RICOH

D093/D094 Technical Training

INTRODUCTION

Slide 1

No additional notes.

Date of change	Version History	Description
15-Jul-10	V0.9	Draft. Several items still TBD.
20-Aug-10	V1.0	Final released.
2-Nov-10	V1.1	Modified some slides for easier translation to Chinese. Corrected some figures on the "Fusing Warm-up" slides.

Introduction:

- **This is a digital black-and-white wide format machine with 600 dpi resolution for scanning and printing.**
- **This machine has color scanning capability.**
  - Target is to improve workflow mainly in the AEC market. For example “Drawing management” and “Scan to email”.

Slide 2

No additional notes.

Objectives

- **Understand and do routine maintenance.**
  - Understand the PM table and counters.
  - Understand the SP codes.
- **Learn how to install, troubleshoot, and repair this product in the field.**

Slide 3

No additional notes.

Class Description

- Give service technicians the skills and knowledge necessary to troubleshoot, maintain and repair this product in the field.
- Information will be presented as a mixture of lectures and practical hands-on work.
- At the end of this course, a test will be used to measure the participants understanding of the information.

Slide 4

No additional notes.

No additional notes

PRODUCT OUTLINE

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

SPECIFICATIONS

- The main specifications will be given. Significant items will be stressed.

NEW AND CHANGED

- The differences from the predecessor product (N-C2) will be presented.

INSTALLATION

- The class will install their machines and the peripherals.
- Service mode will be introduced.
- Firmware upgrade will be covered.

MACHINE OVERVIEW

- The components will be discussed briefly.
- The copy process will be outlined.
- The machine's organization and overall PCB structure will also be covered.

SCANNING

- The scanner mechanism and sensors will be described.

IMAGE PROCESSING

- The machine's image processing features and adjustments will be described.

PROCESSES AROUND THE DRUM

- Drum drive, charge, drum cleaning, quenching, and other processes around the drum will be described

Course Overview

- Exposure
- Development and Toner Supply
- Paper Feed and Cutting
- Image Transfer and Paper Separation
- Fusing
- Paper Exit
- Maintenance
- Troubleshooting

Slide 7

EXPOSURE

- The latent image writing mechanism will be described.
- This machine uses LED arrays.

DEVELOPMENT AND TONER SUPPLY

- The development process will be described.
- Toner supply mechanisms and toner density control will also be described.
- Toner end detection will also be described.

PAPER FEED AND CUTTING

- The paper feed mechanisms for the main body will be described.
- The cutter will also be described.
- The optional feed unit mechanisms will also be covered in this section, because most users will install the roll feeder option.

IMAGE TRANSFER AND PAPER SEPARATION

- Image transfer and paper separation mechanisms will be described.

FUSING

- Fusing will be described.

PAPER EXIT

- The paper feed out mechanisms will be described.

MAINTENANCE

- PM will be described briefly.

TROUBLESHOOTING

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

PURPOSE OF THIS SECTION

- ❒ 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.

How Many Models?

- **Two models**
  - D093: N-C3a
  - D094: N-C3b
- **What is the difference between the two models?**
  - Print speed
    - » D093: 2 cpm/ppm for A0/E SEF, 4 cpm/ppm for A1/D LEF
    - » D094: 3 cpm/ppm for A0/E SEF, 6 cpm/ppm for A1/D LEF

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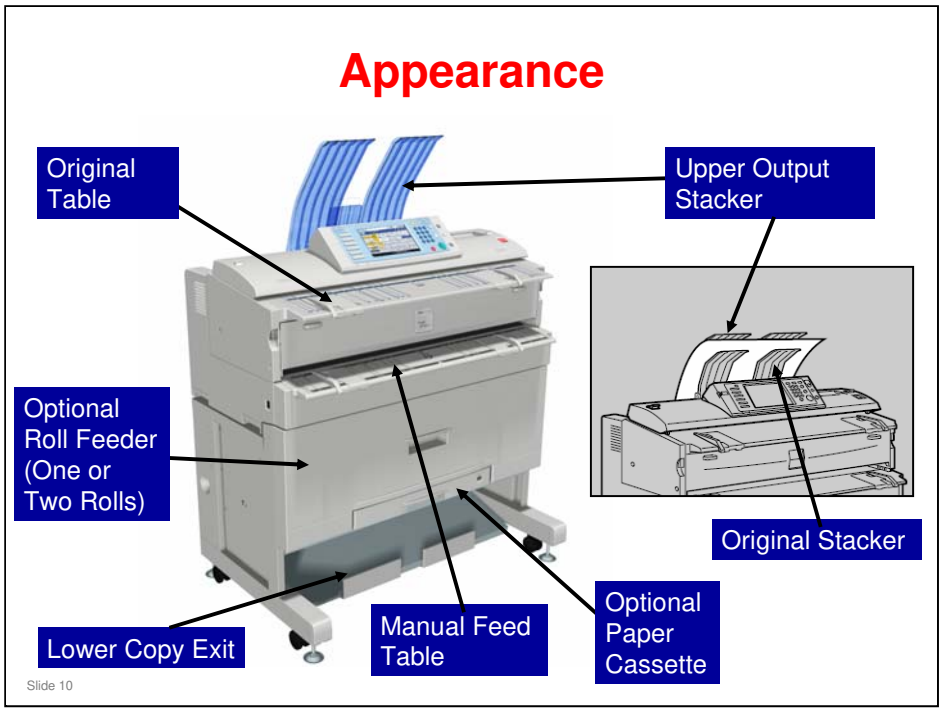
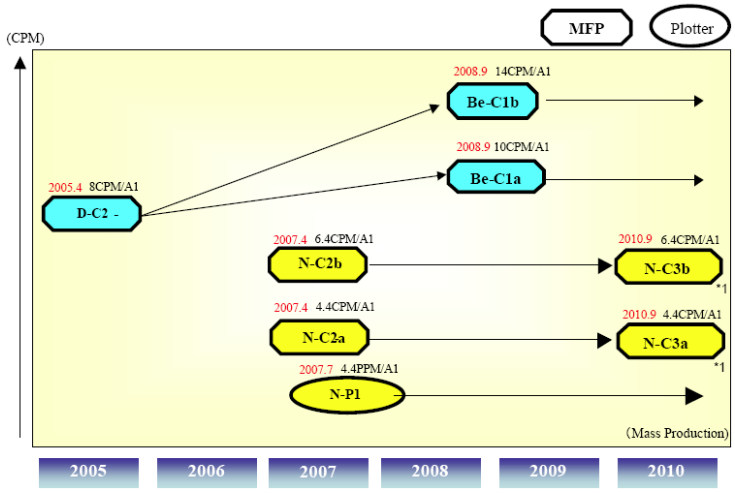
- The line speed for both models is 80 mm/s.
- Both Neptune-C3 models have the same line speed, so why is the print speed different?
  - ➢ he slower model has a larger gap between pages (D093: 480 mm between pages, D094: 168 mm between pages)



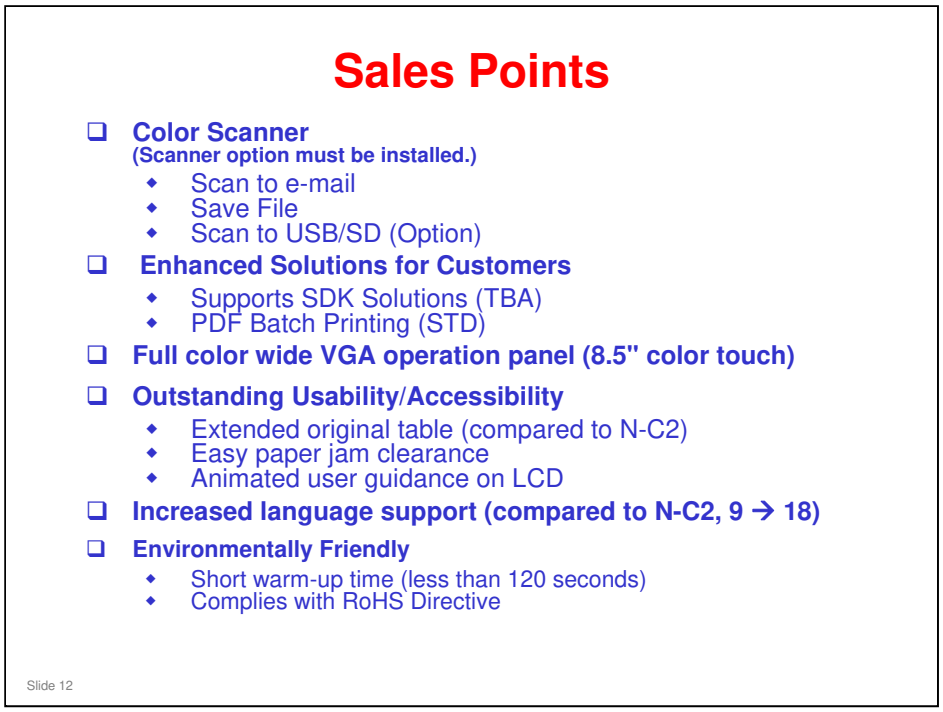
- This slide shows a front view of the machine.
- Original Table: One sheet at a time.
- There are exits for the original at the top and the rear. But, there is only one original exit path. To change the exit, install or remove the upper output stacker, shown in the diagram.
  - If the user uses the top exit, the machine feeds out between the upper output stacker and the original stacker.
  - If the user uses the rear exit, the user must remove the upper output stacker and extend the guides at the rear of the machine (not shown here). There is more about this in the Operation and Scanner sections of the training course.
- There are exits for the copy at the top and at the bottom.
  - If the user uses the top exit, the machine feeds the copies behind the original output stacker.
  - If the user uses the bottom exit, the copies come out at the lower copy exit, shown in the illustration. To use this exit, the optional roll feeder or the optional table must be installed.
- Manual Feed Table (called the Bypass Tray in the User Tool menus): This lets the user feed one sheet of copy paper at a time. If the optional roll feeder or paper cassette are not installed, this is the only tray for the user to feed copy paper into the machine.
- Optional roll feeder: A one-roll feeder or a two-roll feeder can be installed
- Optional paper cassette: This is a Universal cassette. It lets the user copy on copy paper of a maximum size of A3/DLT. But, it only accepts the SEF orientation. It can only be installed if the roll feeder is installed.

Product Positioning



Slide 11

*1 Chinese version is three months later.



Printer/scanner controller

- The Ratio controller is not available on this product.

Ease of operation

- It is not necessary to go behind the machine to get the originals and prints.
  - It is only necessary when you feed originals to the rear exit. You must do this for some types of originals (for example, thick or easily damaged originals).
- The machine is small, which makes it easier for customers to accept this model when they replace their analog machines and inkjet plotters.

Flexible

- Different paper feed options (roll feeder, manual feed table, paper cassette)
- A wide range of copier features, almost the same as a digital black-and-white copier

Optional Units - 1

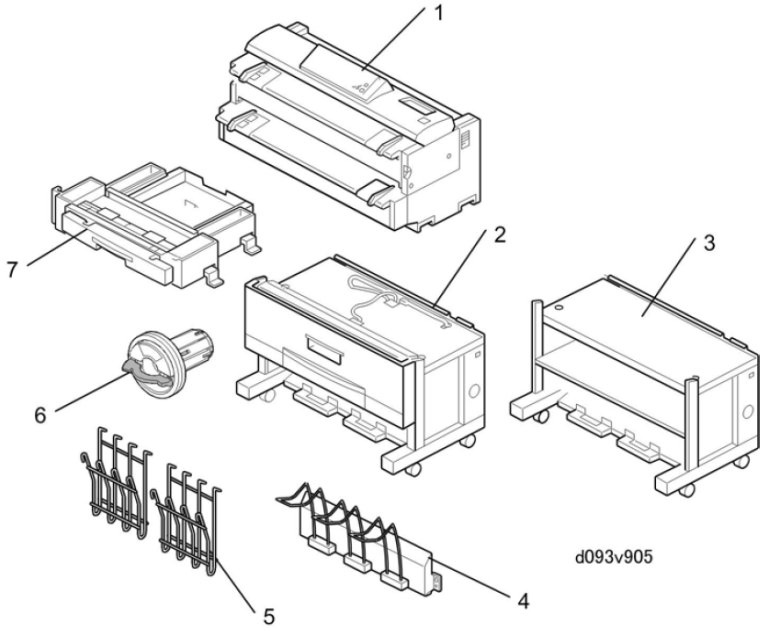
- **Original hanger**
- **Roll feeder (one-roll or two-roll options available)**
- **Universal paper cassette**
  - A roll feeder must be installed
- **Table**
  - You must install this if the roll feeder is not installed.
  - If the table is installed, only manual paper feed is available.
- **USB 2.0/Slot Type E**

Slide 13

- The original hanger is installed under the bypass feeder at the front of the machine. It is a convenient place to put originals before or after scanning.
- You must install a table or a roll feeder. If the table is installed, only manual paper feed is available.
- Hard disk: This machine contains a hard disk as standard equipment (not an option).

Optional Units – 2

Main Machine and Peripherals



❑ **Callout names are in the notes.**

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1. Main machine (D093/D094)
2. Roll feeder type 3601 A/B (D503/D504)
3. Table type 240 (B854)
4. Rear stacker (option for copies) (D312)
5. Original hanger (option for originals) (D311)
6. Roll holder type A (B394)
7. Paper cassette type 240 (B853)

❒ Installable boards and software are not shown. Refer to the FSM.

- GW options
  - These are installed as SD cards or interface cards in the same way as other GW models.
- The Security and Encryption unit is shipped with the machine on an SD card in slot 1. (Not option) It contains Data Overwrite Security and HDD Encryption.
- If the printer option is to be installed, the Security and Encryption applications must be moved to the printer SD card before installation.
- There is no fax option.

Supply Yields

- **Toner: Average 2.2K copies/cartridge**
  - A1/D size paper
  - Ricoh 6% chart
  - Same toner as Models N-C1/C2 and D-C1/C2.
- **Developer: Average 27.5 km for two bags**
  - A1/D size paper
  - Ricoh 6% chart
  - Same developer as Models N-C1/C2.

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No additional notes.

Reliability Targets

- **Unit Life: 180 km or 5 years, whichever comes first**
- **Average Copy Volume per month:**
  - N-C3a: 360 m
  - N-C3b: 540 m
- **Maximum Copy Volume: 3.0 km**
- **PM cycle: 5.5 km; 18,000 ft**

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- Note that the PM cycle is 5.5 km (length of copies made).

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New and Changed

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- PURPOSE OF THE SECTION
  - The new features of the machine will be discussed.
  - The product will be compared to the N-C2 (B286, B289).
  - Refer to the FSM for full details.

New Features

- **Color scanner (Scanner option must be installed)**
  - Color drawings or drawings marked with color can be scanned in color and distributed with scan-to-email or scan-to-folder.
- **Operation panel**
  - The new operation panel provides better usability and many new features (see the next slide).
- **Original table**
  - The original table is longer by 40 mm (1.8"). This provides more surface to stabilize originals while they are being scanned.
- **Output Guides**
  - The number of output guides has been reduced from six to four. This is possible because the upper output guide replaces two output guides when it is lowered.
- **Newly provided as standard**
  - Security and Encryption Unit
    (Shipped on an SD card in slot 1. Default setting is off.)

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No additional notes.

Operation Panel – 1

- **New operation panel features**
  - WVGA touch panel
  - LEDs that can be seen from a distance
  - Login/logout key allows easier operation during authentication
  - Better overall accessibility

(Continued on next slide.)

B286/B289

D093/D094

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No additional notes.

Operation Panel – 2

- **New firmware has added new features for use on the operation panel**
  - Thumbnail view – Documents can be viewed as thumbnails in full color. Zoom in/out also provided.
  - Simplified display – Allows the user to select an enlarged display with a minimum number of keys and with large fonts.
  - Job management – Job list function allows management of copy and print jobs (holding back jobs, changing order of the job queue, deleting jobs, etc.).
  - Animated guidance – Animation gives step-by-step instructions to guide the user through problems.

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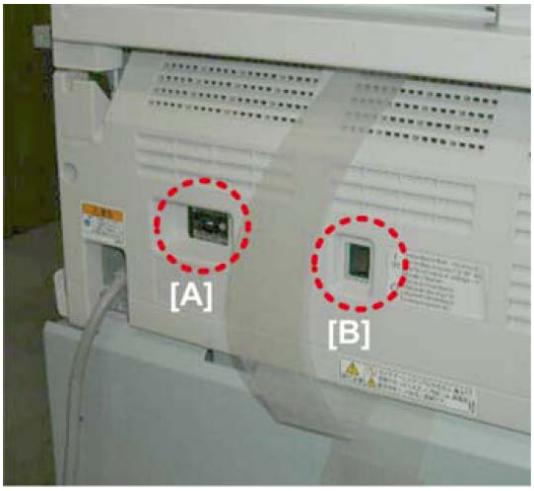
- The FSM has more details.

Rear Switches

- **Two new switches on the back of the machine**
- **Breaker Switch [A]**
  - The breaker switch is at the same location.
  - Breaker switch testing can be done without removing the rear cover.
- **Anti-condensation heater switch [B]**
  - The anti-condensation heaters do not require connection at installation.
  - The anti-condensation heaters can be easily switched on and off.
  - The default is off.



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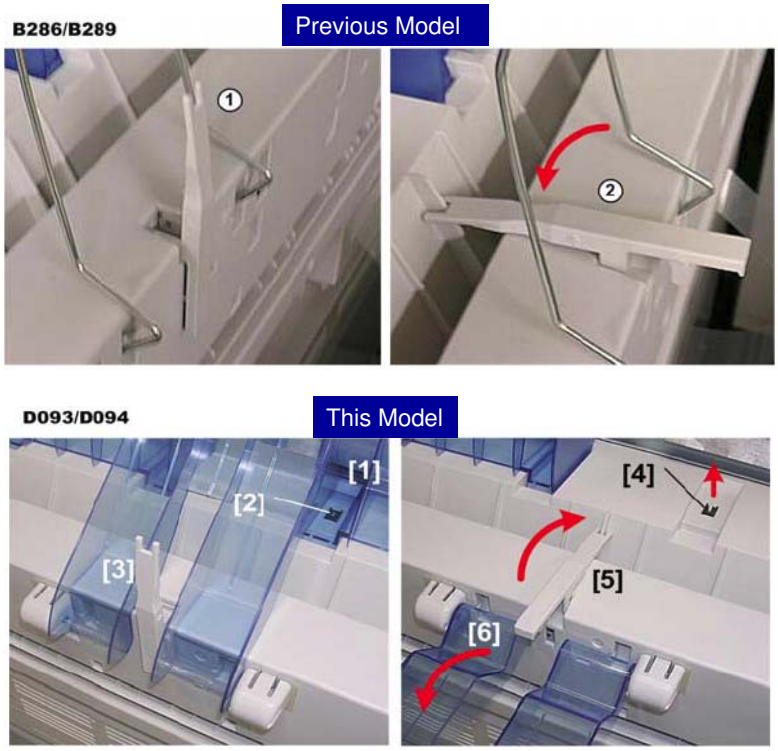
- The breaker switch must be tested once per year.

Paper Exit Selection Switch

- **The previous model has a paper exit selection sensor which detects the position of the selection lever.**
- **This model has a paper exit selection switch that detects when the upper output stacker [1] is installed.**

(Details are in the notes.)



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- The previous model has a selection lever that can be raised and lowered to select the exit path. A paper exit selection sensor detects the position of the lever and tells the machine whether the upper or lower path can be selected on the operation panel, or whether output is restricted to the lower path.
- The D093/D094 has a paper exit selection switch.
  - To allow selection on the operation panel of either the upper or lower output location:

    The left upper output stacker [1] must be installed on the machine.

    The bottom of the stacker keeps the paper exit selection switch [2] depressed. This closes the switch and allows the operator to select either the upper or lower path on the operation panel.

    The lever [3] should be moved manually to the upright position. (There is no sensor for the lever position.)
  - To restrict output to the lower output location:

    The right upper stacker must be removed so the push-button switch [4] comes up and opens the push-switch. This restricts output to the lower path.

    The lever [5] must be lowered manually so original can pass over it. The upper output guide [6] must also be lowered.
- See the FSM for more details.

Options

Option	Comments
Roll Feeder Type 3601A/B (D503)	One roll, Nearly identical to B851
Roll Feeder Type 3601A/B (D504)	Two rolls, Nearly identical to B852
Paper Cassette Type 240 (B853)	Same as previous
Rear Stacker (D312)	Same as previous
Roll Holder Unit Type A	Same as previous
Table Type 240 (B854)	Same as previous
Original Hanger (D311)	Same as previous
Printer Option Type W3601 (D506)	SD card, A roll feeder must be installed.
Printer Option TIFF/GL Filter	SD card (comes with D506, also has VMware)
Scanner Option Type W3601 (D507)	SD card, D533 must also be installed.
IEEE802.11a/g Interface Unit Type J (D377-01, -02) /K (D377-19)	Board, Antennas attached
GigaBit Ethernet Type B (D377-21)	Board
File Format Converter Type F (D533)	Board
Browser Unit Type E (D430-05, -06, -07)	SD card
USB 2.0/SD Slot Type E (D534)	See the next slide.

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- The table on the slide has the options available for the D093/D094.
- The following B286/B289 options cannot be used in the D093/D094.
  - Folder FD 6500A (B889)
  - Manual Feeder (D333)
  - VM Card Type E (D338)
    (VMware for this machine resides on the new printer SD card (Printer Option TIFF/GL Filter).)
  - Printer Controller RW-3600/Interface PCB Type 3600 (D344/D329)
  - USB Host Interface Unit Type 7300 (G819)

USB and SD Card Option

- This new option (D534) provides easy access USB and SD card slots.
- Operators can scan documents to either an SD card or a USB memory device.
- This SD slot cannot be used to load optional software

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No additional notes.

Feature Comparison
(D093/D094 vs B286/B289)

- **Target reliability is the same for both (details in FSM)**
- **Feature comparison table (Details in the notes)**

Item	D093/D094	B286/B289
Operation panel	Wide Color VGA	Wide Monochrome VGA
External controller (*1)	No	Yes (RATIO CTL)
Color scanning (*2)	Yes	No
SDK (*3)	Yes	No
PDF batch scanning	Yes	Yes (*4)
Print and scan tools	TBD	No
Memory	1GB (Std.) + 160 GB HDD (Std.) (*5)	1GB + 80 GB HDD (Std.)
Scanning speed	80 mm/s (B/W) 26.7 mm/s (FC)	80 mm/s (B/W)
Languages (*6)	18 languages	9 languages
SD slots on controller (*7)	2 SD card slots	3 SD card slots

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*1 Both models have an embedded Ricoh controller.

*2 Color scanning is limited to scanning to a file (printing limited to B&W)

*3 SDK (Software Development Kit). Still under development.
This will provide a set of development tools that allows for the creation of applications. These tools will require installation of Printer Option Type W3601 (D506).

*4 Only with a firmware update.

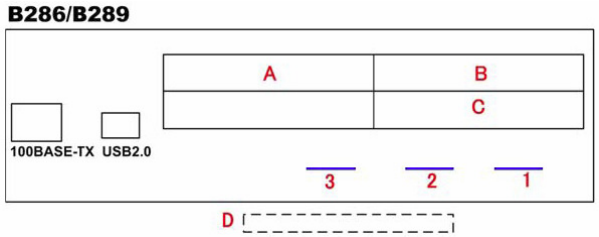
*5 An additional 1GB memory unit is provided with Scanner Option Type W3601 (D507).

*6 These languages are available for the D093/D094 user interface: 1. English, 2. German, 3. French, 4. Italian, 5. Spanish, 6. Dutch, 7. Swedish, 8. Norwegian, 9. Danish, 10. Finnish, 11. Hungarian, 12. Czech, 13. Polish, 14. Portuguese, 15. Russian, 16. Catalan, 17. Turkish, 18. Simplified Chinese

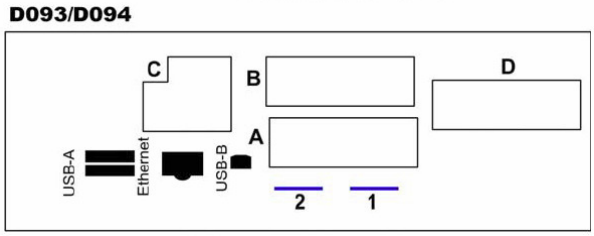
*7 The arrangement of the board slots and SD cards on the controller box has changed. The D093/D094 has only two SD card slots. (See the illustration in the next slide.)

Controller Board Slot Layout

Previous Model



This Model



- The arrangement of the board slots, SD card slots, and I/O ports on the controller board has changed.
- More details are in the FSM installation section.

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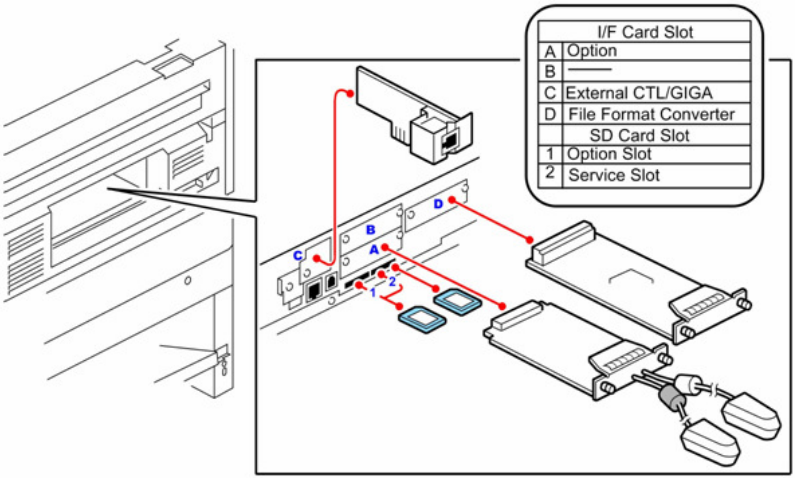
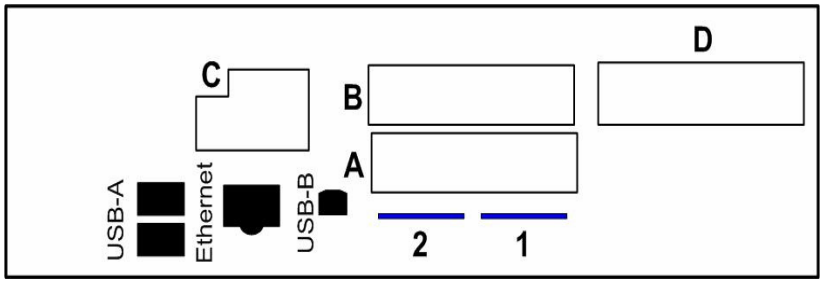
No additional details.

Interface Card Slots

- **Slot functions are in the notes section**





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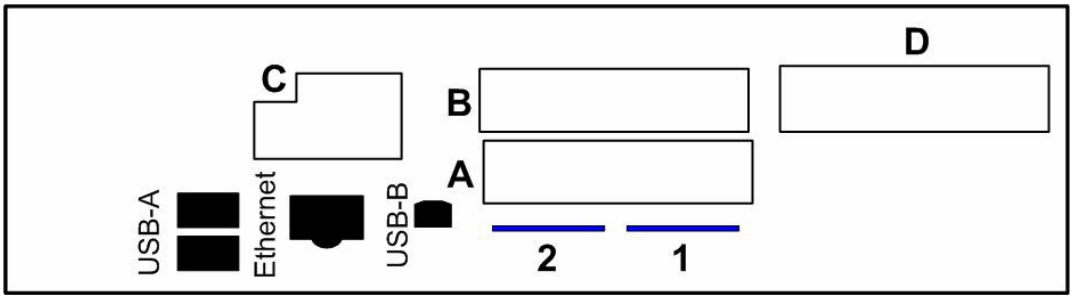
- Slot A
  - IEEE802.11a/g Interface Unit Type J (D377-01, -02), Type K (D377-19)
- Slot B
  - Not used.
- Slot C
  - GigaBit Ethernet Type B (D377-21)
- Slot D
  - File Format Converter Type F (D533)

SD Card Slots



- **Slot 1 : Options**
  - Security and Encryption Unit (Provided with the machine already loaded in slot 1.)
  - Printer Option Type W3601 (D506)
  - Scanner Option Type W3601 (D507) (The scanner option requires the File Format Converter)
  - Browser Unit Type E (D430-05, -06, -07)
- **Slot 2 : Service Slot**
  - Firmware update
  - NVRAM data download/upload
  - Application move/undo
  - Printer Option TIFF/GL Filter

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- There is no special location inside the machine to keep SD cards that have been copied.
- The machine has two SD card slots:
  - SD card Slot 1 is for application programs.
  - Slot 2 is used for machine servicing and application program installation (firmware updates, NVRAM upload and download, application move and undo).
- If the customer needs more than two applications, one or more application must be moved to one SD card with SP5873-1.

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D093/D094 Technical Training

SPECIFICATIONS

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PURPOSE OF THE SECTION

- ❒ The most important specifications of the machine will be discussed.
- ❒ Refer to the FSM for the full list of specifications.

Date of change	Version History	Description

Specifications

Originals:	**One sheet at a time**
Original Image Size: (W x L)	**Maximum: 914 x 15,000 mm (36" x 590")** **Minimum: 210 x 210 mm (81/2" x 81/2")**
Max Original Width:	**960 mm (37.7")**
Original Weight	**18 ~ 135 g/m²** **35 μm ~ 1.0 mm**
Copy Paper Size: (W x L)	**Maximum:** **Bypass feed: 914 x 2,000 mm (36" x 78")** **Roll Feed: 914 x 15,000 mm (36" x 590")** **Paper Cassette: 297 x 420mm (12" x 18")**
	Minimum: **Bypass Feed: 210 x 257 mm (81/2" x 10")** **Roll Feed: 210 x 280 mm (81/2" x 11")** **Paper Cassette: 210 x 297 mm (81/2" x 11")**
Copy Paper Weight	**52.3 ~ 110 g/m² (13.9 ~ 29.3 lb)** **68 ~ 148 μm (Plain paper, Translucent)** **3 ~ 4 mil (Film)**

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Originals

- Only one original can be fed at a time. There is no separation mechanism.
- 15 m original length: Only for wide paper (841 mm/34" and 36"). Multiple copying not allowed (the copy quantity can only be 1).

Copy Paper Size

- Manual feed table (bypass feed): You cannot feed long sheets without some skew.

Specifications

Copying Speed: **(cpm: copies / minute)**	**D093** **2 cpm/ppm for A0/E SEF** **4 cpm/ppm for A1/D LEF** **D094, higher-speed model** **3 cpm/ppm for A0/E SEF** **6 cpm/ppm for A1/D LEF**
Reduction/Enlargement: **(%)**	**Inch – Engineering** **25, 32.4, 50, 64.7, 100, 129.4, 200, 258.8, 400** **Inch – Architectural** **25, 33.3, 50, 66.7, 100, 133.3, 200, 267, 400** **Metric** **25, 33.3, 50, 66.7, 100, 133.3, 200, 267, 400**
Zoom:	**25 ~ 400% (0.1%/step)**
Resolution:	**Scanning: 600 dpi** **Printing: 600 dpi**
Gradation:	**Scanning: 256 levels** **Printing: 2 levels**

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Specifications

Warm-up Time:	Less than 2 minutes (Room temperature 23° C, 120V: US, 220-230V: EU)
First Copy Time:	From roll feeder: 18 seconds A1/D LEF From cassette: 19 seconds (A3 LEF/B LEF) From manual feed table: 31 seconds A1/D LEF
Copy Number Input:	Ten-key pad, 1 to 99 (standard sizes only)

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Specifications

Copy Paper Capacity:	Bypass Feed: 1 sheet Roll Feed: Max. Diameter: 175 mm (6.9") Max. Length: 150 m (16.4 yds) Roll Core Diameter: 76.4 ± 0.25 mm (about 3") Paper Cassette: 250 sheets
Output Tray Capacity:	Upper Output Stocker Plain paper: 50 sheets (A1LE/D LE) Translucent: 10 sheets Roll Feeder or Table Plain paper: 40 sheets (A1/D or A0/E) Translucent: 1 sheet

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Specifications

Memory Capacity:	RAM: 1GB standard + 1GB with scanner option (DDR-DIMM) HDD: More than 160 GB x 1 (built-in)
Toner Replenishment:	Cartridge exchange (800 g/cartridge)
Toner Yield:	2,200 copies (A1 LE / D LE, 6% full black, 1 to 99 copying, Text mode)
Weight:	Less than 107 kg (235.9 lb)

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INSTALLATION

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PURPOSE OF THE SECTION

- ❒ The class will install the machine and the options.
  - ➢ Install one machine or more with all options as a full system.
  - ➢ Make sure that the class follows all notes and cautions in the procedures.
- ❒ The class will install the most recent firmware.

Installation Sequence

- Remove the copier from the box and start to install the copier
- Install the roll feeder or the table
- Install the paper cassette
- Complete the copier installation procedure
  - Test the breaker switch.
  - Install the accessories.
- Check that the copier operates correctly
- Install MFP options.

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- This shows the best sequence when you install the copier and all its options.
- If you do the steps in a different sequence, to install a component, you must remove something that you installed before.

START TO INSTALL THE COPIER

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Show the next five slides before the trainees start to install the machines. Then do the procedure following the details in the field service manual.

Caution

- **Never turn the main machine off when the Operation Switch LED is lit or flashing. This can damage the hard disk or memory.**
- **Main power off sequence:**
  - Press the operation switch on the operation panel to turn the power off.
  - Wait for the power LED to go off.
  - Then, turn the main power switch off.

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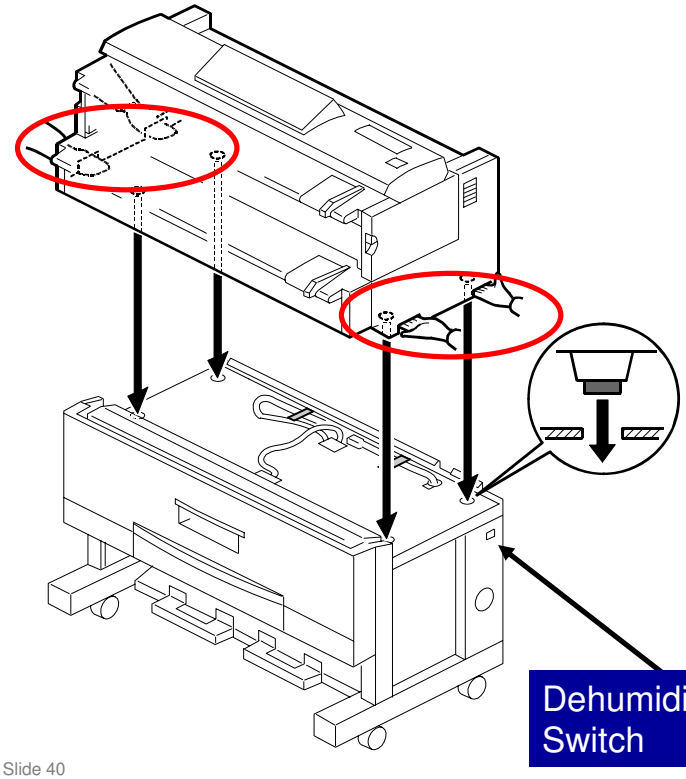
No additional notes

Start to Install the Copier - 1



- **Remove the copier from the box and remove the external packing materials.**
- **Put the copier on the roll feeder or table**
- **CAUTION: The machine is heavy.**
  - A minimum of two persons are necessary.
  - Lift with the handles.
- **Make sure the dehumidifier switch on the roll feeder is off.**

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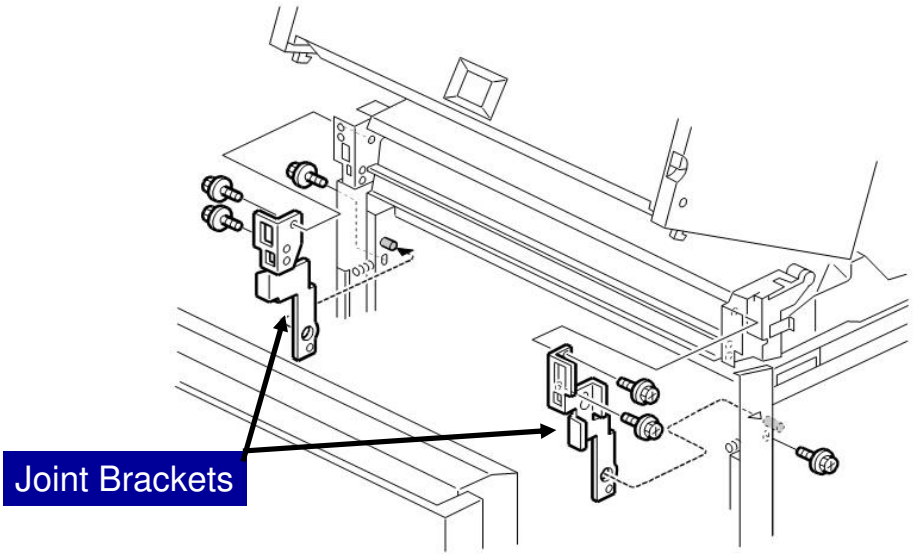
- Lift the machine with the handles that are shown in red in the diagram.
- Do not remove the shipping tape from the connectors of the roll feeder before placing the copier on the roll feeder.

Start to Install the Copier - 2



- **Attach the joint brackets and guide plates for the roll feeder or table.**

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- Attach the joint brackets immediately after putting the copier on the roll feeder or table. Otherwise the roll feeder or table may become warped due to the weight of the copier.

Start to Install the Copier - 3

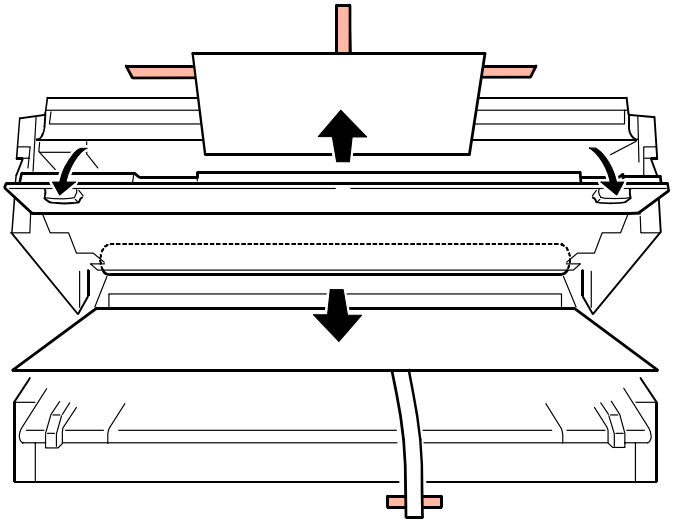
- **Make the copier level.**
- **Check at two places, as explained in the manual.**
  - On the development unit
  - On the exposure glass
- **Notes:**
  - If the machine is not level from left to right, developer is not supplied equally across the development unit.
  - The procedure has changed slightly from the N-C2. The original table must be removed to do the level check.

Slide 42

No additional notes.

Start to Install the Copier - 4

- Open the upper unit, and remove tape and packing materials.
- Remove the drum protection sheet slowly to avoid damaging the entrance seal in the cleaning unit.



Slide 43

No additional notes.

Start to Install the Copier - 5

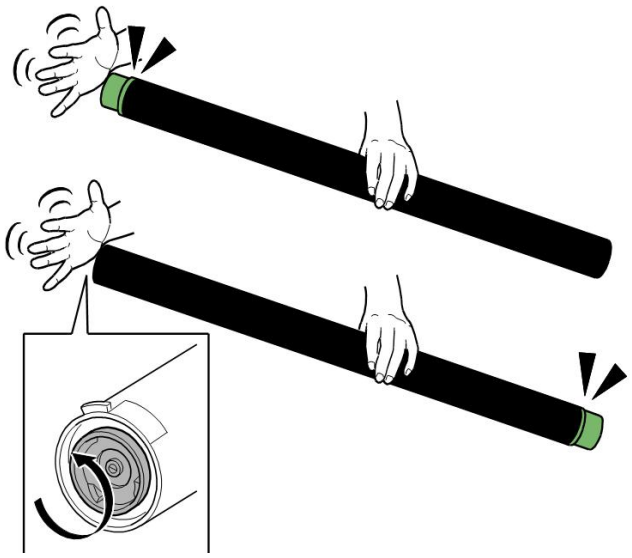
- **Add the two bags of developer.**
  - Do not add both bags at the same time. You must follow the procedure in the service manual carefully.
  - Do not throw the bags away until after you input the lot numbers.

Slide 44

- Pay close attention to all "Notes" and "Important" information in the procedure.

Start to Install the Copier - 6

- **Set a toner cartridge.**
  - Shake the toner cartridge a few times to make sure that toner moves around freely inside the cartridge. You must follow the procedure in the service manual carefully.
  - Show the customers how to install a toner cartridge correctly, and how to store the spare cartridges (see the field service manual).



Slide 45

- Pay close attention to all "Notes" and "Important" information in the procedure.
- The guidance for toner cartridge storage has been expanded from that of the N-C2.
  - Cartridges must be stored horizontally on a flat surface to prevent toner from clumping together at one end of the cartridge.
  - A toner cartridge should never be stored standing on one end.
  - Toner cartridges should never be stored in a location exposed to direct sunlight .
  - Never break the seal of a toner cartridge until it is to be installed.
  - The room temperature where toner cartridges are stored should be less than 40°C (104°F).
  - To prevent fire hazards and personal injury, never incinerate used toner cartridges. Obey the local laws and regulations that apply to such materials.

Start to Install the Copier - 7

- **Then initialize the developer.**
  - First, input the lot numbers of the two bags of developer with SP 2801 002 and 003.
  - Then initialize the developer with SP 2801 001.
  - Important: You must input the lot numbers and install a toner cartridge before you do the initialization.
- **Then do SP2923 to apply a thin layer of toner on the bare drum.**
  - This reduces friction between the blade and the drum.

Slide 46

Go into SP mode as follows

SP 2801 (Developer Lot Number Input and Initialization)

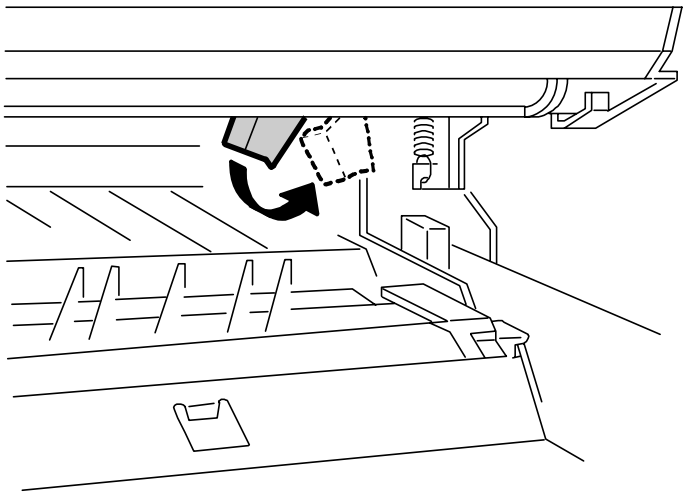
- There are two bags of developer to install, and you must input both lot numbers before you can start initialization.

SP2923 002 (Cleaning Blade Set Mode)

- This SP gives the drum a layer of toner.
  - Show this to the class. The end of the drum is shiny because there is no toner layer, but the remaining part of the drum has a layer of toner.
- This toner layer makes sure that the cleaning blade does not bend permanently in the opposite direction when the drum starts to turn (this has the same function as setting powder).
- In a counter blade system, friction between the blade and the drum can do this to the blade, unless setting powder or a toner layer is added.
- At this time, the cleaning blade does not touch the drum. At the factory, the blade is installed away from the drum.
- After the end of drum set mode, move the cleaning blade against the drum, which is its usual operation position.
  - This is shown on the next slide.

Start to Install the Copier - 8

- **Move the cleaning blade lever right (standard operation position).**
  - Move the blade left again before you move the machine to a new location over a long distance.



Slide 47

- To send the machine from the factory, the blade is away from the drum.
- After Drum Set Mode, move the blade until it touches the drum (move the lever right), where it will stay during standard operation.
- The first time that the drum turns, the layer applied during Drum Set Mode will be cleaned off. This layer will lubricate the edge of the cleaning blade, and this makes sure that the blade will not bend in the wrong direction when the drum turns.
- If you move the machine a short distance within the same room, it is not necessary to move the cleaning blade back to the transportation position. But, after installation, if you move it a long distance (for example, between a warehouse and the customer location), move the blade to the transportation position.

Start to Install the Copier - 9

- **Next do SP3001 002 to initialize the ID sensor.**
  - This takes about 15 seconds.
  - Do not make copies before this step.

Slide 48

No additional notes.

INSTALL THE OPTIONAL ROLL FEEDER OR THE TABLE

Slide 49

- Now install the roll feeder. Teach the points on the next two slides before you start to install the machines. Then do the procedures in the above section of the service manual.
- The table is an easier installation procedure, and the steps are almost the same as some of those done for the roll feeder. Do it in the class if you have time.

Install the Roll Feeder

- ❑ **Remove packing materials.**
- ❑ **Install the roll feeder**
- ❑ **Attach Mylars**
  - Rear cover of the copier
  - Rear plate of the roll feeder
- ❑ **Install the rolls**
  - See the decal on the machine.
  - If you install the paper cassette, do it before you install the rolls.

Slide 50

- ❒ If you did the installation procedure for the copier, the copier is on top of the roll feeder at this time.
- ❒ The main points of the installation procedure are on the slide.

INSTALL THE OPTIONAL PAPER CASSETTE

Slide 51

Teach the points on the next slide before you start to install the cassette.
Then ask the class to install the optional cassette.

- ❒ Do the procedure in the above section of the service manual.

Install the Cassette

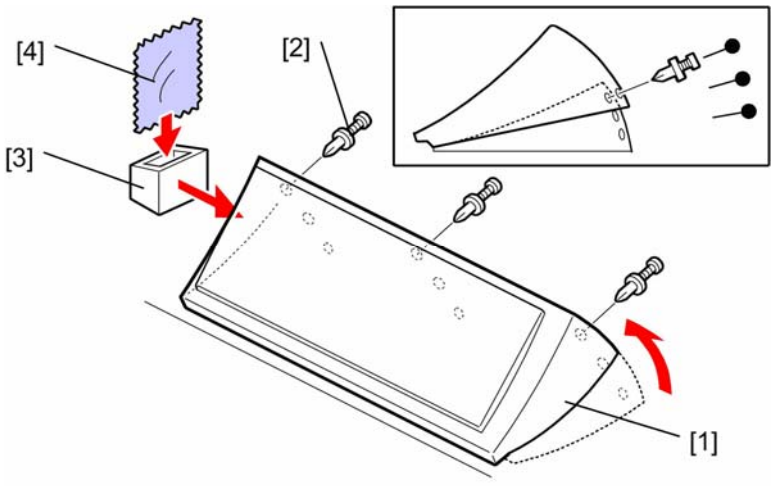
- Remove roll 2 if it is installed in the roll feeder.
- Install the cassette.

Slide 52

No additional notes

Finish the Copier Installation – 1

- Adjust the angle of the operation panel display.
- Attach the exposure glass cloth pocket and put the exposure glass cloth in the pocket.



[1] Operation panel

[2] Anchor screws

[3] Pocket

[4] Exposure glass cloth

Slide 53

- Adjust the operation panel to decrease reflections from lighting.
- A technician must do this adjustment. It is not in the operation manuals.
- The exposure glass cloth pocket is new with this product.

Finish the Copier Installation – 2

- **Select the paper tray size and type.**
  - User Tools > System Settings > Tray Paper Settings
- **Test the breaker switch [A].**
  - Follow the test procedure in the FSM.
  - Turn off the machine power. (The machine must be off when testing the breaker switch.)
  - The breaker switch must be tested at installation and at least once a year after that.

Breaker Switch

Slide 54

No additional notes.

Set Up the Roll Feeder

❑ Do SP1920

Roll	SP No.	Adjustment
Roll 1	1920-22	Cut Length Adjustment: 1st Roll:297 mm:Plain Paper
Roll 1	1920-26	Cut Length Adjustment: 1st Roll:1189 mm:Plain Paper
Roll 2	1920-82	Cut Length Adjustment: 1st Roll:297 mm:Plain Paper
Roll 2	1920-86	Cut Length Adjustment: 1st Roll:1189 mm:Plain Paper

❑ Do these user tools

- Paper size:
  - » System Settings → Tray Paper Settings → Tray Paper Size: Tray 1, Tray 2
- Paper type:
  - » System Settings → Tray Paper Settings → Paper Type: Tray 1, Tray 2
    - – Plain, translucent (tracing paper), film, recycled

Slide 55

SP 1920

- ❒ There are two adjustments for each roll.
- ❒ Input the values that are written on the decal on the on the right side of the roll feeder drawer.

User Tools

- ❒ Set the paper size and type for each roll. You can also do this for the paper cassette and for the manual feed table. For the manual feed table, the user must do this for each job (if the user frequently uses different types and sizes of paper from this table).

Set Up the Cassette

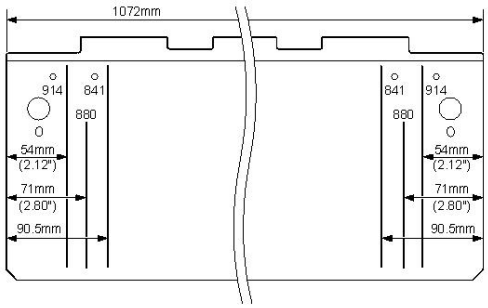
- **Do these user tools**
  - Paper size:
    - » System Settings → Tray Paper Settings → Tray Paper Size: Tray 3
  - Paper type:
    - » System Settings → Tray Paper Settings → Paper Type: Tray 3

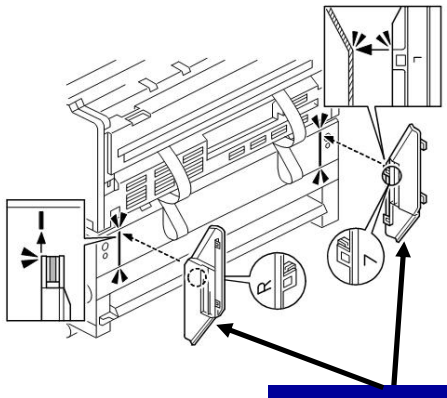
Slide 56

- ❒ Install the cassette as shown in the manual.
- ❒ Set the SP and user tools as shown in the manual.

Install the Accessories

- **Do the procedures in the following sections.**
  - Main Machine Accessories
  - Roll Feeder, Table Accessories
    - » Lower output trays
    - » Exit Guide Plates
  - Original Hanger (D311)
  - Rear Stacker (D312)





Exit Guide Plates

Slide 57

- ❒ See the FSM for procedure details.
- ❒ The exit guide plates must be set to match the width of the paper roll.

Check the Copy Quality

- Check the copy quality as described in the "Copy Check" section of the FSM.
- Adjust the following if necessary.
  - Leading edge registration
    - » SP1001, 5 ± 0.5mm
  - Side to Side registration
    - » SP1002, 5 ± 0.5mm

Slide 58

No additional notes.

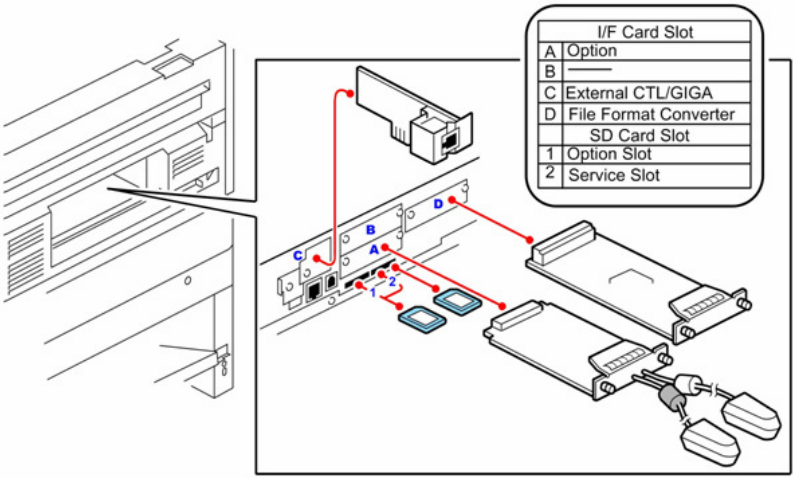
CONTROLLER OPTIONS

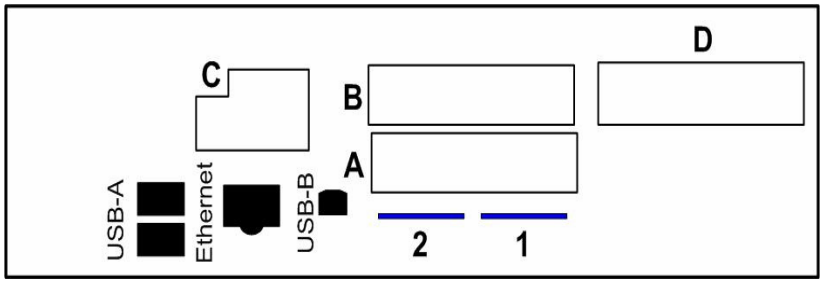
Slide 59

❒ Study the slides first. Then do the procedures in the service manual.

Interface Card Slots

- **Slot functions are in the notes section**

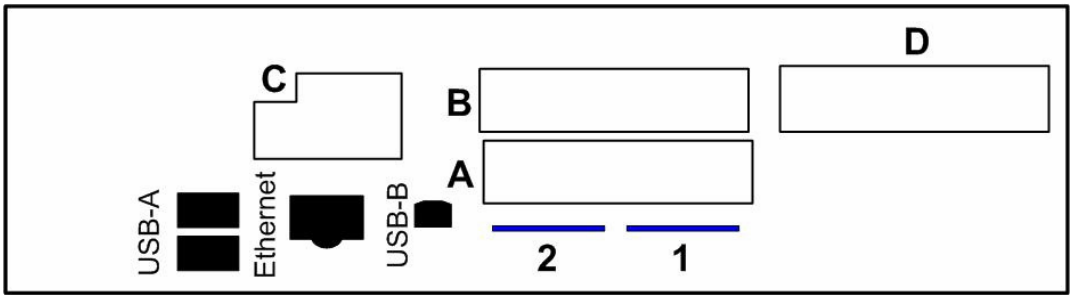




Slide 60

- Slot A
  - IEEE802.11a/g Interface Unit Type J (D377-01, -02), Type K (D377-19)
- Slot B
  - Not used.
- Slot C
  - GigaBit Ethernet Type B (D377-21)
- Slot D
  - File Format Converter Type F (D533)

SD Card Slots



- **Slot 1 : Options**
  - Security and Encryption Unit Unit (Provided with the machine already loaded in slot 1.)
  - Printer Option Type W3601 (D506)
  - Scanner Option Type W3601 (D507) (The scanner option requires the File Format Converter)
  - Browser Unit Type E (D430-05, -06, -07)
- **Slot 2 : Service Slot**
  - Firmware update
  - NVRAM data download/upload
  - Application move/undo
  - Printer Option TIFF/GL Filter

Slide 61

- There is no special location inside the machine to keep SD cards that have been copied. Ask the customer to store them in a safe place.
- The machine has two SD card slots:
  - SD card Slot 1 is for application programs.
  - Slot 2 is used for machine servicing and application program installation (firmware updates, NVRAM upload and download, application move and undo).
- If the customer needs more than two applications, one or more application must be moved to one SD card with SP5873-1.

Enable the Built-in NIB and USB

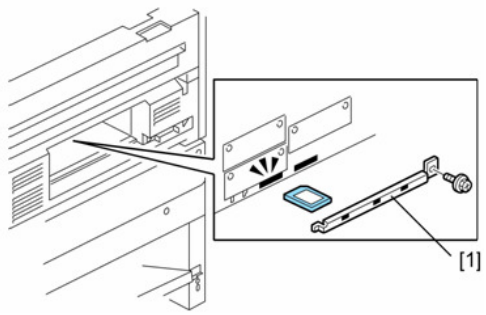
- **The controller has Ethernet and USB built-in.**
- **But they must be enabled with SP 5985, or any installed printer or scanner options will not operate.**
  - SP5985-001 must be set to 1 to enable the NIB functions.
  - SP5985-002 must be set to 1 to enable the USB function.

Slide 62

No additional notes

Using SD Cards

- Remove the SD card slot cover [1] to access the SD card slots. (Replace after inserting/removing SD cards.)



- Study the "Restrictions and Precautions on the Use of SD Cards" in the FSM.
- Study the SD card "Move/Undo Restrictions" in the FSM.
  - Copyright restrictions prevent some applications from being moved to another SD card.
  - See the FSM for procedures.

Slide 63

No additional notes.

Notes - 1

- **To use the GW printer option, you must install the optional roll feeder.**
  - There are two printer option SD cards.
  - One has the Type W3601 printer option (insert in slot 1), and the other has the TIFF/GL filter (insert in slot 2).
    - » Note: The Security and Encryption Unit must be copied to the printer option SD card (Type W3601) before printer installation.
- **You can move the scanner option to the printer option (Type W3601) SD card.**
  - You must do this if you want to use scanner option with the printer option.
- **If the gigabit Ethernet board is installed, the standard Ethernet can no longer be used.**
  - A caps is provided to cover the standard Ethernet connector. This prevents accidental reconnection of the cable while the Gigabit Ethernet board is installed in the machine.

Slide 64

No additional notes.

Notes - 2

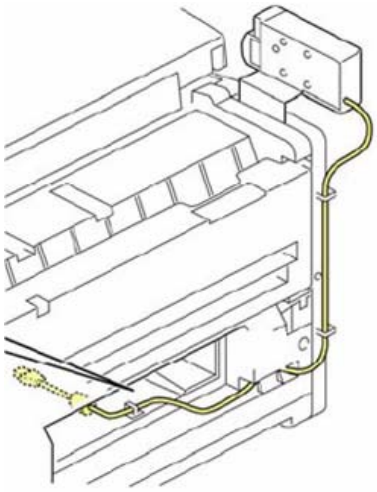
- **Browser Unit Type E**
  - The installation procedure for the browser unit has been changed.
    - » Before inserting the browser unit SD card into slot 1, you must turn off the main power switch and unplug the machine.
    - » After the software is installed, the machine must be switched off/on.
    - » Then you must check if the installation was successful.
    - » Then you must switch the power off again before the card can be removed.
  - See the service manual for the procedure.

Slide 65

No additional notes

Install the USB2.0/SD Unit

- **The USB2.0/SD-slot Unit (Type E) is new with this product.**
- **It allows users to scan documents in electronic format to an SD card or a USB memory device.**
- **Follow the installation procedure in the FSM.**
  - Be sure to set **Scanner** SP1013 to 1.



Slide 66

- Rotating plate 1 on the controller board 180 degrees blocks the upper USB port, forcing the use of the lower USB port for the USB/SD unit.

Other SP Modes

- **5812: Service telephone and fax numbers**
- **5841: Supply name setting**
  - Input the product name of the toner and other supplies.
  - These names appear on the screen when the user presses the Inquiry button in the user tools screen.

Slide 67

OTHER SP MODES

- The SPs on the slide can also be necessary at installation.
- 5812 001 is for the user to refer to (it comes on the screen when there is a SC problem).

UPDATING FIRMWARE

Slide 68

Service manual, Service Tables, Firmware Update

The class will now install the latest firmware in the machine.

Update Procedures - Copier

- Use SD cards for this machine.
- All the firmware can fit on one SD card.
- Put the SD card with the new firmware in SD card slot 2.
- Follow the procedure in the FSM.
  - Select the modules that you want to update.
  - You cannot update operation panel firmware at the same time as controller firmware.
- Do not switch off the machine power during a firmware update.

Slide 69

- To check firmware versions use:
  - User Tools → System Settings → Administration Tools → Firmware Version
  - Or SP 7801

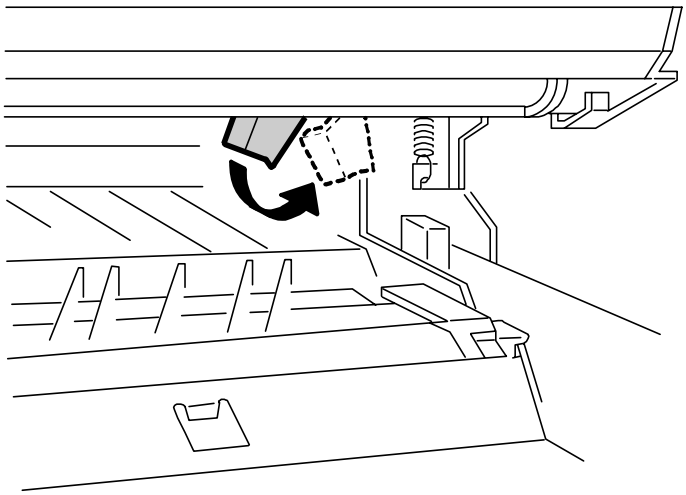
TRANSPORTING THE MACHINE

Slide 70

No additional notes

Transporting the Machine

- **If you move the machine a short distance within the same room, it is not necessary to do these things. But, after installation, if you move it a long distance (for example, between a warehouse and the customer location), you must do the two steps on the slide.**
- **Move the cleaning blade lever left (transportation position).**
  - Move the blade right again before you let the customer use the machine.
- **See the FSM for more details on transporting the machine.**



Slide 71

No additional details.

Operation Familiarization

Slide 72

No additional notes

Operation Familiarization

- **This is a good point to familiarize yourself with machine operation.**
  - Study the operator's manuals
  - Practice making copies and using the various machine functions.

Slide 73

No additional notes.

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MACHINE OVERVIEW

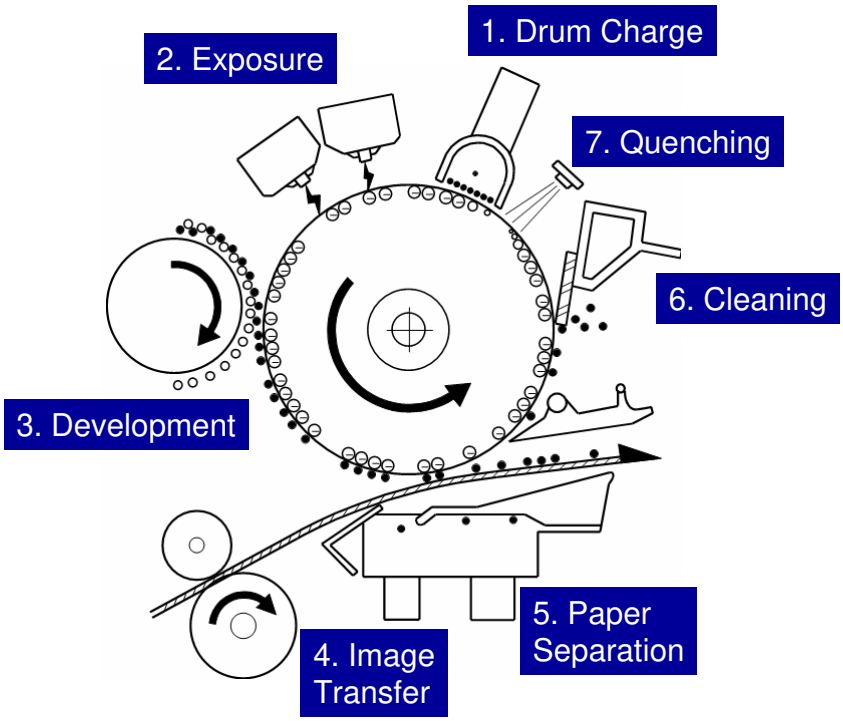
Slide 74

PURPOSE OF THE SECTION

- ❒ The components will be discussed briefly.
- ❒ The copy process will be outlined.
- ❒ The machine's organization and overall PCB structure will also be covered.

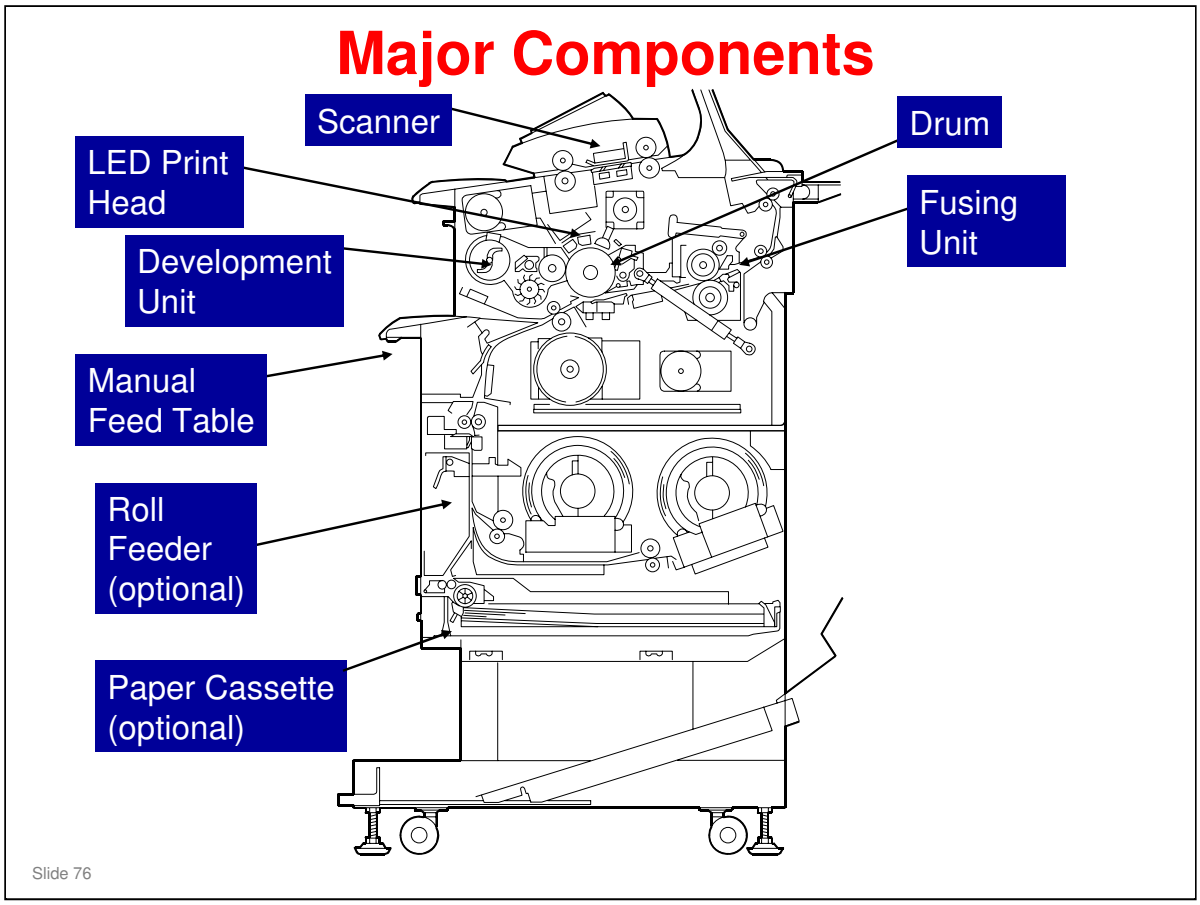
Processes Around the Drum

- The illustration shows the image process that occur around the drum.
- Descriptions are in the notes below.
- Refer to the Core Technology Manual for more information about imaging processes.



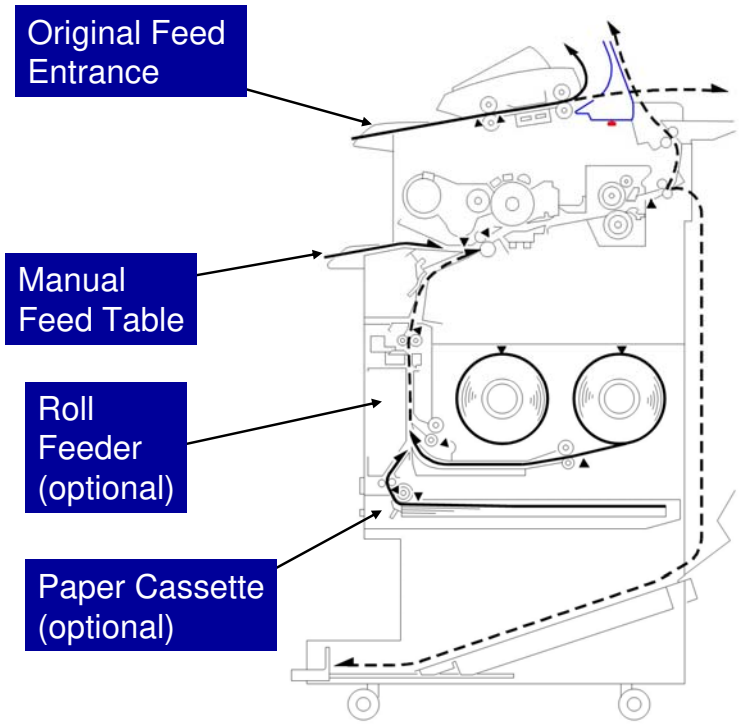
Slide 75

1. **Drum Charge**
   The charge corona unit (scorotron) gives a uniform negative charge to the organic photoconductive (OPC) drum. The charge remains on the surface of the drum because the OPC drum has a high electrical resistance in the dark.
2. **Exposure**
   The LPH (LED Print Head) applies light to the drum to create a latent image in the form of a charge pattern on the surface of the drum.
3. **Development**
   Positively charged toner is attracted to the negatively charged areas of the drum, thus developing the latent image.
4. **Image Transfer**
   Paper is fed to the drum surface at the proper time so as to align the copy paper and the developed image on the drum surface. A strong negative charge is applied to the back side of the copy paper, producing an electrical force which pulls the toner particles from the drum surface to the copy paper. At the same time, the copy paper is electrically attracted to the drum surface.
5. **Paper Separation**
   A strong ac corona discharge is applied to the back side of the copy paper, reducing the negative charge on the copy paper and breaking the electrical attraction between the paper and the drum. Then, the stiffness of the copy paper causes it to separate from the drum surface. The pick-off pawls help to separate paper.
6. **Cleaning**
   The cleaning blade removes any toner remaining on the drum.
7. **Quenching**
   Light from the quenching lamp electrically neutralizes the surface of the drum.



- Show the major units to the class, as listed in the manual.
  - LED Print Head (LPH): This is an assembly of three LED heads. Lasers are not used.
  - Scanner: Uses a CIS (contact image sensor) that is an assembly of five units.
  - Fusing unit: One lamp
  - Roll feeder: The roll feeder can contain one or two rolls.
  - Manual feed table: Can be used to feed cut sheets, one at a time.
  - Paper cassette: This is a universal cassette. It can be installed only if the roll feeder is installed.
- The rollers, sensors, and other small components will be explained in the applicable sections.
- Refer to "Machine General Layout" and "Mechanical Component Layout" in the FSM for more details about mechanical components.

Original and Paper Feed Paths



Slide 77

Original Feed Paths

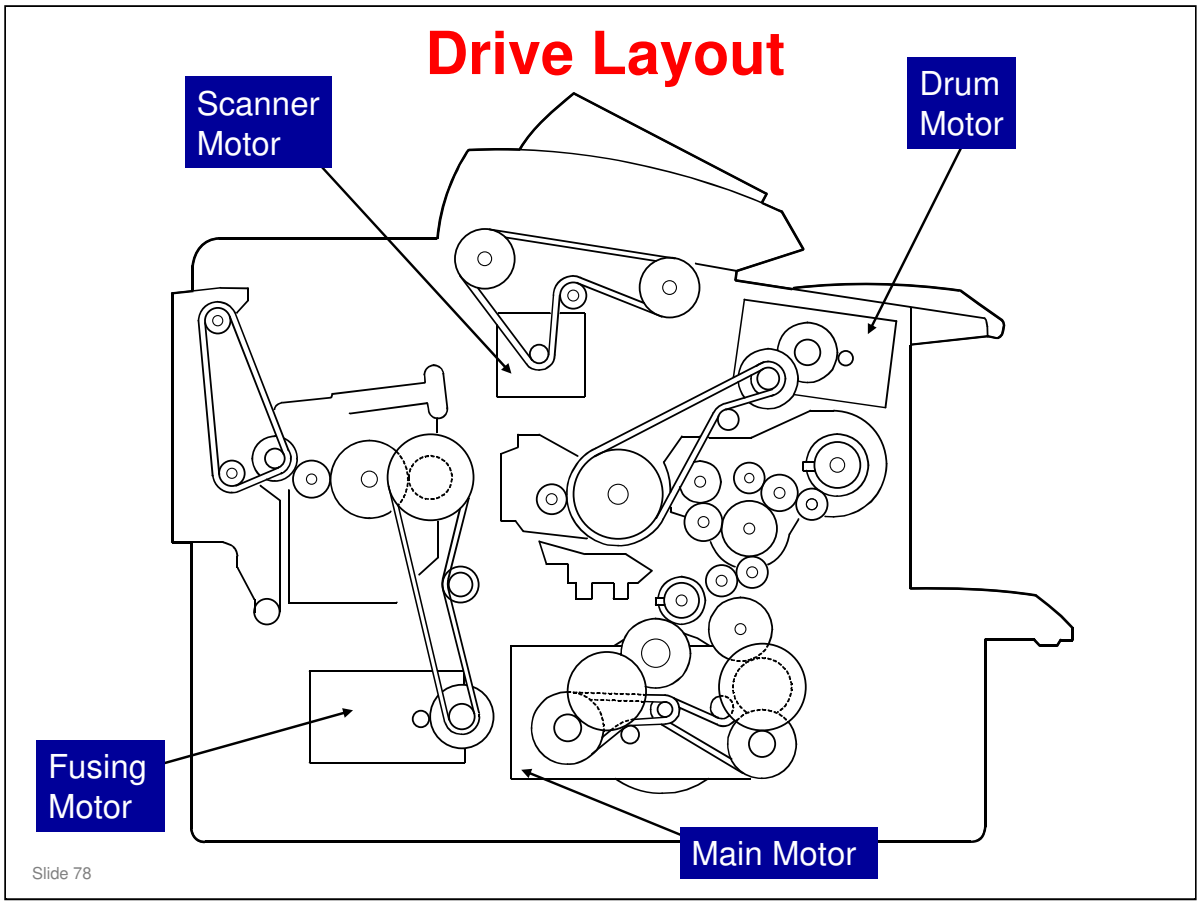
- There are two exit paths: upper, and rear.
  - These paths use the same exit. The exit that the machine uses is set by installing or removing the stacker.
  - For more details, see the following sections of the FSM.

    New Features of D093/D094 → Paper Exit Selection

    Overview → Original/Copy Paper Paths

Copy Feed Paths

- There are three paths into the machine: Roll feeder, paper cassette, or the manual feed table
- The customer uses the manual feed table to make a copy on a sheet of cut paper larger than A3.
- There are two exits: upper, and rear.
- For more how to select the exit, see the "Original/Copy Paper Paths" section of the FSM and the operator's manuals.



Show the following drive paths to the trainees.

- ❒ Scanner motor - original feed mechanism
- ❒ Drum motor – drum, OPC mechanisms
- ❒ Main motor – development unit, registration roller
- ❒ Roll feed motor - rollers in the roll feed unit (not shown above)
  - ➢ Paper that is put in the manual feed table goes directly to the registration roller.
- ❒ Cassette motor – rollers in the paper cassette (not shown above)
- ❒ Fusing motor - fusing unit, and exit rollers

Electrical Components

- **Locate the major electrical components on the machine.**
- **Refer to the following:**
  - Electrical component list.
    (FSM → Appendix → Electrical Components)
  - Point-to-Point diagram.
  - Electrical component layout illustrations.
    (Troubleshooting → Jam Code Tables, Cover Open)
- **Two component names have changed from those of the N-C2.**
  - IPU → SIPU
  - SIB → SIF
- **The number and layout of LEDs and fuses have also changed.**

Slide 79

Switches

- Dehumidifier switch: The roll feeder tray has dehumidifiers as standard components, not as options. If the switch is turned on, the heater will turn on when the main power is switched off. In a new machine, the switch is off, to agree with Energy Star requirements.

Others

- Dehumidifiers and anti-condensation heaters: There are heaters in the roll tray, and by the drum. They are standard components of the machine, not options.
- Fusing lamp: There is only one in this machine.

PCB Organization

- **The MCU controls the machine.**
- **The SIPU controls the image processing.**
- **There is a GW controller board**
  - The controller board controls the memory and all peripheral devices.
  - To add a printer or scanner option, install the appropriate SD card.

Slide 80

No additional notes.

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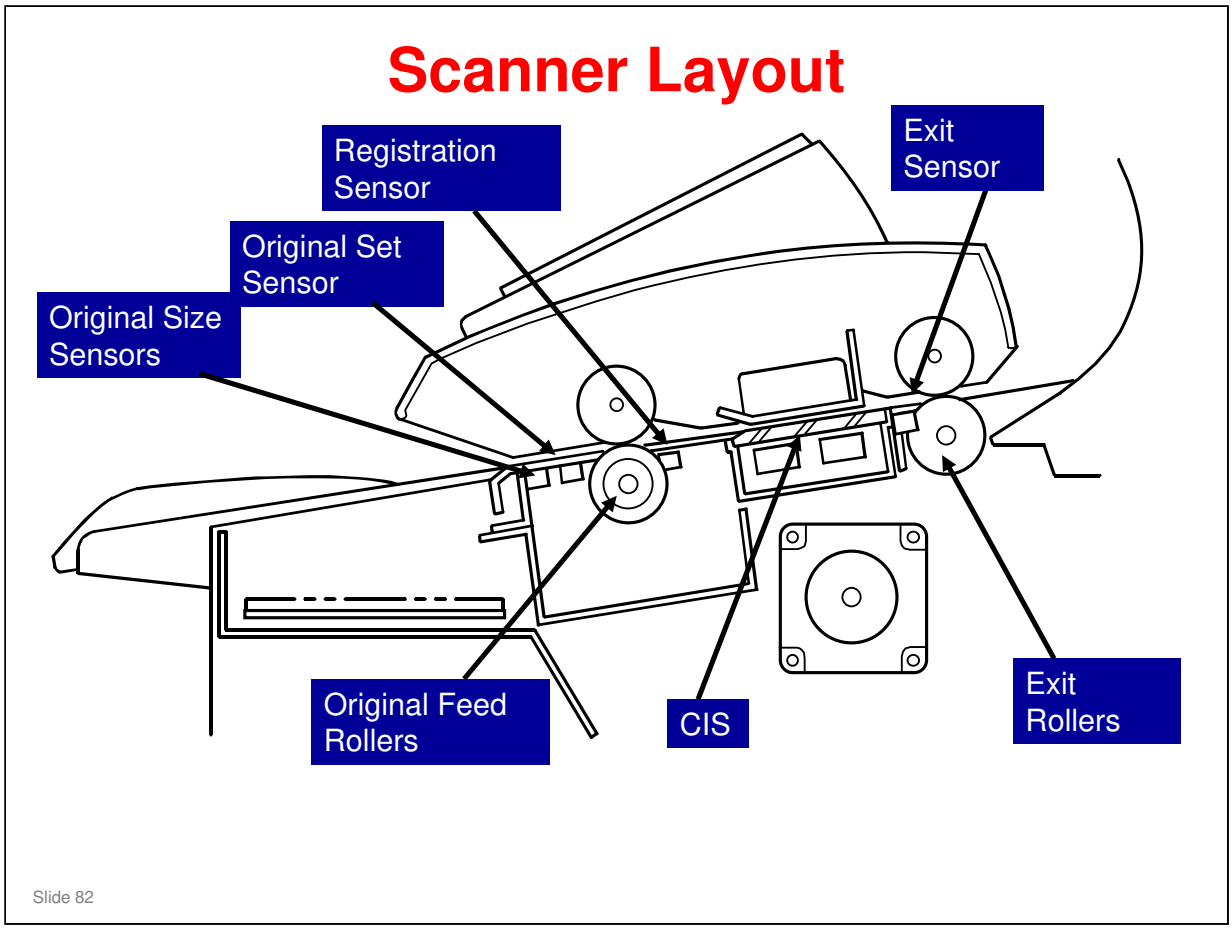
SCANNING

Slide 81

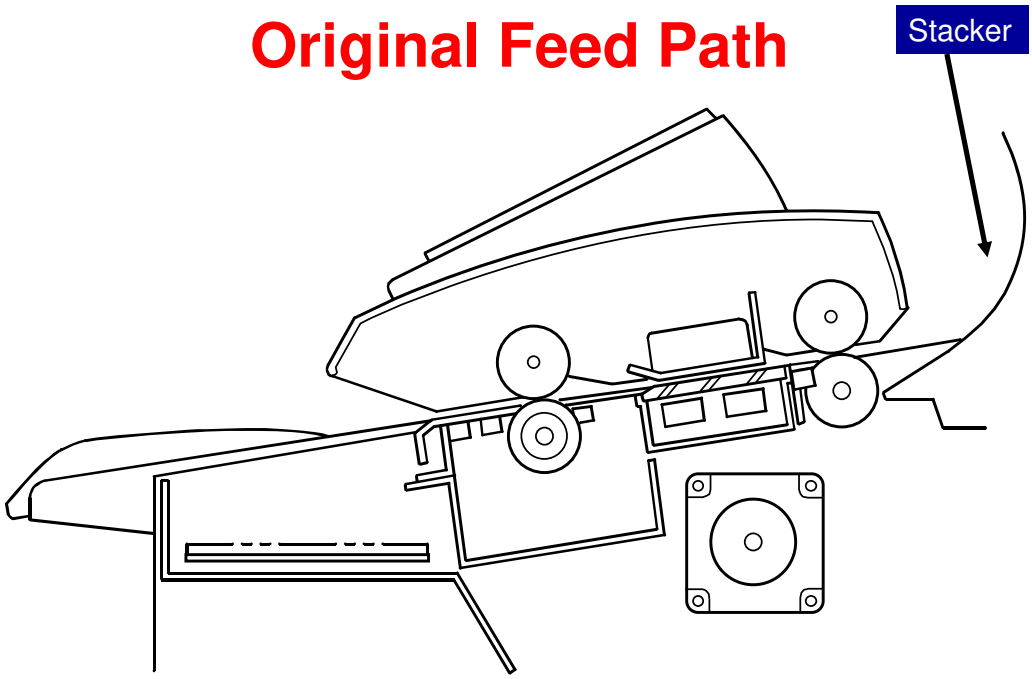
PURPOSE OF THIS SECTION

- This section explain the original feed and scanner mechanisms.



- A 600 dpi CIS (contact image sensor) is used in this machine.
- There are five original size sensors. The original set sensor is also used for original size detection.
- The white plate above the CIS is used for auto shading (to get the standard white level for image processing).
- The original registration sensor detects jams in the original feed path. It also detects the leading edge of the original, which makes the CIS start to scan the original.
- The original exit sensor detects jams in the original feed path, and detects the trailing edge of the original.
- The diagram in the Scanner Layout section shows the dimensions of the scanner.

Original Feed Path

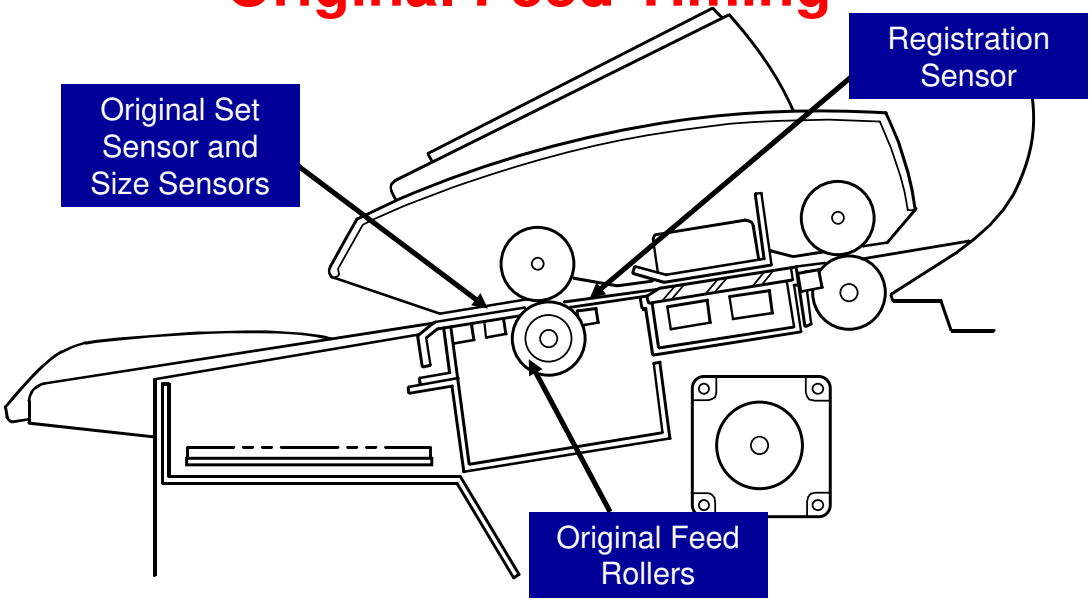


- **Only one sheet can be placed in the original feeder.**
- **Two exit paths: Upper, rear**

Slide 83

- Only one sheet can be put in the feeder.
  - There is no separation mechanism.
- There are two paths to feed out the originals. These two paths use the same exit.
  - If the stacker is in its position, the original hits the front of the stacker, and is stacked at the front side.
  - If the stacker is removed, the original feeds through the scanner and feeds out at the rear.

Original Feed Timing

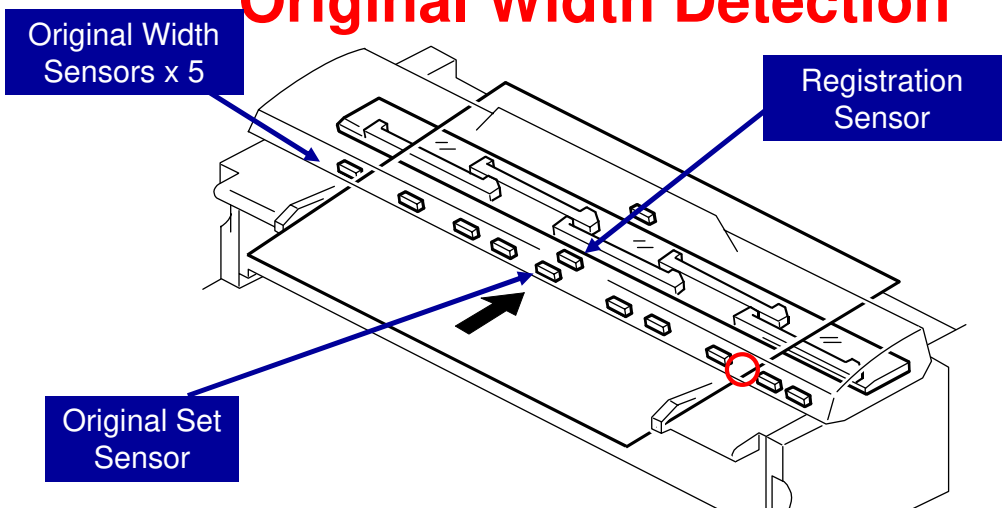


- **From original set sensor turn-on until feed roller starts: 1 second**
  - System Settings - General Features - Original Feed Delay 1
- **Stop at the registration sensor: 1 second**
  - System Settings - General Features - Original Feed Delay 2

Slide 84

- Original feed stops two times to let the user correct for skew and other feed problems before the scan starts.
- They are controlled with user tools as shown on the slide.
- After that, the feed speed is controlled by the reproduction ratio, as explained on the Original Feed Mechanism slide.

Original Width Detection

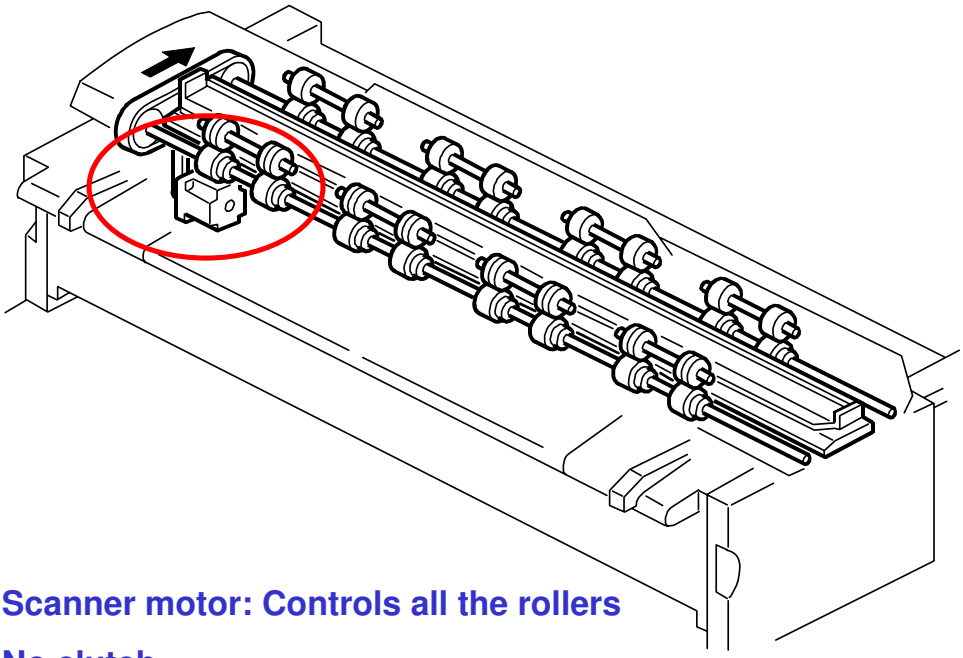


- **Ten sensors detect the width: 9 width sensors, and the original set sensor**
  - North America version: 11 sensors (10 width sensors + set sensor)
- **EU version: The sensors on the right detect A series paper widths, and the sensors on the left detect B series paper widths.**
- **NA version: The sensors on the right detect Engineering paper widths, and the sensors on the left detect Architecture paper widths.**

Slide 85

- The position of the additional sensor for the North America version is shown here by a red circle. It is at the 30" position.
- The machine is designed for the Japanese B series only, which is not the same as the European B series. However, the sensors are positioned so that widths of European B series will be interpreted correctly. But the enlargement and reduction ratios are designed for Japanese sizes, so for European sizes, the magnification may be slightly inaccurate.
- The original set sensor detects A4 or B4 SEF and North American A size originals (8.5 x 11 or 9 x 12). The original size sensors detect larger sizes.
  - The original set sensor is in the centre of the main scan. Because of this, it detects each time that paper that is put in the feeder.

Original Feed Mechanism

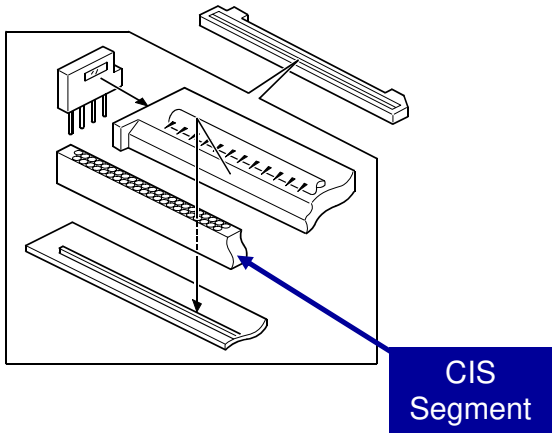


- Scanner motor: Controls all the rollers
- No clutch

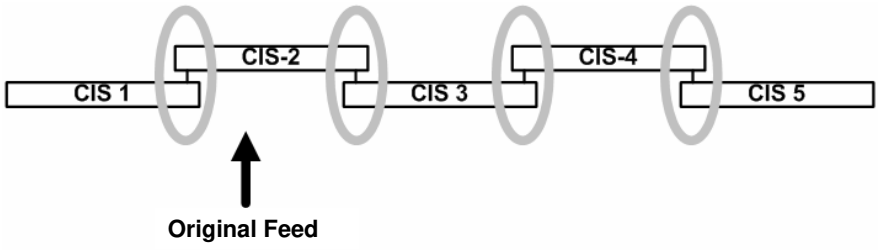
Slide 86

- The service manual shows how the feed speed is set by the required reproduction ratio.
  - To magnify the image, scanning slows (see the graph at the bottom of the page in the service manual).

Contact Image Sensor (CIS)



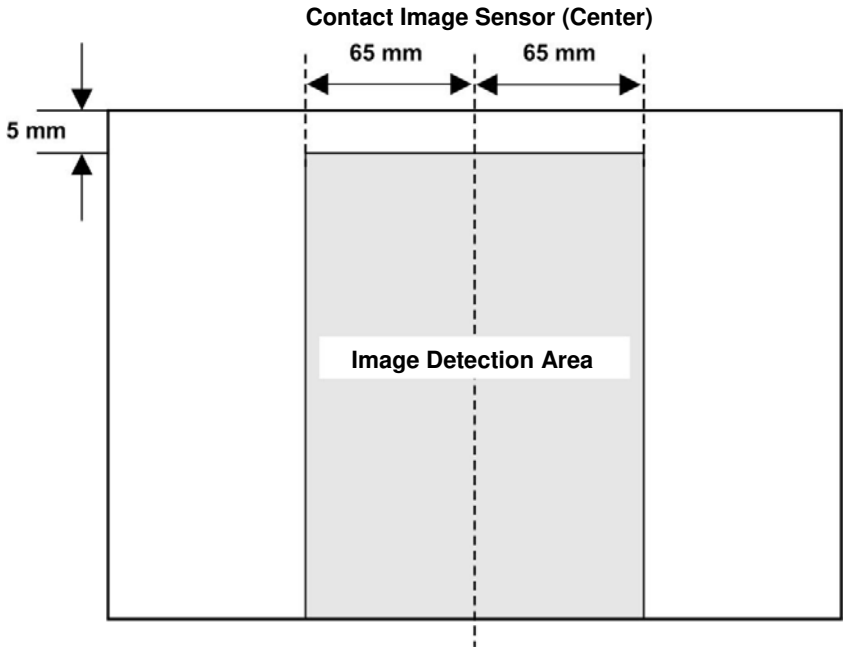
- **600 dpi**
- **Five CIS segments**
- **Positioned below the original**
  - Originals are scanned face down



Slide 87

- The CIS assembly contains five segments.
- After the CIS is replaced, some adjustments must be made to make sure that pixels across the main scan are not missing or do not overlap. This is done using the SD card that comes with the CIS. (Refer to the procedure in the FSM.)

ADS (Auto Image Density Correction)



❑ **The white level is read from the white tapes above the CIS.**

Slide 88

- The white level (absolute white) is read from the white plate above the CIS. This procedure is known as ‘auto shading’.
  - There are two white tapes on the upper guide plate of the scanner, because the CIS elements are not all in one line (there are two rows of elements, with alternate blocks on alternate lines).
- Then, for each line, the machine checks the background and removes it from the image.
- The background is checked from a 130 mm wide strip in the middle of the original.
  - This is not done for the 5 mm at the leading edge of the original.

Removal and Adjustment

- **Practice removing scanner components.**
  - FSM → Replacement and Adjustment → Scanner
- **After you replace the original feed roller or the original exit roller:**
  - Do the CIS sub scan test and adjustment: Replacement and Adjustment → Scanner → Original Feed Unit Rollers.
- **The CIS requires special handling and adjustments. See the following three slides.**

Slide 89

Do the procedures in the manual.

- Make sure you understand the notes and cautions in the procedures.

CIS Replacement

- Carefully read and understand the cautions and guidance in "Before You Begin…"
- Do the "Preparation" items before starting CIS replacement.
- Remove the CIS following the procedure in the FSM.
- After installing the CIS, adjust the CIS settings using the SD card that came with the replacement CIS.
  Carefully follow the procedure in the FSM.
- The next two slides cover fine adjustment of the CIS joints.

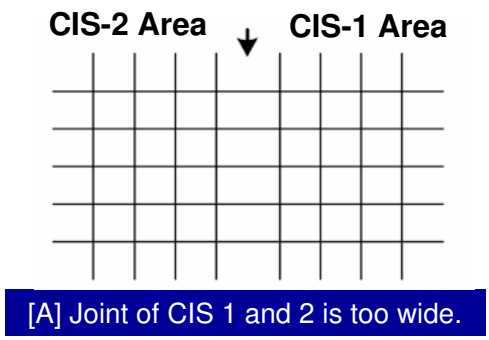
Slide 90

- "Before You Begin…" – These cautions are very important.
  - Always handle the CIS unit carefully to protect it from sudden shock and vibration.
  - Never touch the CIS lens cover with bare hands
  - Clean the CIS lens cover with lens paper only. Never use tissue paper or cloth; they could leave lint or other particles on the glass.
  - Always disconnect and re-connect the CIS unit at the SIF. Never disconnect the signal or power supply harnesses from the CIS unit.
- CIS Adjustment
  - For the N-C2 you had to input the settings from the label on the CIS. This is now done automatically using the SD card that ships with the replacement CIS.
  - SP5985-001 must be set to "1" to do the adjustment procedure. Don't forget to return it to the original setting after completing the adjustment.
  - You may need to do CIS fine adjustment. (Replacement and Adjustment → Special Adjustments → CIS Adjustment with SP Codes)

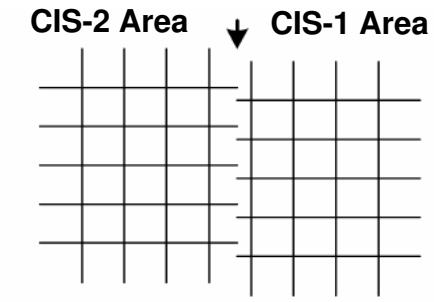
CIS Adjustment with SP Codes – 1

- **Print the CIS Adjustment Pattern (pattern 28)**
  - Special Adjustments → CIS Adjustment with SP Codes → To Print the CIS Adjustment Pattern
  - Follow the procedure exactly
- **Check the pattern alignment at the joint area of CIS 1 and 2 and adjust as necessary.**
  - [A] If the space between the two lines is wider or narrower than usual adjust the main scan offset. (SP4972-1).
  - [B] If the lines do not line up (broken) adjust the sub scan offset (SP4972-6).

(Continued on next slide.)



[A] Joint of CIS 1 and 2 is too wide.

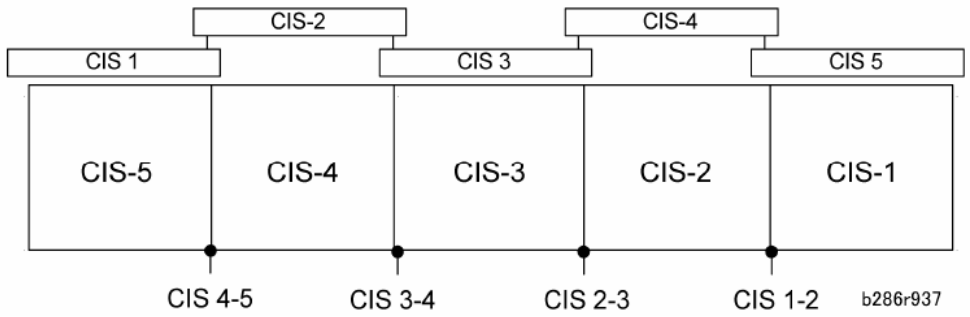


[B] Lines are broken.

Slide 91

No additional notes.

CIS Adjustment with SP Codes – 2



- **After adjusting main scan and/or sub scan offsets for CIS 1-2:**
  - Print another grid pattern and check the CIS 1-2 joint area again.
  - Repeat this until the CIS 1-2 joint is correct.
- **Repeat the above steps for the other three joints.**
  - CIS 2-3 (Use SP4972-3 and SP4972-8)
  - CIS 3-4 (Use SP4972-4 and SP4972-9)
  - CIS 4-5 (Use SP4972-5 and SP4972-10)
- **This adjustment must be done with SP4973 set to 0. After completing the adjustment, be sure to return SP4973 to 2.**
- **See the FSM for more details. (Special Adjustments → CIS Adjustment with SP Codes → To Adjust the Image at the CIS Joints)**

Slide 92

No additional notes.

SP Modes and SC Codes

Scan Related SP Modes

- SP 4008: Sub-scan magnification
- SP 4010: Sub-scan registration
- SP 4011: Main scan registration
- SP 4965: Adjust the original feed roller speed
- SP 4975: Turn this on to make the scanner stop and hold the trailing edge of the original after scanning, so that it does not fall.

Scan Related SC Codes

- SC101: Scanner Lamp Error (Level D)
- SC143: Scanner Automatic Adjustment Error (Level C)

Slide 93

- 4008: Adjusts the scanner motor speed.
- 4010 001: Sets when to start scanning at the leading edge. The time that the CIS starts to scan is controlled by this setting. The registration sensor triggers the start of scanning.
- 4010 002: Sets when the CIS stops scanning after the original leading edge passes the registration sensor.
- 4011: Sets the CIS main scan starting position at the side of the page.
- 4965: This is part of the CIS sub scan test and adjustment after you replace the original feed or exit roller. Instructions are in the replacement procedures for these rollers in the Replacement and Adjustment section of the FSM.

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IMAGE PROCESSING

Slide 94

PURPOSE OF THIS SECTION

- ❒ The machine's image processing features and adjustments will be explained.

Original Types

- **The customer can use one of the following**
  - Text
  - Drawing
  - Text/Photo
  - Glossy Photo
  - Printed Photo
  - Copied Photo
  - Photo
  - Background Lines
  - Patched Original
  - Generation

Slide 95

- The user can use one of seven image processing modes at the LCD touch panel.
- To access the last four in the list, it is necessary to use the 'Special Original' menu on the LCD panel.

Shading Correction

- The CIS scans the white plate above the CIS to calibrate the white level.
- There are no adjustments.

Slide 96

❒ The main points are on the slide.

Magnification

- Main scan direction: Done on the IPU board
- Sub scan direction: Scanner speed change
- SP 4101: Main scan magnification adjustment
- SP 4008: Sub scan magnification adjustment

Slide 97

No additional notes

Other SP Modes and SC Codes

Other SP Modes

- 2954: Adjusts quality of printed vertical lines
  - » See the service manual for details
- 4010: Sub scan registration
- 4011: Main scan registration
- 4012: Erase margin settings for the scanner
- 4550 to 4571: Image processing adjustments

SC Codes

- SC161-1 to -4: SPIU errors (Level D)
- SC168: Gray Balance Adjustment Error (Level B)

Slide 98

- These SPs were not explained before. Refer to the SP mode tables in the FSM.
- See the SC table in the FSM for details.

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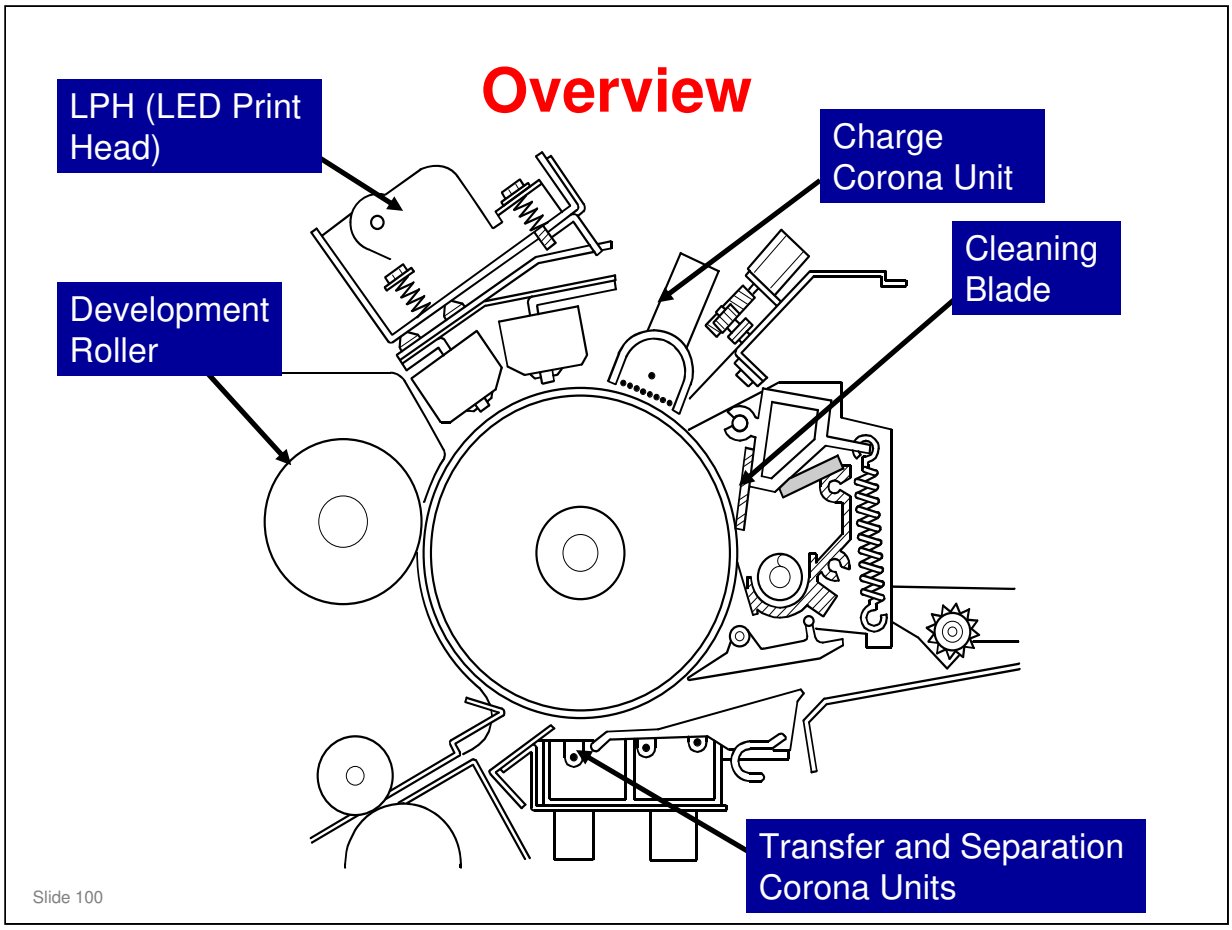
PROCESSES AROUND THE DRUM

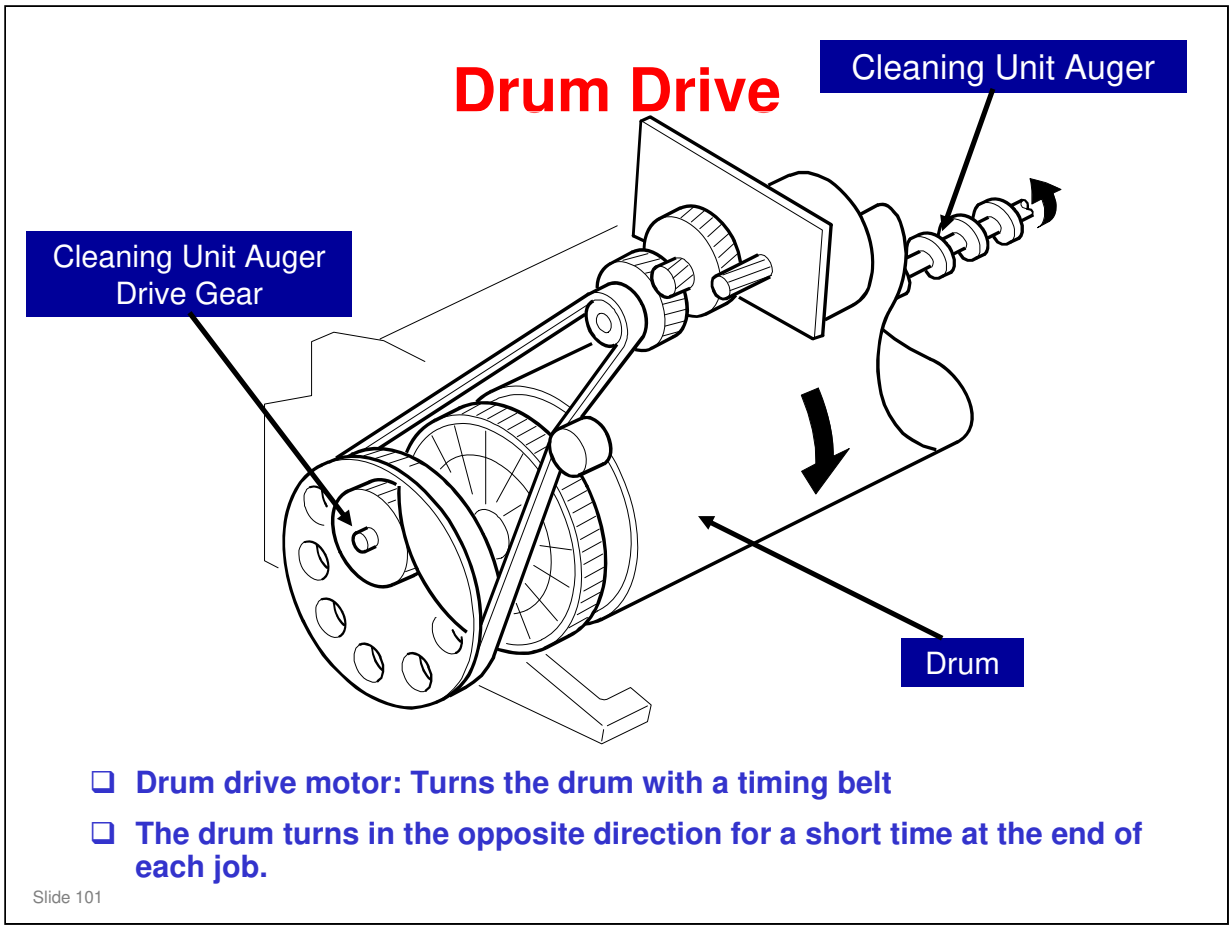
Slide 99

PURPOSE OF THE SECTION

- This section will explain drum drive, the charge corona unit, drum cleaning, and quenching.

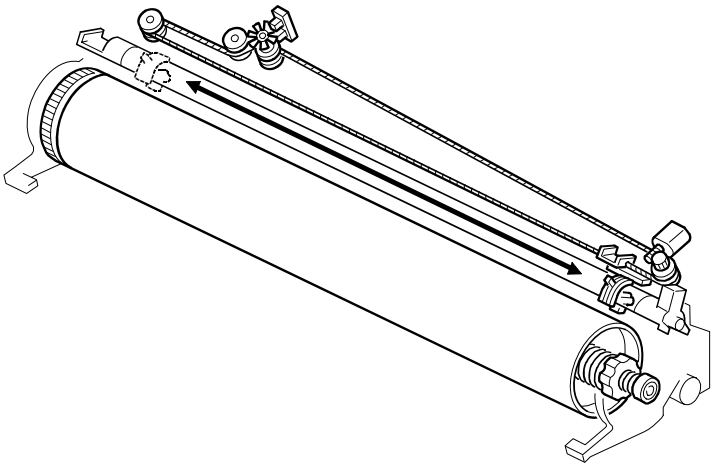


- These are the most important components around the drum.
- The paper goes past the drum at 80 mm/s.
- The drum diameter is 80 mm.
  - The circumference is 251.4 mm.
- The machine prints with LEDs, not a laser beam. The LPH (LED Print Head) contains three A3-width LED arrays, for A0-width printing.
  - A single A0 LED array is very expensive, so three A3 arrays are used.
  - For more about the LED array, see the Exposure section of the course.



- ❒ The drum drive motor has only one job: to control the drum.
- ❒ A gear at the rear of the drum turns the auger in the cleaning unit.
- ❒ The service manual explains the timing for the drum.
- ❒ The drum turns in the opposite direction for 0.3 s at the end of each job. This removes paper dust and toner from the cleaning blade.

Charge Corona Unit



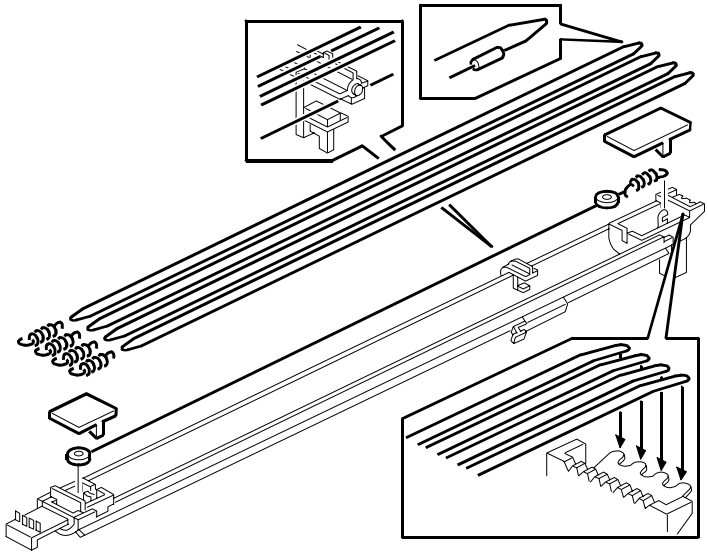
- **Single-wire scorotron charge corona unit**
- **8 parallel grid wires**
- **Voltages**
  - Grid: -825 V
  - Drum surface: -850 V
  - Corona wire: About 200 mA

RTB 1
Corrected

Slide 102

- This is one wire. But, it is installed in a loop. As a result, two wires go across the drum.
- The grid is 8 parallel wires.
  - See the next slide for a diagram.
  - This model uses constant current to control the corona charge.
- The mesh-type grid system is usually better. But it is not used in wide format machines. In this type of machine, there can be too much tension in the grid, and this bends the mesh. Because of this, the parallel-wire system is used.

Corona and Grid Wires

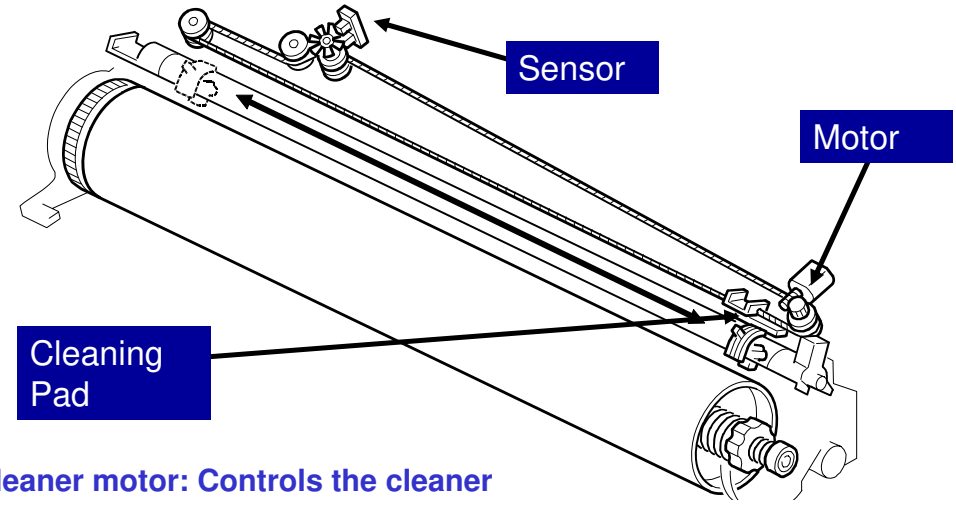


❑ **Eight parallel grid wires, a wide distance apart.**

Slide 103

- ❒ In this type of unit, the charge on the drum is greater than the charge on the grid. This occurs because the space between the grid wires [D] is sufficiently large for some of the charged particles from the corona to get through to the drum.
- ❒ The corona wire is gold-plated for better cleaning and to keep charge leaks at a minimum.

Corona Wire Cleaning



- **Wire cleaner motor: Controls the cleaner**
- **The corona wire is cleaned automatically, immediately after the power is switched on, if these two conditions occur:**
  - The temperature of the hot roller is less than 50°C (122°F).
  - 600 m of paper fed through the machine since the last wire cleaning.
    - » The 600-m interval can be changed with SP mode 2804.
- **The wire motor sensor monitors the motion of the cleaner**

Slide 104

- The motor turns a worm gear. This gear pulls the wire that is attached to the cleaner.
- The wire cleaner first goes to home position (at the front, by the motor). Then it moves to the rear (by the sensor), then to the home position again.
- The corona wire is cleaned immediately after the main power switch or operation power switch is switched on, if these two conditions occur:
  - The temperature of the hot roller is less than 50°C (122 °F).
  - 600 m of paper fed through the machine since the last wire cleaning.

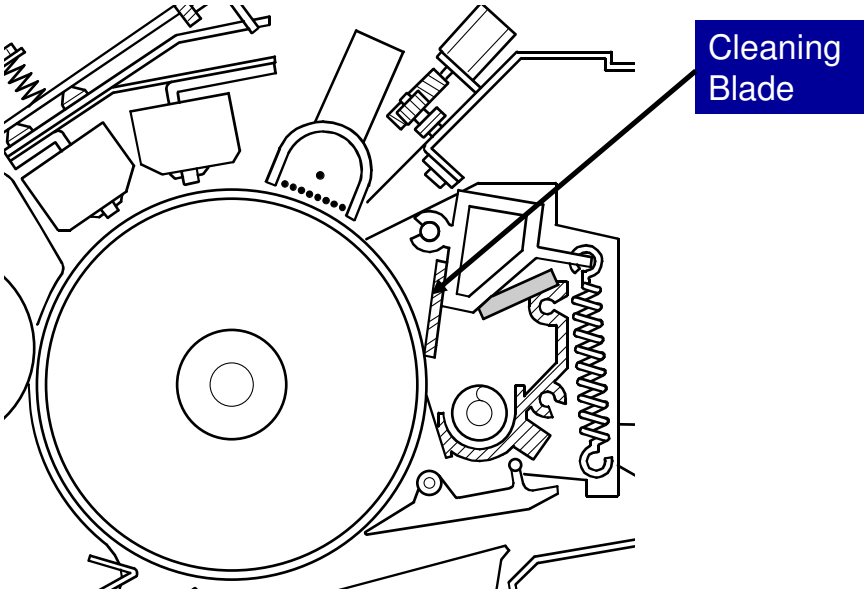
    The 600-m interval can be changed with SP mode 2804.

    The interval can be 300, 600, 900, 1200, or 1500 m. The factory setting is 600 m.

    To disable cleaning, set the SP to 0.

    To enable cleaning immediately after every power-up, set the SP to 1.
- There is also a forced wire cleaning procedure - SP 2803. Do this when it is necessary to clean the wire.
  - This SP also moves the cleaner to home position. Because of this, it is important to use this SP after you change the motor or do some work on the wire cleaning mechanism.
- The actuator for the wire cleaner sensor turns while the cleaner moves. The signals from this sensor tell the machine when the cleaning pad moves.
  - If the wire cleaner stops before it gets to the end, or if stops too long at the far left position, the wire cleaner sensor detects an error.
  - The machine also uses this sensor to monitor the home position of the cleaning pad.

Drum Cleaning

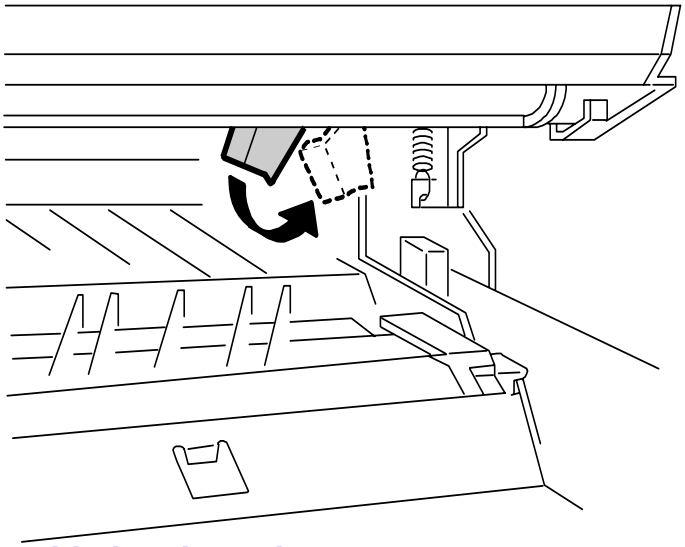


- **Counter blade system**
- **The drum changes direction after every job to remove toner stuck on the blade.**

Slide 105

- A counter blade cleans better.
  - The drum turns anti-clockwise as seen in this diagram.
- Also, remember the Drum Set Mode procedure (SP 2923) during installation. During this procedure, you move the cleaning blade away from the drum, then the machine gives the drum a layer of toner. This lubricates the cleaning blade, and this makes sure that the blade will not bend in the wrong direction when the drum turns.
  - This must also be done after you install a a new drum or cleaning blade.

Cleaning Blade Release

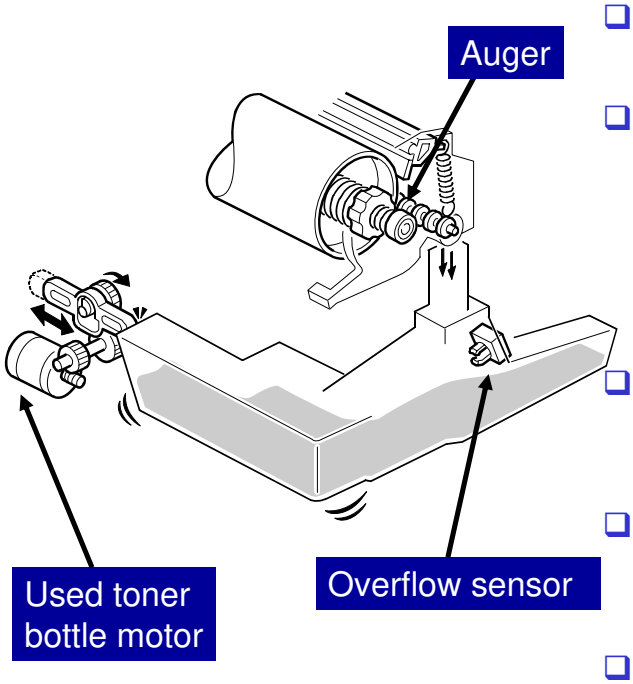


- **Cleaning blade release lever:**
  - Push left: The blade is away from the drum.
  - Push right: The blade touches the drum.

Slide 106

- Before you do the Drum Set Mode procedure, move the cleaning blade lever left (as seen from the front of the machine) to make sure that the blade is away from the drum.
- After the Drum Set Mode procedure, move the lever right. The blade touches the drum for standard operation.
- It is not necessary to move this lever to the transportation position when you move the machine to a different location in the same room. But if you move the machine a long distance (for example, between a warehouse and the customer's location), move the blade to the transportation position.

Collecting Used Toner



- **The machine does not recycle toner.**
- **Cleaning unit auger: Moves used toner from the drum to the used toner collection bottle.**
  - Drum motor: Controls the auger
- **Used toner bottle motor: Shakes the tank to make the toner in the tank level.**
- **Toner overflow sensor: Detects when the tank is almost full**
- **The technician must empty the bottle.**

Slide 107

- The used toner bottle motor is explained in more detail on the subsequent slide.
- Used toner is not recycled in this machine, because paper dust from the cutter can get into the toner that is removed from the drum.
- The technician removes the used toner from the bottle; the user does not do this.

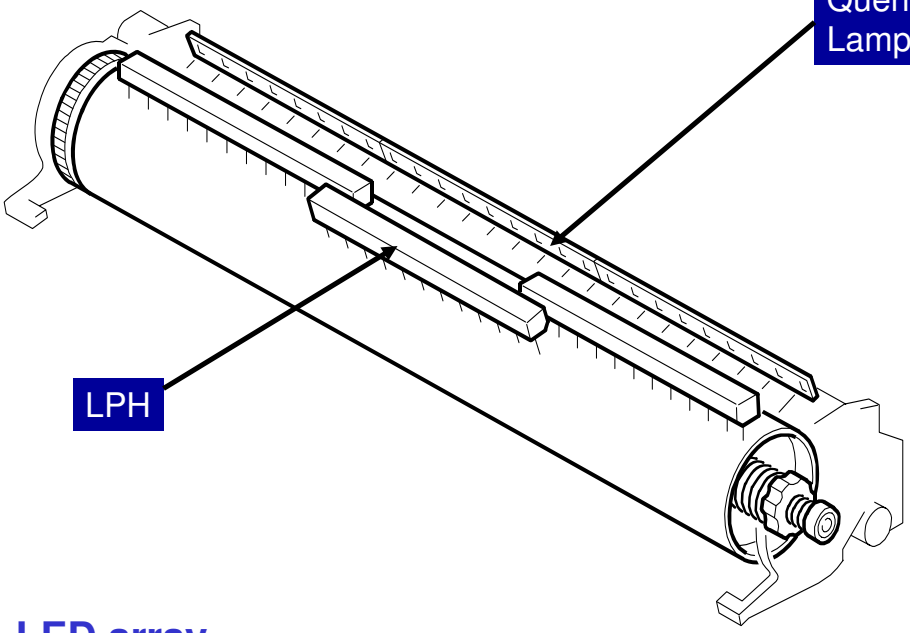
Used Toner Bottle Full

- **When the used toner overflow sensor detects that the used toner tank is almost full, the motor switches on for 20 seconds at the end of the job (SP2926-1).**
  - The sound of the vibration is audible. This is one alert that the bottle is near full and should be emptied.
  - During the motor operation, printing and scanning cannot be done.
- **Then, if the machine still detects that the bottle is almost full, the user is informed about this on the operation panel.**
- **Copying can continue until the end of the job, or for 15 more meters if that comes first. Then copying is disabled.**
  - The 15 m limit can be changed with SP 2926-3.
- **The technician must empty the bottle.**
  - A 15-metre warning is not very much for this type of machine. So, empty the used toner bottle every time you visit the user.

Slide 108

- If the 15 m limit occurs during printing a page, printing continues to the end of the page, then the machine stops and the used toner must be removed from the bottle.
- In addition, after a new **toner cartridge** is installed and the cover is closed, the motor switches on for 30 seconds (SP2926-2). This was included as a result of designer's tests to improve the performance of the detection for user toner bottle full detection.

Quenching Lamp

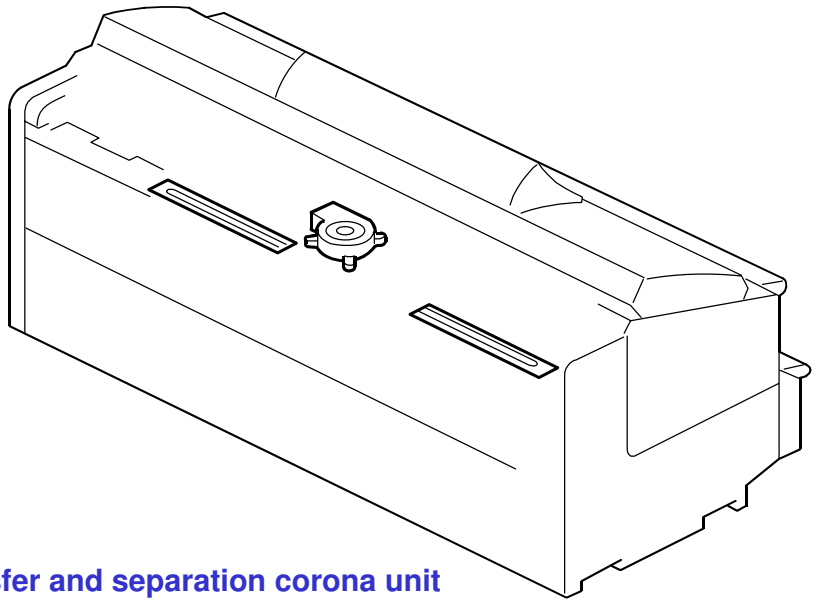


❑ **LED array**

Slide 109

❒ The lamp contains red LEDs to prevent drum fatigue.

Drum Anti-condensation Heaters



- Below the transfer and separation corona unit
- Prevent condensation near the drum
- Turn on when the main power switch or operation switch is turned off
- These are standard components of the machine, not optional items

Slide 110

- The heaters are off when the main power or operation switch is on.
- The heaters are on when the main power or operation switch is off.

Replacement and Adjustment

- Charge Corona Wires, Grid Wires, Cleaner
- Quenching Lamp
- Drum
- Cleaning Blade
- ID Sensor
- Pick-off Pawls and Solenoid

Slide 111

Ask the class to do the procedures on the slide.

- Make sure that they understand the cautions in the manual.
- Make sure that they understand the SP modes that must be done after each procedure (they are in the procedures in the manual).

Drum

- Make sure that the drum is not exposed to light for a long time.
- It is possible that the drum gear [C] is attached with a paint lock screw. But this screw must be removed, which is different from usual paint-locked screws.
- Do the Drum Set Mode (SP 2923) after you install a new drum or cleaning blade.
- Do SP 3001 002 to initialize the ID sensor after you install a new drum.

Cleaning Blade

- Do the Drum Set Mode (SP 2923) after you install a new drum or cleaning blade.

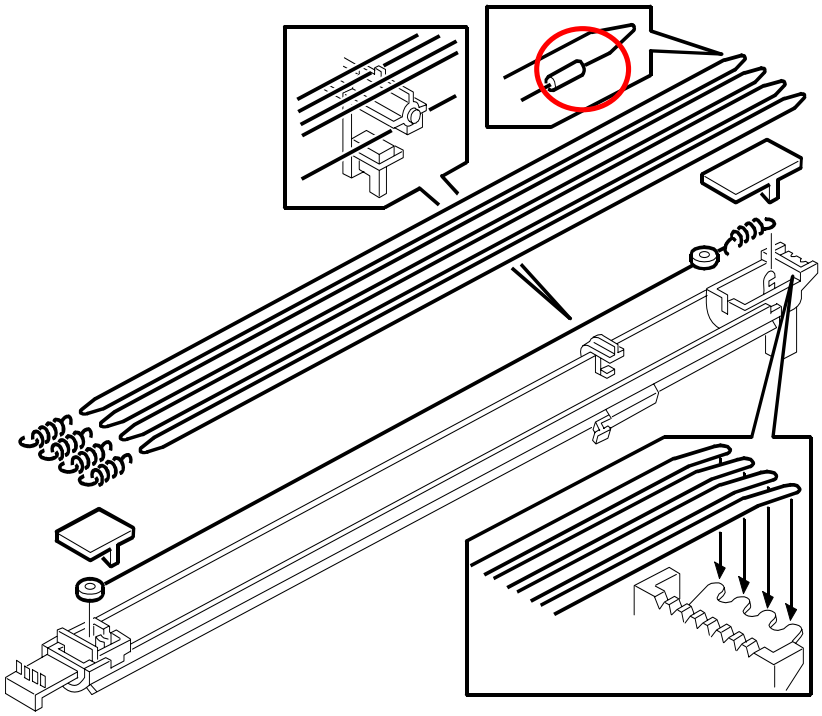
ID Sensor

- Do SP 3001 002 to initialize the ID sensor after you install a new sensor.

Corona and Grid Wires

- See the next slide.

Corona and Grid Wires



Slide 112

- The joint, circled in red, must be under the endblock cover.

SC Codes

- SC300: Charge Corona Output Error (Level D)
- SC305: Charge Corona Wire Cleaner Error (Level D)
- SC521: Drum Motor Error (Level D)

Slide 113

- See the SC table in the FSM for details.

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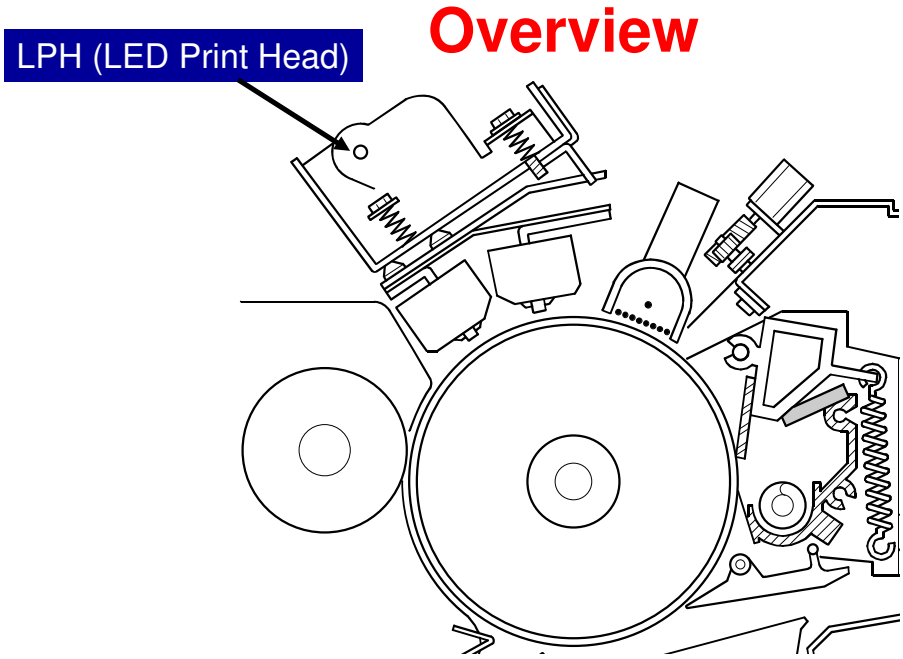
EXPOSURE

Slide 114

PURPOSE OF THIS SECTION

- ❒ The latent image writing mechanism will be explained.
- ❒ This machine uses LED arrays. Because of this, there are no safety switch circuits as there would be for a laser exposure system.

Overview

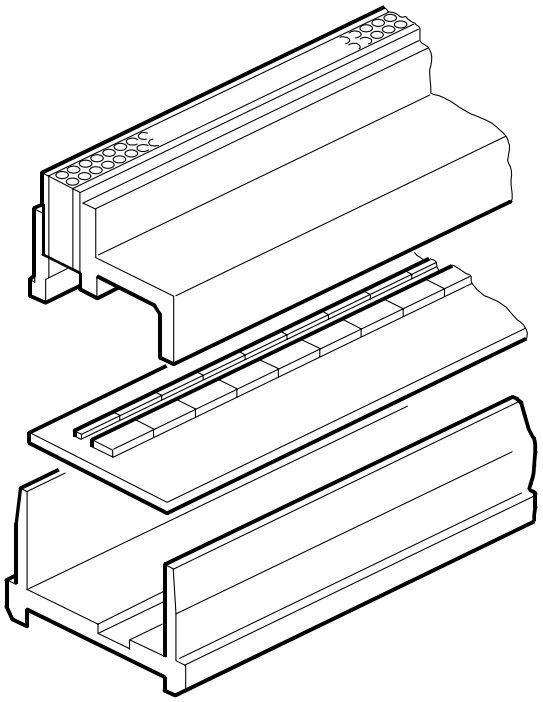


- **The LPH (LED Print Head) shines directly on the drum.**
  - There are no mirrors.
  - Resolution: 600 dpi

Slide 115

No additional notes

LED Head Structure

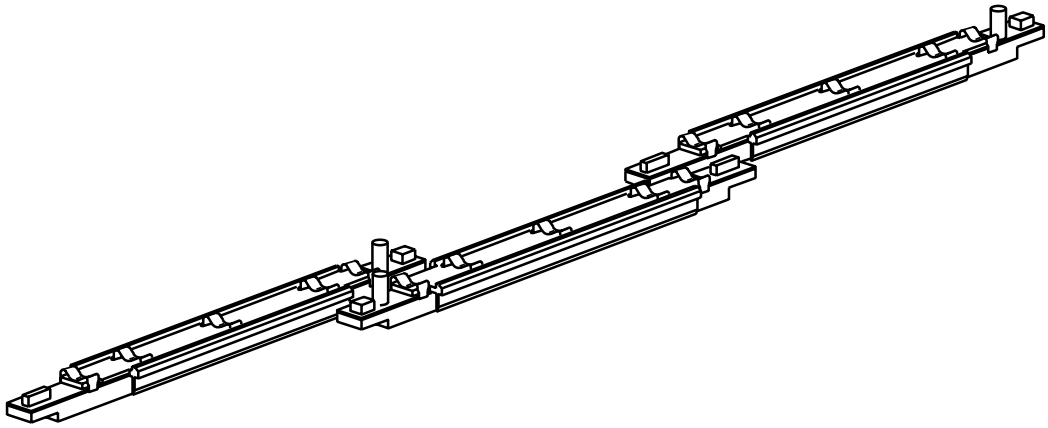


- **Each head has:**
  - Self-focusing lens array
  - LED array
  - Drive board
  - Heat sink
- **Maximum print width: 914.36 mm**
- **The unit is known as the LPH (LED Print Head)**

Slide 116

No additional notes

LED Head Structure



- Three A3-width LED heads are joined together.
- Three A3-width heads are one-third the cost of one A0-width head.

Slide 117

- Note the large reduction in cost. But there is a potential problem with copy quality at the joints between the heads; this will be explained in this section.

Data Processing

- CIS: Eight-bit (256 levels per pixel)
- Data input to IPU board: Eight-bit (256 levels per pixel)
- Data output from the IPU to the VDB: One-bit (2 levels per pixel)

Slide 118

No additional notes

LPH Replacement and Adjustment

- **Install the new LPH**
  - RSM → Replacement and Adjustment → Around the Drum, LPH
- **Do not replace the ROMs.**
- **Input the SP settings on the decals (SP 2943 and SP 2952)**
- **Make a print to check if the LPH settings need more adjustment**
  - Service manual, Replacement and Adjustment, SP Adjustments, LPH

Slide 119

Ask the trainees to remove and replace the LPH.

ROMs

- In this model, do not change ROMs on the VDB board.

SP settings on the decals

- Before you reassemble the machine, read the LPH settings from the labels on the LPH.
- Input these into the correct SP modes, as explained in the manual.
  - In a new machine, the settings for the installed LPH unit are input at the factory. But if you do an NV-RAM reset, you could have to input these values again if you do not have the original data on an SMC print or on a flash memory card.

What are these settings?

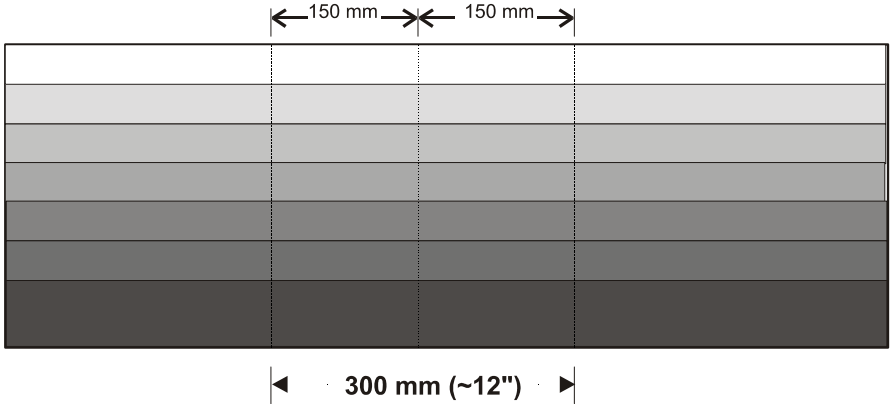
- The LPH contains three heads.
- SP 2952 tells the machine about errors in alignment at the joints in the LPH. These SPs correct errors in the main scan and sub scan directions.
- SP 2943 controls the output pixel brightness from the LEDs.

LPH Replacement and Adjustment

Making a test print

❑ Look at the test print

- SP 4417, pattern number 27
- Feed a wide original (914 mm, 35“), at least 297 mm (11”) long, into the scanner.
- The pattern will print automatically

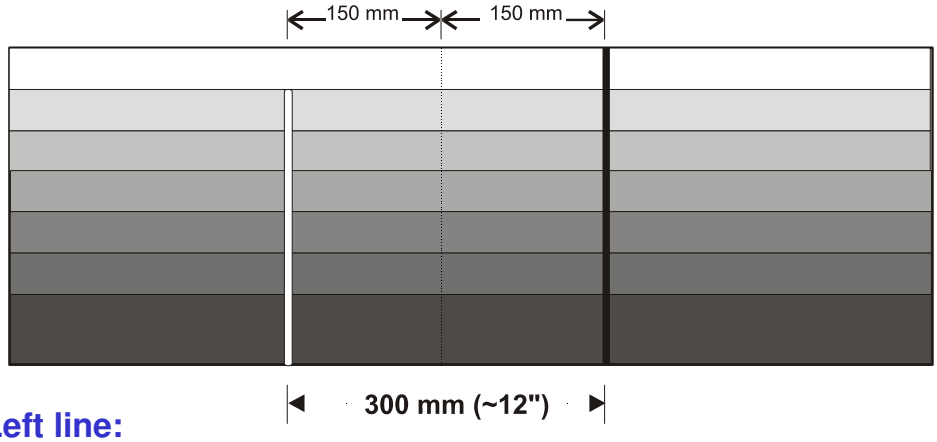


Slide 120

- ❒ Pattern number 27 is shown on the slide.
- ❒ Look at the pale lines at the 1/3 and 2/3 positions. These are the joints.
- ❒ These lines are usual for a correctly adjusted LPH. It is not possible to remove these pale lines.
  - ➢ Make sure that the customer has no problems with a typical printout of something that they use frequently (for example, a CAD schematic). If they see a problem at the 1/3 and 2/3 positions, try to adjust again.
- ❒ If there is a problem with the factory settings, the black or white lines can be clearly seen, as shown on the subsequent slide.

LPH Replacement and Adjustment

Removing Vertical Black or White Lines



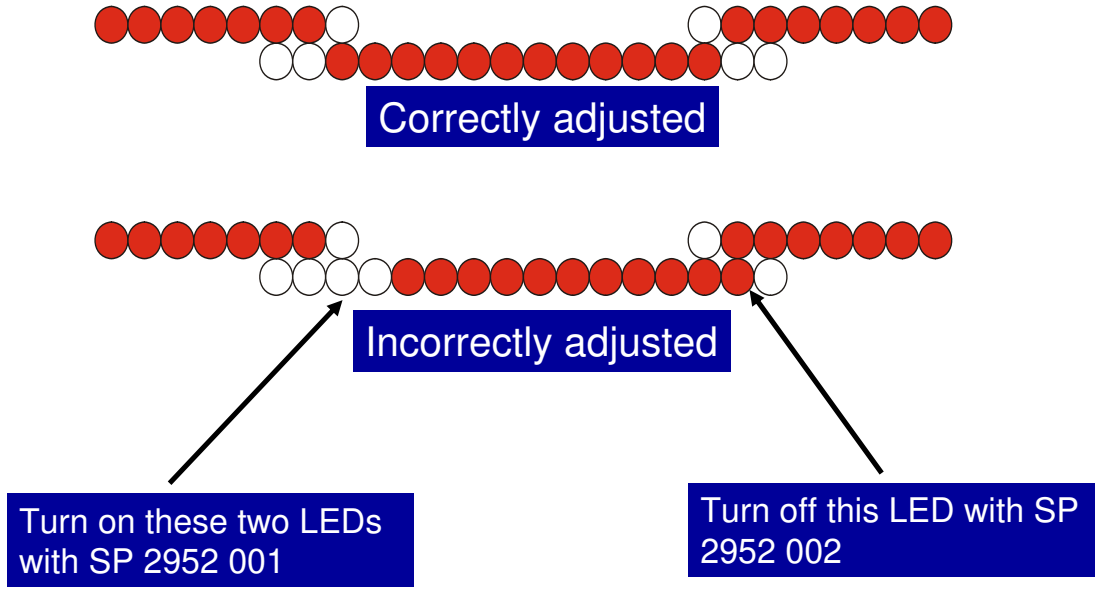
- **Left line:**
  - If white, decrease the value of SP2952-1
  - If black, increase the value of SP2952-1
- **Right line:**
  - If white, decrease the value of SP2952-2
  - If black, increase the value of SP2952-2

Slide 121

- If the values on the decals are not correct, there can be vertical black or white lines on the test print as shown. The next three slides show how to remove these vertical black and white lines.
- If the SP settings are only incorrect by one pixel, you will see a clear white or black line, as shown on the slide.
- On the left, too many LEDs are switched off and the result is a white line.
- On the right, too many LEDs are switched on, and the result is a black line.
- Adjust the lines until they are pale; the lines cannot be fully removed.
- For how to adjust, see the next slide.

LPH Replacement and Adjustment

Removing Vertical Black or White Lines

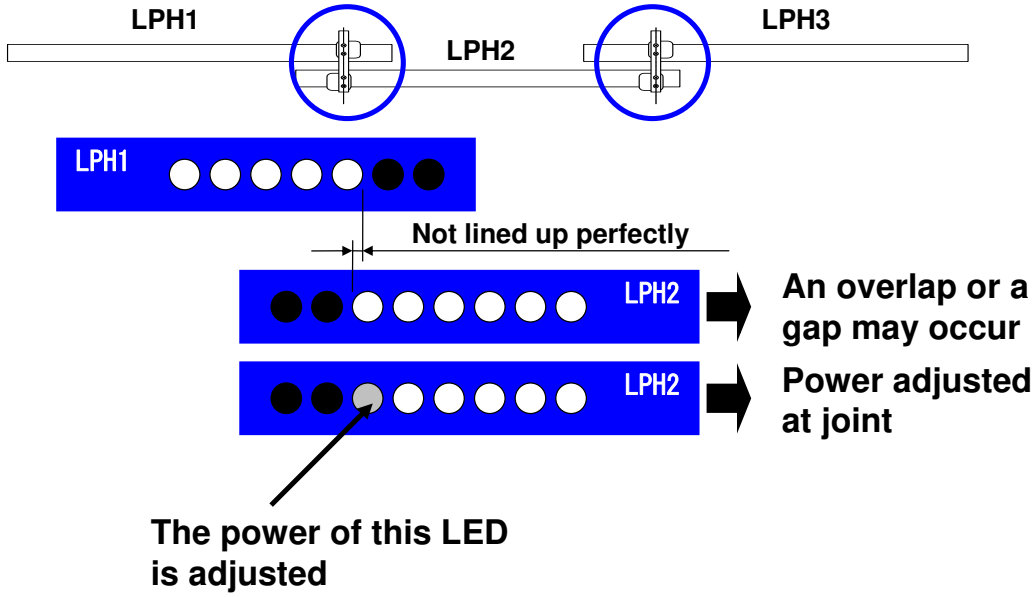


Slide 122

- This fine adjustment should not be necessary in the field.
- The top diagram shows how the LEDs should come on.
- The bottom diagram shows not sufficient LEDs on at the left joint and too many at the right joint.
  - On the test pattern, this will cause a white line at the 1/3 posiiton, and a black line at the 2/3 position.
- The SPs switch off LEDs in the central segment of the LPH (LPH 2). There is no effect on the LEDs in LPH 1 and LPH 3.
  - If you increase the SP setting in intervals of 10 (410, 420, etc.), one LED switches off for every interval of 10.
  - If you decrease the SP setting in intervals of 10 (390, 380, etc.), one LED switches on for every interval of 10.
  - If you increase the SP setting by less than 10 (401, 402, etc.), this decreases the light intensity of the LED at the end of the row of LEDs that are on.
  - If you decrease the SP setting by less than 10 (399, 398, etc.), this increases the light intensity of this LED.
  - This only affects the LED at the end of the line of LEDs that are on.
- To remove a line, adjust by 10 until it goes. Then adjust in the opposite direction by 1 until it comes back again. Then adjust in the initial direction again by 1 to complete the job (the line should go again). Then make test prints to make sure that the copy quality is satisfactory.
- Why do we have these intervals of 1/10? The LEDs are not perfectly aligned vertically; see the next slide for more.

LPH Replacement and Adjustment

Removing Vertical Black or White Lines

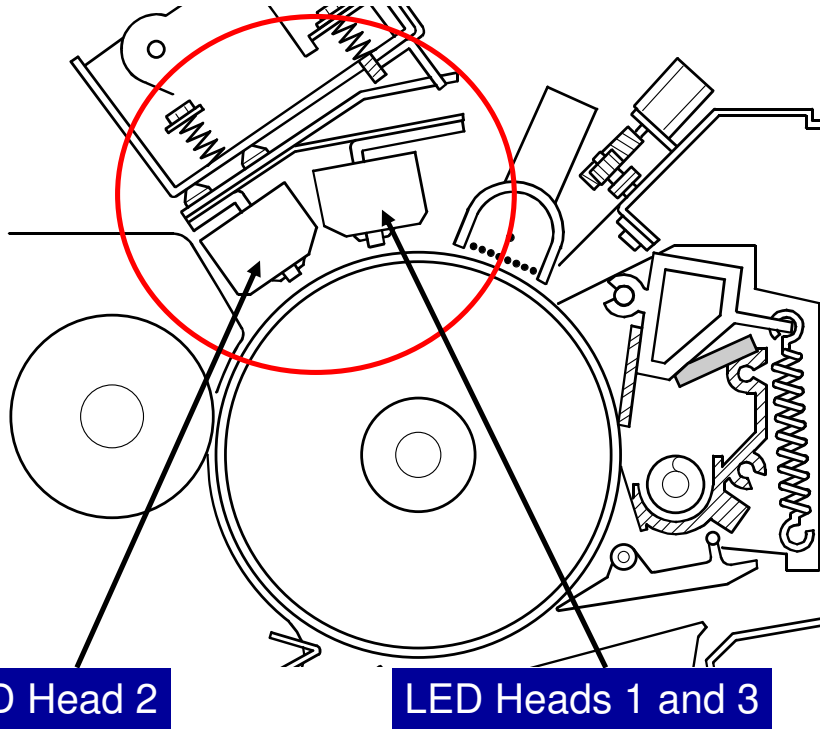


Slide 123

- In the example on the slide, the LEDs in head 2 are not directly aligned with those in head 1.
- If there is an overlap at the joint, a black line will occur on the printout if the two LEDs in the overlap are on.
- If there is a gap at the joint, then a white line will occur on the printout between the two pixels.
- To stop this, you can adjust the power of the LED shown in the diagram. There are 32 possible power values between off and fully on(at 10% of maximum possible power).
- The heads are joined. This decreases the increase in size that is caused by heat.
  - If the heads are not joined, the gap between two pixels increases by 100 μm.
  - With the joints, the increase in size is less than 20 μm.
  - To compare, the gap between the dots is 42.3 μm.

LPH Replacement and Adjustment

Misalignment in the Sub-scan Direction



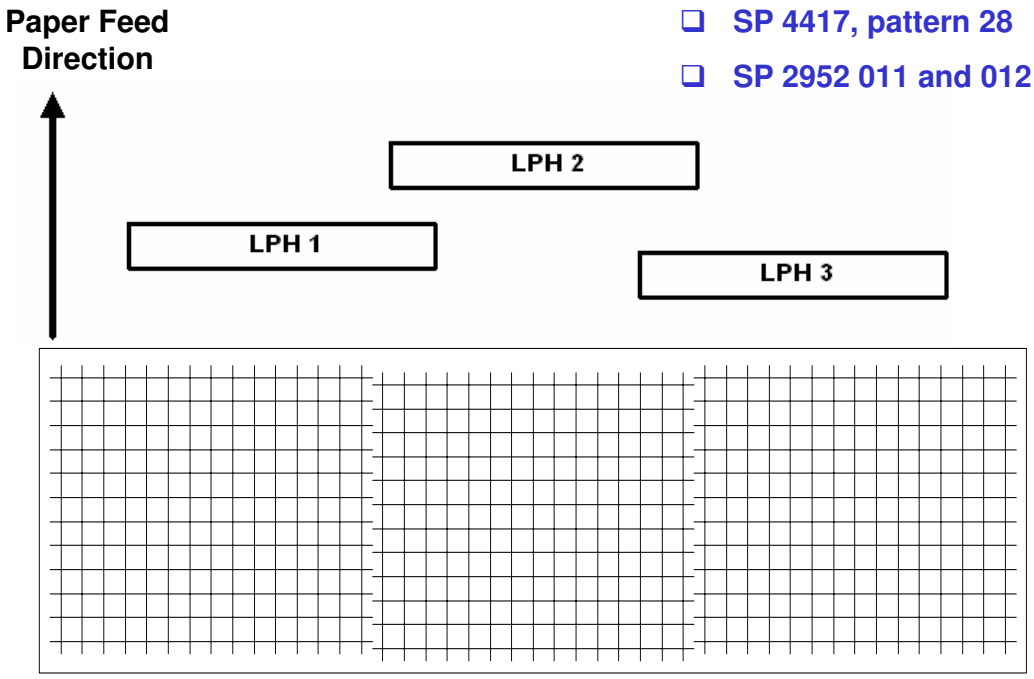
Slide 124

Service manual, Replacement and Adjustment, SP Adjustments, LPH (continued)

- The diagram shows the LPH unit, above the drum.
- There are three heads, LPH 1, LPH 2, and LPH 3. LPH 2 is in the centre.
- Clearly, they are not in the same position above the drum in the sub scan direction.
  - Two of the heads (LPH 1 and LPH 3) are almost aligned, but the gap between these and the one in the centre (LPH 2) is larger.
- SP 2952 011 and 012 tell the machine the errors in alignment between the three heads in the sub-scan direction. The machine will use these settings to adjust the writing timing for each of the heads. This makes sure that each scan line of the latent image is written across the drum correctly.
  - We can see this more clearly during the adjustment procedure in the manual.

LPH Replacement and Adjustment

Misalignment in the Sub-scan Direction



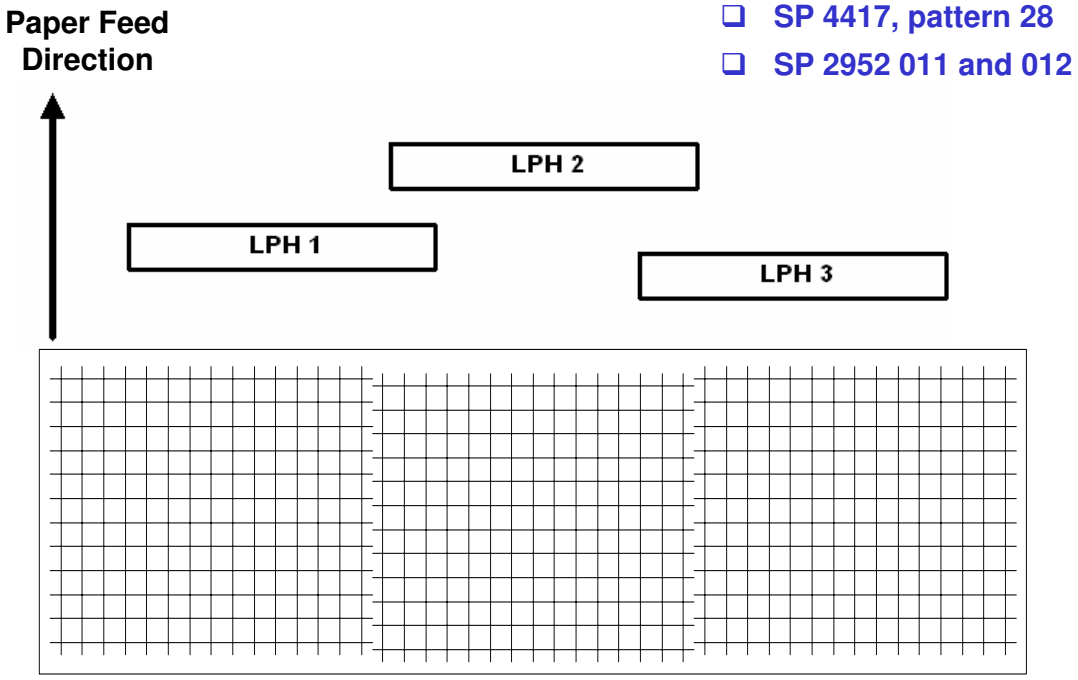
Slide 125

- If the values on the decals are not correct, there can be incorrect alignment in the sub scan direction on the test print, as shown above. The next two slides show how to remove this error.
- The three LED heads are not in a straight line across the page.
  - See the top diagram - the difference between the two at left and right is not shown to scale, but we must show that the heads at left and right are not aligned perfectly.
- Because of this, the main scan signals for each head must be timed so that they are output in the correct locations on the drum.
- If the timing is incorrect, the main scan lines will not be aligned at the 1/3 and 2/3 positions across the page, as shown in the bottom diagram.
- If the values on the decals on the LPH are input into the SP modes as explained in the manual, this problem should not occur.
  - These SPs adjust the timing of the main scan lines for each head. The head that is farthest ‘up the page’ will print its part of the line first. Then, when the drum turns, the other heads will add their segments of the same scan line, at the correct time.
  - As a result, the data that is output at a given time from the LPH to the drum is not a continuous scan line, but segments of three different scan lines. But the output on the page is one continuous line, if the SP settings are correct.

Go to the next slide

LPH Replacement and Adjustment

Misalignment in the Sub-scan Direction



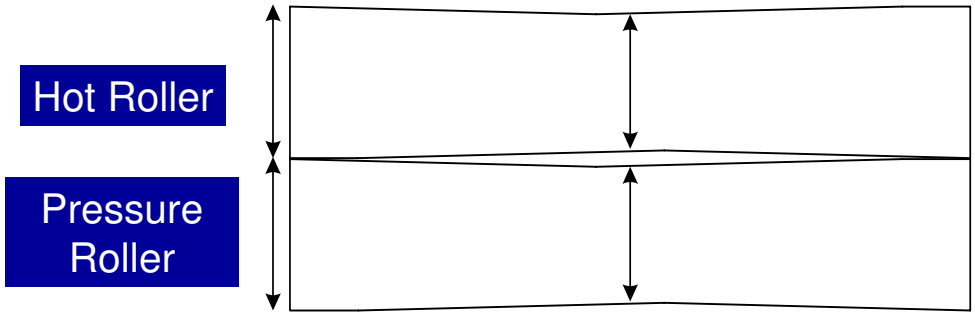
- SP 4417, pattern 28
- SP 2952 011 and 012

Slide 126

- If the test print out is not aligned, adjust SPs 2952 011 and 012 by trial and error until the main scan lines are printed correctly.
  - Adjust SP 2952 011 first. This uses LPH 1 as the standard for the adjustment, and corrects the timing for LPH 2 to agree with that.
  - Make a test print. If the left and central parts of the chart are not aligned correctly, adjust SP 2952 011 again.
  - If the right side of the chart is not aligned, adjust SP 2952 012. This corrects the timing of LPH 3 with LPH 2 used as the standard, which should now be the same as LPH 1.
  - Make a test print. Adjust SP 2952 012 again if the right part of the chart is not aligned correctly.

LPH Replacement and Adjustment

Misalignment in the Sub-scan Direction



- **The shape of the hot and pressure rollers increases the risk of slippage at the center with paper less wide than 420 mm.**
- **Because of this:**
  - For users who always use paper less wide than 420 mm, first input the values of SP 2952 011 and 012 from the decal. Then do the sub scan adjustments for the LPH joints with SP2952 051, 052.

Slide 127

- The hot roller and pressure roller are slightly spindle shaped, as shown above.
- Because of this, paper transport speed at the ends is slightly faster than at the center. Also, because the centers of the rollers bend in slightly, this increases the risk of slippage at the center with paper less wide than 420 mm.
- For users who always use paper wider than 420 mm, do the sub scan adjustments for the LPH joints with SP2952 011, 012.
- For users who use paper less wide than 420 mm, do the sub scan adjustments for the LPH joints with SP2952 051, 052 after you input the values of SP 2952 011 and 012 from the decal.
  - Usually, it is not necessary to adjust 2952 051 and 052, because these two values are automatically adjusted when 2952 011 and 012 are adjusted. But, for users who do most of their work on paper less wide than 420 mm, it is good to make the machine operate the best for this paper size.

Other SP Modes and SC Codes

Other SP Modes

- 1001: Leading edge registration
- 1002: Side-to-side registration
- 2101: Printing erase margin (copy mode)
- 2953: Fine adjustment for errors at the joints between LPH blocks

SC Codes

- There are no SC Codes specific to the LPH, but a defective LPH or poor LPH connection could cause SC967.

Slide 128

- This slide shows other SPs for LED exposure that were not explained in the section.
- 1001: The adjustments for the cassette and the manual feed table may be given as differences from the setting for the roll feeder.
  - If this is true, when you change 1001 001, the registration for all the trays changes, and the settings for 1001 003 and 005 are differences from the setting for 1001 001).
  - Please test in the class.
- 2953: This is a high-resolution adjustment for the LPH joint adjustment (SP 2952). Adjust the brightness of these 8 LEDs to remove errors at the joints between the two LPH blocks that stay even after doing SP 2952.

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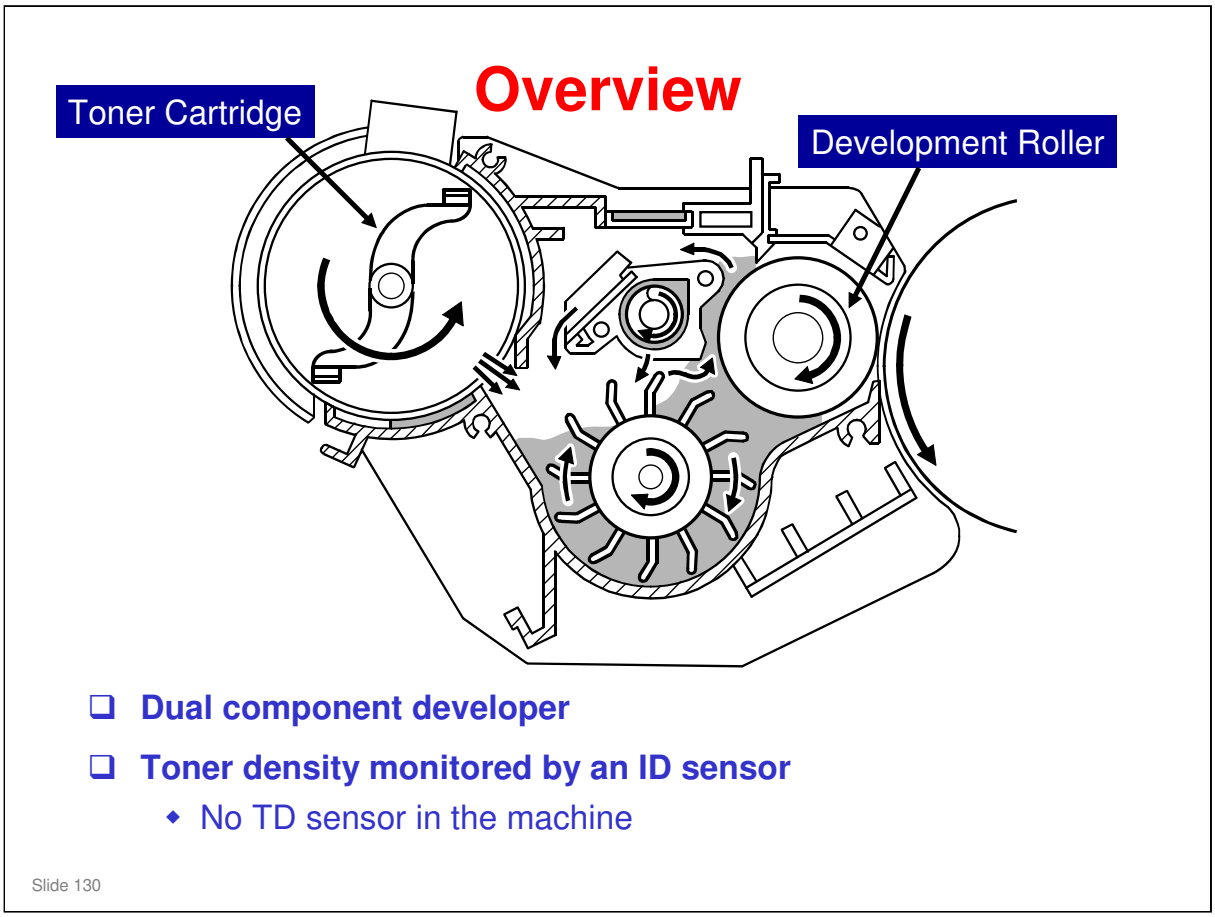
DEVELOPMENT AND TONER SUPPLY

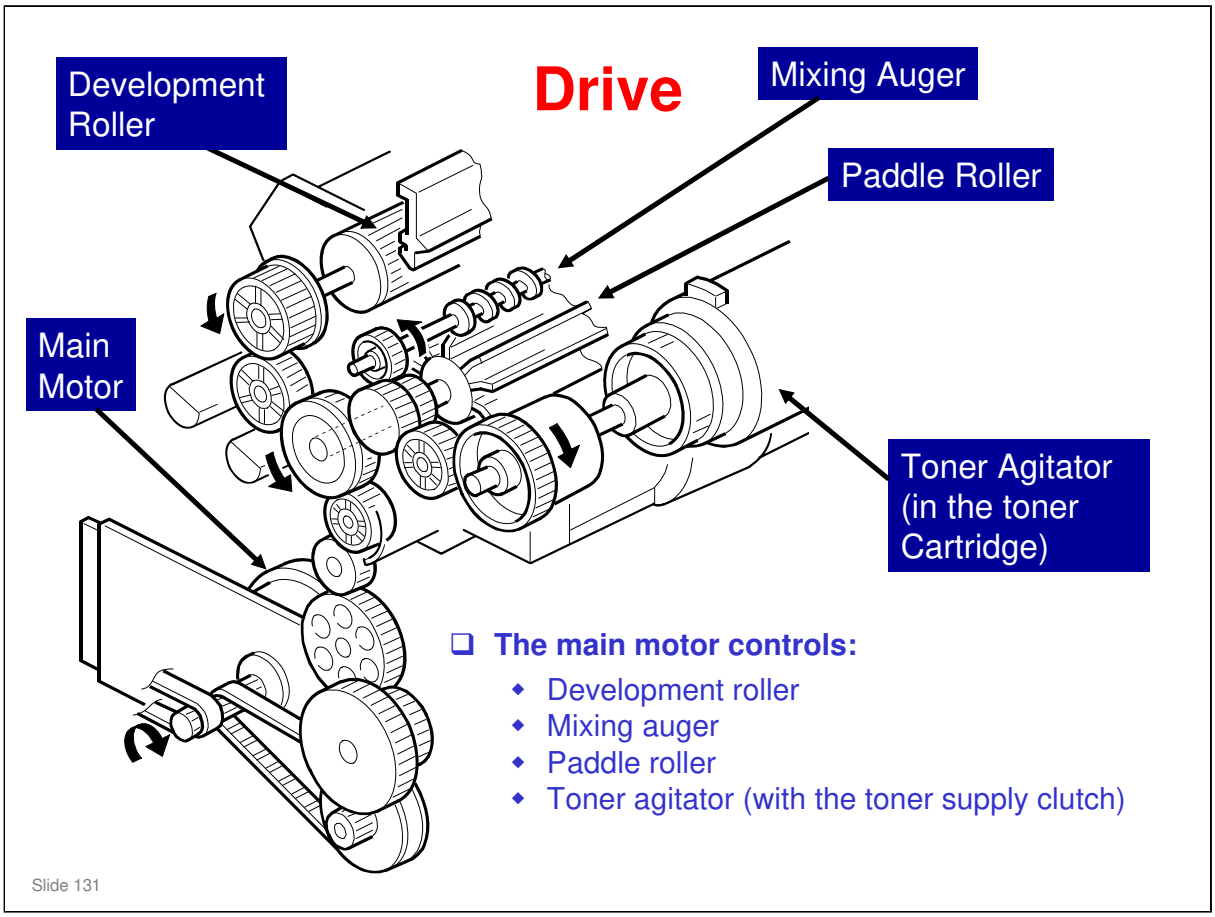
Slide 129

PURPOSE OF THIS SECTION

- ❒ The development process will be explained.
- ❒ Toner supply mechanisms and toner density control will also be explained.
- ❒ Toner near-end and end detection will also be explained.

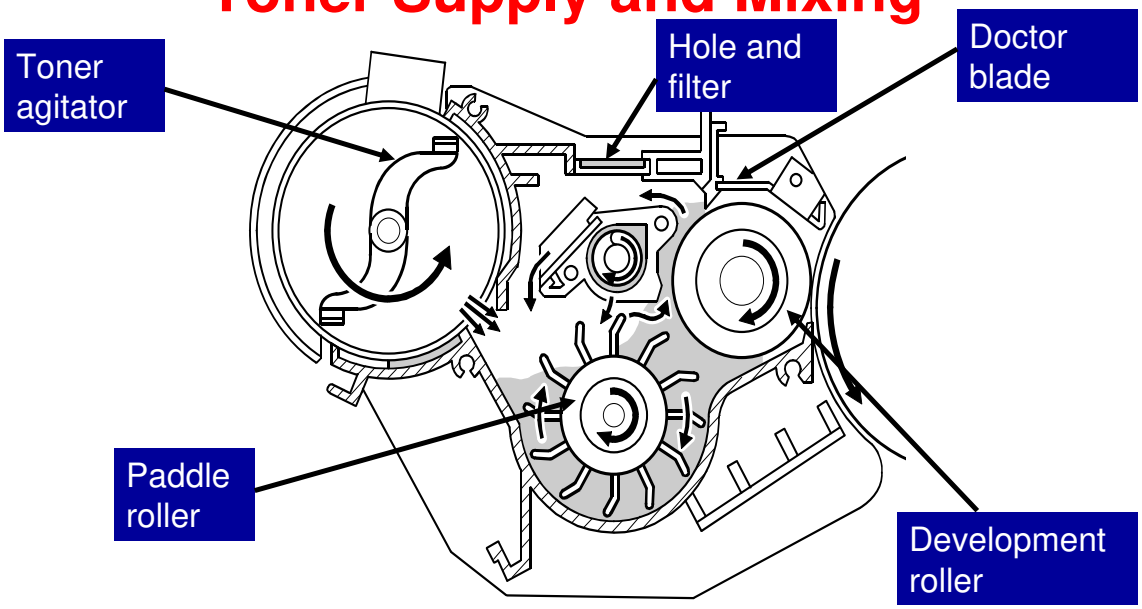


❒ The toner cartridge is installed in the development unit (at the top left in the drawing).



- Show how the main motor controls these four items with the different gears.
  - The timing for the main motor is given in the service manual.
  - The on/off timing for the toner supply clutch is controlled by the measurements from the ID sensor (this is toner supply control; it is explained in this section of the course)

Toner Supply and Mixing

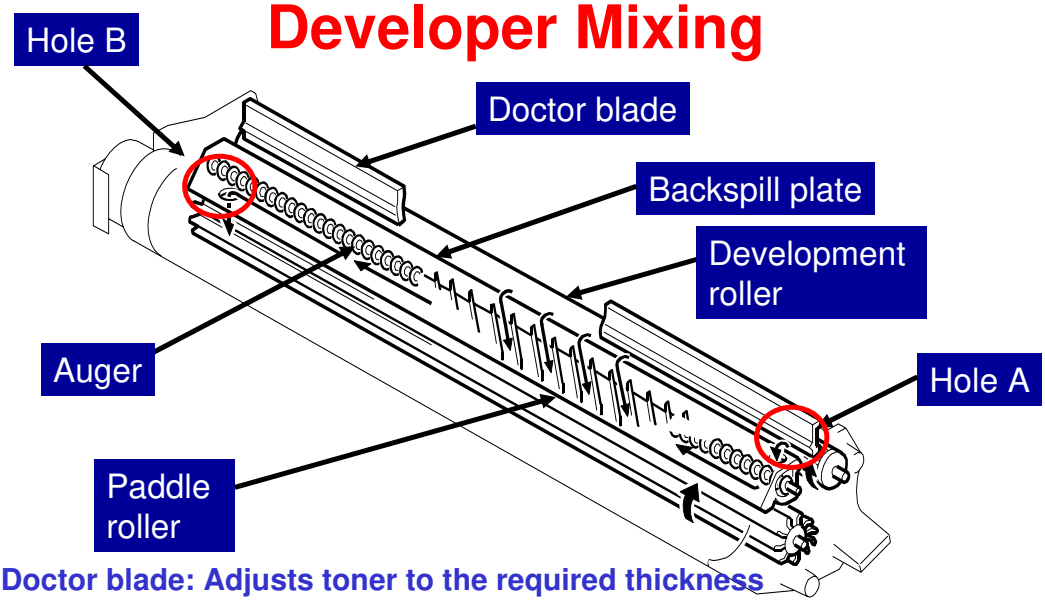


- **Toner agitator: Transfers toner out of the cartridge**
- **Paddle roller: Mixes the toner with developer backspill from the separator**

Slide 132

- This slide shows how toner gets to the development unit from the toner cartridge, and how it mixes with the developer in the development unit.
- The toner goes directly to the development unit from the cartridge. There is no hopper between the cartridge and the development unit. But the cover where the cartridge is installed is known as the 'hopper cover', and the area where the cartridge stays is known as the 'hopper'.
- The mixing is the same as in other models. Details are as follows:
  - The toner agitator moves toner from the toner cartridge to the development unit.
  - The paddle roller gets developer in its paddles and moves it to the development roller. Magnets in the development roller pull the developer to the sleeve of the development roller.
  - The sleeve turns, and this moves developer to the drum.
  - The doctor blade adjusts the layer of developer to the correct thickness and makes a backspill to the cross-mixing mechanism.
  - The movement of the paddle roller and development roller increases the air pressure in the unit. A hole with a filter on top of the unit releases air pressure to decrease toner scattering.
- The quantity of toner that is supplied is controlled by the toner supply clutch on/off timing, which in turn is controlled by the ID sensor.
  - Toner supply control will be explained in this section of the course.

Developer Mixing

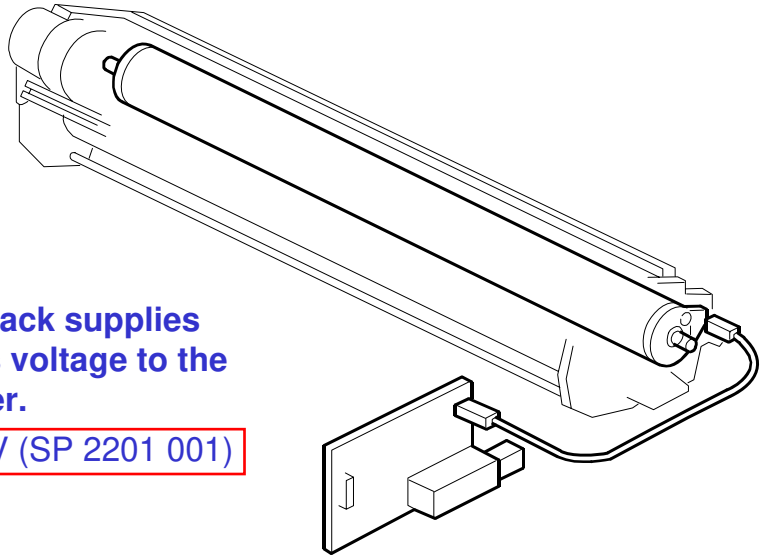


- **Doctor blade: Adjusts toner to the required thickness**
- **Backspill plate: Moves part of the toner to the paddle roller.**
- **Hole A: Part of the toner falls through this onto the auger**
- **Hole B: Toner falls from the auger onto the paddle roller**
- **Auger: Moves this toner in the other direction**

Slide 133

- This slide shows how toner and developer are mixed in the development unit to make the toner density equal in all parts of the development unit.
- The quantity of developer moved right by the backspill plate is the same as the quantity moved left by the mixing auger.
- It is the same as cross-mixing mechanisms in other copiers.
- The doctor blade position cannot be adjusted.

Development Bias



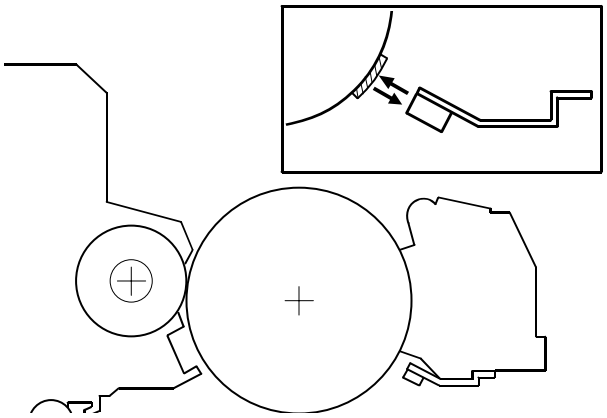
- **The CBG power pack supplies development bias voltage to the development roller.**
  - Voltage: -650 V (SP 2201 001)

RTB 1
Corrected

Slide 134

- The development bias is smaller when the machine makes an ID sensor pattern.
- In this model, there is no High Duty Mode/Low Duty Mode feature for development of the ID sensor pattern.
  - An SP setting to enable High Duty mode exists. But, high duty should not be needed because this machine will not print a high-enough volume per month, if used within specifications. (High Duty Mode is only needed if the average copy volume is more than 2.5 km per month. This may occur in the Dolphin series, but not in the Neptune series.)

ID Sensor



- **Measures the light reflected from the bare drum (Vsg) and from the ID sensor pattern (Vsp)**
- **Vsg and Vsp control toner supply, and toner near-end and end detection**
- **Vsp is read after each copy, to adjust the toner supply.**
- **Vsg is checked once only, when these two conditions occur:**
  - Just after the machine power is switched on
  - The upper unit is closed.

RTB 1
Corrected

Slide 135

- The ID sensor is used for toner supply control and toner near-end/end detection.
- Here is some more about ID sensor sampling:
  - 1) When ID sensor sampling starts, the ID sensor takes a Vsg and Vsp reading 16 times every 4 ms and stores these Vsg and Vsp values.
  - 2) The 16 stored Vsg and Vsp values are sorted.
  - 3) The 4 readings at the low end and high ends of the sorted values are discarded. The remaining 8 values are averaged.
  - 4) The average then becomes the reading for Vsg or Vsp. The averaged values of Vsp and Vsg are stored in NVRAM.

RTB 1
Additional information

ID Sensor Operation at Warm-up

- **Vsg is checked after the upper unit is closed and after the machine is turned on (or returns from low power mode). Vsp is not checked at these times.**
  - After power-on or recovery from low power mode, it is only checked if the the fusing temperature is less than or equal to 50°C (122°F).
    - » This behaviour can be changed with SP 2924-1.
      - – If the SP is changed to 2, Vsg is always read after power-on.
      - – If the SP is changed to 0, Vsg is never read after power-on
      - – If the SP is kept at the default (1), the fusing temperature is take into account as stated above.
  - If Vsg < 2.5 V twice, SC401 occurs
  - If Vsg > 2.5 V, the machine will adjust the ID sensor
  - If Vsg > 4.8 V, SC401 occurs

Slide 136

- This operation prevents dirty background on the first copy.
- Vsg is the measurement of the light reflected from the bare drum.
- The service manual shows how the ID sensor is adjusted for different ranges of detected Vsg values.

When is Vsp tested?

- After every page.

What is the reason for this ID Sensor Operation at Warm-up?

- After power-on/recovery from low power mode, if the temperature is less than 50 C, the developer is mixed to increase the chargeability (Q).
  - This is done because if Q is low, the carrier cannot hold the toner, and some of it may jump to the drum because the drum has a small residual charge. Then the ID sensor will not read a clean drum. Also, when Vsp is read after the first page, the toner does not have enough charge on it to stay on the Vsp pattern in the normal amounts, so ineffective values will be read for Vsp and Vsg initially, and this will cause copy quality problems for the first few pages after power is turned on, if the toner chargeability was low.
  - Developer is not mixed if the cover is just opened/closed.
- Then Vsg is read. The machine tries to adjust the ID sensor so that Vsg is always 4.0.
- Vsp is read every copy. If Vsp is more than 1/8 of Vsg, then toner is added.
- If Vsg is not adjusted to the correct value, for example, if it is 3.8, then too much toner will be added to the developer.

Why does the machine test Vsg after the cover is opened/closed?

- Toner can fall onto the sensor after the cover is closed. Also, if the ID sensor was cleaned, the machine must recalibrate Vsg. So the machine always calibrates Vsg after the cover is opened/closed.

Toner Density Control - Overview

- **Controlled by switching the toner supply clutch on/off**
- **Two toner supply modes: detect mode and fixed supply mode. Selected by SP2208-3.**
- **Detect mode: Uses the ID sensor, paper length, and the settings of SP2208-1,-2 to determine the amount of toner to add. This is the mode used for normal operation.**
  - SP2208-3 must be set to 0.
  - The threshold for toner supply (the "Gain" value) is set by SP2208-1.
  - A parameter that adjusts for paper width is set by SP2208-2.
  - The machine switches to the "Long Print" mode (fixed supply mode) for originals longer than 1189 mm (46.8"). (See the notes below.)
- **Fixed supply mode: A fixed amount is supplied every page.**
  - If SP2208-3 is 1 the fixed supply amount is 3%.
  - If SP2208-3 is 1 the fixed supply amount is 6%.

Slide 137

- There are two "Long Print" modes – Long Print: Drawing and Long Print: Graphic.
  - SP2208-7 selects the Long Print mode. (0 = Drawing, 1 = Graphic)
    If the operator routinely runs jobs that contain either a lot of lines/text or a lot of graphics, then SP2208-7 should be set accordingly.
  - SP2208-5 sets the supply amount for Long Print: Drawing.
  - SP2208-6 sets the supply amount for Long Print: Graphic.
- There is no TD sensor.

Toner Density Control
Switching Between Modes

- During copying, detect supply mode is used.
- If an ID sensor problem occurs, the machine stops at the end of the job. Printing is disabled.
- If you replace the ID sensor, printing can resume.
- If you cannot replace the sensor, put the machine into fixed supply mode (SP 2208-3).
- After you repair the machine, put the machine back into detect supply mode (use the same SP).

Slide 138

No additional notes.

Toner Near-end Detection

- **Detected by the ID sensor (there is no near-end sensor)**
  - ID sensor pattern made between copies
- **If Vsp/Vsg is more than SP 2927-1 three times in a row, near-end is detected**
  - Default: 0.145 (DFU)

Slide 139

Recovery from Near-end

- If Vsp/Vsg drops below SP 2927-1 three times in a row, the following happens:
  - The machine is released from the near-end condition
  - The distance counter is reset to zero

Toner End Detection

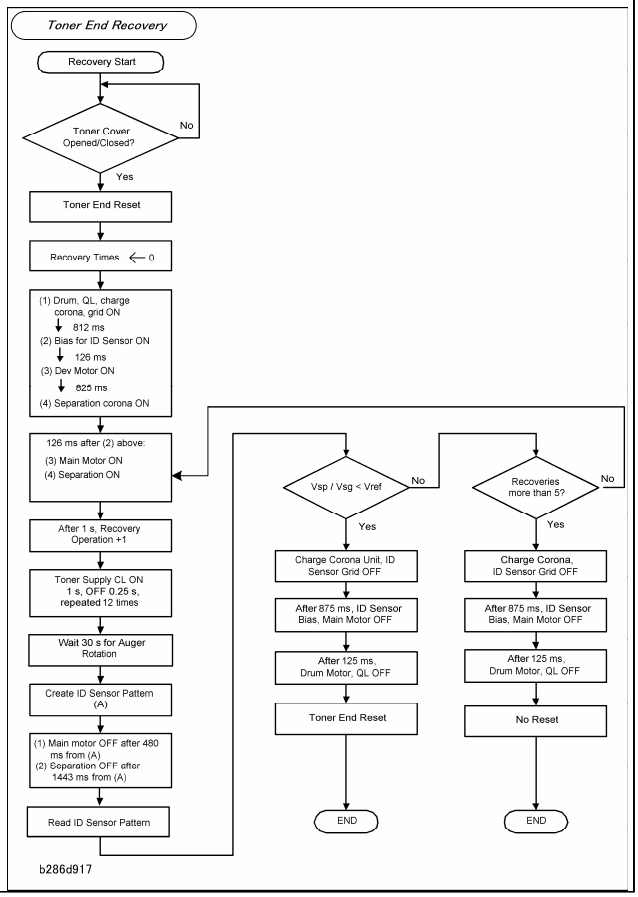
- If Vsp/Vsg is more than SP 2927-2 three times in succession, toner end is detected
  - Default: 0.165 (DFU)
- One more page is printed. Then, the machine cannot be used until toner end recovery is fully completed.

Slide 140

No additional notes

Toner End Recovery

- Recovery starts when you replace the toner cartridge and open/close the toner hopper cover.
- The process is as shown on the flow chart.



Slide 141

- There are no field service adjustments, so it is not necessary to explain the flow chart in the class in detail. It is for reference only.
  - The value of Vref in the flow chart can be made smaller with SP 2928, to make it more possible that recovery is done.
- The main point is that the machine cannot go back to standard operation if you only open/close the cover. The machine must detect the correct quantity of toner.

Replacement and Adjustment

- **FSM → Replacement and Adjustment → Development**
  - Development Unit
  - Developer
  - Toner Supply Clutch

Slide 142

Have the class do the procedures on the slide.

- Make sure that they follow the cautions in the manual.
- Make sure that they are aware of the SP modes that must be done after each procedure (they are in the procedures in the manual).

Developer

- SP 5804-32 can be used to distribute the developer in the development unit. When you install a new machine, the machine is cold. Because of this, the main motor switches on automatically and the developer is supplied equally across the development unit, and SP 5804-31 is not necessary. When you replace developer, the machine can be warm. In this condition, the main motor does not switch on automatically, and you must use SP 5804-32 to supply the developer equally.
- SP 2801 (Lot Number Input, developer mixing, and ID sensor initialization): Follow the procedure in installation section of the FSM.

Toner Supply Clutch

- In one of the steps, you cut a harness clamp. When you re-assemble the machine, attach the cable with a new harness clamp.

Other SP Modes

- **2207: Forced toner supply**
- **3001-2: Initialize ID sensor**
  This is normally done only during installation but must also be done after replacing these components.
  - OPC Drum
  - ID Sensor
  - NVRAM
  - MCU
- **3103: Displays the ID sensor outputs.**

Slide 143

- This slide shows other SPs related to development and toner supply that were not covered earlier in the section.
- SP 2207: Forced toner supply. For every execution, toner is supplied one time. There is no ID sensor check during forced toner supply, so after doing this SP, make a copy and check the image density.

SC Codes

- SC392: Development Bias Error (Level D)
- SC400: ID Sensor Auto Adjustment Error (Level D)
- SC401: ID Sensor Vsg Error (Level D)
- SC402: ID Sensor Vsp Error (Level D)
- SC406: ID Sensor Pattern Edge Detection Error (Level D)

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- See the SC table in the FSM for details.

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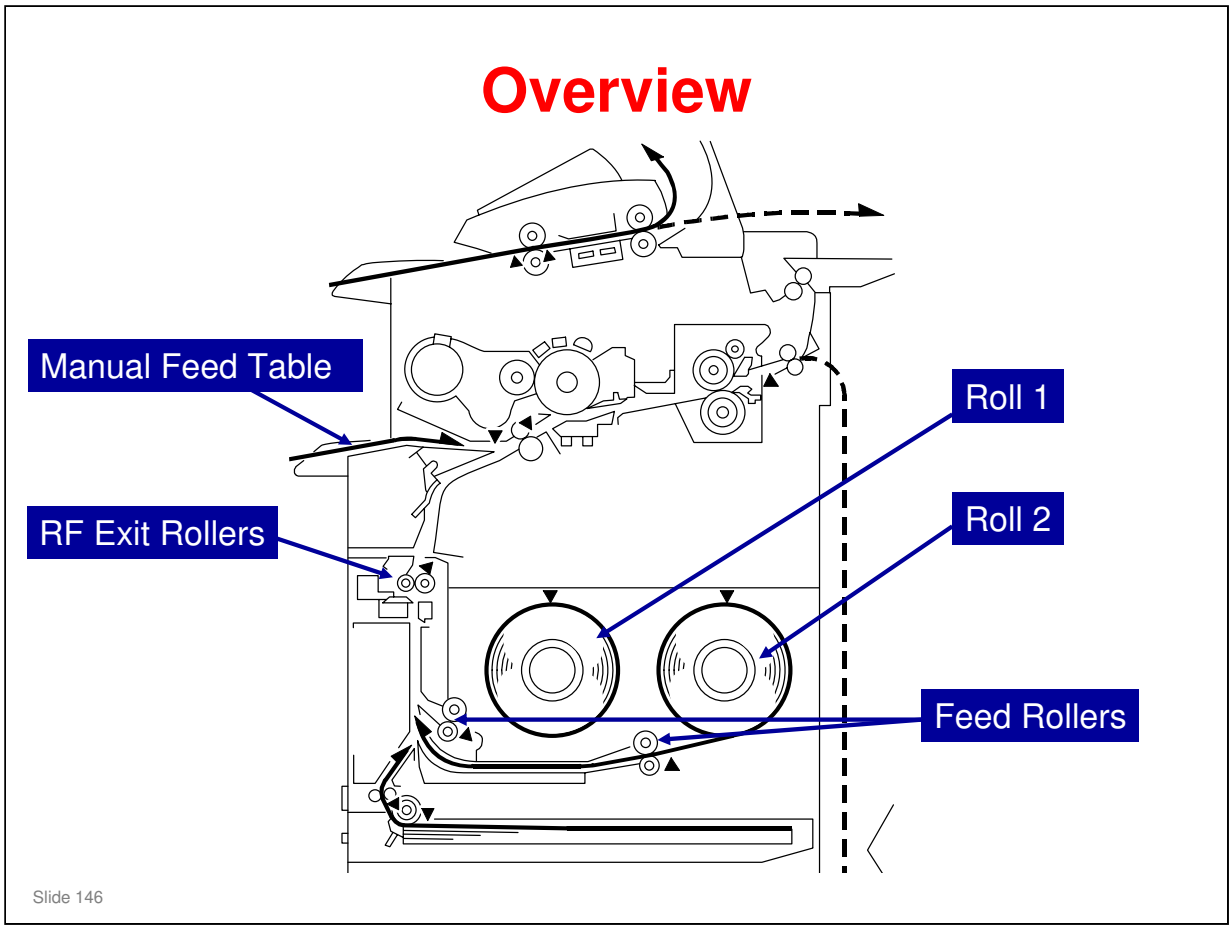
PAPER FEED AND CUTTING

Slide 145

PURPOSE OF THE SECTION

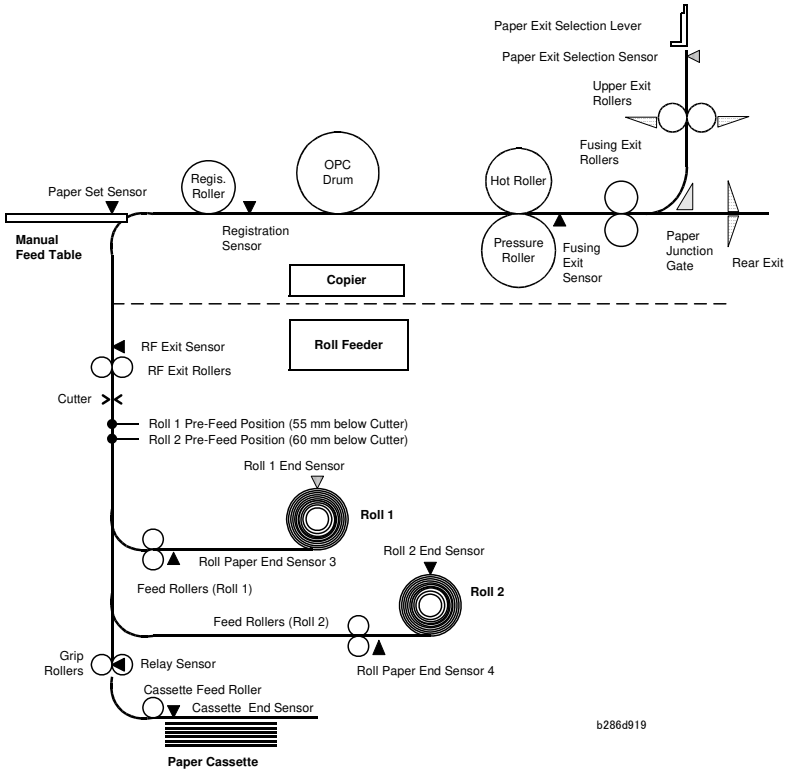
- The paper feed and cutter mechanisms will be explained.
- We will start with an overview. Then the feed mechanisms will be explained in this order:
  - Manual feed table
  - Roll feeder and cutter (option)
  - Paper cassette (option)
- The optional feed units will also be explained in this section, because most customers will have the roll feeder option.



Show the manual feed table, the roll feeder, and the cassette.

- There are two types of roll feeder: one roll, or two rolls.
- The roll feeder unit contains a cutter.
- The cutter cuts the paper after the specified paper length is fed.
  - The length of paper fed is monitored by the RF exit sensor.
  - The start time of the cutter is controlled by the cutting mode that was set at the operation panel (preset cut, synchro cut, or variable cut)
- After paper is cut, both rolls feed the leading edge to a standby position that is immediately below the cutter. This lets the next job start quickly for roll 1 or for roll 2. This process is known as 'pre-feeding'.
  - There are no rollers between the feed rollers and the RF exit rollers. Because of this, paper from roll 2 can go past the paper from roll 1, and paper from roll 1 can go past the paper from roll 2.

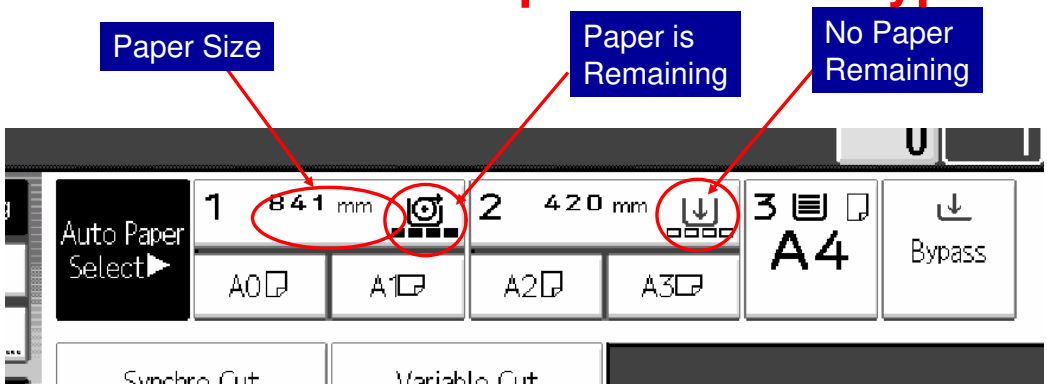
Components Used During Paper Feed



Slide 147

- This diagram shows all the rollers and sensors used during paper transport. It is not to scale. The class should refer to it as an overview only.
- The components are controlled by these motors:
  - Paper cassette: Cassette feed motor
  - Roll feeder: Roll feeder motor (one motor for the tray; clutches control which roll is fed)
  - Registration roller: Main motor
  - Drum: Drum motor
  - Hot and pressure rollers, fusing exit rollers, and upper exit rollers: Fusing motor
- There are small differences in the speeds that the motors operate. This makes sure that there is no wrinkling or other copy problems.

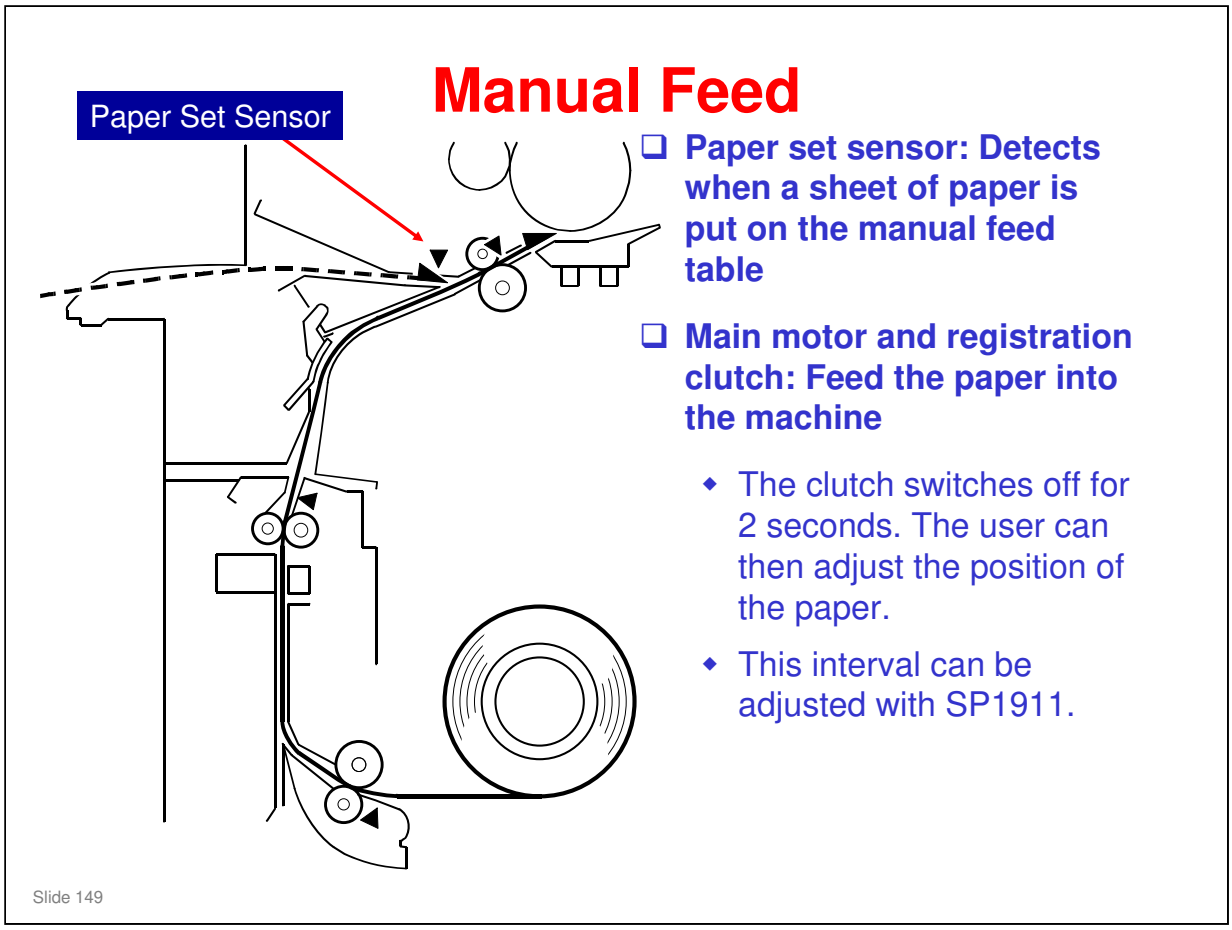
User Tools for Paper Size and Type



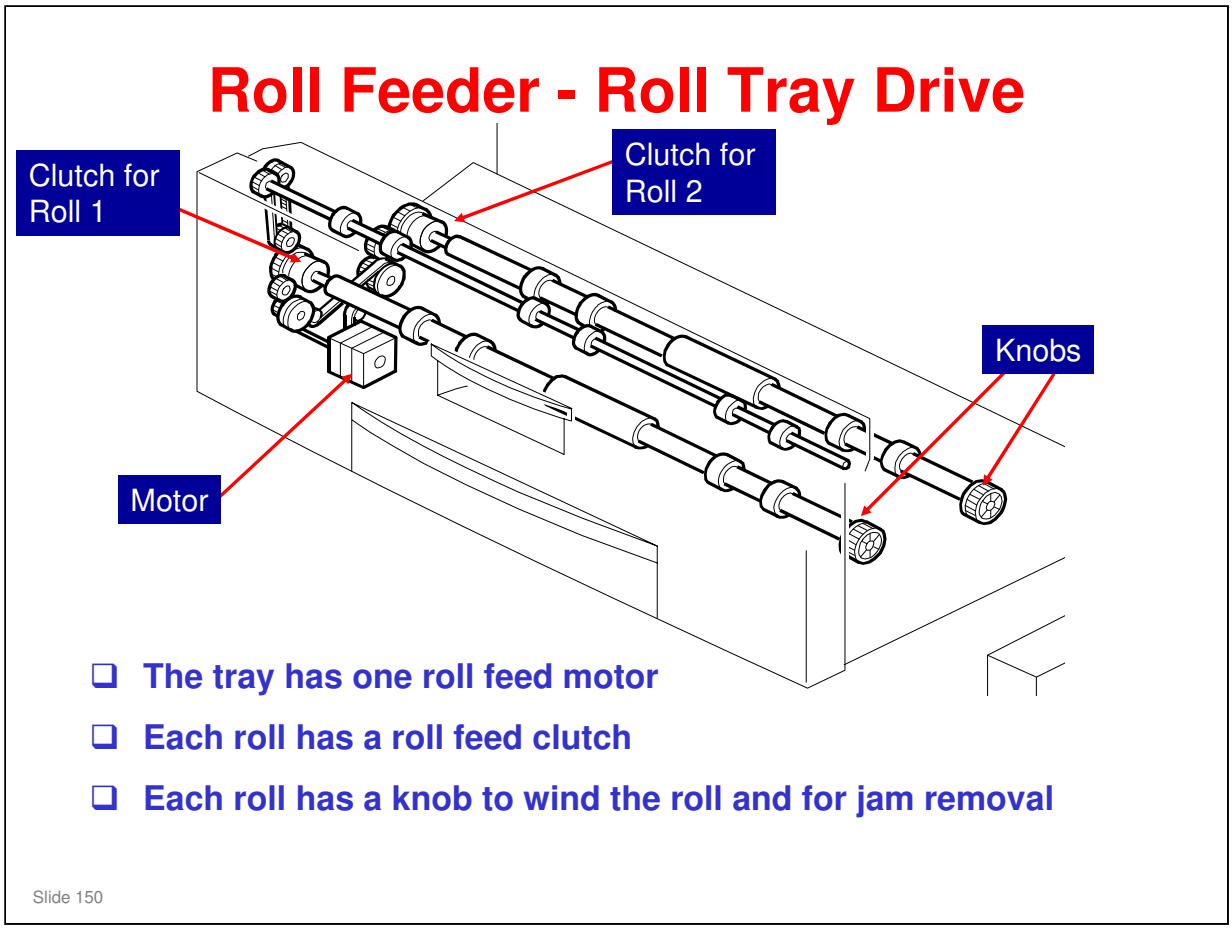
- **Paper Size: System Settings - General Features - Tray Paper Size**
  - Paper width cannot be detected automatically
- **Paper Type: System Settings - General Features - Tray Paper Type (Plain, translucent, film, or recycled)**
- **Quantity of Remaining Paper: System Settings - General Features - Paper Volume**
  - Paper near-end and remaining paper volume not detected automatically.
  - Paper end is detected automatically

Slide 148

- These user tools must be used to set up the indications on the operation panel for paper size and type.
  - Ask the class to study how the settings affect the display panel.
  - Paper type and width have effects on toner supply and fusing temperature/pressure. Because of this, the correct settings must be made.
- Remaining Paper: There is no remaining paper detection, and no near-end detection. For correct display of remaining paper quantity on a network, the user must set the remaining paper quantity with a user tool (there are settings of 100%, 75%, 50%, and 25%). This is only for the user to refer to; the user tool setting has no effect how the machine operates. When the user installs a new roll, the user must reset this user tool to 100% for correct display of remaining paper quantity.
- There is roll end detection. This will be explained later. When the roll ends, the icon changes as shown above.



- There is no feed roller for the manual feed table. The user feeds the cut sheet of paper to the registration roller.
- The paper set sensor is immediately before the registration roller.
- When the sensor detects the paper, the main motor and registration clutch feed the paper to the registration sensor.
- When the paper gets to the registration sensor, the machine makes a sound.
  - If there is no sound, the paper did not get to the sensor.
- The paper stops at the registration sensor. The user then has a short time to adjust the position of the paper to prevent skew before feed starts.
  - The by-pass feed start timing can be adjusted with SP 1911 (default is 2 seconds).



No additional notes

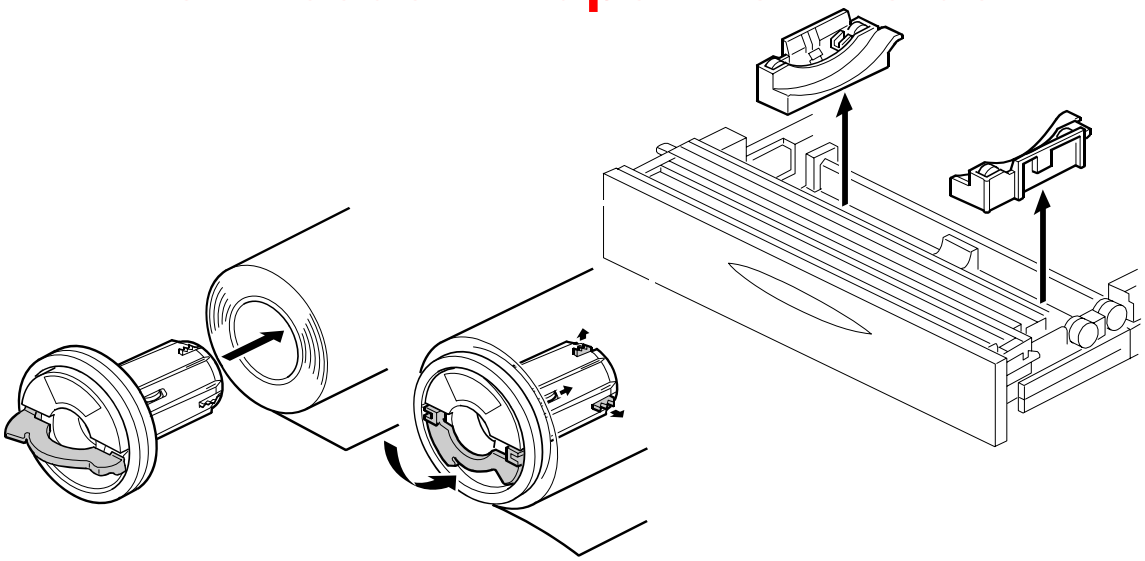
Roll Feeder – Pre-feed

- **When is this done?**
  - Immediately after the main power switch or operation switch is switched on
  - Immediately after the roll feeder drawer is opened and closed
  - Immediately after the end of a copy job
- **What is done?**
  - The cutter is moved to home position, to let paper feed through it
  - The leading edge of roll 1 is fed 55 mm below the cutter
  - The leading edge of roll 2 is fed 60 mm below the cutter

Slide 151

- For more, see the service manual.
- Prefeed is done to let copying start quickly.
- Look at the diagram of the paper feed path in previous slides.
- There are no rollers between the feed rollers in the roll feeder and the RF exit rollers. So, paper from roll 2 can go past the paper from roll 1, and paper from roll 1 can go past the paper from roll 2.

Roll Feeder - Paper Roll Holder

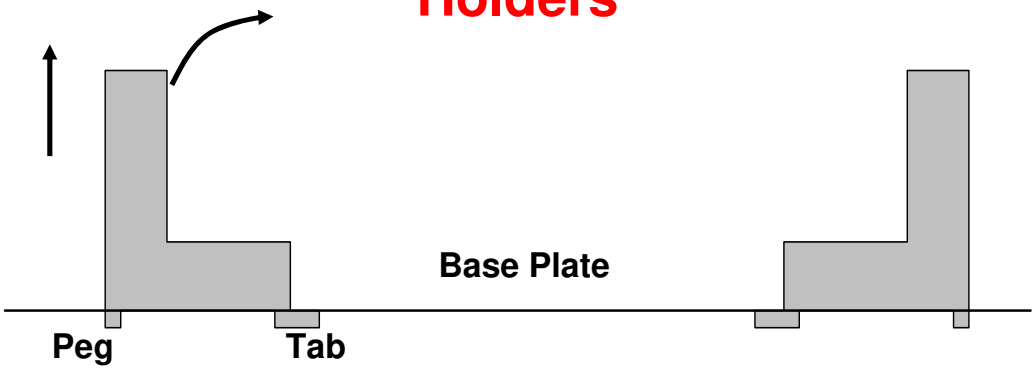


- The user must input the paper roll width and media type for each roll with user tools.
- There is no paper width detection.

Slide 152

- A roll holder goes into the end of each roll (see the diagram on the left).
- The roll holders then go into two racks, which can be easily moved to a different position to change the paper size (see the diagram on the right).

Roll Feeder - Taking out the Paper Holders



- 1. Lift the peg out.
- 2. Turn the holder upwards and towards the centre of the tray to take the tab out of the slot in the base plate

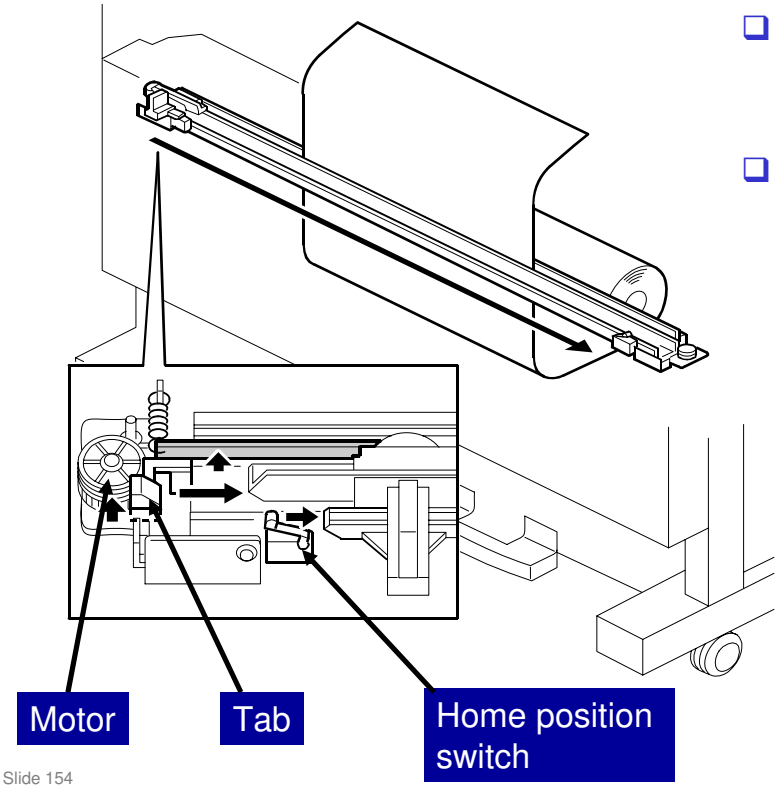
Slide 153

- Paper holders - one goes in each end of the roll, and the assembled roll is installed in the roll holders. The roll holders can be moved to the width of the paper roll.
- The roll holder is attached by plastic pins (at the side farthest away from the centre of the machine), a magnet, and a plastic tab (at the side nearest the centre of the machine).

Show the class how to remove the tabs safely. It is important not to break the tabs of the paper roll holders.

- The best procedure is :
  - First, lift up the side furthest away from the centre of the machine to disconnect the pins
  - Then turn that side up in the direction of the center to remove the plastic tab carefully.

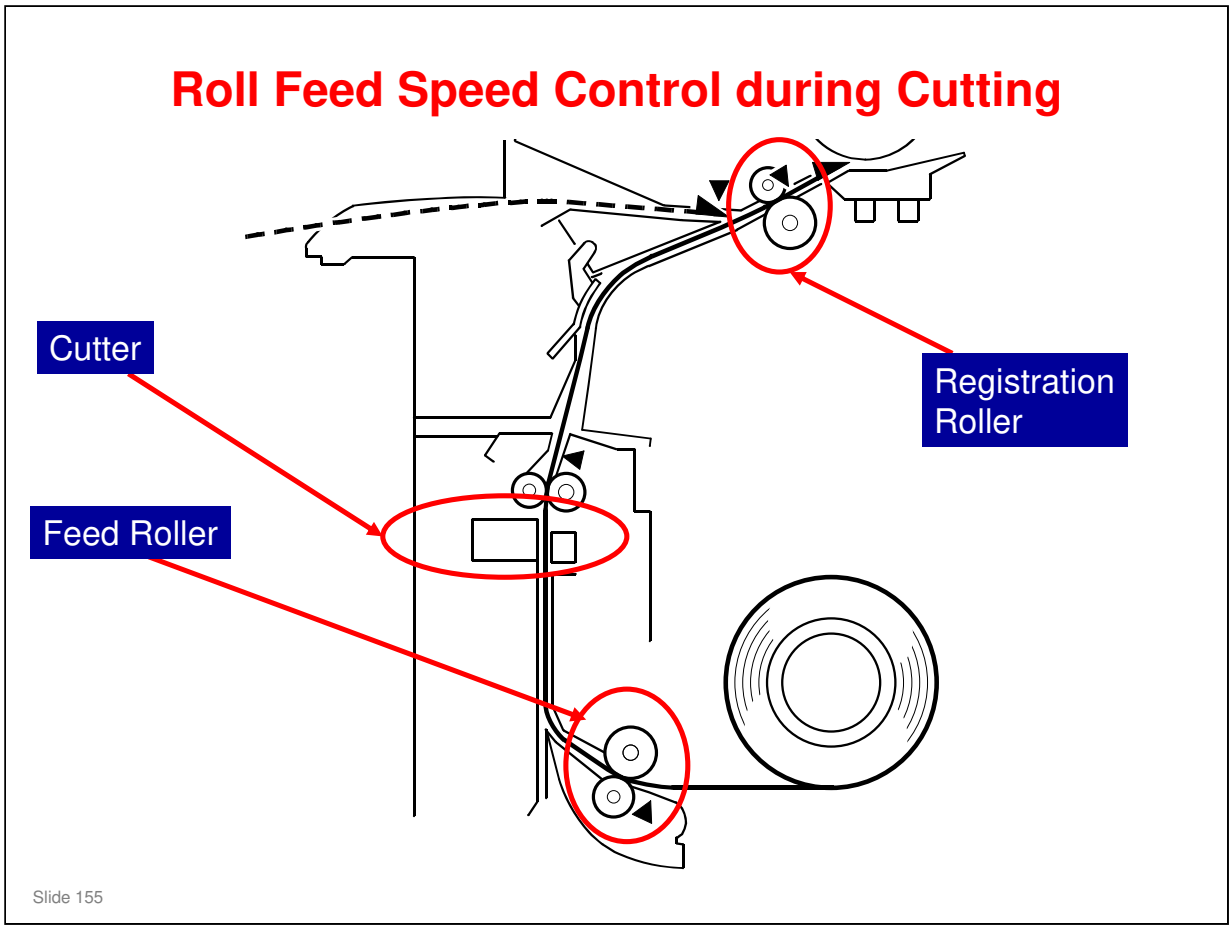
Roll Feeder - Cutter



- **Cutter motor: Moves the cutter across the paper**
- **Home position switches: Detect when the cutter is at home position**

Slide 154

- There is one cutter in the roll feeder.
- The cutter is a rotary disk that pushes the paper against a metal plate and moves across the paper.
- The cutter motor moves the cutter across the paper.
  - The cutter can move in each direction. But when it cuts a page, it only moves one direction (it does not come back until the subsequent page).
  - The cutter can also be moved across the paper manually.
- There is a home position switch at each end of the cutter (not shown in the diagram).
- When the cutter moves away from home position, a tab closes the paper holder.
  - Paper holder: There are two plates, one on each side of the paper path. The cam moves one of these plates across to clamp the paper. Then the machine can cut the paper.
- When the cutter is at home position, the tab opens the paper holder and paper can go through.



- ❒ This explains how the machine can continue to feed the roll paper during cutting, while it makes a straight cut across the roll.
- ❒ To do this, the machine makes some slack in the paper immediately before it cuts. Then, while the machine cuts, it continues to feed (the slack is taken up at this time). Without this slack, tears could be made in the paper during cutting, because it is pulled too tight at the cutter while it is clamped.
- ❒ Explain the following points, while showing the components on the diagram.

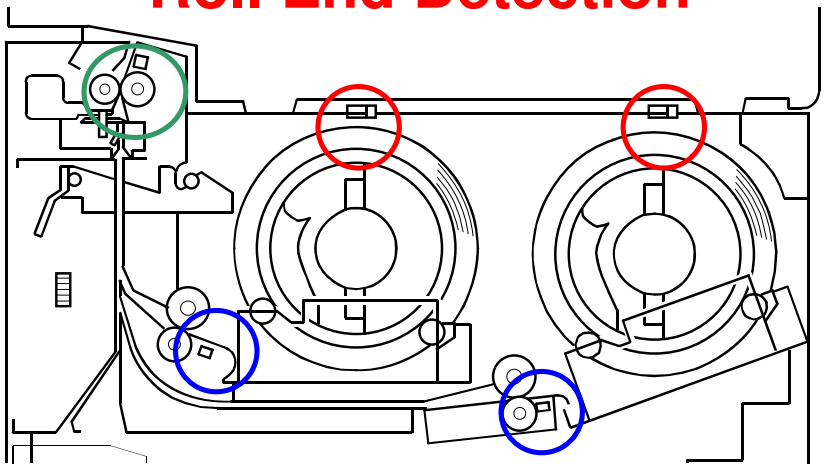
Before cutting:

- ❒ The registration roller continues to turn at normal speed
- ❒ The feed roller speed increases slightly
- ❒ Result: The paper buckles at a place between the registration roller and the top of the cutter.

During cutting:

- ❒ The feed roller stops.
- ❒ The registration roller continues to turn.
- ❒ Result: The slack made between registration roller and cutter is taken up. This lets paper feed past the drum at the same speed during cutting.
  - ➢ For cutting, one second is necessary. There is sufficient slack in the paper for this time interval.

Roll End Detection



- **Sensors circled in red: Detect roll end for rolls that have a black core.**
- **Sensors circled in blue: Detect roll end for rolls that do not have a black core**
  - Only in machines sold outside Japan.
- **RF exit sensor (circled in green): Detects paper end if no paper detected a short time after the start of a job**

Slide 156

Roll end sensors (circled in red)

- These are reflective photosensors.
- The paper rolls for this machine have a black core.
- Because of this, when paper runs out, light is not reflected from the core to the photosensors.

Paper end sensors (circled in blue)

- Usually, there is always paper at these sensors, unless the roll has no paper.
- These sensors detect the trailing edge of the paper at the end of the roll.
- These sensors are backups for the roll end sensors.
  - Some users could install paper rolls that do not have black cores. In this condition, the roll end sensors may not detect the end of the roll.

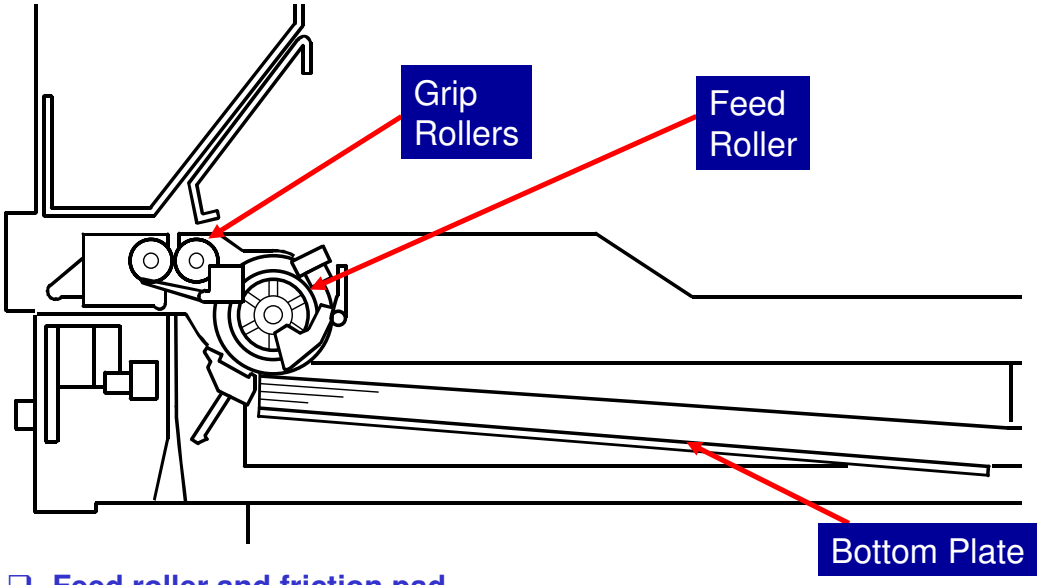
Paper Volume Detection

- There is no sensor.
- The machine counts the amount of paper that was fed after the new roll was installed, and adjusts the paper volume indicators on the operation panel in accordance with this calculation.
- If the user takes out a roll and installs a roll that has a different amount of remaining paper on it, the indicator will be wrong.
- To correct the indicator, the user adjusts the following user tool.
  - System Settings → Tray Paper Settings → Paper Volume

Slide 157

No additional notes

Paper Cassette - Feed

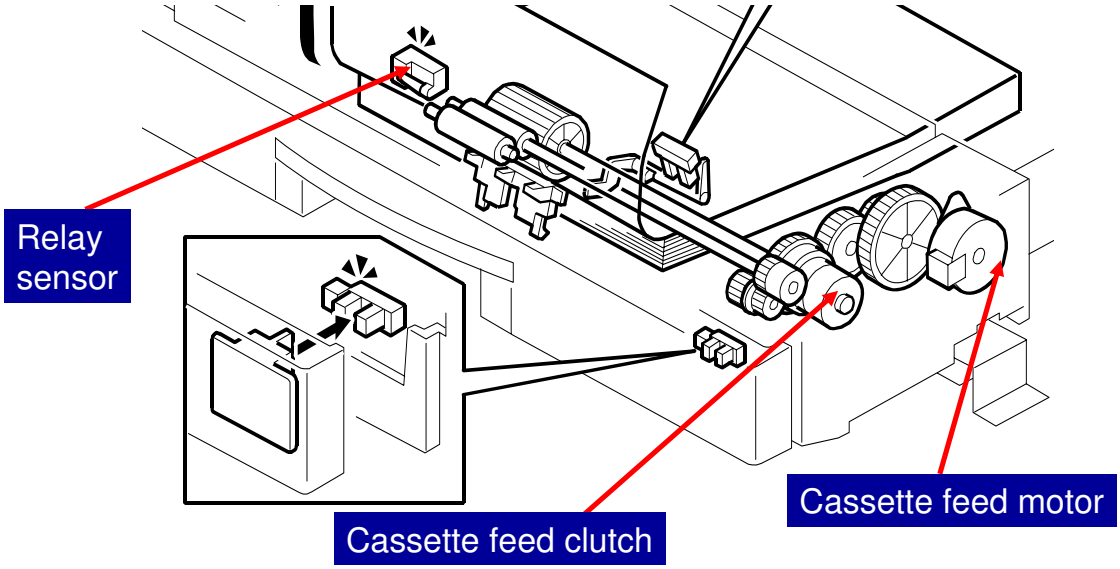


- Feed roller and friction pad
- Grip rollers: Feed the paper up into the machine, and to the RF exit rollers
- The bottom plate is pulled up by springs to keep the stack at the correct height

Slide 158

No additional notes

Paper Cassette - Drive

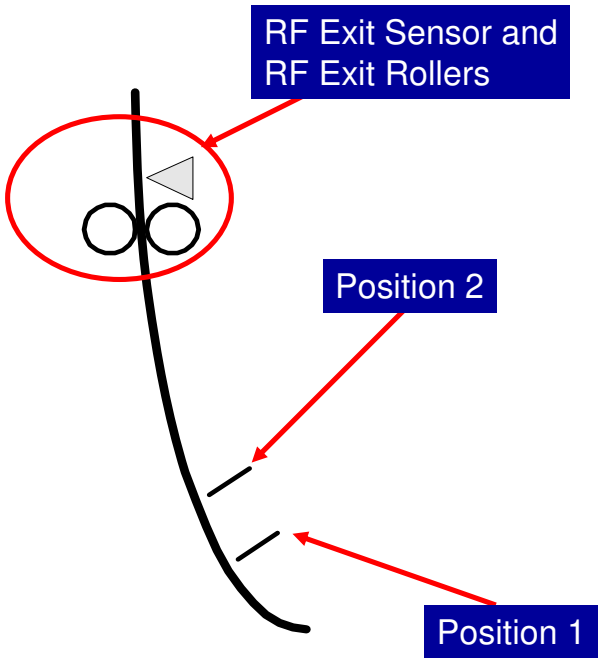


- **Cassette feed motor: Controls the feed roller and the grip rollers**
- **Clutch: Switches power to the feed roller on/off**

Slide 159

- The clutch switches off the feed rollers when the leading edge of the paper gets to the relay sensor.

Paper Cassette – Pre-feeding

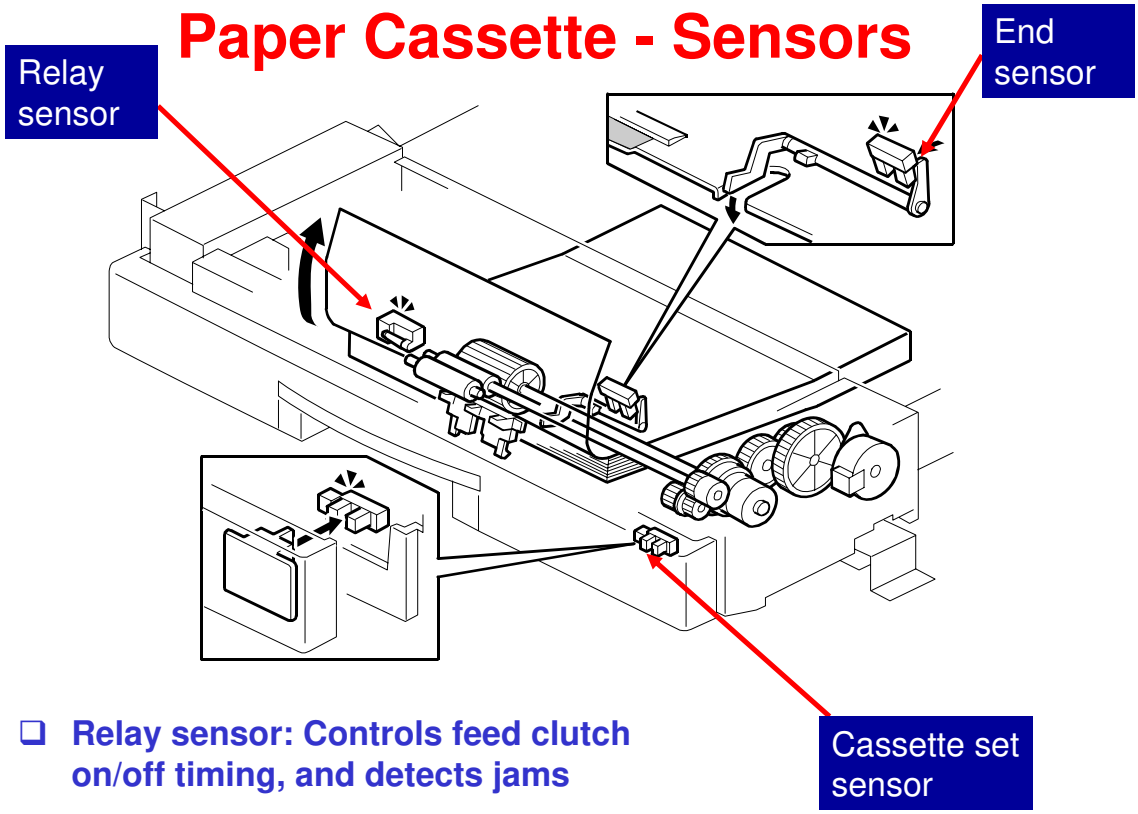


- **Only between pages of multi-page jobs**
- **Position 1: If the paper length is 18.7” (457.2), paper is pre-fed to this position.**
  - This is the maximum length for the cassette
- **Position 2: If the paper length is less than 18.7” (457.2), paper is pre-fed to this position.**

Slide 160

- During multi-page jobs, each page of copy paper is fed to the prefeed position while the page before is printed. This decreases the time between pages.
- Sheets of the maximum length stop at position 1, farther back than the other sizes. Because of this, the leading edge of a sheet does not overlap the sheet that is before it.

Paper Cassette - Sensors

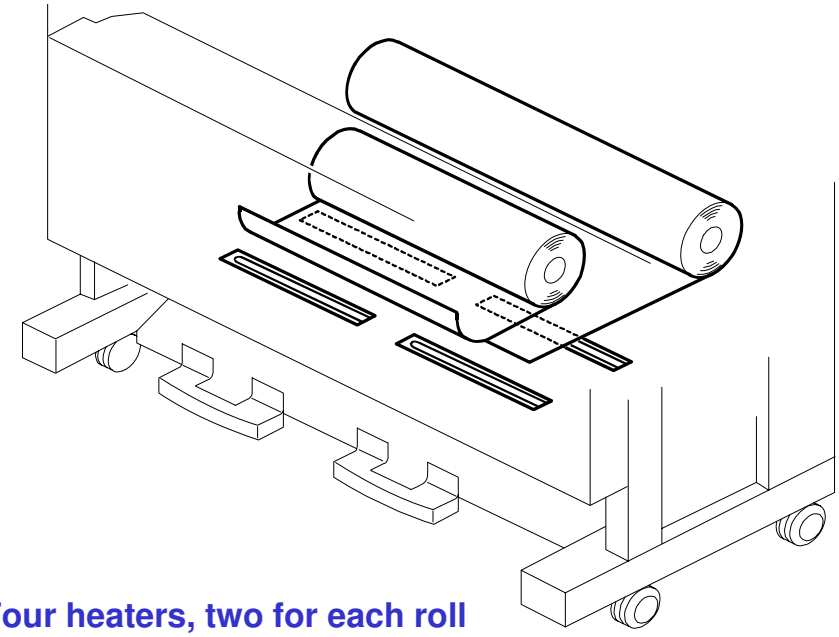


❑ **Relay sensor: Controls feed clutch on/off timing, and detects jams**

Slide 161

- ❒ When the relay sensor detects the leading edge of the paper, it stops the feed clutch. The grip rollers then pull the paper up into the machine.
  - ➢ The feed roller still touches the paper, but the pressure is weak. Because of this, the grip rollers can feed the paper easily.
- ❒ The set sensor detects when the cassette is put in the machine or taken out.
- ❒ The end sensor detects when there is no paper in the cassette.

Roll Feeder/Cassette - Condensation Prevention

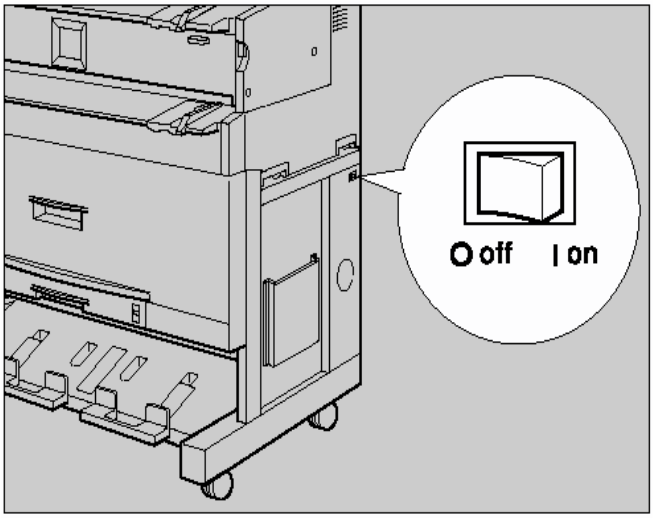


- Four heaters, two for each roll
- The heaters are standard components, not options.

Slide 162

- The dehumidifier switch (see the next slide) controls what occurs when the main power is off.

Roll Feeder/Cassette - Condensation Prevention



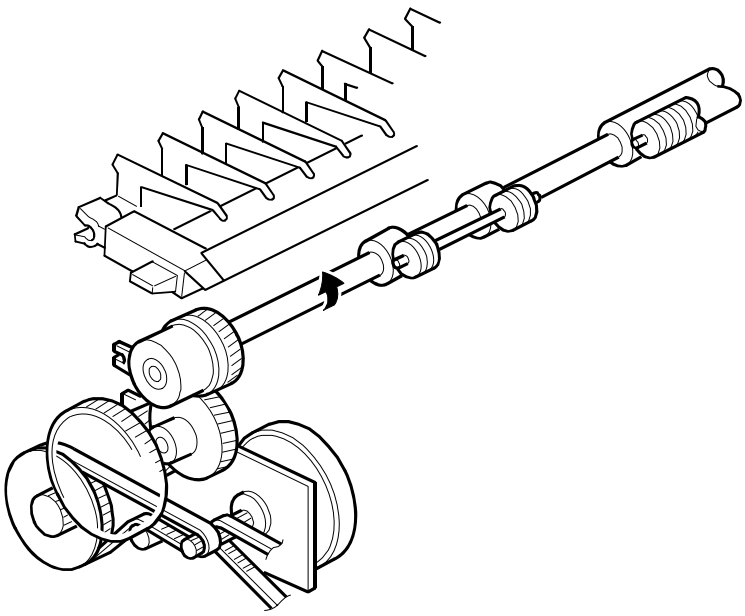
- **One switch for the tray.**
  - The default setting of the switch is off, to meet Energy Star specifications

Slide 163

- This slide shows the dehumidifier switch on the right side of the machine.
- Dehumidifier switch on:
  - The dehumidifiers stay on when the fusing lamp is off.
  - When the fusing lamp switches on, the dehumidifiers switch off.
  - When the fusing lamp switches off, the dehumidifiers switch on again.
- Dehumidifier switch off:
  - The dehumidifiers always stay off.

Registration

- Main motor and registration clutch: Control the registration roller.



Slide 164

- For the paper cassette and the roll feeder, the registration clutch switches off for a short time to let the paper buckle slightly at the registration roller. This corrects for skew.
- For the manual feed table, the user must do this manually in less than 2 seconds as explained earlier.

Replacement and Adjustment

- Do the procedures in the Replacement and Adjustment – Paper Feed section of the FSM.

Slide 165

No additional notes.

SP Modes and SC Codes

- **SP Modes**
  - SP1920: Cut Length Adjustment
    - » This is done at installation. Input the values from the roll feeder decals.
  - SP4961: Synchro Cut (Trailing Edge Registration)
  - Use to match original and copy lengths. Do if requested by the operator.
- **SC Codes**
  - SC508: Cutter Error (Level B)

Slide 166

❒ See the SC table in the FSM for details.

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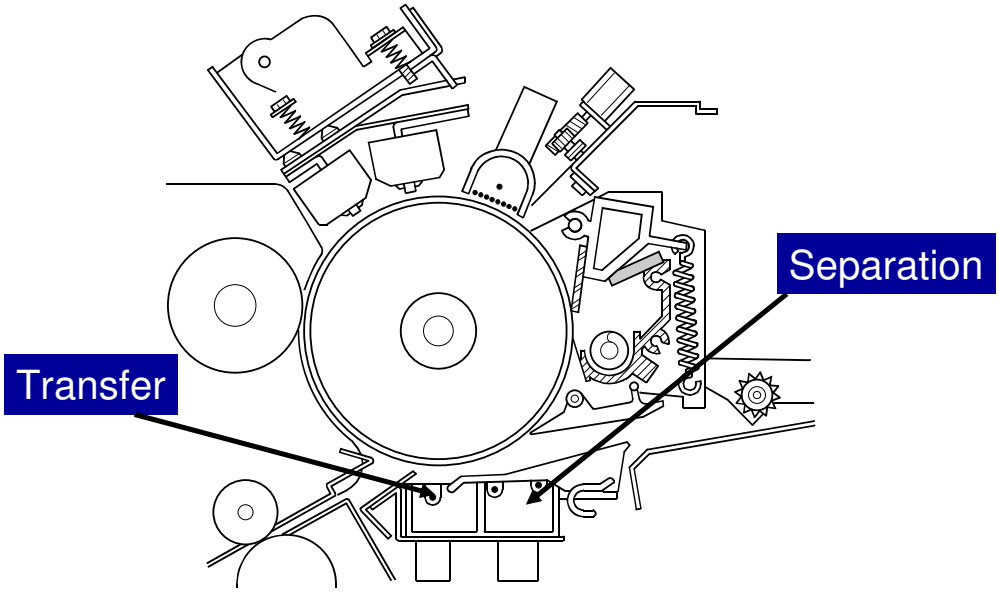
IMAGE TRANSFER AND PAPER SEPARATION

Slide 167

PURPOSE OF THE SECTION

- ❒ Image transfer and paper separation mechanisms will be explained.

Overview

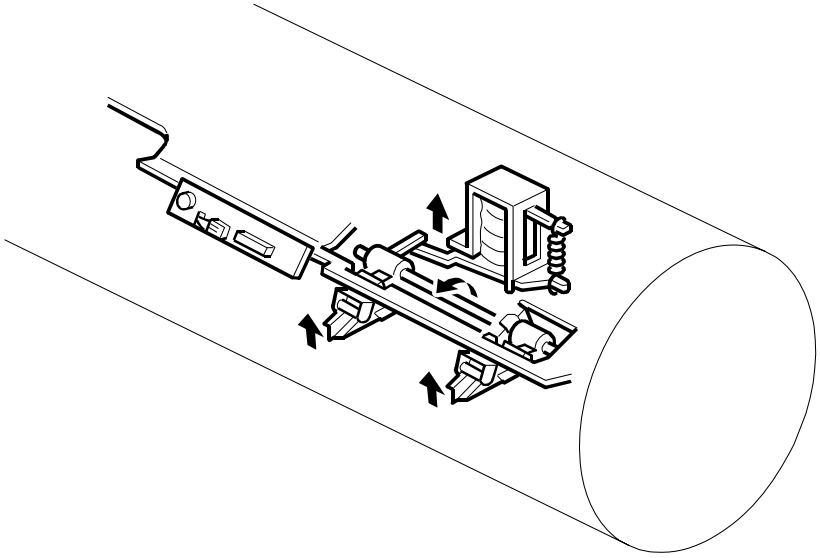


- Transfer corona unit: Transfers toner from the drum to the paper.
- Separation corona unit: Separates the paper from the drum.

Slide 168

No additional notes

Pick-off Pawls



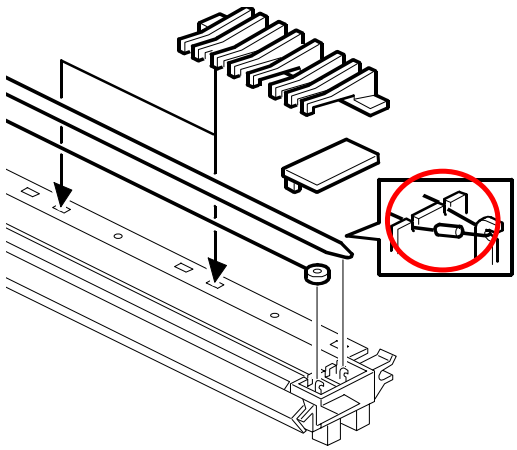
- **Pick-off pawl solenoid: Switches on to move the pick-off pawls until they touch the drum**

Slide 169

- This back-up mechanism strips the paper from the drum if the separation corona does not separate the paper from the drum.

Replacement and Adjustment

- **Transfer and separation corona wires**
  - FSM → Replacement and Adjustment → Around the Drum → Transfer and Separation Corona Wires
- **Charge Corona Wire and Grid Wires**
  - FSM → Replacement and Adjustment → Around the Drum → Charge Corona Unit



The joint of grid wires, circled in red, must be under the endblock cover.

Slide 170

Ask the class do the procedures on the slide.

- Make sure that they understand the cautions in the manual.

SC Codes

- SC440: Transfer Output Error (Level D)
- SC460: DC Separation Corona Output Error (Level D)

Slide 171

- See the SC table in the FSM for details.

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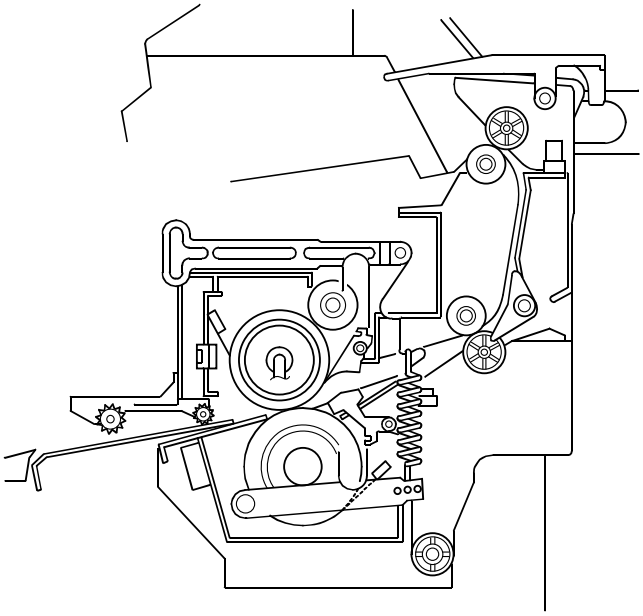
FUSING

Slide 172

PURPOSE OF THE SECTION

- ❒ The fusing unit and fusing temperature control will be explained.

Overview

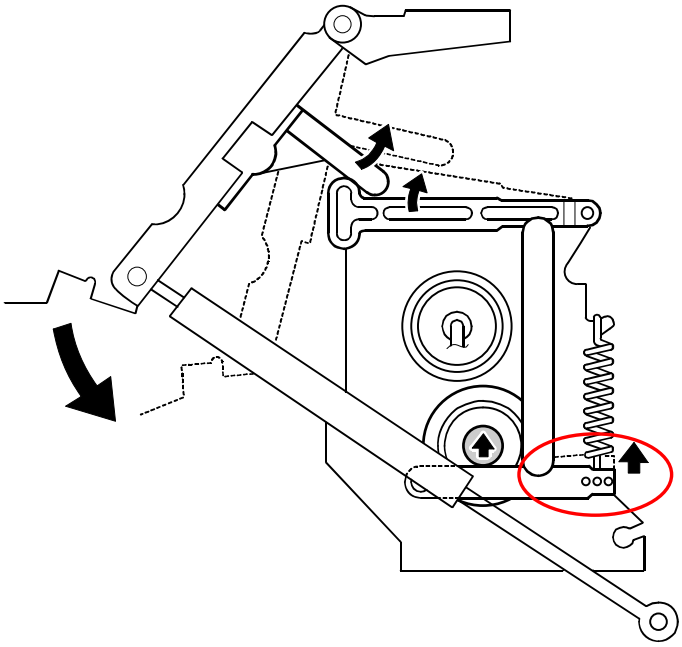


- **Hot roller: Very thin wall**
  - Heats up quickly
- **One fusing lamp**

Slide 173

- The slide shows the main points about this fusing unit.
- 'Paper Feed Through the Fusing Unit' explains the fusing and exit process step by step. The class should read this.
- Hot roller: This is an empty cylinder with two fusing lamps in it. The wall (metal plus layer) is only 1.3 mm thick, and gets to the operation temperature very quickly
  - Warm-up time is less than 2 minutes from 23°C.

Pressure Control Mechanism

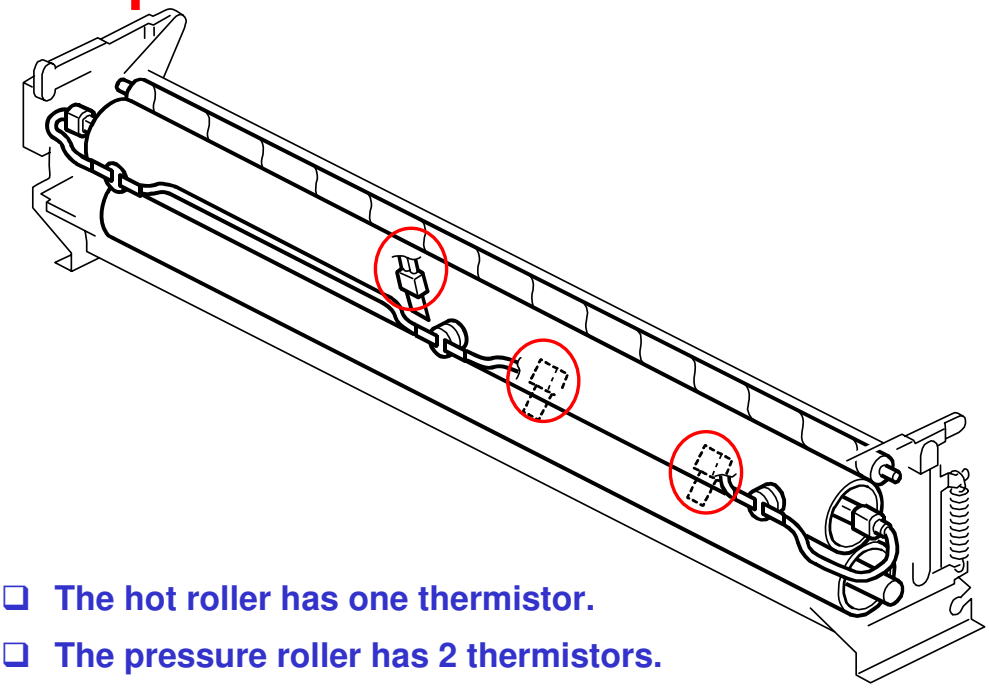


- Springs apply pressure between the hot and pressure rollers
- The springs can be adjusted manually.
- There is no automatic adjustment mechanism for paper type.

Slide 174

- The default position for the springs is in the central hole.
- If there is wrinkling, try to decrease the pressure (to do this, move the spring to the left hole). But for some paper types, you must increase the pressure.

Temperature Control - Thermistors

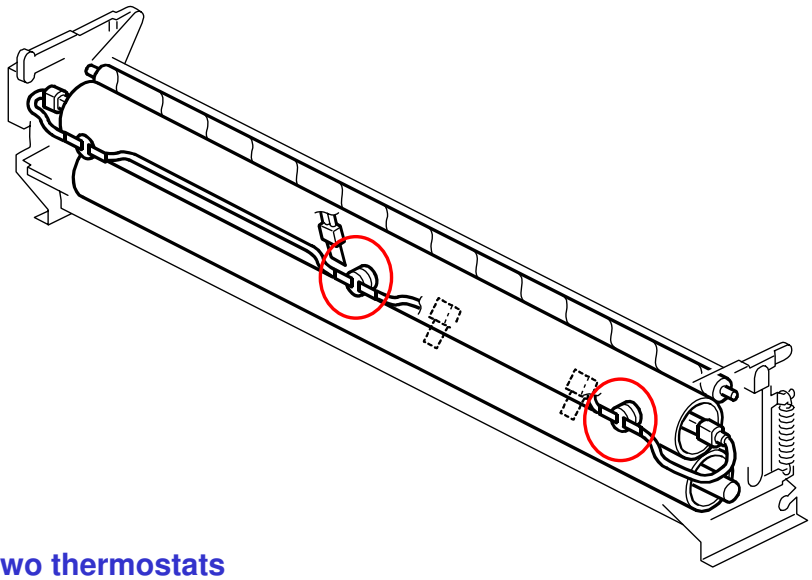


- The hot roller has one thermistor.
- The pressure roller has 2 thermistors.
- Feedback from these three thermistors is used to control the fusing temperature.

Slide 175

- This slide shows the locations of the thermistors.
- The thermistors for the pressure roller are shown with dotted lines.

Temperature Control - Thermostats



- **Two thermostats**
- **They are not identical. Make sure to put them back correctly if you remove them.**
  - Use M3 x 6 screws when you replace the thermostats. If you use a longer screw, it will not be sufficiently tight.

Slide 176

❒ This slide shows the locations of the thermostats.

Fusing Temperature Control
Hot and Pressure Roller Temperatures

- **Controlled by the following**
  - Paper type (user tool – see the next slide)
    - » Plain, Translucent or Film
    - » For recycled paper, use 'Plain Paper'.
  - Paper weight setting (user tool – see the next slide)
    - » Five modes for each of the three paper types
  - SP Mode Settings
    - » SP1931 through SP1936 set various fusing temperature control parameters for each paper type.

Slide 177

- SP1931 through SP1936
  - SP1931: Target hot roller temperature
  - SP 1932: Target pressure roller temperature
  - SP 1934: Hot roller lower limit
  - SP 1935: Pressure roller upper limit
  - SP1936: Pressure roller lower limit

Fusing Temperature Control
User Tools

- **These settings have an effect on temperature control:**
  - Paper type (Plain, Translucent, Film)
    - » The paper type for each roll is set with a user tool:
      System Settings - Tray Paper Settings - Paper Type
      System Settings - Tray Paper Settings - Paper Type
      Paper Bypass
  - Paper weight (Fusing Adjustment)
    - » Can be set for each paper type with a user tool:
      System Settings - Tray Paper Settings – Paper Thickness
    - » Each paper type (plain, translucent, film) has 5 settings

Slide 178

- The operation of the fusing unit is controlled by the paper type that was set for the job, and on the fusing adjustment setting.
  - The paper type must be set correctly with the user tool.
  - The paper type shows on the display panel, as part of the icon for the roll.
- The fusing adjustment user tool for the paper weight controls the temperature.
  - Setting 1 is for thick paper, and setting 5 is for thin paper.
  - Settings for thin paper prevent wrinkling and blurred images.
  - For film, we do not recommend setting 5. This is designed for a very thin type of paper used in Japan.

Paper Thickness Settings

- **There are 5 modes available for each paper type. The table in the manual shows paper weights and their recommended mode selections.**
  - This is the same principle as Neptune-C1/C2.
- **The machine heats the hot roller to the proper temperature. This temperature depends on type of paper selected.**
  - Strict control of the fusing temperature is necessary, because wrinkling can occur if the temperature is too high.
- **Changing the paper thickness setting can improve results if copy images are blurred or when wrinkling occurs.**
  - [User Tools] → "System Settings" → "General Features" → "Tray Paper Settings"

Slide 179

No additional notes

Notes on the Paper Thickness Settings

- When plain paper is used when room temperature is low (10°C, 15% Rh), change the thickness from 3 to 2 if you get poor fusing.
- If wrinkling occurs on translucent paper with Mode 2 selected, select Mode 1.
- Fusing conditions can be affected by low temperature, humidity, the length of the print job, continuous printing, etc. To improve fusing, shift the mode selection down: 3> 2> 1.
- To eliminate wrinkling or blurred images, shift the mode selection up: 3> 4> 5.
- If the selection is changed from Mode 1 or 2 for translucent paper to another setting (plain, film), the machine may take longer (up to 2 min.) to reach the copy ready temperature.
- During long jobs, the interval between copies may increase. This slows down printing. The machine does this automatically (CPM down) to keep the correct fusing temperature.

Slide 180

No additional notes

Switching on the Fusing Lamp Power

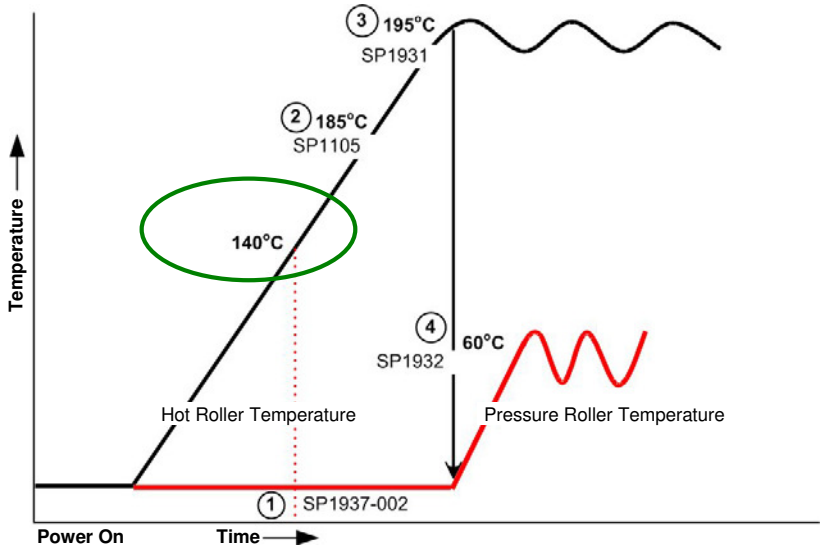
- When the fusing lamp is switched on, the applied voltage is added in steps.
- This "soft start" prevents problems that can be caused by voltages that fluctuate rapidly.

Slide 181

- The machine uses the ‘soft start’ process to switch on the fusing lamp. This is used in other models.

Fusing Warm-up 1

RTB 1
Corrected



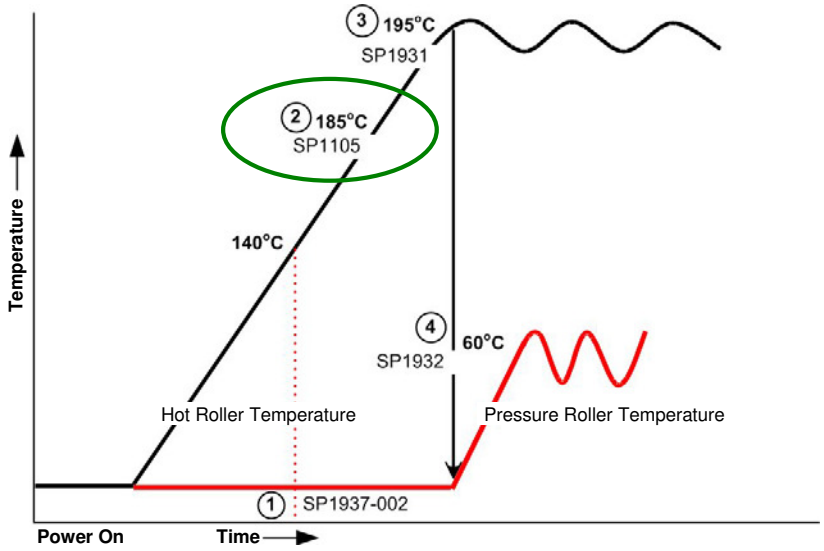
- **First, the machine detects how long it takes for the hot roller to get to 140°C.**
  - If it takes more than 85 seconds, the procedure will be different, as we shall see later.

Slide 182

- The black line is the hot roller temperature, and the red line is the pressure roller temperature.
- The procedure in the next three slides is for plain paper with the mode 3 setting.

RTB 1
Corrected

Fusing Warm-up 2



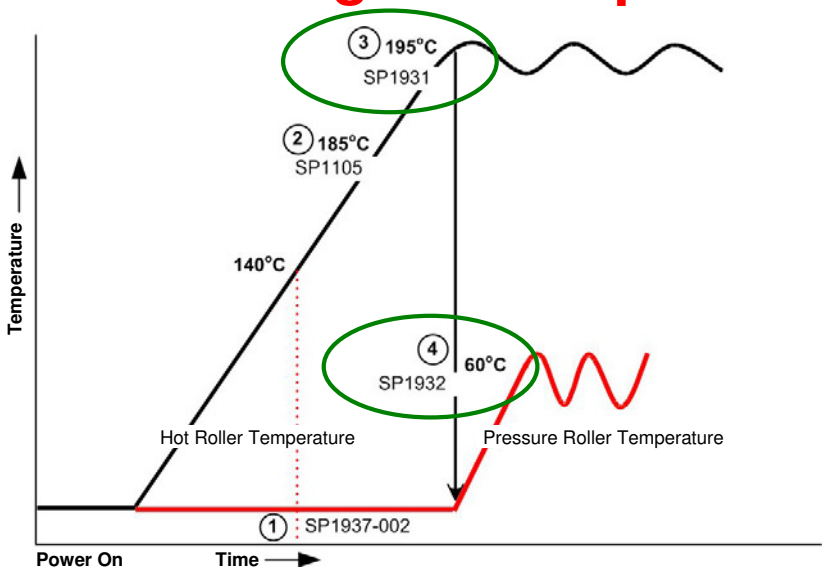
- **If it took less than 85 seconds for the hot roller to get to 140°C, then copying can start when the hot roller gets to 185°C (this is 10°C less than the copy start temperature).**

Slide 183

- The black line is the hot roller temperature, and the red line is the pressure roller temperature.

RTB 1
Corrected

Fusing Warm-up 3

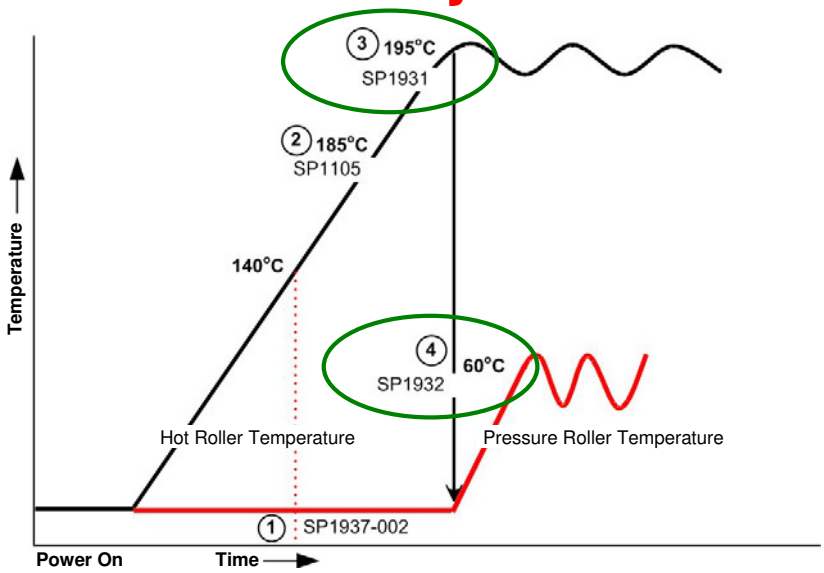


- **If it took longer than 85 s for the hot roller to get to 140°C, copying cannot start until the hot roller gets to its target temperature.**
- **When the hot roller temperature gets to its target (195°C), the fusing unit idles until the pressure roller gets to its target temperature (60°C).**

Slide 184

- The black line is the hot roller temperature, and the red line is the pressure roller temperature.
- Note that if the target pressure roller temperature is increased, then copying cannot start until both rollers get to the target temperatures, regardless of how long it takes for the hot roller to get to 160°C. The fusing unit idles until the rollers get to the target temperatures.

Stand-by Mode



- **During standby mode, the hot roller and pressure rollers are kept within ±5°C of their target temperatures.**
  - Hot roller: 195°C
  - Pressure roller: 60°C

Slide 185

- The black line is the hot roller temperature, and the red line is the pressure roller temperature.

Going to Energy Saver Mode

- **If the machine remains idle for 7 minutes, the machine goes to energy saver mode**
  - The hot roller is kept at 105°C.
  - The 7-min time interval can be adjusted with a User Tool: [User Tools]>"System Settings"> "Timer Settings"> "Energy Saver Timer".
- **If the machine remains idle for 14 min. after entering the energy saver mode, the machine goes to auto off (low power mode).**
  - The fusing lamp switches off.
  - The 14-min time interval can be adjusted with a User Tool: [User Tools] → "System Settings" → "Timer Settings" → "Auto Off Timer".

Slide 186

- SP 5305: If this is 0, the user cannot disable the auto off function. If it is set to 1, the user can disable the function and prevent the machine from turning off automatically.

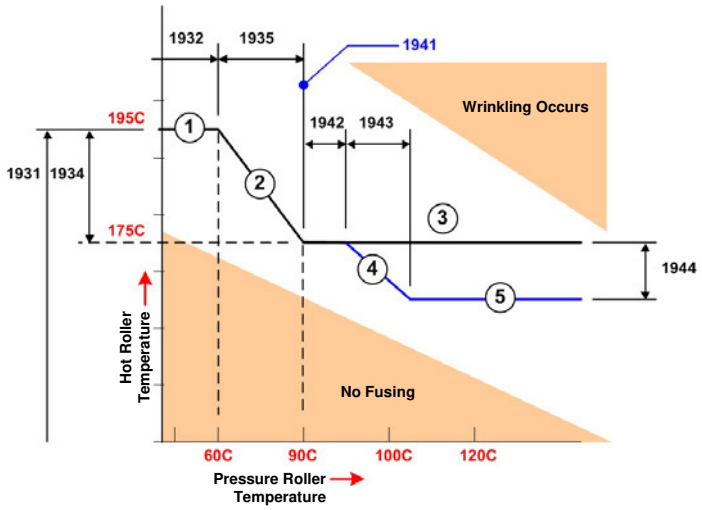
Copying: Feedback from the Thermistors

- The hot roller has one thermistor.
- The pressure roller has 2 thermistors.
- Feedback from these three thermistors is used to control the fusing temperature during copying, to prevent wrinkling.

Slide 187

- A complex set of SP settings controls how the feedback from the thermistors is used to control the fusing unit temperature.
- The SP settings and the temperature readings are used to keep the hot roller and pressure roller in the 'white zone'. If the temperatures go too far one way, then wrinkling will occur. If they go too far the other way, then the machine does not allow copying because the toner will not be fused correctly.

Copying: Feedback from the Thermistors



- During copying, the SP settings and the temperature readings are used to keep the hot roller and pressure roller in the 'white zone'.
- If the temperatures go too far one way, then wrinkling will occur.
- If they go too far the other way, then the machine does not allow copying because the toner will not be fused correctly.

Slide 188

- Without specific instructions these SPs should not be adjusted in the field. RTBs will be issued to cover specific problems. Do not play with these SP settings.

Wrinkle Prevention

- **Paper speed at the fusing unit is slightly faster than at the registration rollers. This prevents the paper from wrinkling in the fusing unit.**
- **Also, there is the 'inching' process.**
  - The hot and pressure rollers turn with no paper in the fusing unit. This gets the correct roller temperatures.
    - » When the temperature of the hot roller falls to 20°C below its target temperature, the fusing motor switches on and starts to turn the hot roller and pressure roller together.
    - » When the pressure roller reaches its target temperature, the fusing motor switches off and idling stops.
    - » The machine is ready.

Slide 189

- Inching is a kind of idling process. The fusing unit rollers rotate with the lamp switched on. This gets the hot and pressure rollers to the correct temperature before paper feeds to the fusing unit.

What is the purpose?

- Idling lets the hot roller apply heat to the pressure roller. To do this, the machine turns the hot roller. This applies equal quantities of heat to all parts of the pressure roller. This prevents unsatisfactory fusing opposite cooler parts of the pressure roller. Idling also repairs small dents on the pressure roller; these could cause jitter on the first few copies. But, more time is necessary for the machine to warm up. Because of this, idling is usually only used in high-speed copiers.
- If fusing is not done fully on the 1st and 2nd copies, increase the fusing idling time. This can occur if the machine is cold, specially with thick paper.

What is the difference between 'inching' and normal 'idling'.

- Idling: Before machine ready
- Inching: After machine ready

SP Modes

- SP1937-3: Sets the inching start temperature (default is 20°C).
- SP1948: Sets the inching target temperature for various paper types.

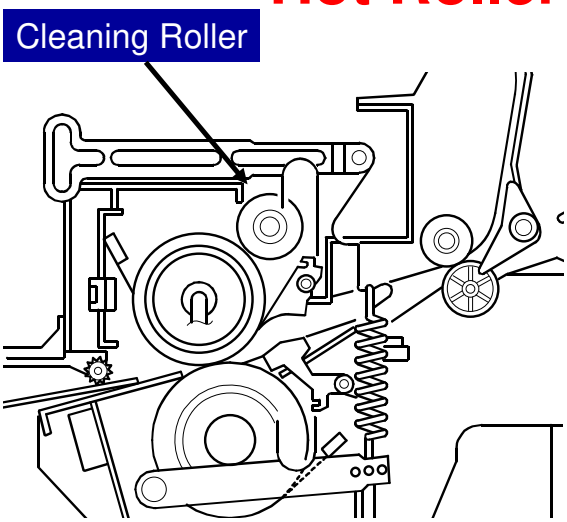
CPM Down

- **During a long copy job on narrow width paper, the difference in the temperatures between the center and end of the pressure roller increases.**
  - The temperature at the center decreases and the temperatures at the ends increase.
- **To counteract this, CPM down automatically adjusts the timing of paper feed. This increases the interval between sheets in the paper path.**
  - The interval between sheets is different for each model.
  - D093: 480 mm, D094 (faster model): 166 mm
- **A longer interval between sheets creates a short delay between feeds to the fusing unit. The extra time allows the temperature of the hot roller and pressure roller to rise.**
- **The operation of CPM down is controlled by SP1940 (CPM Down Setting).**

Slide 190

- SP1940 has a large number of settings. Generally change these settings only if directed to by the service supervisor.

Hot Roller Cleaning

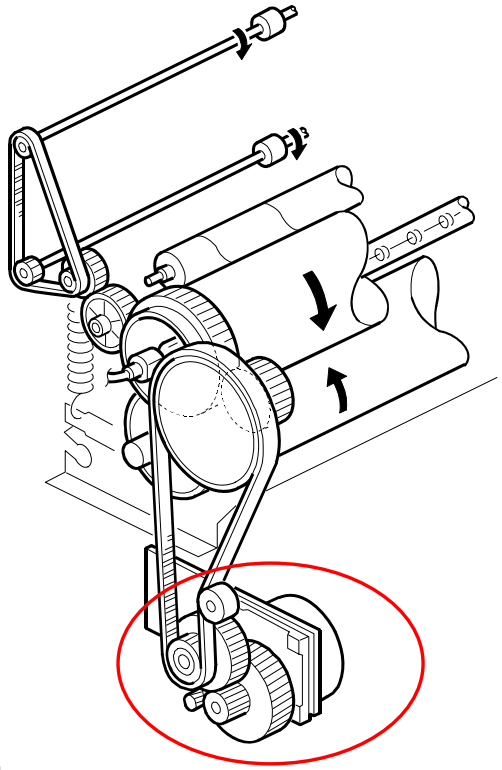


- **Cleaning roller**
  - Always touches the hot roller
  - Outer layer soaked in silicone oil
- **Each time the fusing motor switches on, it reverses for 0.4 s to clean the hot roller.**
  - Prevents oil streaks on outputs.

Slide 191

- The main points are on the slide.
- There is no oil supply unit. The cleaning roller's outer layer is soaked in silicone oil, which cleans the hot roller.
- This helps prevent problems caused by paper that contains calcium carbonate.

Fusing Unit Drive



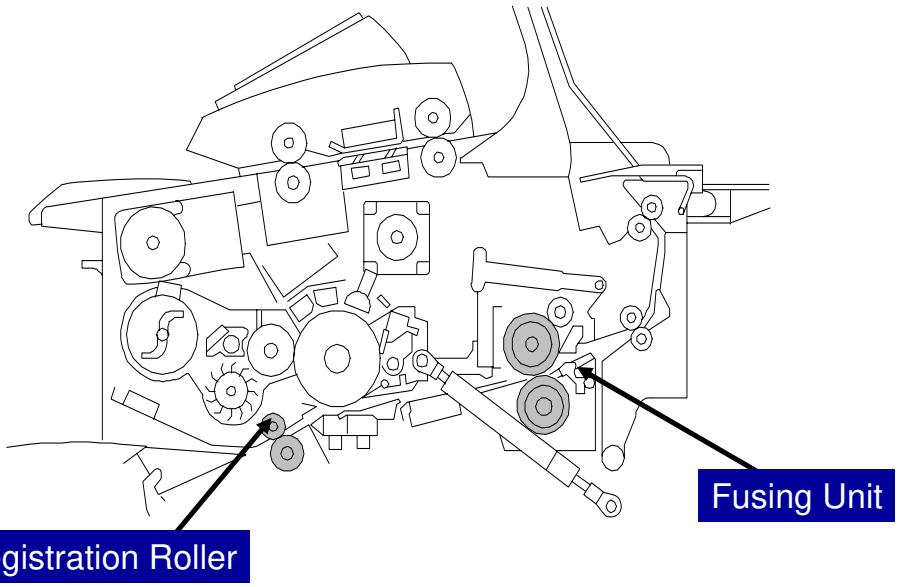
- Fusing motor: Controls the fusing unit and the exit rollers
- Each time the fusing motor switches on, it reverses for 0.4 s to clean the hot roller.

Slide 192

No additional notes

Wrinkling Prevention

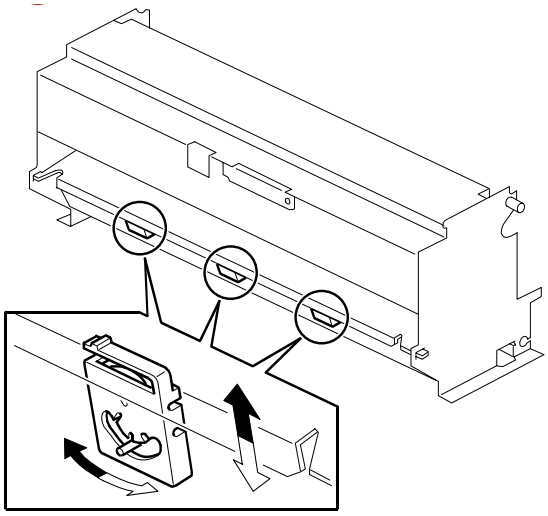
- Paper speed at the fusing unit is slightly faster than at the registration rollers
- This prevents the paper from wrinkling in the fusing unit



Slide 193

No additional notes

Fusing Unit Entrance Guide



- **You must remove the fusing unit before you adjust this.**

Slide 194

- There are three adjustment levers at the center of the fusing unit entrance.
- The levers can be moved left and right to adjust the vertical position of the entrance guide plate.
- Adjust only when the paper thickness causes a problem at the fusing entrance.
  - The adjustment cannot be made on the fusing unit in the machine. Because of this, it was not in the FSM, and it must not be done unless there is an important problem.

Replacement and Adjustment

- **FSM → Replacement and Adjustment → Fusing**
  - Pressure Spring Adjustment
  - Hot Roller Strippers
  - Fusing Exit Sensor
  - Pressure Roller Thermistors
  - Pressure Roller Strippers
  - Exit Unit Switch
  - Pressure Roller
  - Hot Roller Thermistor, Thermostats

Slide 195

Do the procedures on the slide.

- Make sure to use M3 x 6 screws for the thermostats. If you use a longer screw, the screw will not be sufficiently tight.

SP Modes

- **SP1105: Fusing Temperature Adjustment**
  - Most of these should not be adjusted.
- **SP1106: Displays the current hot and pressure roller temperatures**
- **SP1159: Fusing Jam SC Setting**
  - Determines whether the machine issues SC559 after three successive fusing jams.
- **SP1915 through SP1949**
  - These SP modes control a large number of fusing parameters. They rarely require adjustment. Adjust only if directed by the service supervisor.

Slide 196

- This slide shows other SP modes related to fusing that were not explained in this section.
- SP1105 are mostly DFU. The exception is SP1105-3, which sets the ready temperature for low power mode.

SC Codes

- SC522: Fusing Drive Motor Error (Level D)
- SC530: Fusing Unit Ventilation Fan Error (Level D)
- SC541 to SC546: Fusing Temperature Errors (Level A)
- SC551 and SC553: Pressure roller center thermistor errors (Level A)
- SC559: Fusing jam errors (Level A)
- SC561 and SC563: Pressure roller end thermistor errors (Level A)

Slide 197

- See the SC table in the FSM for details.

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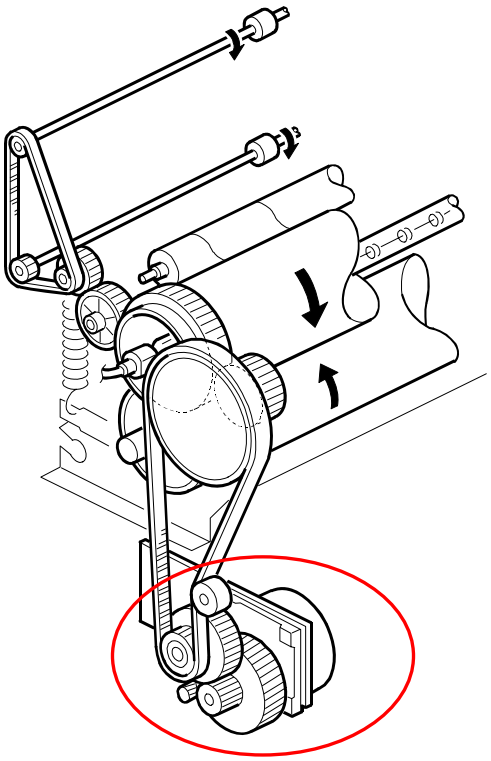
PAPER EXIT

Slide 198

PURPOSE OF THE SECTION

- ❒ The paper exit mechanisms will be explained.

Drive

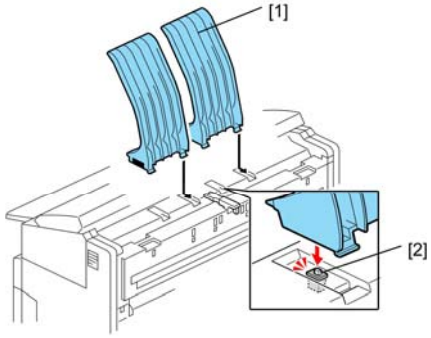


- **Fusing motor: Controls the fusing unit and the exit rollers**

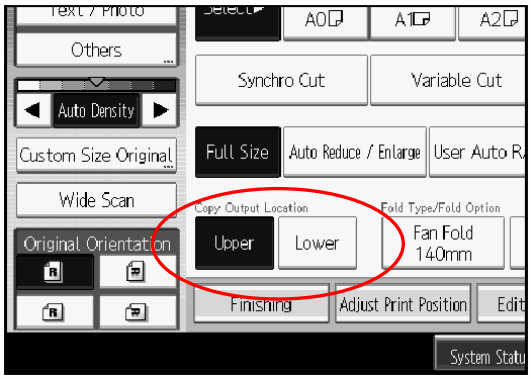
Slide 199

No additional notes

Selecting the Copy Exit Path



d093d609

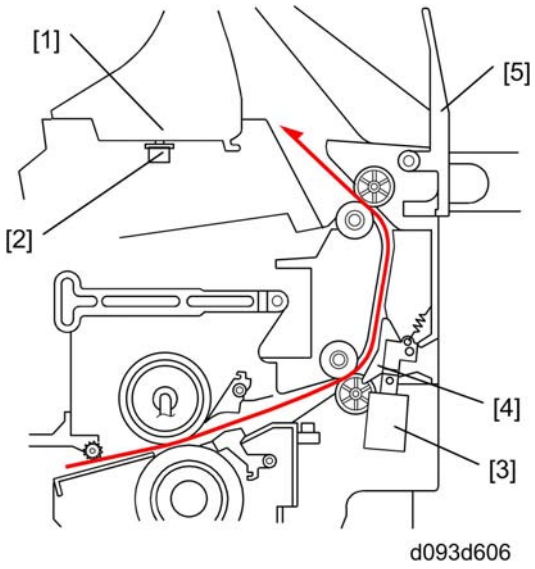


- With the upper output stackers [1] installed on the machine, the operator can select either the upper path or the lower path on the operation panel. (The left upper output stacker actuates paper exit selection switch [2].)

Slide 200

- For more, see the next two slides.

Selecting the Upper Exit

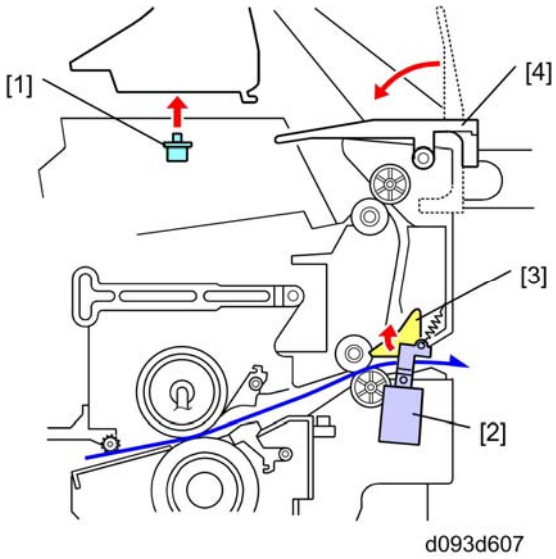


- **When the upper output stackers are installed:**
  - The left output stacker [1] depresses paper exit selection switch [2] and keeps it closed. This de-activates the paper junction gate solenoid [3].
  - The closed junction gate [4] guides paper to the top of the machine.
  - The lever [5] should be up.

Slide 201

For normal operation, the left upper output stacker must be installed, so the operator has the option of selecting either "Upper" or "Lower" for paper exit.

Selecting the Rear Exit

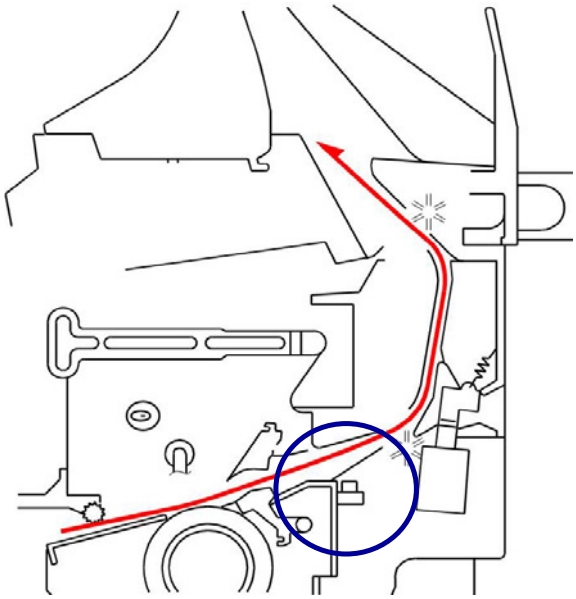


- **When the left and right upper output stackers are removed:**
  - The paper exit selection switch [1] under the left output stacker comes up and opens the switch.
  - This activates the [2] paper junction gate solenoid which opens the paper junction gate [3]. The open junction gate guides paper out the back of the machine.
  - When the upper output stackers are removed, the lever [4] must be lowered so the original can pass over it.

Slide 202

- With the upper output stackers removed, the original must exit to the rear.

Exit Jam Detection



- The fusing exit sensor (circled) detects jams in the fusing exit area.

Slide 203

No additional notes

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Electrical Component Replacement

Slide 204

PURPOSE OF THE SECTION

- ❒ Practice replacing any electrical components not yet replaced.

Electrical Component Replacement - 1

- **Do the following removal and replacement procedures.**
  - Motors (FSM → Replacement and Adjustment → Motors)
  - PCBs (FSM → Replacement and Adjustment → Boards)
    - » Put the NVRAM from the old controller board on the new controller board.
    - » If you install a new MCU board, do SP3001 2 to initialize the ID sensor.
  - Hard disk (FSM, Replacement and adjustment, Others, HDD Replacement)
    - » Do SP5832 001 (HDD Formatting - All) to format the new HDD.
    - » Do SP5853 (Stamp Data Download) to download the fixed stamp data from ROM to the new hard disk.

Slide 205

Do the replacement procedures.

- Make sure you understand the cautions in the manual.
- If the Controller board is replaced, the HDD Encryption application (if installed) must be reinstalled. (Installation → Installation of MFP Options → Printer Options → Important Information About HDD Encryption)
- The Roll Feed Motor, Cutter Motor, and Cassette Feed Motor replacement procedures are in the Paper Feed replacement section not the Motor replacement section.

Electrical Component Replacement - 2

- **Check the following removal and replacement procedure.**
  - NVRAM (FSM, Replacement and adjustment, Boards)
    - » If you cannot download the NVRAM data, some of the settings are printed on a sheet that is stored inside the machine. You can input these after you replace the NVRAM.
    - » For the CIS values (SP4972), you must use the SD card that was shipped with the CIS. (Refer to the CIS replacement procedure for details.)
    - » For the LPH values (SP 2943, SP 2952), check the decals on the LPH.
    - » If you install a new NVRAM, do SP3001 2 to initialize the ID sensor.

Slide 206

- This procedure refers to the NVRAM that is on the controller board, not the MCU.
- The MCU board also has another NVRAM which cannot be replaced separately.
- If NVRAM download fails, some items must be manually set to the values in the factory data sheet using SP modes.
  These items are listed in the FSM. (Replacement and Adjustment → Boards → MCU, SIPU, MB → Re-installation)

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MAINTENANCE

Slide 207

PURPOSE OF THE SECTION

- ❒ This is a short description of PM for this machine.

PM

- **A visit is necessary every 5.5 km (18,000 ft).**
- **The circuit breaker switches on the main machine and on the folder unit must be checked at least once a year.**
- **The technician must empty the used toner bottle at PM (not the user).**
  - A 15-metre warning is not very much for this type of machine. So, empty the used toner bottle every time you visit the user.
- **Lubrication**
  - The diagrams in the manual show the lubrication points.
- **SP Modes**
  - 7803: PM counter status at this time
  - 7804: Resets the PM counter
    - » Do this after PM

Slide 208

Service manual, Preventive Maintenance

Make sure that the class knows about the maintenance table.

- The PM cycle is 5.5 km of printouts.
  - ➢ PM at 5.5 km is not necessary for all items. For some items, PM is only necessary at longer intervals. See the PM table for more.
- Roll cutter: The life of the roll cutter is 127k cuts. However, there is no counter. If the customer makes A1 copies always, this means that the lifetime is 75.4 km. Anyway, check the cutter every 5.5 km.

PM Items

- Ask the trainees to do a maintenance procedure on their machines.

Cleaning

- The fusing entrance guide spurs must be cleaned each visit. There is a brush below the bottom plate. The diagram in the manual shows where this brush is. Be sure to put it back in the correct position after you clean the spurs.

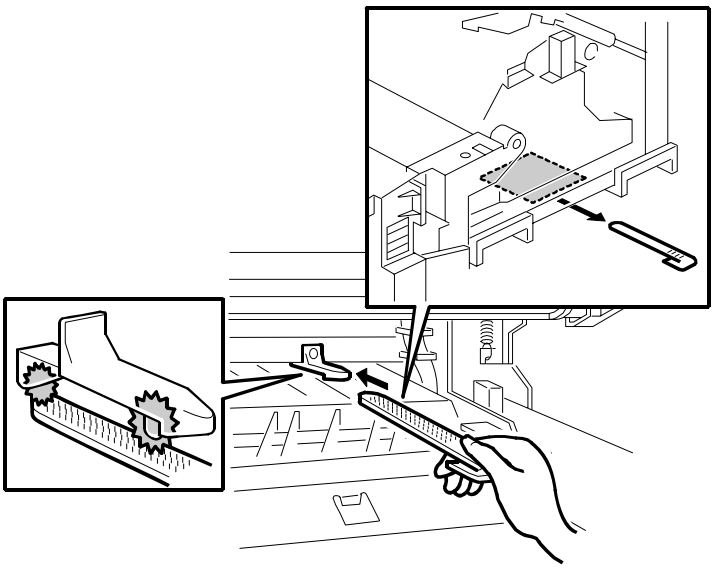
PM Counter

- SP7803 displays the count in number of sheets -- not length.
- To calculate the approximate PM status, multiply SP7803 by A1/D length.

Counter Reset

- Reset the PM counter after you do PM (SP 7804).

Cleaning the Fusing Entrance Guide Spurs

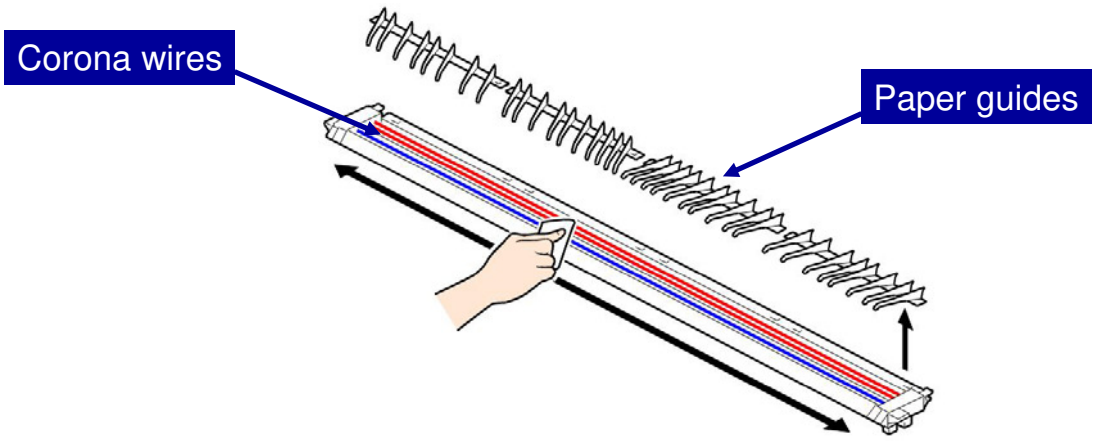


- ❑ Clean the spurs every time you visit the customer.
- ❑ Put the brush back after you clean the spurs.

Slide 209

No additional notes.

Cleaning The T/S Corona Unit

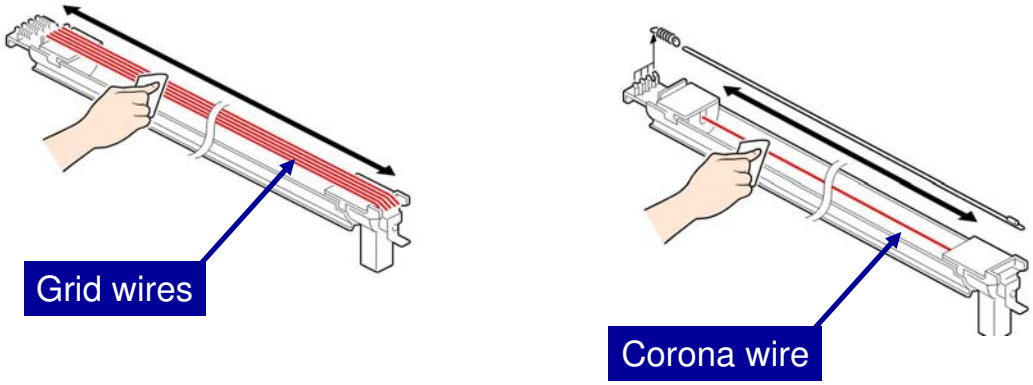


- **Remove and clean the paper guides. Use lens paper or dry cloth.**
- **Clean the transfer/separation corona wires with lens paper.**

Slide 210

- If you clean the corona unit casing and paper guides with a damp cloth, make sure to completely wipe them dry before re-assembling.

Cleaning the Charge Corona Unit

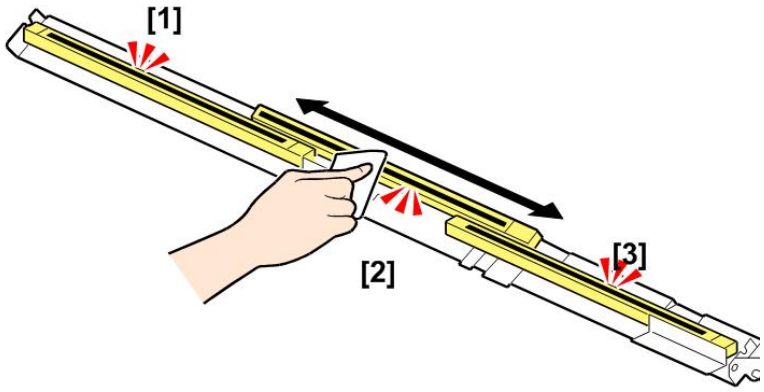


- **Clean the grid wires and the charge corona wire with lens paper.**

Slide 211

- If you clean the corona unit casing with a damp cloth, make sure to completely wipe it dry before re-assembling.

Cleaning the LPH



- **Clean the surfaces of the LPH unit lenses with lens paper (or clean cloth dampened with alcohol).**
- **Important:**
  - Do not use any other chemical cleaners.
  - Discharge static after cleaning.

Slide 212

- If you clean with a damp cloth, make sure to completely wipe it dry before re-installing.
- If you use an alcohol dampened cloth, make sure there is no residue remaining around the cleaned area.

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TROUBLESHOOTING

Slide 213

PURPOSE OF THE SECTION

- This section explains the troubleshooting tools in the machine.
- Explain that the troubleshooting section does not explain all possible problems. In the field, technicians must think for themselves and use their own experiences. But the procedures in the manual give some ideas for where to start to look when a particular problem occurs.

Memory All Clear

- **Before memory all clear:**
  - SP5990 002: Print the lists of settings (SMC lists)
  - Before you erase the memory, try to load the NVRAM contents to a blank SD card (SP 5825)
- **Memory All Clear**
  - SP 5801 (see the SP table for how to operate the SP)
  - Does not reset these items:
    - » SP5811 (Machine Serial Number)
    - » SP5849 (Installation Date)

Slide 214

- Do memory all clear only after you replace the NVRAM, or when you repair the machine after an NVRAM problem.
  - The NV-RAM must be replaced if you install a new total counter in the machine.
  - In this model, the total counter is known as the 'total feed meter'. This is because it counts length, not copies.
- The procedures are in the SP table (SP 5801).
  - If you will send the SMC lists by fax, you must cut the paper to the correct size after it is printed. The SMC lists are printed on paper from a paper roll, but the image is A4/LT LEF size. You cannot feed a sheet of A4 at the manual feed table.
  - Why are the lists called 'SMC Lists'?. SMC means 'Serviceman Machine Communication'.
- The NVRAM upload and download procedures are in this section of the service manual.
  - If NVRAM download fails, manually set to the values in the factory data sheet using SP modes.

SC Codes

- Four levels
- To reset a 'Level A' code, go into SP mode and switch the machine off/on

Slide 215

Show the four levels of SC code.

- Level A codes cannot be reset by switching the machine off/on.
  - You must go into SP mode. There is no special SP number to use; get to the SP mode menu, then switch off/on.

Error History SP Modes

- **SC history**
  - 7401: Total number of SCs so far
  - 7403: Displays the SC history
  - 7807: Reset the SC history (also resets jam history)
- **Jam history**
  - 7502: Total number of copy jams
  - 7503: Total number of original jams
  - 7504: Copy jam counters (by location)
  - 7505: Original jam counters (by location)
  - 7506: Copy jam counters (by paper size)
  - 7507: Displays data on the latest 10 copy jams
  - 7508: Displays data on the latest 10 original jams

Slide 216

- Copy and original jam history codes are in the above section of the service manual.
- Use SP 7507 to see the most recent jam detection codes.
  - When an error occurs, the code is also shown on the operation panel.

SP Modes - Tests

- 2902: Test pattern printing
- 3103: ID sensor output display
- 5803: Input tests
- 5804: Output tests

Slide 217

No additional notes.

SP Modes - Free Runs

- **Scanner free run**
  - SP 4013 001
  - SP 4013 002
- **Printer free run**
  - SP 5802: Starts the free run

Slide 218

- 5802: Paper is not fed from the roll during this free run.

SP Modes - Others

- 5831: Resets user tools to the initial settings
- 5849: Shows the date that the machine was installed

Slide 219

No additional notes

Other Troubleshooting Information

- **Image quality adjustments**
  - Replacement and Adjustment → Special Adjustments → Image Adjustment with SP Codes
- **Jam codes and Cover switch table**
  - Troubleshooting → Jam Code Tables, Cover Open
  - This section also has electrical component layout illustrations.
- **Fuse table**
  - Troubleshooting → Fuses
- **LEDs and DIP Switches**
  - Troubleshooting → Board LEDs, DIP Switches

Slide 220

Image quality adjustments

- Do these adjustments if the customer says that the output is unsatisfactory.
- Before you do the measurements, let the test print output become cool for five minutes. This lets the paper cool and shrink to its usual size.
- Always do the adjustments in the order given in the FSM.
  - It is not necessary to do all of the adjustments. But they must be done in the given sequence, unless specially explained in the procedure in the FSM.
- Have the students try these adjustments on their machines.

Jam Code, Cover Open

- These tables provide troubleshooting information about scanner and plotter (printer) jams.
- There is also information about machine condition when various covers are open (which power lines the door switches cut).
- SP7502 through SP7508 provide more information about jams. Familiarize yourself with their use.

Fuses

- These tables give information about the power lines protected by the various fuses. Output connectors are also listed.

LEDs and DIP Switches

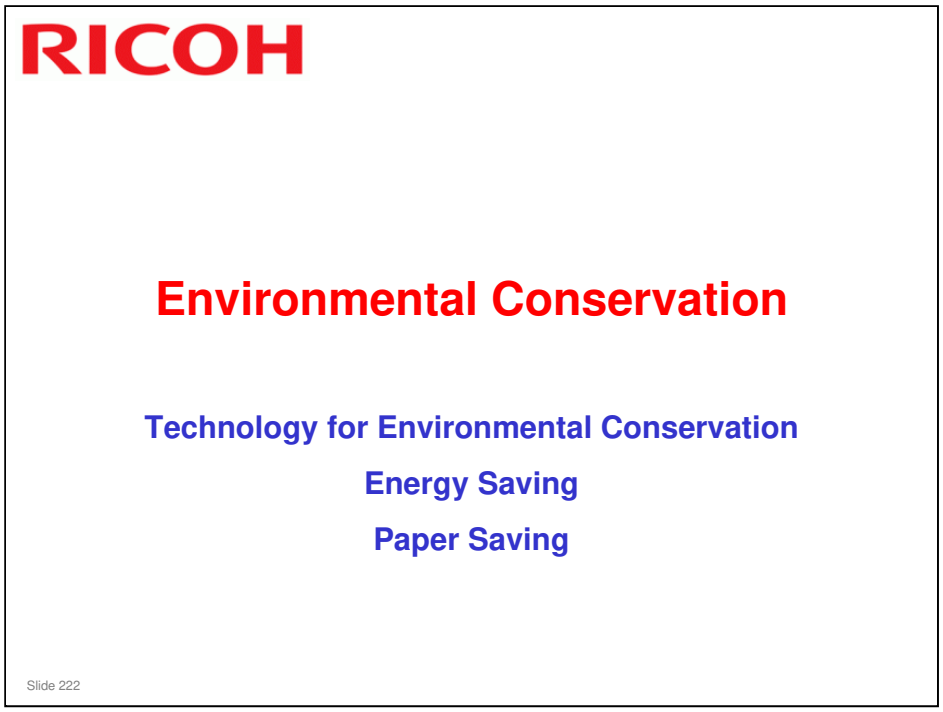
- This machine has a lot of on-board LEDs and DIP switches. Familiarize yourself with their functions.

Fusing Unit Jams

- Normally, the user will remove fusing unit jams.
- But, if SP 1159 is changed to '1' (Enabled), the machine stops if a jam occurs in the fusing unit for three consecutive paper feeds. Then, SC559 appears. The technician must remove the jam.
- The fusing unit cover must be opened and closed after this SC occurs to restore the machine to full operation. This ensures that the operator has opened and closed the cover to check for paper and/or paper scraps around the hot roller. Loose paper around the hot roller is a fire hazard.

Slide 221

- The default setting is ‘off’. In Japan, customers complained of a burning smell (not actual burning – just a smell) when paper jams in the fusing unit. You can enable this SP if customers complain about it.



❒ 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 N-C3	Old model N-C2
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 Read 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 hot roller.
- **2. Hybrid QSU**
  - This technology adds a capacitor 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.

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No additional notes

Brief Descriptions of the Technologies

- **5. High-speed duplex copying**
  - 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

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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**
  - The thickness of the metal core in the hot roller is 1.3 mm. This allows the core to reach the ready temperature much faster.
- **This also means that the warm-up time is reduced.**
  - Warm-up time: 120 s

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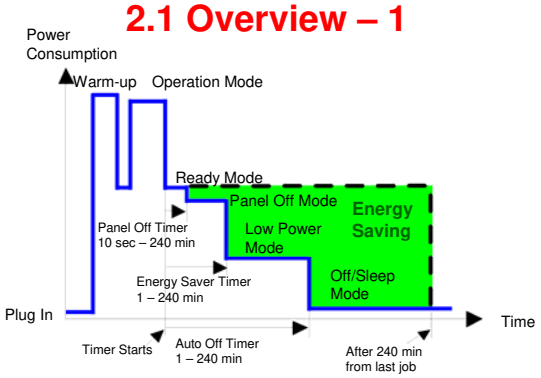
❒ Through major reductions in warm-up time and recovery time from energy saver modes (Low power, Off/Sleep), QSU (Quick Start Up) Technology has eliminated the traditional trade-off between energy saving and convenience of speed.

2. Energy Saving

2.1 Overview – 1

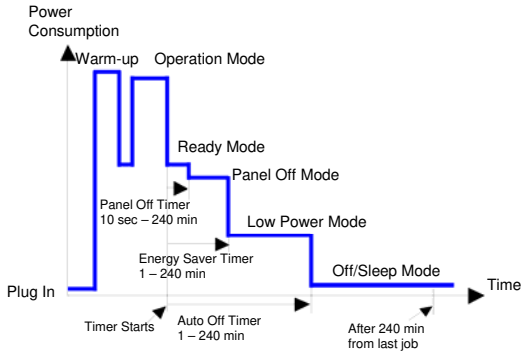


Energy Saver Modes	Description
Energy Saver Mode (Panel Off)	The machine is still in the Copy Ready condition. Level 1: Panel off only Level 2: Panel off and lower the fusing temperature.
Low Power Mode	The fusing temperature is lowered to the prescribed temperature (below ready temperature).
Sleep Mode	When a printer/scanner unit is installed: No power is supplied to the printing engine, and almost none to the controller.

Slide 231

- 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
Panel off Mode	Panel Off Timer	60 sec.	10 sec to 240 min.	3 sec.
Low Power Mode	Energy Saver Timer	7 min.	1 to 240 min.	78 sec.
Off/Sleep Mode	Auto Off Timer	14 min.	1 to 240 min.	120 sec.

Specified values for timers	Panel Off Mode	Low Power Mode	Auto Off Mode
If Panel Off > Energy Saver > Auto Off	Can start	Can start	Can start
If Panel Off = Energy Saver = Auto Off	Cannot start	Cannot start	Can start
If Panel Off < Energy Saver < Auto Off	Cannot start	Cannot start	Can start

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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
Panel off Mode	On	On	On
Low Power Mode	Off	On	On
Off/Sleep Mode	Off	Off	On

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No additional notes

2. Energy Saving
2.2 Energy Saver Mode: Panel Off Mode – 1

- **The machine enters panel off mode when one of the following is done.**
  - The panel off timer runs out after the last job.
    - » The panel off timer is controlled by User Tools: Timer settings.
  - The Energy Saver key is held down for a second.
- **The machine is still in the stand-by (ready) condition, but turns off the LCD of the operation panel.**
- **The machine recovers to the ready condition if one of the following occurs:**
  - The Energy Saver key is pressed
  - An original is placed
  - The original feed unit is lifted
  - The user touches the operation panel
  - The toner hopper cover is opened
  - The roll feeder is opened
  - The cassette is opened
  - The Upper unit is opened

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- In some MFP models, when it takes 1 minute to return from Off/Sleep mode, there may be no Panel Off Mode
- Also, there is no Panel Off Mode in printers.

2. Energy Saving

2.2 Energy Saver Mode: Low Power Mode

- **The machine enters low power mode when the energy saver timer runs out after the last job.**
- **When the machine enters low power mode, the fusing temperature is lowered to the prescribed temperature (below the machine ready temperature).**
- **The machine recovers to the ready condition if one of the following occurs:**
  - The Energy Saver key is pressed
  - An original is placed
  - The original feed unit is lifted
  - The user touches the operation panel
  - The toner hopper cover is opened
  - The roll feeder is opened
  - The cassette is opened
  - The Upper unit is opened
- **Recovery time: 28 seconds**

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No additional notes

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 120 seconds**

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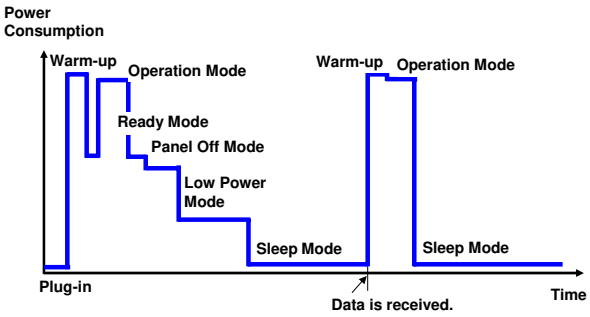
No additional notes

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

- **The machine recovers to the ready condition:**
  - **If data is received**
    - » After warm-up, the job starts, but the operation panel stays dark.
    - » Then, after the job is completed, the machine returns to sleep mode immediately. Panel Off and Low Power modes are skipped.



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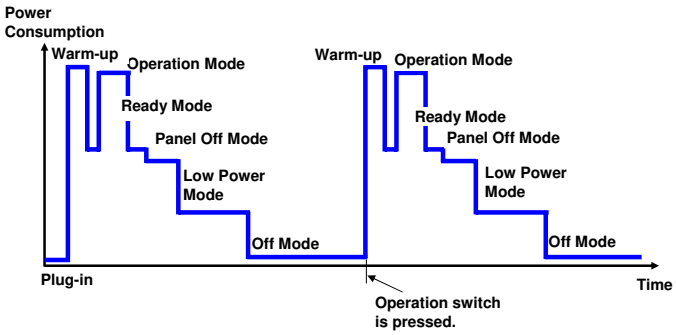
No additional notes

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 when the auto off timer runs out or the operation switch is pressed.



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❒ This timing chart shows what happens if the data is received while the machine in sleep mode.

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
  - 8941-002: Standby mode
  - 8941-003: Panel off mode
  - 8941-004: Low power mode
  - 8941-005: Off/sleep mode
- **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).

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

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

(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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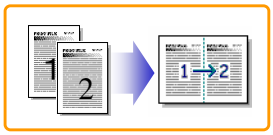
No additional notes

3. Paper Saving

3.1 Measuring the Paper Consumed – 1

- **Combine: Reduce paper volume in half!**



- The combine function reduces the amount of paper used. This means that less energy overall is used for paper production, which improves the environment.
- To check the paper consumption, look at the total counter. The total counter counts all pages printed. (See next slide.)

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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 single-sided with combine mode counter.**
  - Total counter : SP 8581 001
  - Single-sided with combine mode : SP 8421 004
- **The following table shows paper savings and how the counters increase for some simple examples of Combine jobs.**

Originals	Copy Sheets Used	Paper Saved	Total Counter SP8581-001
1	1	0	1
2	1	1	1
3	2	1	2
4	2	2	2
5	3	2	3
10	5	5	5
20	10	10	10

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- Basically, for even numbers of originals, the paper saved by using Combine Mode is the number of originals divided by 2. For odd numbers of originals, the paper saved is the number of originals minus one divided by 2.
  - Even number of originals: Paper Saved = Number of originals / 2
  - Odd number of originals: Paper Saved = (Number of originals-1) / 2