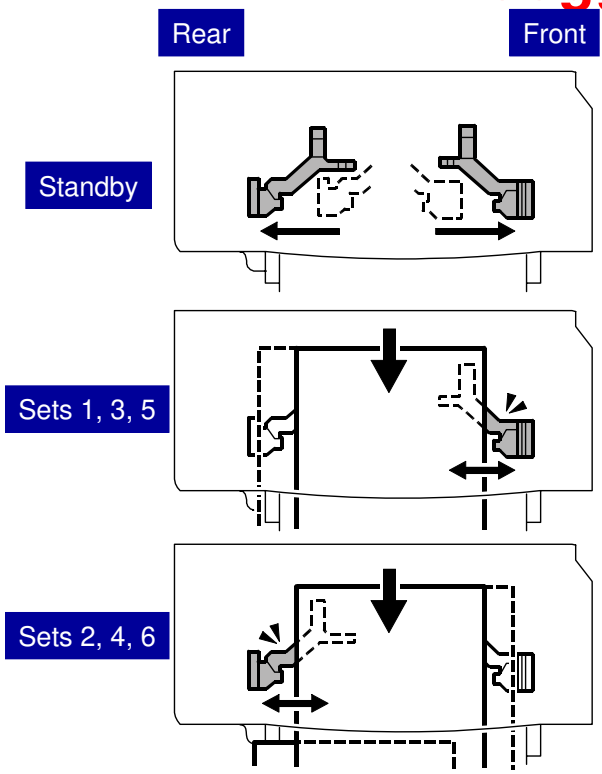
Slide 330

- This shows how the paper is fed back into the duplex unit of the machine.



No additional notes

Jogging

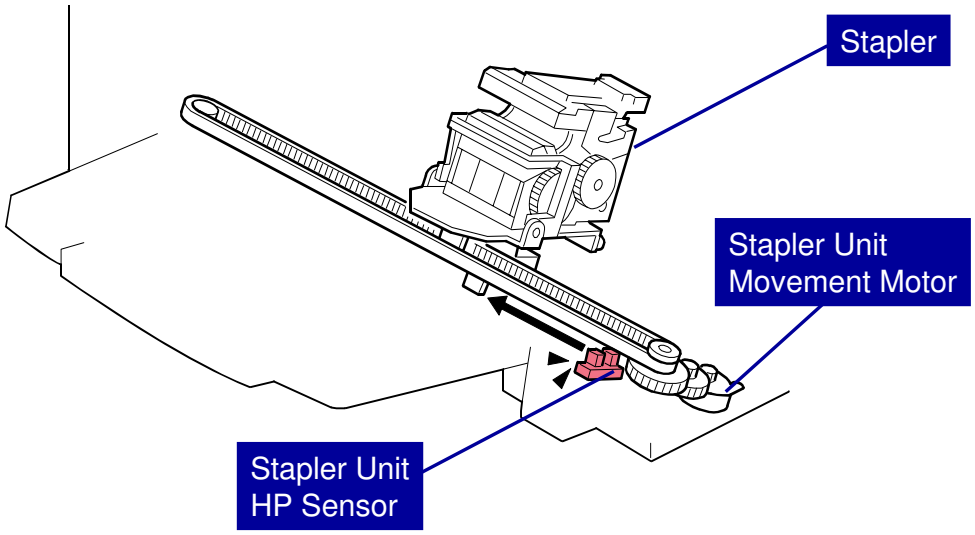


- **In standby mode, the jogger fences move away from the center.**
- **In sort mode, the sets are separated as follows:**
  - Odd-numbered sets (set 1, 3, 5, etc): The front fence jogs the output.
  - Even-numbered sets (set 2, 4, 6, etc): The rear fence jogs the output.
- **In staple mode, only the front jogger fence moves.**

Slide 332

No additional notes

Stapler Unit Movement



- The stapler unit movement motor moves the stapler to the correct position for stapling.

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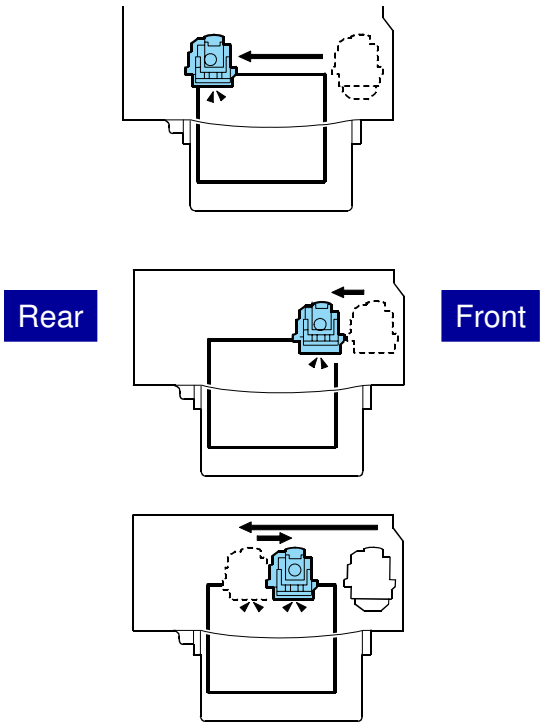
No additional notes

Stapling Positions

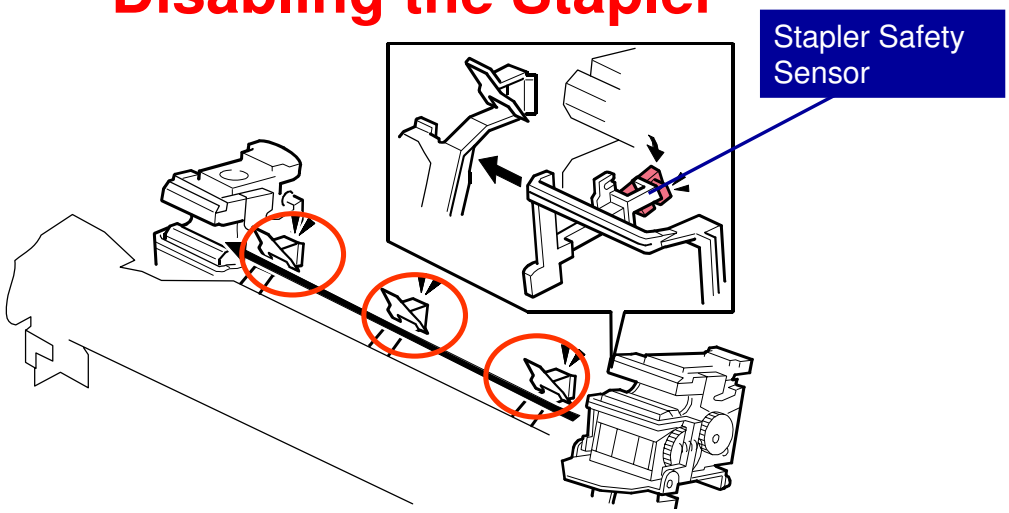


- **There are three stapling positions.**
  - One staple at the trailing edge (rear only)
  - One staple at the trailing edge (front only)
  - Two staples at the trailing edge (front and rear)

Slide 334

No additional notes

Disabling the Stapler



- There are three fences in the stapler path. The stapler must not staple these fences.
- To disable the stapler, an actuator in the stapler is pushed into the stapler safety sensor when the stapler is at one of these fences.
- When the machine detects this actuator, the stapler will not operate.

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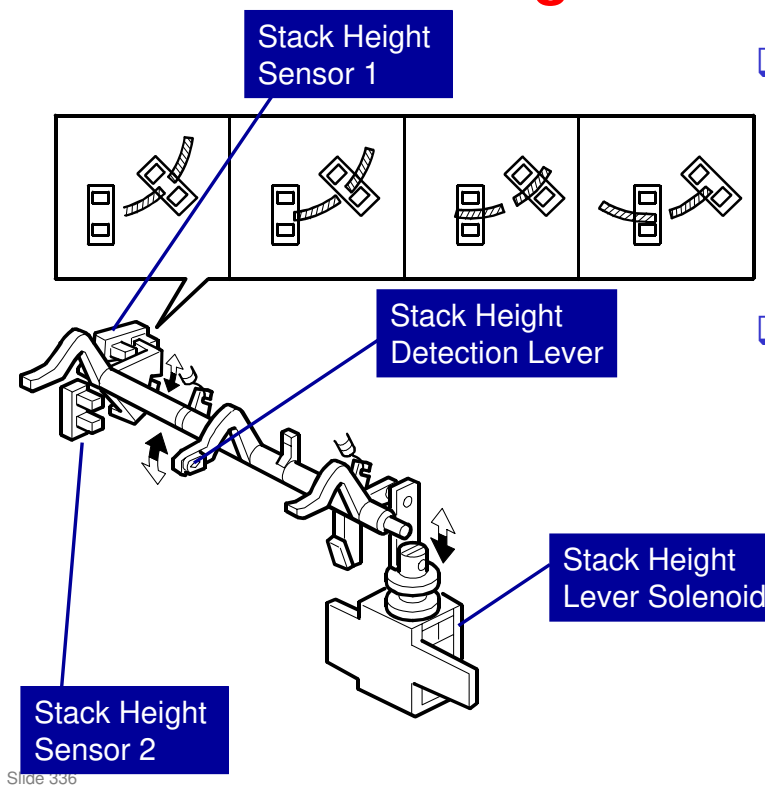
- The three fences are shown in red circles in the diagram.

Stack Height Detection



- **Stack height lever solenoid: Moves the detection lever to the top of the stack**
- **Stack height sensors: These make sure that the top of the stack is at the correct height.**

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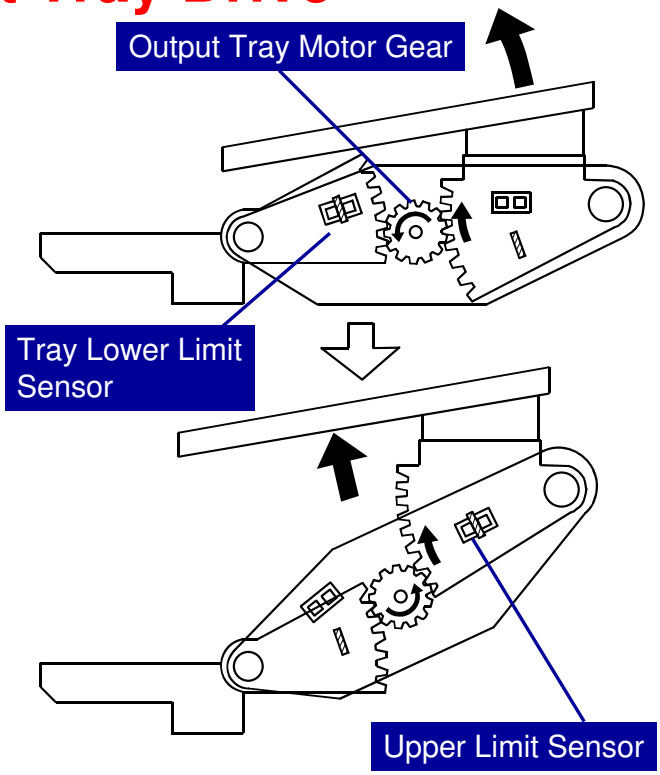
- This shows how the stack height is detected. If the stack height is above a set level, the output tray must move down.
- The outputs from the two sensors tell the machine what to do.
  - Sensor 1 and 2 both off: The stack height is below the target. The output tray is then lifted to the target position.
  - Sensor 1 on, sensor 2 off: Target stack height position
  - Sensor 1 and 2 both on: The stack height is above the target. The output tray is then lowered to the target position.
  - Sensor 1 off, sensor 2 on: The stack height detection lever is at home position.
  - 'Off' means 'Actuator not in sensor'
- At the start of a print job, the solenoid turns on. The stack height detection lever comes down, to detect the current stack level.
- When a sheet of paper is being fed out, the solenoid turns off and the lever goes back up to home position (inside the unit).
- After paper has been fed out, the solenoid turns on again, and the lever detects the level of the stack.

Output Tray Drive

- Output tray motor: Moves the output tray up or down if the top of the stack is not at the correct height
- Tray lower limit sensor: Detects when the tray cannot be moved down more
- Upper limit sensor: Detects when the tray cannot be moved up more



Slide 337

Overview

- The output tray motor gear lifts/lowers the tray if the stack height is not at the target position.
- The output tray motor turns the two sector gears. These gears keep the tray at the same angle during up/down movement.

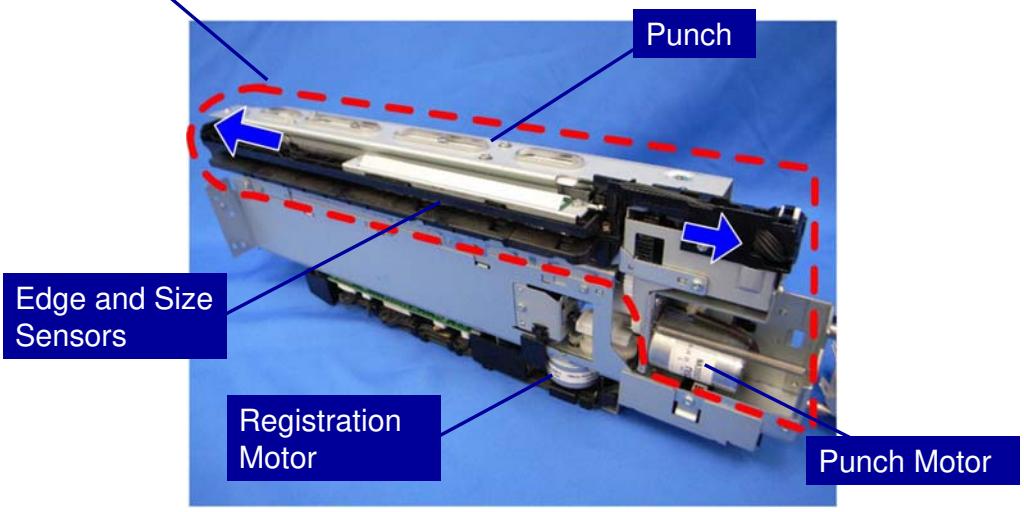
Output Tray Downward Movement

- The top of the paper stack is checked after every page (or set of pages) has been fed out. If the top of the stack is higher than the target level, the output tray motor moves the tray down.
- When the tray lower limit sensor detects the actuator on the sector gear (the gear on the left in the diagram), a stack near-limit signal is transferred to the main frame. The tray cannot move any lower. The next time the top of the stack height is above the target level, printing stops.

Output Tray Upward Movement

- If paper is removed from the stack, the top of the stack will be lower than the target level, and the output tray motor moves the tray up.
- When the tray upper limit sensor detects the actuator on the other sector gear, the tray cannot be moved up any more, so the motor stops.

Punch Unit - Overview



- **The punch slider unit moves from side to side, to make sure that the punch holes are made at the correct location.**
- **The punch slider unit consists of the punch, punch motor and paper edge and size sensors, and it is driven by the registration motor.**

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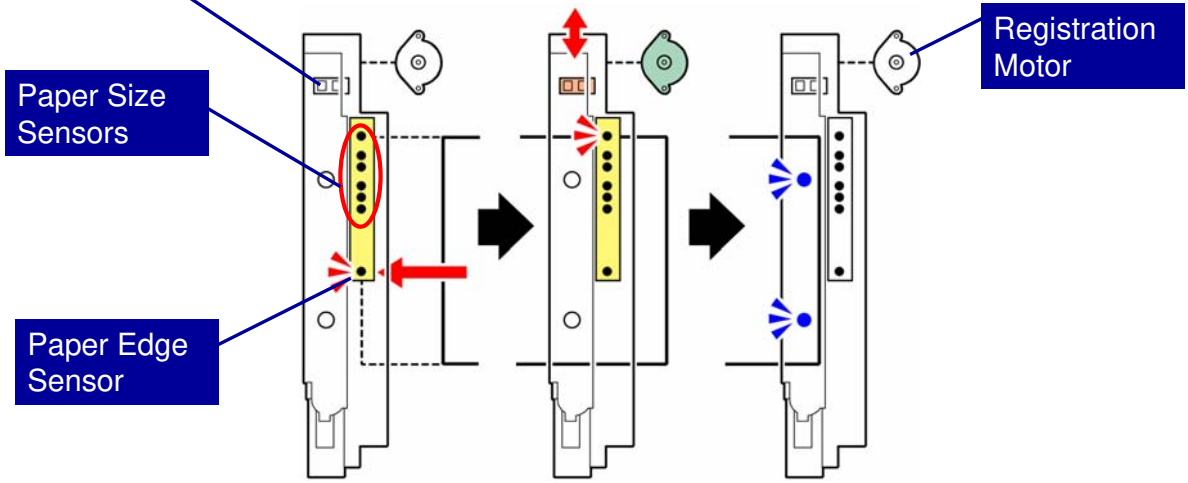
- The punch slider unit is surrounded by the red dotted line in the photo.

Punch Unit - Registration



- When the paper comes from the main machine, the paper edge sensor detects the leading edge.
- The registration motor moves the slide unit towards the front, until the paper size sensor that corresponds to the paper size detects the rear edge of the paper.
- When the paper edge sensor detects the trailing edge of the paper, the paper transport motor (of the finisher) stops, and the punch holes are made (shown in blue in the diagram).

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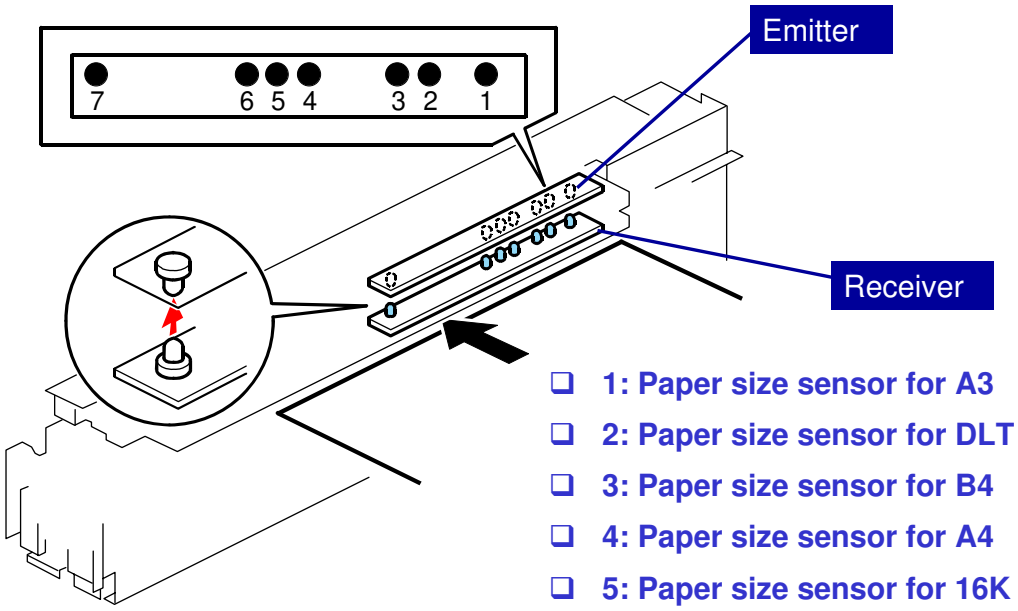
- The registration home position sensor detects when the slide unit is at home position (in other words, when the paper edge sensors are at home position).

Paper Edge and Size Sensors



- 1: Paper size sensor for A3
- 2: Paper size sensor for DLT
- 3: Paper size sensor for B4
- 4: Paper size sensor for A4
- 5: Paper size sensor for 16K
- 6: Paper size sensor for B5
- 7: Paper edge sensor

Slide 340

- The paper sizes shown above are for short-edge feed (SEF).

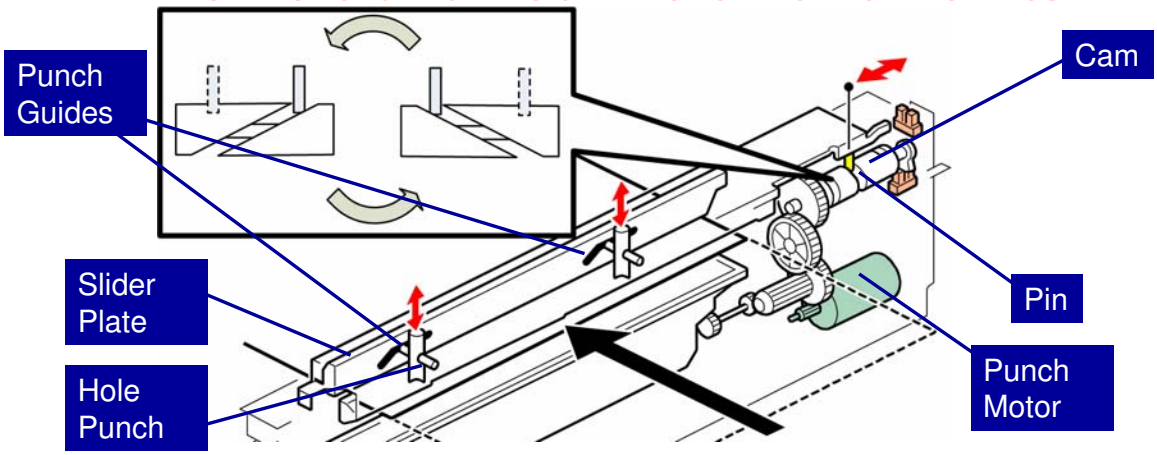
Punch Units

- **There are four types:**
  - 2 holes
  - 2 or 3 holes
    - » The user can select 2-hole punching or 3-hole punching from the operation panel or the printer driver.
  - 4 holes
    - » There are two 4-hole types: for North Europe, and for other areas.

Slide 341

No additional notes

Two-hole and Four-hole Punch Units

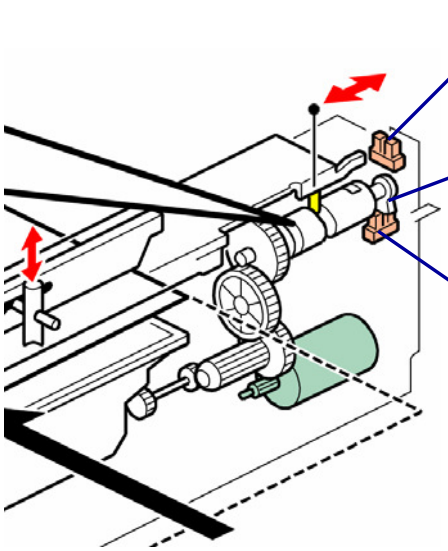


- The punch motor turns a cam. A pin moves along a helical groove in this cam, and this pin moves the slider plates to the front and to the rear (only one slider plate is visible in this drawing).
- The hole punches are attached to the slider plates. Pins attached to the hole punches are linked to punch guides that are carved into the slider plates.
- When the slider plate moves side to side, the hole punches move down and up to make holes in the paper. All punches move at the same time.

Slide 342

- The two-hole punch unit and the four-hole punch unit have the same mechanism.
- The two-hole punch unit is described here.

Two-hole and Four-hole Punch Units

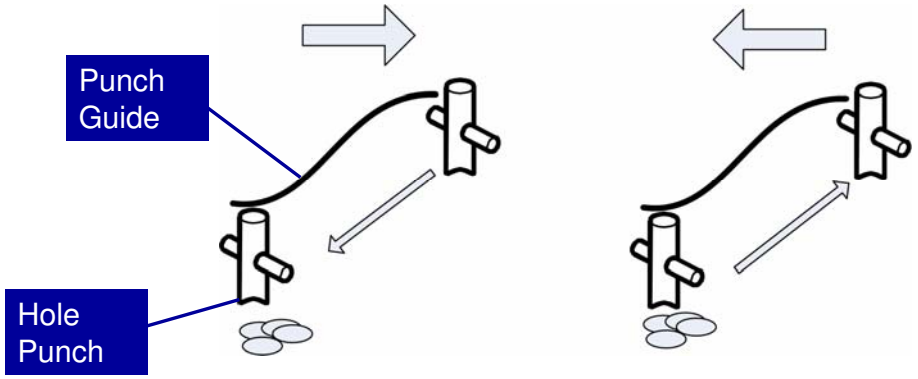


- These two sensors control the positioning of the slider plates.
- When the actuator enters the rear limit position sensor, the machine detects that a hole has been punched.

Slide 343

No additional notes

Two-hole and Four-hole Punch Units

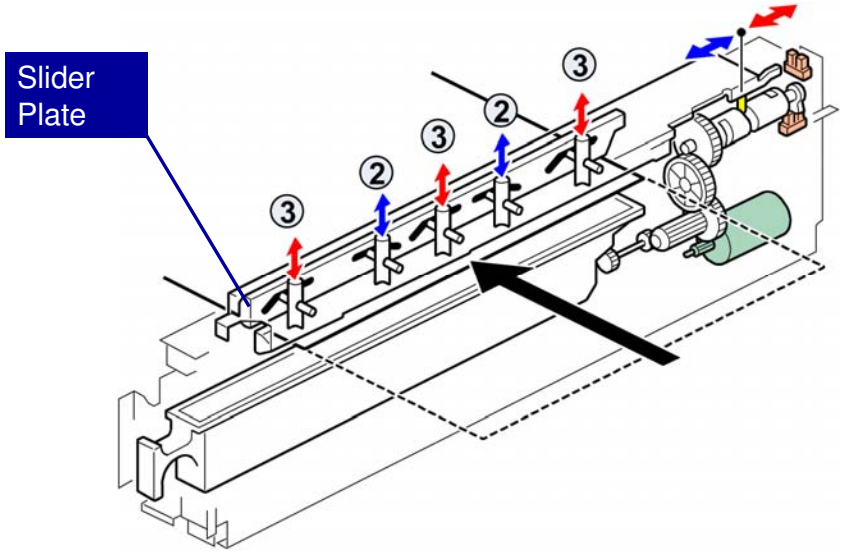


- For the first sheet of paper, the punch motor moves the slider plate to the rear.
- The punch guide forces the hole punch to move down, to punch a hole in the paper.
- The punch motor continues to rotate in the same direction, until home position is detected again.
- The punch motor then changes direction to punch the holes in the next sheet of paper. The slider plates move to the rear again, to punch the holes in the paper.

Slide 344

- The punch motor alternately turns forward and in reverse for alternate sheets of paper. But the slider plate always moves to the rear to punch the paper, because of the shape of the groove in the cam.
- Why does the punch unit change direction between sheets? This is so that the actuator of the punch waste detection mechanism can move back across the punch waste hopper. It is driven by the same motor, and if the motor turns in the same direction for a long time (during a long job), punch waste can build up without being detected.

Two-hole and Three-hole Punch Unit

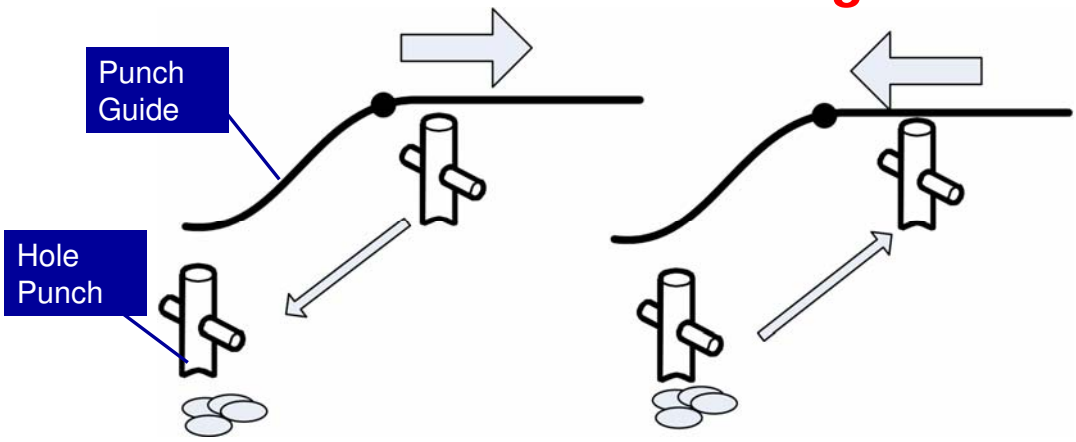


- **Similar to the two-hole and four-hole punch units, except:**
  - To punch two holes, the slider plate moves to the front
  - To punch three holes, the slider plate moves to the rear.

Slide 345

No additional notes

Three-hole Punching

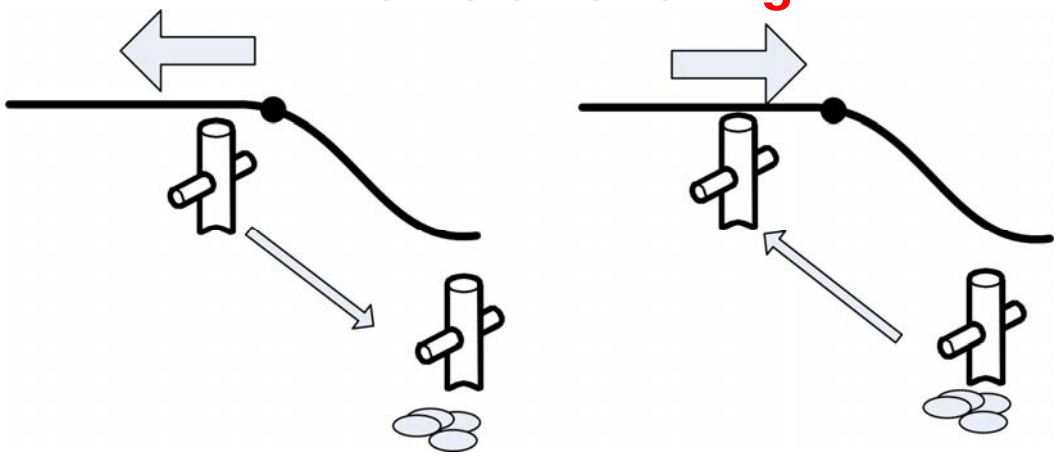


- For the first sheet of paper, the punch motor moves the slider plate to the rear.
- The punch guide forces the hole punch to move down, to punch a hole in the paper.
- The punch motor then changes direction until home position is detected again.
- For the next sheet, the punch motor moves the slider plate to the rear again. It does not turn in the opposite direction.

Slide 346

- If the slider plate is moved to the front from home position, the three-hole punches do not move down to the paper. However, the two-hole punches do move down, as we shall see on the next slide.

Two-hole Punching

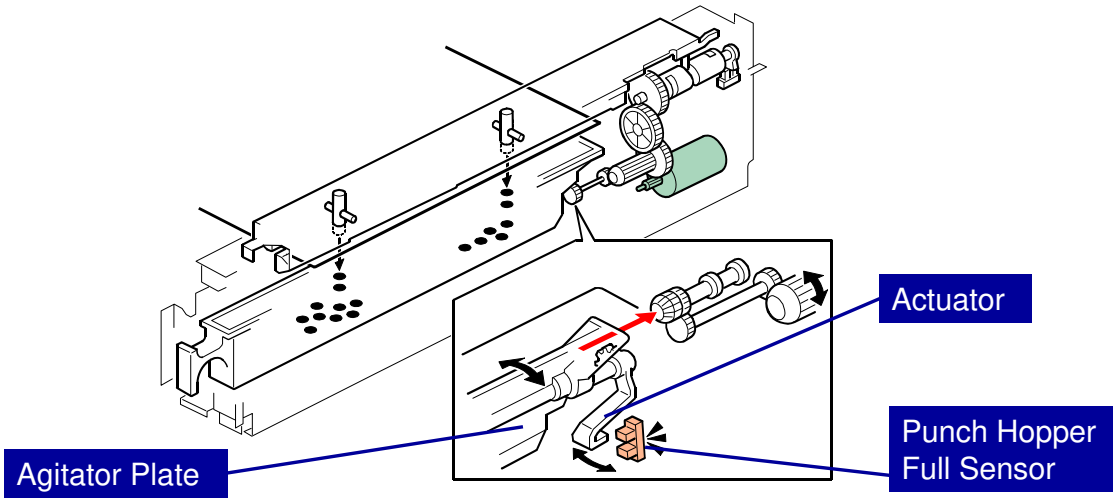


- For the first sheet of paper, the punch motor moves the slider plate to the front.
- The punch guide forces the hole punch to move down, to punch a hole in the paper.
- The punch motor then changes direction until home position is detected again.
- For the next sheet, the punch motor moves the slider plate to the front again. It does not turn in the opposite direction.

Slide 347

- If the slider plate is moved to the rear from home position, the two-hole punches do not move down to the paper. However, the three-hole punches do move down, as we saw on the previous slide.

Punch Waste Hopper Full Detection



- **An actuator is attached to the rear edge of the agitator plate. This plate keeps the punch waste in the hopper level.**
- **When the punch motor rotates forward and in reverse to punch the paper, the agitator plate is also moved from right to left.**
- **If the punch full sensor does not detect the movement of the actuator for a set time, the machine decides that the punch hopper is full.**

Slide 348

- The punch hopper full sensor checks the actuator at initialization and while the punch unit is active.
- If the punch hopper is not set in the punch unit and the punch full sensor does not detect the actuator after a set time at power on, the machine also decides that the punch hopper is full.
  - There is no punch hopper set sensor. If the waste hopper is not in the machine when you turn the power on, the machine will not detect the actuator, and will display ‘punch waste hopper full’.
- Two/four hole punch unit: The punch motor changes direction between sheets. This is so that the actuator can move back across the punch waste hopper. It is driven by the same motor, and if the motor turns in the same direction for a long time (during a long job), punch waste can build up without being detected.

Replacement

- Before you remove the covers from the finisher, you must remove the finisher from the machine.

Slide 349

No additional notes

SP Modes Related to this Finisher

- SP6101: Stapling position
- SP6102: Punch position (sub scan)
- SP6104: Punch position (main scan)

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No additional notes

RICOH

Di-C1.5 TRAINING

MAINTENANCE

Slide 351

No additional notes

PM

- **PM cycle: 60K**
  - 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.
- **Peripherals: At EM only**
- **Refer to the Maintenance Tables in the FSM for detailed PM and EM Tables**
  - FSM → Appendices → Preventive Maintenance Tables

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Service manual, Appendix, Maintenance Tables

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)

Slide 353

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).

Slide 354

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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- Study the 'Before removing the old PM parts' and 'After installing the new PM parts' procedures in 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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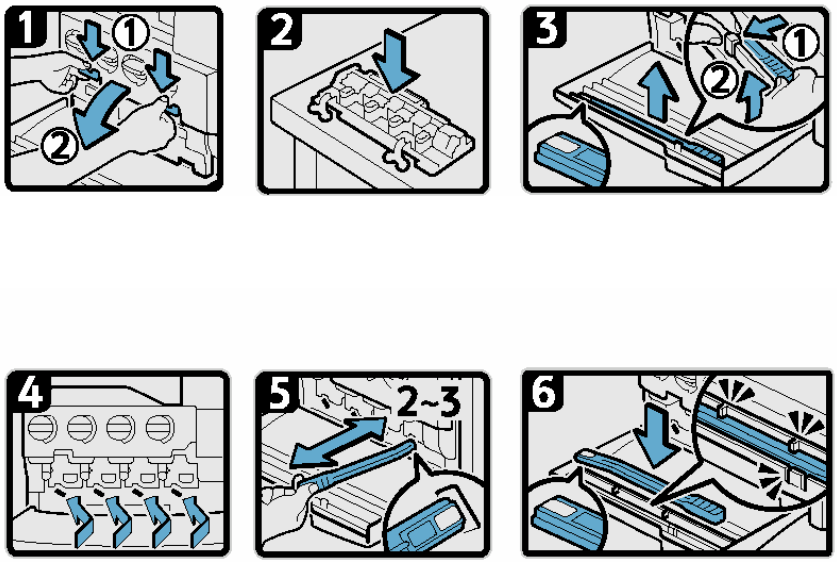
❒ Ask the class to study the 'Preparation before operation check' procedure in the manual.

Service Maintenance - Cleaning

- The service manual shows which parts of the machine and optional equipment must be cleaned when you visit the machine.
- The cleaning tool for the dust shield glass is stored in the front cover, as shown below.



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No additional notes

Important Notes to Remember for PM

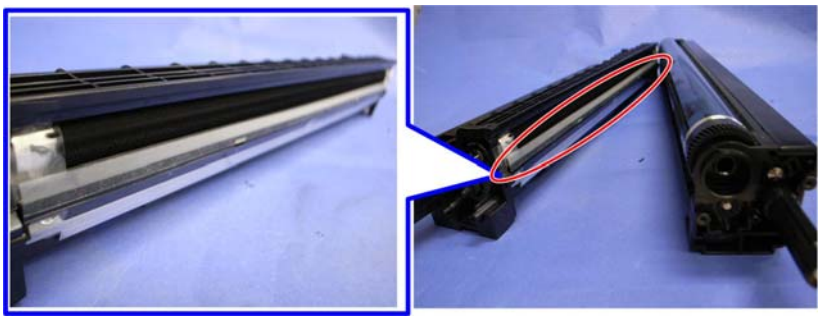
Slide 358

No additional notes

Drum Unit

When installing the new drum unit :

- Clean around the entrance sheet of the development unit



New unit set & PM counter reset

item	SP
Drum Unit K,C,M,Y	SP3-902-009 to -012

Slide 359

No additional notes

RICOH

Di-C1.5 TRAINING

TROUBLESHOOTING

Slide 360

- 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 3-325**
  - **000 = Front, Center, Rear**
    - e.g. 111 → Successfully completed
- **Process Control Self-Check Result: SP3-012**
  - **YY CC MM KK: 11 11 11 11 ~ 99 99 99 99**
    - e.g. 11 → Successfully completed
- **Line Position Adjustment Result: 2-194-10~12**

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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

Slide 362

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’.

Slide 363

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

- SP 7504 shows details on jams that occur in each section of the machine.
- SP 7507 can be used to show details on the 10 most recent jams.

Slide 364

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.

Slide 365

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 D 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.

Service Manual - 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: ADF input tests
- 6-008: ADF output tests
- 6-120: Finisher input tests
- 6-121: Finisher 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/jam counter reset

Slide 370

No additional notes

SP Modes - Others

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

Slide 371

No additional notes

RICOH

Di-C1.5 TRAINING

D555: Fax Option Type C2551

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No additional notes

Fax Option

- Fax option is slid in from the rear side of the machine.
- See the installation procedure in the Fax Option Type C2551 FSM.

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No additional notes.

General Specifications

Resolution:	G3: Standard: 8 x 3.85 lines/mm, 200 x 100 dpi Detail: 8 x 7.7 lines/mm, 200 x 200 dpi Fine: 8 x 15.4 lines/mm Super Fine: 16 x15.4 lines/mm, 400 x 400 dpi Super Fine: Optional Expansion Memory required

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❒ There is no optional G3 interface unit.

General Specifications

Data Compression:	MH, MR, MMR, JBIG
Protocol:	Group 3 with ECM
Modulation:	V.34, V.17 (TCM), V.29 (QAM), V.27ter (PHM), V.21, V.8 (FSK)
Data Rate:	G3: 33600/31200/28800/26400/24000/21600/ 19200/16800/14400/12000/9600/7200/4800/ 2400 bps Automatic fallback
I/O Rate:	With ECM: 0 ms/line Without ECM: 5, 10, 20, or 40 ms/line

Slide 375

No additional notes

General Specifications

Memory Capacity:	ECM: 128 KB SAF: Standard: 4 MB With optional Expansion Memory: 28 MB Page Memory: Standard: 4 MB x 2 With optional Expansion Memory: 8 MB x 2

Slide 376

No additional notes

Preventing Transmission to the Wrong Destination

- **If you want to prevent documents being sent to the wrong destination, you can configure the machine to do the following:**
  - Prompt users more than once for the destination
    - » How many times will the user have to input the destination: User parameter switch 22, bits 7 to 4 (1 to 15 times)
    - » To disable this feature, set all 4 bits to 0.
    - » Cannot be used from the Simplified Display
  - Display the entered destination prior to transmission
    - » Enable/disable: User parameter switch 17, bit 4
    - » Does not work with manual dial or on-hook dial
    - » Cannot be used from the Simplified Display
- **To avoid accidentally specifying multiple destinations, you can disable broadcasting.**
  - You cannot specify group destinations if you disable broadcasting. You can specify only one address at a time.
    - » Enable/disable: User parameter switch 17, bit 1

Slide 377

- New features have been added to help the user prevent transmission to the wrong destination.

Replacement and Adjustment

- **FCU**
  - When you replace the FCU board, remove the MBU board from the old FCU board and install it on the new FCU board.
  - Set the correct date and time with the User Tools: User Tools> System Settings> Timer Setting> Set Date/Time
- **NOTE:**
  - Do not turn off the battery switch (SW1).
  - Do SP6101 (Fax SP) to print the system parameters, and check the settings.

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No additional notes

FCU

- **FACE3 (Fax Application Control Engine)**
  - CPU
  - Data compression and reconstruction (DCR)
  - DMA control
  - Clock generation
  - DRAM backup control
- **Ricoh Modem and NCU Circuit**
  - V.34, V.17, V.29, V.27ter, V.21, and V.8
  - Data transfer
  - Line control
  - Ringing signal/tone detection

Slide 379

No additional notes

FCU

- **DRAM**
  - The 16 MB of DRAM is shared as follows.
    - » SAF memory: 4 MB
    - » Page memory: 4 MB for scanning, 4 MB for printing
    - » Work area, cache: 4 MB
- **Memory back-up**
  - A rechargeable battery backs up the SAF memory (DRAM) for 1 hour.

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No additional notes

MBU

- **On this board, the flash ROM contains the FCU firmware, and the SRAM contains the system data and user parameters. Even if the FCU is changed, the system data and user parameters are kept on the MBU board.**
- **ROM**
  - 3MB flash ROMs for system software storage
  - 2MB (16bit x 1MB) + 1MB (16bit x 512K)
- **SRAM**
  - The SRAM for system and user parameter storage is backed up by a lithium battery (battery life: 5 years).
    - » 256 KB

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No additional notes

MBU

- **Memory back-up**
  - A lithium battery backs up the system parameters and programmed items in the SRAM, in case the base copier's main switch is turned off.
- **Switch**
  - CN1: Switches the SRAM backup battery on/off.

Slide 382

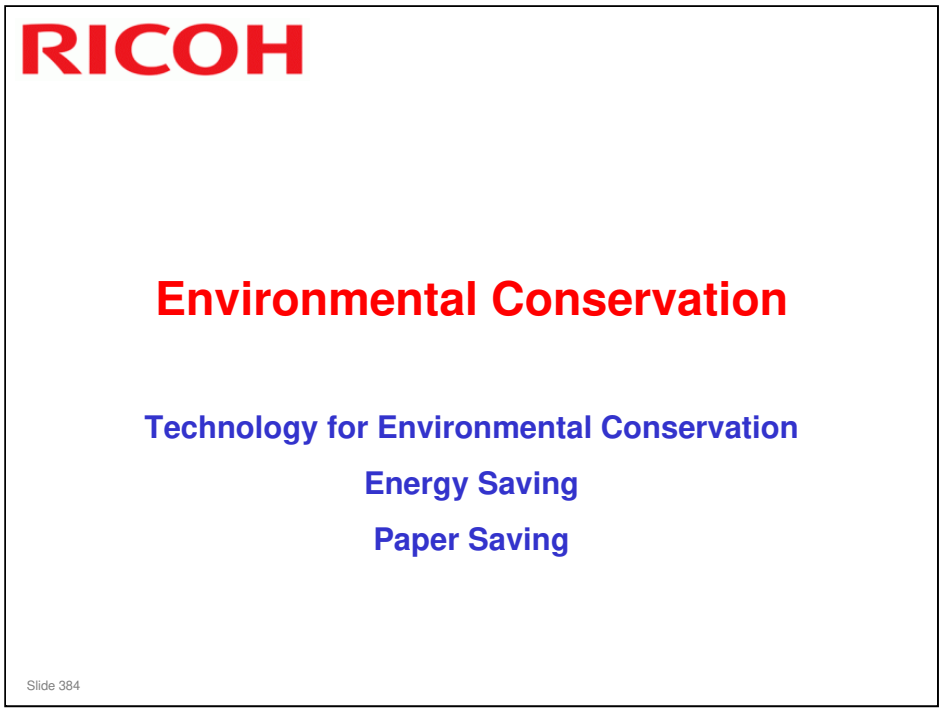
No additional notes

Stamp

- SP 6010: Adjusts the position of the stamp on the original in the sub scan direction.

Slide 383

No additional notes



❒ This section explains the technology used in this machine for environmental conservation, and the default settings of related functions.

Technology for Environmental Conservation

**: New or modified function
*: Has this function
Blank: Does not have this function

Environmental Technology/Feature	Description	New model Di-C1.5	Old model Di-C1
1. QSU	- Reduction of warm-up time (Energy saving) - Reduction of CO_2 emissions	**	*
2. Hybrid QSU			
3. IH QSU			
4. Paper-saving features	- Allows documentation to be managed digitally, cutting down on paper consumption. - Improves machine productivity when printing out duplex (double-sided) images.	*	*
5. High-speed duplex output	- Improves machine productivity when printing out duplex (double-sided) images	*	*
6. Ozone reduction design	- Low ozone emissions	*	*
7. PxP (polymerized) toner	-Energy saving - Conservation of materials/resources (reduced toner consumption)	*	*
8. Noise reduction design	- Low noise	*	*
9. Minimization of harmful substances	- Minimization of harmful substances	*	*
10. Environmentally-friendly toner bottle	- Conservation of materials/resources	*	*
11. Toner recycling		*	*
12. Recycle-friendly design		*	*

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❒ This slide explains what technologies are used for conserving the environment in this product.

Brief Descriptions of the Technologies

- **1. QSU (Quick Start-up)**
  - This technology reduces both the amount of energy consumed while in Standby mode (the Ready condition) is reduced, as well as the time it takes for the machine to warm up to the Ready condition.
  - This is made possible through the utilization of dual fusing lamp heating, low fusing point toner, a pressure roller with a "sponge" surface layer, and a thin surface layer heating roller.
- **2. Hybrid QSU**
  - This technology adds an additional circuit to conventional QSU Technology, which allows the benefits of reduced energy consumption and reduced warm-up time described above to be extended to high-speed machines.

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No additional notes

Brief Descriptions of the Technologies

- **3. IH QSU**
  - This technology incorporates IH (Inductance Heating) technology into conventional QSU technology, which allows the benefits of reduced energy consumption and reduced warm-up time to be extended to color machines.
- **4. Paper-saving features**
  - 1) The duplex (double-sided) and Combine features reduce paper consumption.
    2) The Document Server and other electronic document management features reduce paper consumption by offering an electronic method for storing and managing important documents.

Slide 387

No additional notes

Brief Descriptions of the Technologies

- **5. High-speed duplex output**
  - 1) Enables high-speed duplex printing through the utilization of the Duplex Interleaf and high-speed Inverter Transport features.
  - 2) Enables quick printing of duplex jobs through the use of Duplex Scanning.
- **6. Ozone reduction design**
  - Greatly reduces the machine's ozone emissions to near-zero levels by utilizing:
    1) A charge roller/belt instead of a corona wire
    2) An image transfer roller/belt instead of a corona wire-based transfer system

Slide 388

No additional notes

Brief Descriptions of the Technologies

- **7. PxP (polymerized) toner**
  - "PxP toner" is a fine-particle, polyester resin based toner, manufactured using a Ricoh-original polymerization method instead of the conventional pulverization method.
  - This allows the toner to fuse at a lower temperature, which reduces the impact on the environment and contributes to achieving even higher image quality than before.
  - PxP toner also has other benefits, including a reduction in the amount of toner needed to develop the image, as well as an approximate 35% reduction in CO_2 emissions during the toner manufacturing process.

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No additional notes

Brief Descriptions of the Technologies

- **8. Noise reduction design**
  - 1) The machine and its components are designed to minimize the overall noise generated by the machine. As a result, all noise levels conform to the local laws and regulations as well as user requirements in each market in which the products are sold.
  - 2) Reduces the noise generated by the polygon mirror motor.
- **9. Minimization of harmful substances**
  - 1) Products sold in the EU conform to the RoHS Directive.
  - 2) Products sold in China conform to China's version of the RoHS Directive.
  - 3) In addition, Ricoh imposes strict internal standards for limiting the presence of harmful substances.

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No additional notes

Brief Descriptions of the Technologies

- **10. Environmentally-friendly toner bottle**
  - A changeover from PS/PP/HDP to PET plastics allows approximately 40 percent by weight of the toner bottle to be recycled, and also reduces CO_2 emissions that occur during the toner bottle manufacturing process.
- **11. Toner recycling**
  - Enables effective use of resources by recycling (reusing) the toner left over on the drum surface after image transfer.
- **12. Recycle-friendly design**
  - To maximize the recycling ratio of machine and component materials, as well as the ease of performing the recycling in the field, machine sections and components are designed so that the recyclable parts can be separated out easily.
  - In addition, components are designed so that they can be reused for as long as possible after the machine has reached its operational lifetime.

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No additional notes

Quick Start-up

- **QSU reduces the operating temperature, because of these improvements in fusing unit technology**
  - Reduced thickness of the heating roller.
  - Low melting-point toner.
- **This also means that the warm-up time and recovery time from energy saver modes are also reduced.**
  - Recovery time (23 s →10 s)

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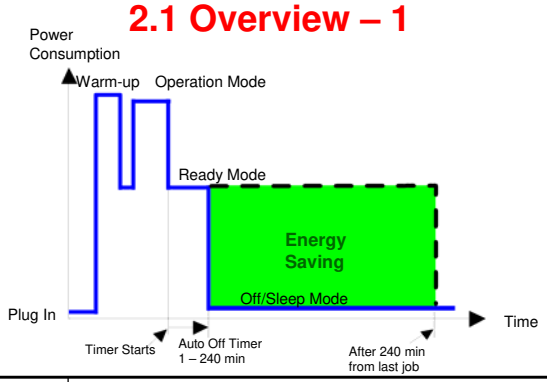
- Through major reductions in warm-up time and recovery time from energy saver modes (Low power, Off/Sleep), QSU (Quick Start Up) Technology has eliminated the traditional trade-off between energy saving and convenience of speed.
- The IH (induction heating) method used in the Apollon series is also a part of this technology.

2. Energy Saving

2.1 Overview – 1



Energy Saver Modes	Description
Auto Off Mode	If no printer/scanner or fax unit is installed: No power is supplied to the printing engine and the controller.
Sleep Mode	When a printer/scanner or fax unit is installed: No power is supplied to the printing engine, and almost none to the controller.

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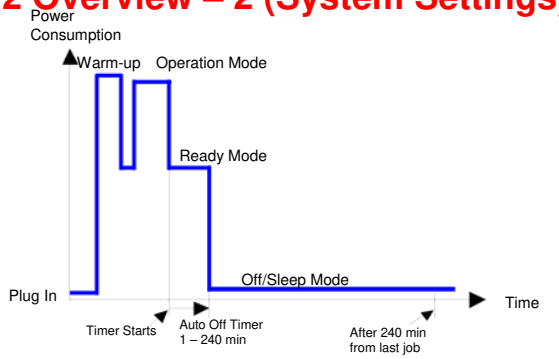
- When the machine is not being used, the machine enters energy saver mode to reduce the power consumption by turning off the LCD of the operation panel and lowering the fusing temperature.
- The area shaded green in this diagram represents the amount of energy that is saved when the timers are at the default settings. If the timers are changed, then the energy saved will be different. For example, if the timers are all set to 240 minutes, the green area will disappear, and no energy is saved before 240 minutes expires.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.2 Overview – 2 (System Settings)



1) Timer settings and recovery time (System settings => Timer setting)

Mode	Timer	Default	Setting range	Recovery time
Off/Sleep Mode	Auto Off Timer	1 minute	1 to 240 minutes	10 seconds

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- The user can set these timers with User Tools
  MFP/ Priport: User Tools > System settings > Timer Setting
  Printer : User Tools > System settings > Energy Saver Timer
- Normally, Panel Off timer < Energy Saver timer < Auto Off timer.
- But, for example, if Auto Off timer < or = Panel Off timer and Energy Saver timer, the machine goes immediately to Off mode when the Auto Off timer expires. It skips the Panel Off and Energy Saver modes.
- Example
  - Panel off: 1 minute, Low power: 15 minutes, Auto Off: 1 minute
  - The machine goes to Off mode after 1 minute. Panel Off and Low Power modes are not used.
- We recommend that the default settings should be kept.
  - If the customer requests that these settings should be changed, please explain that their energy costs could increase, and that they should consider the effects on the environment of extra energy use.
  - If it is necessary to change the settings, please try to make sure that the Auto Off timer is not too long. Try with a shorter setting first, such as 30 minutes, then go to a longer one (such as 60 minutes) if the customer is not satisfied.
  - If the timers are all set to the maximum value, the machine will not begin saving energy until 240 minutes has expired after the last job. This means that after the customer has finished using the machine for the day, energy will be consumed that could otherwise be saved.
  - If you change the settings, the energy consumed can be measured using SP8941, as explained later in this presentation.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.2 Energy Saver Mode: Condition of LEDs

❑ **Condition of LEDs on the operation panel**

Mode	Operation Switch LED	Energy Saver LED	Main Power LED
Off/Sleep Mode	Off	Off	On

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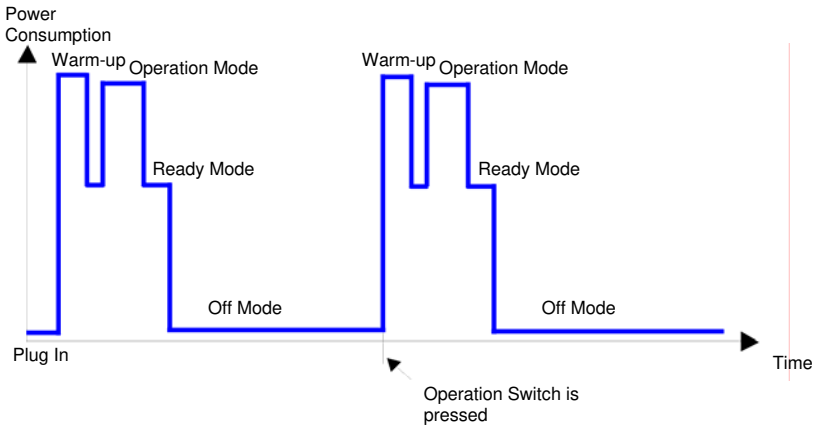
No additional notes

2. Energy Saving

2.2 Energy Saver Mode: Off Mode – 2

- **The machine recovers to the ready condition if the operation switch is pressed.**



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- This timing chart shows what happens if the operation switch is pressed while the machine in off mode.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.2 Energy Saver Mode: Sleep Mode – 1

- **Sleep mode is used instead of auto off mode when a printer/scanner or fax unit is installed.**
- **The machine enters sleep mode when one of the following is done.**
  - The auto off timer runs out after the last job.
  - The operation switch is pressed to turn the power off.
- **When the machine enters sleep mode, no power is supplied to the printing engine, and almost none to the controller.**
- **Recovery time**
  - Less than 10 seconds

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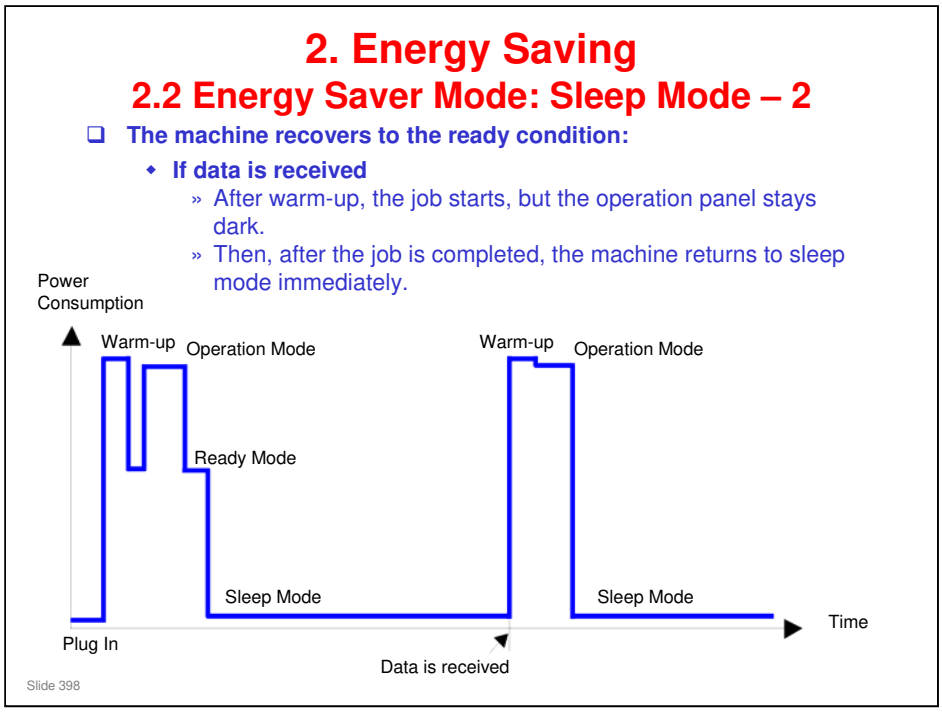
No additional notes

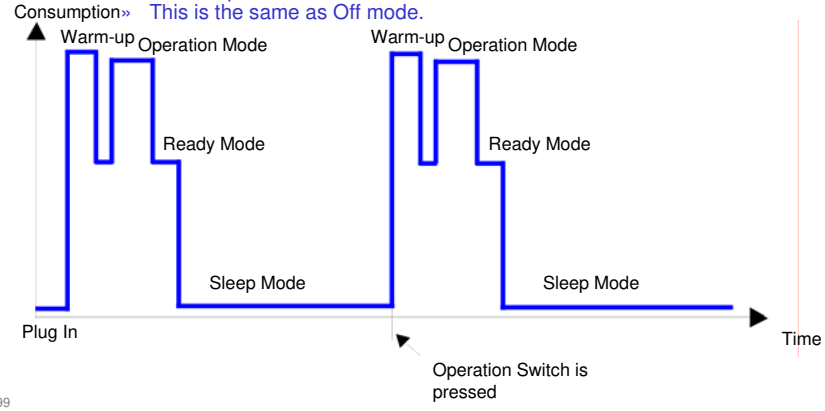


- This timing chart shows what happens if data is received while the machine is in sleep mode.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving

2.2 Energy Saver Mode: Sleep Mode – 3

- **The machine recovers to the ready condition:**
  - **If the operation switch is pressed**
    - » The operation panel lights. When warm-up is finished, the machine goes to the ready condition.
    - » Then, after the job is completed, the machine returns to sleep mode (via ready mode) when the auto off timer runs out or the operation switch is pressed.
    - » This is the same as Off mode.



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- This timing chart shows what happens if the operation switch is pressed while the machine in sleep mode.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.3 Energy Save Effectiveness – 1

- **With the data from SP 8941:Machine Status, and the power consumption values from the specifications, we can estimate the amount of energy that is used by the machine.**
  - 8941-001: Operating mode time
  - 8941-002: Standby mode time
  - 8941-003: Panel off mode time
  - 8941-004: Low power mode time
  - 8941-005: Off/sleep mode time
- **This should only be used as a reference value, because the power consumption specifications are measured in a controlled environment with a constant power supply.**
- **To get an exact measurement at the customers site, a watt meter must be used to measure the actual energy consumed.**

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No additional notes

2. Energy Saving

2.3 Energy Save Effectiveness – 2

(1) At the start of the measurement period, read the values of SP 8941:001-005 (Machine Status), measured in minutes.

(2) At the end of the measurement period,read the values of SP 8941:001-005 (Machine Status), measured in minutes.

(3) Find the amount of time spent in each mode.
(Subtract the earlier measurement from the later measurement and convert the result to hours.)

(4) Power consumption figures for each model are acquired from "Publication System of MSDS_&_PEI (PRODUCT ENVIRONMENT INFORMATION)" database.
Example:

Mode/condition	Power consumption:
Operating mode	1081.8W
Ready mode / Energy Save	214W
Low power mode	146W
Off/Sleep mode	7W

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No additional notes

2. Energy Saving

2.3 Energy Save Effectiveness – 3

(5) Multiply this by the power consumption spec for each mode and convert the result to kWh (kilowatt hours)

(6) This is a simulated value for power consumed.

Example calculations:

Mode/condition	SP8941: Machine Status	Time at Start (min.) (1)	Time at End (min) (2)	Running time (hour) (2) – (1)/60 = (3)	Power Consumption Spec. (W) (4)	Power consumption (KWH) (3) x (4)/1000 = (5)
Operating	001: Operating Time	21089	21386	5.0	1081.8	5.35
Stand by (Ready)	002: Standby Time	306163	308046	31.4	214.0	6.72
Energy save	003: Energy Save Time	71386	75111	62.1	214.0	13.29
Low power	004: Low power Time	154084	156340	37.6	146.0	5.49
Off/Sleep	005: Off mode Time	508776	520377	193.4	7.0	1.35
Total (6)						32.20

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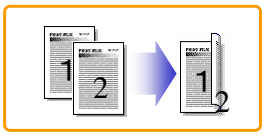
No additional notes

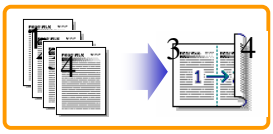
3. Paper Saving
3.1 Measuring the Paper Consumed – 1

1. Duplex: Reduce paper volume in half!



2. Combine: Reduce paper volume in half!

3. Duplex + Combine: Using both features together can further reduce paper volume by 3/4!



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No additional notes

3. Paper Saving
3.1 Measuring the Paper Consumed – 2

- **To check the paper consumption, look at the total counter and the duplex counter.**
  - Total counter : SP 8581 001
  - Single-sided with duplex mode : SP 8421 001
  - Double-sided with duplex mode : SP 8421 002
  - Book with with duplex mode : SP 8421 003
  - Single-sided with combine mode : SP 8421 004
  - Duplex with combine mode : SP 8421 005
- **The total counter counts all pages printed.**
- **The duplex and combine counter counts all pages printed with duplex and combine mode.**

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No additional notes

3. Paper Saving
3.1 Measuring the Paper Consumed – 3

- **How to calculate the paper reduction ratio, when compared with Single-sided copying, with no 2-in-1 combine mode**
- **Paper reduction ratio (%) = Number of sheets reduced: A/Number of printed original images: B x 100**
  - Number of sheets reduced: A
    = Output pages in duplex mode/2＋ Number of pages in Single-sided with combine mode + Number of pages in Duplex with combine mode x 3/2
    A = (②+③+④)/2 + ⑤+⑥ x 3/2
  - Number of printed original images: B
    = Total counter＋ Number of pages in Single-sided with combine mode ＋ Number of pages in Duplex with combine mode
    B = ①+⑤+⑥

① **Total counter**	**: SP 8581 001 (pages)**
② **Single-sided with duplex mode**	**: SP 8421 001 (pages)**
③ **Double-sided with duplex mode**	**: SP 8421 002 (pages)**
④ **Book with with duplex mode**	**: SP 8421 003 (pages)**
⑤ **Single-sided with combine mode**	**: SP 8421 004 (pages)**
⑥ **Duplex with combine mode**	**: SP 8421 005 (pages)**

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In the above formula:

- Sheet: A sheet of paper
- Page: A side of a sheet of paper. In duplex mode, one sheet is two pages
  - Output page: One side of a sheet of output paper
- Original Image: An image of one original page (or, an image of one side of a two-sided original)
  - For one sheet of output paper in two-in-one copying, four original pages are copied onto two output pages.

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Di-C1.5 TRAINING

Supplement: Coverage Counter

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No additional notes

Spec. for Coverage Counter

Count item

◇ Dot Coverage Counter

For every page printed, dot coverage is calculated in A4 converted size for each color, and accumulatively counted.

- ❑ **Item: Color coverage / B&W coverage**
- ❑ **Definition:**
  - Color coverage: Object is those judged as “full color” in each mode of full color / 2 color / single color or in ACS.
  - B&W coverage: Object is those judged as “B&W” in B&W mode and in ACS.

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Spec. for Coverage Counter

- **Unit: % (percent), by 1% (round off digit below 1%)**
  - A4 converted figure
  - Coverage (%) = No. of dot per page (all colors total) / A4 full dot No. x 100
- **Count timing: Synchronous to total counter**
- **Objective page to count: Same as total counter**
- **Count accuracy: Below 1% as dot count (in case accumulatively 1000 or more pages counted.)**

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Spec. for Coverage Counter

<Example>

In case 1 page each is printed in the following modes

No.	Color mode	Paper size	K	C	M	Y
1)	Full color	A4	5%	4%	6%	5%
2)	Two color	A3	10%	5%	5%	0%
3)	Single color	A4	0%	0%	10%	10%
4)	ACS	A4	15%	0%	0%	0%
5)	Black & White	A3	10%	0%	0%	0%

- Color coverage : In case of No. 1), 2), 3)

1) [5+4+6+5=20]+ 2) [(10+5+5) x 2=40]+ 3) [10+10=20] = 80%

- B&W coverage : In case of No. 4), 5)

4) [15]+ 5)[10 x 2] = 35%

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Spec. for Coverage Counter

- **Old calculation method:**

  Coverage (%) = [No. pixels used] / [Total No. pixels on original] * 100

- **New calculation method:**

  Coverage (%) = [No. pixels used] / [Total No. pixels on an A4 sheet] * 100

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Spec. for Coverage Counter

An example of calculating the cumulative coverage:

100 A4 sheets, 50 A3 sheets
Actual size of image area: 25% of one A4 sheet

Old calculation method:

Cumulative coverage (%) = (100 sheets * 25%) + (50 sheets * 12.5%)

New calculation method:

Cumulative coverage (%) = (100 sheets * 25%) + (50 sheets * 25%)

Note: With the new calculation method, the area which is the size of 25% of an A4 sheet is counted as 25% of an A4 sheet, regardless of whether the original used is A4 or A3.

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Spec. for Coverage Counter

◇ **Objective page for dot coverage**

No. of pages printed in color / No. of paged printed in B&W

- **Definition :**
  - Color coverage : Object is those judged as “full color” in each mode of full color / 2 color / single color or in ACS.
  - B&W coverage : Object is those judged as “B&W” in B&W mode and in ACS.
- **Unit : no. of page (no. of faces)**
- **Count timing : synchronous to total counter**
- **Objective page to count : Same as total counter**
- **Double count should not be made even if it is objective size to double-count.**

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Spec. for Coverage Counter

Contents to show

- **Color coverage : 1234567890%**
  Color printed page : 12345678 (no. of faces)
- **B&W coverage : 1234567890%**
  B&W printed page : 12345678 (no. of faces)
  - Max. no. of coverage counter shall be 2,147,483.648%
  - Counter gets reset to 0 when max. no. is reached, and starts counting again
    Example) In case “2,147,483.647” is progressed by “10%”, counter no. shall be “9”
  - No. of print is not synchronous to coverage counter’s “0” reset. It just keeps counting.

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Spec. for Coverage Counter

01.COUNTER INDICATION FOR ADMINISTRATOR (NO. OF FACES)

Counter indication for administrator / print ; Exp (print)

Total		12345678
Copier	Full Color	00000123
	Twin Color	00000012
	Single Color	00000023
	B/W	00001234
Printer	Full Color	00000123
	Twin Color	00000012
	Single Color	00000023
	B/W	00001234
FAX	Single Color	00000023
	B/W	00001234
A3/DLT	Color	00000023
	B/W	00001234
Duplex	Total	00012345
Coverage	B/W coverage	1234567890
	Color covergae	1234567890
	B&W page	12345678
	Color page	12345678

Coverage counter can be selected to “show/not to show” by SP mode (default : not).

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Important Note

Please be aware that the dot coverage count is based on the area that the picture covers and not the actual toner amount that is being consumed.

Therefore, the new coverage counter should not be used in cases where sales companies wish to bill customers based on actual toner consumption. There are several factors which must be accounted for.

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SP Modes

- **SP5-056: Coverage Count Display**
  - Display or does not display the coverage counter on the LCD and the counter sheet (default: off)
- **SP8-601: Coverage Counter**
  - 001 to 002: Dot Coverage Counter
    - » For every page printed, dot coverage is calculated in A4 converted size for color and BW, and accumulatively counted.
  - 003 to 004: Objective page for dot coverage
    - » No. of pages printed color and BW
- **SP8-921: Coverage Counter: Total**
  - 001 to 004: Dot Coverage Counter
    - » For every page printed, dot coverage is calculated in A4 converted size for each color, and accumulatively counted.
  - 005 to 008: Objective page for dot coverage
    - » No. of pages printed for each color

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