No additional notes

Introduction

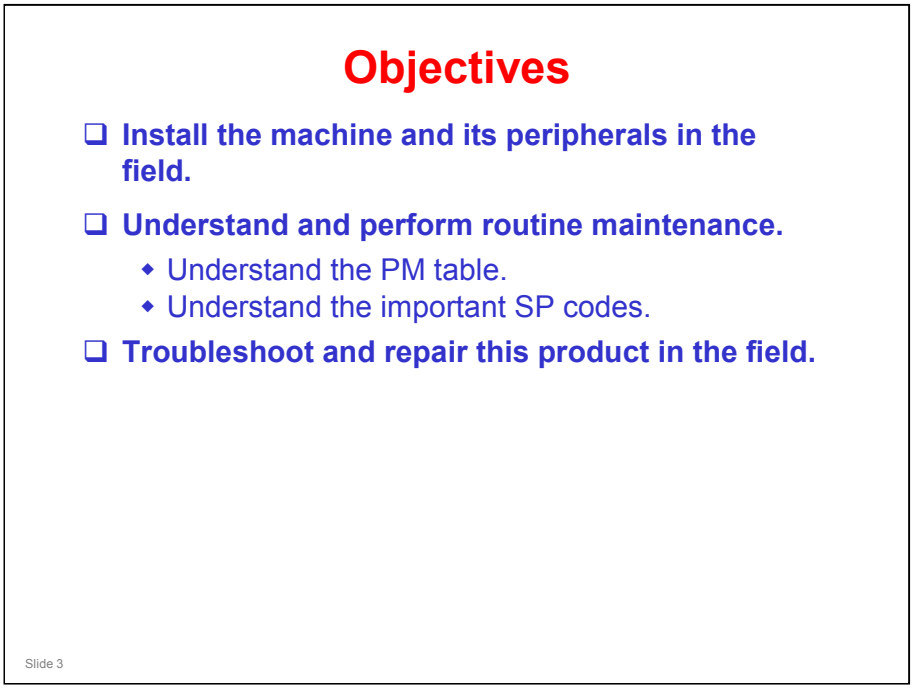
- This is a digital black-and-white wide-format machine with 600 dpi resolution for scanning and printing.
- The controller is a GW controller. A Ratio controller is also available.

Slide 2

PREPARATION CHECK LIST

Description	Quantity	Remarks
Service Manual	1 per trainee	Give copies to the trainees
Operation Manual	1 per trainee	Give copies to the trainees
Training Schedule	1 per trainee	Give copies to the trainees
Instructor's guide and presentation	1 set	Instructor only
Training machines	1 for every 3 trainees	Have the trainees completely install these during class.
Special Tools	1 set per machine	As necessary

- Provide the relevant manuals and any additional handouts you feel are necessary. Special tools are listed in the parts catalog.



ORIENTATION

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

Introduction of instructors

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

Introduction of trainees

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

Explanation of curriculum

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

Explanation of training center rules

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

No additional notes

PRODUCT OUTLINE

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

SPECIFICATIONS

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

INSTALLATION

- Installation of the machine and the peripherals will be covered.
- 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.
- The optional document feeders will be dealt with in a later section.

PROCESSES AROUND THE DRUM

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

EXPOSURE

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

Course Overview

- ❑ Development and Toner Supply
- ❑ Paper Feed and Cutting
- ❑ Image Transfer, Paper Separation, and Paper Transport
- ❑ Fusing
- ❑ Paper Exit
- ❑ Maintenance
- ❑ Optional Paper Cassette
- ❑ Optional Folder

Slide 6

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 are the same as for the main body, so do not require a separate section.

IMAGE TRANSFER, PAPER SEPARATION, AND PAPER TRANSPORT

- ❒ Image transfer and paper separation mechanisms will be described.
- ❒ Transport from the drum to the fusing unit will be explained.

FUSING

- ❒ Fusing will be described.

PAPER EXIT

- ❒ The paper feed out mechanisms will be described.

MAINTENANCE

- ❒ PM is described briefly.

OPTIONAL PAPER CASSETTE

- ❒ This describes the optional paper cassette mechanisms.

OPTIONAL FOLDER

- ❒ This describes the mechanisms in the optional fan folder and cross folder.

PURPOSE OF THIS SECTION

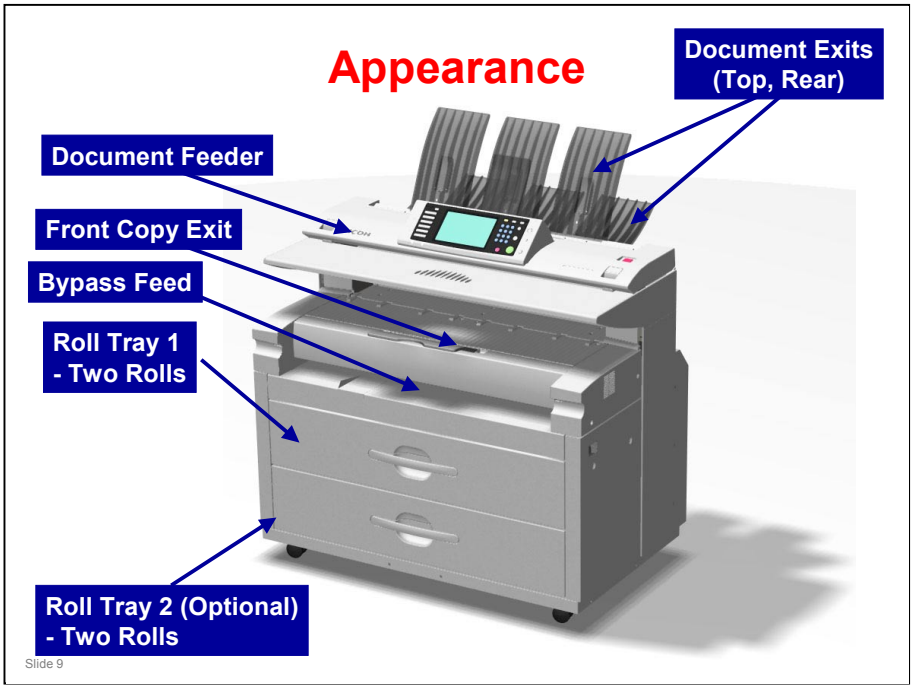
- ❒ The model will be introduced.
- ❒ The optional peripherals will be introduced.
- ❒ The product concept, sales points, and targets will be presented.

How many models?

- **D046: Beluga-C1a**
- **D049: Beluga-C1b**
- **Differences**
  - Maximum scan length
    - » D046: 15 m (590”), D049: 30 m (1180”)
  - Copy speed
    - » D046: 120mm/s, 10 cpm (A1/D LEF), 5 cpm (A0/E LEF)
    - » D049: 170mm/s, 14 cpm (A1/D LEF), 7 cpm (A0/E LEF)
  - Fusing lamps and hot roller are different

Slide 8

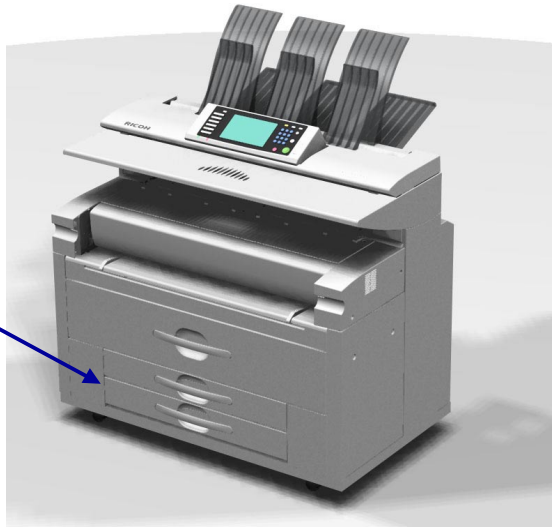
No additional notes



APPEARANCE

- This slide shows a front view of the machine.
- Document feeder: One sheet at a time.
- Document exits at top and rear
- Copy exits at front and rear (rear one not shown in the diagram).
- Bypass Tray: One sheet at a time
- Roll Tray 1: Contains two paper rolls (rolls 1 and 2)
- Roll Tray 2 (Optional): Contains two paper rolls (rolls 3 and 4).

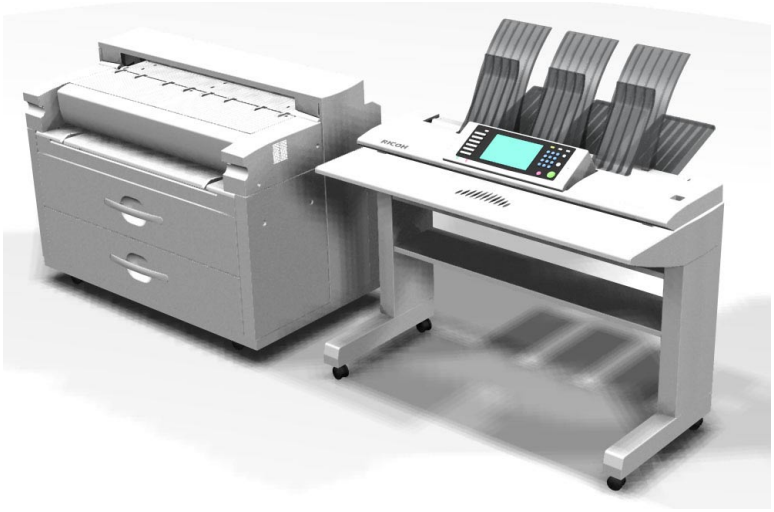
With Optional Paper Cassette



Slide 10

❒ An optional paper cassette can be installed instead of an optional roll feeder. There are two trays.

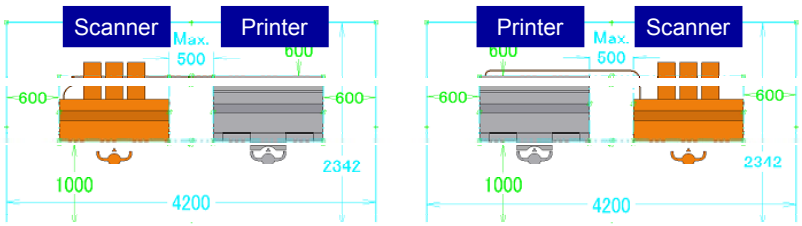
With Scanner Separation Unit (D049 only)



Slide 11

- This is for D049 only.
- The table is too high for most wheelchair users.

Scanner Separation Unit

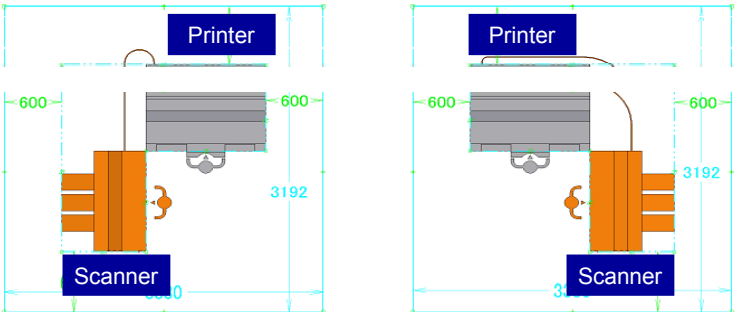


- The scanner can be moved to the left or the right of the printer.

Slide 12

No additional notes

Scanner Separation Unit

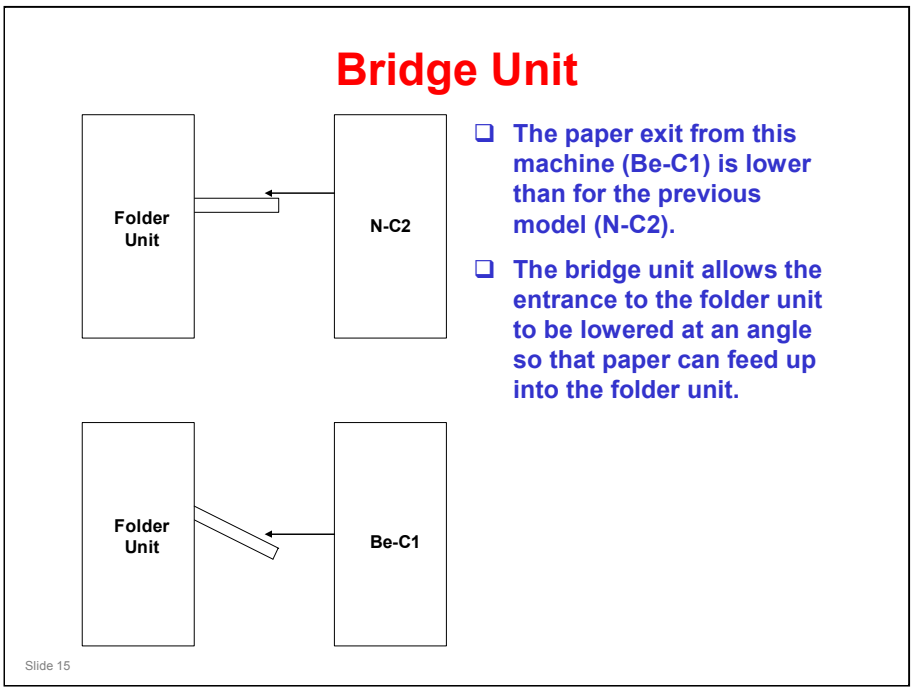


- The scanner and printer can be arranged at right-angles to each other.

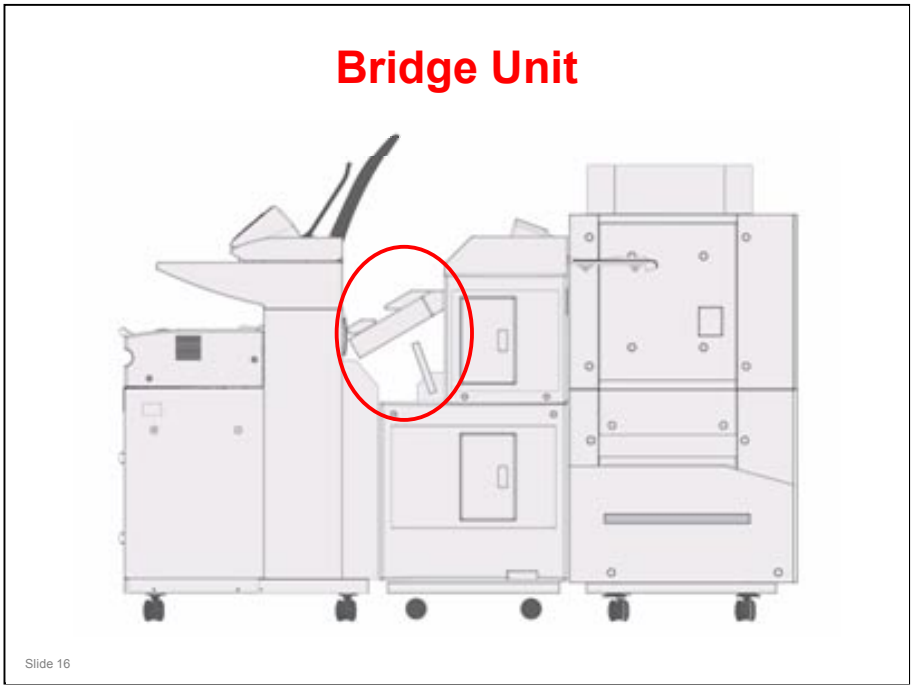
Slide 13

No additional notes

- This is the same fan folder that was used with the Neptune-C2.
- However, a bridge unit is required to install it on this new machine. See the next slide for details.

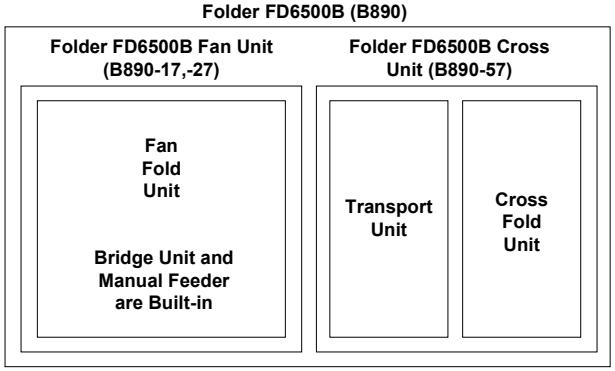


- The bridge unit must be installed with the fan folder unit on the Be-C1.
- With the optional cross folder unit (explained next), this is not necessary, because the bridge unit is built-in.



❒ Here is another view of the bridge unit (in the red circle).

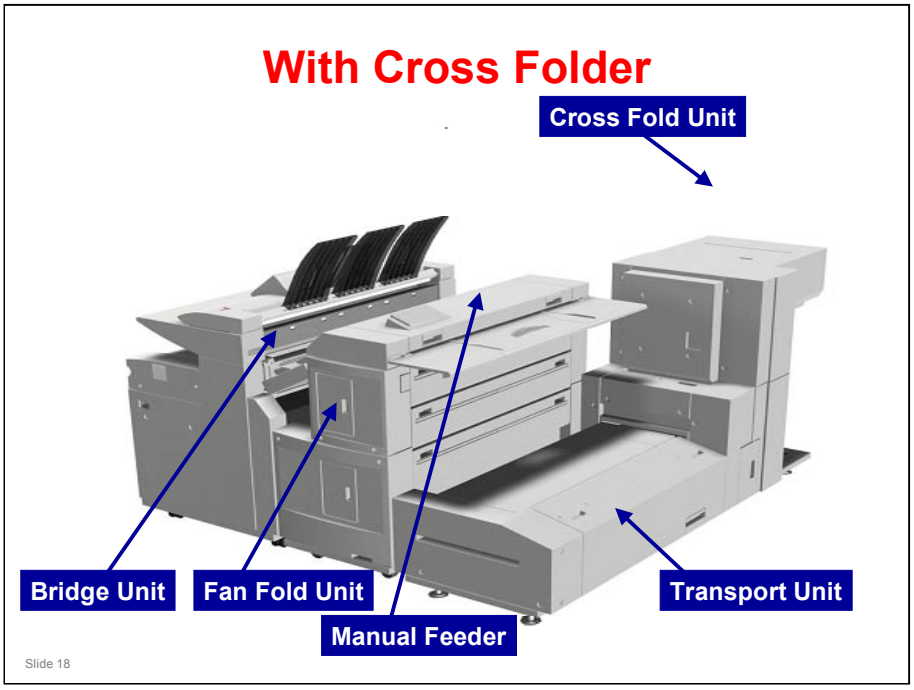
Cross Folder Unit



- **The cross folder unit (B890) consists of two main sub-units.**
  - Fan Unit (B890-17,-27) : One box, containing a fan fold unit, a bridge unit and a manual feeder unit
  - Cross Unit (B890-57) : Two boxes on one pallet (one contains a transport unit, and the other contains the cross fold unit).

Slide 17

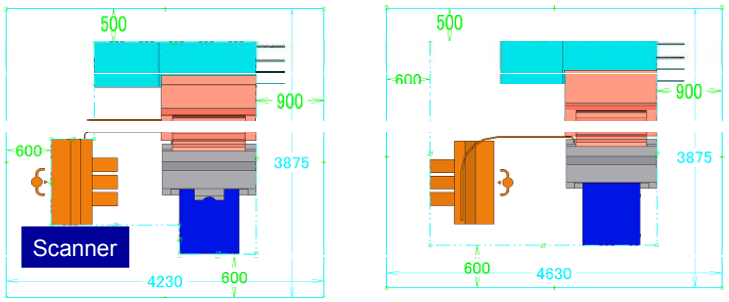
- This slide explains the composition of the new cross folder unit.
- See the next slide for a photograph.



This shows the cross folder installed on the machine.

- ❒ After leaving the fan fold unit, the transport unit feeds the paper sideways into the cross fold unit.

Cross Folder with Scanner Separation



- This shows how the cross folder unit can be installed with the scanner separation unit.

Slide 19

No additional notes

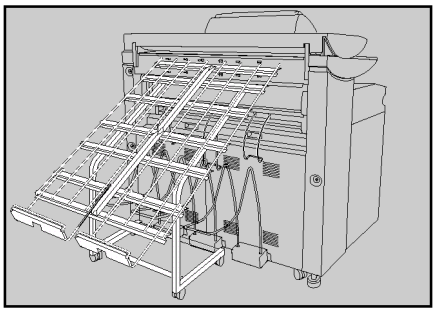
Optional Original and Copy Trays

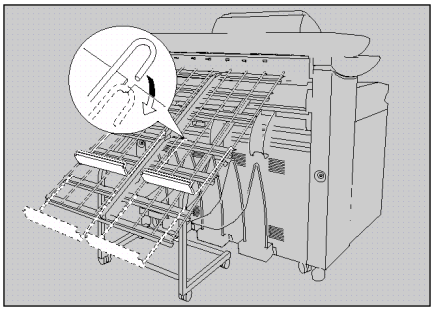
- Original Exit Tray: Same as the Dolphin-C2
- Original Hanger: Same as the Neptune-C2
- Multi Stacker Type 7140 (New)
- Rear Stacker Type 7140 (New)
- Double Stacker Type 7140 (New)

Slide 20

No additional notes

Original Tray





- This option cannot be used when the optional fan folder or cross folder is installed.

Slide 21

- This is the same option that was used with the Dolphin-C2.
- Note how this option can be used to stack originals coming out of the rear exit.
- The diagram on the right shows how to adjust the tray to match the size of the originals.

Original Hanger

- Originals can be stored in this hanger until scanning.

Slide 22

No additional notes

- This option can be attached at the front or the rear.
- If installed at the front, it is used as a copy stacker.
- If used at the rear, it can be installed as an original stacker or a copy stacker.
- This option cannot be used at the rear when any of the following are installed:
  - Folder FD 6500 A/B (B889/B890)
  - Original Exit Tray Type G (B341)
  - Rear Copy Stacker Type 7140 (D438).

Slide 23

❒ This is a new option.

Rear Stacker

- If the fan folder is installed, you can install this option to receive scanned originals.
- This option can be installed only when the Manual Feeder is installed on top of the fan folder or cross folder.

Slide 24

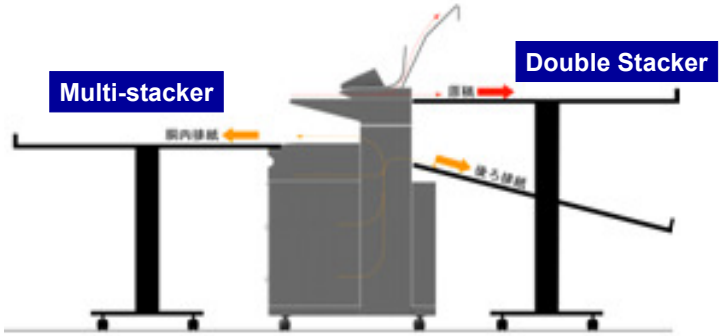
- This is another new option.

- This option can be installed at the rear.
- It stacks originals (upper stacker) and copies (lower stacker).
- This option cannot be used when the optional fan folder or cross folder is installed.

Slide 25

❒ This is another new option.

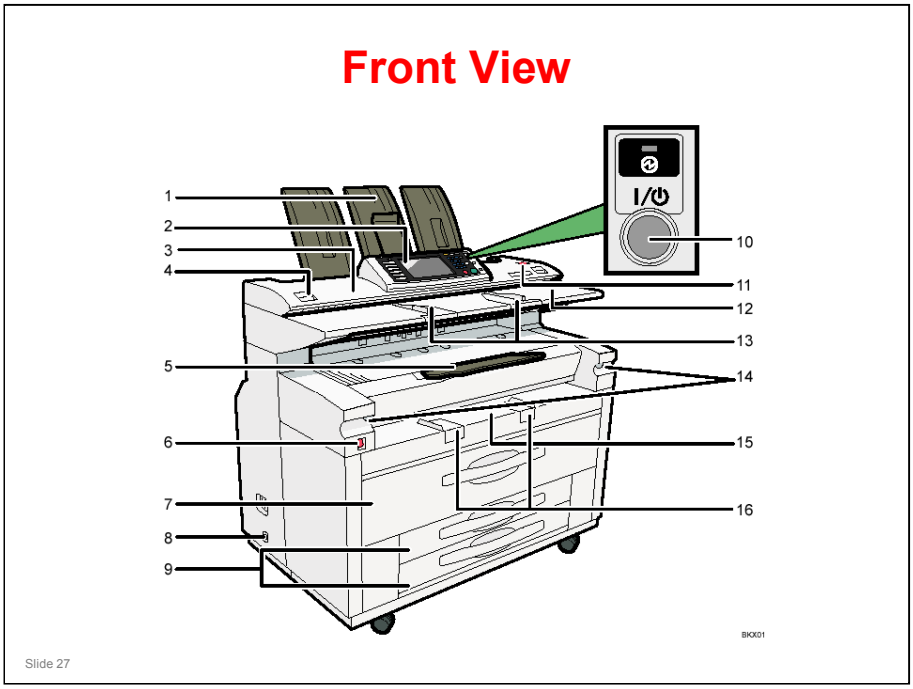
Multi-stacker and Double Stacker



- This shows the multi-stacker installed at the front, with the double stacker installed at the rear.

Slide 26

- If the folder option is installed, a stacker cannot be installed at the rear.



FRONT VIEW

Operating Instructions - About the Machine – Getting Started

Copy paper sources

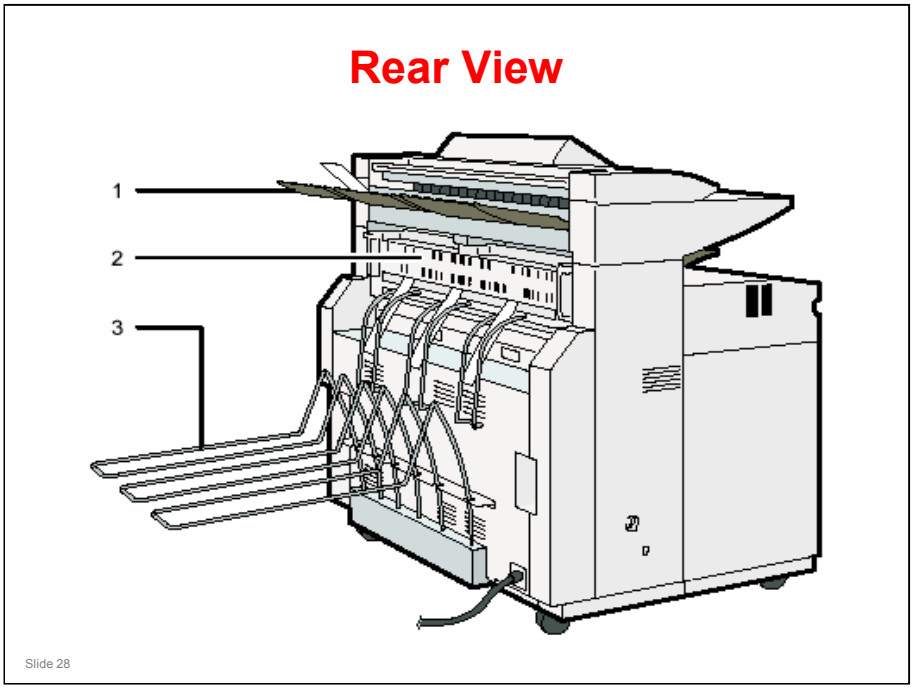
- ❒ Upper roll tray (item 7): Contains two paper rolls
- ❒ Lower tray (item 9): Contains two paper cassettes or paper rolls. This tray is an optional item.
- ❒ Bypass feed tray (item 15): Use this to make a copy on a sheet of cut paper.
  - ➢ To copy on cut paper, you must use the bypass tray or the optional cassette unit.

Copy exits

- ❒ Front exit (item 5)
  - ➢ There is another exit at the rear. It will be shown on the next slide.
  - ➢ For recommendations on which exit to use, see the Operating Instructions.

Other items

- ❒ Note the locations of the main power and operation switches (items 6 and 10).
- ❒ Note the Scanner Stop key (item 11). Use this to stop scanning if the original starts to skew. Also use it to release the original after it has been scanned.
  - ➢ Depending on a user tool setting, the scanner holds on to the trailing edge of the original after scanning, to prevent it from falling and being damaged. To release the trailing edge, press the Scanner Stop key.



REAR VIEW

Operating Instructions - About the Machine – Getting Started

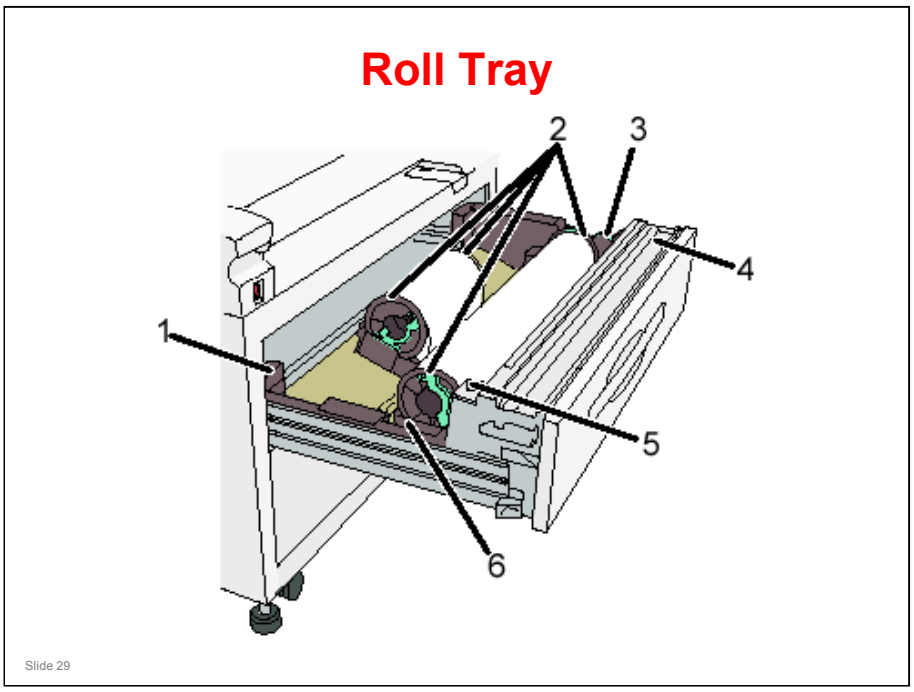
❒ Point out the following items on the diagram. Demonstrate them on the machine, because some items are not immediately clear from the drawing.

Original exit

❒ Rear exit (item 1): The original is fed out to this exit.

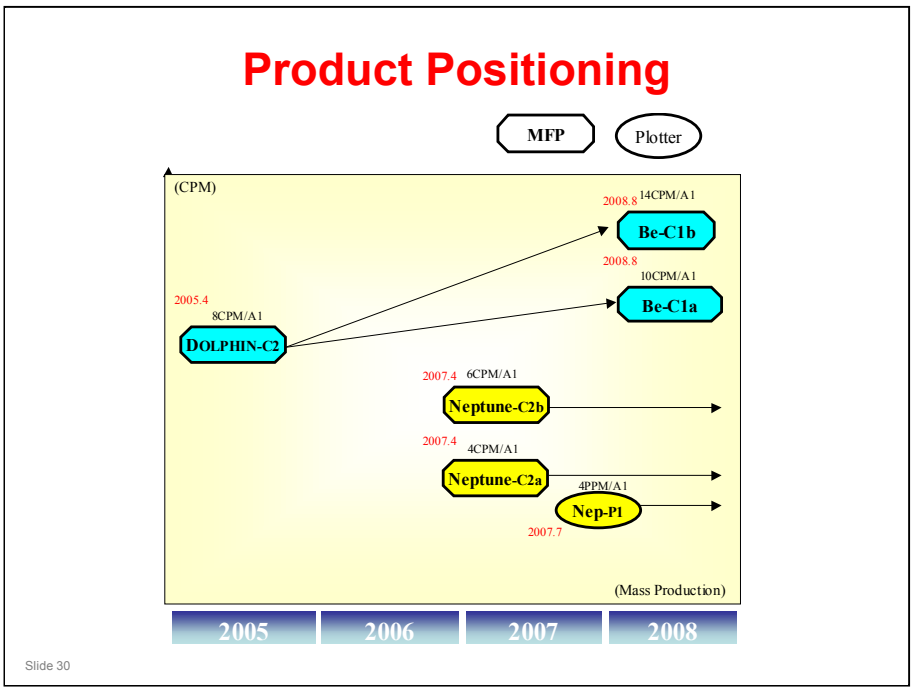
Copy exit

❒ Rear exit (item 3): The copy is fed out to this exit.



Operating Instructions - About the Machine – Getting Started

- The diagram shows the upper tray.
- 1. Anti-humidity heater switch
  - When humidity is high, paper in the paper tray may absorb moisture, which can affect copy quality. The anti-humidity heater prevents this.
  - Turn this switch on when humidity is high.
- 2. Paper holder
  - The two paper holders grip the paper roll and are mounted on the paper roll tray's roll holder.
- 3. Paper feed knob
  - Use when loading paper rolls or clearing paper jams.
- 4. Cutter knob
  - Use to manually cut paper if there are paper jams in the cutter area of the machine. Always return the cutter knob to the left or right end.
- 5. Auto feed button
  - The switch allows the user to feed the leading edge of a new roll into the machine properly. Press the key to feed paper, then release to cut the paper.
  - Use this to clear misfeeds in the paper feed area. Keep this button pressed to feed the roll paper continuously.
  - When approximately 100 mm (3.9“) of paper length is fed, release the button so that paper will be cut automatically.
- 6. Roll holder
  - Adjust this to the size of the paper roll you are using. The anti-humidity heaters are not options in this machine. The switches are off by default, to meet Energy Star requirements.



No additional notes

Comparison with D-C2 (1)

- **D-C2 does not have these options:**
  - Folder, Copy Stacker, Original Hanger, Rear Stacker, Scanner Separation Unit
- **Display Panel**
  - D-C2: Monochrome LCD, Be-C1: Color Wide VGA
- **Scanner**
  - D-C2: Monochrome , Be-C1: Color
- **External Controller**
  - D-C2: Ratio, Be-C1: Ratio (Printer/Scanner)
- **Embedded Controller**
  - D-C2: Scanner, Be-C1: GW (Printer/Scanner)
- **HDD Security**
  - D-C2: No, Be-C1: Yes (Option)

Slide 31

No additional notes

Comparison with D-C2 (2)

- **Memory**
  - D-C2: 1GB RAM + 40 GB HDD x 2
  - Be-C1: 1GB RAM (with optional 1GB) + 160 GB HDD x 2
- **ACV (paper size: A1/D)**
  - D-C2: 1,500m / 4,920 feet or 2,530 copies
  - Be-C1a: 1,500m / 4,920 feet or 2,530 copies
  - Be-C1b: 8,000m / 26,240 feet or 13,493 copies
- **Estimated Unit Life (paper size: A1/D)**
  - D-C2: 657K copies [390km]
  - Be-C1a: 657Kcopies [390km]
  - Be-C1b: 1683Kcopies [1000km]
- **Speed (paper size: A1/D)**
  - D-C2: 8 ppm
  - Be-C1a:10 ppm, Be-C1b:14 ppm
- **Max Length**
  - D-C2: 15m
  - Be-C1a: 15m, Be-C1b: 30m

Slide 32

No additional notes

Sales Points

- High Speed: 10 ppm (D046) & 14 ppm (D049)
- High Resolution: 600 dpi
- Color Scanner
- Large variety of Peripherals/Flexible Layout
- Color LCD Operation Panel
- Scanner Separation Unit
- Outstanding Usability
  - Easy paper jam clearance
  - Animated user guidance on LCD
  - Easy-to-handle paper trays
  - Simplified display

Slide 33

No additional notes

Optional Units

- Roll Feeder (New): Contains two paper rolls
- Paper Cassette (New): This can be installed instead of the two-roll tray
- Roll Holder Unit: Same as the Dolphin-C2
- Original Exit Tray: Same as the Dolphin-C2
- Original Hanger: Same as the Neptune-C2
- Multi Stacker Type 7140 (New)
- Rear Stacker Type 7140 (New)
- Double Stacker Type 7140 (New)
- Scanner Separation Unit Type 7140 (New)

Slide 34

No additional notes

Optional Units

- Folder FD6500A (Fan Folder) (Same as Neptune-C2)
- Folder FD6500B (Cross Folder) (New)
- Bridge Unit Type 7140 (New): Required to connect FD6500A to Beluga-C1
- Manual Feeder for FD6500A (Same as Neptune-C2)

Slide 35

- The bridge unit and manual feeder are built into the FD6500B.

Optional Units

- **Printer Option Type W7140 (New)**
- **Scanner Option Type W7140 (New)**
  - Memory Unit Type 7140 (New): Needed for scanner option.
- **Gigabit Ethernet Type B (Same as V-C2)**
- **IEEE802.11a/g Interface Unit Type J (Same as V-C2)**
- **IEE802.11g Interface Unit Type K (Same as V-C2)**
- **IEEE 1284 Interface Board Type A (Same as K-C2)**
- **Controller RW-7140 (Ratio Controller including scanner option): New**
  - Interface PCB Type W7140 (required for the Controller RW-7140)
  - Ratio Scanner option
  - Other Ratio controller options: PS3, CGM, DWG/DXF/DWF, VIC

Slide 36

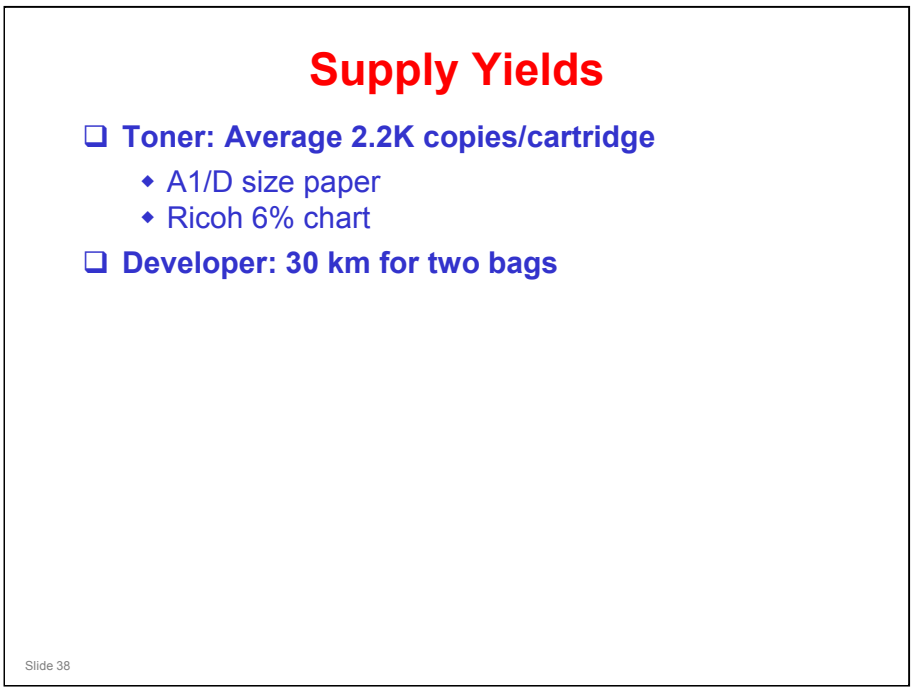
No additional notes

Optional Units

- DataOverwriteSecurity Unit Type H (Same as V-C2)
- Browser Unit Type D (Same as V-C2)
- Java VM Card Type F (Same as V-C2)
- HDD Encryption Unit Type A (Same as V-C2)

Slide 37

No additional notes

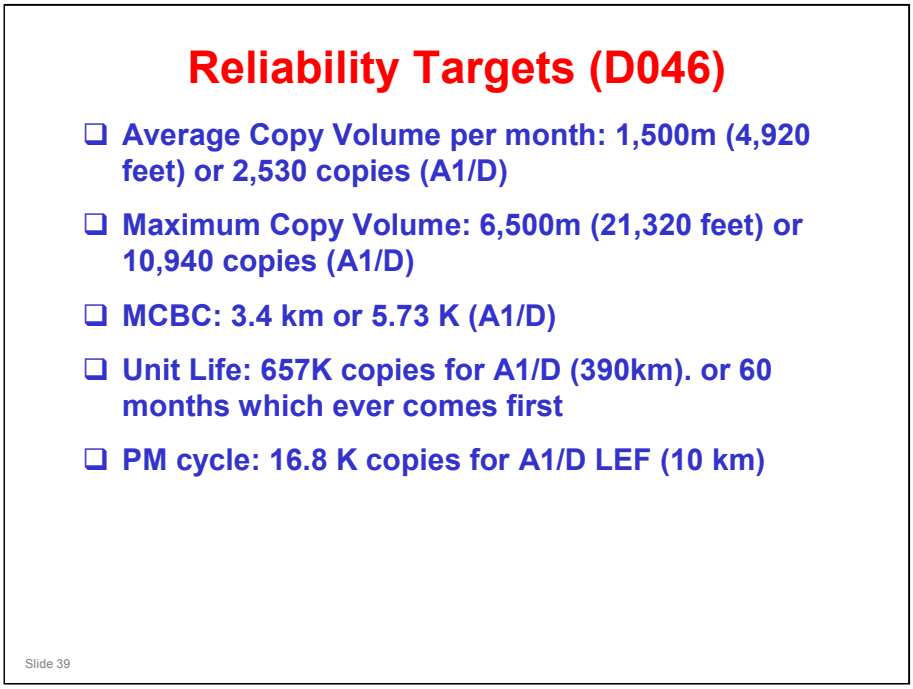


Toner

- The toner cartridge capacity is 800 g.
- The toner is the same as Neptune-C2 and Dolphin-C2, but the toner cartridges are unique. The rear flange is different, so that you cannot install the wrong type of toner cartridge.

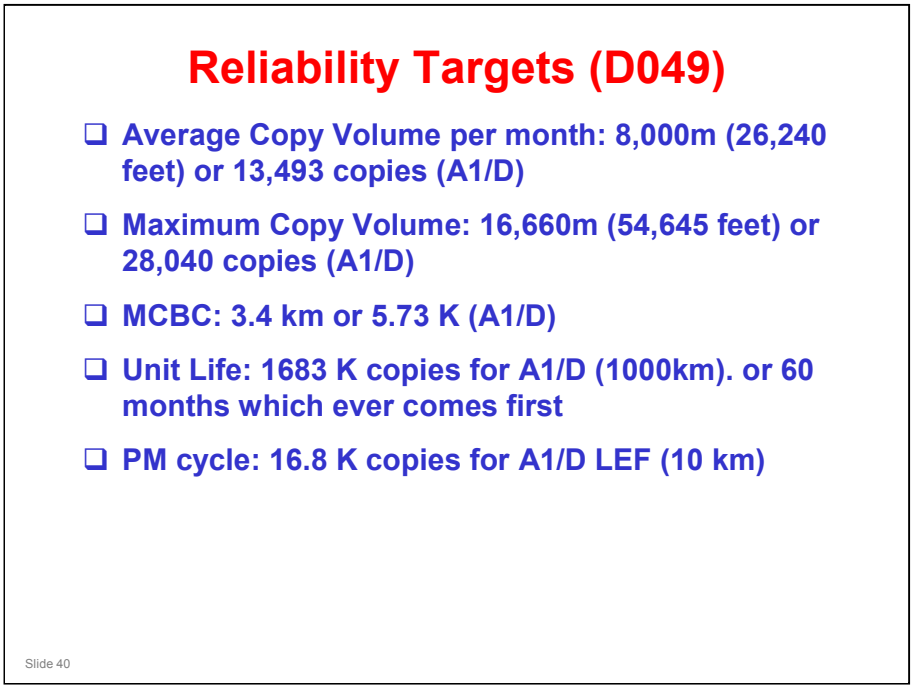
Developer

- The developer bag contains 1.0 kg. Two bags are added at installation.
- The developer is Neptune-type, not Dolphin-type.
- Developer is a PM part, so it is counted with the length counter.



RELIABILITY TARGETS

- The main points are on slide.
- The targets for the D046 are basically the same as the D-C2.
- Note that the PM cycle is 10 km (length of copies made).



RELIABILITY TARGETS

- The main points are on slide.
- The targets for the D049 are very different from the D-C2. This is due to marketing requirements.
- Note that the PM cycle is 10 km (length of copies made).

Electronic Counters: Two Types

- **There are two types**
  - Length counter (measured in m, ft, or yards)
  - Area counter (measured in m^2, ft^2, or $yards^2$): Calculated from the paper width and the cut length
- **The area counter is new for the Dolphin-C2. What is the purpose of this counter?**
  - In the Dolphin-C1, there is only a length counter.
  - An output that is 594 x 841 mm LEF adds more to the length counter than the same image on 841 x 594 SEF.
  - Because of this, customers who print images in the SEF orientation will get more prints from their service contracts.
- **The area counter operates differently for the bypass tray**
  - The area is calculated from the **original** length and **original** width, and the magnification ratio that was used.
  - This is because there is no paper width and length detection for the bypass tray.

Slide 41

No additional notes

Electronic Counters: How to Select?

- **SP 5045 002: Selects the unit for the counter (m, ft, yards, m^2, ft^2, or $yards^2$)**
  - You can change the unit at any time.

Slide 42

- In other machines, you cannot change the unit after you install the machine, because the machine cannot remember the history of changes for the unit.
- For example, we start with metres, and print 5 metres. Then we change to feet, and print 6 feet. The total is 5 + 6 feet = 11 feet, which is not correct.
- But with this model (same as D-C2), there is a basic counter in the software that counts in mm or mm2, and converts this to the required unit. If you change the unit, the value in the basic counter stays the same. So, you can change the unit any time.

Card Save (1)

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

Slide 43

No additional notes

Card Save (2)

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

Slide 44

❒ Study the procedure in the service manual.

Service Manual - System Maintenance Reference - Card Save Function

❒ Note that there is no message on the screen to indicate that a file was copied to the SD card successfully. But there are some error messages that appear if things go wrong.

❒ If an error occurs, press “OK”. The device will discard the job and return to the ready state.

PURPOSE OF THE SECTION

- ❒ The most important specifications of the machine will be discussed.

Specifications

- **Originals: One sheet at a time**
- **Max. Original Width: 950 mm (37.4")**
- **Max. Original Image Size (W x L)**
  - D046: 914.4 x 15,000 mm, 36" x 590"
  - D049: 914.4 x 30,000 mm, 36" x 1180"
- **Min. Original Image Size (W x L): 210 x 210 mm, 8.5" x 8.5"**
- **Max. through-put width: 950 mm (37.4")**
- **Original Weight**
  - Rear Straight: 20.0 to 157 g/m² (5.32 to 41.7 lb.), 30 µm to 1.1 mm
  - Upper: 20.0 to 104.7 g/m² (5.32 to 27,9 lb.)

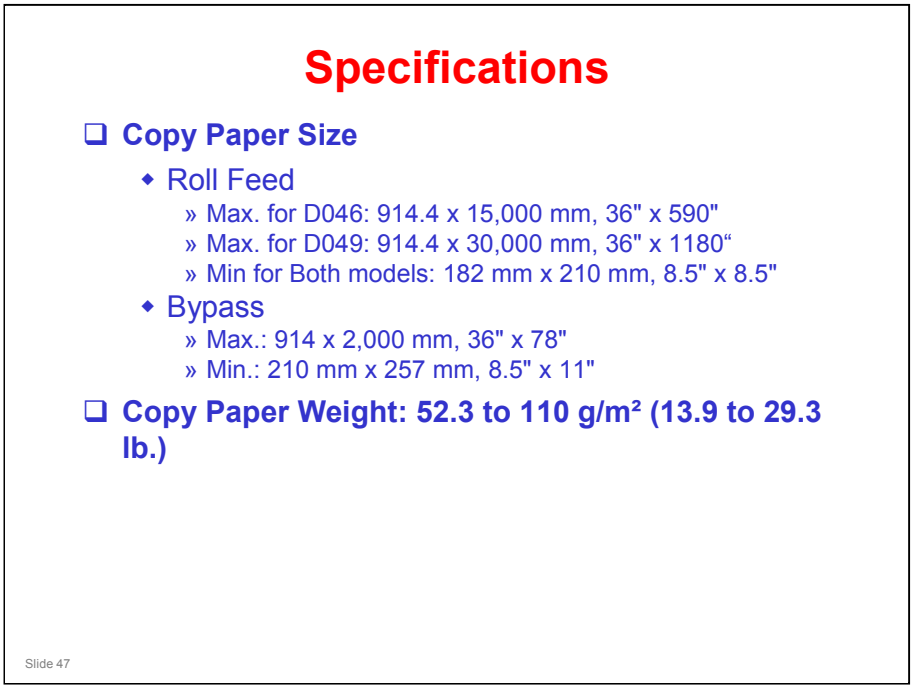
Slide 46

Originals

- Only one original can be fed at a time. There is no separation mechanism.

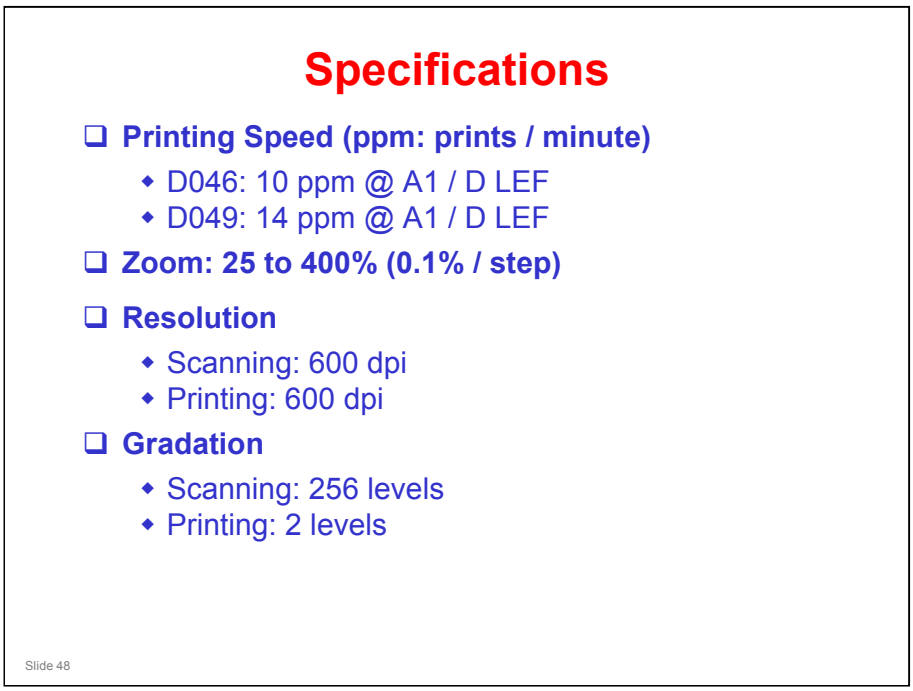
Original Weight

- Note that the rear straight feed path can be used for heavier paper than the others. This is because there are no twists and turns in the feed path.



Copy Paper Size

- Bypass feed: You cannot feed long sheets without some skew developing, so the maximum spec has been limited to 2 m.
- Maximum copy length: This is the same for all rolls.
- Minimum copy length: There are no rollers in the paper feed path up from roll 3 and 4 (roll tray 2), after the feed exit roller for the lower tray. Because of this, the minimum copy length is longer (anything shorter would get stuck between trays 1 and 2, with no rollers to push the paper up towards the registration roller.



Zoom

- Note the fine increments on the zoom.

Resolution

- Both scanner and printer are 600 dpi.

Gradation

- Scanning: The capability of the CIS is 256 gradations. However, the output from the IPU is two-bit (4 levels).
- Printing: The VDB sends the four-level data to the LED print head. However, the capability of the print head is 32 levels. The machine uses a gamma table to select 2 of these 32 levels to print the data.

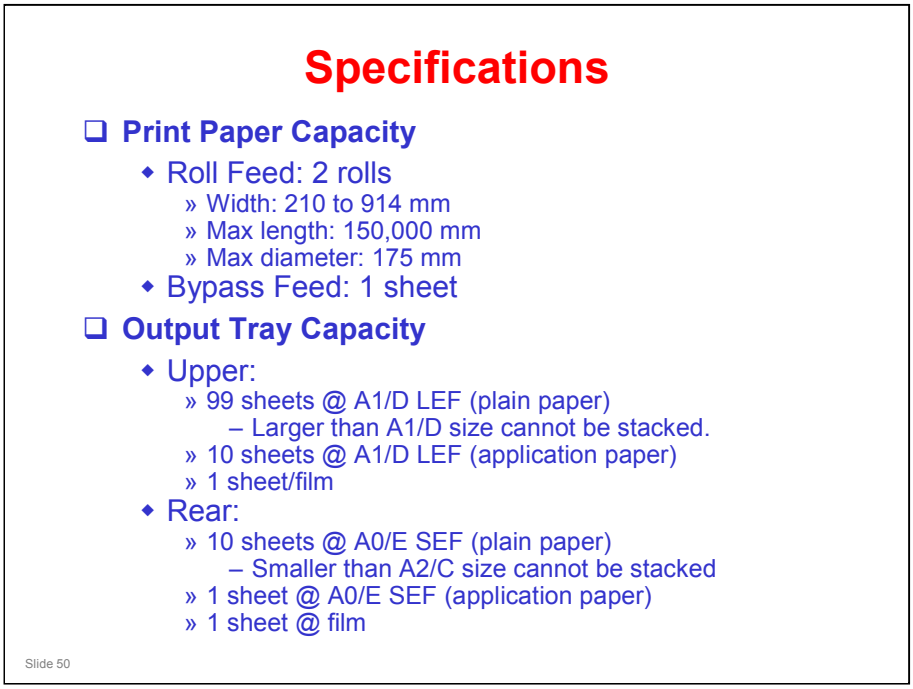
Specifications

- **Warm-up Time: Less than 120 seconds (Room temperature 23 ° C)**
- **First Print Time (A1/ D LEF)**
  - 1st Feed
    - » D046: 13 sec, D049: 10 sec
- **Print Number Input: Ten-key Pad, 1 to 99 (Standard sizes only)**

Slide 49

Copy Number Input

- Note that multi-copying is only available for standard copy sizes.



Copy paper capacity

- Don't use rolls with a larger diameter, or they will not turn in the holders.

Output tray capacity

- 'Application paper' means 'paper for special applications. It really means 'anything except normal plain paper'. Examples would be translucent paper and film.

Specifications

- **Memory Capacity:**
  - 1024 MB (Copy, Printer)
  - 2048 MB (Scanner)
- **HDD: 320 GB (shared with copy, print, scan applications)**
- **Toner Replenishment:**
  - Cartridge exchange (800 g/ cartridge)

Slide 51

No additional notes

PURPOSE OF THE SECTION

- ❒ To learn how to install the machine and the peripherals.
- ❒ To learn how to install the latest firmware.

Installation Sequence

- **Install the copier.**
- **Install the optional roll feeder or paper cassette unit in the lower compartment of the copier.**
- **Install the controller options.**
- **Either:**
  - Install the fan folder
    - » 1. Install the bridge unit on the fan folder.
    - » 2. Install the manual feeder.
    - » 3. Dock the fan folder to the main machine.
  - Install the cross folder
    - » 1. Dock the fan folder unit to the back of the main machine.
      - – The Manual Feeder and Bridge Unit are pre-installed on the Fan Folder Unit.
    - » 2. Connect the transport unit and cross unit.
    - » 3. Dock the assembled cross folder unit to the back of the fan folder.

Slide 53

- 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.
- You must install the roll feeder or paper cassette before the folder. The folder will block access to the rear of the machine and you will not be able to install the roll feeder or paper cassette.
- Install the controller options before you install the folder unit. It is much easier to access the slots for controller options if the folder is not installed.
- Folder unit – do this last, or you must separate the folder and copier, then must adjust the levelling again for folder and copier.

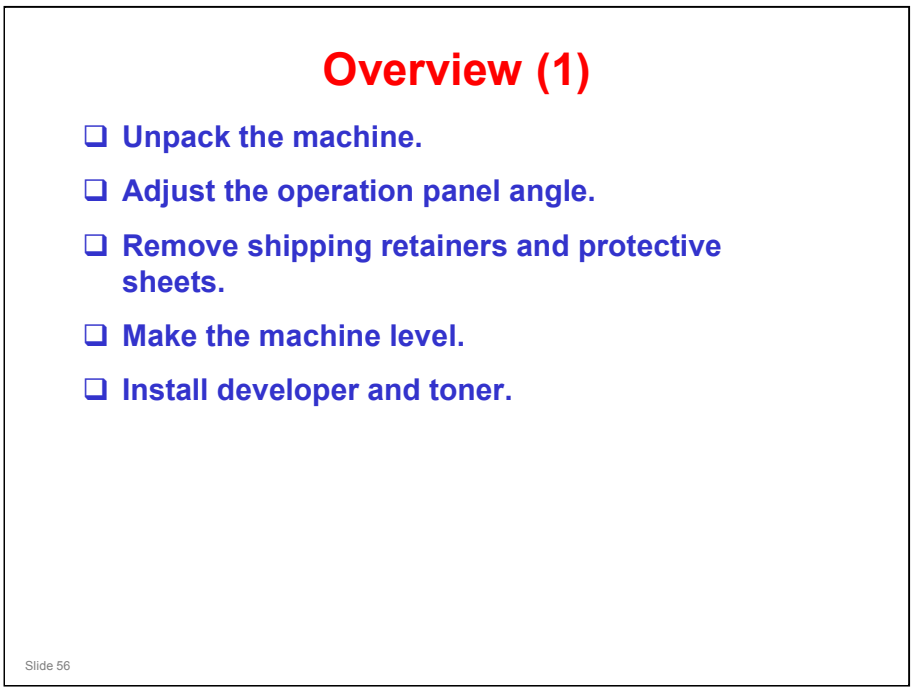
Installation Sequence

- **The fan folder blocks access to the rear of the machine.**
- **Because of this, you must install the following options before you start to install the fan folder.**
  - Roll feeder or cassette tray (you need to remove the rear cover during installation)
  - Controller options (access to the slots is easier if the folder is not present).

Slide 54

No additional notes

- The next few slides show the important points about the installation procedure.
  - They do not cover the complete procedure, only the important points.
- Go over the points on these slides before you start to study the installation procedure.



- This is a summary of the steps of the installation procedure. Some of these will be explained in more detail. Then we will study the installation procedure.

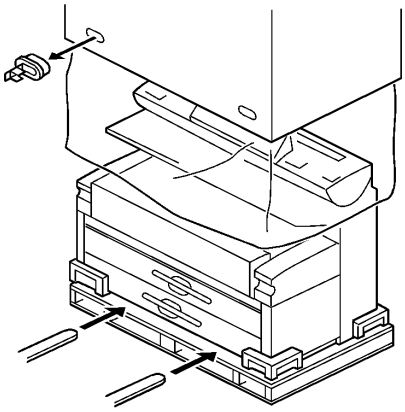
Overview (2)

- Input developer lot numbers.
- Initialize the developer.
- Apply a coat of toner to the drum (SP mode).
- Initialize the ID sensor.
- Check that the copier operates correctly.
- Attach the emblems, trays, and mylars.
- Test the breaker switch.

Slide 57

- This is a summary of the steps of the installation procedure. Some of these will be explained in more detail. Then we will study the installation procedure.

Unpacking



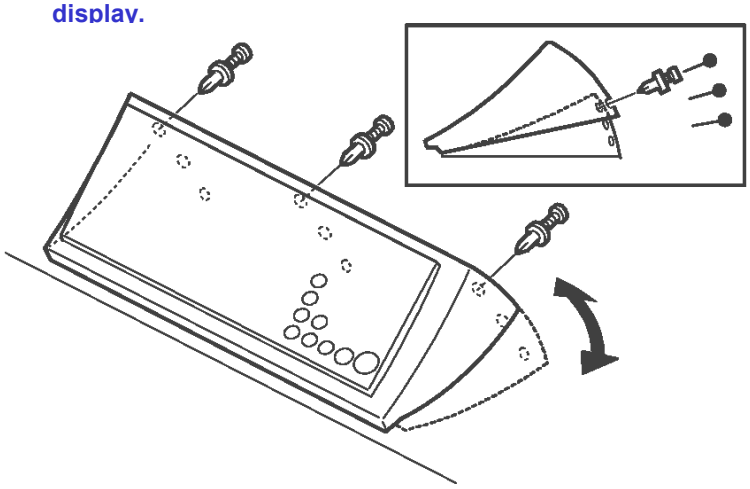
- **Unpack the machine and place it onto a flat floor with a fork lift.**
- **If a fork lift is not available, at least 4 people, one on each corner of the machine, are needed to lift it from the pallet.**
- **Keep all shipping retainers.**
  - They will be reused if the machine is moved to another location in the future.

Slide 58

❒ The machine weighs approximately 230 kg (507 lb).

Adjusting the Operation Panel Angle

- If necessary, adjust the angle of the operation panel display.

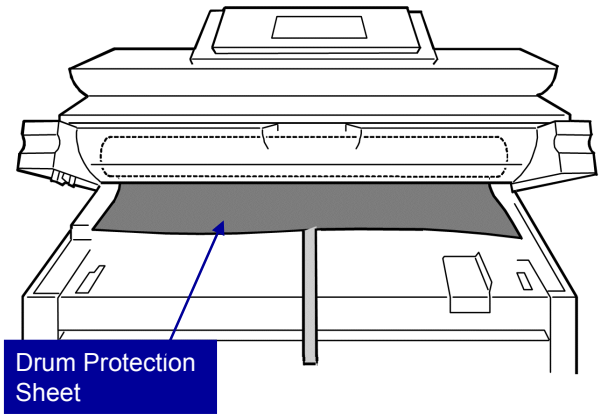


Slide 59

- Adjust this panel to decrease reflections from lighting.
- The customer can do this adjustment.
- This is the same as in the B286 copier (Neptune-C2).

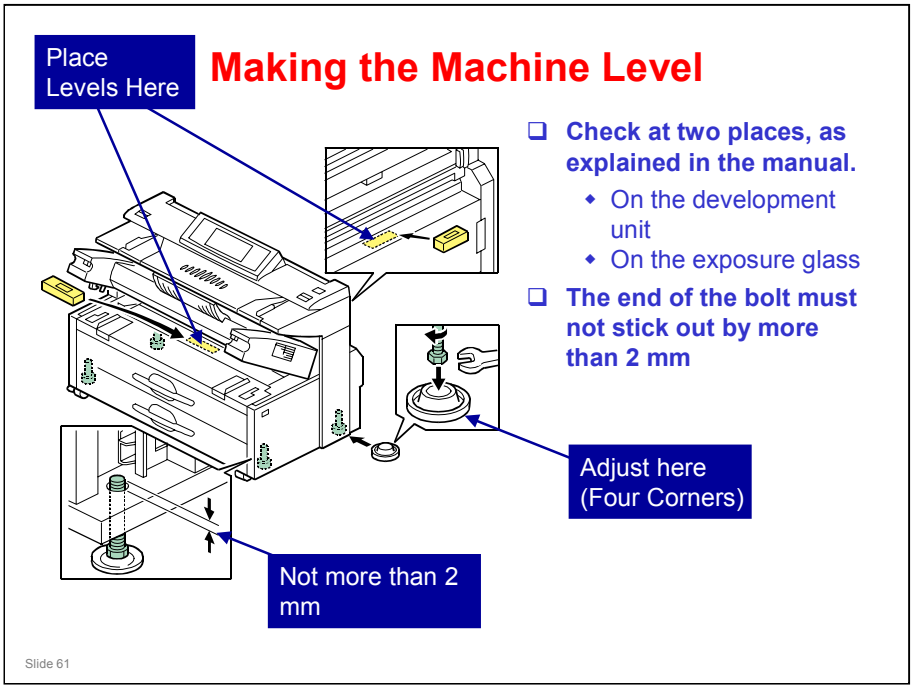
Removing the Drum Protection Sheet

- **Remove the drum protection sheet slowly, or you could damage the mylar blade in the cleaning unit.**
  - Pull the red tape to remove the sheet.



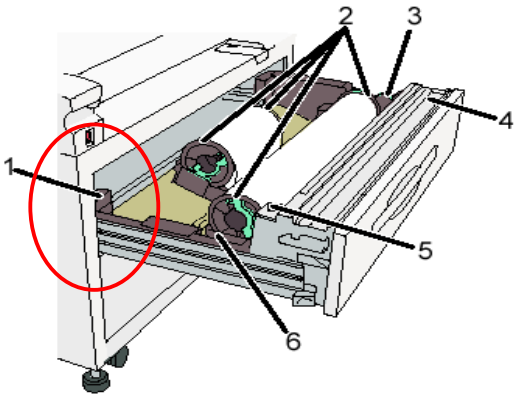
Slide 60

No additional notes



- Emphasize the note - if longer than 2 mm is left sticking above the bottom plate, you cannot pull out or slide in the optional 3rd/4th roll feeder.
- If the machine is not level from left to right, developer will not be distributed evenly across the development unit.

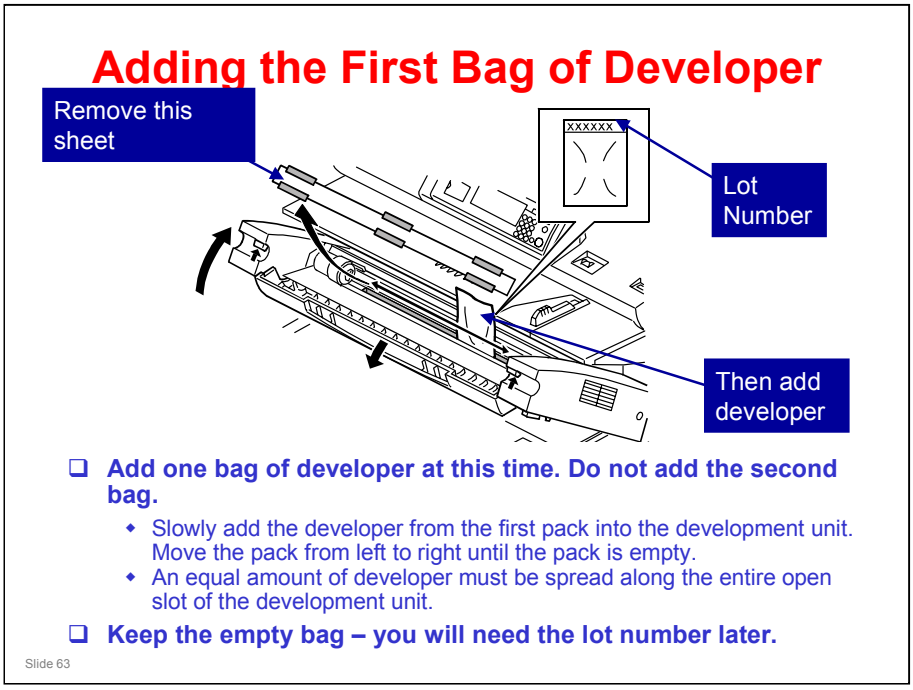
Turn off the Dehumidifier Switch



- The dehumidifier switch on the roll feeder must be off during installation.

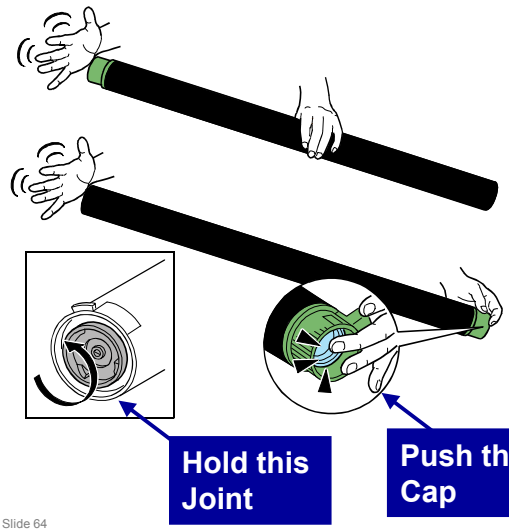
Slide 62

No additional notes



- Each bag contains 1 kg of developer.
  - The developer is the same as the Neptune-C2.
- Earlier models had a knob which must be turned to distribute developer. In this machine there is no knob. The machine distributes the developer automatically after you turn the power on for the first time. This is explained on the next slide.

Preparing the Toner Cartridge

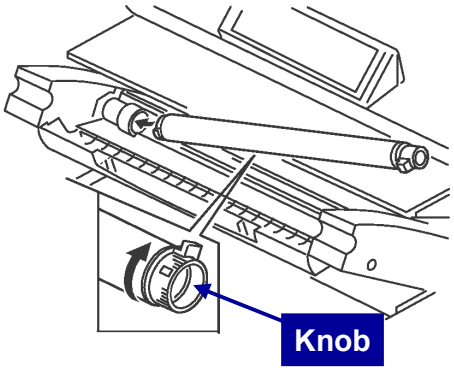


- Shake the cartridge several times and make sure that the toner is moving inside.
- Push the cartridge cap. At the same time, tap the bottom of the toner cartridge 4 or 5 times.
- Hold the cartridge horizontally and shake it quickly from side to side 4 or 5 times.
- Hold the joint of the toner cartridge with two fingers, and turn the joint. If the joint does not turn, do the procedure again.

Slide 64

- Install the toner cartridge before you input lot numbers and initialize developer.
- You must shake the toner cartridge to make the toner loose inside the cartridge. If not, torque in the mechanism is too high and the development unit is damaged.
- In case you forget, a slip clutch was added to the mechanism between the toner hopper and the toner supply clutch to prevent this damage.

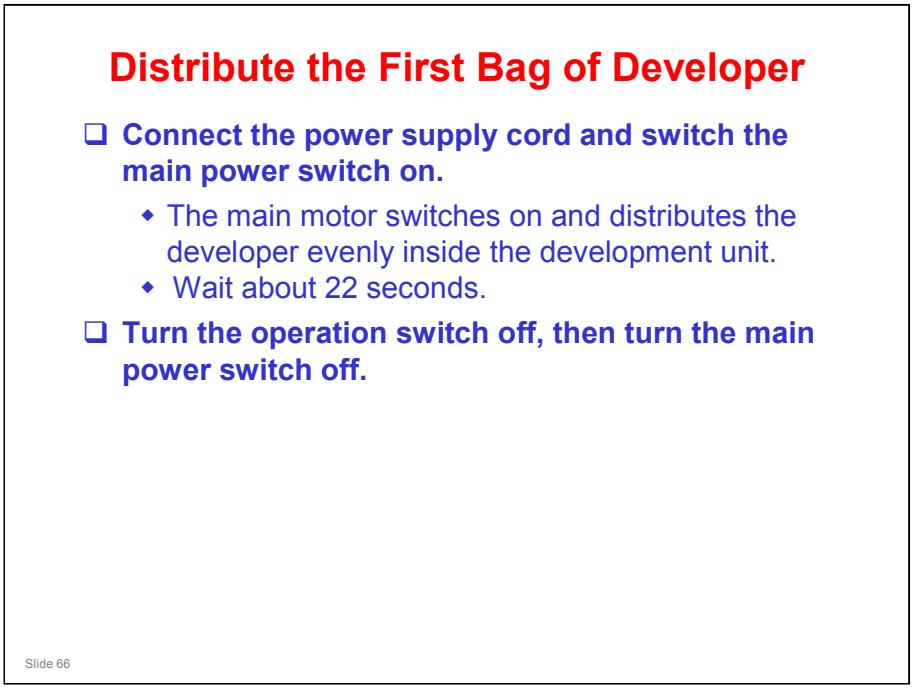
Put the Toner Cartridge in the Machine



- Rotate the knob clockwise until it stops.
- Do not peel off the green tape at this time.
- Close the toner hopper cover and the upper unit.

Slide 65

- This is a temporary installation. It is needed to continue with the developer installation procedure. The cartridge must be physically in the machine, but toner must not be added. So don't remove the tape.



- After installing the first bag, you must turn on the machine to distribute the developer evenly inside the development unit.
- If you do not do this, there is no space for you to add the second bag.
- When the machine distributes the developer, the paddle roller moves developer from the front of the unit to the inside of the development unit, and this makes room to add the second bag.

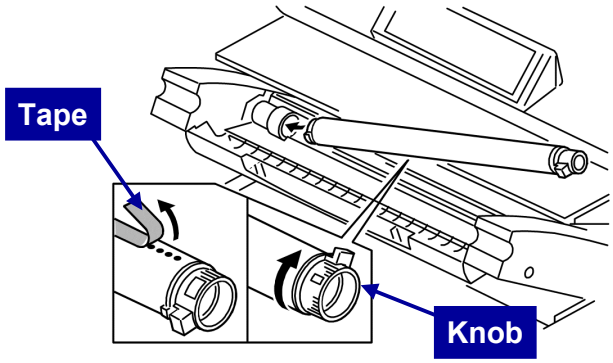
Adding the Second Bag of Developer

- Remove the toner cartridge.
- Then add the second bag of developer.

Slide 67

No additional notes

Installing the Toner Cartridge



- Peel off the green tape from right to left to expose the clear tape and toner supply holes.
- Rotate the knob clockwise until it stops.
- Close the toner hopper cover

Slide 68

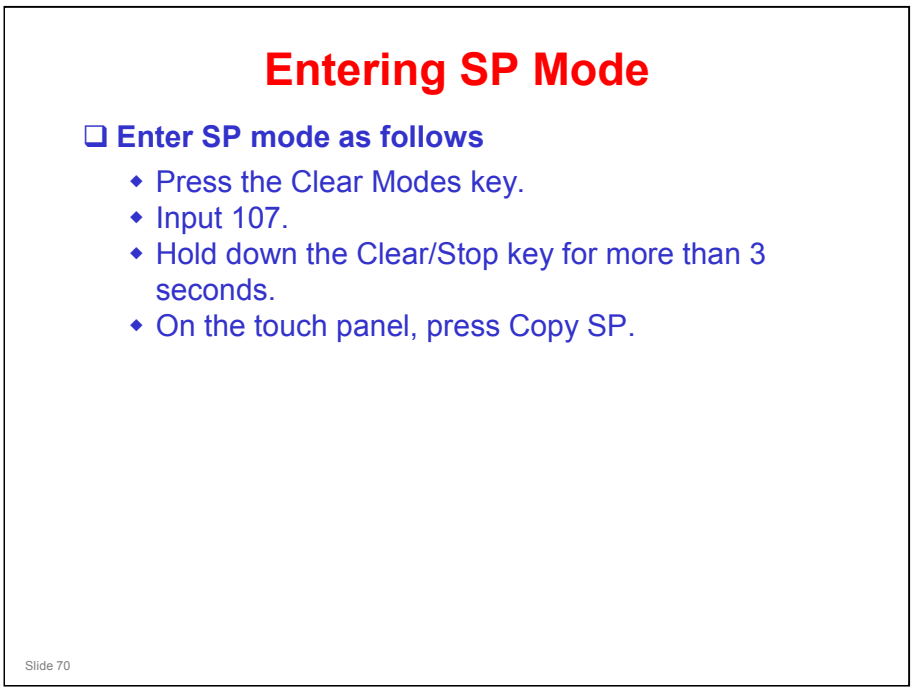
❒ A decal on the left side of the machine explains how to install the toner cartridge.

Toner Cartridges – Important Notes

- **Tell the customer how to prepare a toner cartridge for installation (see the previous slide).**
- **If toner is not loosened before the toner cartridge is installed, the customer may hear a rattling noise.**
  - The agitators inside the toner cartridge will disengage if compacted toner does not let them turn easily. This is the source of the rattling noise.
- **To prevent this problem, instruct the customer to store extra toner cartridges horizontally on a flat surface. Do not put a toner cartridge on its end or store it vertically.**

Slide 69

No additional notes



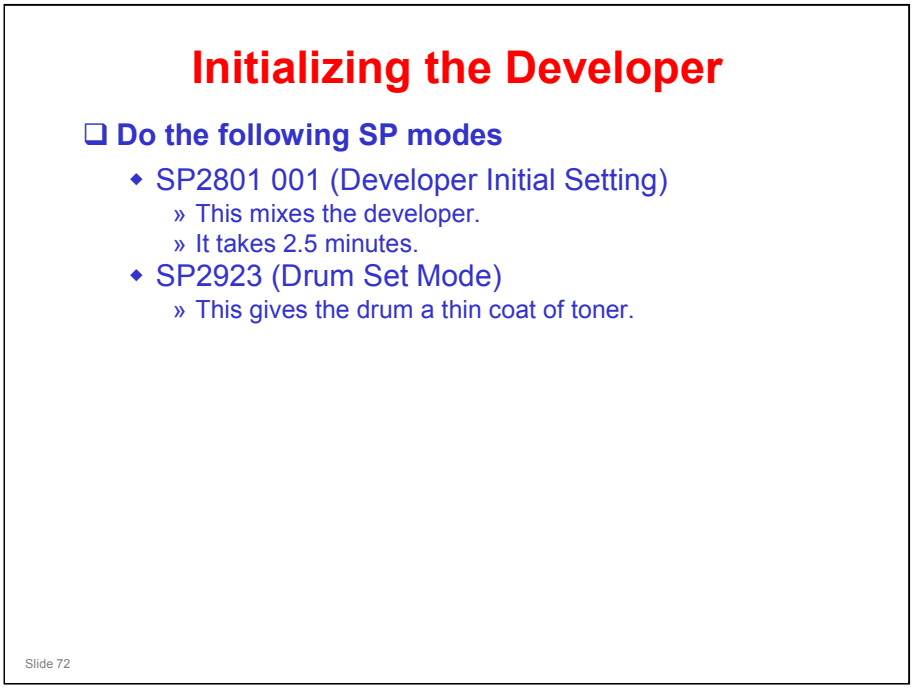
❒ The screen shows how to enter SP mode.

Inputting Developer Lot Numbers

- **Do SP2801-2 and 3 to enter the lot numbers.**
  - Use the soft keyboard on the display panel to enter the lot numbers.
  - The lot numbers are embossed on the top edge of each developer pack.
  - If the numbers are the same, enter the same number twice.
- **You must do this before you try to initialize the developer.**
  - If you try to initialize the developer first, an error message is displayed, and you must enter the lot numbers before the machine can initialize the developer.

Slide 71

No additional notes



- ❒ Then do the two SP modes listed on the slide.
- ❒ Do not attempt to make copies yet.

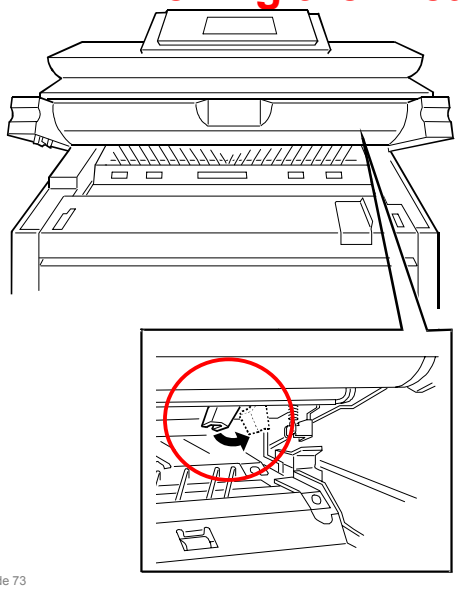
SP2801 (Developer Initial Setting)

- ❒ This prepares the developer for copying by agitating it for about two minutes, which brings the electrostatic charge on the developer to the correct level.

SP2923 (Drum Set Mode)

- ❒ Drum Set Mode coats the drum with toner.
  - ➢ Have a look at the drum; the end of the drum is shiny because there is no toner coating, but the rest of the drum has a coating of toner.
- ❒ This toner coating acts like setting powder, to ensure that the cleaning blade does not flip over when the drum starts to turn.
- ❒ In a counter blade system, friction between the blade and the drum can flip the blade over unless setting powder or a toner coating is added.
- ❒ At this point, the cleaning blade is still not in contact with the drum. When shipped from the factory, the blade is away from the drum.
- ❒ After drum set mode has finished, you have to move the cleaning blade against the drum, which is its normal operating position.

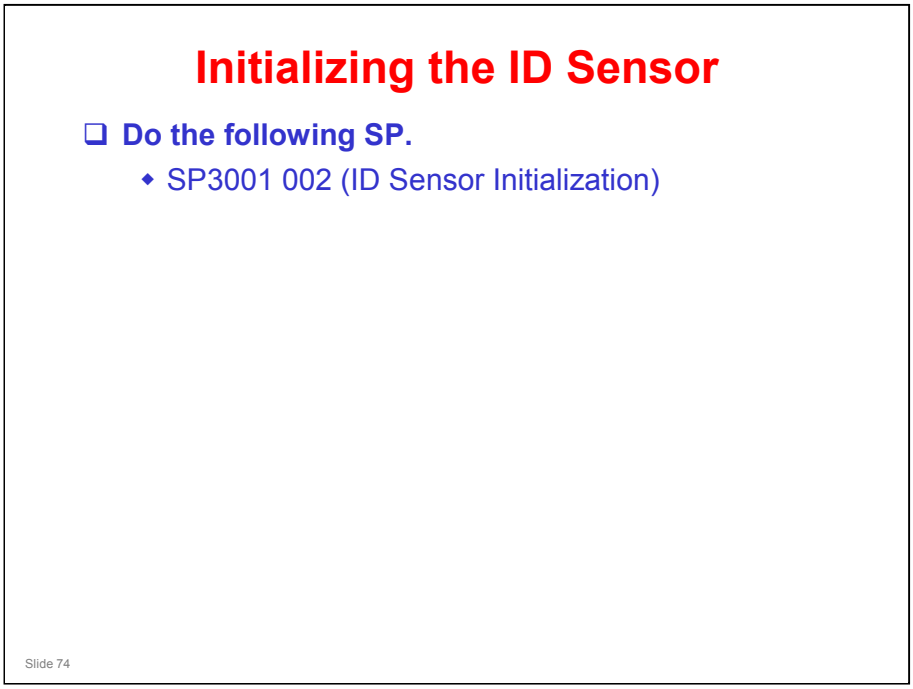
Moving the Cleaning Blade



- Move the cleaning blade lever to the right (the blade moves into contact with the drum).
- When the drum turns, the coating applied during Drum Set Mode will be removed, and this will lubricate the tip of the cleaning blade.

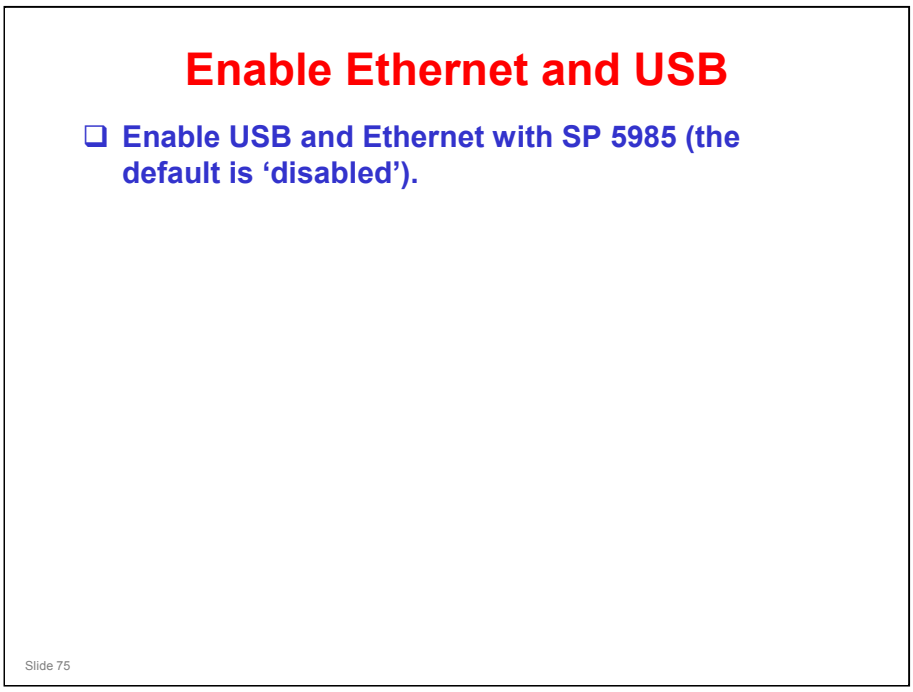
Slide 73

- 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.



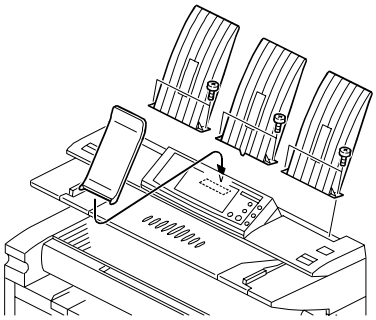
SP 3001 002

- Initializing the ID sensor takes about 6 seconds.
- After it is finished, two numbers are displayed. PWM is the power applied to the ID sensor, and Vsg is the output when measuring the light reflected from the bare drum.



No additional notes

Original Exit Tray

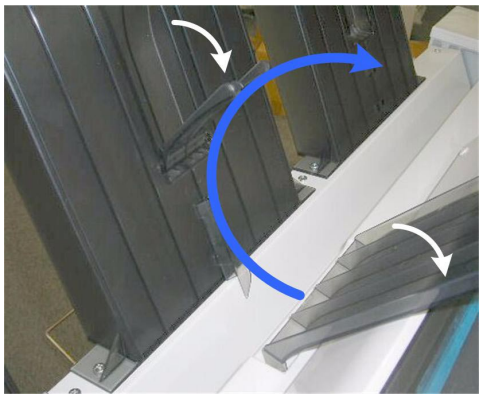


- The original exit trays can be installed either at the upper exit or the rear (straight through) exit.
- If the user wants trays at each exit, they must buy an additional set of trays.

Slide 76

No additional notes

Instruct the Customer



- If using the upper original exit, before feeding large originals (larger than A0), pull the original guide plate and original guide forward.

Slide 77

- This is not important for the rear original exit.

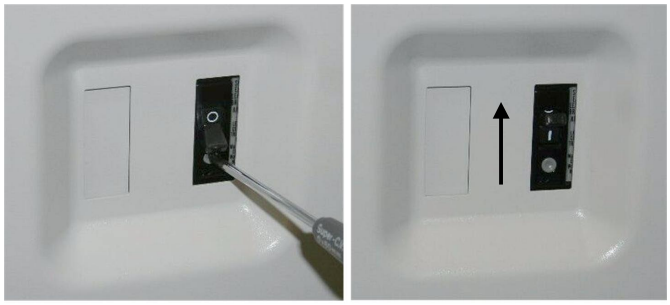
Making Test Copies

- **First, install paper rolls.**
  - This should be explained in the operation manual and on decals attached to the machine.
- **After installing each roll, press the Auto Feed button for that roll on the roll tray frame.**
  - The roll feeds a short length of paper, and cuts it. then it reverses so that the leading edge is out of the paper feed path; this is because rolls 1 and 2 both use the same paper feed path. The roll is now initialized.

Slide 78

No additional notes

Testing the Breaker Switch



- **The machine power must be off.**
- **The power cord must be connected to the power source.**
- **Test the breaker switch.**
  - Push the button with the screwdriver until the 'O' appears.
  - Then manually turn the switch to the 'I' position.
- **This switch must be tested once a year.**

Slide 79

- If the breaker switch does not drop to the "O" position:
  - Make sure that the power cord is securely connected to the power supply.
  - Push the test button again.
  - If the breaker switch does not snap down to the 'O' position, the breaker switch must be replaced.
- The breaker switch must be at the "I" position for the machine to operate.

Caution

- Never turn the main machine off when the main power LED is lit or flashing. This can damage the hard disk or memory.
- 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.

Slide 80

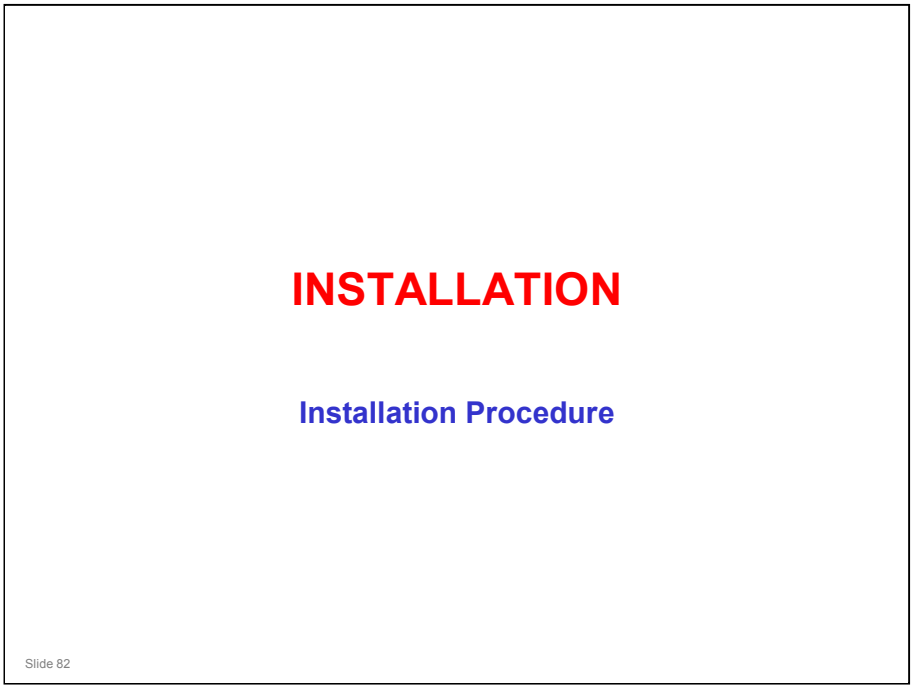
No additional notes

Moving the Machine

- **Before you move the machine, move the cleaning blade away from the drum.**
  - Move the lever to the left. This prevents damage to the drum during shipping.

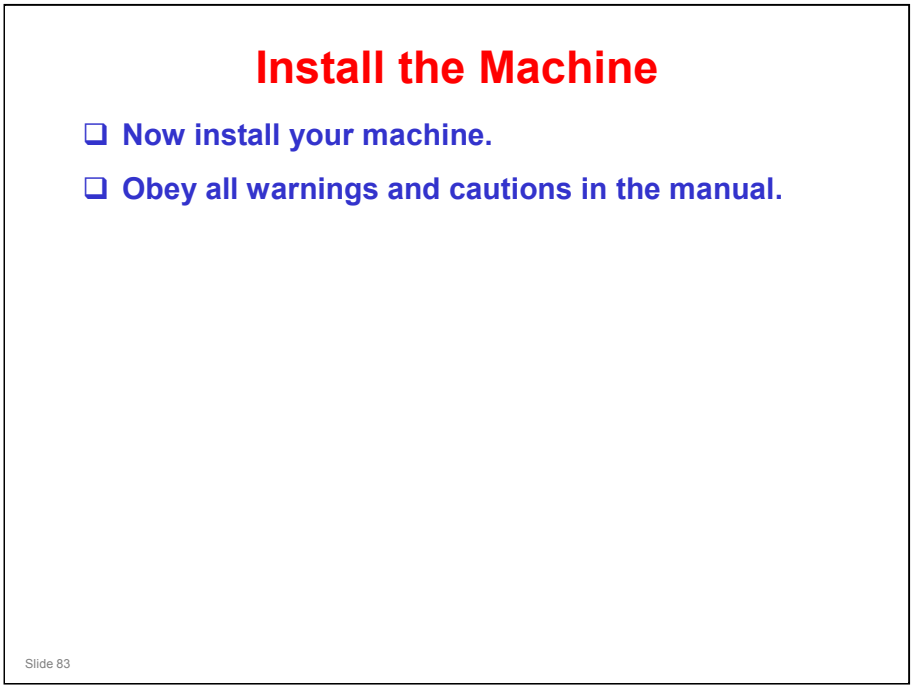
Slide 81

- The lever is shown on a previous slide. The shipping position is the left. We move it to the right after installation, but we must move it to the left again before we move the machine.



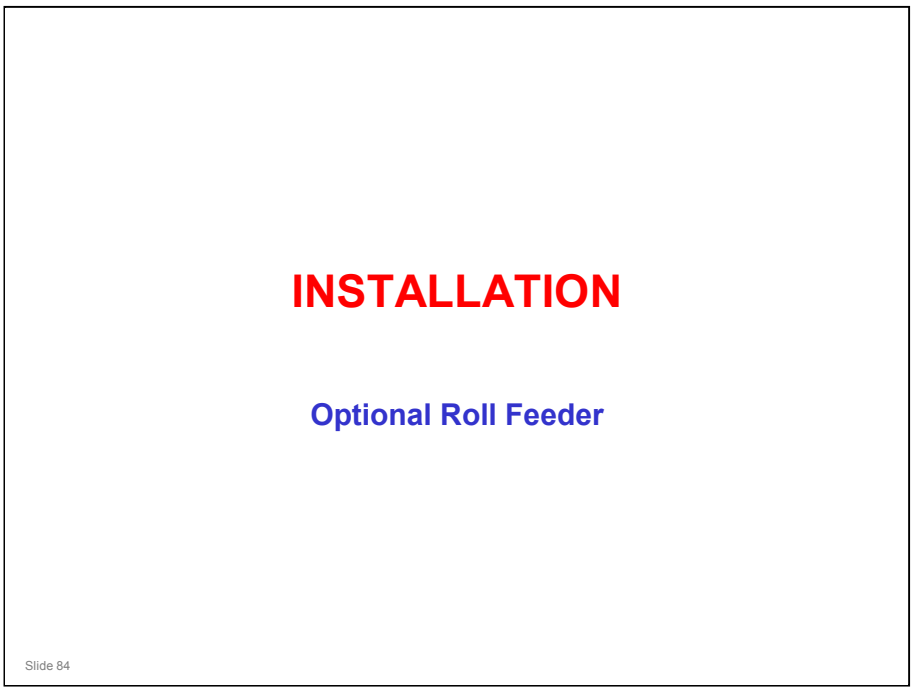
Service manual, Installation, Copier Installation

- ❒ Study the installation procedure.
- ❒ If you have access to a machine, do the installation procedure now.

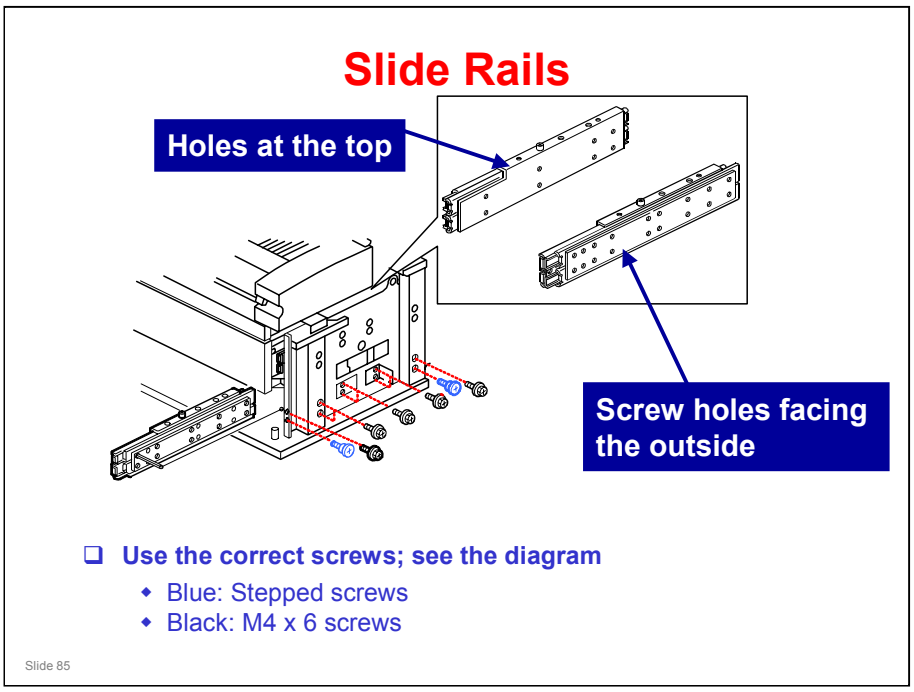


Service Manual, Installation, Copier Installation

- Because the installation procedure is not packed with the copier as an accessory, always bring the manual with you.



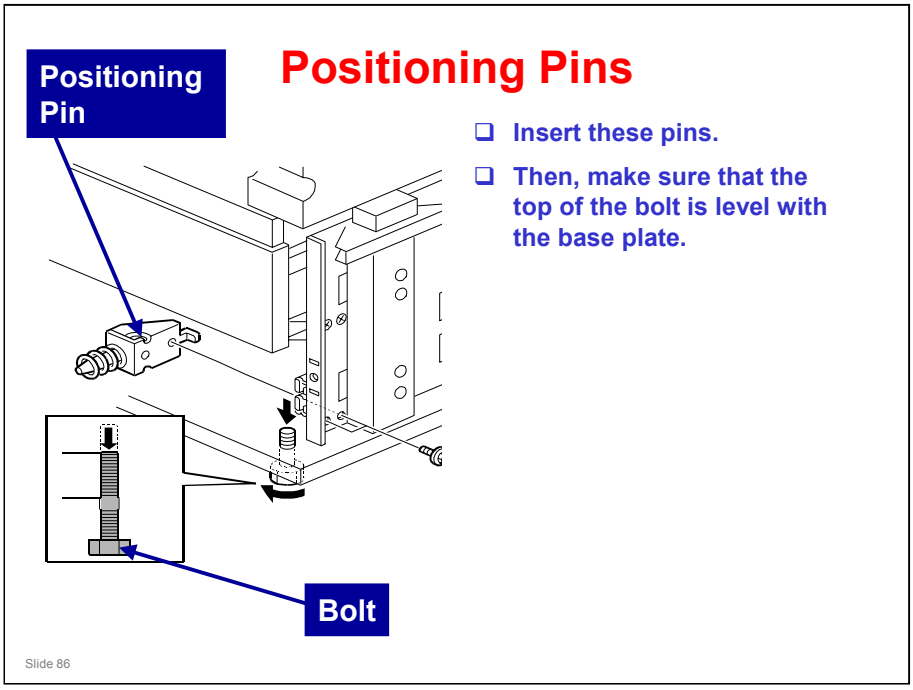
- This unit allows the user to install another two rolls of paper.
- Take care when lifting the unit. It is quite heavy and will need up to four people to install.
- Go over the next few slides before starting to install the machines.



- ❒ Study the diagrams and follow the notes in the manual.
- ❒ This will help you to figure out which rail should go on the left and which on the right, and which way up they should be.

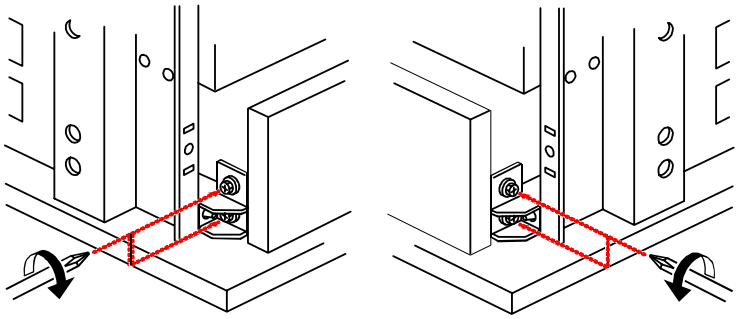
Which way round to install the guide?

- ❒ See the diagram on the slide.
- ❒ There are two criteria.
  - ➢ The edge with the pin inserted should be at the top.
  - ➢ The face with the threaded holes should be facing the outside of the machine. The other face has non-threaded holes only.



No additional notes

Loosen the Positioning Brackets

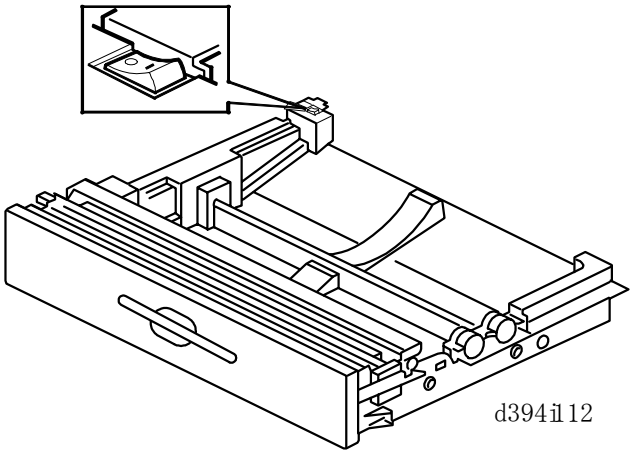


- Loosen these brackets before you push the drawer in.
- If you do not loosen the brackets, then the plastic bushing in the positioning bracket on the rear of the drawer will be broken.

Slide 87

No additional notes

Heater Switch



- Turn the tray heater on if the humidity at the installation site is very high.

Slide 88

No additional notes

Install the Tray

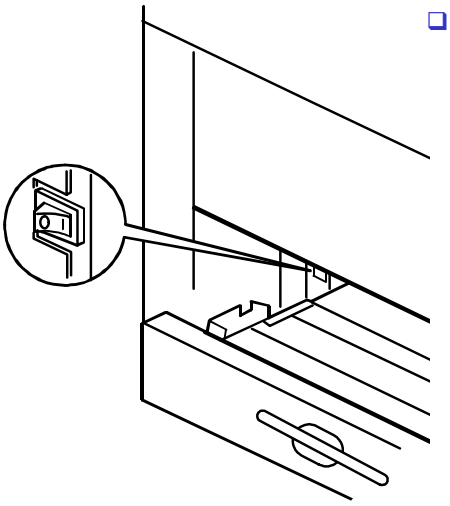
- Now install the optional roll feeder.
- Obey all warnings and cautions in the manual.
- Take care when lifting the unit. The installation should be done by two or more people because the tray is heavy.

Slide 89

No additional notes

- In particular, take care when lifting the unit. It is quite heavy and will need up to four people to install.
- Go over the next few slides before starting to install the machines.

Heater Switch



- Turn the tray heater on if the humidity at the installation site is very high.

Slide 91

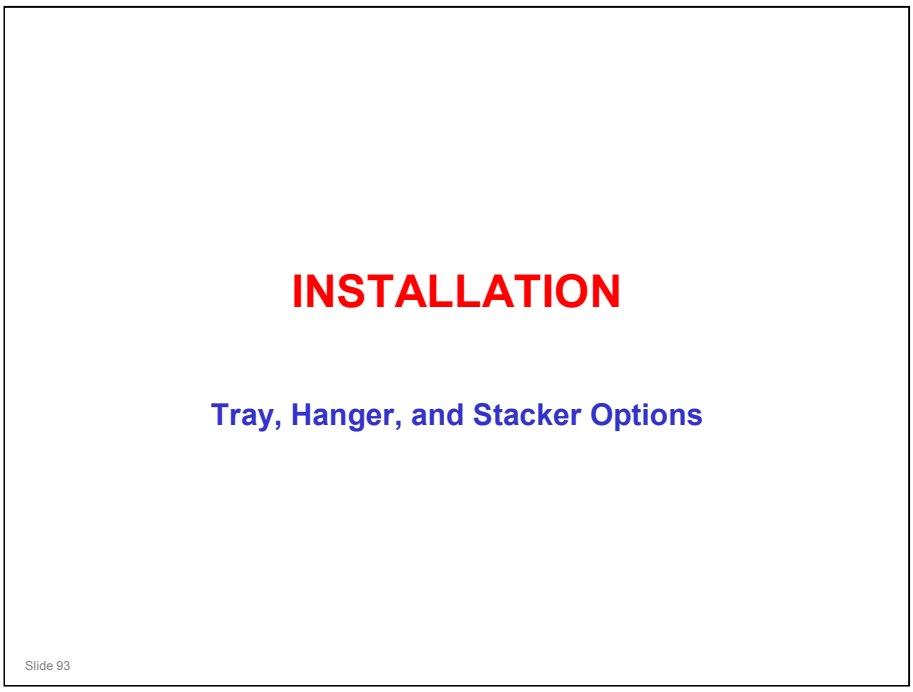
No additional notes

Install the Tray

- Now install the tray.
- Obey all warnings and cautions in the manual.
- Take care when lifting the unit. The installation should be done by two or more people because the tray is heavy.

Slide 92

No additional notes



No additional notes

Exit Table, Hanger, and Stackers

- Original Exit Tray
- Original Hanger
- Multi-Copy Stacker
- Rear Stacker
- Double Stacker

- Note:
  - If you install an original tray or stacker at the rear, go into the SP mode and switch off SP4975 (Original Edge Hold). Otherwise, only one original can be fed at a time.

Slide 94

❒ These procedures are fairly simple. Study them in the manual.

- The installation procedure that is packed with the folder is for use with the Neptune-C2. Do not attempt to use this procedure when installing the Beluga-C1.
- The correct installation procedure for the Beluga-C1 is packed with the Bridge Unit (this covers the bridge unit and the folder unit).

Caution

- The folder unit is heavy and requires two service technicians to move it and install it safely.
- Before installing the folder unit, switch off the main machine and disconnect its power cord from the main power source.
- Do not reconnect the main machine and switch it on until after the folder installation has been completed.

Slide 96

No additional notes

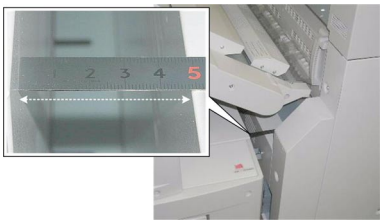
Procedure

- Prepare the bridge unit
- Attach the damper unit
- Attach the bridge unit to the folder
- Move the bridge unit position switch.
- Attach mylars and decals.
- Prepare the fan folder.
- Make the machine level.
- Connect the bridge unit and folder to the machine.
- Make the folder level.
- Test the breaker switch.
- Turn the power on.
  - The folder unit must be switched on before the main machine.
- Do the skew adjustment

Slide 97

No additional notes

Distance from Bridge Unit to Machine



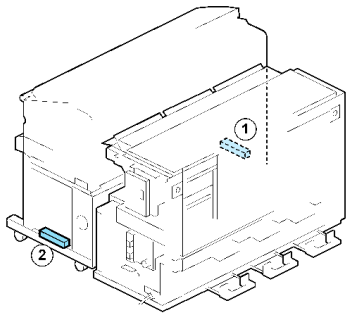
- When you dock the bridge unit/folder assembly with the machine, measure the distance at the left rear and right rear corners of the machine.
- This should be about 49.5 to 50 mm.
- The difference between the two distances must not be more than 0.5 mm.

Slide 98

No additional notes

Make the Main Machine Level

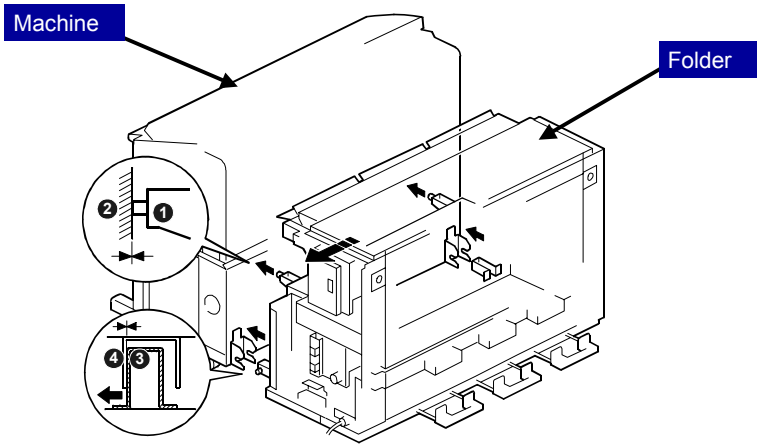
- **Make sure that the main machine is level from side to side.**
  - If you installed the copier correctly, it should be level, because that is part of the installation procedure.
- **Then make it level from front to rear as shown in the manual. Position the levels as shown in the diagram.**
  - The machine must be level from side to side before you try to do this.



Slide 99

❒ After you install the joint brackets, mylars, and positioning brackets (see the manual), then you must make sure that the machine is aligned and level. The next few slides explain this.

Connecting the Folder to the Machine - 1

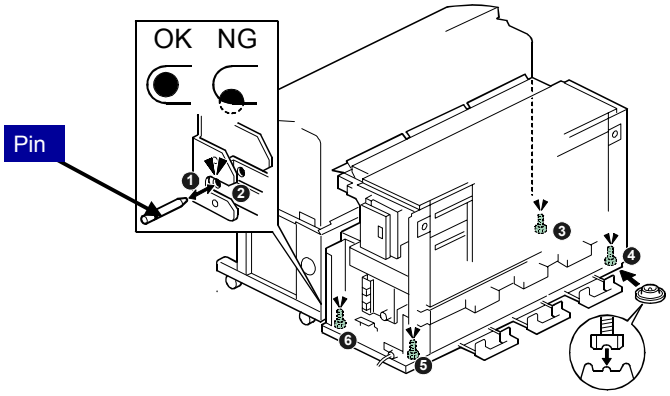


- Push the folder unit against the back of the machine.
- Align the folder with the back of the machine.
  - See the manual for details.

Slide 100

- On both sides, 1 and 2 must touch as shown in the diagram.
- At the bottom right, 3 must touch 4.

Connecting the Folder to the Machine - 2



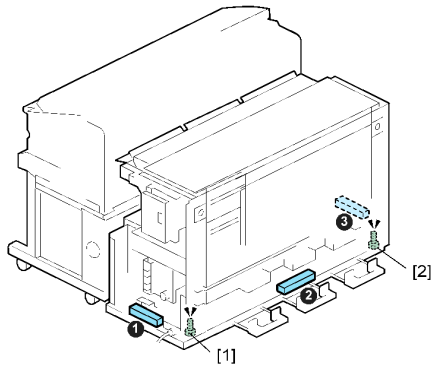
- **At each side, insert a pin through (1) and (2).**
  - The pins are in the accessories.
- **If the pins cannot go through, adjust the screws (3) to (6) on the feet.**
  - (3) and (4) must be given the same number of turns.
  - (5) and (6) must be given the same number of turns.

Slide 101

- This procedure checks the alignment.
- The screws at the base must be given the same number of turns, as shown above.
  - For example, you can give (3) and (4) two turns each, and you can give (5) and (6) three turns each.

Make the Folder Level

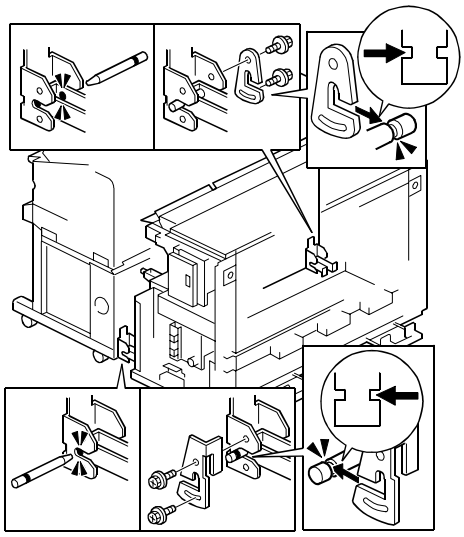
- Make sure that the folder is level. Position the levels as shown in the diagram.
- Do the leveling in the order 1, 2, 3 as shown in the diagram.
- Adjust with the nuts on the right and left legs of the folder ([1] and [2] in the diagram).



Slide 102

No additional notes

Attach the Lock Plates

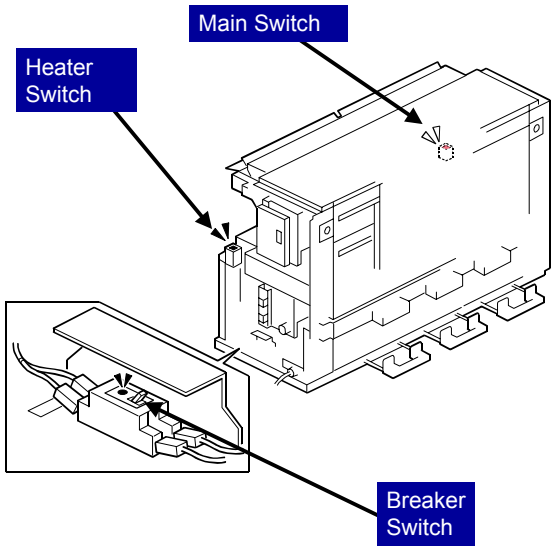


- The lock plate for the left side has a different shape to the one for the right side.

Slide 103

No additional notes

Checking the Switches



- Connect the power cable of the folder unit to a power source.
- Make sure that the main power switch and heater switch are OFF.
- Test the circuit breaker as shown in the manual.
- Disconnect the power cable of the folder unit from the power source.

Slide 104

No additional notes

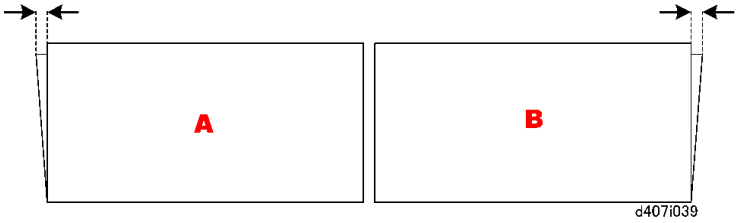
Turning on the Power

- **The folder unit must be switched on before the main machine.**
  - The folder unit must be switched on first, so that the main machine will recognize the folder unit after the main machine is powered on and starts its initialization procedure.

Slide 105

No additional notes

Skew Adjustment (1)

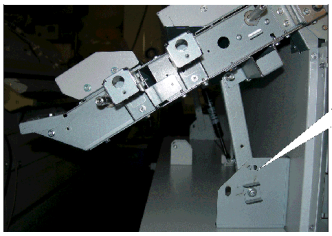


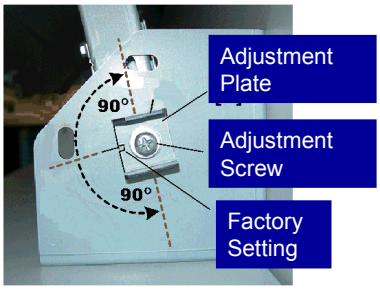
- **Do a folding test run with at least 10 sheets of A1 LEF paper.**
- **If there is skew, the bridge unit is not level, and the paper is slipping to one side.**
  - If the skew is like A, the right side is too low.
  - If the skew is like B, the right side is too high.

Slide 106

- In this diagram, the view is from above as the paper is fed from the folder unit, while you are standing at the operation panel side of the machine.

Skew Adjustment (2)

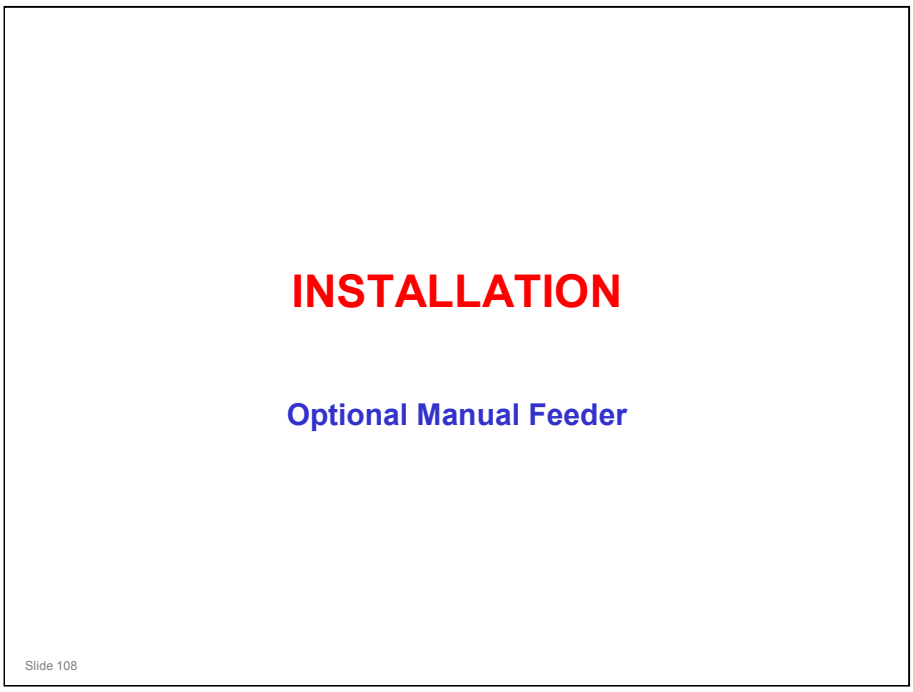




- If the right side is too low, lift the right side of the bridge unit.
- To do this, turn the adjustment plate clockwise.
- Loosen the screw and turn the plate the correct angle.
- See the service manual for how to find the correct angle.

Slide 107

- Each degree of rotation adjusts for 0.0166 mm. If the amount of skew is 0.8 mm, the plate should be rotated right approximately 50 degrees (0.8/0.0166 = 48.2)
- There is a similar adjustment plate on the left side of the machine, but to make the procedure in the manual more simple, we specify that the adjustment should only be made on the right side.



No additional notes

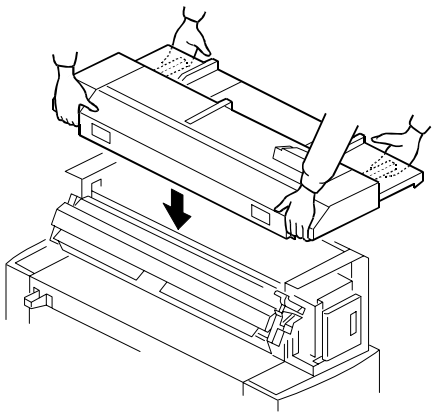
Caution

- The Manual Feeder weighs 31 kg (68.2 lb.) and requires two service technicians to move it and install without bending or warping its shape.
- Before installing the manual feeder: 1) Switch off the main machine and folder unit, 2) Disconnect both the main machine and folder unit from the power source.
- Do not reconnect the main machine and switch it on until after the manual feeder has been installed.

Slide 109

No additional notes

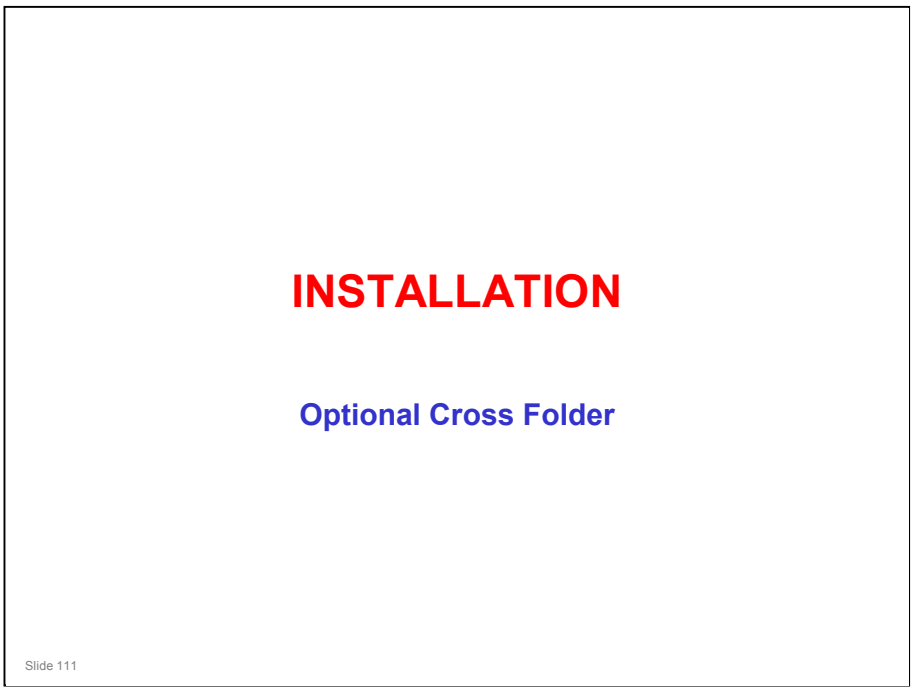
Lifting the Manual Feeder



- Lift the unit with a hand at each corner, or it will be damaged.

Slide 110

No additional notes



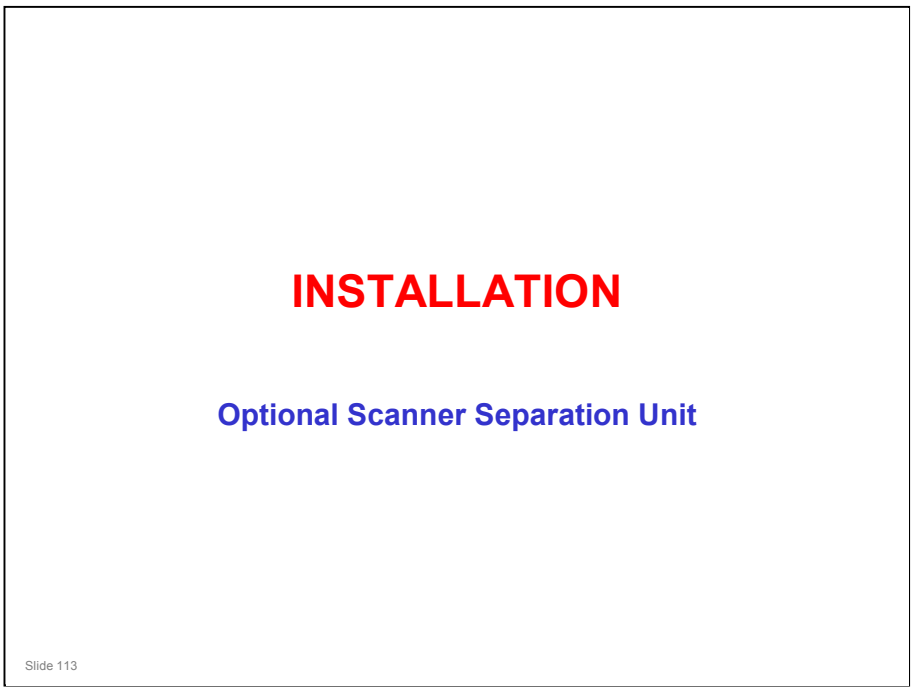
No additional notes

Levelling the Machine

- **When installing the fan fold unit, do the same levelling procedure as for the fan folder unit.**
- **For the transport unit and cross folder unit, levelling is not so important.**
  - Just check by eye, to make sure that the base of the transport unit, fan fold unit, and cross folder unit are about on the same level.
  - There is no need to use a level.

Slide 112

No additional notes



❒ This procedure requires at least two technicians.

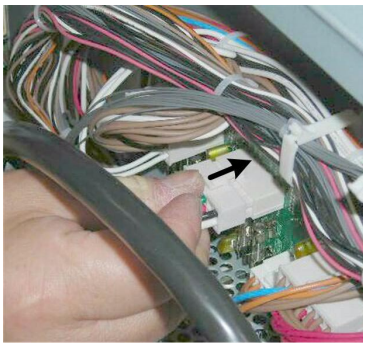
Overview

- Can only be installed on the D049.
- The scanner is removed from the machine and placed on the table (the table must be assembled).
- A cover is installed on top of the machine to replace the removed scanner unit.
- Procedure
  - Assemble the table.
  - Install the scanner unit.
  - Make sure that the table is level.

Slide 114

- This is an overview of the procedure.
- The procedure is fairly simple.

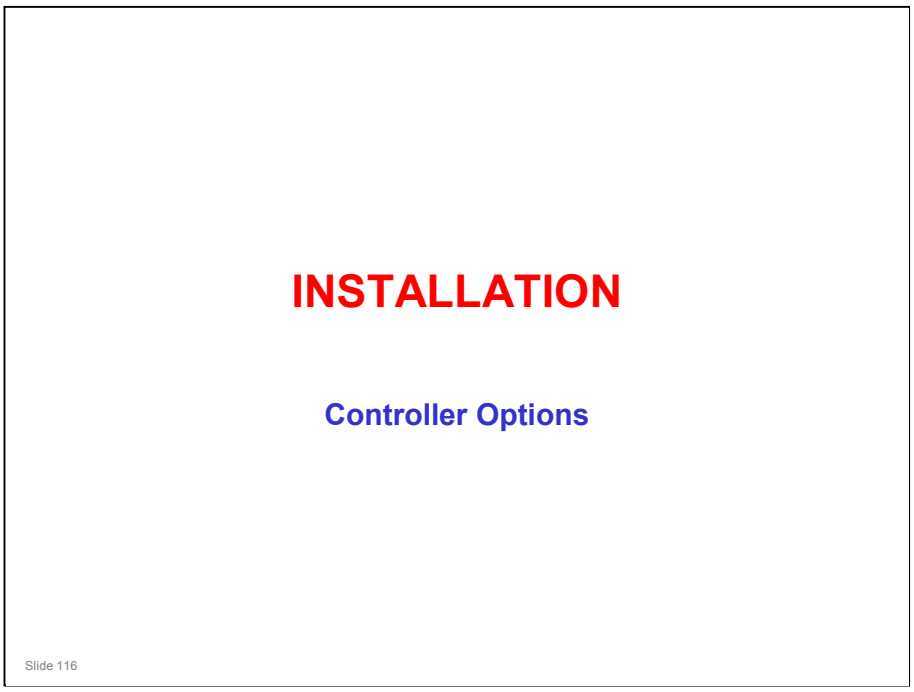
Safety Notice



- **Make sure that you connect this connector to the PSU, which is attached to the 24V power supply harness.**
  - This is a black DP1 cable that meets electrical standards (UL, etc.).

Slide 115

No additional notes



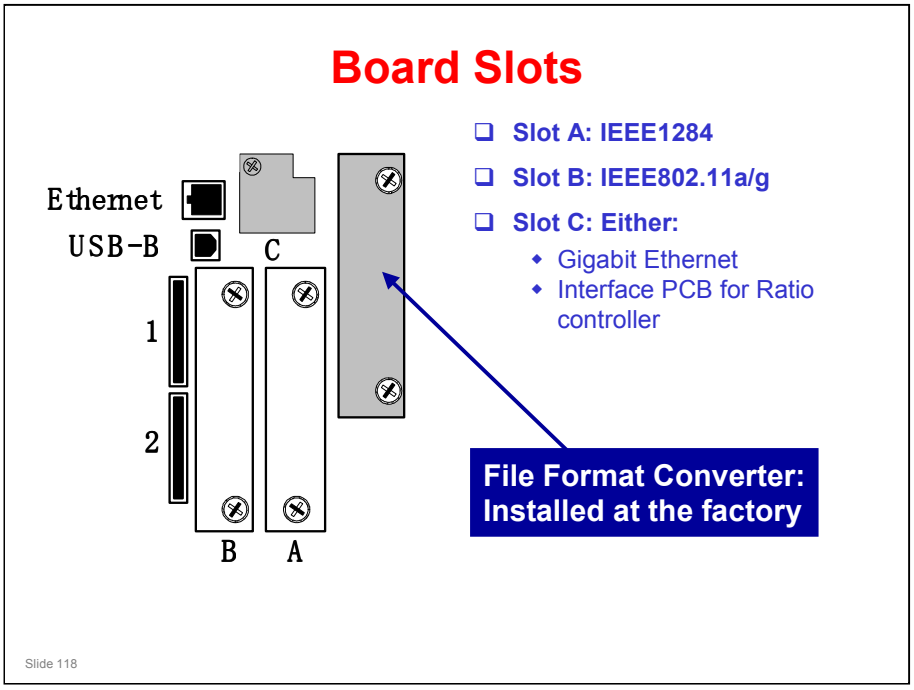
❒ We will not do the Ratio controller installation in this course.

Overview

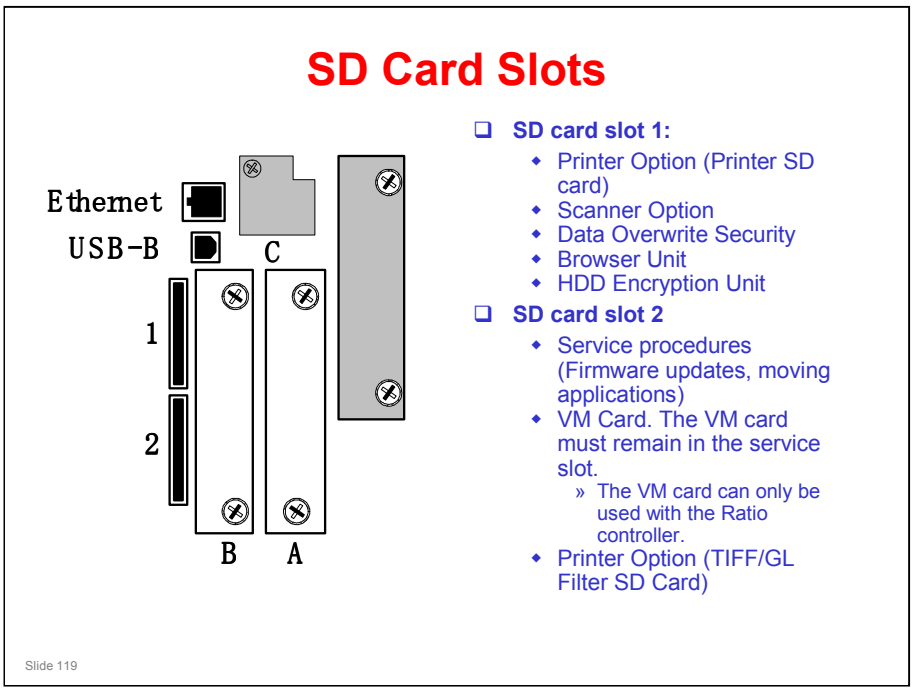
- **In this section, we will install these parts:**
  - Printer option
  - Scanner option
  - GW scanner controller
  - IEEE1284 board
  - IEEE802.11a/g board
  - HDD encryption unit
  - DOS (Data Overwrite Security) unit type H
  - Gigabit Ethernet
  - Browser unit
  - VM card

Slide 117

No additional notes



- USB B: Built-in for connection of USB devices.
  - NOTE: USB is built-in, but it must be enabled with SP5985.
- Ethernet: Standard LAN connection point for network; must be enabled with SP5985.
- The gigabit Ethernet slot is also used for the Ratio controller (RW-7140). The installation kit will have a 5m cable.

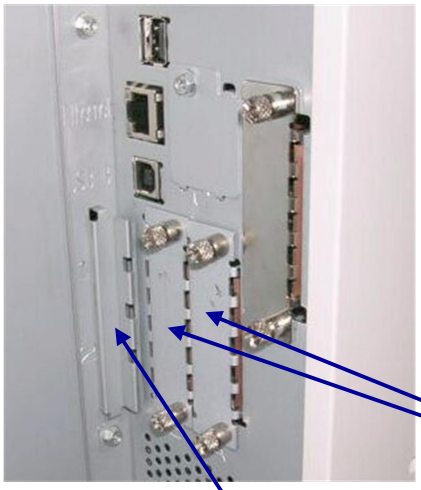


- Applications can be moved to the card in slot 1.
- TIFF/GL Filter for the Printer Option (D320): Due to copyright restrictions, this option cannot be moved to another SD card. Also, you cannot move applications to the TIFF/GL card.
- There is no special location inside the machine to keep SD cards that have been copied.

What is the purpose of the TIFF/GL card?

- In Web Image Monitor on your PC, you can select TIFF or HPGL files on the screen, and print them. It is not necessary to open an application and print with a printer driver.

Card Slot Covers



- Remove these covers to use the slots.

Board Slot Covers

SD Card Slot Cover

Slide 120

No additional notes

Moving Applications to Another Card

- Put the Source SD card in Slot 2.
- Put the Target SD card in Slot 1.
- Turn the copier on.
- Do SP5873-1.
- Follow the instructions on the display and touch "Execute" to start copying.
- When the display tells you copying is completed, touch "Exit". Then turn the copier off.
- Remove the Source SD card from Slot 2, and leave the target SD card in Slot 1.
- Turn the copier on.
- Check that all the applications on the SD card in Slot 1 are enabled.
  - User Tools> System Settings> Administrator Tools> Next> Firmware Version> Next (3/4)

Slide 121

Service Manual, Installation, MFP Options, Before You Begin, Moving Applications onto one SD Card

Store the Card after Moving

- **After you move an application off an SD card, store the copied SD card at the customer site.**
  - There is no special storage location inside the machine.
- **The SD card must be stored with the machine for these reasons:**
  - After an SD card has been copied, it can no longer be used. But it must be stored at the customer site to serve as proof of purchase by the customer.
  - Also, at a later time the stored SD cards can be restored to full use with SP5873-2 (see the 'Undo Exec' procedure in the manual).
  - Before storing the SD card at the customer site, label it so that it can be easily identified.

Slide 122

- When you use the ‘Undo Exec’ procedure, the SD card in Slot 1 must be the original SD card of the application you want to move from Slot 2 to Slot 1. You cannot use any blank SD card in Slot 1. The application can be moved only to the original SD card.

Installing the Printer and Scanner Options

- **The printer and scanner options on SD cards are GW options.**
- **The printer option consists of two SD cards: Printer SD card, TIFF/GL Filter**
  - Both of these must be installed in SD card slots. You cannot move the TIFF/GL module to the printer SD card (copyright restriction).
- **Make sure that Ethernet and USB are enabled (SP 5985).**
- **If you want to install the scanner and the printer option, you must combine the applications onto one SD card and insert it in Slot 1.**
- **The Memory Unit D444 is required for the scanner option.**

Slide 123

- To install the memory option, you must take the controller box cover off. This is a bit troublesome, so, if you take this cover off for another reason (for example to install the Gigabit Ethernet or Interface PCB for the Ratio controller), take this opportunity to install the memory option.

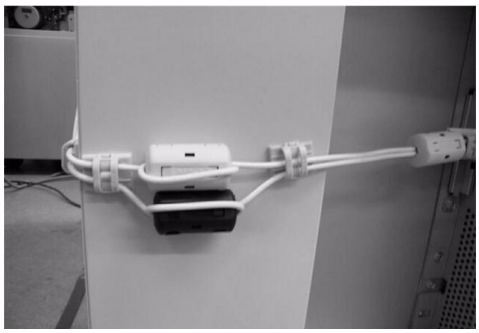
Installing the Ratio Controller Options

- **You cannot install both the GW printer option and the Ratio printer controller.**
  - However, you can install the GW scanner option with the Ratio controller and Ratio scanner option.
- **If the GW printer option has been moved to the scanner SD card, be sure to remove the printer option from the SD card.**
- **If you install the Ratio scanner option, you must also install the optional Memory Unit (D444).**

Slide 124

No additional notes

IEEE802.11 Options – Antenna Cables (1)

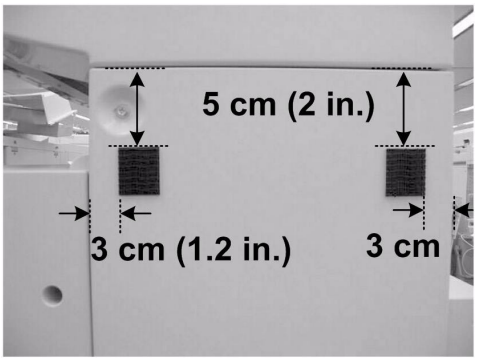


- **Separate the antenna cables so that they are not tangled.**
- **When you clamp the cables, the white ferrite core must be above and the black ferrite core must be below.**
- **Attach the clamps to the rear panel of the right rear cover.**
  - The clamps must be at the same height, so that the cables are straight and level with the board connection to the controller board.

Slide 125

No additional notes

IEEE802.11 Options – Antenna Cables (2)

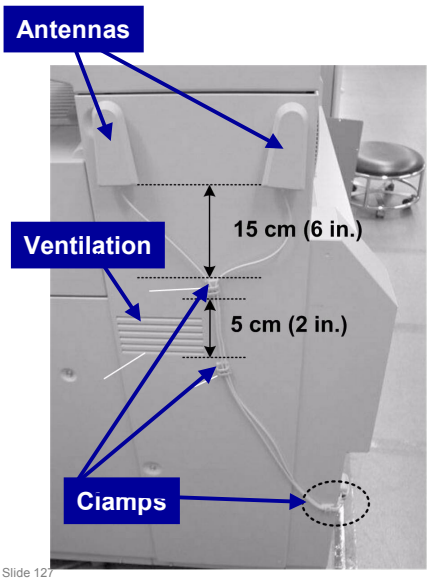


- Attach the black Velcro pads to the right panel of the right rear cover.

Slide 126

No additional notes

IEEE802.11 Options – Antenna Cables (3)



- Attach the antenna that has the black core on its cable to the front pad.
- Attach the antenna that has the white core on its cable to the rear pad.
  - The antenna with the black core transmits and receives. It must be installed at the front.
  - The antenna with the white core only receives. It must be installed at the rear.
- Clamp the cables at 15 cm and 5 cm intervals as shown here.
- Make sure that the cables are not over the ventilation port.
- Make sure that the cables are not crossed.

Slide 127

No additional notes

Data Overwrite Security Unit

- **Must be type H**
  - Make sure that you have a type H unit.
  - Before you can install this unit, the customer must store some names and passwords related to authentication.
  - Check the box to make sure that the VOID marks are not visible on the packing tape.
  - Enable the unit with SP 5878 001.
    - » If you have installed the wrong type by mistake, you will see 'Failed' on the display when you do this SP. Do the installation procedure again with the correct type of DOS unit.
    - » You do not have to replace the NVRAM
  - Follow the procedure in the service manual carefully, or the installation will fail.

Slide 128

❒ VOID marks: If these are visible, it is possible that the box has been tampered with, and security could be compromised.

Browser Unit

- During the installation procedure, you must put an SD card with the browser unit firmware into slot 2.
- The machine copies firmware from the SD card to the hard disk during the installation procedure.
- You must remove the SD card from slot 2 after you install the browser unit.

Slide 129

No additional notes

VM Card

- **The VM card must stay in slot 2.**
- **Is this a problem when using the printer option?**
  - No. The VM card can only be used with the Ratio controller.

Slide 130

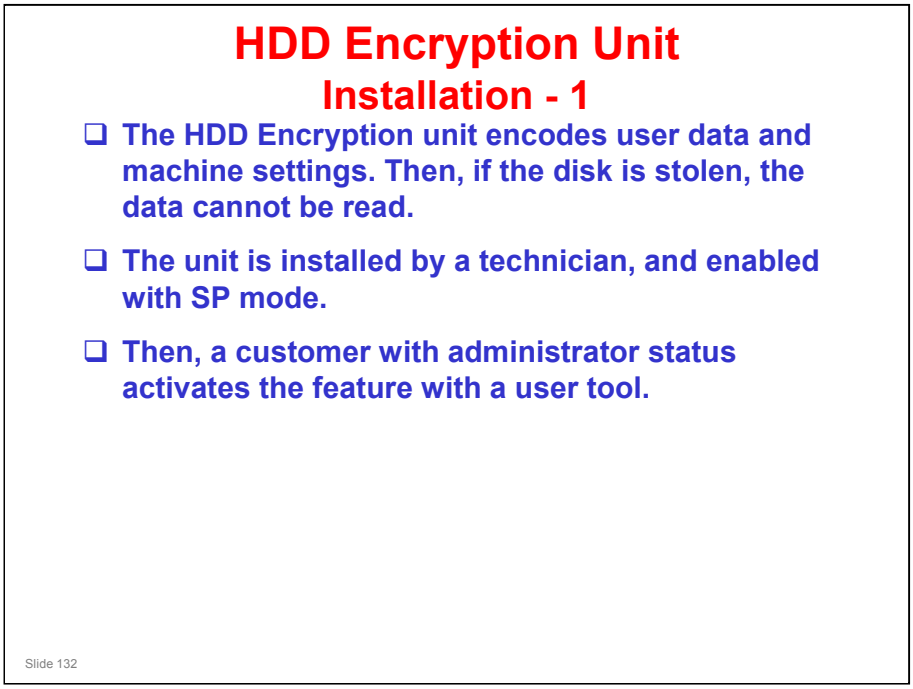
No additional notes

HDD Encryption Unit

- **HDD Encryption Unit**
  - Before you can install this unit, the customer must store some names and passwords related to authentication.
  - Check the box to make sure that the VOID marks are not visible on the packing tape.
  - Enable the unit with SP 5878 002.
  - Remove the SD card from slot 2 after installation.

Slide 131

No additional notes



- Details of procedures for customers are in the Security Reference Operation Manual, in the following section.
  - 3. Ensuring Information Security, Encrypting Data on the Hard Disk

HDD Encryption Unit
Installation - 2

- **The machine then creates an encryption key automatically. It stores this encryption key in three locations.**
  - A memory chip on the controller board (this is where the original of the encryption key is held)
  - The NVRAM on the controller board (this is a copy)
  - The hard disk, if installed (this is also a copy)
- **If the encryption key in these three locations is not the same, the encryption unit will not work.**
- **The user also prints out this encryption key, in accordance with the procedures in the operation manual.**
  - The user keeps this printout in a safe place, and does not show it to the technician.
  - This encryption key will be needed if the controller board is replaced.

Slide 133

- The memory chip on the controller board is sometimes called the “USB Flash memory”.

HDD Encryption Unit
Installation - 3

- **If there is data already on the hard disk at the time that the HDD encryption unit is being installed, what happens to this data?**
- **It depends on the setting that is chosen by the user after installation, when the user enables the HDD encryption unit.**
- **There are three settings:**
  - File System Data Only: User authentication data, stored document data, and temporary data on the hard disk are all deleted. Machine settings, user tool settings, network settings, security log data and address book data already on the disk are encrypted
  - Format All Data: All data is deleted except for machine settings and network settings, and these are encrypted.
  - All Data: All existing data on the disk is encrypted. Nothing is deleted
- **After enabling the HDD encryption unit, all data is encrypted.**

Slide 134

No additional notes

HDD Encryption Unit

What is encrypted during operation?

- **The following data is encrypted:**
  - Network interface setting data
  - Machine settings
  - User mode settings
  - Address book data
  - Security log data
  - User authentication data
  - Stored document data
  - Temporary data on the hard disk

Slide 135

No additional notes

HDD Encryption Unit

After Replacing the Controller - 1

- **After the controller is replaced, one of the following must be done:**
  - The existing encryption key must be restored to the memory chip on the new controller board: This is done by the technician, with help from the customer
  - A new encryption key must be stored: This is done by the customer
- **The encryption key cannot be copied back from the two copies (NVRAM, HDD).**

Slide 136

No additional notes

HDD Encryption Unit
After Replacing the Controller - 2

- **Restoring the existing encryption key:**
  - You must first store this encryption key in a text file on a blank SD card.
  - The customer must input the encryption key that was printed after installation.
- **How to store the encryption key on the SD card, and restore it to the new controller board: Service manual, Installation, HDD Encryption Unit, Recovery from a Device Problem**
- **If the user has forgotten the encryption key, the NVRAM must be cleared in addition to this: See the service manual, same location as above**

Slide 137

Service manual, Installation, HDD Encryption Unit, Recovery from a Device Problem

- The service manual contains two procedures for restoring the encryption key.
  - The first one assumes that the original encryption key has not been lost.
  - The second one is for use when the user has forgotten the encryption key and lost the printout that was made by the machine.
- The operation manual does not refer to these procedures. Instead, the user is instructed to 'update the encryption key', which actually means 'make a new one'.

HDD Encryption Unit
After Replacing the Controller - 3

- **Storing a new encryption key:**
  - This procedure is in the operating instructions.
    - » Security Reference, 3. Ensuring Information Security, Encrypting Data on the Hard Disk, Updating the Encryption Key

Slide 138

No additional notes

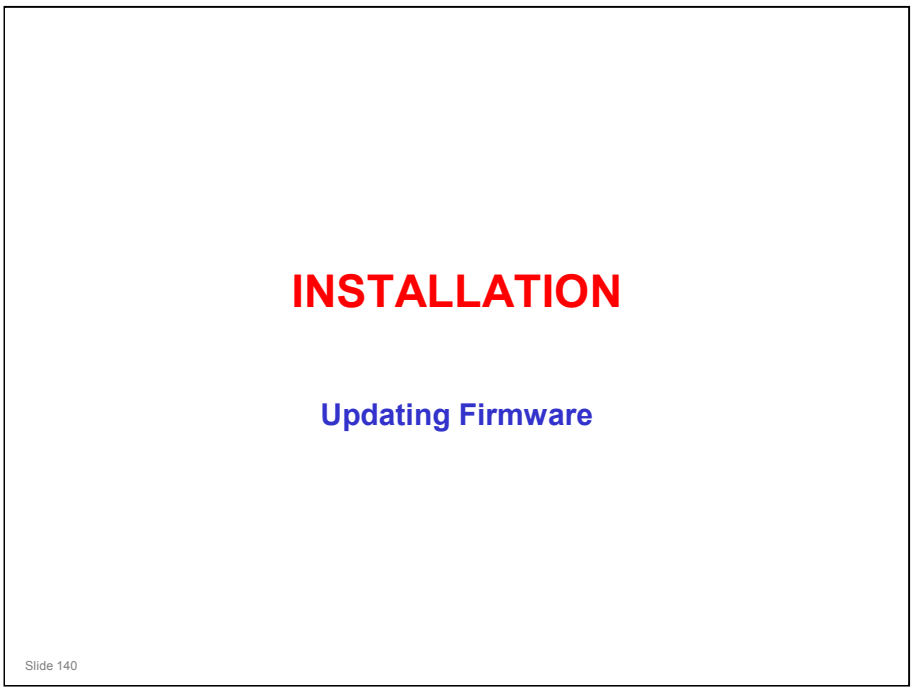
HDD Encryption Unit

After Replacing the HDD or NVRAM

- **If the HDD (hard disk drive) must be replaced, a new encryption key must be stored.**
  - This procedure is for the user to do. It is not in the service manual. We studies this on the previous slide.
  - It is theoretically possible to copy the existing encryption key from the controller board, but there is no information about how to do this.
- **If the NVRAM is defective, then the HDD encryption unit cannot be recovered, even if the controller is OK.**
  - The user must obtain a new HDD encryption unit.

Slide 139

- The operation manual explains how to make a new encryption key, as explained on the previous slide.



No additional notes

Update Procedures - Copier

- **Use SD cards for this machine.**
- **All the firmware can fit on one SD card.**
  - Make a 'romdata' folder on the SD card, and store the firmware here.
- **Put the SD card with the new firmware in SD card slot 2.**
- **Follow the procedure in the service manual.**
  - 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 141

Service manual, System Maintenance Reference, Firmware Update

- SP 7801: This shows the firmware versions.
- If the update procedure fails, you must replace the controller board.

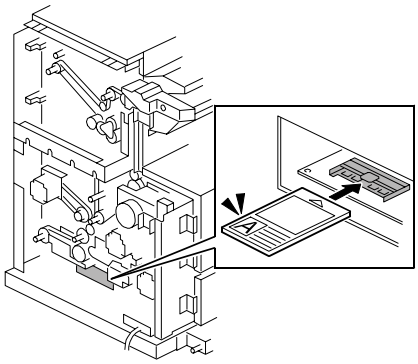
Update Procedures – TIFF/GL2

- Turn OFF the main power switch.
- Remove the SD card containing the TIFF/GL from Slot 2.
- Delete the folder "sdk" from the SD card.
- Extract the firmware to the SD card.
- The contents of the SD card should as follows:
  - sdk folder
  - Two files
- Insert the SD card into Slot 2.
- Turn ON the main power switch.

Slide 142

❒ Not in the manual – will be informed later by RTB.

Update Procedures – Fan Folder



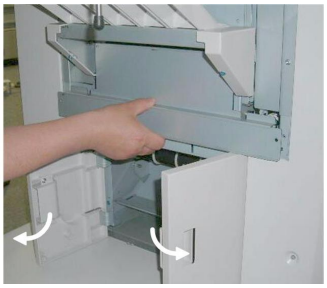
- Turn off the power of the main machine and folder unit.
- For the folder unit, connect an IC card (flash memory card) with the firmware to CN 220 of the MCU board inside the folder unit.
- Turn on the power of the folder unit.
- The LEDs on the main board tell you when the update is finished (see the service manual for details).

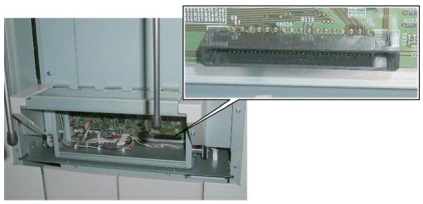
Slide 143

Folder unit service manual, Replacement and Adjustment, Firmware Update

- If the firmware update fails, try it again. In some cases, it may be necessary to replace the MCU board inside the folder unit.

Update Procedures – Cross Folder





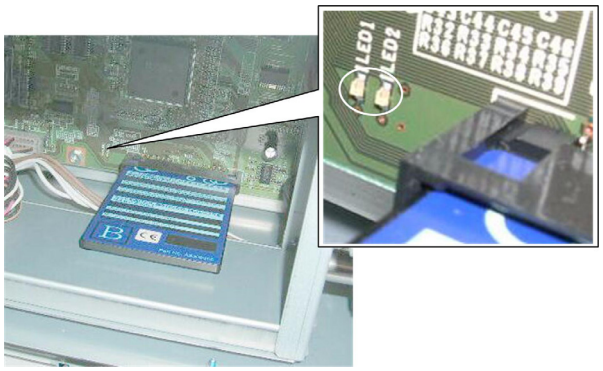
- **Two IC cards are needed**
  - One card is for fan folder firmware
  - One card is for cross folder firmware
- **Do not store both firmware modules on the same IC card.**
- **The IC cards go in different places.**
- **You can update both firmware modules at the same time, or separately.**

Slide 144

Folder service manual, Replacement and Adjustment, MCU and Firmware

- The next few slides show how to access the location for inserting the IC card for the cross folder firmware.
- The IC card for the fan folder firmware goes in the same location as the stand-alone fan folder.
- The fan folder firmware for the cross folder is the same as the firmware for the stand-alone fan folder.

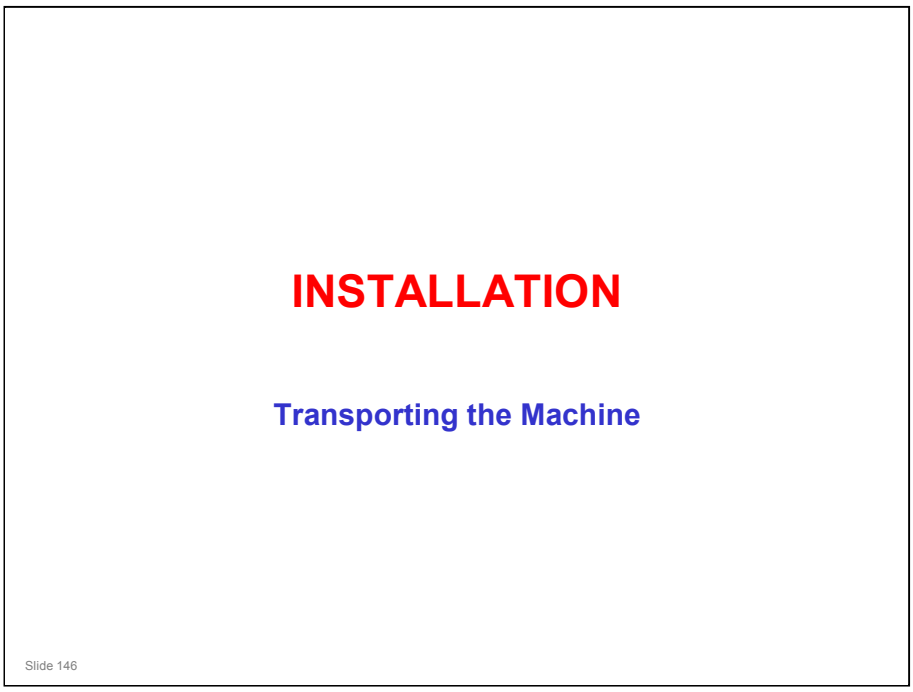
Update Procedures – Cross Folder



- These LEDs show the progress of the firmware download, as explained in the service manual.

Slide 145

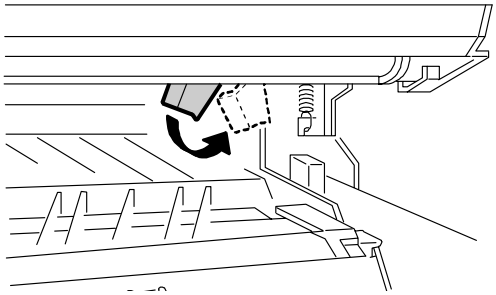
No additional notes



No additional notes

Transporting the Machine

- **Disconnect the copier from the roll feeder or table.**
- **Move the cleaning blade lever left (transportation position).**
  - Move the blade right again before you let the customer use the machine.



- **After moving the machine to a new location, always re-install the leveling shoes under the casters of the machine.**

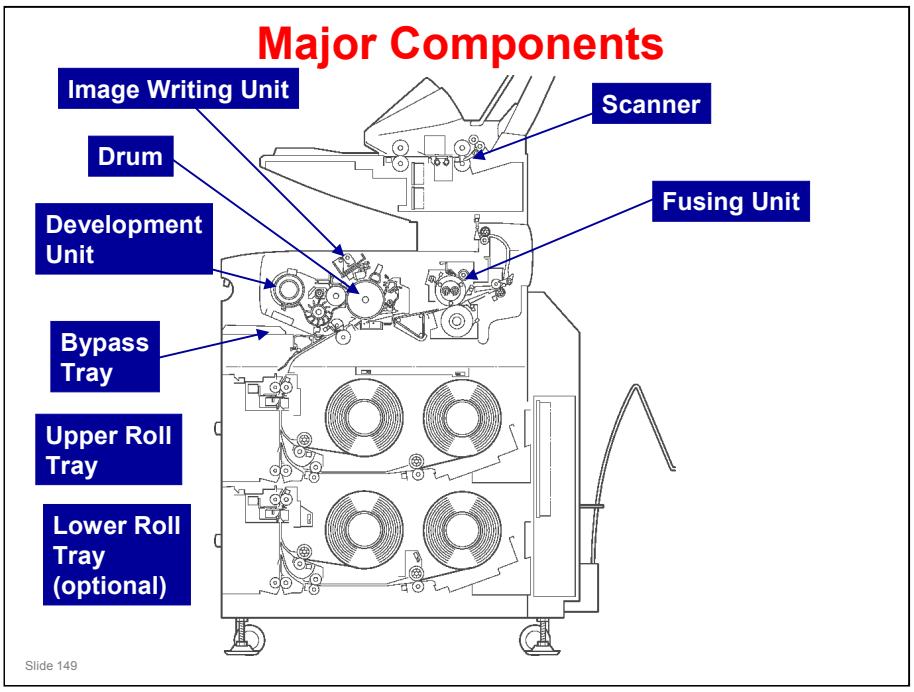
Slide 147

Service manual, Safety/Conventions/Trademarks, Special Instructions, Moving the Copier

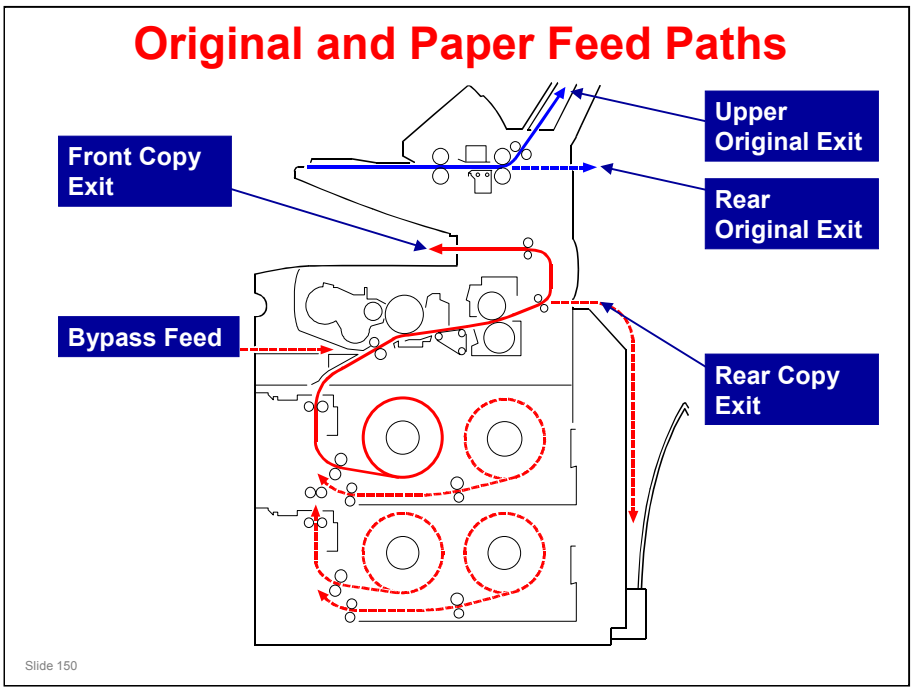
❒ If you move the machine a short distance within the same room, it is not necessary to do these things. But, after installation, if you move it a long distance (for example, between a warehouse and the customer location), you must do the two steps on the slide.

PURPOSE OF THE SECTION

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



- The machine's layout is similar to the Dolphin-C2.
- Important points about the major units are as follows:
  - Image writing unit: This is an assembly of three LED heads. Lasers are not used.
  - Scanner: Uses a CIS that can scan in color
  - Fusing unit: Two lamps, and a pressure control system
  - Roll trays: These each contain two rolls. The lower tray is an optional unit. A two-tray cassette unit can be installed instead of this optional roll tray unit.
  - Bypass tray: Can be used to feed cut sheets, one at a time.
- The rollers, sensors, and other smaller components will be described in their appropriate sections.

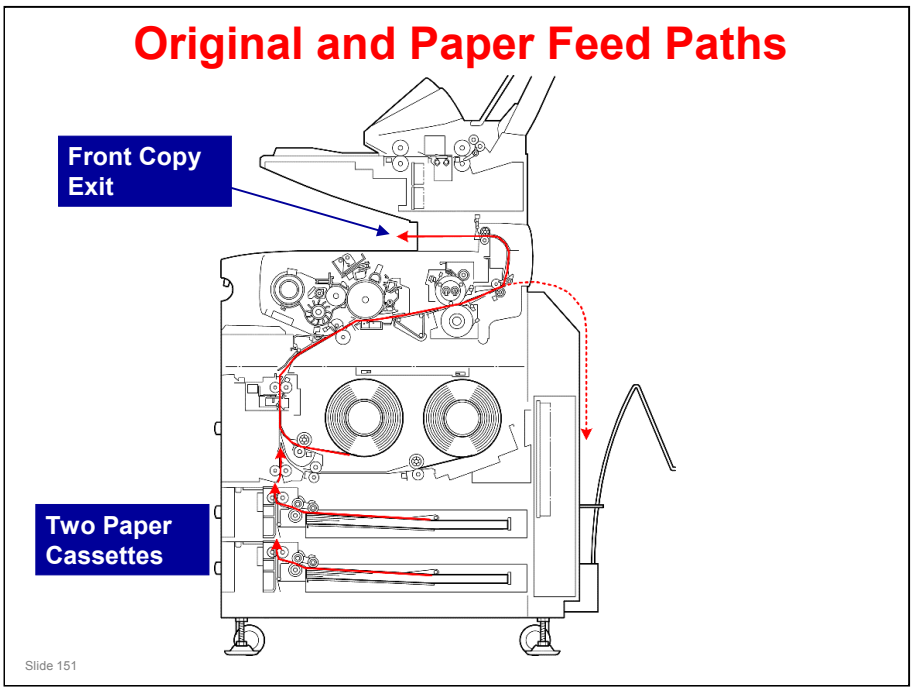


Original Feed Paths

- There are two exits: upper, and rear.
- An optional original exit table can be installed behind the machine to catch originals coming out of the machine.
- Thick paper must go to the rear original exit, to prevent image jitter during scanning.

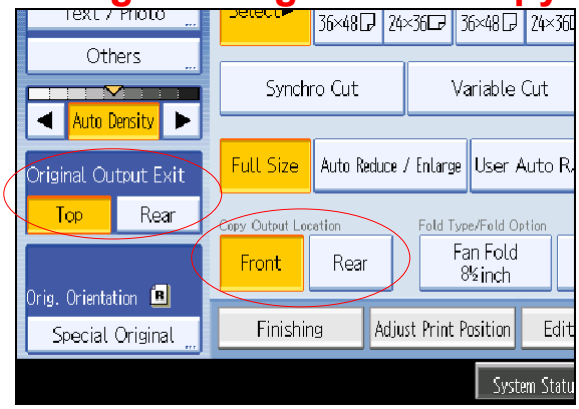
Copy Feed Paths

- There are three routes into the machine: Roll tray 1, roll tray 2 (optional unit), or the bypass table
- The bypass table is used when the customer wishes to make a copy on a sheet of cut paper.
- Note that there are two exits: front, and rear.
- The rear exit has a long document catcher below it.



❒ This shows the paper path when the optional cassette unit is installed instead of the optional roll feeder.

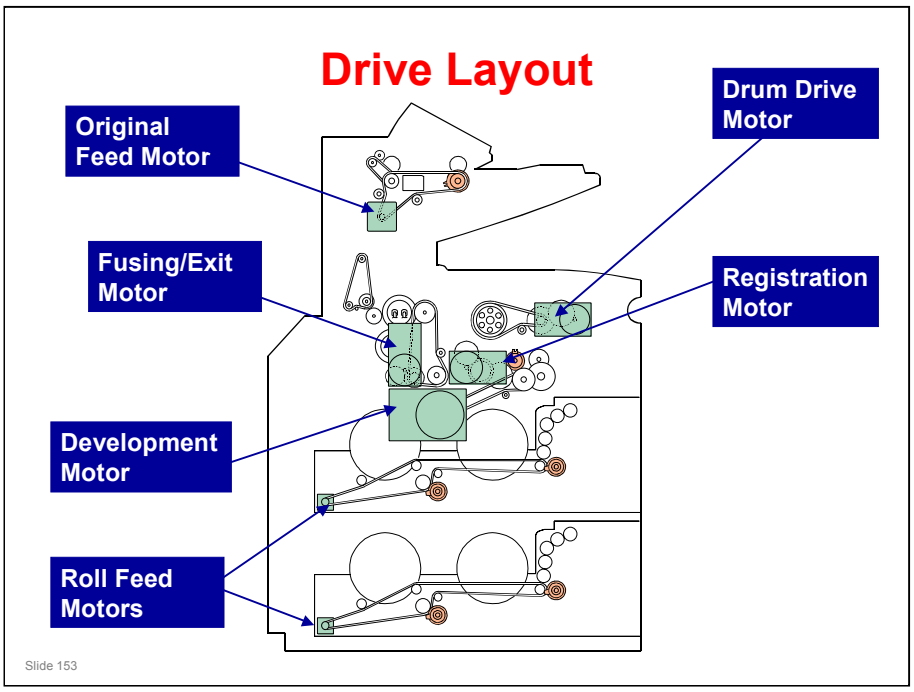
Selecting the Original and Copy Exits



- This shows how to select the feed-out paths for the original and for the copy.
- For recommendations on which exit to use, see the Operating Instructions.
  - Copy Reference – Placing Originals

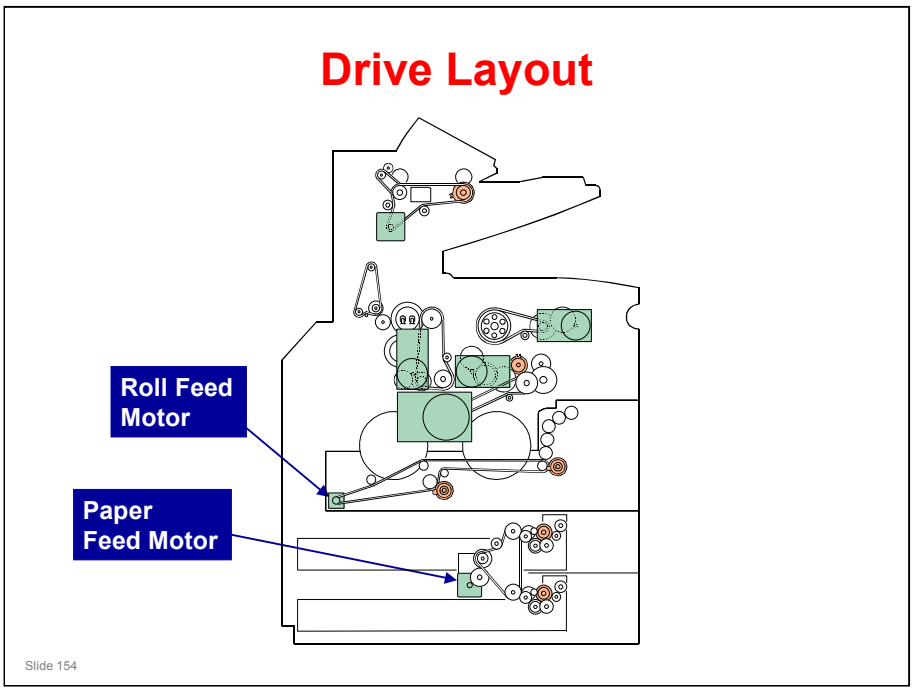
Slide 152

No additional notes

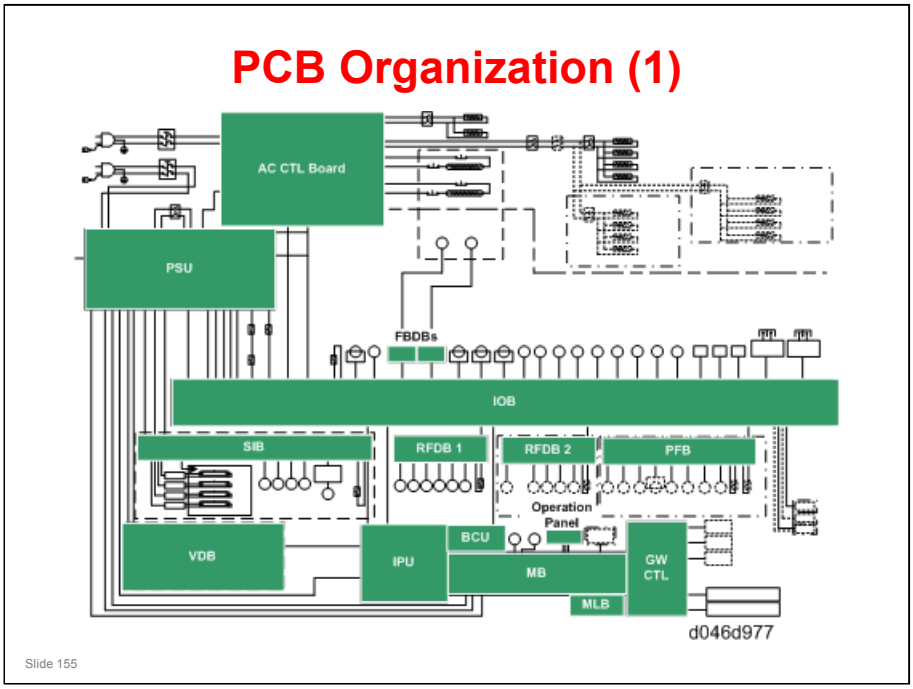


- Study the following drive paths.
  - Original feed motor - original feed mechanism
  - Drum drive motor - drum
  - Registration motor - registration roller, toner collection coil
  - Roll feed motors 1 and 2 - rollers in each roll feed unit

    Paper inserted in the bypass feeder goes straight to the registration roller.
  - Development motor - development unit
  - Fusing/exit motor - transport belts, fusing rollers, and exit rollers



- This slide shows the optional paper cassette unit installed instead of the optional roll feeder.

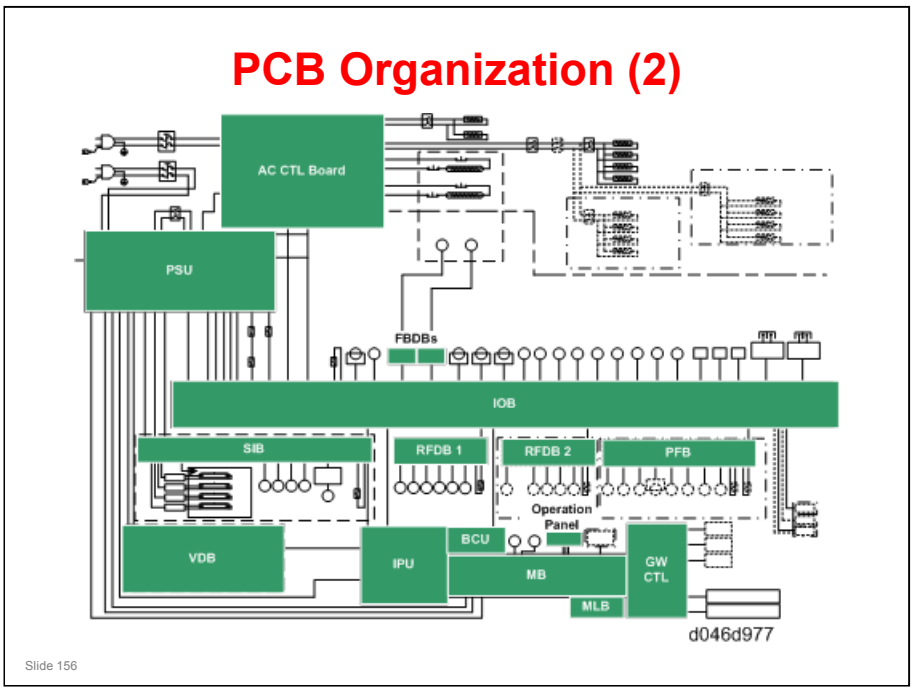


PCB ORGANIZATION

- GW controller architecture allows a basic 600-dpi copier to be upgraded to a full multifunctional product, including printing, Internet, scanning, scan-to-email, and scan-to-folder with Scan Router.

Boards

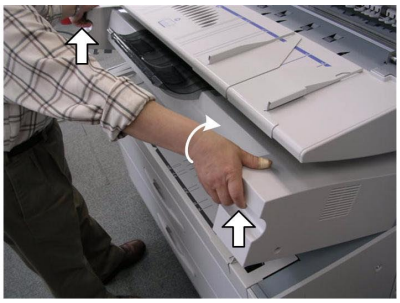
- The BCU controls the machine.
- The IPU controls the image processing.
- The IOB controls the mechanical components. It also performs process control, transfers serial data between the machine and peripherals, and controls the fusing unit.
- The PSU (Power Supply Unit) supplies direct current for every electrical component in the machine, and controls alternating current input to the fusing lamps and anti-condensation heaters.
- File Format Converter (MLB): The file format converter (also called the "Media Link Board" or "MLB") allows you to download copy and print data through via network with Desk Top Binder.
- CIS: A contact image sensor is used instead of a CCD. The main scan width is A0. The resolution is 600 dpi.
- LPH: This is the LED print head. It consists of three A3-width LED heads, to write a main scan width of A0. The resolution is 600 dpi.
- VDB: This drives the LED print head.
- RFDB: These control the roll tray units, one for each tray (upper/lower).
- FPDB: These control the fusing pressure motors. As stated earlier, the fusing unit adjusts fusing pressure automatically. It uses two motors, which are each controlled by one of these boards.



Boards (continued)

- AC CTL Board: This is the connection point for the main power supply. It controls the power supply to the PSU, fusing lamps, and all heaters.
- HVPS: Two power packs (High Voltage Power Supply). The CGB power pack provides is the power supply for the charge, grid, bias applied to the drum. The T&S power pack is the power supply for image transfer to paper and paper separation from the drum.
- SIB. The Scanner Interface Board controls the scanner, and serves as the signal I/F board between the IOB and IPU.
- PFB. The Paper Feed Board inside the optional Paper Cassette (D395) controls the components in the paper cassette (sensors, clutches, and motors).

Opening and Closing the Machine

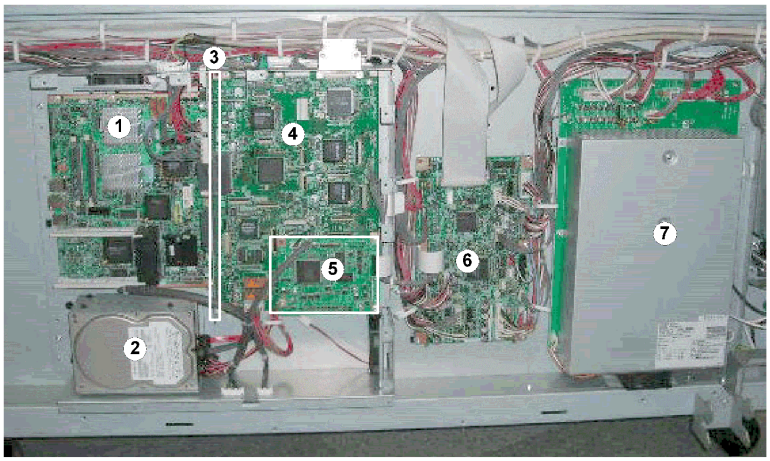


- To avoid bending the catch and release mechanisms, always release and raise the right and left sides together.

Slide 157

No additional notes

Rear of the Machine



Slide 158

With the controller box cover removed, you can see:

- ❒ 1. Controller board
- ❒ 2. HDD unit
- ❒ 3. Motherboard (MB)
- ❒ 4. IPU
- ❒ 5. BCU
- ❒ 6. IOB
- ❒ 7. PSU

Controller Replacement

- **You must remove the NVRAM from the old board and install it on the new board.**
  - There are no NVRAMs on other boards.
- **If you will change the NVRAM, upload the contents to an SD card if possible.**
- **Make sure that the DIP switches on the new board are the same as on the old board.**
- **If there is an HDD encryption unit installed, restore the encryption key.**
  - Service manual, Installation, HDD Encryption Unit, Recovery from a Device Problem

Slide 159

No additional notes

Hard Disk Removal (1)

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

Slide 160

No additional notes

Hard Disk Removal (2)

- **If the customer uses the DOS unit option, this option must be set up again after a new hard disk is installed.**
- **If the HDD encryption unit is installed, the user must copy the encryption key from the controller to the new hard disk.**
  - This is not a service procedure, so it is not in the service manual.
- **Any SDK applications must be installed again.**
  - It is not necessary to install the VM card option again.
- **If the customer is using the optional Browser Unit, this option must be installed again. You must use the same SD card as when the browser unit was installed first.**

Slide 161

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

Hard Disk Removal (3)

- **This is a two-disk unit. All disks must be replaced at the same time. Do not try to replace one disk only.**
- **Before you install a new unit:**
  - Do SP 5846 051 to copy the address book from the hard disk to an SD card (put the SD card in slot 1).
- **A decal shows you how to connect up the new hard disk unit.**
- **After you install a new unit:**
  - Do SP5853 001 to download the fixed stamps from the ROM to the HDD.
  - Switch the machine off and on to enable the fixed stamps for use.
  - Do SP 5846 052 to download the address book from the SD card to the hard disk (put the SD card in slot 1).

Slide 162

No additional notes

Disposal of HDD Units

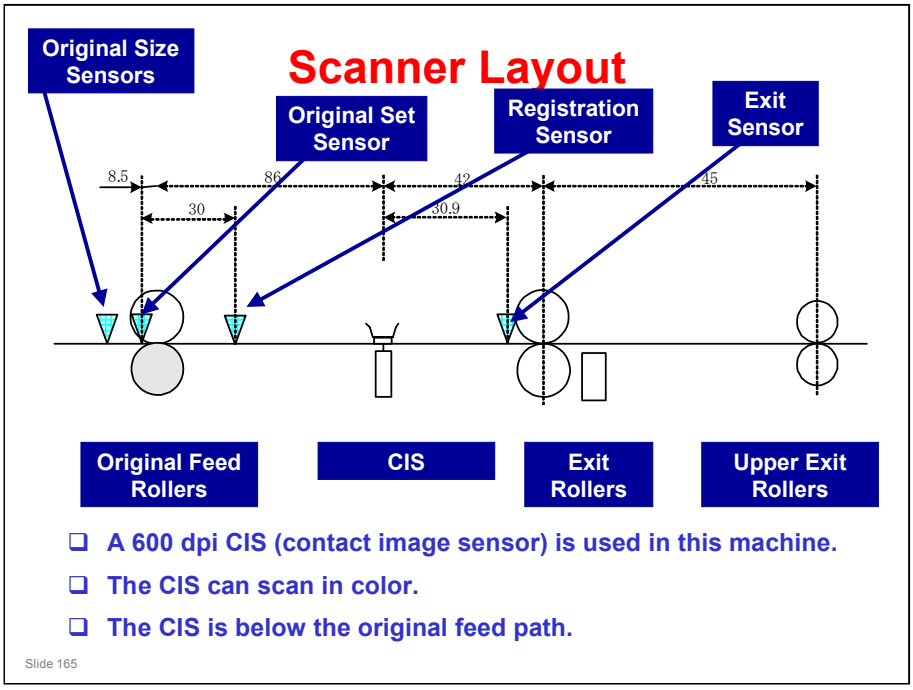
- **Never remove an HDD unit from the work site without the consent of the client.**
- **If the customer has any concerns about the security of any information on the HDD, the HDD must remain with the customer for disposal or safe keeping.**
- **The HDD may contain proprietary or classified (Confidential,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

Slide 163

No additional notes

PURPOSE OF THIS SECTION

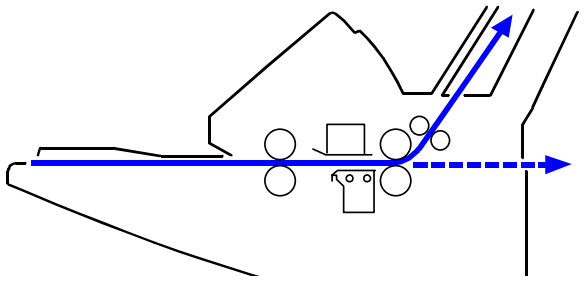
- This section describes the original feed and scanner mechanisms.



SCANNER LAYOUT

- The diagram shows the dimensions of the scanner.
- A 600 dpi CIS (contact image sensor) is used in this machine.
- There are ten original size sensors. The original set sensor also takes part in original size detection.
- The white platen plate 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, and detects the leading edge of the original, which makes the CIS (Contact Image Sensor) start to scan the original.
- The original exit sensor detects jams in the original feed path, and detects the trailing edge of the original at the rear original exit (for straight-through feed).

Original Feed Path

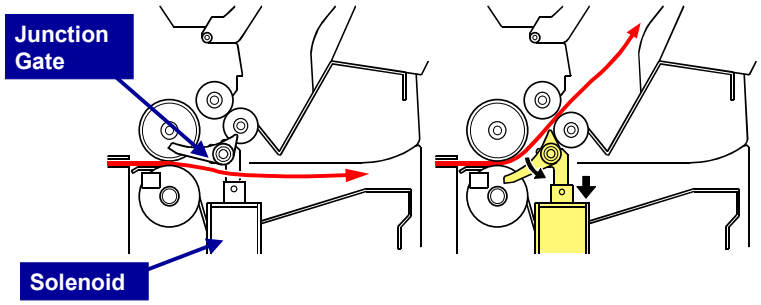


- **Single-sheet feed only**
- **Two exits**
  - Upper exit
  - Rear exit (straight out)
- **Thick paper must go to the rear original exit, to prevent image jitter during scanning.**

Slide 166

- Only one sheet can be placed in the feeder at a time.
  - There is no separation mechanism.
- There are two original exits.

Original Exit Switching



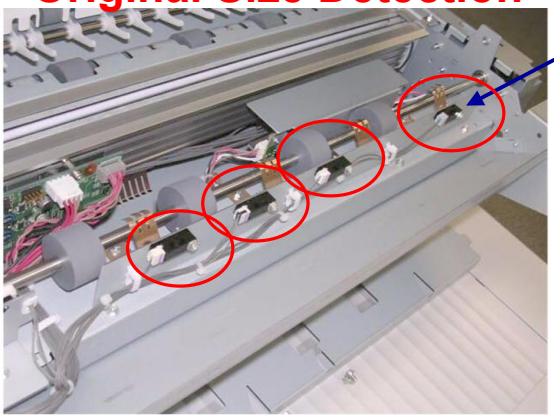
- **Original junction gate solenoid: Directs the original to the top exit or to the rear exit**
  - Solenoid on: Junction gate is down, paper goes to the top exit- turns on when the registration sensor detects the leading edge of the original
  - Solenoid off (default): Rear exit
  - Depends on an operation panel selection

Slide 167

- The mechanism is described on the slide.
- For recommendations on which exit to use, see the Operating Instructions.

Copy Reference – Placing Originals – Original and Copy Output Locations

Original Size Detection

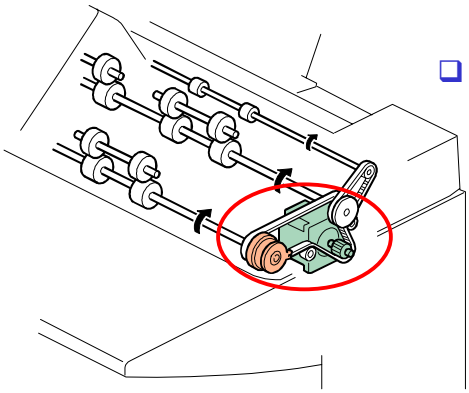


- There are many sensors. Because of this, the machine can detect A and B series (Europe/Asia) and Arch./Eng. sizes (USA) without a user tool adjustment.

Slide 168

- The original set sensor detects A4 or B4 SEF and North American A size originals. The original size sensors detect larger sizes.
  - The original set sensor is in the centre of the main scan, so it detects any paper that is put in the feeder.

Original Feed Mechanism

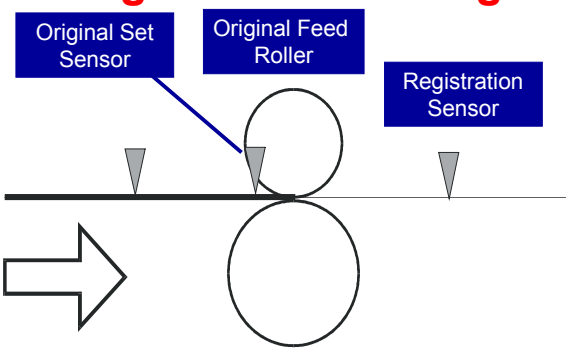


- Original feed motor: Drives all the rollers
- Original feed clutch: Controls on/off timing for the feed roller

Slide 169

- The main points are on the slide.

Original Feed Timing

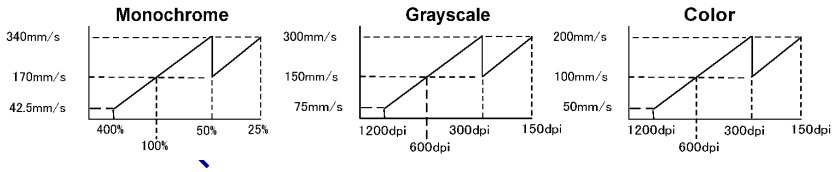


- **From original set sensor turn-on until feed roller starts: 1 second**
  - System Settings - General Features - Original Feed Delay 1
- **Pause at the registration sensor: 1 second**
  - System Settings - General Features - Original Feed Delay 2

Slide 170

- There are two delays to allow the user to correct for skew and other feeding problems before the scan begins.
- They are controlled with user tools as shown on the slide.
- The machine feeds at 105 mm/s as far as the registration roller.
- From that point, the feed speed depends on the reproduction ratio.

Original Feed Speed - 1



- **To ensure accurate scanning, the scanning speed is adjusted for the reproduction ratio and for resolution.**
  - Enlarged images are scanned slower; reduced images are scanner faster.
  - Higher resolution images are scanned slower; lower resolution images are scanned faster.

Slide 171

No additional notes

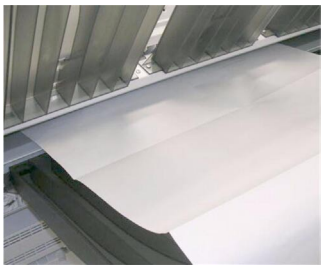
Original Feed Speed - 2

- This thermistor reads the temperature near the exit roller.
- The exit roller expands when the temperature increases. This causes original feed to become quicker. This causes errors in the sub scan magnification.
- Depending on the thermistor reading, the motor speed changes to make sure that the speed of the original is constant.

Slide 172

- SP 4962 can be used to check if the sensor is working. See the SP table for details.

Original Edge Hold

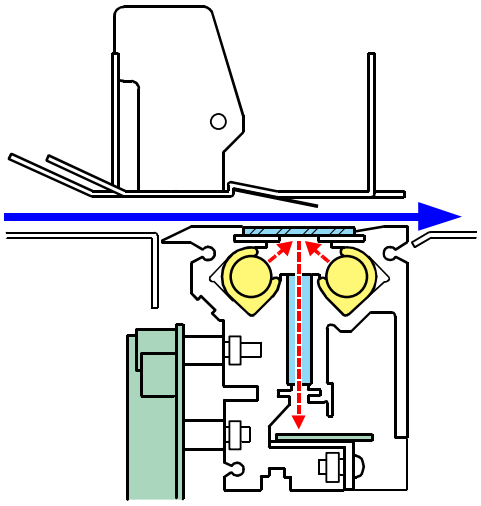


- If an original fed out of the rear exit is longer than 450 mm (18"), the rollers will stop and hold the trailing edge. The operator must pull the original out and remove it from the tray.
- If the original is shorter than 450 mm, the rollers feed the original out to the rear original exit tray.
- This feature prevents long originals from falling off the rear exit tray.

Slide 173

- This feature can be switched off and on with SP4975. The default setting is on (the rollers do not release the trailing edges of originals longer than 450 mm).
  - This SP must be turned off if a rear original stacker is used. Otherwise, only one original can be fed at a time.
- The machine does not hold the trailing edge of copies.

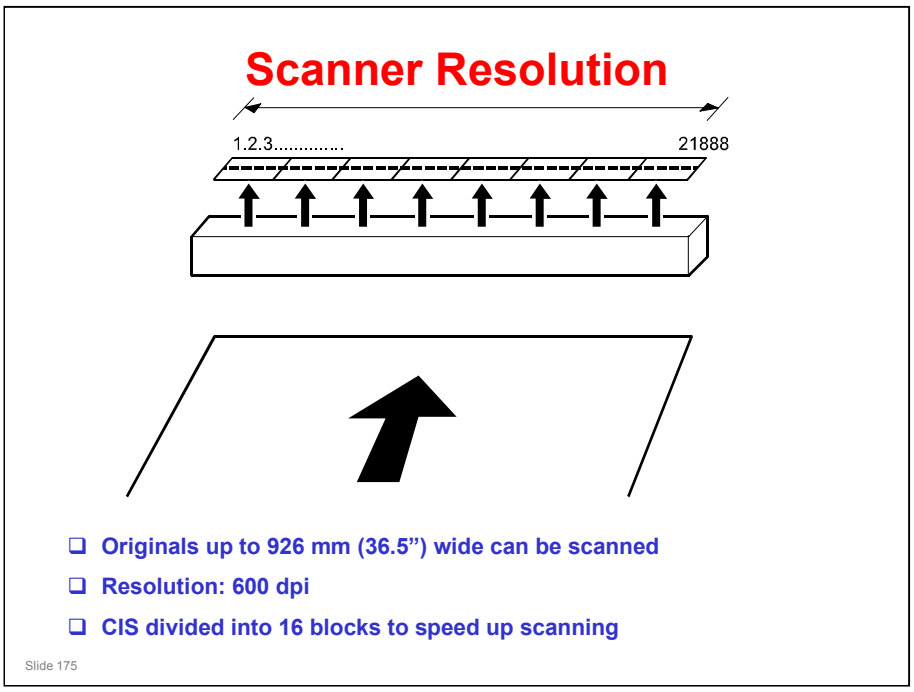
Contact Image Sensor (CIS)



- Below the original feed path

Slide 174

- In previous models, the CIS was above the original, to prevent objects from falling into the CIS assembly. However, in the Neptune-C2, this was not a problem (CIS was below).
- The CIS can only be replaced in the field as a unit.



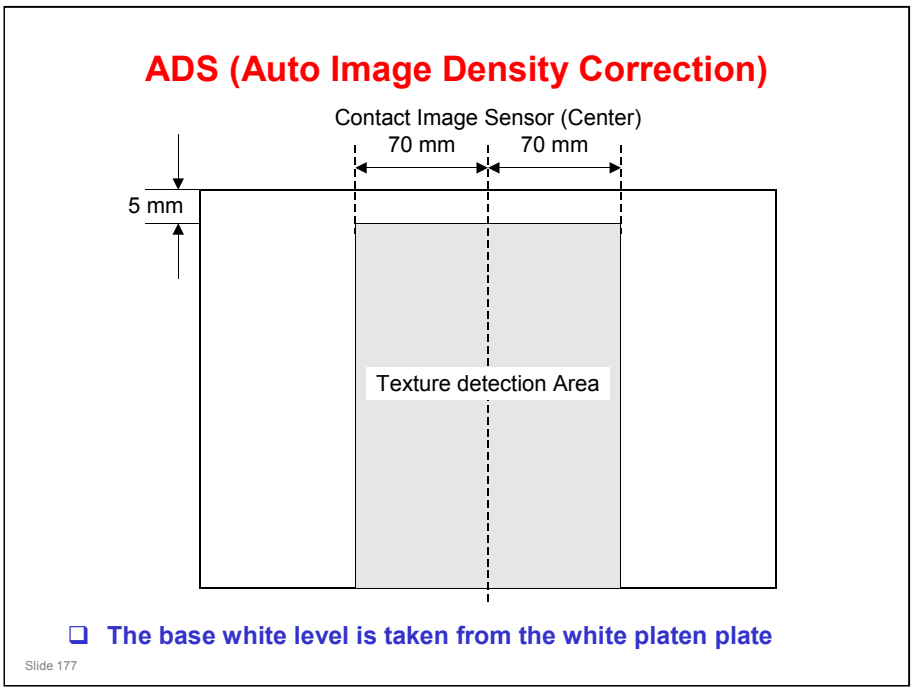
❒ Each block contains a latch and shift register, so assembling the video signal is 8 times faster than with all the elements in one big block.

Magnification Adjustment

- **The magnification ratio is adjusted automatically to compensate for stretching or shrinking of various paper types as they go through the copier engine.**
- **The image is magnified according to the settings done with either the SP or User Tools mode for each type of paper.**
- **After a paper source has been replenished with a different type of paper, the paper size and paper type must be entered with the User Tools.**
- **The default settings for the magnification adjustment can be adjusted with SP2916.**
  - For details about how to do this: Service Manual, Replacement and Adjustment, Important Adjustments, Image Position/Magnification/Margin Adjustments, Printer Magnification Adjustment

Slide 176

❒ This is a new feature.



- The base white level (absolute white) is taken from the white platen plate - auto shading.
- Then, every line, the machine checks the background and removes that from the image.
- The background is checked from a 140 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

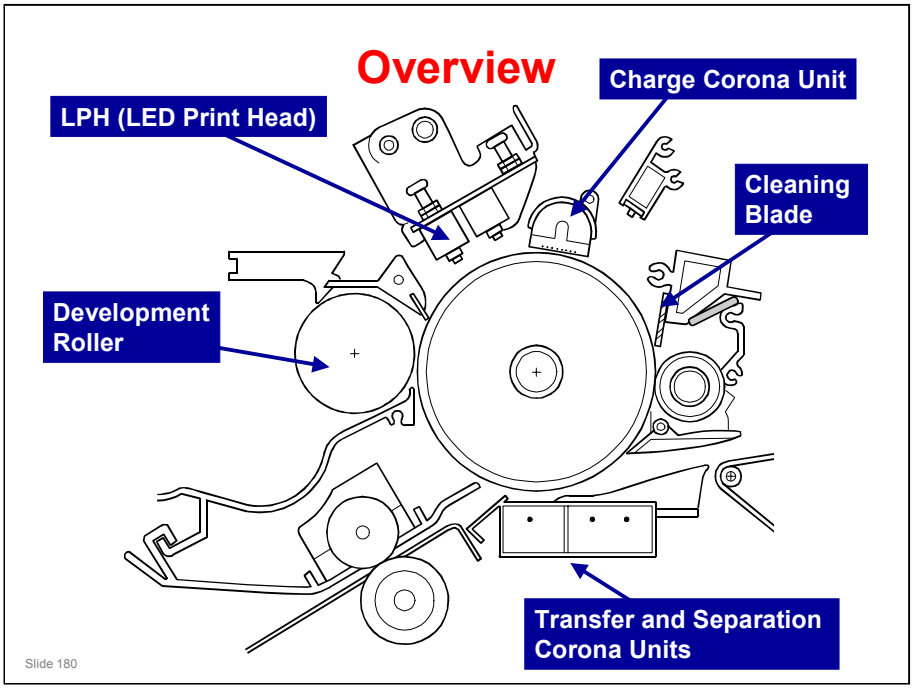
- **Scanner Components**
  - The CIS and its two lamp regulators must be replaced as a set.
  - Make sure that you connect the lamp regulators correctly, as shown in the manual.
  - The cables and connectors are marked from 1 to 4.
- **Exposure glass**
  - After you remove the exposure glass, work carefully to prevent dust from entering the CIS unit.

Slide 178

No additional notes

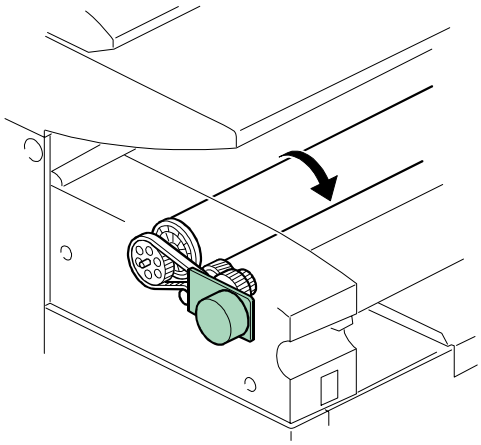
PURPOSE OF THE SECTION

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



- These are the most important components around the drum.
- The paper passes the drum at 120 mm/s (D046) or 170 mm/s (D049). However, the fusing motor pulls a little faster. This will be discussed in the Fusing section of the course.
- The drum diameter is 80 mm.
  - This means that the circumference is about 251.4 mm.
- The charge corona unit has widely-spaced grid wires, like some previous wide-format copiers.
- The machine prints with LEDs, not a laser beam. The LPH (LED Print Head) consists of three A3-width LED arrays, to allow A0-width printing.
- A single A0 LED array is very costly, so three A3 arrays are used. This is discussed in more detail in the Exposure section of the course.

Drum Drive

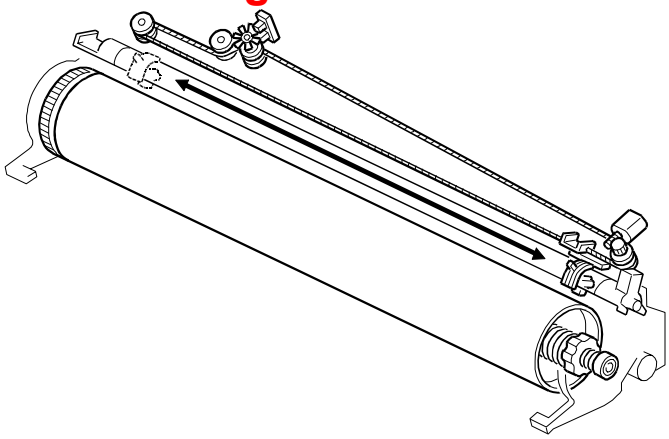


- **Drum drive motor: Drives the drum via gears, a timing belt, and a pulley**

Slide 181

- The main points are on the slide.
- The drum drive motor has only one job: to drive the drum.

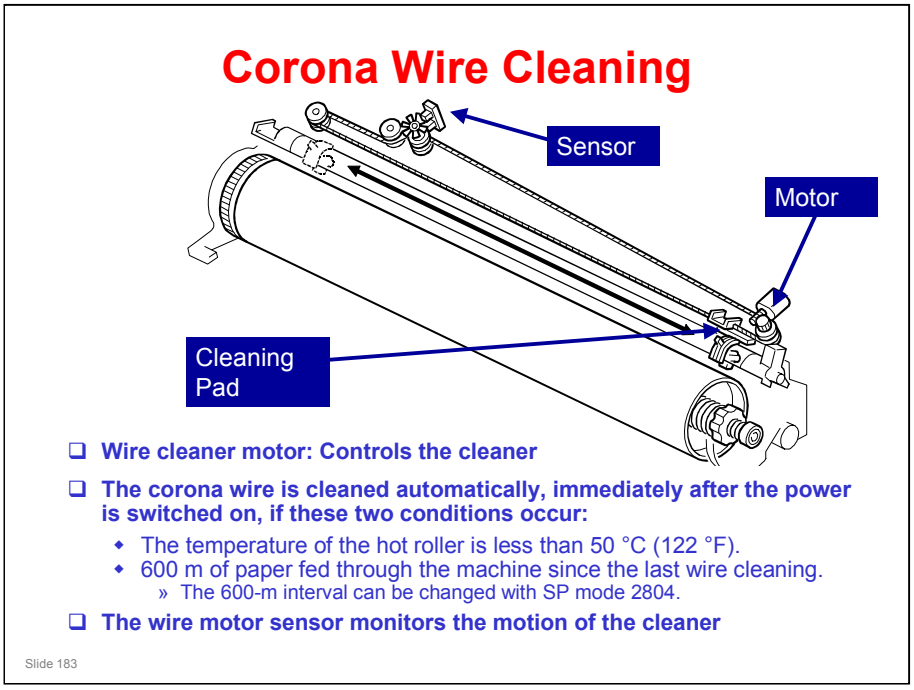
Charge Corona Unit



- Single-wire scorotron charge corona unit

Slide 182

- It's a single wire, but it's looped so there are actually two wires crossing the drum.
- The main point to note about this unit is that the grid consists of 10 parallel wires strung along the length of the charge corona unit.
- The mesh-type grid system is a better method. However, it is not used in wide format machines. In this type of machine, there may be excessive tension in the grid, deforming the mesh. So the strung-wire system is used.



- 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.

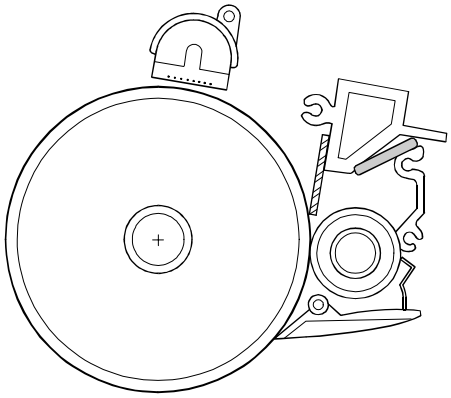
    The 600-m interval can be changed with SP mode 2804.

    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

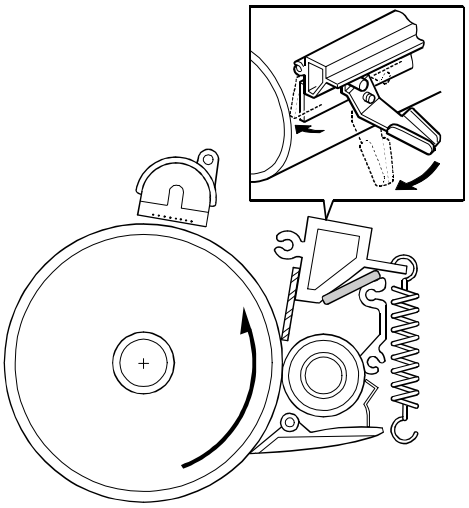


- Counter blade system
- The drum reverses after every job to remove toner stuck on the blade.

Slide 184

- A counter blade cleans more effectively.
  - The drum turns anti-clockwise as seen in this diagram.
- Also, remember the Drum Set Mode procedure (SP 2923) during installation, in which the cleaning blade is kept away from the drum while the drum is coated with toner. This lubricates the tip of the cleaning blade to prevent it from flipping over when the drum turns against it.
  - This must also be done after a new drum or cleaning blade is installed.
- In the diagram, the circular object below the cleaning blade is not touching the drum. It is the toner collection coil drive gear.

Cleaning Blade Release

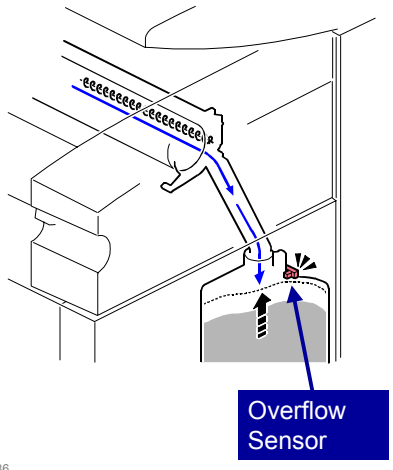


- **Pressure release lever: Press this to move the cleaning blade into contact or away from the drum**

Slide 185

- Before doing the Drum Set Mode procedure, move the cleaning blade lever to the left (as seen from the front of the machine) to make sure that the blade is away from the drum.
  - The diagram on this page is a side view. The three-dimensional view at the top right is a rear view, so the handle moves in the opposite direction from the one in the Installation section.
- After the Drum Set Mode procedure, move the lever back to the right so that the blade is pressing against the drum.
  - This was covered in the Installation section.

Collecting Used Toner



- Registration motor: Drives the toner collection coil
- Toner collection coil: Transfers used toner from the drum to the used toner tank.
- Toner overflow sensor: Detects when the tank is almost full
- When near-full is detected, another 20 m of copies can be made. Then copying is disabled.
  - The current job is completed, and then the used toner bottle must be emptied.
- Recovery: Switch the machine off/on. If the error message still appears, empty the bottle and switch off/on again.

Slide 186

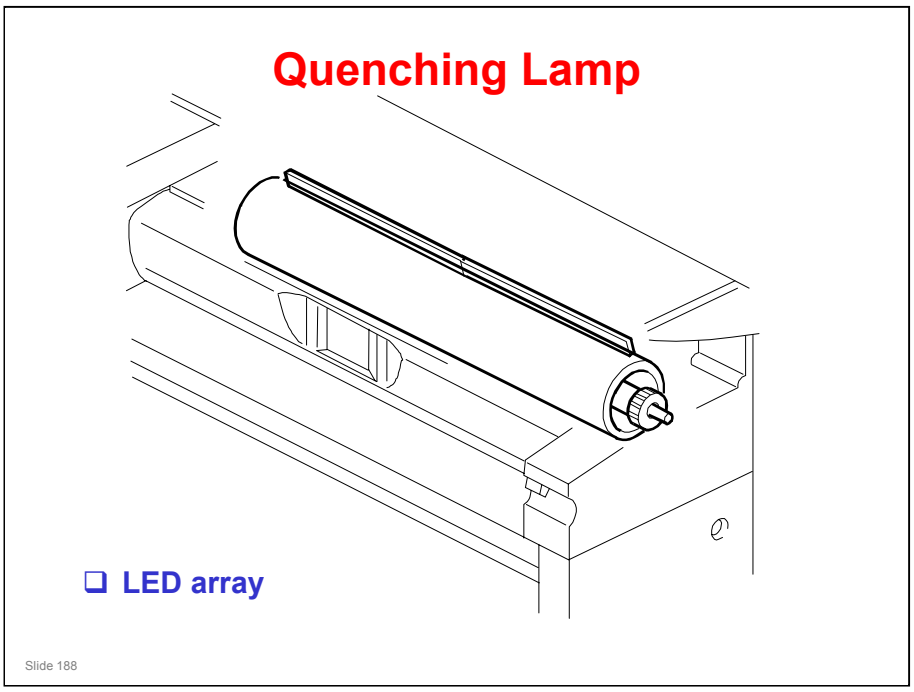
- The service manual states the capacity of the bottle.
- The sensor is half way between the spout and the side of the machine, so there should not be many premature alarms caused by piles of toner building up in front of the sensor.
  - There is no mechanism to shake the bottle and level the waste toner.

Collecting Used Toner

- **Used toner is not recycled in this machine, because paper dust from the cutter may be present inside the machine and this may get into the excess toner removed from the drum.**
- **The technician empties the used toner bottle; the user does not.**
- **Important:**
  - After emptying the used toner bottle, you must clean the area inside the bottle where the used toner overflow sensor is located.

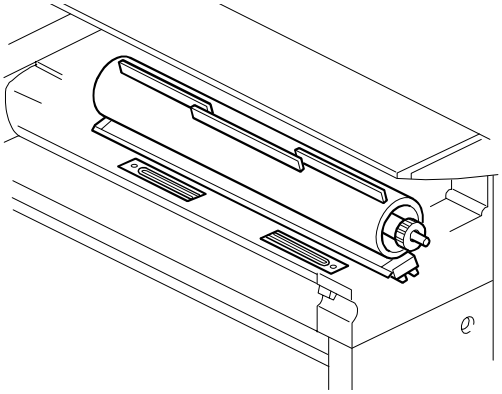
Slide 187

No additional notes



❒ The lamp contains red LEDs to prevent drum fatigue.

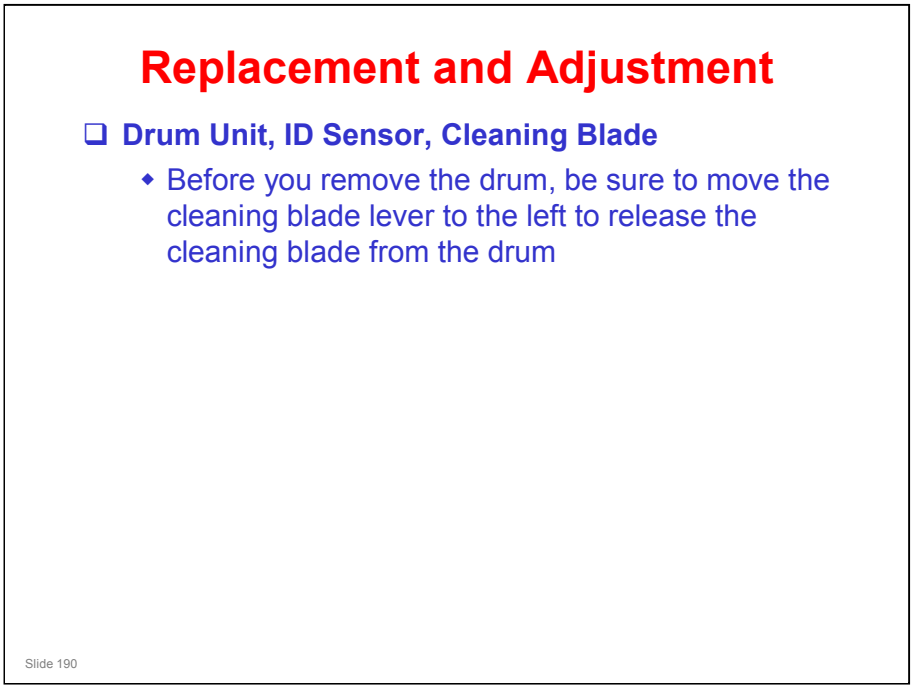
Drum Anti-condensation Heaters



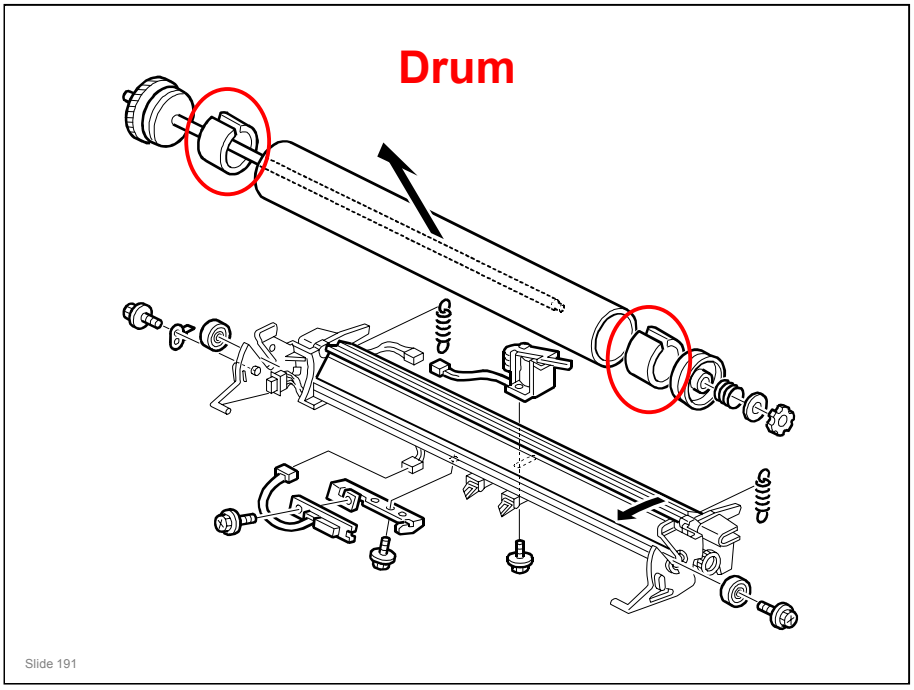
- Below the transfer and separation corona unit
- Prevent the formation of condensation in areas around the drum
- Turn on when the main power switch is turned off

Slide 189

- The main points are on the slide.
- The heaters are off when the main power is on, and on when the main power switch is off.
- These are standard components of the machine, not optional items.



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



DRUM

- ❒ Make sure that the photoconductor is not exposed to light for a long period.
- ❒ Note the purpose of the rubber plates (circled in red). Take them out of the old drum and put them in the new one.

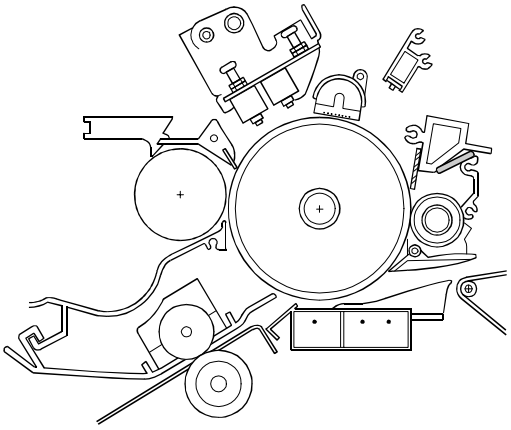
DRUM AND CLEANING BLADE

- ❒ Make sure to do the Drum Set Mode (SP 2923) after installing a new drum or cleaning blade.
- ❒ After installing a new drum, also initialize the ID sensor (SP 3001 002)

PURPOSE OF THIS SECTION

- ❒ The latent image writing mechanism will be described.
- ❒ This machine uses LED arrays, and not lasers, so there are no safety switch circuits to describe.

Overview

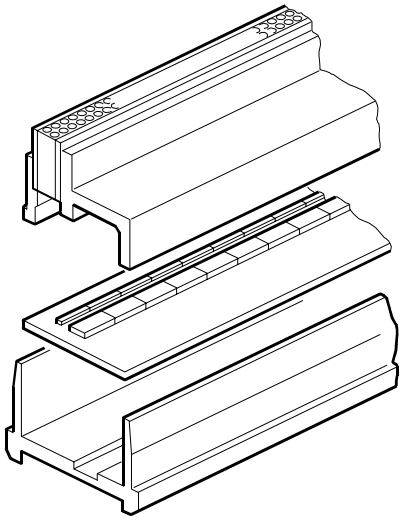


- **Three LED heads shine directly on the drum.**
  - There are no mirrors.
  - Resolution: 600 dpi

Slide 193

- The main points are on the slide.
- Illuminated areas of the drum drop to - 50 V (with a tolerance of +20V and -30V). Un-illuminated areas are at -900 V ±40V.

LED Head Structure

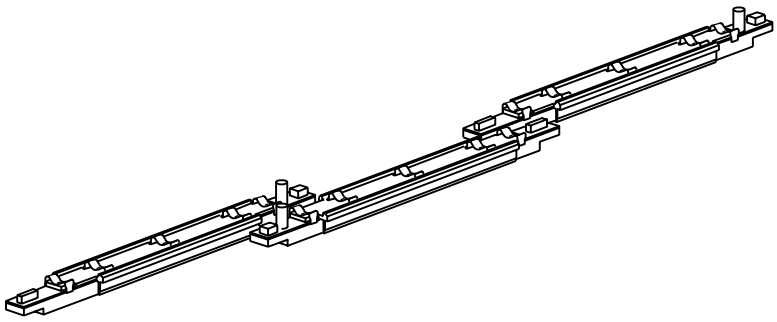


- **Each head has:**
  - Self-focusing lens array
  - LED array
  - Drive board
  - Heat sink
- **Maximum print width: 930 mm**
- **The unit is called the LPH (LED Print Head)**

Slide 194

❒ The main points are on the slide.

LED Head Structure



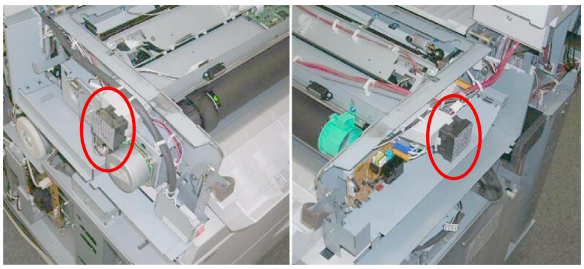
- Three A3-width LED heads have been joined together.
- Using three 600-dpi A3-width heads is one-third the cost of using a single 400-dpi A0 width head.

Slide 195

LED HEAD STRUCTURE

- The main points are on the slide.
- Note the major cost reduction. However, there is a small problem with copy quality at the joints between the heads, as will be seen later in this section.

LPH Cooling Fans



- There is a fan (with filter) at each end of the LPH unit.
- The fans pull air into the machine and circulate it around the LPH unit.
  - Heat expansion could distort the images.
- Both fans switch on when the main motor and fusing/exit motor switch on, and they switch off when these motors switch off.
- SP2940 controls the operation of these two fans.

Slide 196

SP 2940

- 0: On when motors on (default)
- 1: Always off
- 2: On at same time as fusing lamps

Data Processing

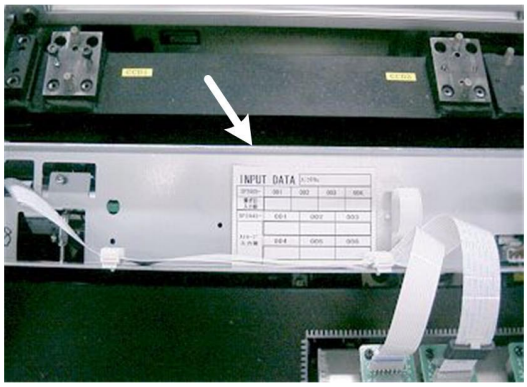
- CIS: Eight-bit (256 levels per pixel)
- Data input to IPU board: Eight-bit (256 levels per pixel)
- Data output from the IPU to the VDB: Two-bit (4 levels per pixel)
- Data output from the VDB to the LED print head (LPH): Five-bit (32 levels per pixel)
  - Only two of these 32 levels are used for any one image.
  - A gamma curve in the VDB board selects which four levels to use for the image.

Slide 197

- Go over the points on the slide.
- The LEDs in the print head light at 10% of their full power.
- To make the 32 grades, the power is divided into 32 equal intervals.
  - For example, if the gradation for a certain pixel is 17, the LED for that pixel will be on at 17/32 of the power.
  - The base (32/32) power is always at 10% of full possible LED power.

LPH Replacement and Adjustment

- ❑ Install the new LPH
- ❑ Note the SP settings on the decals (see below)



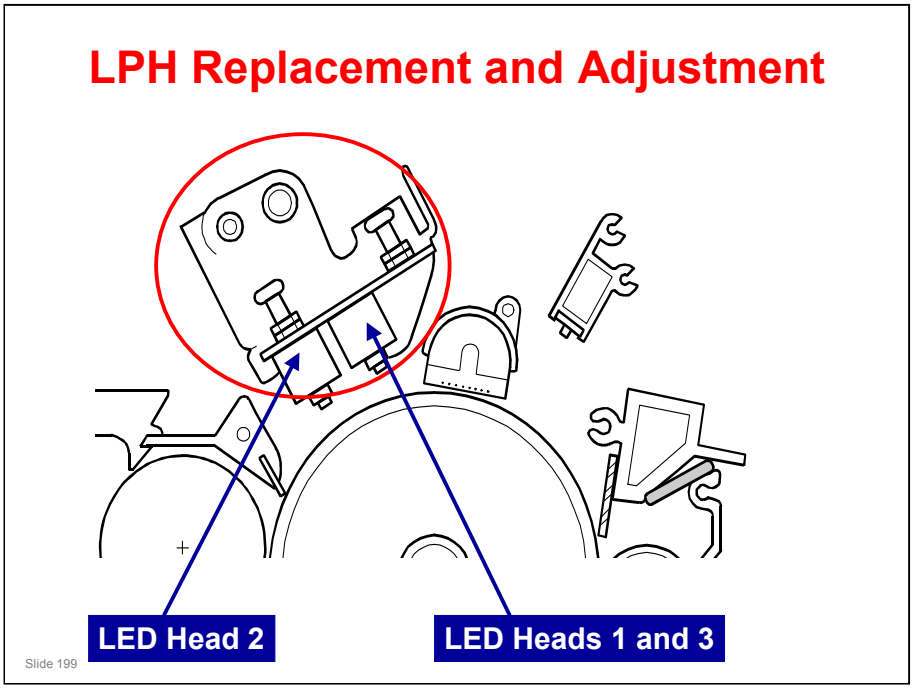
Slide 198

SP settings on the decals

- ❒ This decal is only on the spare parts, not on the original part installed at the factory. See the factory setting sheet for the original factory settings.
- ❒ Before re-installing the right copy tray, read the LPH settings from the labels attached to the LPH.
  - ➢ Look for 4 labels, probably on the underside of the unit. See the manual for an example
- ❒ Input these into the correct SP modes, as explained in the manual.
  - ➢ In the factory, the settings for the installed LPH unit are already made. However, if you do an NV-RAM reset, you may have to re-input these values.

What are these settings?

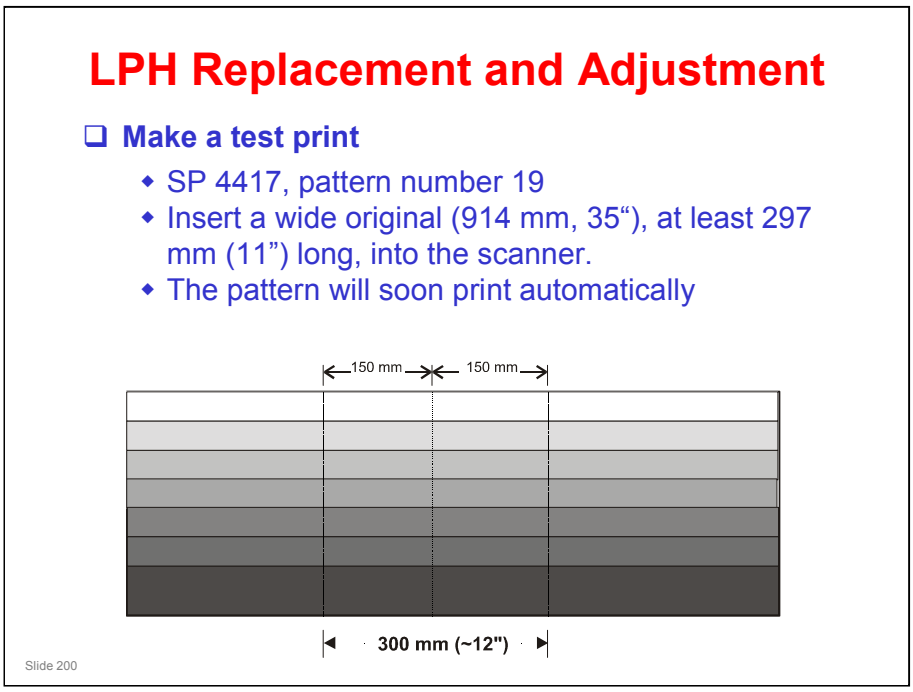
- ❒ The LPH consists of three heads joined together.
- ❒ SP 2952 001 informs the machine where the left and central heads are joined (I.e., at which pixel).
- ❒ SP 2952 002 informs the machine where the central and right heads are joined.
- ❒ Now please go to the next slide for an explanation other two SP settings.



LPH REPLACEMENT AND ADJUSTMENT

What are these settings?, 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 (but probably not exactly) in the same place, but the gap between these and the central one (LPH 2) is considerably larger.
- SP 2952 011 and 012 tell the machine the misalignment between the three heads in the sub-scan direction. The machine will adjust the writing timing for each of the heads, using these settings, to make sure that each scan line of the latent image is written across the drum correctly.
  - We will see this more clearly later during the adjustment procedure in the manual.

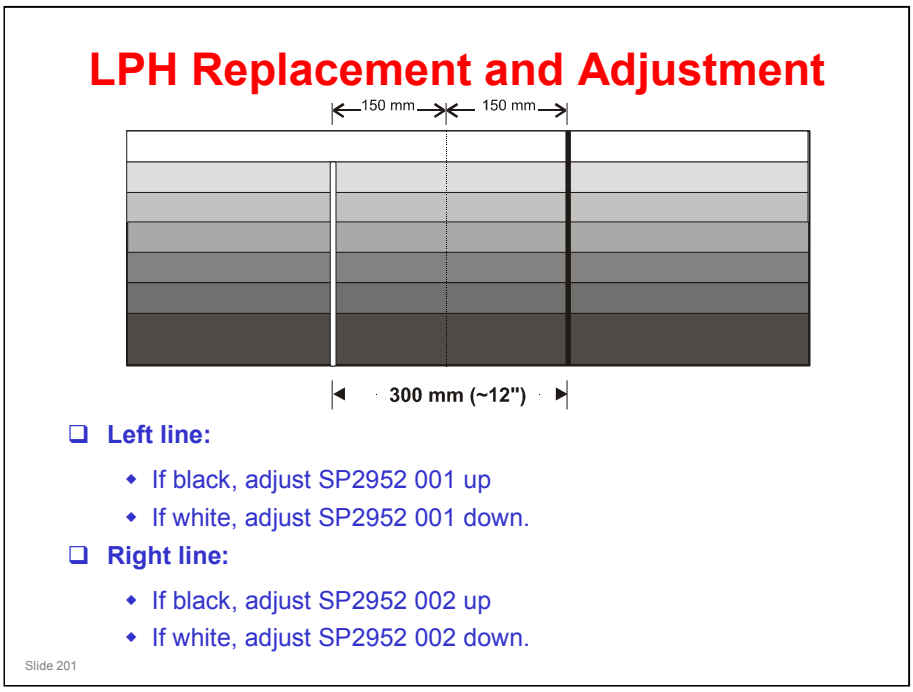


LPH REPLACEMENT AND ADJUSTMENT

Printing the Test Pattern

Replacement and Adjustment, Important Adjustments, LPH Adjustment with SP Codes

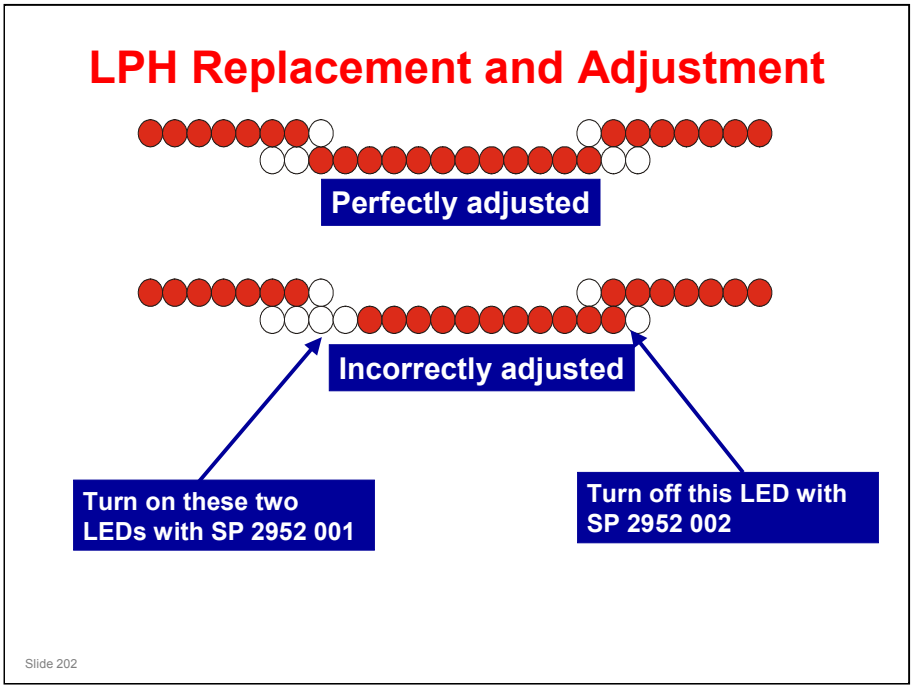
- The pattern appears something like shown on the slide.
- Note the faint lines one third and two thirds of the way across. These are the joints.
- These lines are typical for a perfectly adjusted LPH. It is impossible to get rid of these faint lines.
  - Just make sure that the customer is satisfied with a typical printout of something that they will be using frequently (a CAD schematic or something). Keep quiet and see if they notice anything one third and/or two thirds of the way across.
- If something is wrong with the factory settings, the lines will look dramatically black or white, as shown in the next slide.



LPH REPLACEMENT AND ADJUSTMENT

Adjusting the SP Settings

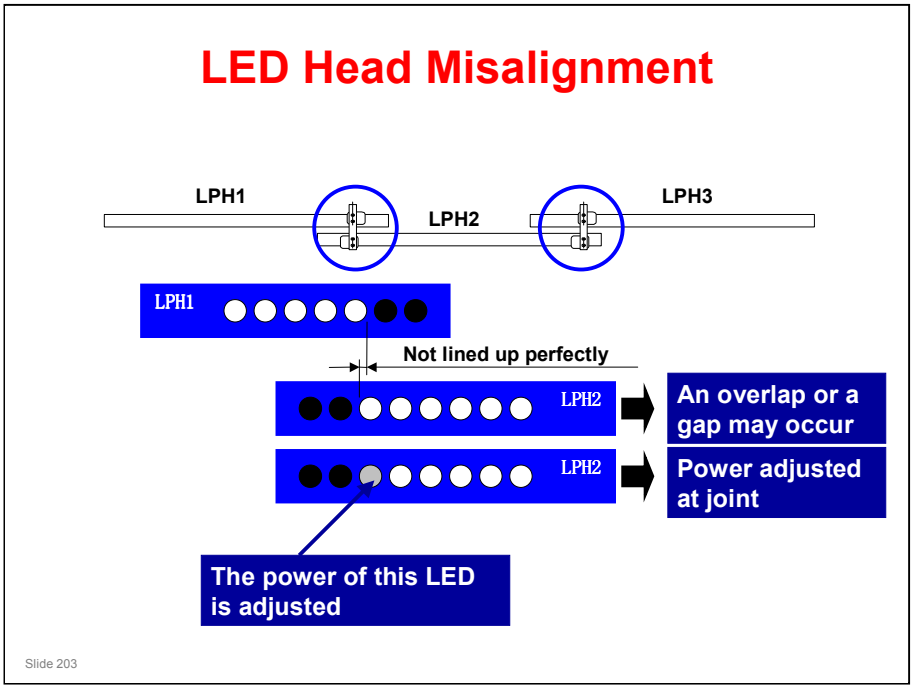
- If the SP settings are as little as one pixel out, you will see a clear white or black line, like in the above example.
- On the left, too many LEDs are switched off and the result is a white line.
- On the right, too many LEDs are switched on, and the result is a black line.
- Adjust the lines until they are faint; the lines cannot be completely erased.
- For how to adjust, see the next slide.



LPH REPLACEMENT AND ADJUSTMENT

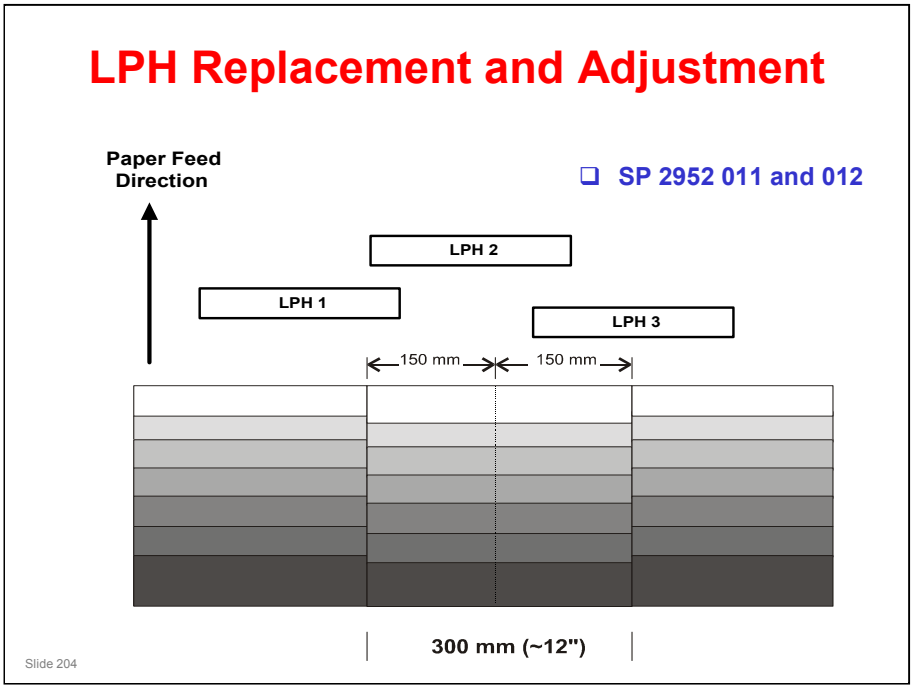
Adjusting the SP Settings

- The top diagram shows how the LEDs should light.
- The bottom diagram shows not enough LEDs lit at the left joint and too many at the right joint.
  - On the test pattern, this will cause a white line one-third of the way across, and a black line two-thirds of the way across.
- The SPs switch off LEDs in the central segment of the LPH (LPH 2). The LEDs in LPH 1 and LPH 3 are not affected.
  - Adjusting the SPs up in intervals of 10 (410, 420, etc.) switches off one LED for every interval of 10, and adjusting down 10 switches on one LED.
  - Adjusting the SPs up less than 10 (411, 412, etc.) decreases the light intensity of the LED at the end of the row of lit LEDs, and adjusting down less than 10 increases the light intensity.
  - The LED at the border between lit and unlit LEDs will be affected.
- To remove a line, adjust by 10 until it goes away. Then adjust the other way by 1 until it just appears again, then adjust back the other way by 1 to finish (the line should have just disappeared). Then make test prints to ensure that the copy quality is tolerable.
- Why do we have these intervals of 1/10? The LEDs are not perfectly lined up vertically; this will be explained later.



LED HEAD MISALIGNMENT

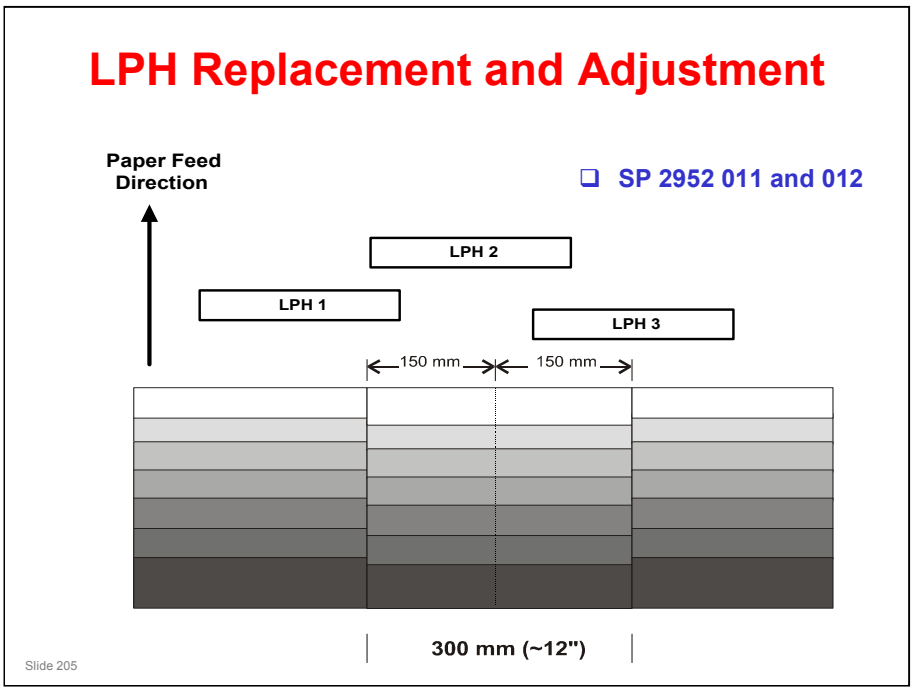
- In the example on the slide, the LEDs in head 2 are not directly in line with those in head 1.
  - A similar situation will occur between heads 2 and 3.
- If there is an overlap at the joint, a black line will occur on the printout if both overlapping LEDs are lit.
- If there is a gap at the joint, a white line will occur on the printout between the two pixels.
- To counteract this, the power of the indicated LED can be adjusted. There are 32 possible power values between off and fully lit (at 10% power).
- Note that the heads are physically joined together. This reduces the expansion due to heat.
  - If the heads were not physically joined together, the gap between two pixels would increase by 100 μm.
  - With the physical joints, the expansion is less than 20 μm.
  - For comparison, the gap between the dots is 42.3 μm.



LPH REPLACEMENT AND ADJUSTMENT

Adjusting the SP Settings, continued

- 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 exaggerated, but we need to point out that the heads at left and right are also not exactly lined up.
- Because of this, the main scan signals for each head have to be timed so that they are output in the correct locations on the drum.
- If the timing is incorrect, main scan lines will appear to be disjointed at one third and two thirds of the way across the page, as shown in the lower 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 appear.
  - These SPs adjust the timing of the main scan lines for each head. The head that is positioned furthest 'up the page' will print its part of the line first. Then, as the drum rotates, the other heads will add their segments of the same scan line, at the correct time.
  - So, the data being output at a particular instant 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.



LPH REPLACEMENT AND ADJUSTMENT

Adjusting the SP Settings, continued

- If the test print out is disjointed, adjust SPs 2952 011 and 012 by trial and error until the main scan lines are printed correctly.
  - Adjust SP 2952 011 first. This takes LPH 1 as the base for the adjustment, and corrects the timing for LPH 2 relative to that.
  - Make a test print. If the left and central parts of the chart are not lined up properly, adjust SP 2952 011 again until they are lined up correctly.
  - The right side of the chart may still be not lined up. Adjust SP 2952 012. This corrects the timing of LPH 3 relative to LPH 2, 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 lined up properly.

Uneven Density between the Three Blocks of the LPH

- **In the factory, SP 2943 is adjusted to make the output from each block the same.**
  - The 16th scale (darkest) of the greyscale is calibrated to be 1.3 ± 0.1.
  - But after this calibration, it is possible that density for other levels in the greyscale are not exactly the same.
- **If the customer complains about unequal density across the page, and if you can see that this is due to the three different blocks of the LPH, then adjust SP 2943.**
  - But, this SP adjusts all levels of the greyscale at one time for each block, and the size of the change may not be the same for each level of the greyscale. So, if you make the output equal for one level, it may not be equal for another level.

Slide 206

No additional notes

RICOH

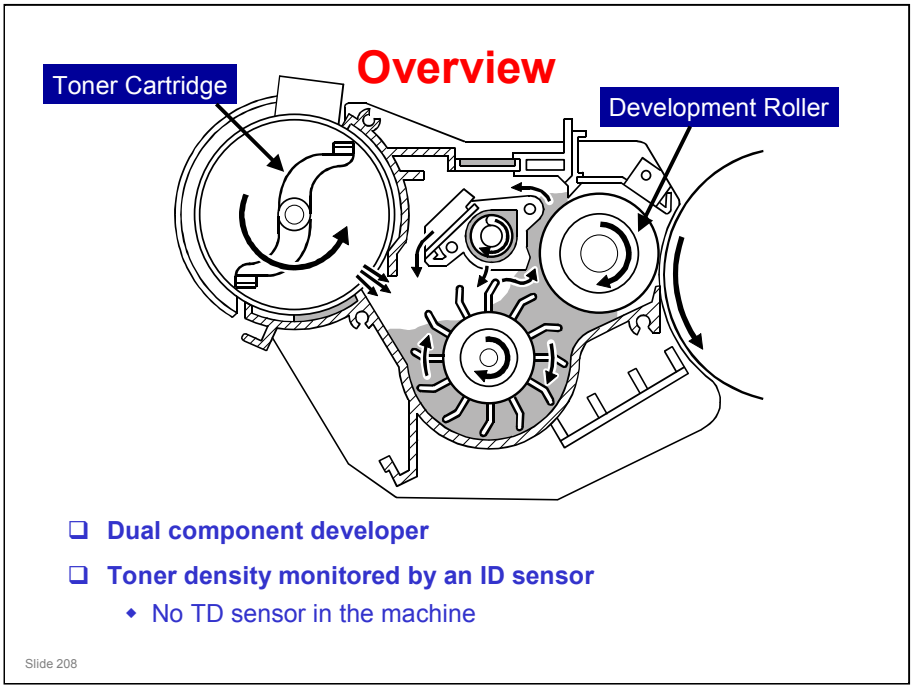
D046/D049 COPIER TRAINING

Development and Toner Supply

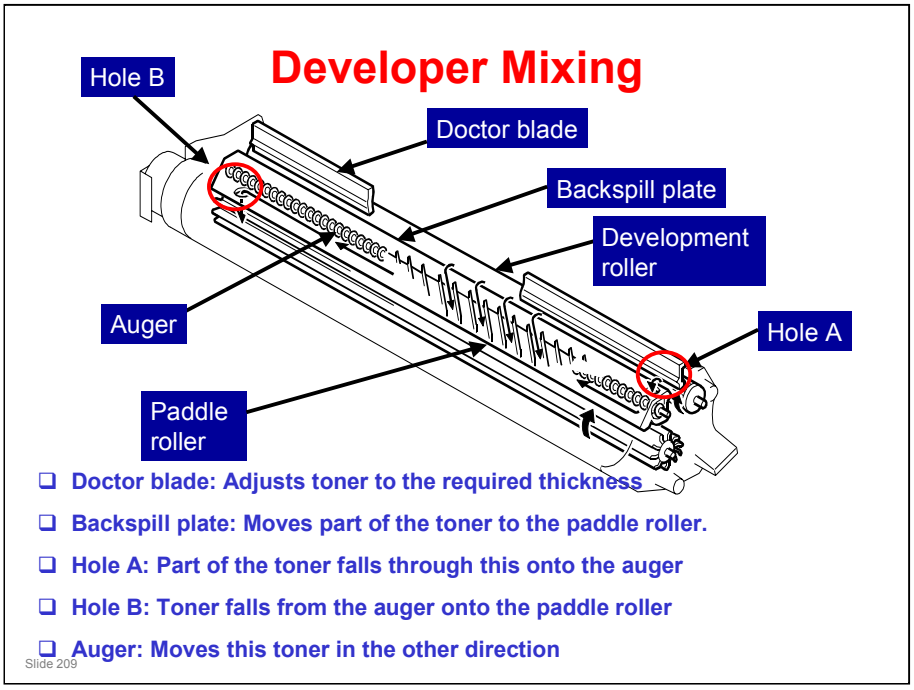
Slide 207

PURPOSE OF THIS SECTION

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

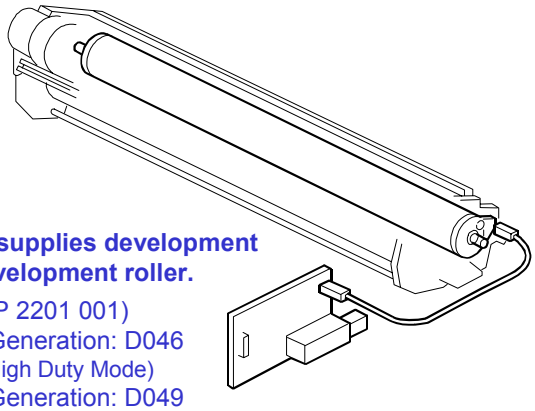


❒ The toner cartridge is installed in the development unit (at the top left in the drawing).



- ❒ 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.**
  - Copying: -650 V (SP 2201 001)
  - ID Sensor Pattern Generation: D046
    - » Default: -440 V (High Duty Mode)
  - ID Sensor Pattern Generation: D049
    - » Default: -490 V (High Duty Mode)

Slide 210

Copying

- The development bias is -680 V.

ID Sensor Patterns

- The main point to note here is that the machine has two ways of making the ID sensor patterns. These are Low Duty Mode and High Duty Mode. The mode used depends on SP 2201 004.
- In this machine, there should be no need to change the low/high duty mode setting (see the next slide).

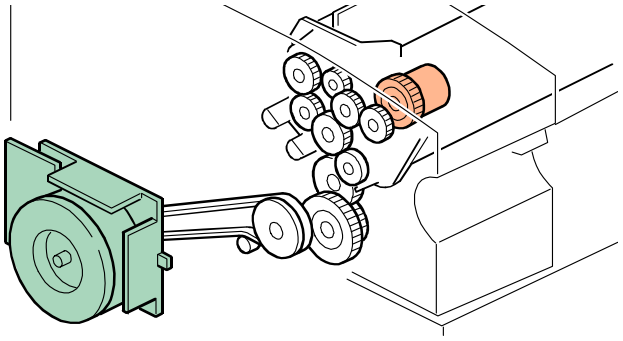
How to Use the Low/High Duty Setting?

- The default setting is high duty mode.
- In low duty mode, if the copy volume is more than 2,500 m/month or 200 m/day, toner scattering can occur.
- In high duty mode, if the copy volume is low, image density in solid areas can be slightly too low (but within specifications).
- So do not change this setting.

Slide 211

- This machine has a higher estimated ACV than the Dolphin, so the default setting was changed from low duty mode to high duty mode.
- It is thought that it will not be necessary to change this setting in the field for this machine.

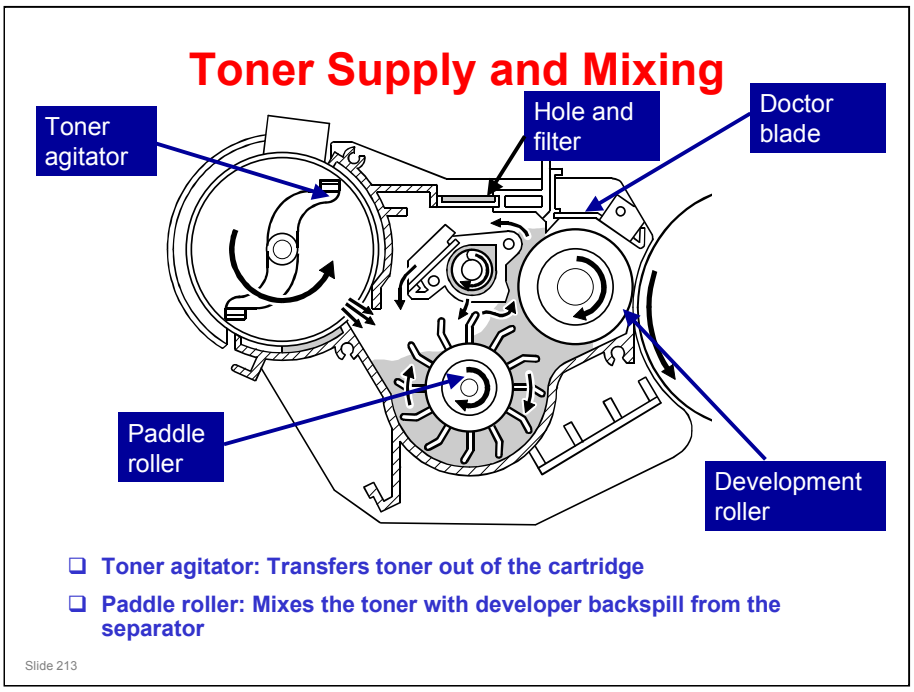
Development Unit Drive



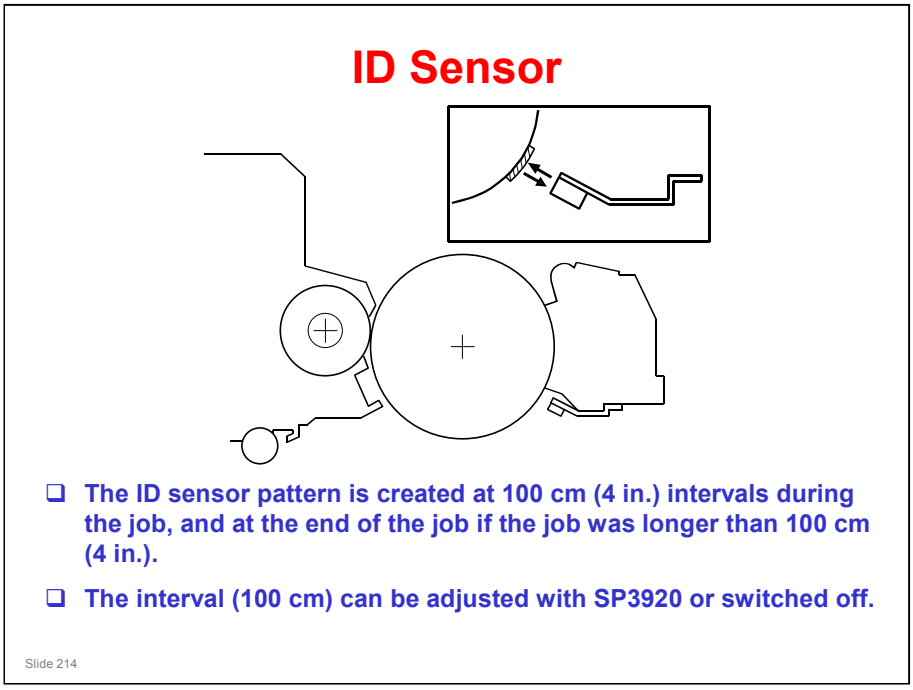
- **Development motor: Drives the development unit through a timing belt and gears**
  - Also turns the toner bottle, via the toner supply clutch

Slide 212

No additional notes



- 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.



ID SENSOR

- The main points are on the slide.
- For example, if the first copy after an ID sensor pattern check is 90 cm long, there will be no ID sensor pattern check after the copy (less than 100 cm made). Then, if the next one is 50 cm long, 140 cm will have been copied since the last check, so the ID sensor pattern is checked after printing the 50 cm copy.
- The interval can be changed with SP 3920.
  - For example, you may need to reduce this interval if the user copies originals with a high amount of black, so that the amount of toner in the developer does not run low.
- The ID sensor pattern is used for toner supply control and toner near-end/end detection, which will be explained later in this section.

Toner Supply

- **The machine controls toner the supply of toner to the development unit by switching the toner supply clutch on/off.**
- **For copies shorter than 1250 mm (49.2 in.): Detect Supply mode is used (this uses readings from the ID sensor).**
- **For copies longer than 1250 mm (49.2 in.): The machine automatically enters the "Long Print" mode.**
  - In Long Print mode, the machine uses Fixed Toner supply mode (the readings of the ID sensor are ignored)
  - There are two types
    - » Drawing: Fixed supply of 3% (adjustable with SP 2208-5)
    - » Graphic: Fixed supply of 6% (adjustable with SP 2208-6)
    - » The default is 'Drawing' (change with SP 2208-7)

Slide 215

No additional notes

Toner Supply Modes

- **Three toner supply modes**
  - Detect mode: Uses the ID sensor
  - Two fixed supply modes (3% and 6%): A fixed amount is supplied every page, based on either 3% or 6% black coverage
- **The machine cannot automatically switch between detect and fixed supply mode.**

Slide 216

- The main points are on the slide.
- The most important point to note is that the machine cannot automatically switch modes when the sensor breaks, or when a new one is installed.
  - SC400 to 406 will occur if the ID sensor fails. This is a D type code, so copying will still be possible after the machine is switched off/on. However, copy quality will deteriorate because no ID sensor check will be done, and the machine will not switch itself to fixed supply mode automatically.
  - If the ID sensor cannot be replaced immediately, the technician has to change to a fixed supply mode using SP 2208 003.
  - See the SP table for instructions on which setting to use.
- 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 copy density.
- SP 2208 002: This can be adjusted to increase or decrease the amount of toner supplied. Refer to the SP table in the service manual for how to use this SP.

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 001 three times in a row, near-end is detected**
  - Default: 0.155

Slide 217

- This is similar to the Neptune-C2.

Recovery from Near-end

- If Vsp/Vsg drops below SP 2927 001, the machine is released from the near-end condition.

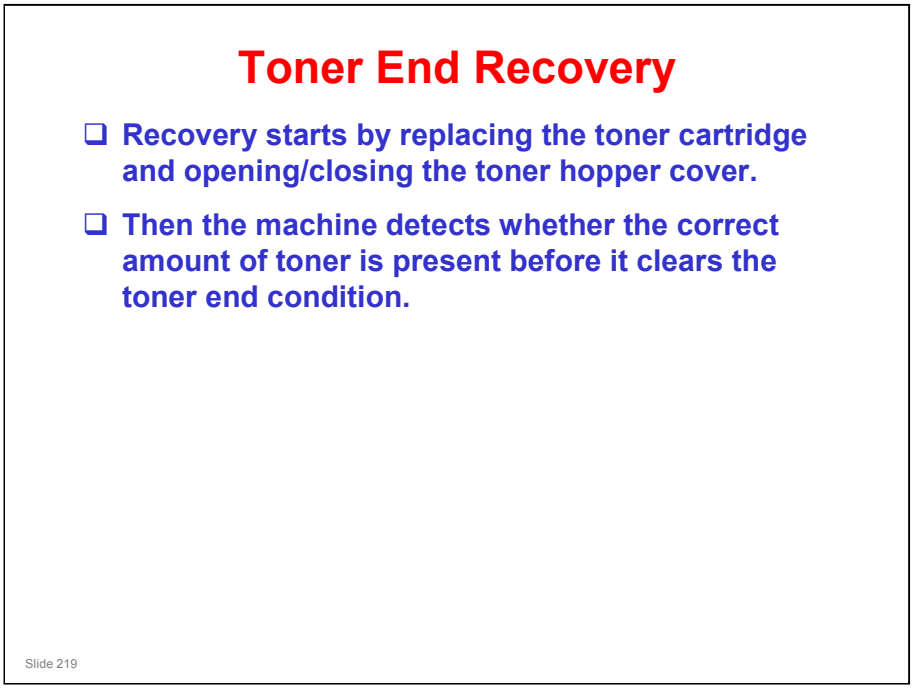
Toner End Detection

- **If Vsp/Vsg is more than SP 2927 002 three pages in a row, end is detected**
  - Default: 0.175
- **Then, the machine cannot be used until toner end recovery is fully completed.**

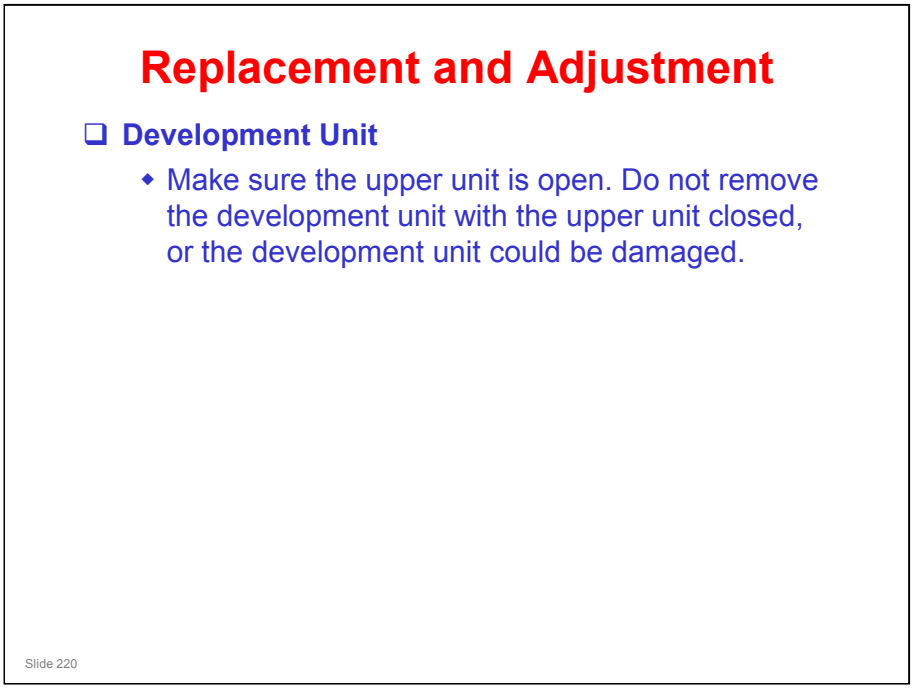
Slide 218

- This is similar to the Neptune-C2.

No additional notes



- The main points are on the slide.
- There are no field service adjustments, so there is no need to go over the process in in detail.
  - Changing related SPs could cause developer to get on the drum (which would damage the drum) or on the copies (which would damage the hot roller).
- The main point is that you cannot recover the machine by just opening/closing the cover. The machine has to detect the right amount of toner.



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

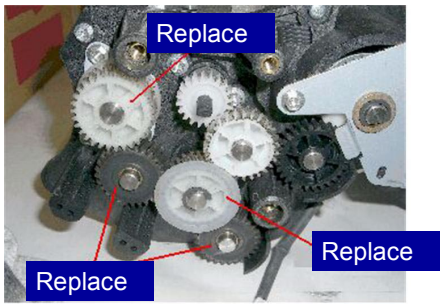
Replacement and Adjustment

- **Developer**
  - You need one unopened toner cartridge to do this procedure (or, you can tape up the existing cartridge, so that toner cannot get out).
  - The installation procedure for new developer is similar to the steps in the machine installation procedure for installing developer and toner.
    - » Set a new toner cartridge after you add the first bag of developer (do not remove the tape).
    - » Then turn the power on to distribute the first bag. (This takes about 22 seconds).
    - » Turn the operation switch off, then turn the main power switch off.
    - » Then remove the toner cartridge and add the second bag.
    - » Then install a toner cartridge and remove the tape (you can use the old toner cartridge if toner is remaining).
    - » Input lot numbers and initialize the developer.

Slide 221

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

Development Unit Gear Replacement



- These gears on the development unit must be checked every 200 km (656 K ft.) of paper feed, and replaced if necessary.

Slide 222

No additional notes

RICOH

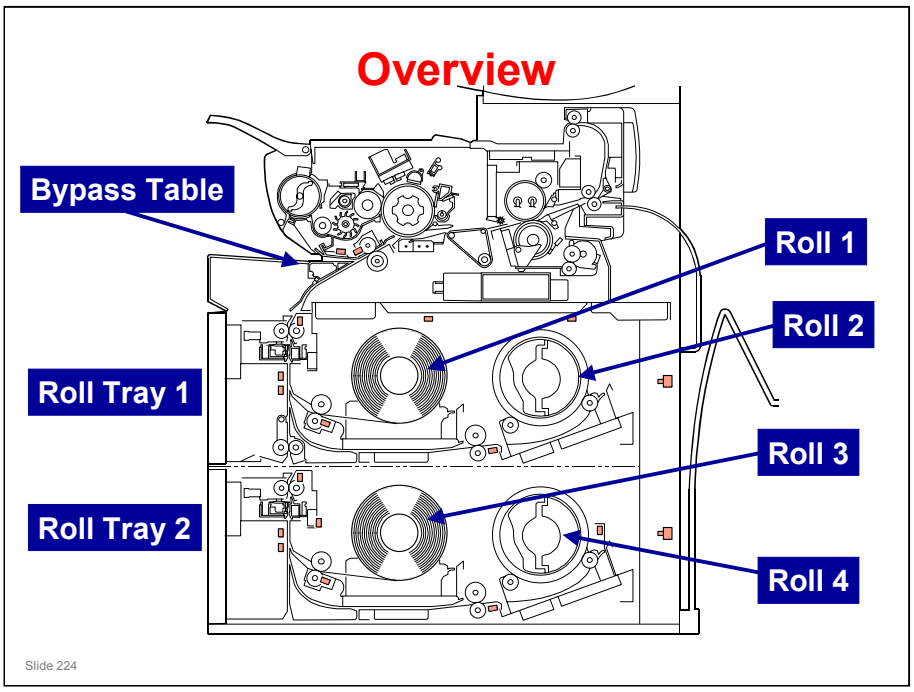
D046/D049 COPIER TRAINING

Paper Feed and Cutting

Slide 223

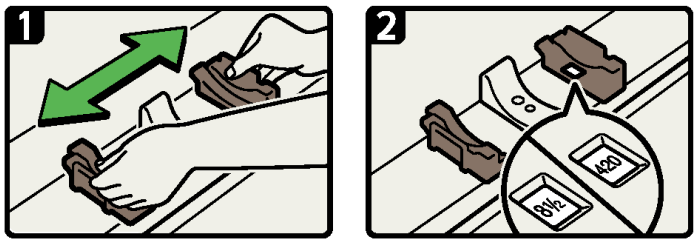
PURPOSE OF THE SECTION

- The paper feed mechanisms for the main body will be described.
- The cutter will also be described.
- The optional cassette feed unit will be dealt with in a later section.
- The mechanisms for the optional roll feeder are the same as for the main body.



- Each roll tray unit contains a cutter.
- The cutter cuts the paper after the specified paper length has been fed.
  - The amount of paper fed is monitored by the cutting sensor.
  - The starting time of the cutter depends on the cutting mode selected at the operation panel (preset cut, synchro cut, or variable cut)
- After paper has been cut, the roll must be reversed to a standby position away from the cutter. This allows the next job to go ahead quickly, if another roll is chosen.
  - For each tray, there is a sensor called the lead edge sensor. This detects when the paper has been reversed away from the cutter.

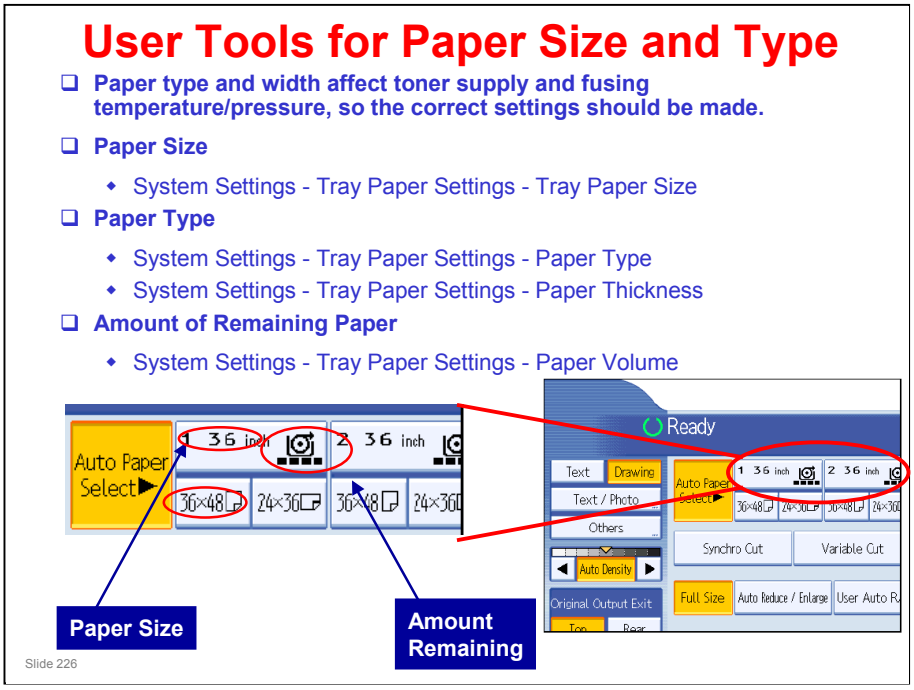
Paper Roll Holder



- **The holders cannot be taken out from the tray.**
  - Instead, they slide across the width of the tray, in a similar manner to paper width guides in a paper cassette.
- **The user must input the paper roll width and media type for each roll with user tools.**
- **There is no paper width detection.**

Slide 225

- A roll holder fits into the end of each roll.
- The roll holders can be easily moved to a different place to change the paper size.
- There are no paper size sensors attached to this mechanism.



General Settings Guide – System Settings – Tray Paper Settings

- Note the user tools that must be used for paper type and other roll-related displays on the operation panel.
  - Note how the settings affect the display panel.
  - Paper type and width affect toner supply and fusing temperature/pressure, so the correct settings should be made.
- Paper type
  - Rolls 1 to 3: Plain, Translucent (tracing paper), Film, Recycled
  - Bypass: Plain, Translucent (tracing paper), Film
  - The paper type is not displayed in the machine's default state. If you change the user tool (Tray Paper Settings – Paper Type), you can see the paper type.
  - Paper thickness: For each paper type, there is a default thickness. You can change this setting with a user tool (Tray Paper Settings – Paper Thickness).
- Remaining Paper: The user has to select a remaining paper icon with another user tool (Paper Volume). The machine then automatically counts down the amount of remaining paper, and changes the icon automatically. There are only four possible icons to display the amount of remaining paper, so it is only a rough indication. This is only for the user's reference; the user tool setting does not affect how the machine works.
  - There is roll end detection. This will be explained later.

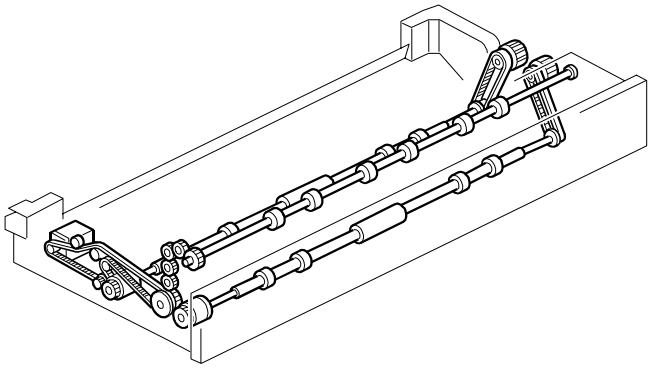
Roll Paper Home Positioning

- **At the end of each job, the feed roller reverses to pull the leading edge of the roll paper to its home position.**
- **This ensures that the common paper path is open for paper feed from any source selected for the next job.**
- **This is done at the following times:**
  - Within 0.5 sec. after the last sheet feeds, if there are no more feed instructions
  - Immediately after the power is turned on
- **The machine monitors the leading edge using the sensors, to determine the correct place to stop the reverse feed.**
  - Each roll has a fixed home position for the leading edge.

Slide 227

No additional notes

Roll Tray Drive



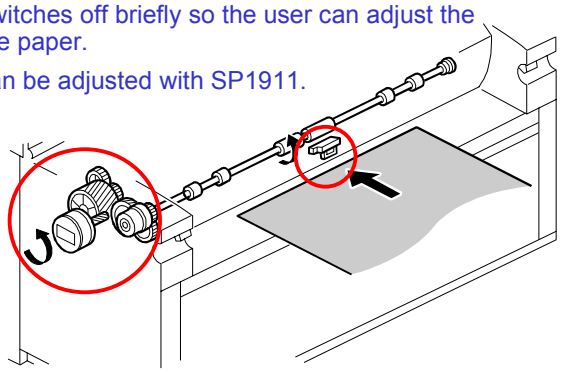
- Each tray has a roll feed motor
- Each roll has a roll feed clutch
- Each roll has a manual knob for winding the roll and for jam removal

Slide 228

- The main points are on the slide.
- Roll 1 is driven by roll feed motor 1 and roll feed clutch 1.
- Roll 2 is driven by roll feed motor 1 and roll feed clutch 2.
- Roll 3 is driven by roll feed motor 2 and roll feed clutch 3.
- Roll 4 is driven by roll feed motor 2 and roll feed clutch 4.

Bypass Feed

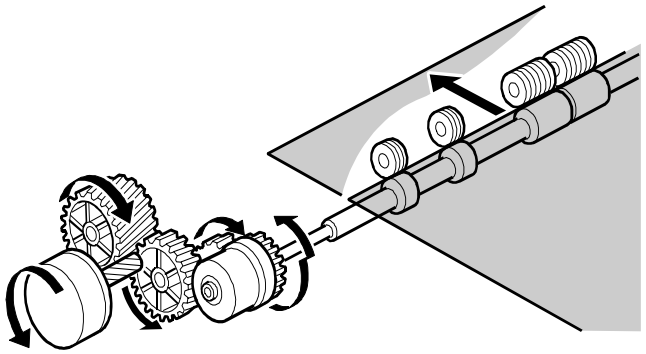
- **Bypass feed sensor: Detects when a sheet of paper is placed on the bypass table**
- **Registration motor and registration clutch: Feed the paper into the machine**
  - The clutch switches off briefly so the user can adjust the position of the paper.
  - This delay can be adjusted with SP1911.



Slide 229

- The main points are on the slide.
- There is no by-pass roller mechanism. The bypass feed sensor is just before the registration roller.
- When the bypass feed sensor detects the paper, the registration motor and clutch feed the paper to the registration sensor.
- When the paper reaches the registration sensor, the machine makes a beep.
  - If there is no beep, the paper didn't reach the sensor.
- The paper stops at the registration sensor so that the user can adjust the position of the paper.
  - The delay can be adjusted with SP 1911.

Registration

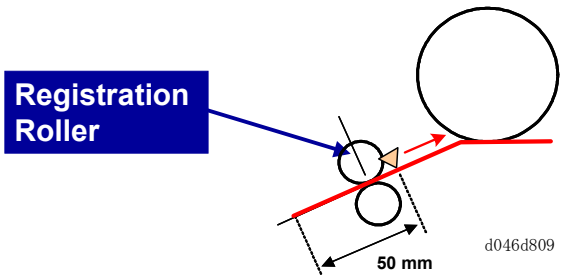


- **Registration motor and registration clutch: Drive the registration roller.**

Slide 230

- The main points are on the slide.
- The registration motor also drives the toner collection coil, so both a motor and clutch are needed for the registration roller.

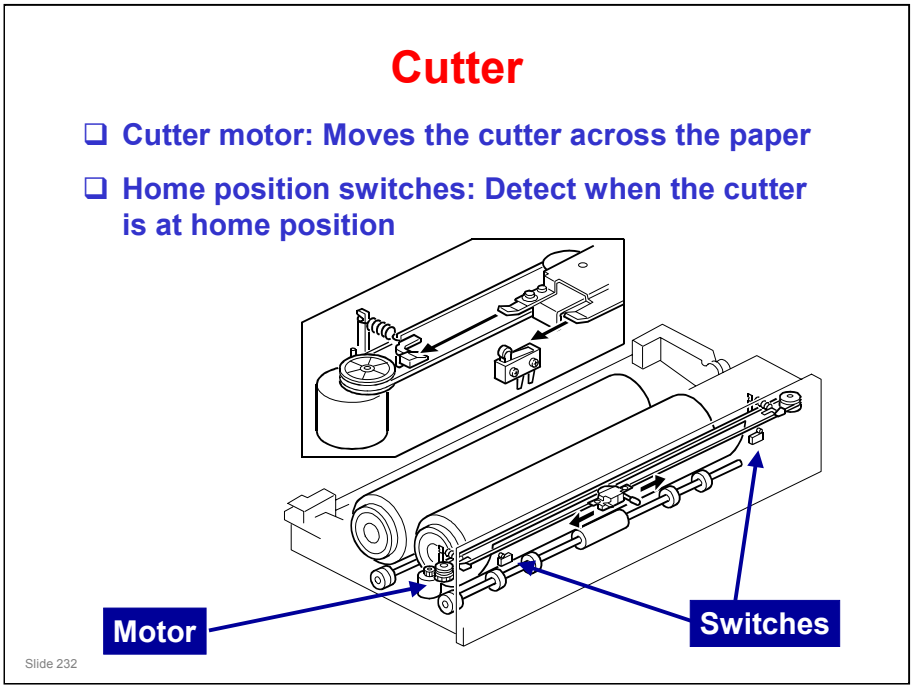
Registration Motor Timing Adjustment



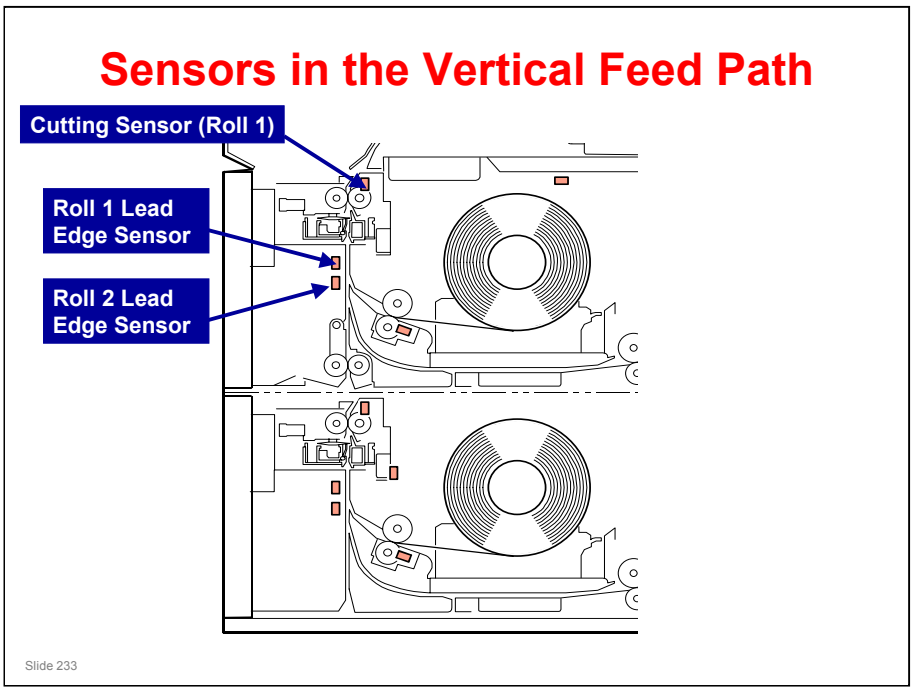
- The fusing roller turns a bit faster than the registration roller, to pull the paper tight. This prevents wrinkling and skew.
- However, the tension can cause image jitter when the trailing edge of the paper leaves the registration roller.
- To prevent this, just before the paper leaves the registration roller, the speed of the registration roller is increased slightly.

Slide 231

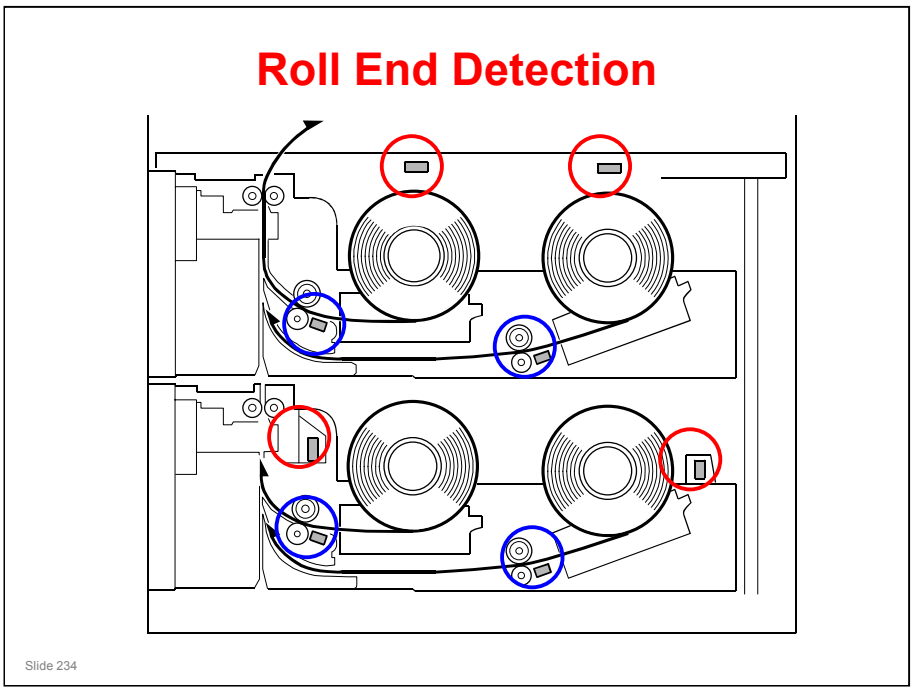
- When the trailing edge of the paper is 50 mm before the registration sensor, the speed of the registration roller is increased 2%.
  - The speed does not reach the speed of the fusing rollers.
- Jitter: A type of image distortion caused by toner particles being shaken from their original position on the paper.



- There is a cutter for each tray (two cutters in total).
- The cutter is a rotary disk that cuts the paper by pressing it against a metal plate and moving across the paper.
- The cutter motor moves the cutter across the paper.
  - The cutter can move in either direction.
  - The cutter can also be moved across the paper manually.
- There is a home position switch at each end of the cutter.
- When the cutter moves away from home position, a cam 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 so that it can be cut.
- When the cutter is at home position, the cam opens the paper holder and paper can pass through.
- There is a roll feed switch for each roll, on the side of the roll tray.
  - When this is held down, the machine feeds the paper.
  - When it is released, the cutter cuts the paper.



- The cutter cuts the paper after the specified paper length has been fed.
  - The amount of paper fed is monitored by the cutting sensor.
  - The starting time of the cutter depends on the cutting mode selected at the operation panel (preset cut, synchro cut, or variable cut)
- After paper has been cut, the roll must be reversed to a standby position away from the cutter. This allows the next job to go ahead quickly, if another roll is chosen.
  - For each tray, there is a sensor called the lead edge sensor. This detects when the paper has been reversed away from the cutter.



ROLL END DETECTION

Roll end sensors (circled in red)

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

Paper end sensors (circled in blue)

- ❒ Normally, there is always paper at these sensors, unless the roll runs out.
- ❒ 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 may install paper rolls that do not have black cores. In this case, the roll end sensors may not pick up the end of the roll.
- ❒ Rolls with taped or glued trailing edges
  - ➢ The trailing edges of some roll paper are attached to the roll core with either glue or tape. In this case:

    When the roll reaches the end the paper will pull against the tape or glued end of the paper and the roll rotation will stop.

    The machine signals a paper jam. This indicates that the empty roll must be replaced.

Roll End Detection

- **Each roll has a roll end sensor. These sensors detect roll end for paper rolls that have a black core.**
  - When the white paper separates from the black core, the sensors detect this change in color (white to black) and signal roll paper end.
- **These sensors cannot detect roll end for rolls that use a white core because they cannot detect a change in color when the paper separates from the roll.**

Slide 235

No additional notes

What Happens when Roll End is Detected

- **If the roll has a black core**
  - When a roll end sensor signals roll end after the trailing edge of the white paper separates from the black core:
    - » If less than 210 mm (about 8 in.) has fed past the cutting sensor, the paper roll reverses and takes up 200 mm of paper. The paper does not exit the machine.
    - » If more than 210 mm has fed past the cutting sensor, paper feed stops the cutter cuts the paper, the paper roll reverses and takes up the paper. There is no slack in the paper, so the paper is cut diagonally. This is no problem for plain paper and translucent paper, but with film the machine will signal a jam.

Slide 236

No additional notes

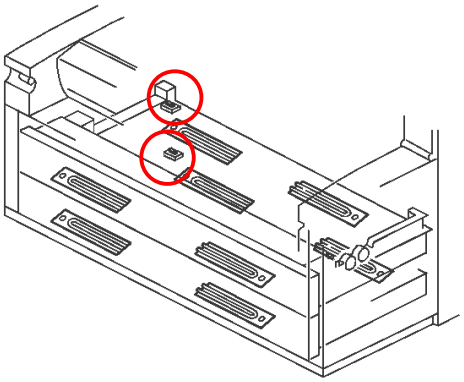
What Happens when Roll End is Detected

- **If the roll has a white core**
  - The roll end sensor cannot detect roll end when the trailing edge of the roll separates from the white core (there is no color change for the roll end sensor to detect).
  - However, when the paper end sensor detects the trailing edge of the paper:
    - » If less than 210 mm (about 8 in.) has fed past the cutting sensor, the roll reverses and takes up 200 mm of paper. The paper does not exit the machine.
    - » If more than 210 mm has fed past the cutting sensor, the paper is allowed to feed out of the machine without cutting.

Slide 237

No additional notes

Condensation Prevention



- The heaters are standard components, not options.
- Four heaters for each tray.
- One switch for each tray.
  - Default setting of the switch is off, to meet Energy Star standards

Slide 238

- The main points are on the slide.
  - There are four heaters for each tray (total 8).
- The heaters are standard components, not options.
- The switches (circled in red) determine what happens when the main power is off.
- These switches are set to OFF before the machine leaves the factory. Each switch is at the rear left corner of the tray. To switch the heaters on/off, open the tray completely and push the switch.
- Heater Switch Operation
  - OFF: Anti-condensation heaters OFF when main power switch is ON/OFF.
  - ON, Main Power SW OFF: The anti-condensation heaters turn on.
  - ON, Main Power SW ON: In standby mode and during copying, the anti-condensation heaters are ON, but when both of the fusing lamps are on, the anti-condensation heaters turn OFF.

Replacement and Adjustment

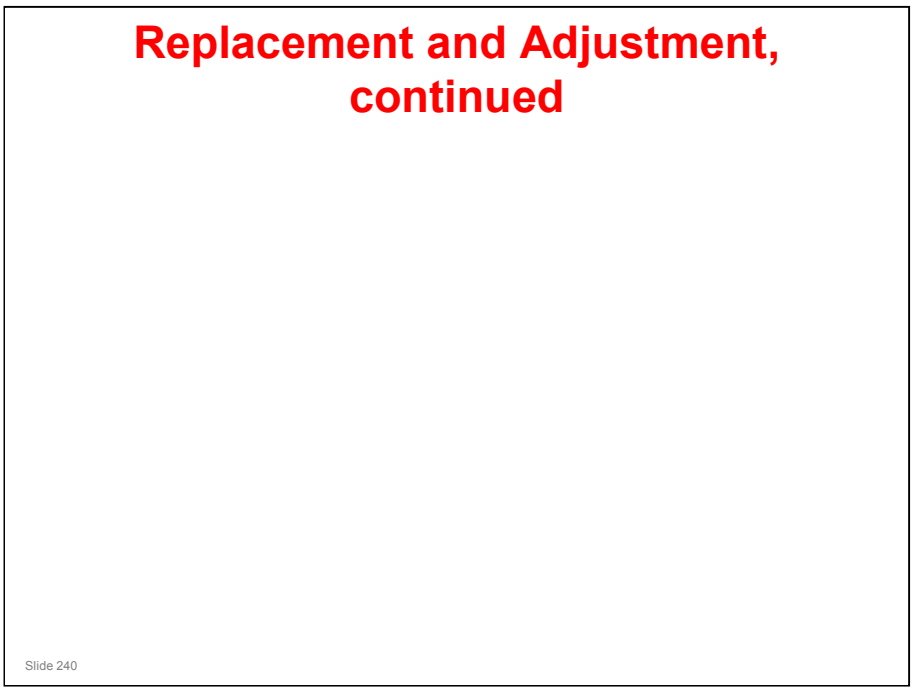
- The roll tray is heavy. At least two technicians are needed to remove it and re-install it.
- Check and adjust the cut length with SP 1920 after you change the feed rollers.

Slide 239

- Make sure that you are aware of the SP modes that must be done after each procedure (they are in the procedures in the manual).
- Adjust the cut length with SP 1920 after changing the feed rollers.
  - There are SPs for rolls 1 to 4. Use the adjustments for the roller that was replaced.
  - Just test the sizes that are most commonly used by the customer.
  - Theoretically, there may be some differences in the diameter of the feed roller, due to manufacturing tolerances. Because of this, this adjustment is recommended after changing the roller.
  - However, there may be no need to make this adjustment in the field, unless the user complains that the paper length is not being cut correctly. This may happen when the roller gets older.
  - USA models: Note that for many of the SP adjustments, you can only calibrate the machine to either Engineering or Architecture cut lengths, not both.

    For example, SP 1920 002 is '1st Roll: 297 mm/11" or 12 ". This means that if the SP is used to calibrate for 11" cut length (Engineering size A), but the user then selects Architecture size A (12") using the preset cut feature, the paper may not be exactly 12", because the machine was calibrated for 11" cut lengths, not 12".

    If these types of problems occur, the user will have to use synchro cut for Architecture paper sizes, or ask the technician to calibrate the machine again for Architecture paper sizes.



Notes, continued

- ❒ For the synchro cut feature, SP 4961 can be used to adjust the cut length. This calibrates the synchro cut feature by measuring two lengths (210 & 1000 mm).

  Replacement and Adjustment, Important Adjustments, procedure 10

  - ➢ Use this in accordance with the procedure in the above section of the manual.
  - ➢ Remember that during copying the synchro cut length is affected by the Margin Adjustment user tool setting. Have the class check whether SP 2101 and 4012 affect this also.

RICOH

D046/D049 COPIER TRAINING

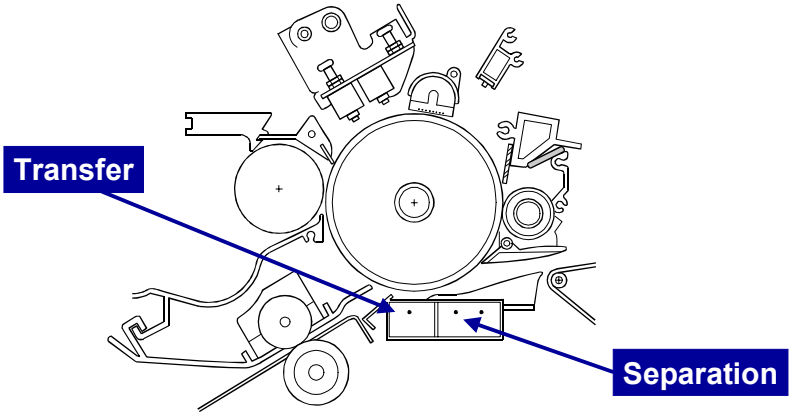
Image Transfer, Paper Separation, and Paper Transport

Slide 241

PURPOSE OF THE SECTION

- ❒ Image transfer and paper separation mechanisms will be described.
- ❒ Transport from the drum to the fusing unit will be explained.

Overview

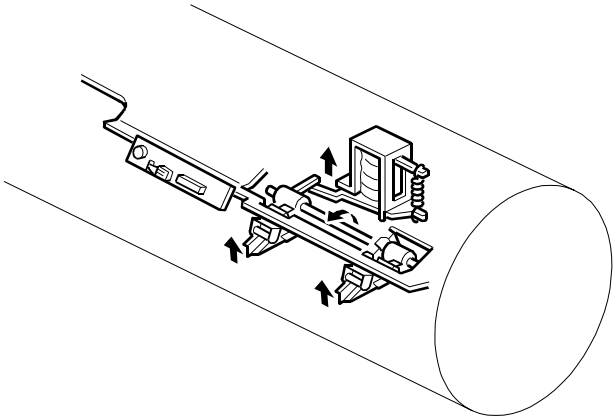


- Transfer corona unit: Applies about -5 kV to transfer toner from the drum to the paper.
- Separation corona unit: Applies about ac 4.5 kV and dc -350V to separate the paper from the drum.

Slide 242

No additional notes

Pick-off Pawls

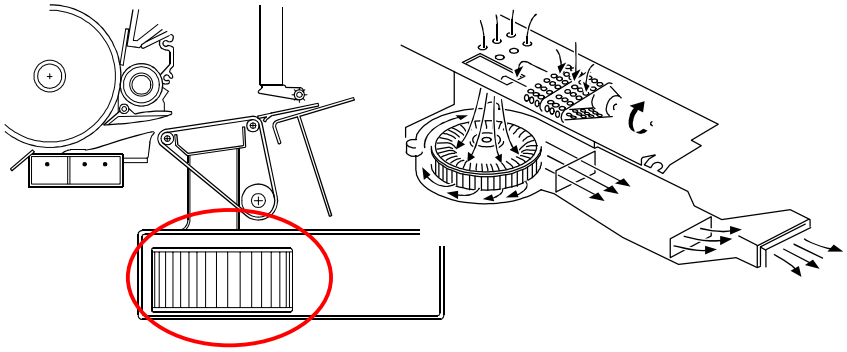


- **Pick-off pawl solenoid: Switches on to bring the pick-off pawls into contact with the drum**

Slide 243

- This is a back-up mechanism, in case the separation corona fails to separate the paper from the drum.
- When the leading edge of the paper on the drum enters the separation corona unit with about 198 mm (7.8") of the paper in contact with the drum, the solenoid switches on.
- The pick-off pawl shaft starts to rotate, and the pawls attached to the shaft are held against the drum by a spring.

Transport

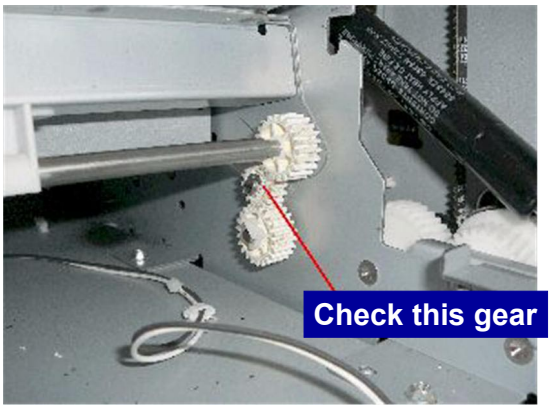


- Suction from the transport fans holds the paper to the transport belt.
- The transport belt carries the paper to the fusing unit.
- The fusing motor drives the transport belt.

Slide 244

- The main points are on the slide.
- The left-hand drawing shows the location of the transport belt and the fans.
  - There are two fans, circled in red.
- The right-hand drawing shows the flow of air out through the ozone filter.
- The fans also cool the fusing unit.
- The fans stay on during standby mode to keep the machine cool.

Gear Replacement



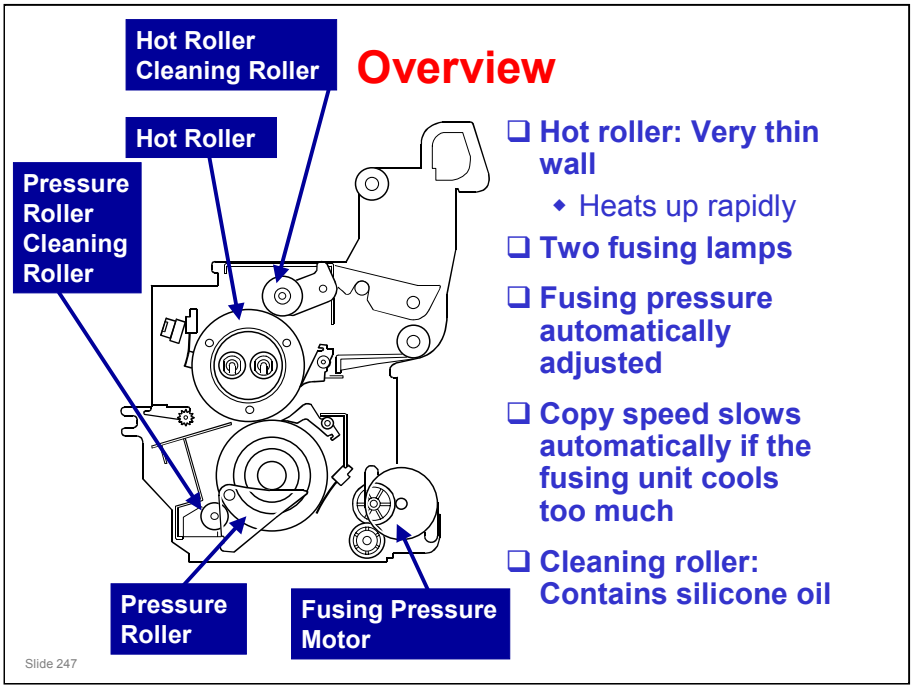
- Check this gear every 200 Km (656 K ft.) of paper feed and replace it if necessary.

Slide 245

No additional notes

PURPOSE OF THE SECTION

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



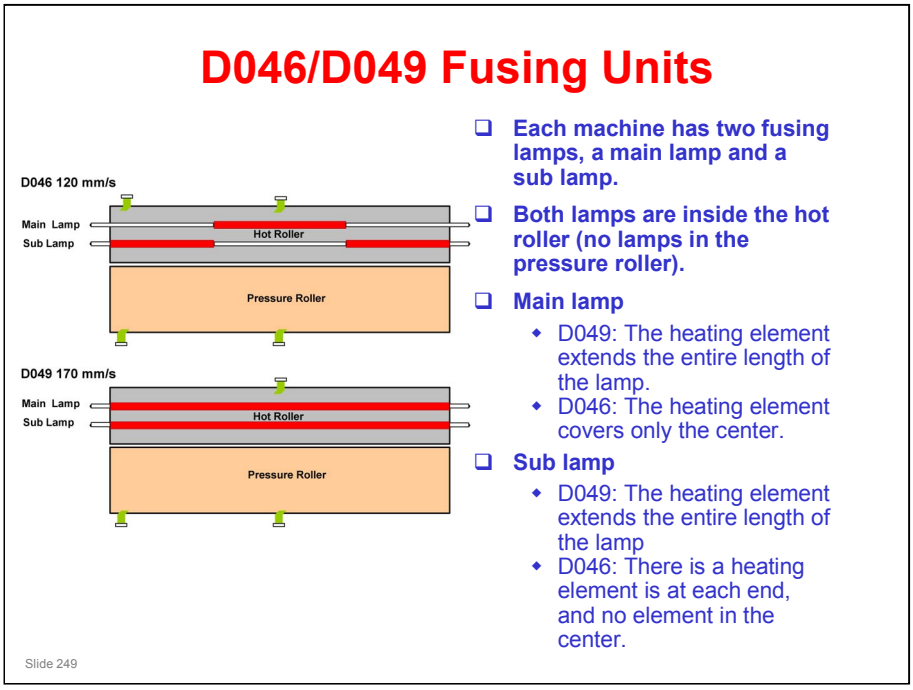
No additional notes

D046/D049 Fusing Units

- There are 4 different fusing units.
  - D046 N America
  - D046 Europe/Asia
  - D049 N America
  - D049 Europe/Asia
- The fusing lamps for each unit have different connectors also, so that it is not possible to install the fusing lamps in the wrong units.

Slide 248

No additional units



- The wattages of the lamps are different for each model also.
  - The connectors for the lamps are different, so it is not possible to install the lamp for the wrong machine.
- D049 hot roller
  - The roller contains three pipes with liquid in them. The liquid circulates when the fusing lamps turn on. This makes sure that the temperature is even all across the lamp (there are small differences in temperature in different places across the lamp due to the coils in the elements – the fluid in the pipes removes these differences).

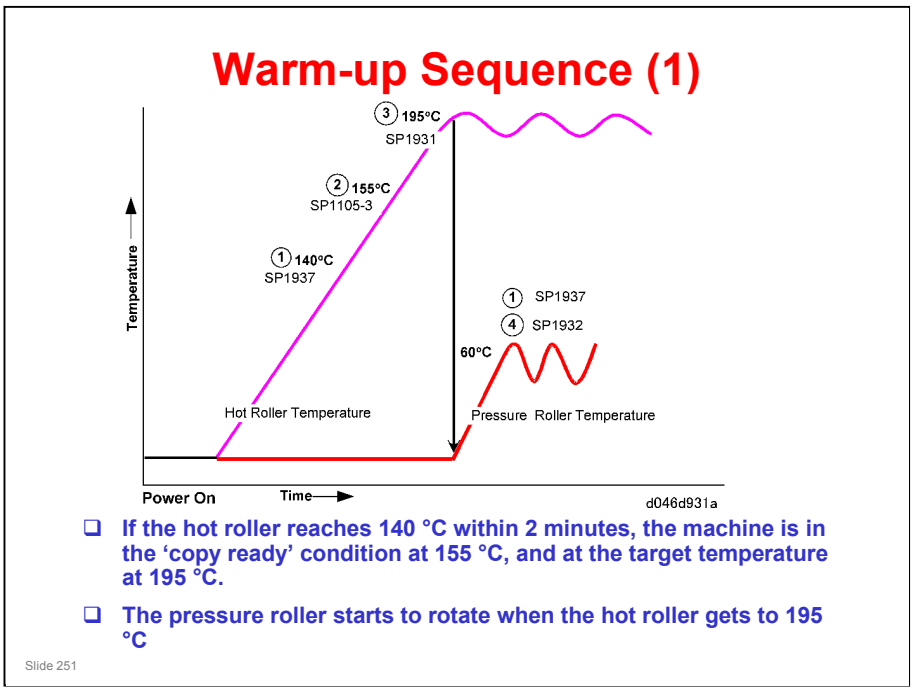
Temperature Control

- **The D046 has four thermistors but the D049 has only three.**
  - Hot roller (center, end)
  - Pressure roller (center, end)
  - D049: No thermistor at the end of the hot roller
- **There is no thermistor to detect the room temperature.**
  - To estimate the conditions inside the room, the machine measures how long is needed to reach 140 °C after the start of warm-up.
  - If it takes more than 2 minutes, the environment is detected to be a 'low-temperature' environment.

Slide 250

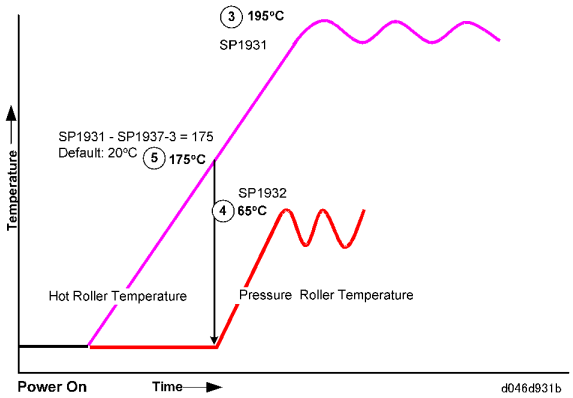
Other differences between the D046 and D049

- Hot Roller
  - D046: Diameter: 60 mm, thickness: 1.6 mm
  - D049: Diameter: 60 mm, thickness: 2.1 mm; contains a heat pipe roller
- Pressure Roller
  - Diameter: 65 mm, thickness: 85 mm (same for both models)
- Pressure Motors
  - Automatic pressure adjustment for both.



- This is for plain paper mode 3, which is the default condition.
- For other paper type settings, the copy ready temperature is the same as the target temperature.

Warm-up Sequence (2)



- If the hot roller cannot reach 140 °C within 2 minutes, the pressure roller starts to rotate when the hot roller gets to 175 °C.
- The target temperature at 195 °C.

Slide 252

- This is also for plain paper mode 3.

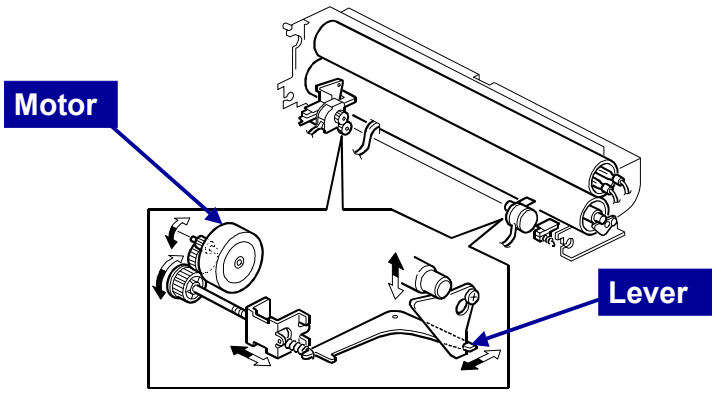
Temperature Control During Copying

- **The machine maintains the correct fusing temperature with two functions: Pressure Feedback Control and CPM Down.**
- **Feedback Control**
  - The machine uses readings from the pressure roller thermistors (center and ends). If the temperature gets too low, the fusing unit idles to get the roller to the correct temperature.
- **CPM Down**
  - If feedback control cannot maintain the correct fusing temperature, CPM down takes over.
  - CPM down adjusts the paper feed timing to create a wider interval between sheets of paper in the paper feed path.
  - A wider gap between sheets allows the hot roller more time with no paper between the rollers, so the hot roller can transfer more heat to the pressure roller.
  - The machine uses the difference between the pressure roller temperatures at the end and the center to control CPM down. Readings from the hot roller thermistors are not used.

Slide 253

No additional notes

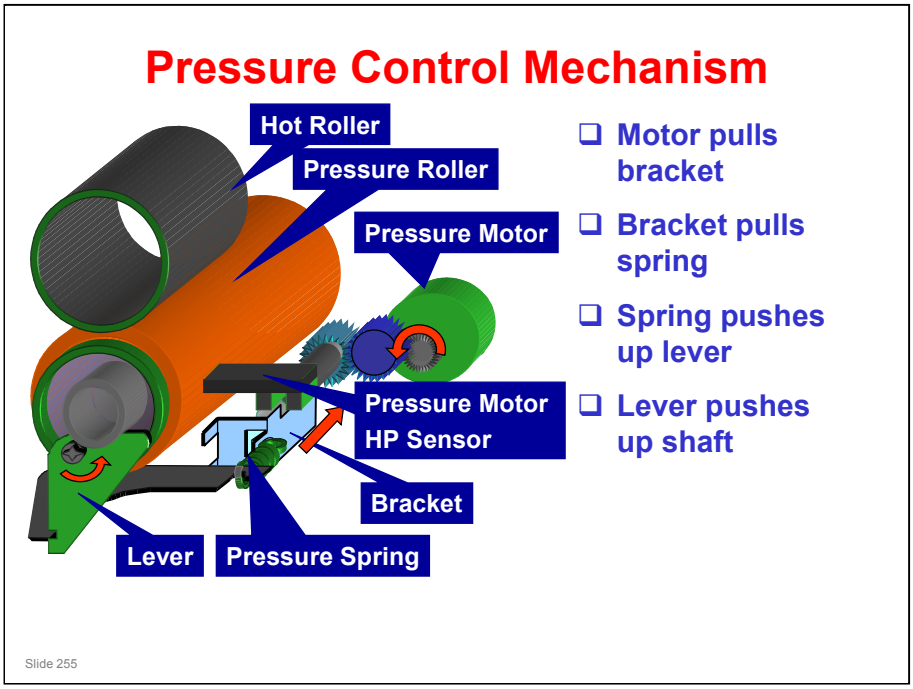
Pressure Control Mechanism



- Fusing pressure motors: Adjust the pressure between the hot and pressure rollers for each sheet of paper.
- The amount of the adjustment depends on:
  - Machine type (D046/D049), Paper type, Hot roller temperature
- If a jam occurs, the pressure is released automatically, so the user can remove the paper.

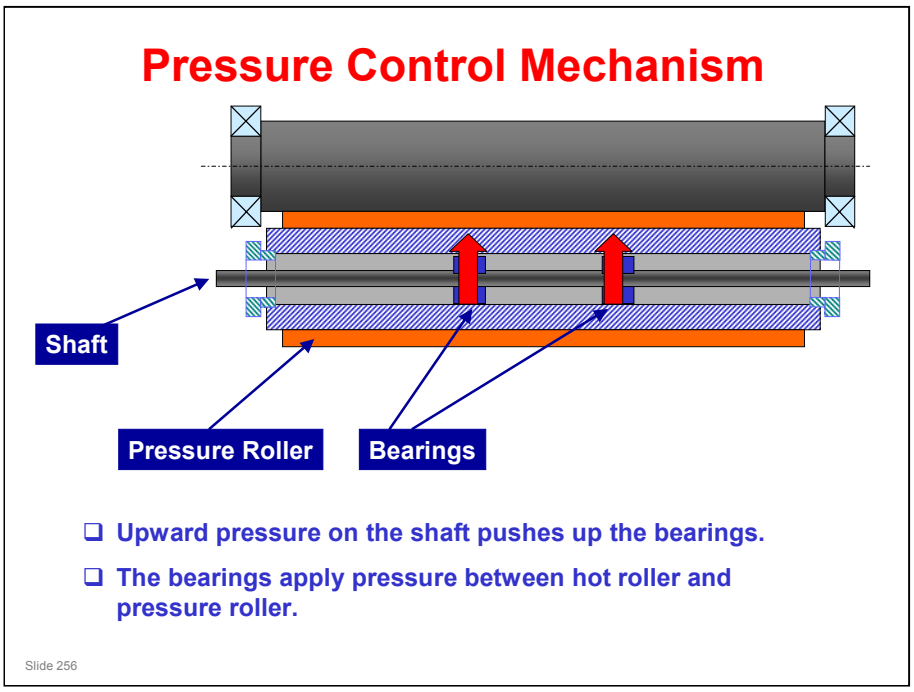
Slide 254

- Each motor pulls a spring, which moves a lever that applies upward pressure on the end of the pressure roller shaft.
- The pressure roller is hollow, so the shaft does not affect the pressure at the ends of the pressure roller. Bushings at the centre of the shaft push upwards, and this applies the upward pressure between the hot roller and pressure roller.
- Details of the process for D046 are different from D049.
- The release position for removing jams is not the same as the home position.
  - The output tests (SP 5804) have two different settings: For the home position and for the jam release position



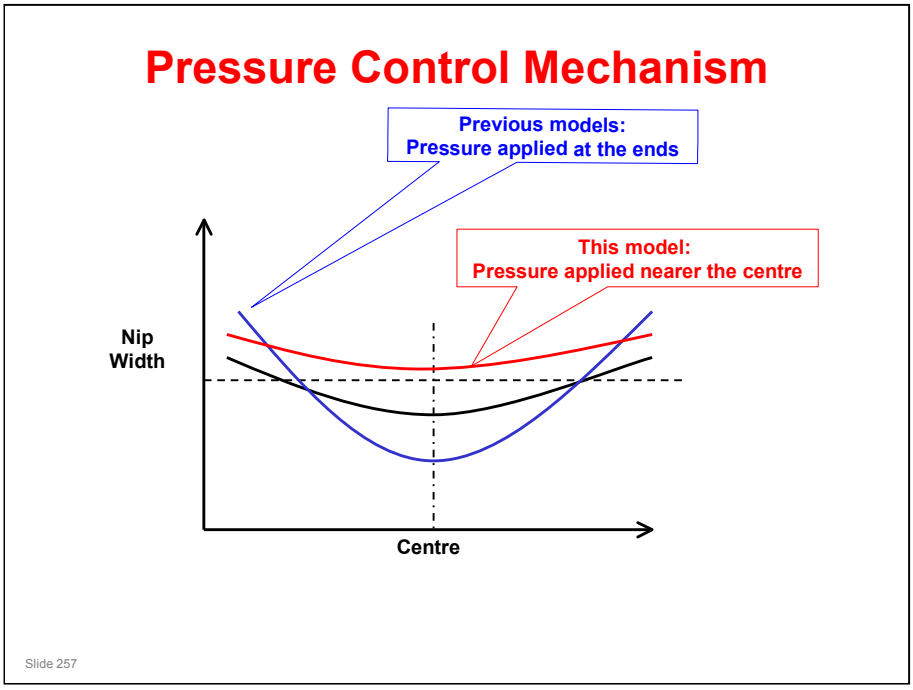
PRESSURE CONTROL MECHANISM

- This slide and the next one show the mechanism in more detail.



PRESSURE CONTROL MECHANISM

- This slide shows the shaft running through the centre of the pressure roller.
- The bearings apply upward pressure near the centre of the pressure roller.
  - This is different from most copiers. Pressure is normally applied between the ends of the shaft.
- The bearings are fixed in position with e-rings. There is no field service adjustment for the bearing position.



PRESSURE CONTROL MECHANISM

- The graph shows how the nip width changes across the width of the fusing unit.
- The dotted line going across the centre shows the ideal nip width.
- The vertical dotted line marks the mid-point of the fusing unit, across the paper path.

No fusing pressure applied

- See the black line. This is the same for previous models and for this model.

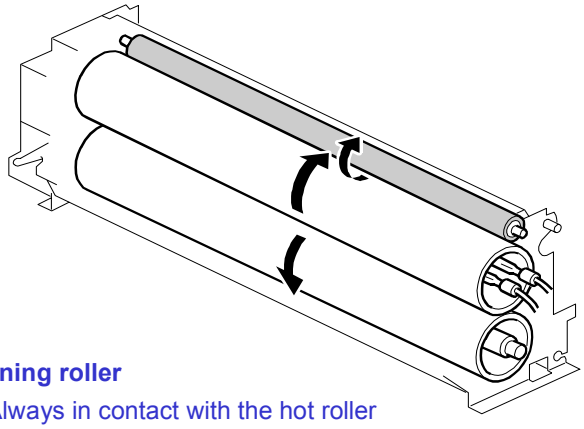
Previous models

- See the blue line.
- Pressure is applied at the ends of the pressure roller.
- The nip width varies widely across the paper.

This model

- See the red line.
- Pressure is applied nearer the centre (see the previous slide).
- The nip width does not vary as much across the paper, and is closer to the ideal nip width than previous models.

Hot Roller Cleaning

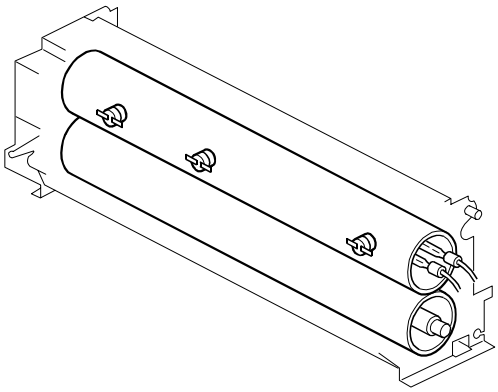


- **Cleaning roller**
  - Always in contact with the hot roller
  - Coating saturated with silicone oil
- **Hot roller: Reverses at the start of rotation to prevent oil streaking on outputs.**

Slide 258

- The main points are on the slide.
- There is no oil supply unit. The cleaning roller's coating is saturated in silicone oil, which cleans the hot roller.
- Helps prevent problems caused by paper that is coated with calcium carbonate.

Overheat Prevention - Thermostats



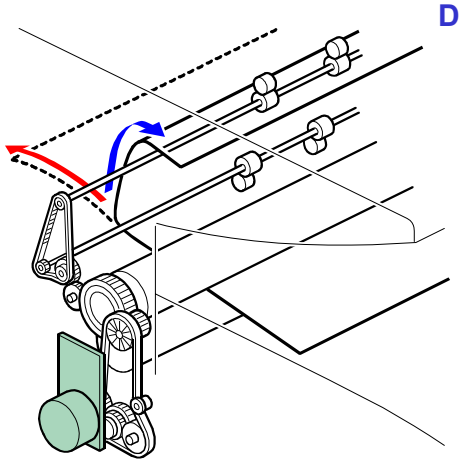
- The hot roller has three thermostats to prevent overheating in the fusing unit.

Slide 259

No additional notes

Fusing Unit Drive

- Fusing/exit motor:
  Drives the fusing unit



Slide 260

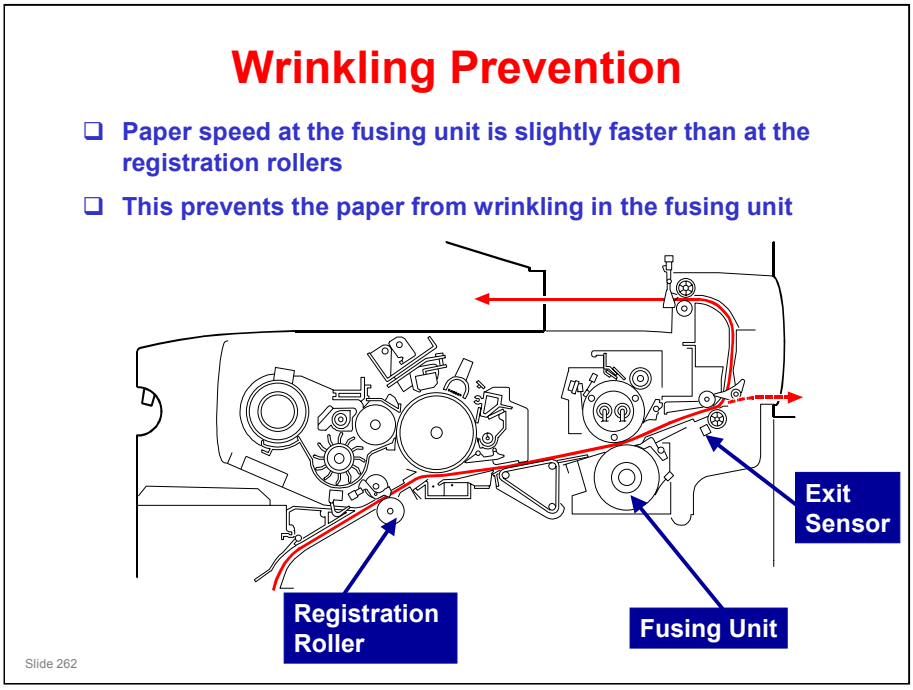
No additional notes

Fusing Motor Speed Adjustment

- **During paper feed, the speed of the fusing roller increases slightly, so that the fusing roller rotates faster than the registration roller.**
  - This pulls the paper tight to keep it straight.
  - The tension on the paper could cause the paper to snap out of the nip of the registration roller and cause "jitter" in the image if the speed is not corrected before the paper leaves the registration roller.
  - This line speed adjustment is done only for paper sizes narrower than 297 mm.
- **When the trailing edge of the paper is 50 mm before the nip of the registration roller, the fusing motor slows by -5%.**
  - This can be adjusted with SP1918.

Slide 261

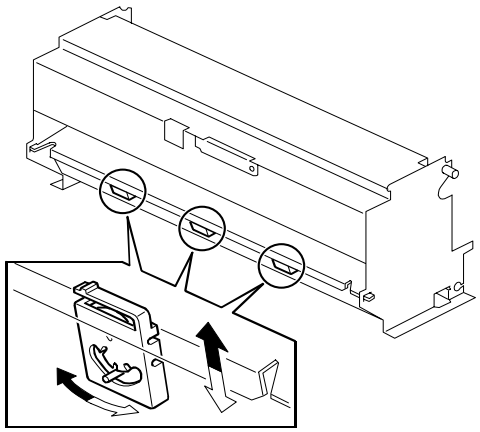
- Also, at about the same time, the registration motor speeds up slightly, as described in the Paper Feed section.
- The speed control adjustment is not done for paper shorter than 250 mm (9.8 in.)
- Fusing starts after the line speed has been slowed and the trailing edge has left the registration roller.
- The speed control setting of SP1918 is not done and the speed is increased after the trailing edge clears.



- The basic point is on the slide.
- When the paper reaches the fusing unit, the fusing motor starts to pull the paper through the machine and out of the exit.
- However, when the paper reaches the fusing unit, if it starts to move past the drum faster, the image will be enlarged in the sub scan direction.
- To counter this, the registration motor and fusing motor both slow down by the same amount, to maintain constant magnification.
  - The fusing unit is faster than the registration roller, to ensure that there is no wrinkling.
  - The speed change occurs when the leading edge of the paper reaches the exit sensor.

    The exit sensor is not on this diagram. The arrow indicates roughly where it is.
- The distance between registration roller and exit sensor is about 360 mm (14.2"), so this speed correction is only used when paper is longer than 360 mm.
- Alert students may observe that for a short while, the paper is moving past the drum faster (from when the fusing unit grabs the leading edge, until the leading edge reaches the exit sensor).
  - However, the fusing unit only pulls the paper slightly faster than the registration rollers. The speed difference is about 2%.
  - Look at a copy and see if you can spot any changes in the sub scan reproduction ratio between the 300 mm and 360 mm mark.

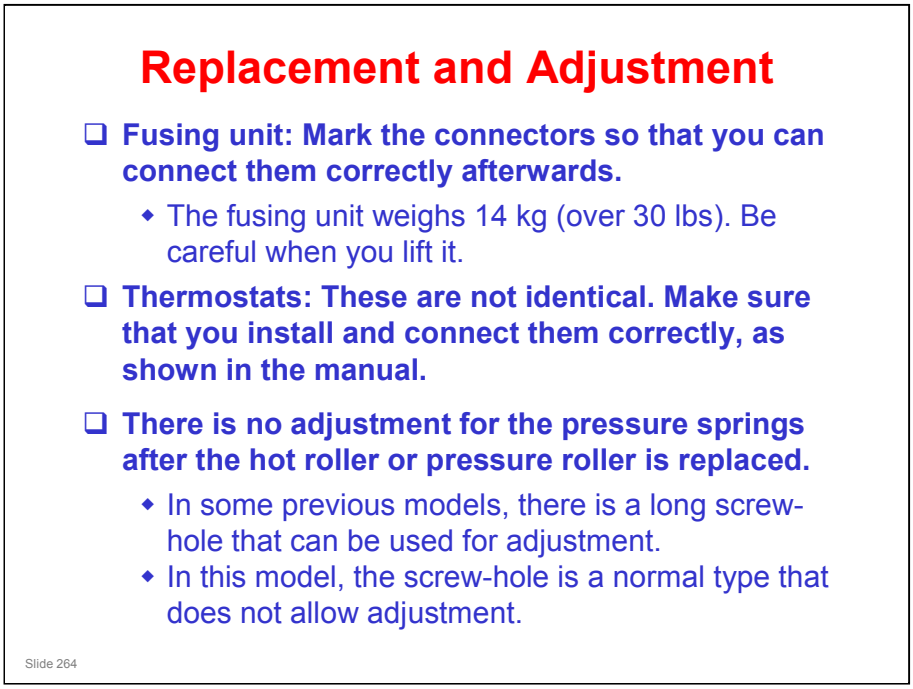
Fusing Unit Entrance Guide



- Cannot be adjusted without removing the fusing unit.

Slide 263

- There are three adjustment levers at the center of the fusing unit entrance.
- The levers can be moved left and right to adjust the height of the entrance guide plate.
- Adjust only when the paper thickness is causing a severe problem at the fusing entrance.
  - The adjustment cannot be made without removing the fusing unit, so it was not mentioned in the service manual, and should not be attempted unless there is a serious problem.



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

FPDB

- The diagram is a rear view. So, the right FPDB is on the left side of the drawing and vice versa.

Thermostats

- Make sure that you install them correctly, as shown in the manual.

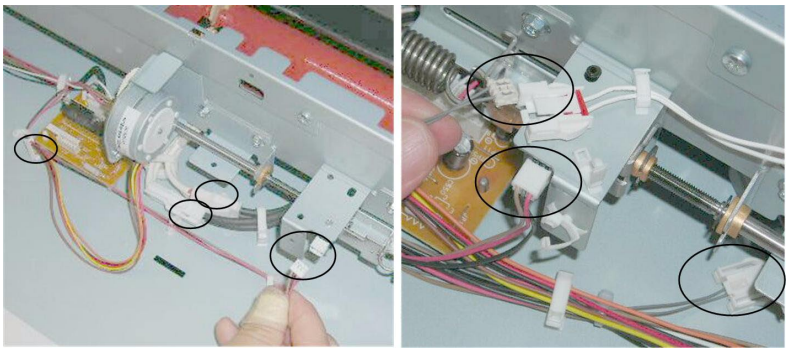
Fusing Lamps

- The fusing lamps are designed so that it is not possible to install the lamps in the wrong model.

Hot Roller

- It is possible to install the roller in the wrong model. The roller for the D049 is heavier.

Pressure Motors



- Make sure that you connect them up correctly (mark the cables and connectors before disconnecting).

Slide 265

No additional notes

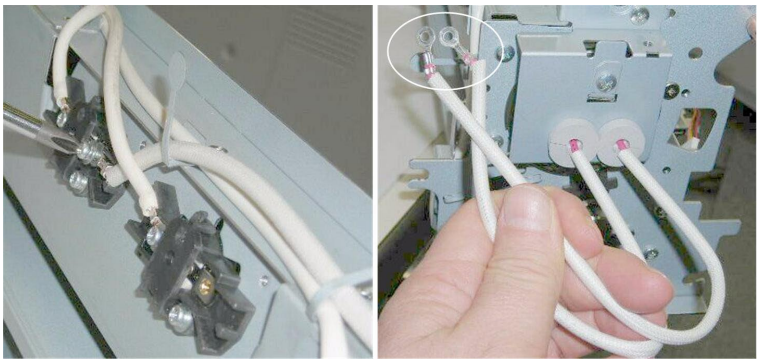
Thermostats

- Make sure that you connect them up correctly (mark the cables and connectors before disconnecting).

Slide 266

No additional notes

Lamps



- Make sure that you connect them up correctly (mark the cables and connectors before disconnecting).

Slide 267

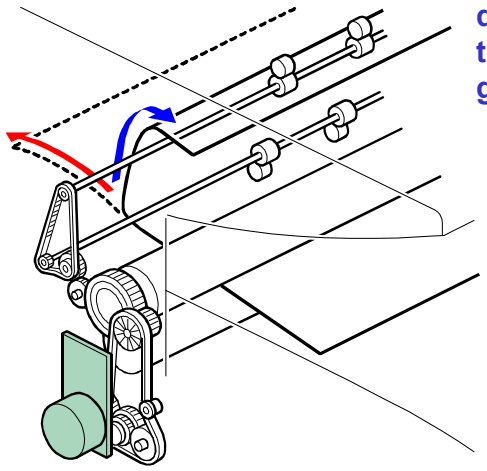
No additional notes

PURPOSE OF THE SECTION

- ❒ The paper exit mechanisms will be described.

Drive

- The fusing motor drives the exit rollers through the hot roller gear.

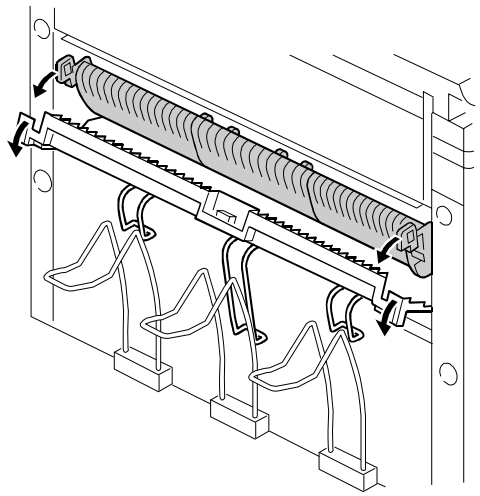


Slide 269

- The main points are on the slide.
- When using the front exit, the trailing edge of the paper is grabbed, so that the output does not fall on the floor.

Exit Guide

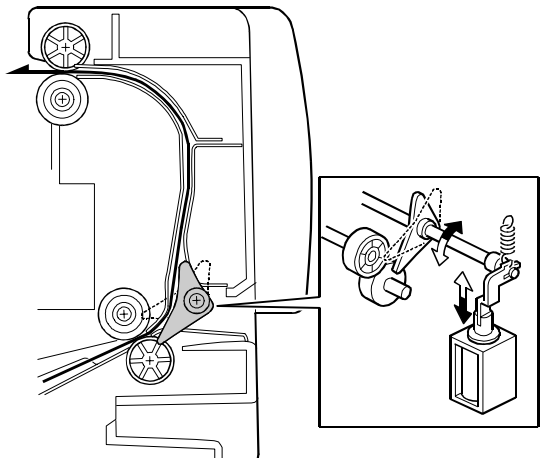
- Open here to remove jams



Slide 270

No additional notes

Switching the Exits



- **Paper junction gate solenoid: Directs paper to the selected exit**
  - Selected at the operation panel
  - Solenoid on: Rear exit
- **There is no copy exit selection lever for the user to operate.**

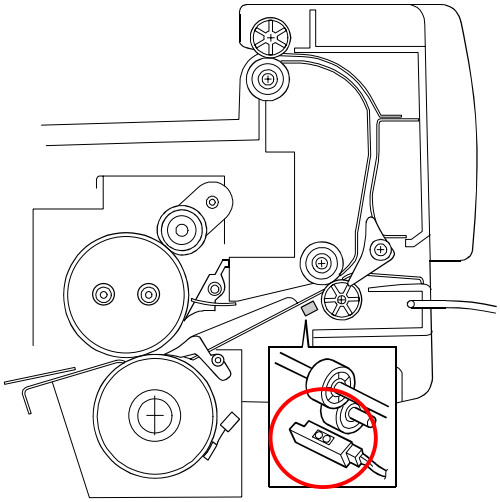
Slide 271

- The solenoid directs the paper to either the front or rear copy exit.
- The user selects the required exit for the job at the operation panel.
  - The procedure for the user to switch between the exits was shown in the Machine Overview section of the course.
  - For recommendations on which exit to use, see the Operating Instructions.

Copy Reference – Placing Originals – Original and Copy Output Locations

- The user must be careful to select the rear cover for A1 (D) LEF or longer paper. The front exit tray cannot support larger sizes.
  - The machine does not automatically switch exits if the paper is A1 (D) LEF or longer.

Jam Detection

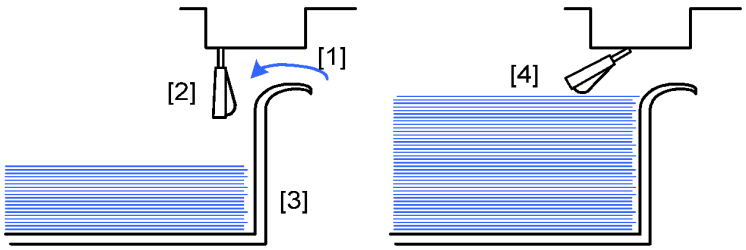


- **Exit sensor: Detects jams in the fusing exit area**

Slide 272

No additional notes

Front Copy Tray Full



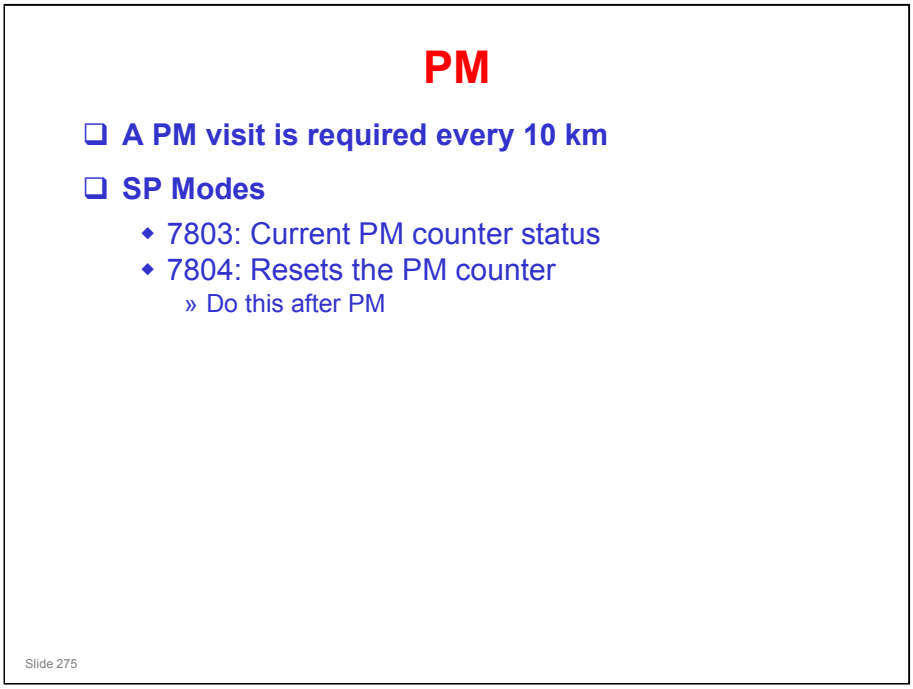
- Paper [1] goes past the tray full sensor actuator [2] into the front copy tray [3].
- If the tray is full [4] (capacity 100 sheets), the top of the stack pushes the actuator out of the sensor.

Slide 273

No additional notes

PURPOSE OF THE SECTION

- ❒ This is a quick overview of PM for this machine.



PM

Service manual, Appendix: Maintenance Tables

- Draw the attention of the class to the maintenance table.
- The PM cycle is 10 km of printouts.
  - Not all items need PM at 10 km. Some only need PM at 20, 30, 40 km, and so on. See the PM table for details.

PM Items

- You might wish to have the trainees do a maintenance procedure on their machines.
  - Development filter: Replace at 10 k. If this is blocked, air pressure may increase inside the development unit, and this may lead to toner scattering.

Lubrication

- Note the diagrams in the manual indicating the lubrication points for the development and fusing units.

Counter Reset

- Reset the PM counter after doing PM (SP 7804).
  - The slide shows the SP modes related to PM.

RICOH

D046/D049 COPIER TRAINING

Optional Paper Cassette

Slide 276

PURPOSE OF THE SECTION

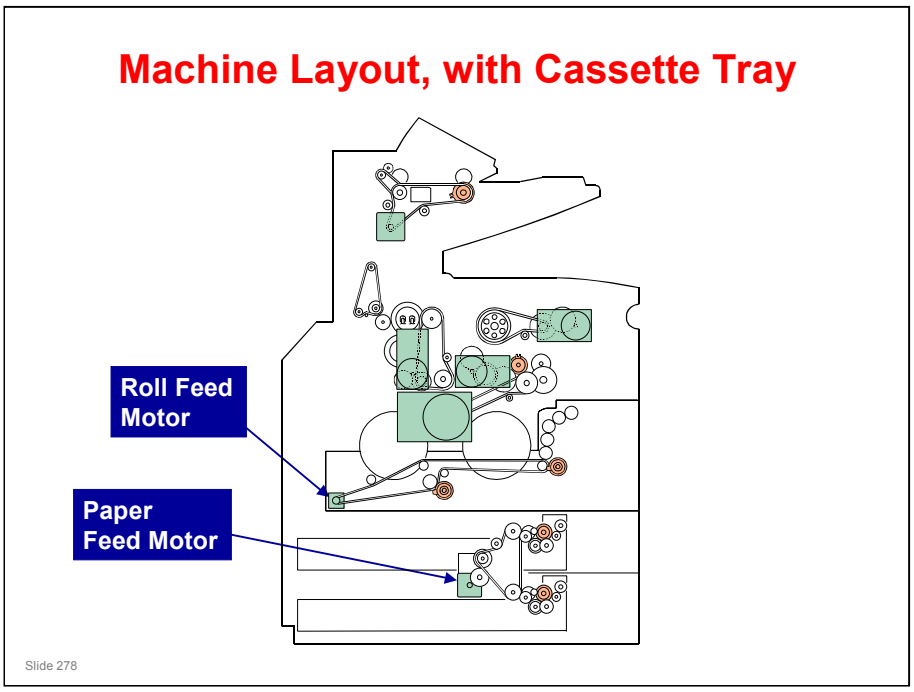
- ❒ This describes the mechanisms in the optional paper cassette.

Overview

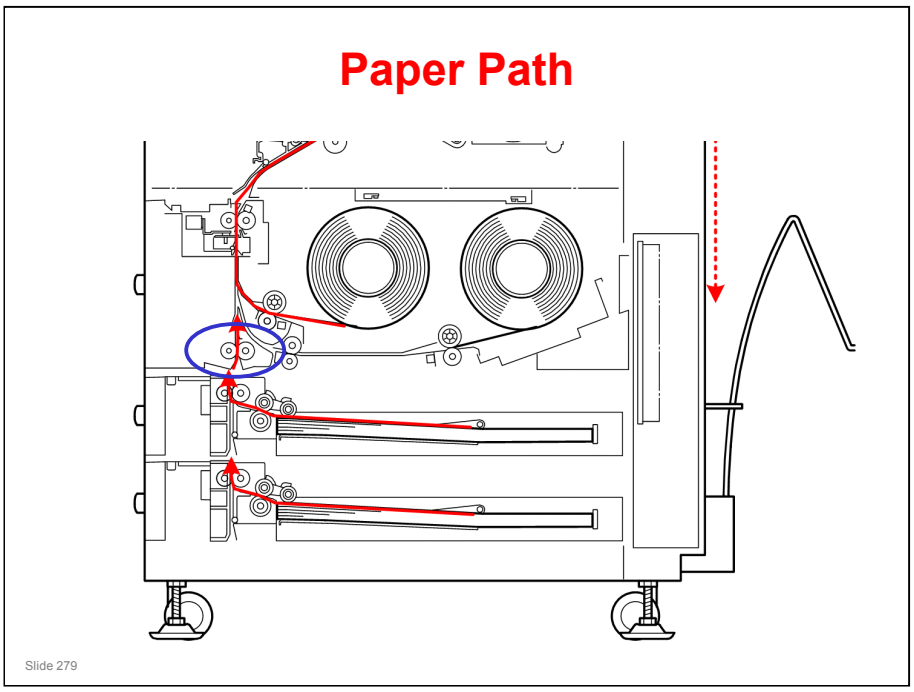
- **You can install this cassette instead of an optional roll feeder.**
- **Main specifications**
  - Copy Paper Size (W x L): A2/C LEF (Max.) to A4/A LEF (Min.)
  - Copy Speed: 10.3 cpm (A2/C LEF), 13.4 cpm (A3/B LEF)
  - Copy Paper Weight: 64 to 110 g/m^2
  - Copy Paper Capacity:
    - » Plain paper: 250 sheets (or less than 27 mm stack thickness)
    - » Translucent paper: 100 sheets (or less than 7 mm stack thickness)

Slide 277

No additional notes

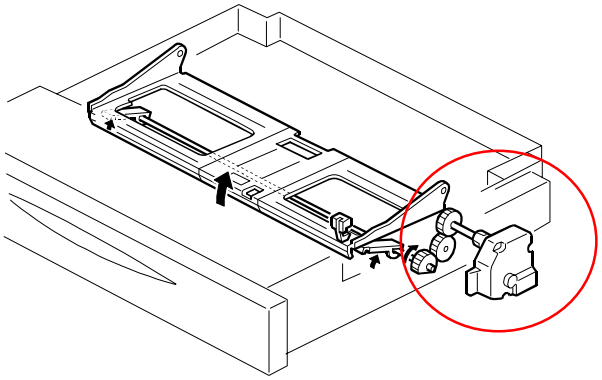


- This slide shows the optional paper cassette unit installed instead of the optional roll feeder.
- The cassette feed motor drives both trays.
- Each tray has a clutch.



❒ The relay roller in the main body (in the blue circle in the diagram) lets the cassette unit feed short paper (A4 LEF is the minimum)

Tray Lift Mechanism

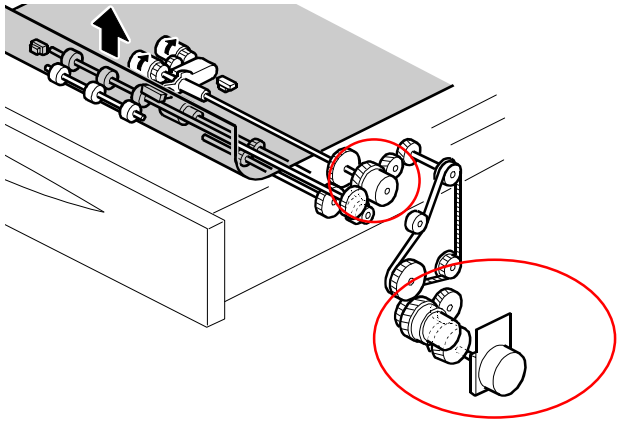


- The lift motor lifts the tray.
- If the tray is removed from the machine, the tray moves down slowly under its own weight.

Slide 280

- The tray lift sensor detects the top of the stack and tells the lift motor to stop. This sensor is not shown in the diagram.
- The paper near-end sensor detects when the bottom plate is getting high. This means that paper is almost finished. This sensor is shown on the diagram. It is at the edge of the tray, and never touches the paper stack.

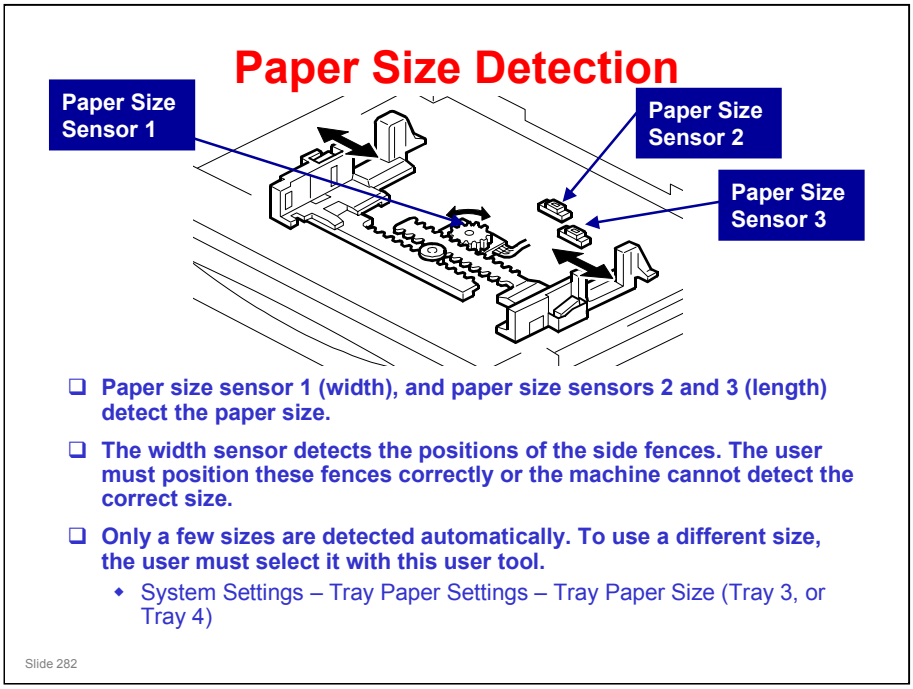
Feed Mechanism



- The feed motor controls the paper feed mechanism.
- This is a feed and reverse roller (FRR) mechanism.
- There is a clutch for each tray.

Slide 281

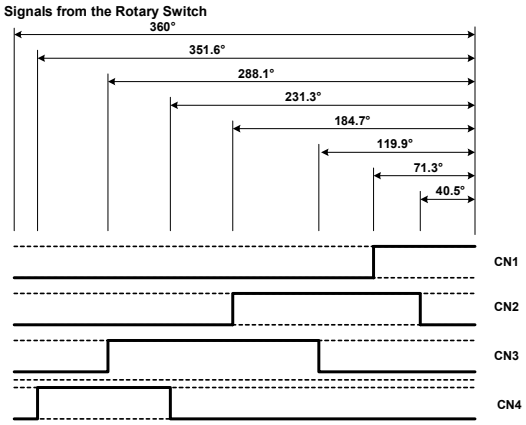
No additional notes



Appendix: Specifications, Supported Paper Sizes

❒ The manual shows which sizes are detected automatically. Other sizes must be specified with the user tool.

Paper Size Sensor 1 (Width)

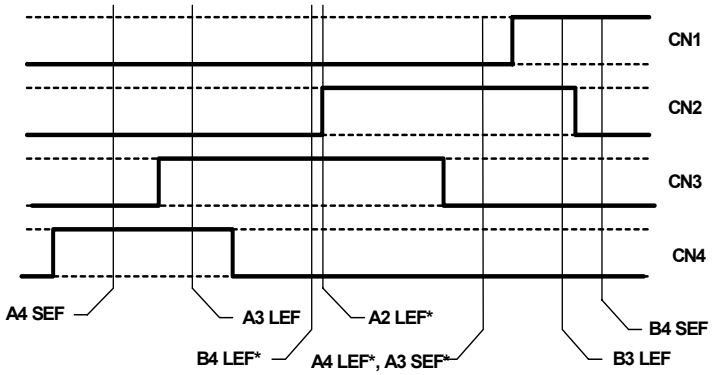


- There are 4 signals from the sensor (CN 1 to CN4).
- The 4 signals change when the rotary switch in the sensor is turned.

Slide 283

- For example, after the wheel turns 40.5 degrees, the state of CN2 changes to HIGH.

Paper Size Sensor 1 (Width) – International Sizes

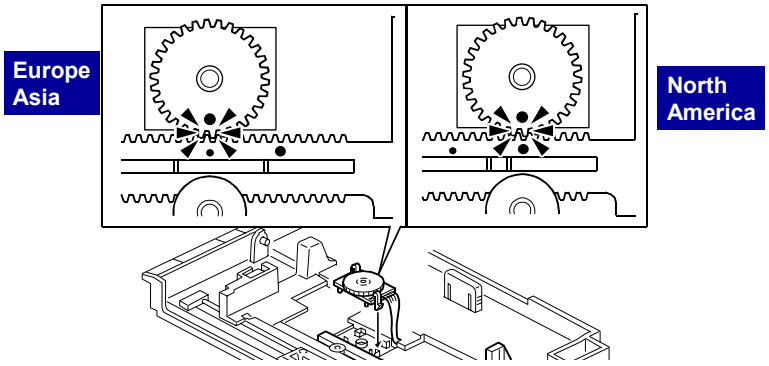


- This shows the outputs of CN 1 to CN4 for each paper size.
- But for some paper sizes, the outputs are the same, so the sensor cannot distinguish them.
- In these cases, the machine must use the length sensors.

Slide 284

- This example shows how the sensor operates for international paper sizes.
- For some sizes, the length sensors must be used to detect the correct size, because the rotary switch output is the same.
  - For A4 LEF and A3 SEF, these widths are the same, so the width sensor cannot distinguish them.
  - But for B4 LEF and A2 LEF, the widths are different. Why can the sensor not distinguish the difference? This is because the wheel turns more than one time. By coincidence, the wheel position is about the same for these two different paper widths, and the width sensor cannot distinguish them. The length sensor must be used.
- Length sensor 2 is only used for USA Architecture paper sizes.

Paper Size Sensor 1 Replacement



- **Align the dots in the rack and pinion mechanism as shown in the service manual.**
  - Europe/Asia: Align the dot on the wheel with the small dot on the rack
  - North America: Align the dot on the wheel with the large dot on the rack.

Slide 285

No additional notes

SP Adjustments

- **1917: Side-to-side registration**
  - The center of the paper cassette is the reference point for the alignment of all paper sizes in the paper cassettes.
  - However, the amount of skew can be different for smaller paper sizes because fewer feed rollers touch the paper.

Slide 286

No additional notes