RICOH

EMERALD-D2

Service Training

Priport Technical Service Section

1

Contents

- Product Outline
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Topaz:

Difference 600 dpi and 400 dpi

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PRODUCT OUTLINE

Overview


High quality operation panel with large LCD touch screen
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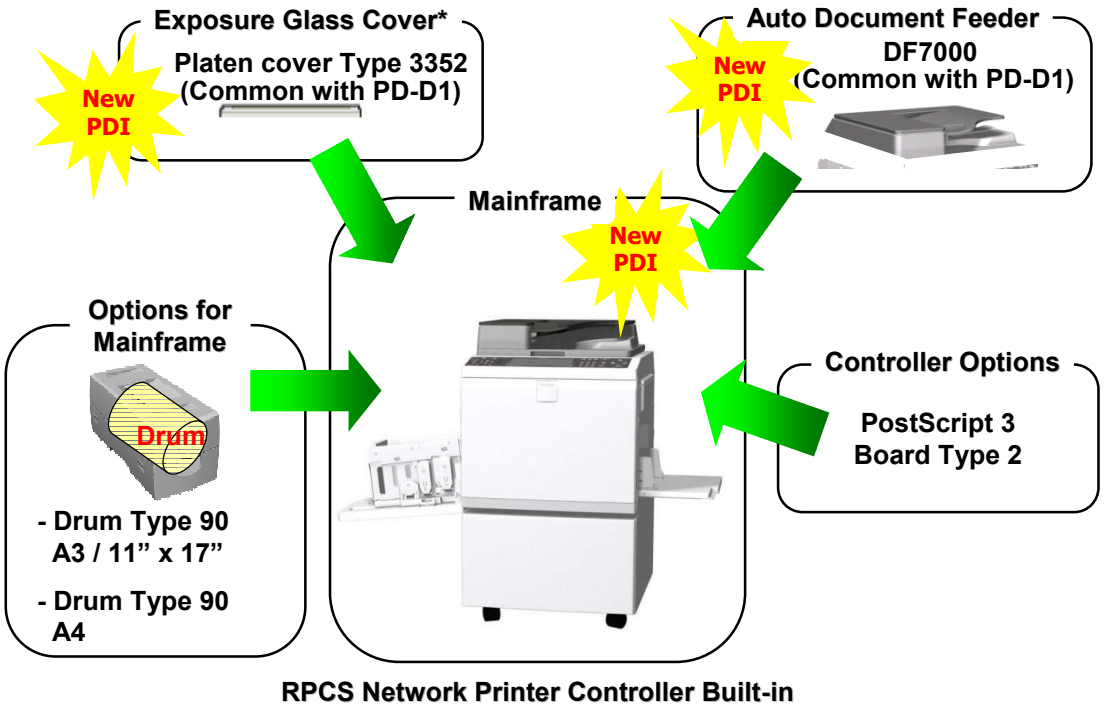
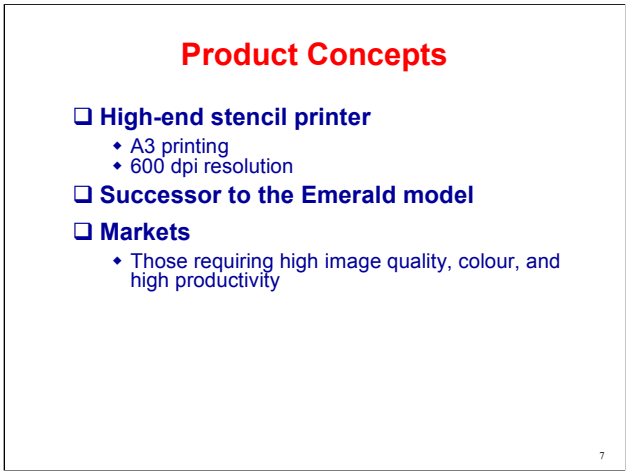
Options

- A4 drum
- Colour drum
- ADF
- Platen cover
- PostScript 3 Board Type 2

NOTE: ADF or platen cover is needed to operate the machine.

Options


Exposure Glass Cover*
New PDI
Platen cover Type 3352
(Common with PD-D1)
Auto Document Feeder
New PDI
DF7000
(Common with PD-D1)
Mainframe
New PDI
Options for Mainframe
Drum
- Drum Type 90 A3 / 11" x 17"
- Drum Type 90 A4
Controller Options
PostScript 3 Board Type 2
RPCS Network Printer Controller Built-in



This is a new A3 model for the upper segment.

It is a replacement for the Pearl/Sapphire series. The engine is almost the same as these models.

Topaz:

High-end stencil printer

A3 printing

400 dpi resolution

New master and ink for improved print quality

Successor to the Peal/Garnet series

The engine is almost the same as the engine used in this series.

Markets

Those requiring high image quality, colour, and high productivity

PFP/CRD Real Entry Machine

Best image quality and high productivity make our entry into the PFP/CRD market

HQ System

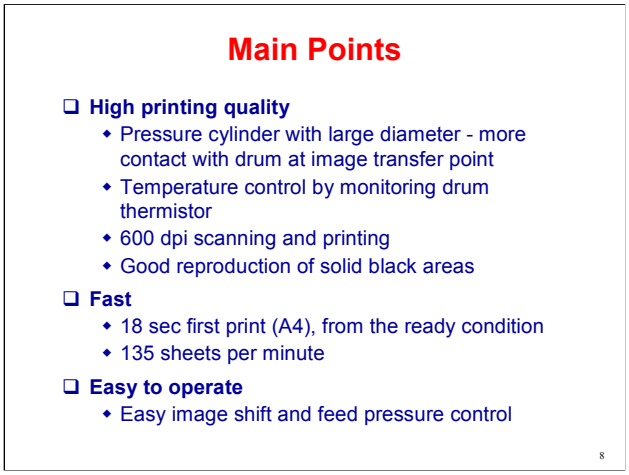
New HQ master & ink with auto print pressure control lead to surpassing image quality

User-friendly Design

Universal design, Accessibility conscious operation panel

Environmental Care

Less energy burden, Compliance with regulations, directives



The next four slides give some basic points about the engine, which are common for previous models in the series.

High Print Quality

A pressure cylinder with a large diameter is used. This means that there is more contact with the drum at the image transfer area. This improves image quality generally, especially for solid fill areas.

Temperature control (thermistor in the drum)

Printing speed for the first three sheets is slower at low temperatures to ensure that the print is dark enough

Reduced thermal head energy at higher temperatures – Ink flows more readily at higher temperatures, making the print too dark

The number of idling rotations with Quality Start is increased at lower temperatures

Fast

First print time for the Sapphire is 25 s.

Easy to Operate

Image shift and paper feed pressure input at the operation panel.

Easy master roll replacement

The user does not have to cut off the leading edge of the master, because the new rolls have a flat leading edge that does not have to be cut off.

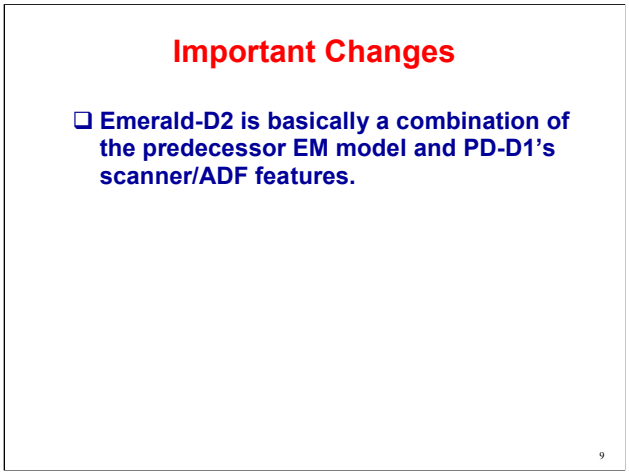
In addition, the user does not have to place the master in the correct position before closing the cover. The machine automatically feeds the leading edge of the roll to the standby position after the cover is closed.

Cost-effective

Even with the A3 drum, A4 masters can be cut to reduce consumption

The optional ADF is needed for this feature.

No tape dispenser to separate jobs



These are the main improvements to the engine for this new model, the Emerald.

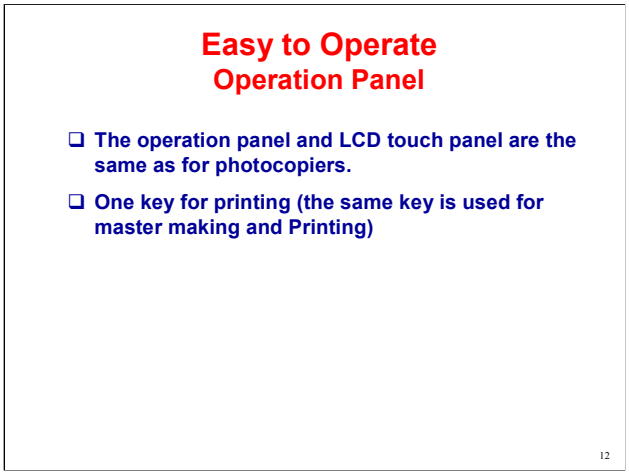
We will see details on all these items during the next few slides.

Reliability

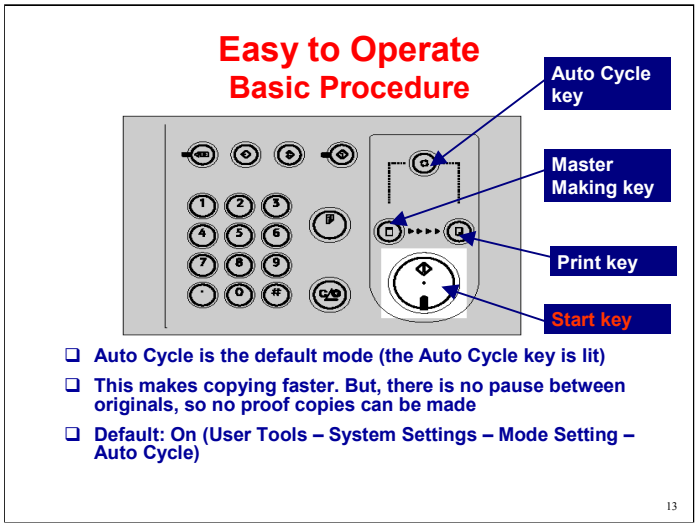
- **Low paper feed errors**
  - Below 1 error per 1000 pages.
- **Paper feed retry**
  - If the registration sensor does not detect the paper feeding into the machine, the feed mechanism tries again.
- **Double feed detector**
  - A sensor measures the amount of light that goes through the paper. If this amount increases suddenly, a double feed is detected.
- **Paper delivery**
  - The tabs on the inner sides of the plates catch the edges of the paper. Because of this, the paper falls more slowly onto the delivery table and reduces ink stains on the rear sides and stacks the pages more evenly.
  - Users can move these plates to one of two positions, depending on the paper type.

Connectivity
Network Utilities

- **The following Document Solutions utilities are used.**
  - Web Image Monitor
  - Smart Device Monitor for Client/Admin



One key for printing (the same key is used for master making and Printing): See the next slide



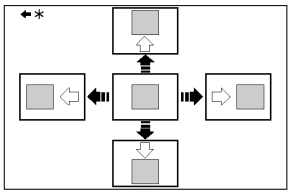
If you switch Auto Cycle off, then you must use the Start key.

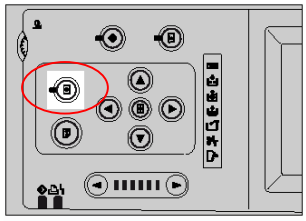
The Start key has two modes: Master Making, and Print.

To change the mode, press the Master Making or Print key to light the indicator in one of these two keys.

This is supposed to prevent you from starting to print before you made your master. But in this machine, there is a Security Mode. For some settings of this Security Mode, it is not possible make prints before you make a master, because the Additional Prints feature is disabled for security reasons. We will study this feature in the Operation section.

Easy to Operate
Adjusting the Image Position





*…Paper feed direction

- Adjustment in both directions done at the operation panel
- No dials or levers to adjust
- The keys are at the left side of the operation panel, which is next to the paper delivery table. This makes it easy for the user to check the output and make adjustments.

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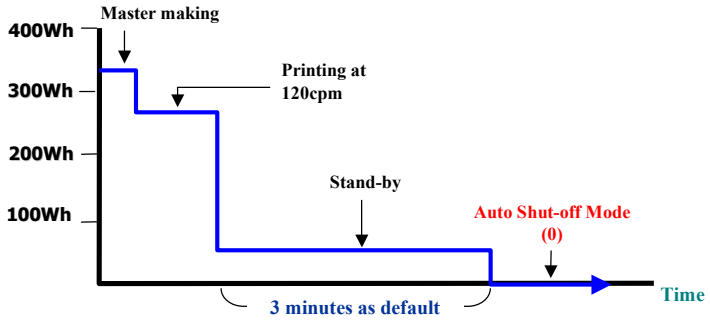
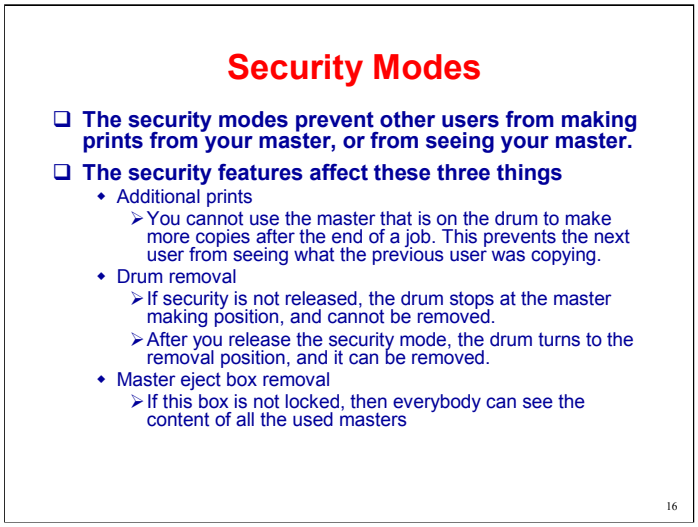
Environment Friendly

- This model has energy saver and auto-shut off modes, like photocopiers.
- Compliance with directives on hazardous materials (RoHS) and waste (WEEE).





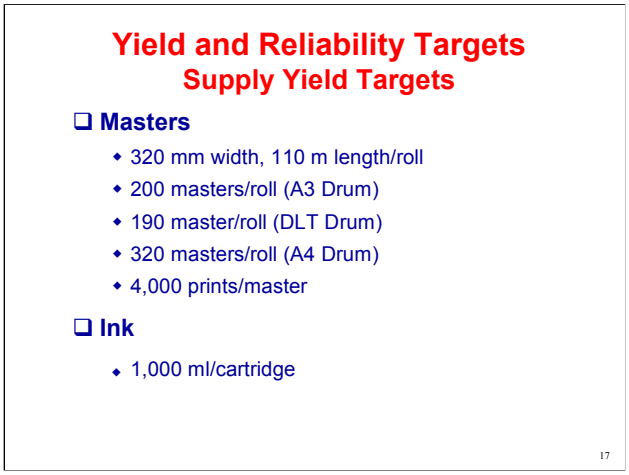
This prevents others from making copies of your master.

Normally, the user can walk up to the machine and make prints of the master that happens to be on the drum. Security mode prevents this.

The drum and master eject box locking mechanisms will be explained in the Drum and Master Eject sections of the course.

Service manual, section 6.13.4

The service manual has a table that shows what happens for each combination of security settings.

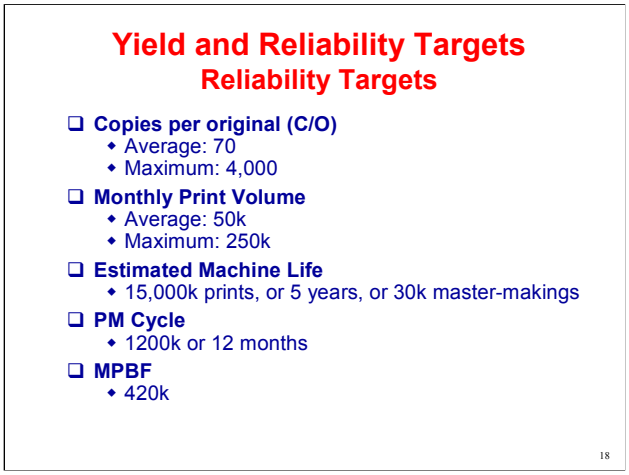


The master and ink are new types.

Emerald masters/ink cannot be used in other models, and other master/ink types cannot be used in the Emerald.

There are three types of ink:

For more details about ink consumption, see ‘Handout 1 – Ink Consumption.doc’.



The following are improvements from the Sapphire 2.

Maximum copies per original: For the Sapphire 2, this was 2,000

Maximum monthly print volume: For the Sapphire 2, this was 170k

Estimated Unit Life: For the Sapphire 2, this was 10,000k prints

PM cycle: For the Sapphire 2, this was 600 k or 6 months

MCBC: For the Sapphire 2, this was 240k

Yield and Reliability Targets
Serviceability Targets

- **Maintenance Time**
  - PM: 30 minutes
  - EM: 40 minutes
- **Installation Time**
  - 20 minutes

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SPECIFICATIONS

Main Specifications - 1

- Resolution
  - Scanning: 600 dpi
  - Master making: 600 dpi
- Originals - Platen mode:
  - Maximum: 297 mm x 432 mm (11.7” x 17.0”)
- Originals - ADF:
  - Maximum: 297 x 432 mm, 11.7” x 17.0”
  - Minimum: 148 x 210 mm, 5.8” x 8.3”
  - Weight: 40.0 - 128 gsm, 11 - 34 lb
  - Capacity: 50 sheets (81.4 gsm, 22 lb)
- Image Modes
  - Letter, Photo, Letter/Photo, Pencil, Pale (Tint)

Main Specifications - 2

- Printing Area
  - Metric: 290 x 412 mm
  - Inch: 11.4 x 16.6”
  - Optional A4 drum: 290 x 202 mm, 11.4 x 8 “
- Leading Edge Margin: Less than 6 mm (0.24”)
- Acceptable Paper Sizes
  - Minimum: 70 x 148 mm, 2.8 x 5.9 ”
  - Maximum: 325 x 447 mm, 12.8 x 17.6 ”
    - Recommended maximum: 297 x 432 mm, 11.6 x 17 ”
- Copy Paper Weight
  - 47.1 ~ 209.3 g/m^2, 12.5 ~ 55.6 lb

Main Specifications - 3

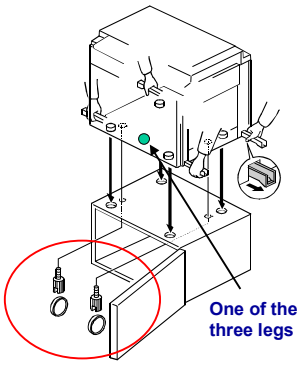
- Printing Speeds:
  - 60, 75, 90, 105, 120, or 135 sheets/minute
- First Print Time
  - A4: 18 s
- Master Eject Box Capacity: 100 A3 masters
- Paper Feed Table Capacity: 1000 sheets
- Paper Delivery Table Capacity: 1000 sheets
- Memory
  - 128 MB of RAM

Controller Specifications

- Printer languages: RPCS, PS3 (Optional)
- Host interfaces: USB2.0, IEEE802.3u
- CPU: 300MHz
- RAM: 128MB
- Protocol: TCP/IP, NetBEUI (Multi protocol support)

The next few slides explain the important points about this installation procedure. Show these slides to the class. Then ask the class to install their machines.

Attach the Screws Securely



- **Attach these screws securely.**
  - If you do not, then grounding is not good, and static electricity will build up inside the machine.
- **There are three legs instead of four for better stabilization.**

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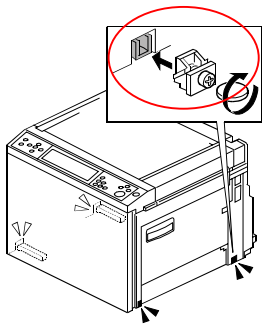
The diagram shows you attaching the screws with coins. If you don't have any money, a screw driver will do the job just as well.

Explain

Need screws

Three legs

Attach the Carrying Handle Stoppers



- **Attach the carrying handle stoppers to the carrying handles.**
  - Injuries can occur when the carrying handle comes out. To prevent this, the stopper was added

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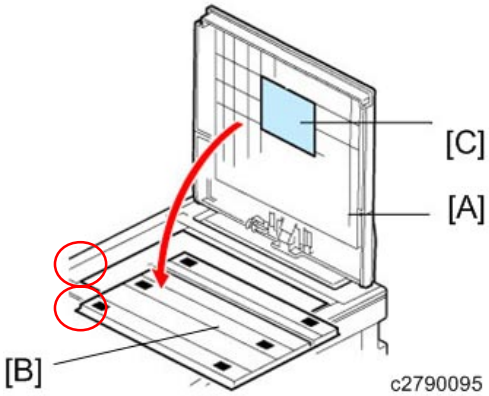
Again, we show the screws being attached with coins instead of screwdrivers.

This is because, in some regions (such as Japan), these items are attached by sales engineers, who have no screw drivers but plenty of money.

Please attach the carrying handle holder

Platen Cover



- Align the front left corner of the platen sheet [B] with the front left corner of the exposure glass.

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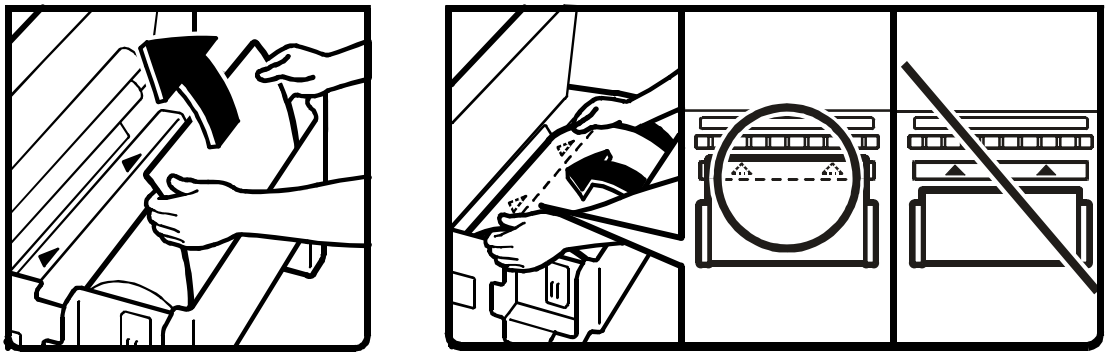
No additional notes

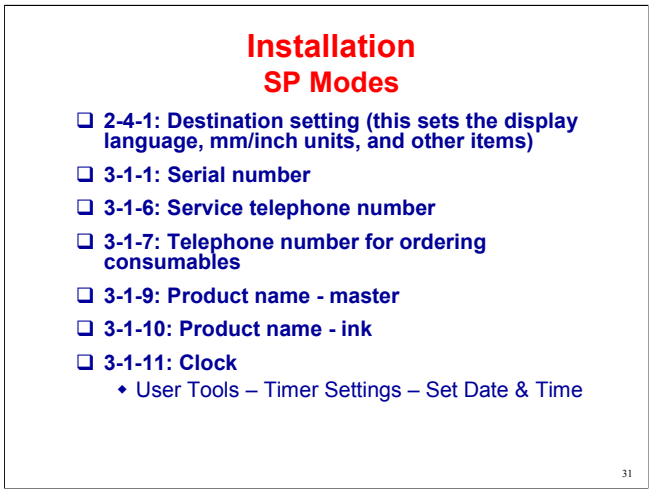
Feed the Master to the Correct Position



- Make sure the leading edge reaches the interior of the master holder.

The master is thin, and it will not stick to the drum if there is insufficient ink on the drum. Because of this, ink is added when a new drum is installed.

The dip switches and SPs for the color drum will be explained in the Installation section.



3-1-6: Service telephone number

This is displayed on the machine if an error occurs.

Operation Manual, Remarks, Other Functions

3-1-6, 3-1-7, 3-1-9, 3-1-10: These names and telephone numbers are shown on the screen if the user presses User Tools then Inquiry. The user can then use this information to order new consumables or call for service.

The setting for the SP mode while installation

Notes on North America Model

- Standard model will no longer be manufactured for the NA market.
- In order to operate the Ricoh model as a Standard model, procure and replace the following service parts and set SP2-004-5.
  - C2572185: MASTER FLANGE - REAR
  - C2572197: MASTER FLANGE - FRONT

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MAINTENANCE

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These are the special tools we just talked about.

We used the drum securing tool already, in the main drive unit replacement procedure.

This is compared with Sapphire 2.

PM is basically the same, but the additional items are shown above.

Some items were deleted from the PM table, because of improvements to the engine.

Ask the class to study the PM table.

The table shows that you must clean some parts each time you visit the customer.

The feed encoder bracket contains a brush, which may become worn after 6,000k prints.

PM Items (2400k, 3000k, Life)

- Paper clamper on pressure cylinder (2400k: Replace)
- Paper pick-up roller bushing (3000k: Lubricate)
- Paper feed roller bushing (3000k: Lubricate)
- Paper exit pawl drive gear (3000k: Lubricate)
- Image shifting gear (3000k: Lubricate)
- Cloth screen (3000k: Replace)
- Drum drive pin (3000k: Lubricate)
- Main drive unit (Life: Replace)
- Feed encoder brush (Life: Replace)
- Cutter unit (Life: Replace)
- Master feed control roller (Life: Replace)

PM Counter Reset

After replacing the following PM items, the PM counter needs to be reset in SP3-4.

- ❑ Cloth screen
- ❑ Paper clamper
- ❑ Pick-up roller
- ❑ Paper feed roller
- ❑ Friction pads A and B
- ❑ Encoder brush bracket
- ❑ Main drive unit

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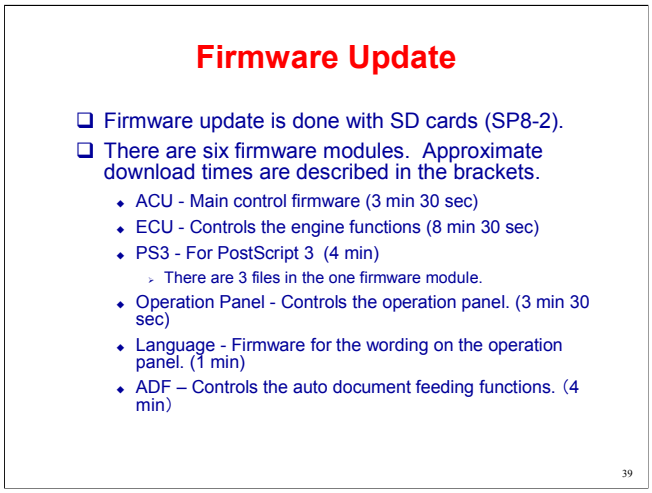
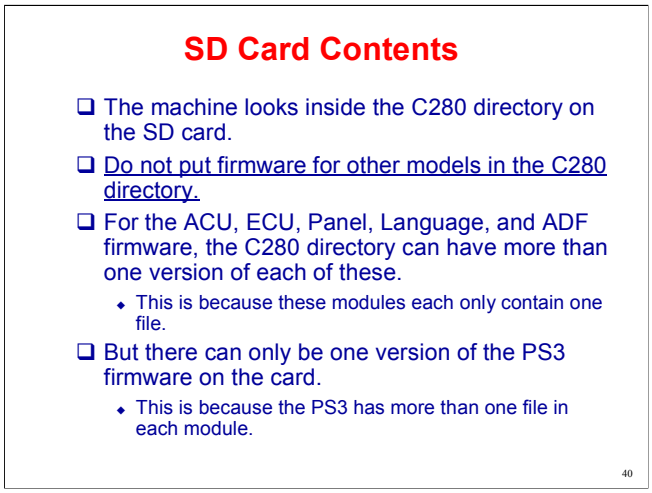
Please check or replace the PM parts in your machines.

SP Classification

100: Scanner
200: Master Making Unit
300: Drum
400: Master Exit
500: Paper delivery and Exit
600: Electrical component
700: Options
800: ACU (GW)
900: ACU (GW)



ACU and PS3 have separate files in one firmware module. ECU, Panel and Language have one file for each firmware module.



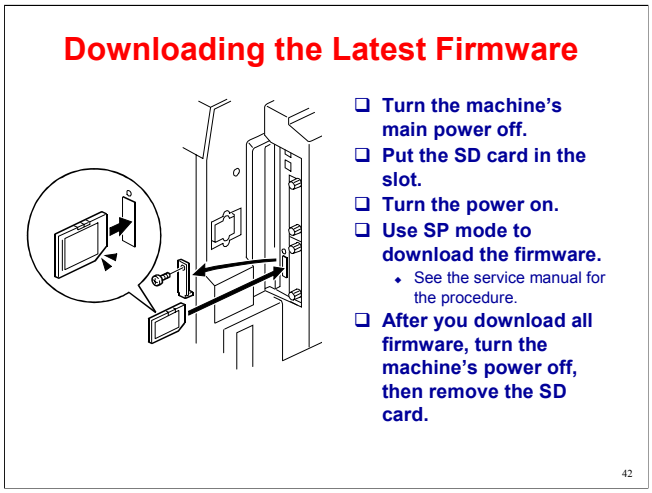
Service manual, section 5.4

An SD card can have firmware for more than one model. But the firmware for each model must be in the correct directory (for example, a directory called C262 must be made for the Emerald firmware).

The service manual contains a procedure that explains how to copy data from a PC to an SD card. This is the same as for photocopiers. If the class needs to learn this procedure, ask them to try it.

Important Points for the Download

- Do not insert or remove the SD card if the machine's power is on.
- Do not remove the card until the download is finished.



Service manual, section 5.4.3

Ask the class to download the latest firmware to their machines.

Ask them to download all 5 modules.

If the download is not successful, see the service manual for instructions. In severe cases, it may be necessary to replace one or more PCBs inside the machine.

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MECHANISM / COMPONENTS

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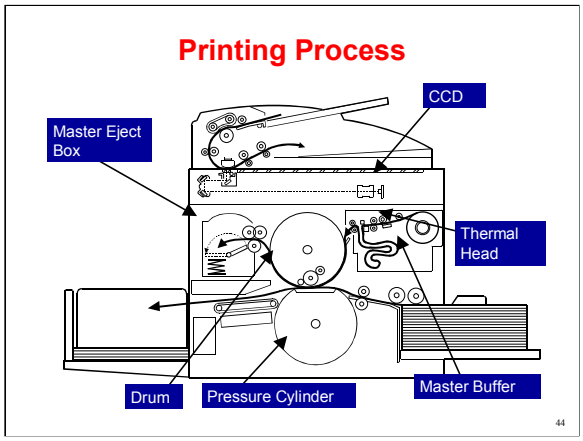


Printing Process

First, the used master still wrapped round the drum is ejected and fed into the eject box.

A xenon lamp illuminates the original, and reflected light passes to a CCD.

The CCD output is digitally processed and sent to the thermal head to make the new master.

> Indicate the master buffer, between the thermal head and the drum. This allows the complete master to be printed before the old master has been completely ejected. This speeds up the printing process.
>
> Note that parts of the master eject, scanning, and master feed processes occur at the same time.

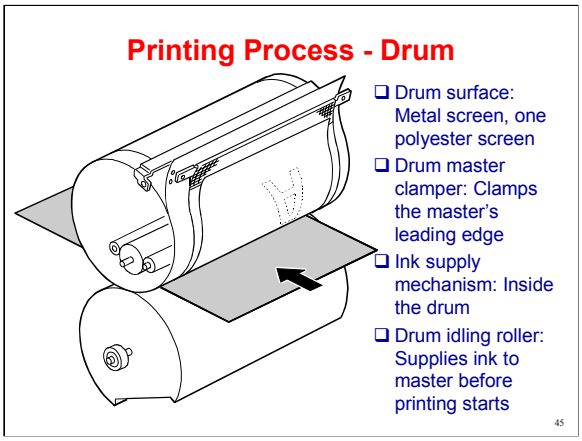
Ink transfers from the drum to the paper.

> Indicate the pressure cylinder. This is much bigger than the press roller used in previous models.
>
> The greater diameter means that there is more contact with the drum at the image transfer area. This improves image quality generally, especially for solid fill areas.

The paper is removed from the drum with pawls and an air knife, and fed out to the delivery table.

Feed Paths

Demonstrate the original, master, and paper feed paths.



Service Manual, section 6.7.1

Go over the basic points on the slide.

One cloth screen instead of two is better for print quality because it lets ink be spread more evenly.

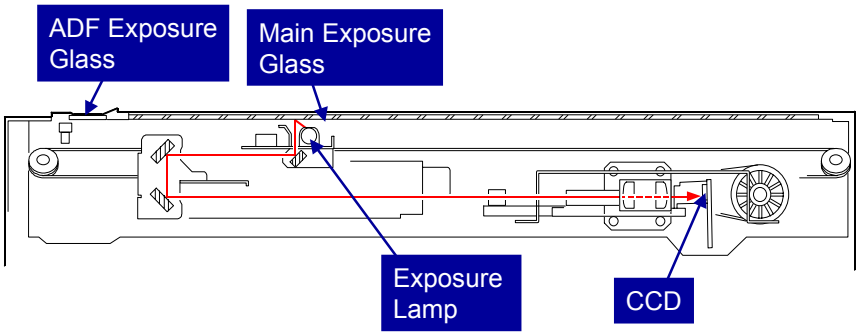
The cloth screen contains three polyester layers.

In this model, the drum also contains the image side-to-side shift mechanism.

MECHANISM / COMPONENTS
Scanner Unit

Scanner Unit

Optical Path



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

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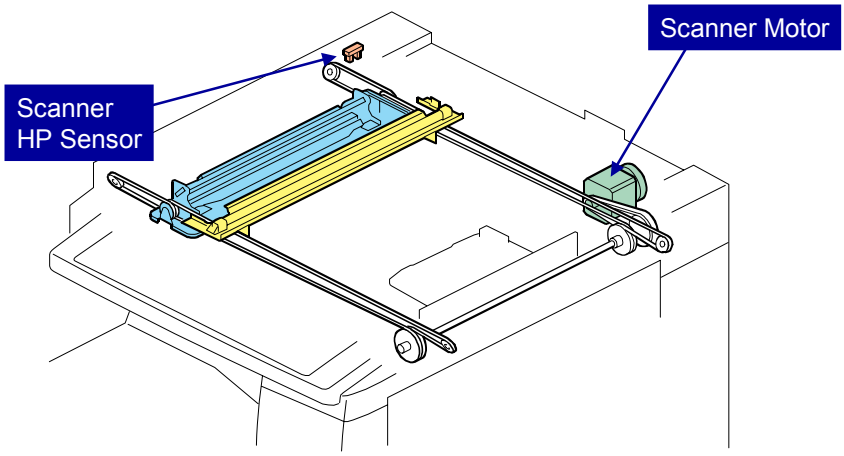
In platen mode, the original is put on the main exposure glass, and the scanner moves down the original during scanning.

In ADF mode, the scanner stays at the home position, and the original is fed past the ADF exposure glass.

The optics anti-condensation heater is an option. It prevents condensation on the mirrors, which will cause image problems.

Scanner Drive



- Motor and wire drive mechanism
  - Stepper motor
  - Position control is based on the scanner HP sensor.

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The same motor drives the first and second scanners.

The first scanner contains the exposure lamp, reflectors, the 1st mirror, and the lamp regulator. The second scanner contains the 2nd and 3rd mirrors.

The regulator is mounted on the scanner to reduce the wiring between the lamp and the regulator.

The second scanner moves at half the speed of the first scanner. This is to maintain the focal distance between lens and original.

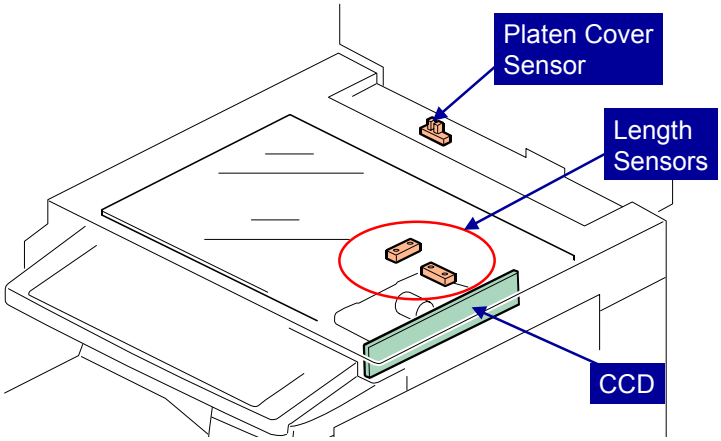
In this machine, wires are used instead of timing belts. These are more difficult to replace, but copy quality is better (less jitter).

Note that the operation in ADF mode is different from platen mode (as shown on the previous page).

In ADF mode, the scanner goes to home position (detected by the home position sensor), and stays there during scanning.

The scanner motor speed and image processing control the magnification.

Original Size Detection – Platen Mode



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

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The machine uses the platen cover sensor to detect the document size.

Length: Determines the length when the platen cover sensor changes from an "Open" to a "Closed" state.

Width: When the sensor changes to “Open”, the scanner lamp moves to the right. Then, when the sensor changes to “Closed”, the scanner lamp turns on and moves to the home position, and the machine reads the document size as it moves.

When the ADF is opened, the scanner carriage moves 30 mm from the home position.

Then, when the ADF is closed, the exposure lamp turns on and the CCD detects the paper width.

The lamp turns on when the platen cover sensor detects that the cover is being closed.

If the cover stays open during copying, the CPU checks the original size when the Start key is pressed.

When feeding with the ADF, the width and length sensors in the ADF detect the original size.

Scanner Unit
Replacement and Adjustment

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

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No additional notes

MECHANISM / COMPONENTS
Automatic Document Feeder

ADF
Overview

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

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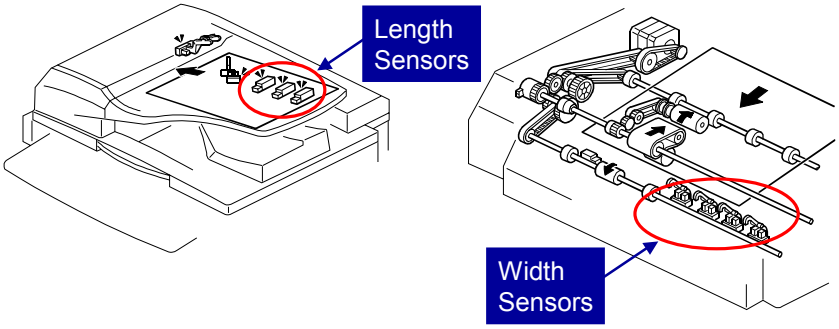
No additional notes

Original Size Detection



- Four width sensors, and three length sensors
  - Width sensor: Photo-interrupters
  - Length sensors: Reflective photo-sensors

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The machine cannot detect more than one original width in the same job. But there is a mixed original-length mode, as explained on the next slide.

Mixed Original-Length Mode

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

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This explains what occurs if the user selects mixed original-length mode.

Normally, in mixed original-length mode, original length is detected as shown below:

The width is detected with the same procedure that is used when all originals are the same size.

The machine keeps an area in memory that is sufficient for an original of the detected width and 432 mm length.

Printing is done after length detection, and only the part of the memory that contains data up to the detected original length is printed.

But, if some functions are selected (for example, Auto Reduce/Enlarge), the length must be detected before image scanning starts. Because of this, the machine must measure the length before scanning.

It must also make sure that the originals are in the correct sequence before scanning. Because of this, the three steps in the manual are done.

If the original is duplex, the original is inverted once again after scanning the first side. Then the second side is scanned, and the paper is fed out.

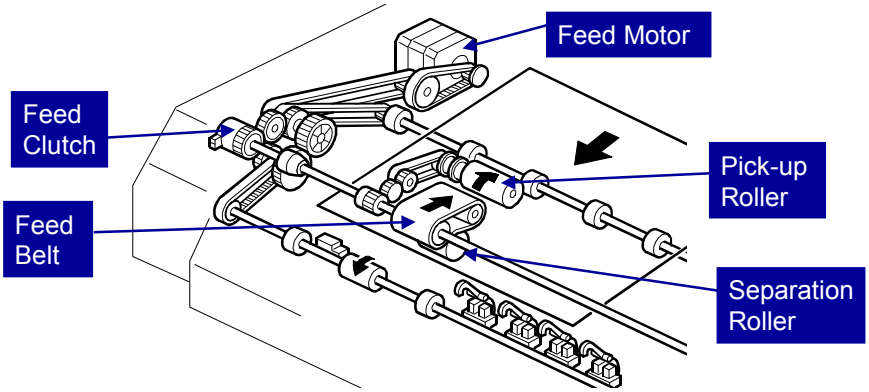
Why must the machine measure length first when we use Auto Reduce/Enlarge, Centering, and other functions?

With these functions, the machine must know the length of the original accurately.

For example, with centering, the image is centered on the copy paper. This cannot be done if the machine does not know the length of the original accurately.

Also, with Auto Reduce/Enlarge, the size of the original's image is decreased to fit on the copy paper. This cannot be done if the machine does not know the length of the original accurately.

Pick-up and Separation



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

55

Main points about the mechanism

The feed motor has two speeds. It feeds the first original to the glass quickly, but is slower for scanning (the speed during scanning is set by the reproduction ratio).

The original sensor detects the trailing edge of the last original, before the original set sensor does.

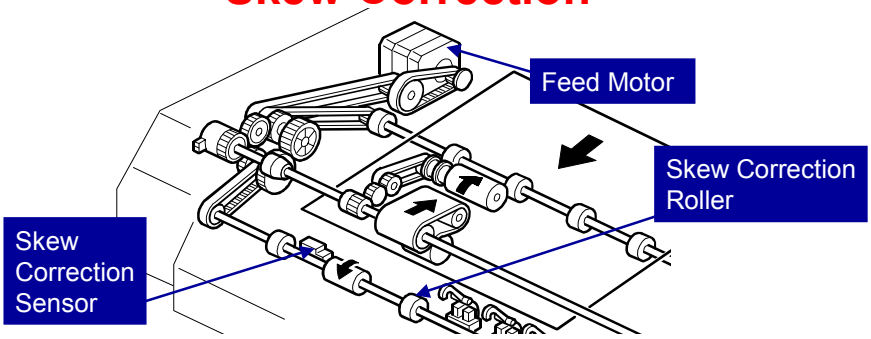
The original set sensor detects if an original is in the feeder. Why not use that sensor? Why is one more sensor necessary?

In this machine, the copier feeds copy paper into the machine first, to increase the copy speed. The original sensor tells the copier that there are no more pages to be scanned. The copier can then stop paper feed.

The original set sensor is near the scan line, to tell the cpu that an original is in the feeder and is ready to be scanned. This is too far into the machine to tell the cpu sufficiently early to stop the next sheet of copy paper.

The original sensor is much nearer to the trailing edge of the stack. This gives sufficient warning to the cpu when the last page of the original is fed in.

Skew Correction



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

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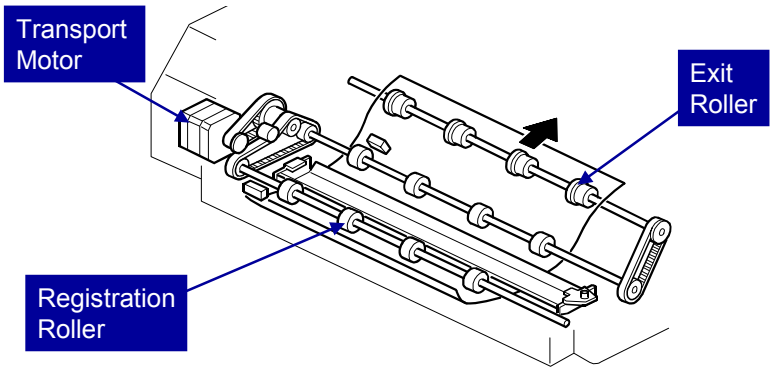
The one-way clutches in the ADF mechanism allow the feed motor to have different effects when rotating forwards and in reverse.

Original Transport and Feed-out



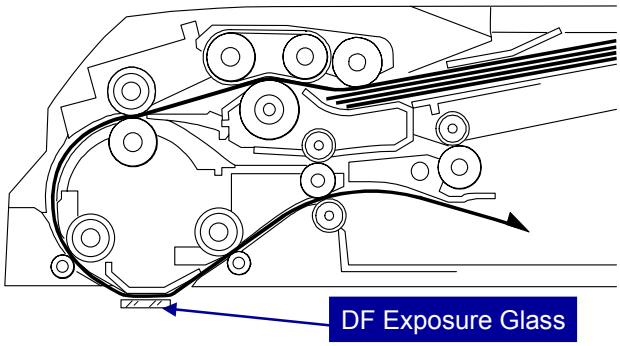
- The transport motor drives the registration and exit rollers.

57

No additional notes

Original Transport and Feed-out

Single-sided



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

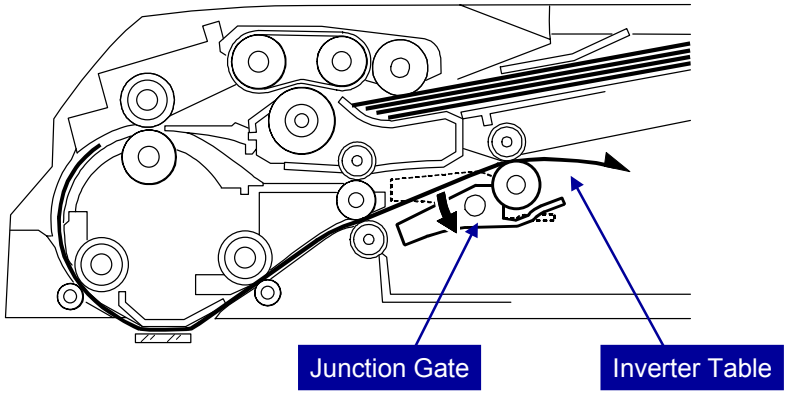
58

The machine scans the original through the DF exposure glass.

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

Original Transport and Feed-out

Double-sided 1



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

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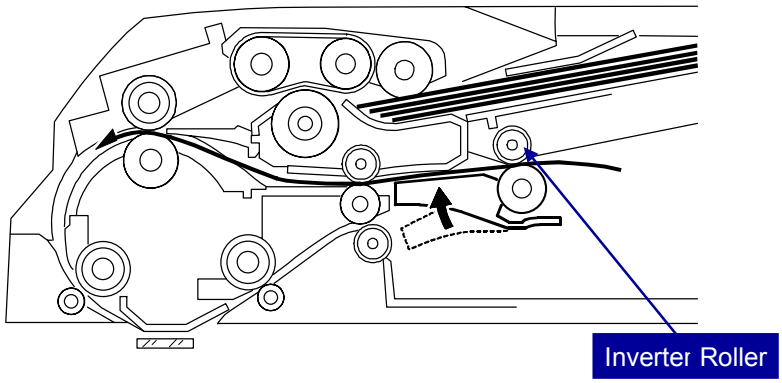
The main points are on the next 4 slides.

Original Transport and Feed-out

Double-sided 2



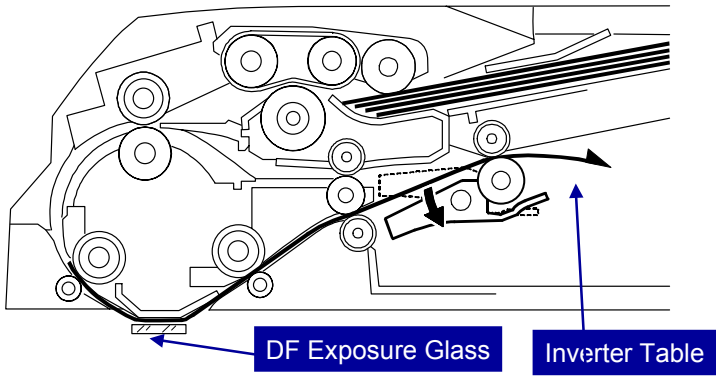
- When the paper is in the inverter table, the feed motor changes direction and the inverter roller feeds the original into the ARDF again.

60

No additional notes

Original Transport and Feed-out

Double-sided 3

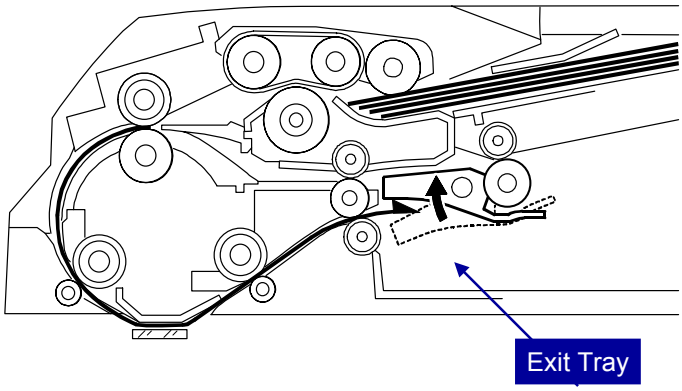


- The rear side is scanned
- The original is fed to the inverter table again
  - The page goes to the inverter mechanism again. This stacks the pages of the original in the correct order.

61

No additional notes

Original Transport and Feed-out
Double-sided 4

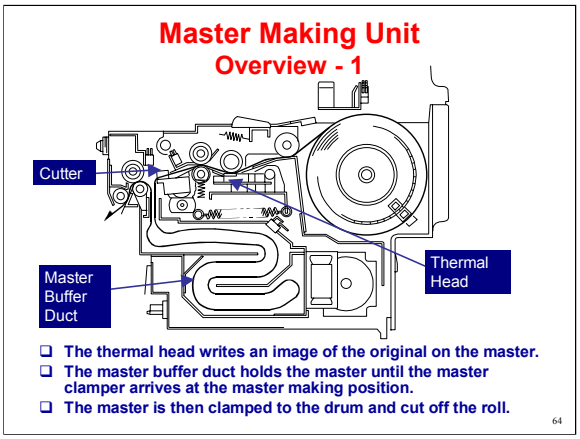


- The page is fed in from the inverter table and out to the exit tray.

62

No additional notes

MECHANISM / COMPONENTS
Master Making Unit



Service Manual, section 6.6.1

Master making starts at the same time as scanning. It is done at the same time as the used master is taken off the drum.

The master buffer duct holds the new master until it is time to feed the new master to the drum.

When the master clamper on the drum arrives at the master feed position (detected by the 2nd drum position sensor), the new master is fed to the drum.

The clamper clamps the master and the drum starts to turn.

When the master has been pulled out of the duct and is tight at the cutter, the new master is cut off the roll.

After the trial print, the drum returns to home position until the print run starts.

> The trial print ensures that there is a sufficient density of ink for the print run to start. If there is not enough, the user can make another print until the ink density is satisfactory.

The slide shows the important parts of the mechanism. For the locations of all the sensors and rollers, please go to the next slide.

The master buffer duct holds the new master until it is time to feed the new master to the drum.

When the master clamper on the drum arrives at the master feed position (detected by the 2nd drum position sensor), the new master is fed to the drum.

The clamper clamps the master and the drum starts to turn.

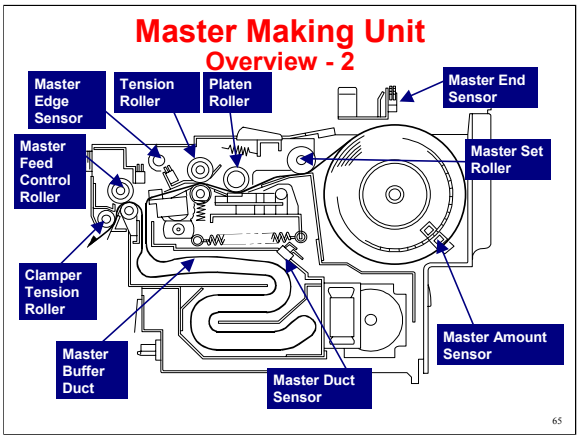
When the master has been pulled out of the duct and is tight at the cutter, the new master is cut off the roll.

After the trial print, the drum returns to home position until the print run starts.

> The trial print ensures that there is a sufficient density of ink for the print run to start. If there is not enough, the user can make another print until the ink density is satisfactory.

Other components to note:

> Master edge sensor: Detects jams
>
> Tension roller: Feeds slightly faster than the platen roller, to keep the master tight
>
> Master feed control roller: Holds the master at the standby position after feeding the leading edge of a new roll or after cutting; sends the master to the clamper on the drum and turns in synchronization with the drum to wrap the master around the drum (The master feed clutch controls the master feed control roller.)



Service manual, section 6.6.1

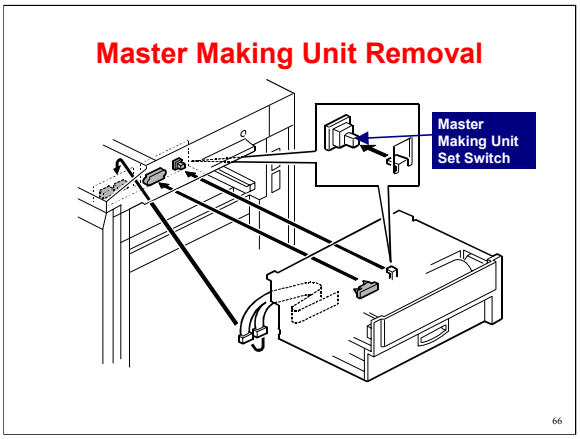
Other components to note:

Master edge sensor: Detects jams

Master amount sensor: Estimates the amount of master that remains on the master roll.

Tension roller: Feeds slightly faster than the platen roller, to keep the master tight

Master feed control roller: Holds the master at the standby position after feeding the leading edge of a new roll or after cutting; sends the master to the clamper on the drum and turns in synchronization with the drum to wrap the master around the drum (The master feed clutch controls the master feed control roller.)

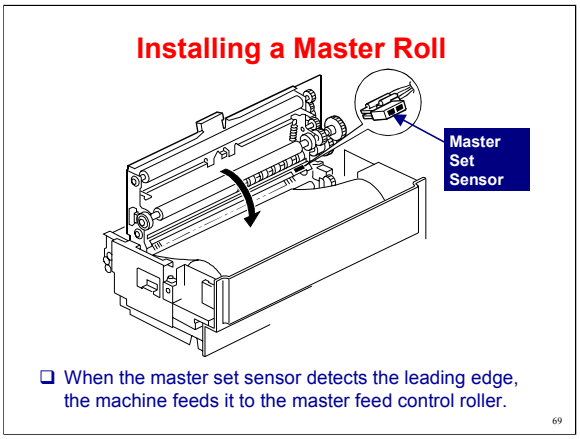


Show how the master making unit slides out.

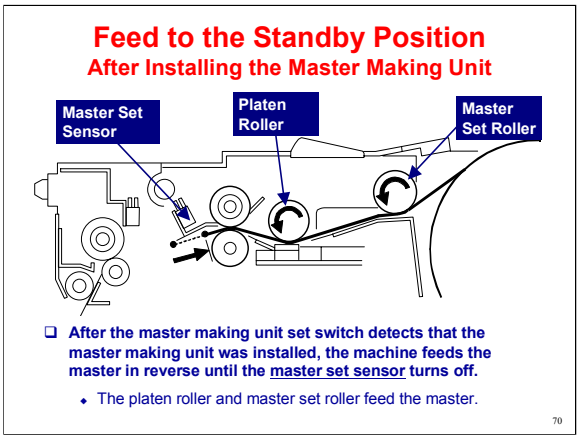
MECHANISM / COMPONENTS
Master Feed

Master Feed

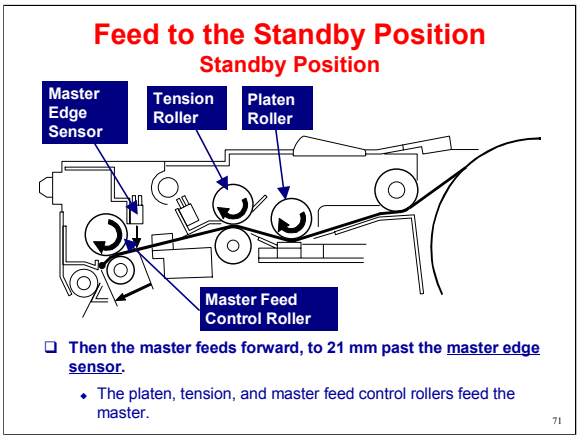
- Master Making Unit Lock Solenoid: Locks the master making unit in position during printing, so that the user cannot accidentally remove it at the incorrect time.
- Master Amount Sensor: Detects the speed of rotation of the master roll, to determine the length of master that remains on the roll.
- Master Buffer Fans: Two fans make sure that the folds of the master does not stick together in the master buffer duct.
- There is no master shutter mechanism.



When the master set sensor detects the leading edge, the machine feeds it to the master feed control roller (detected by the master edge sensor, as explained on the next slide).



Go over the points on the next two slides.

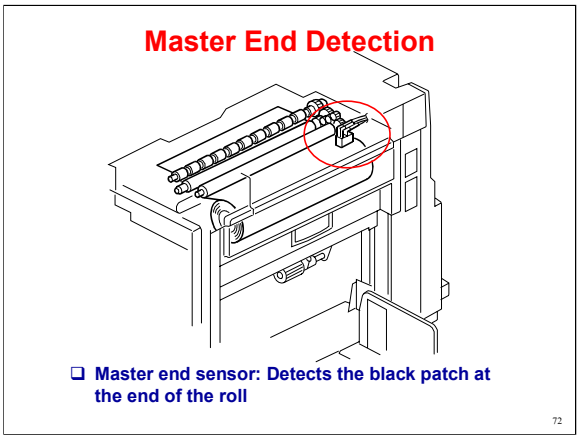


Explain that the platen roller applies and releases pressure during master feed to prevent skew or creasing during master feed.

The master edge sensor is only used to detect the leading edge when a new roll is installed. This is because the machine does not know where the leading edge is.

After cutting, this sensor is not used, because the master knows where the leading edge of the rest of the roll is. The machine feeds a fixed distance, then stops without checking the sensor.

Also note that the machine does not make a cut at the leading edge when a new roll is installed. The leading edge of the new roll is a straight edge, not a pointed one, so cutting is not needed.

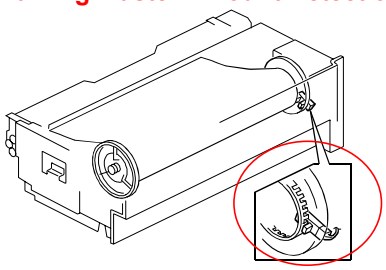


The master end sensor detects the black patch at the end of the roll.

This happens when there are a few layers of master still on the roll, so that the machine does not print on the black patch. The master is semi-transparent, so the sensor can detect the patch through a few layers.

The machine also detects master near-end, with a different sensor (see the next slide).

Remaining Master Amount Detection



- **The master amount sensor counts the slits in the flange, when the flange turns.**
- **The operation panel shows when less than half the roll remains.**
  - The user tool setting (System Settings – Mode Setting – Master/Ink Remaining Volume) must be changed to 'On'.

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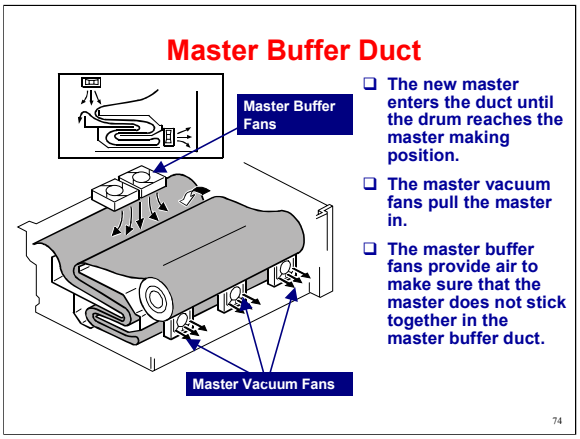
After some of the master roll is used, the diameter of the roll decreases. Because of this, the flange turns more quickly. The CPU takes this into account when it calculates the remaining master amount.



Service Manual, p 2-32

Go over the points on the slide.

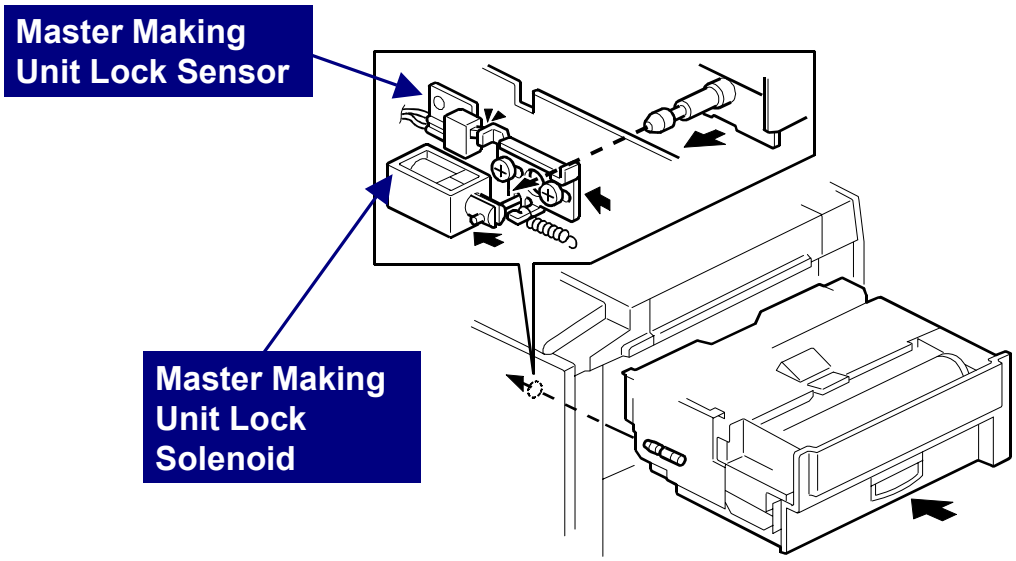
The fans start when master making starts.

> The master feed control roller already has the leading edge of the master since standby mode, so it does not get sucked into the duct.
>
> The complete master enters the duct before wrapping starts.
>
> This mechanism saves time – the next master can be prepared while the current one is still being used.

When the drum reaches the master making position, the master feed control roller starts to feed the master out of the duct towards the clamper.

> The master feed control motor controls the master feed control roller. The other master feed rollers are controlled by the master feed motor.

Master Making Unit: Lock Mechanism



- During master making or master feeding, the solenoid locks the master making unit.
- The sensor detects when the mechanism is locked.

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Service Remarks - Thermal Head

- Do not touch the elements with bare hands (clean with alcohol).
- Remove foreign materials from the platen roller and master roll area.
- Do not touch the master surface with bare hands
- Do not touch the connector terminals with bare hands.
- Keep the connectors horizontal.
- Adjust the thermal head voltage after installing a new head or power supply board.

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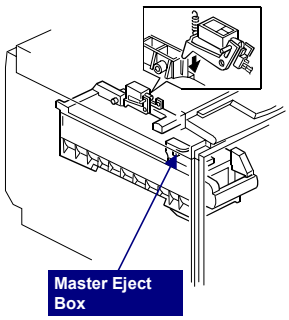
Master Eject: Box Lock Mechanism



- When the 'higher' security mode is enabled, the master eject box cannot be removed.
- The solenoid locks the box in the machine.

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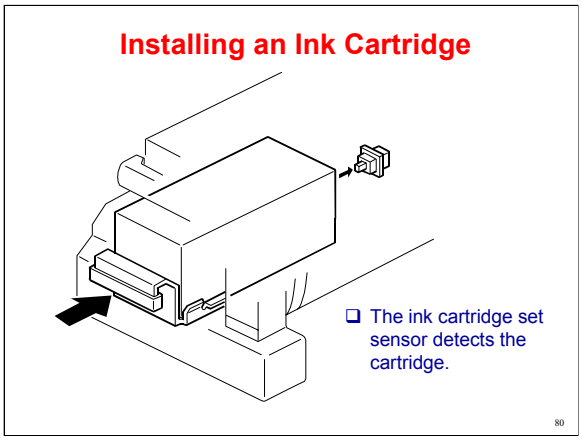
Master Eject Box Lock Solenoid: Locks the master eject box, so that old masters cannot be removed. This security feature can be cancelled only by the machine's administrator.

For details about 'higher' security mode, see the Operation section of the course.

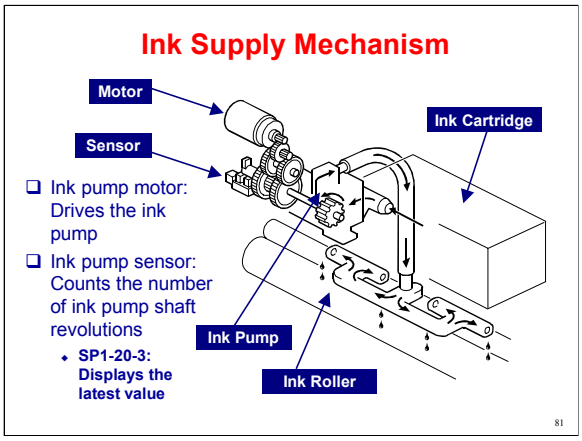
MECHANISM / COMPONENTS
Drum Unit

Drum

- Ink Flow Sensor: Detects when the ink level is too high. This is a backup for the ink detection pins, to prevent ink flooding inside the drum.
- Ink pump: This does not have a piston. A rotor inside the pump assembly moves ink into the drum.
- Metal plates are added inside the drum, to reduce ink leakage.
- There is no quality blade. This is because of the properties of the new ink.



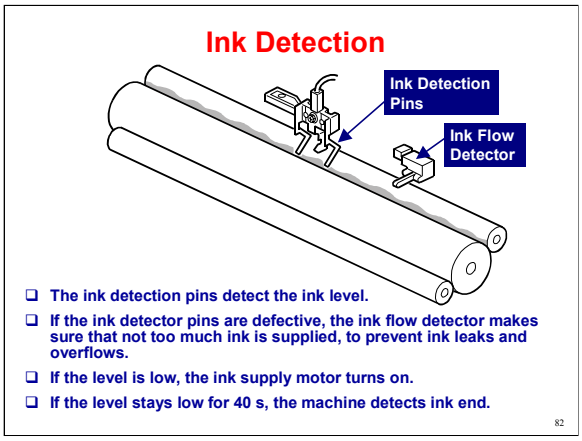
Describe this briefly. The main points are on the slide.



Go over the basic points on the slide.

The ink pump revolution count is used for ink near-end detection.

Ink pump is new mechanism.



Go over the basic points on the slide.

Bent shape for the outer pins

The long straight pins in the Pearl can block the flow of ink in the space between the ink rollers. These new pins allow smoother flow between the ink rollers.

Also, the shorter pins allow more ink to accumulate on the ink rollers.

Ink is not detected until more has been supplied to the rollers.

This is particularly useful when the print job contains a lot of solid black areas, and has led to quality improvements for this type of job.

Short central pin

Even though the above mechanism reduces the chances of the flow of ink getting blocked, it may happen sometimes.

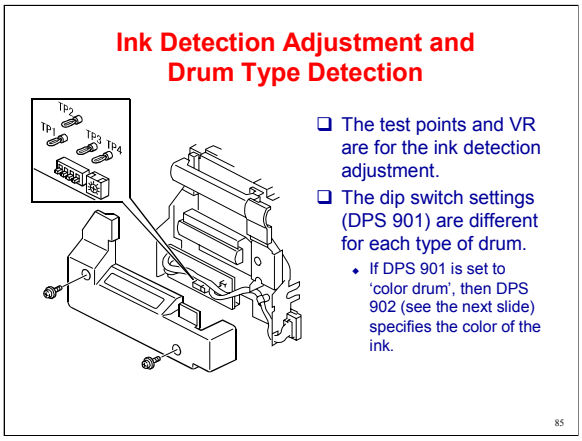
If it does happen, the new central pin detects when the ink level is getting too high and stops the ink supply.

Note the ink supply mode, which is useful when installing a new drum.

This turns the drum 40 times, to supply ink to the new drum to prepare it for printing.

Refer the 6-65 service manual

The machine cannot detect colour A4 drums. But you can put coloured ink in an A4 drum. The only problem is that the machine will not display the colour on the operation panel.



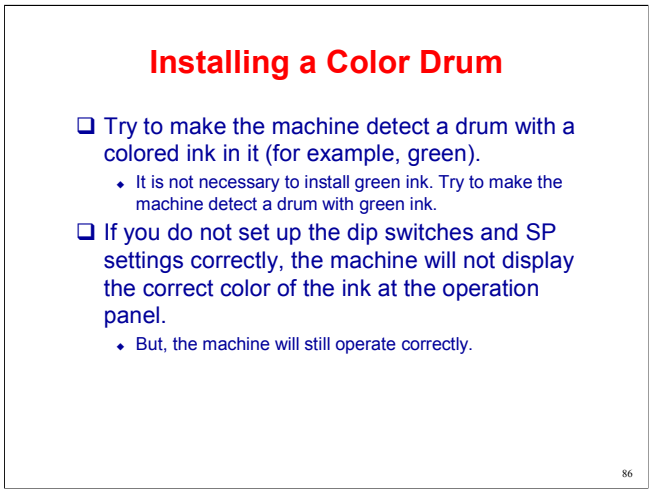
Describe the main points about the ink detection board, on the slide.

Make sure that the class is aware of the different dip switch settings for each drum type.

> The drum type is displayed on the operation panel. The display depends on these dip switch settings.

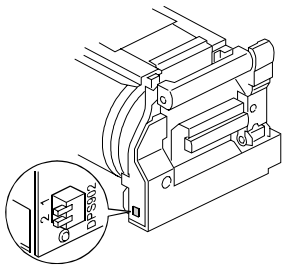
The only difference between the A3 and colour drums is the configuration of dip switches inside the drum assembly, which controls the indicators on the operation panel. There are settings for A3, A4, and colour.

The colour indicator indicates A3 colour. If an A4 drum is used for colour printing, the operation panel will indicate A4 unless a technician changes the dip switches for the customer to the 'colour' setting. In any case, the display cannot indicate both A4 and colour.



For a colour drum, ink is supplied automatically when the machine detects a new drum, in the same way as for black ink. This was explained earlier, during the installation procedure for the main body.

Color Drum ID Detection



- **DPS 902 has four possible settings.**
- **This means that four different colours can be automatically recognized.**
- **To specify the four colours that the machine recognizes, use SP 2-10.**
  - A separate color can be specified for each of the four possible dip switch combinations.
  - There are 15 colors to choose from
  - When the machine detects a color drum, it checks DPS 902, and displays the color that is set by DPS 902.

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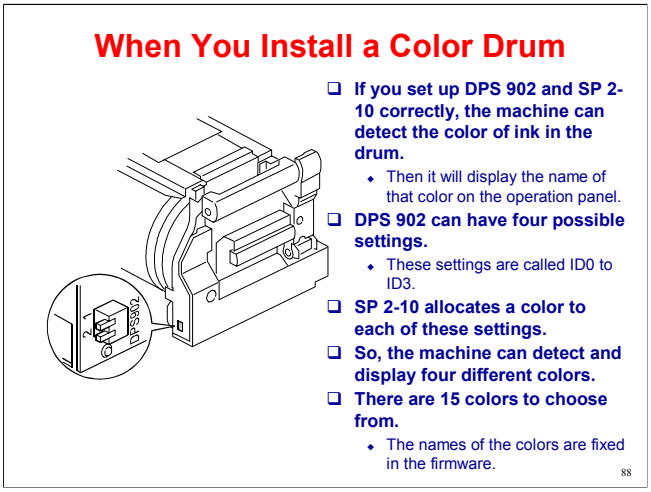
The names of the 15 possible colors are fixed in the software and cannot be changed by users or technicians.

DPS902 can be used by sales staff and customers. Because of this, there is no cover to remove when you get access to DPS902.



Example:

You want to install a drum that has blue ink.

The dip switch settings on the drum are both ‘Off’.

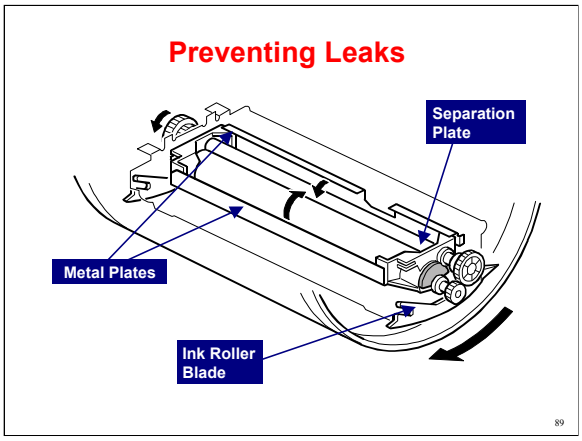
This is the setting for ID0.

SP 2-10-1 controls the colour that is displayed when the machine detects ID0.

The SP setting for ‘blue’ is ‘2’.

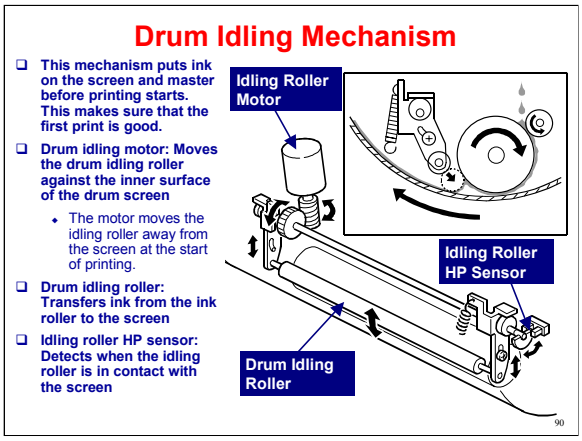
If you set SP 2-10-1 to 2, then, when the machine detects a drum that has both switches of DPS 902 set to ‘off’, it will display ‘blue’ on the operation panel.

Full details about the SP and dip switch settings are in section 5.



Two metal plates across the width of the drum were added to prevent excessive ink leaks from the drum if the ink overflows inside the drum.

Show the new mechanism to the class.

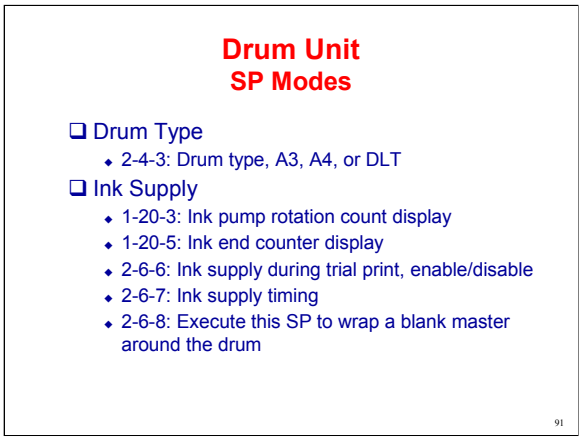


The idling mechanism puts ink on the screen and master before printing starts. This makes sure that the first print is good.

This mechanism is used in Quality Start Mode. This mode is explained on the next few slides.

The drum idling roller is only used during the preparation for printing in Quality Start mode. When printing starts, the roller always moves away from the screen.

In some earlier models, the roller did not move away until after the 2nd print.



Drum Type

2-4-3: Drum type

This changes the master making area and the image shift range.

Ink Supply

1-20-3: Ink pump rotation count display

This shows how many times the ink pump sensor has been activated.

1-20-5: Ink end counter display

This shows how many times ink end has been detected.

2-6-6: Ink supply during trial print, enable/disable

The default setting is 'disabled'. However, this machine has Auto Quality Start mode, which ensures that enough ink gets to the drum screens and master before printing.

If Auto Quality Start is enabled, it is OK to keep 2-6-6 disabled.

If Auto Quality Start is disabled, then 2-6-6 should be enabled.

Note that the user can disable Auto Quality Start but cannot adjust SP 2-6-6.

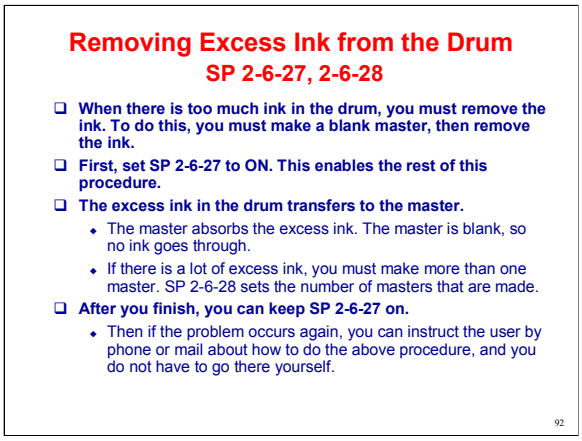
2-6-7: Ink can be supplied before printing, during printing, or after printing.

The default is 'after', to reduce idling time before printing.

If low ink is detected, then ink is supplied and this SP is ignored.

2-6-8: This should be done if a drum will not be used for a long time.

If a normal used master is used, the holes in the master will let the ink become dry. Also, if the drum is removed, people can see the content of the master.



How does the machine know when to stop removing ink? Are the ink detection pins used?

The machine does not stop. The machine always completes the procedure without looking at the ink detection pins.

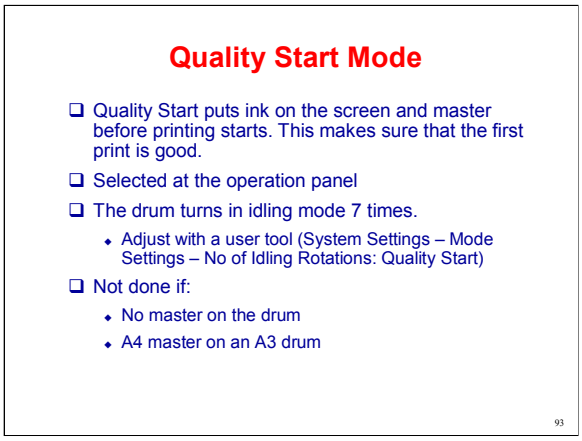
Other comments

The customer does this procedure when ink is leaking - but that's too late. (Also, the customer doesn't know when to stop removing excess ink.)

If a user makes a lot of prints with a mostly-white image, then leaking is likely. Because of this, the user should do this procedure before leaking starts. But when? There is no data on how many sheets can be printed before leaks start. It depends on the image; customers can go by their past experience of when leaking starts.

Generally, if coverage < 3%, the user should do this procedure, but we do not know when leaking starts. Leaking should only occur in extreme cases (making repeated sets of 5,000 copies of this type of original).]

連続+スタート

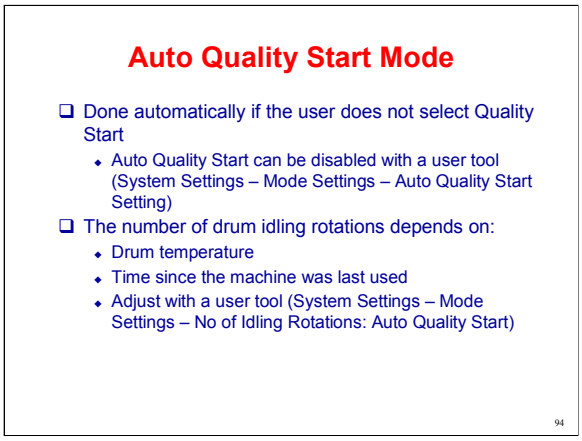


Describe this briefly. The main points are on the slide.

If the drum turns more than 7 times, too much ink will be removed from the drum idling roller, and the image will be patchy.

In most cases it is not necessary to select Quality Start, because Auto Quality Start (next slide) is done automatically.

> With Auto Quality Start, the machine checks the temperature and the time since the last print job, and decides whether idling rotations are necessary.
>
> But if the user does not like the results, they can do Quality Start.



More drum rotations are applied for lower temperatures and after longer periods since the machine was used.

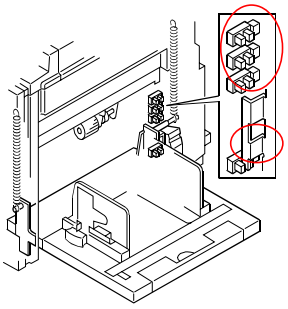
MECHANISM / COMPONENTS
Paper Feed

Paper Feed

- Registration Pressure Motor: Releases the pressure between the registration rollers, to allow jammed paper to be removed easily.
- Remaining Paper Sensors 1, 2, 3: Detect the amount of paper remaining on the paper table.
- Paper feed retry mechanism (during printing, and not for the trial print):
  - When paper is misfed at the paper feed tray, a paper feed jam is not displayed, and the machine tries to feed the paper again.
  - The retry is done only one time. If paper is not fed, then a misfeed occurs.

Remaining Paper Detection

- Three remaining paper sensors and the lower limit sensor detect the volume of paper on the feed table.
- The amount is measured when the top of the stack turns on the paper height sensor.
- The reading stays in memory, and the operation panel shows the same amount after the paper feed table lowers.
- If the user adds paper, the correct amount will be displayed the next time the paper feed table moves up to the paper feed position.



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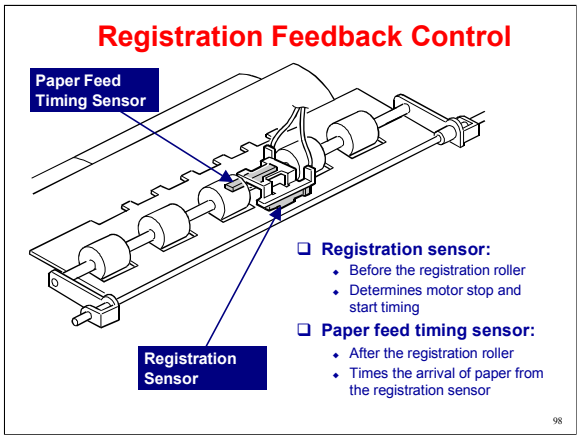
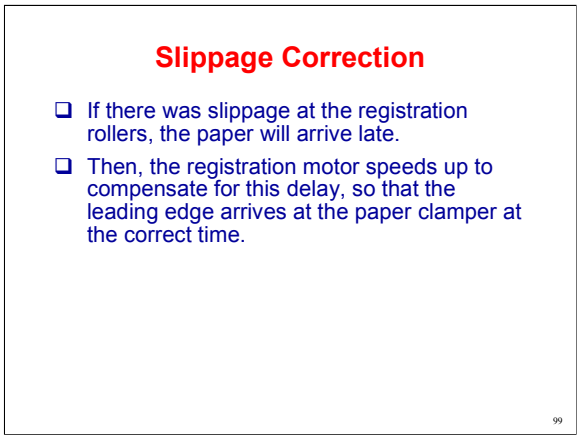
The service manual shows how the signals from the sensors affect the remaining paper amount that is detected by the machine.



The registration sensor is the same as in most machines.

It determines the timing for the registration and paper feed motors, to make a buckle in the paper to ensure proper registration.

The paper feed timing sensor is used to measure how long it takes for the paper to arrive at the sensor after the registration motor starts again.

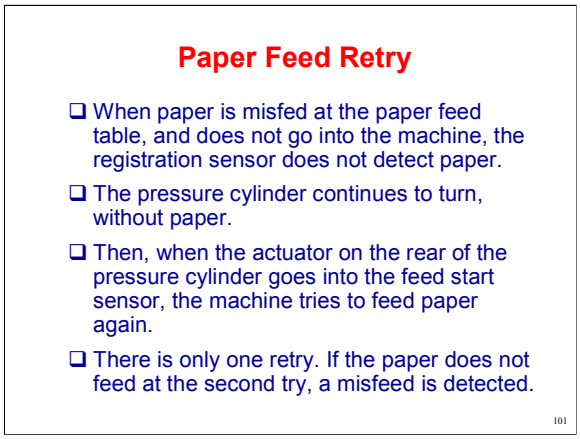


In addition, registration motor start timing is affected by detected fluctuations in pressure cylinder rotation, so that the paper can be accurately fed to the clamper.

This is covered in the Printing and Pressure Cylinder section of the course.

Paper Feed Speed

- Feed-in: The paper speed is 1.4 times as fast as the pressure cylinder rotation.
- Printing: When the paper clamper closes on the paper, the paper is fed by the pressure cylinder.
- The pressure cylinder speed depends on the feed speed that was selected by the user.

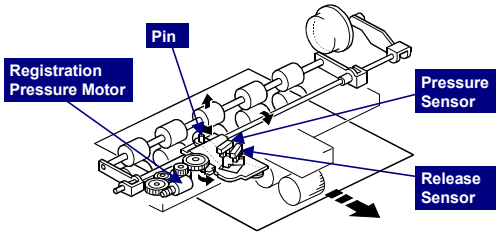


Service manual, section 6.8.6

Please check the retry mechanism

Push the paper on the paper feed table and release after the one rotation of drum

Pressure Release Mechanism



- This lets the user remove jams at the registration roller, without tearing the paper.
- The motor pushes the pin to release the roller.
- Two sensors monitor the position of this mechanism.
  - Pressure sensor: Paper feed position
  - Release sensor: Jam removal position

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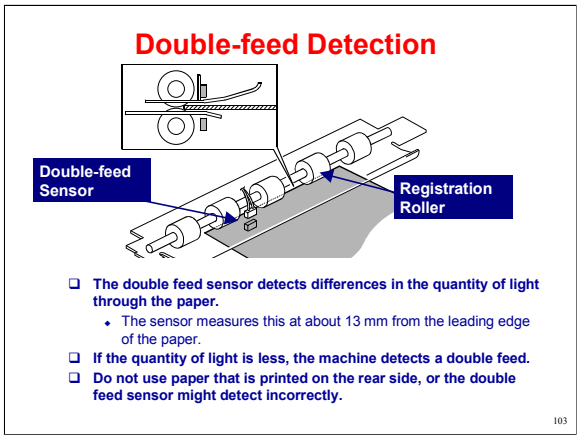
Service manual, section 6.8.7



Service manual, section 6.8.8

This function may not operate correctly when:

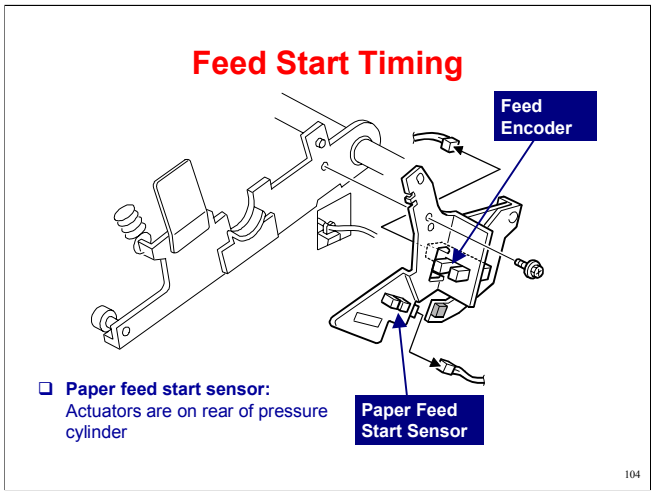
The paper is not all the same colour

The paper is not all the same thickness

Enable this function with a user tool (default is disabled)

System Settings – Mode Setting – Double Feed Warning

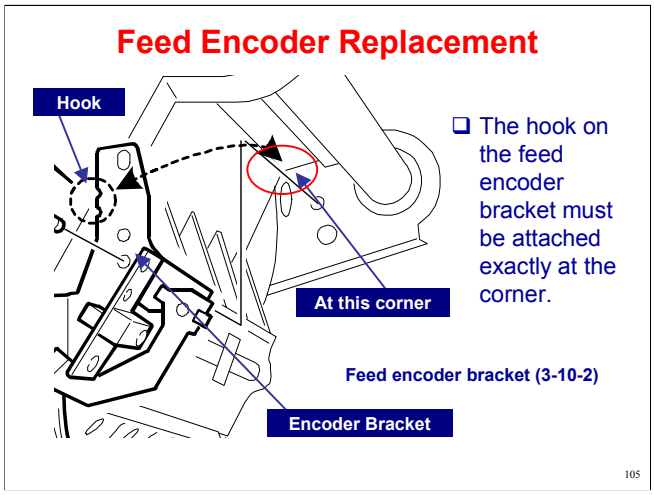
Also with SP 3-2-10



Service Manual, section 6.9.7

The paper feed start sensor actuators are on the rear of the pressure cylinder.

The sensor was covered in the Paper Feed section of the course.



Service manual, section 3.10.2

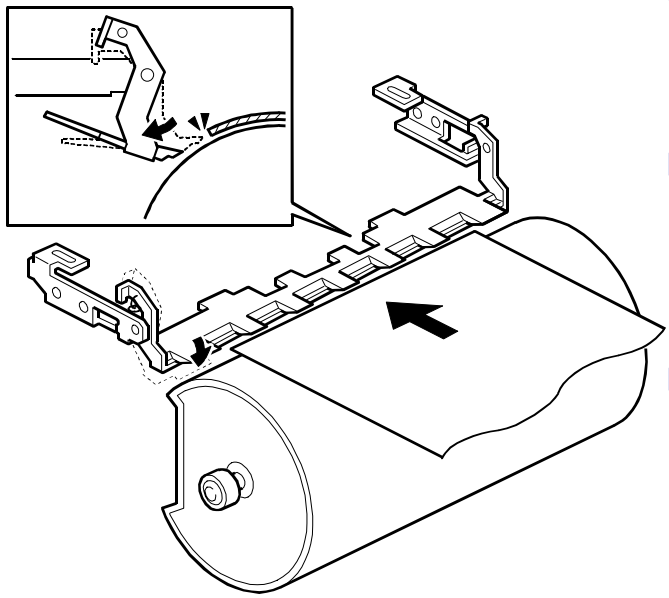
Here is the corner in close-up.

MECHANISM / COMPONENTS
Paper Delivery

Paper Delivery

- **Adjustable buffer fins are added to the side plates. These help to prevent ink stains on the rear sides of prints, and help to make the output stack tidy.**
  - The user can adjust these fins. The operation manual shows the best settings for each paper type.
- **The paper pick-off plate can move.**
  - If the paper is firmly stuck to the pressure cylinder, the paper pick-off plate moves away to prevent damage.
- **Air Knife Fans: Increased to 3**

Paper Eject
Pick-off Plate



- The pick-off plate helps to remove paper from the drum.
- But, if paper is firmly stuck on the drum, a jam can occur at the pick-off plate.
- Because of this, the plate moves away from the paper if there is even a small amount of resistance.

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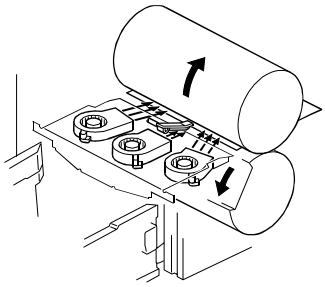
Air Knife



- Air knife fans: Above delivery unit. They help to separate the paper from the drum.

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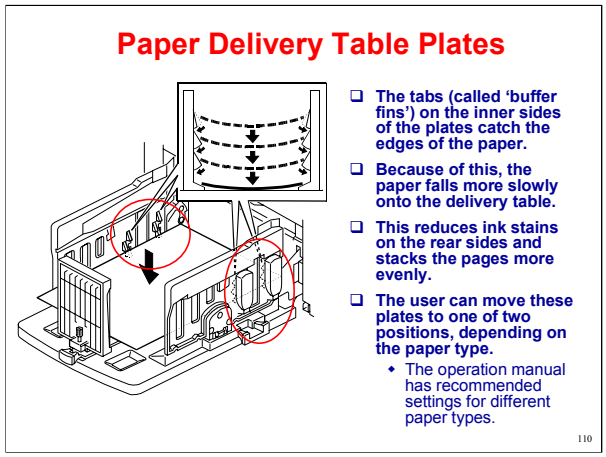


These plates are called 'Chocks' in the operation manual.

For the recommended settings, refer to Operating Instructions – Basics – Printing Preparations – Using the Paper Feed Tray and Delivery Table.

Note the correct way to set up the delivery table.

In this machine, the side and end fences are not the only items to adjust.

The paper alignment wings and chocks must be adjusted to match the paper size and thickness.

Do not confuse the paper alignment wings (on the paper delivery table; must be adjusted manually) with the paper delivery wings (inside the machine; cannot be adjusted manually).

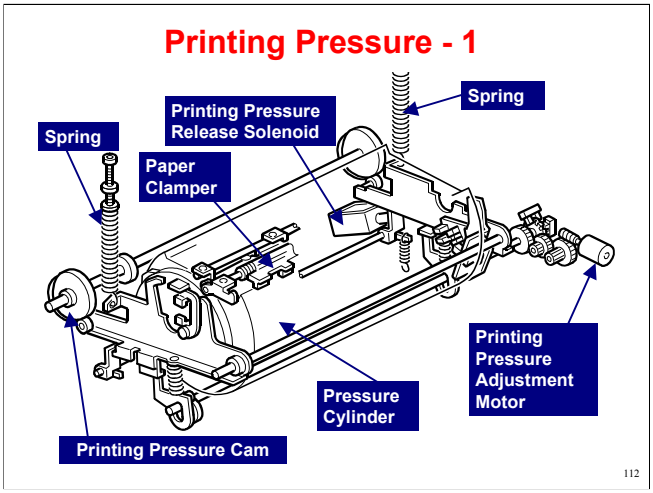
The correct settings are shown in the operation manual.

What is the purpose of these?

The paper alignment wings keep the paper's shape so that it drops onto the tray flat and not all curled up.

The tabs (called the 'buffer fins') on the inner surfaces of the chocks catch the edges of the paper, so that the paper falls more slowly. This prevents ink stains on the rear side of the prints.

MECHANISM / COMPONENTS
Printing Pressure



Service Manual, section 6.9.1

Describe the pressure cylinder briefly, using the two points on the slide.

Go over the mechanism, as follows.

In standby mode, the printing pressure release solenoid holds the cylinder away from the drum.

When the first page reaches the image transfer area, the solenoid releases the cylinder.

The paper clamper on the cylinder catches the leading edge of the paper after it has left the registration roller, and carries it to the nip area between the drum and the pressure cylinder. Shortly after the leading edge has passed the nip area, the clamper releases it.

Springs pull the cylinder up against the drum.

The print pressure adjustment motor makes sure that the pressure is correct for the current temperature and printing speed. This prevents changes in image density.

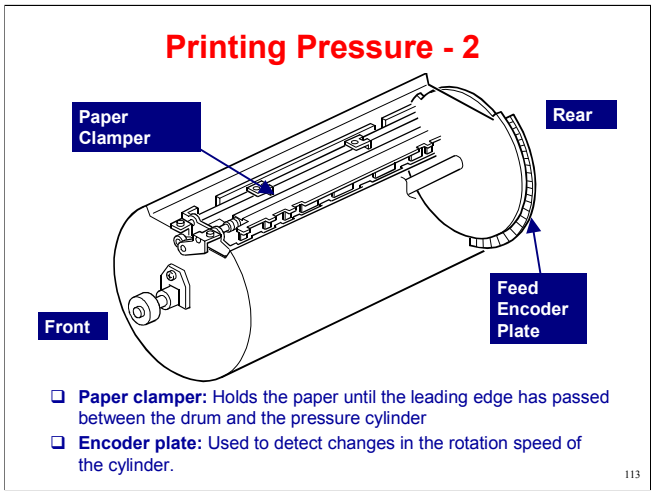
The printing pressure cams push the cylinder back when the master clamper on the drum is coming round, so that it does not damage the pressure cylinder.

If the machine is printing on an A4 sideways master, another set of cams is automatically used, to keep the cylinder in contact with the drum only in the image printing area, to avoid getting ink on the pressure cylinder.

When the job is finished, the printing pressure release solenoid catches the cylinder again, and holds it away from the drum.

The lower wrapping jam sensor detects if paper does not separate from the pressure cylinder after image transfer (this is known as a ‘lower wrapping jam’).

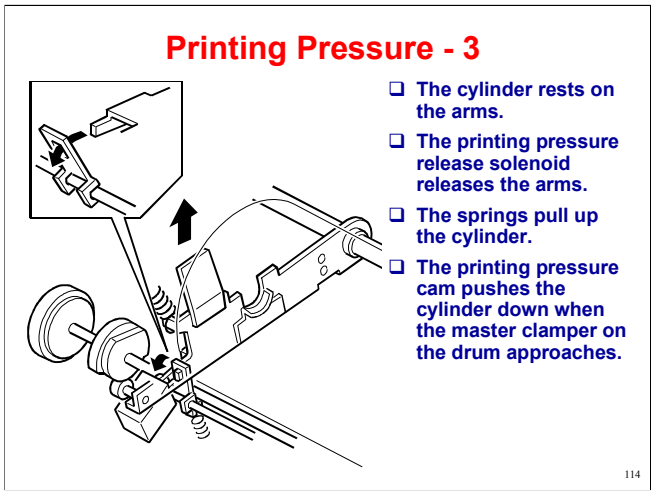
The paper exit sensor in the delivery unit detects when paper wraps around the drum (this is known as an ‘upper wrapping jam’).



Service manual, section 6.9.2

This shows the pressure cylinder.

On the rear, there are also two actuators for the feed start timing sensor (see the Paper Feed section of the course).



Service Manual, section 6.9.4

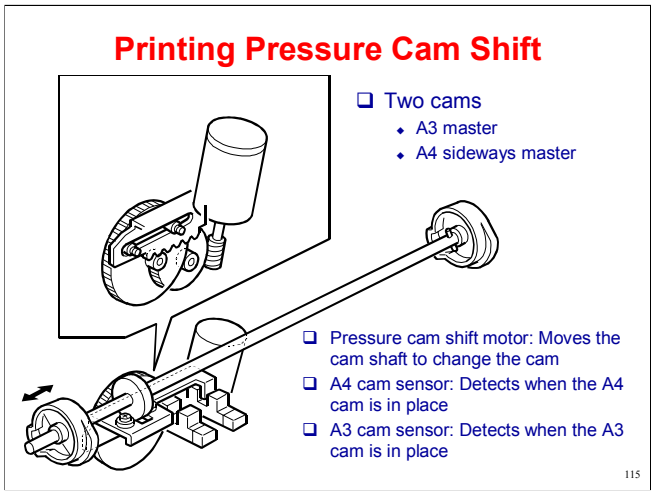
Describe the mechanism. The slide gives an outline. There are more details in the manual. In particular, note the following:

The printing pressure cam is driven by the main motor, so it is always turning.

The printing pressure solenoid can only release the arms when the high point of the cam is at the bearing, which is when the paper has just reached the image transfer area. The arm is pushed down slightly, and a small gap is created, which allows the solenoid to release the arms.

Point out how the arms turn about the release arm shaft.

Show how the printing pressure cam applies and releases the printing pressure.



Service Manual, section 6.9.5

In certain conditions, if the A3 drum is installed, the machine can make A4 sideways masters to conserve the master roll.

This mechanism is used when both the following conditions are met:

A4 sideways prints are made with the A3 drum (namely, when the CPU detects A4 sideways on the paper feed table)

Two or more sheets are placed in the ADF (this is when the ADF still detects an original in the feeder after the first one has been fed)

If the above two conditions are met, the A4 printing cam is selected.

Describe the mechanism. The main points are on the slide (bottom right).

The A3 and A4 sideways cams are side by side on the same cam wheel.

If the A4 drum is installed, the A4 sideways cam is always used.

With the A4 cam, printing pressure is only applied between drum and cylinder when there is paper between them.

Pressure is released when the paper has gone past, to prevent transfer of ink to the cylinder.

The pressure is applied at the same time, but is released earlier for the A4 cam.

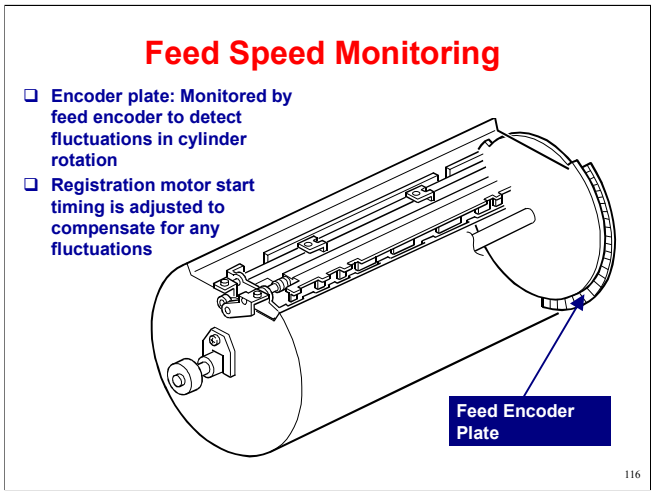
For the final original of a print job, a large master (A3) is always made, to prevent ink from drying on the drum.

Because of this, for a one-original job, an A3 master is made.

In platen mode, an A4 master is never made with the A3 drum, because the machine cannot detect the number of originals.

So, with the A3 drum, it is better to use the ADF for multi-original jobs.

This feature is explained in the Operation section of the course (Master Saving Mode)



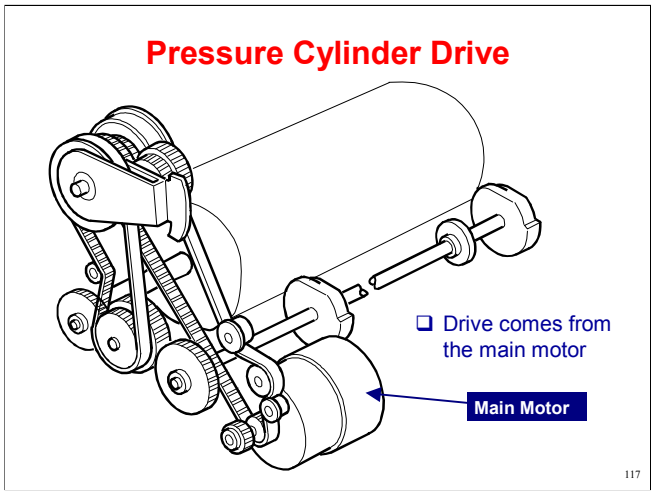
Explain why pressure cylinder rotation speed may fluctuate.

Not perfectly circular in cross section

The paper clamper is heavy, so the centre of gravity is away from the centre of rotation.

The machine corrects the registration motor start timing, so that the paper clamper can catch the leading edge of the paper accurately (the main points are on the slide).

The encoder is shown on the previous slide.



Describe this briefly. The main points are on the slide.

Printing Pressure Adjustment

- As shown on the previous slide, the machine automatically adjusts the printing pressure, depending on the printing speed, and the temperature measured by the drum thermistor.
- If necessary, this feature can be disabled, and a constant pressure can be applied for all temperatures and printing speeds.
- To disable the feature, set SP 2-6-16 to ‘on’. Then, the printing pressure will always be at the value that is set with SP 2-6-17.

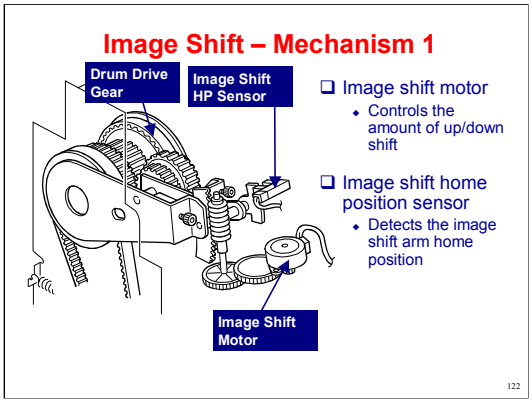
Pressure Cylinder

- **Printing Pressure Adjustment Motor:**
  Adjusts the printing pressure to the correct value for the current temperature and speed of printing. This is done to prevent changes in image density.

MECHANISM / COMPONENTS
Image Shift

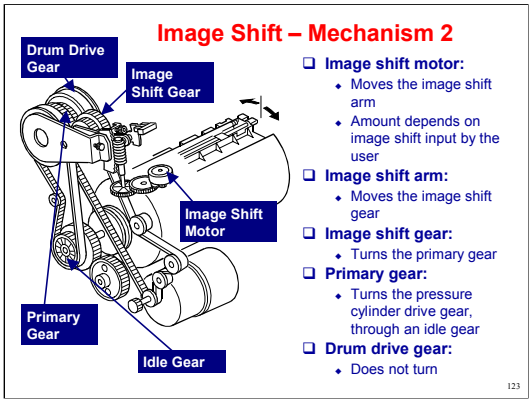
Image Shift - Overview

- The machine changes the registration motor start timing.
- However, the paper clamper mounted on the pressure cylinder must catch the leading edge of the paper properly.
- Therefore, the pressure cylinder must be rotated slightly to take account of the time that the paper leaves the registration rollers.
- The paper clamper will then catch the paper's leading edge correctly.



Service Manual, section 6.11

The next few slides show how the position of the pressure cylinder is adjusted relative to the drum.



Service Manual, section 6.11

The main points are on the slide.

The mechanism turns the pressure cylinder but not the drum.

The drive from the image shift gear drive is not strong enough to turn the drum.

Point out each component as you explain the mechanism.

The image shift motor automatically detects the amount of rotation. Because of this, there is no encoder in this machine for the image shift mechanism.

MECHANISM / COMPONENTS
Main Drive Assembly Unit

Main Drive Unit

Replacement and Adjustment

- **After replacing the main drive unit, the following need to be adjusted:**
  - Drum home position
  - Image shifting arm home position
  - Pressure cylinder drive installation position
  - Scissors gear installation position
  - Printing pressure cam drive gear installation position
  - Registration roller lifting cam installation position
  - Paper exit pawl drive timing installation position
  - Pressure cylinder rotation knob position
- See field service manual for details on the above procedures.

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Service Manual, section 3.11.2, Reassembly Procedure

During reassembly, the items on the slide have to be adjusted properly.

There are some special tools needed for this job. A set of three tools is provided. See the next slide.

End of Course