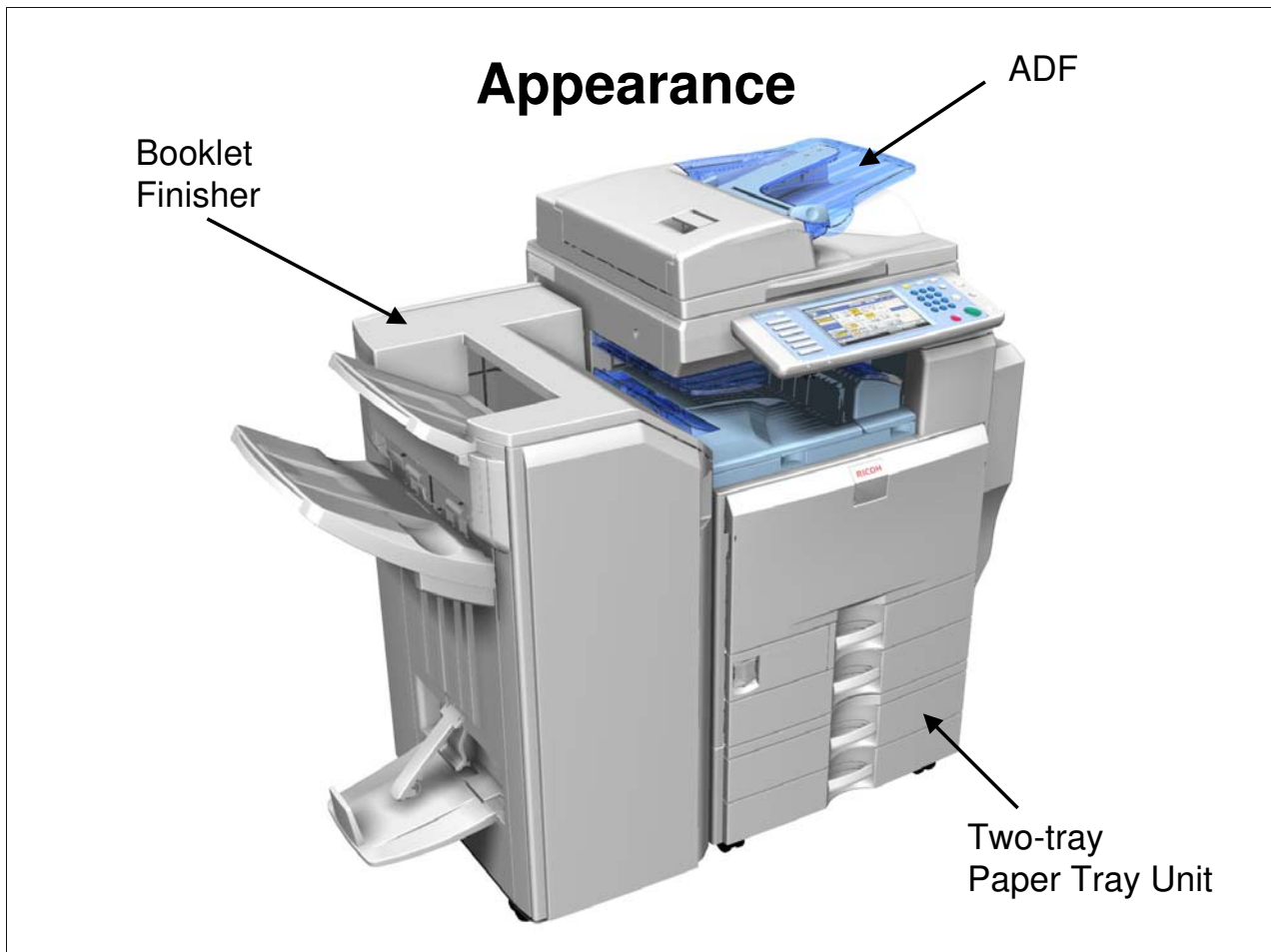# RICOH

APOLLON-C1 TRAINING

PRODUCT OUTLINE

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

INTRODUCTION

Appearance

ADF

Booklet
Finisher

Two-tray
Paper Tray Unit

❒ Here is a view of the machine with three optional peripherals installed.
❒ There are other options, as we will see later.
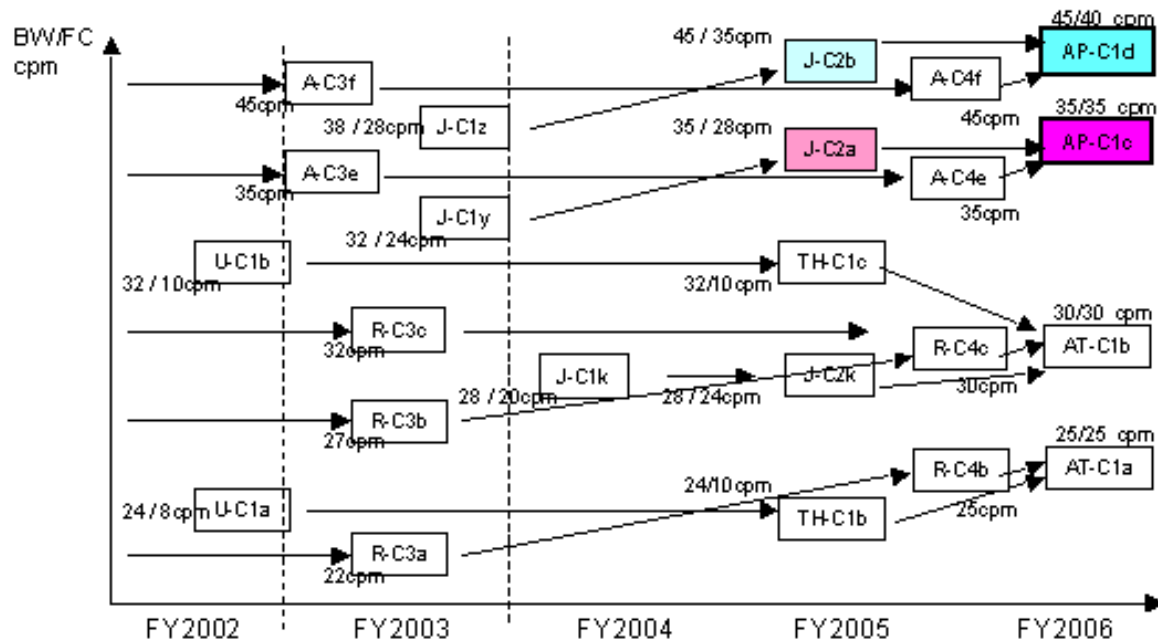
How many models?

■ **Two models:**

- AP-C1c (B222): 35 cpm (color/black & white)

- AP-C1d (B224): 45 cpm (black & white) or 40 cpm (color)

■ **The differences between the two models are as follows:**

- Print speed (see above)

- Laser optics unit (the B224 has two laser beams per colour, but the B222 has only one).

■ **Both models contain a printer/scanner kit as standard equipment.**

Product Positioning

□ This chart shows which machines the Apollon-C1c/C1d could be used as alternatives or as replacements.

□ The faster machine could be seen as a replacement for the faster models of the Jupiter-C1/C2 series. The Athena uses a four-PCU tandem colour copying system, like the Jupiter, so it is quite fast.

SALES POINTS

Main Sales Points

■ **High performance (close to black-and-white models)**

- Short Warm Up time: 45 sec (B222), 60 s (B224).

- Shorter First Copy Output Time (A4/LT LEF) :

  • B222: 8 s or less (colour), 4.9 s or less (black-and-white)

 • B224: 7 s or less (colour), 4.5 s or less (black-and-white)

■ **Productivity**

- High speed color output

  • B222: 35 cpm, B224: 40 cpm

- Booklet Finisher

- Large Paper Capacity: Max. 3,100 sheets

- LCT can be refilled during feeding from the LCT itself.

- High Speed Scanning: 63 pages/minute (monochrome), 38 pages/minute (colour): A4 LEF, 200dpi

- Thick paper (up to 216 g/m^2) can be fed from the front tray

❒ Faster warm-up: The IH coil heating system makes it quick for thick paper as well as standard plain paper.
  ➢ The B224 has a longer warm-up time, because it is a faster engine. Because of this, the B224 needs to get to a higher temperature and build up more inside the fusing unit before the first job can start.

❒ There are also a lot of connectivity features, which we will not explain in this class. We will limit ourselves to the engine in this course.

New Display Panel

Colour Mode Icon

Check Modes

Job List

Remaining Job Time
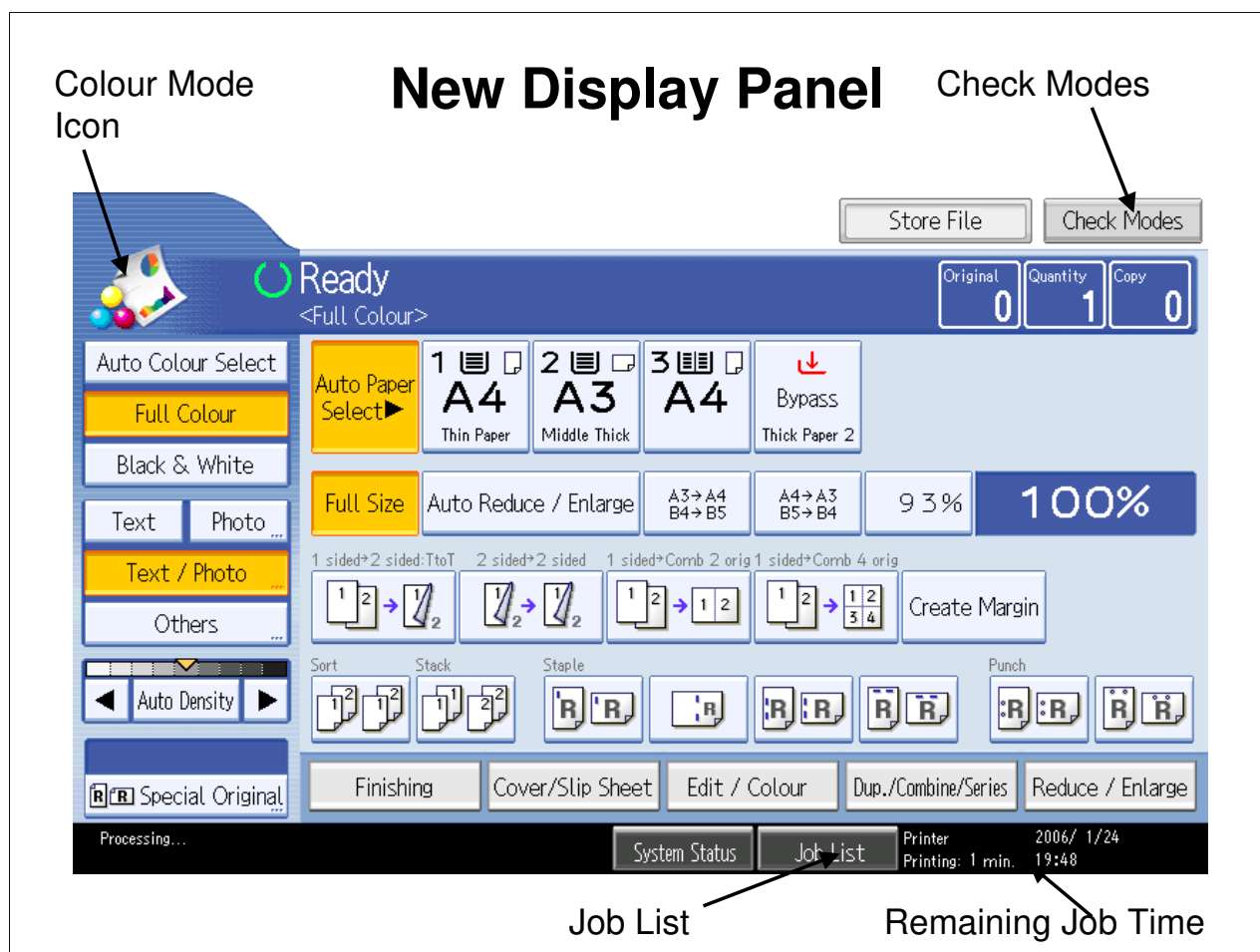
❒ The colour mode icon changes when you select Auto Colour Select, Full Colour, or Black and White. Ask the class to try it on the machine, if you have one set up already.

> ➢ Other modes, such as two-colour mode, can also be shown as options on the display by adjusting machine settings.

❒ The Check Modes button is part of the LCD display.

❒ The Job List button is a new feature.

❒ You can also see an estimate of the remaining time for the job, at the bottom of the screen. (Does not work for fax communication.)
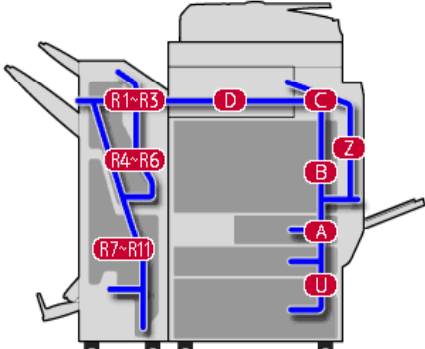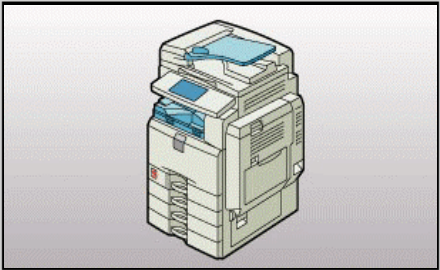

Improved Operation Panel

Larger LCD

Login/Logout,
for Authentication

Status Lamps
Can be seen from a distance

Start Key

Simplifies
the Display
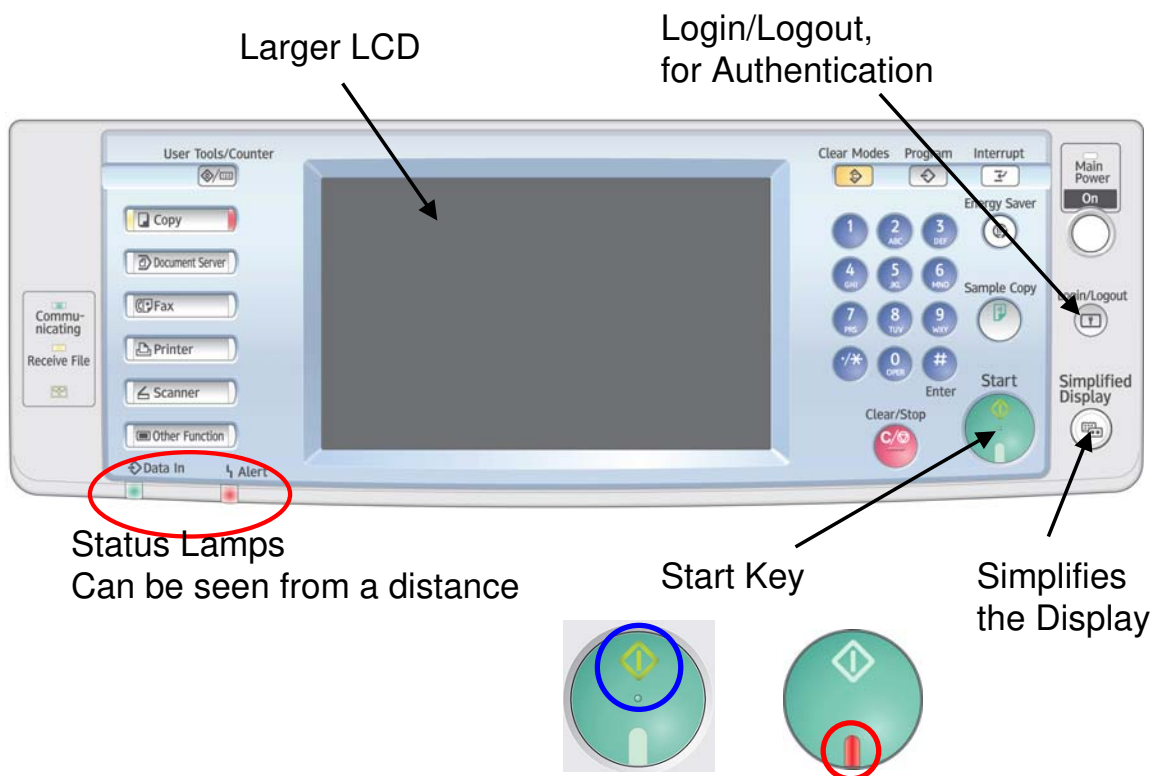
- ❒ The login/logout button makes authentication a bit easier.
- ❒ The 'simplified display' button reduces the amount of information on the LCD panel. Try it and see. The next slide gives an example.
- ❒ The red and green lamps on the Start key show clearly when the machine will or will not start.

Display
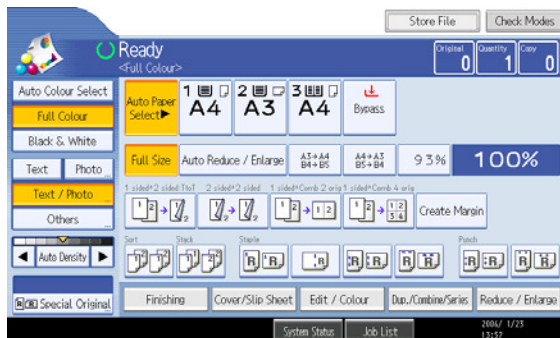
Normal Display

Simplified Display

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

Easy Jam Removal

- **Simple paper path**
- **All jams can be removed from the right side of the machine.**
    - If the finisher is installed, jams can occur in the finisher.

❒ The photo on the left shows that the path through the machine is simple.

LED on the One-bin Tray

One-bin Tray

This LED lights when the one-bin tray has an output in it

Standard Output Tray

- **This LED lights when an output arrives on the one-bin tray.**

    - The one-bin tray is an optional device.

- **If the one-bin tray is set up to receive fax messages, then the LED tells the customer when a fax message has been printed.**

❐ The LED does not become lit during duplex operation.

Paper Tray Handle

- The handle can be pulled easily with an 'overhand' or 'underhand' grip.

Replacing Toner is Easy

- Toner cartridges can be changed with one hand, and with one movement.

Scanner Accessibility Option

- The scanner and operation panel can be separated from the main body, and put on a separate table.

- This makes it easier to operate the machine for people who cannot reach the scanner and operation panel.

EQUIPMENT

Mainframe, with No Options

■ **The machine has this equipment built in.**

- Duplex
- Bypass tray
- 2x500-sheet trays
- 500-sheet output tray
- 8.5-inch W-VGA touch panel
- Printer/Scanner, with USB and Ethernet
- 1024MB Memory
- 80GB HDD
- PCL5c/6, RPCS
- 10/100 BaseTX

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

Paper Handling Options
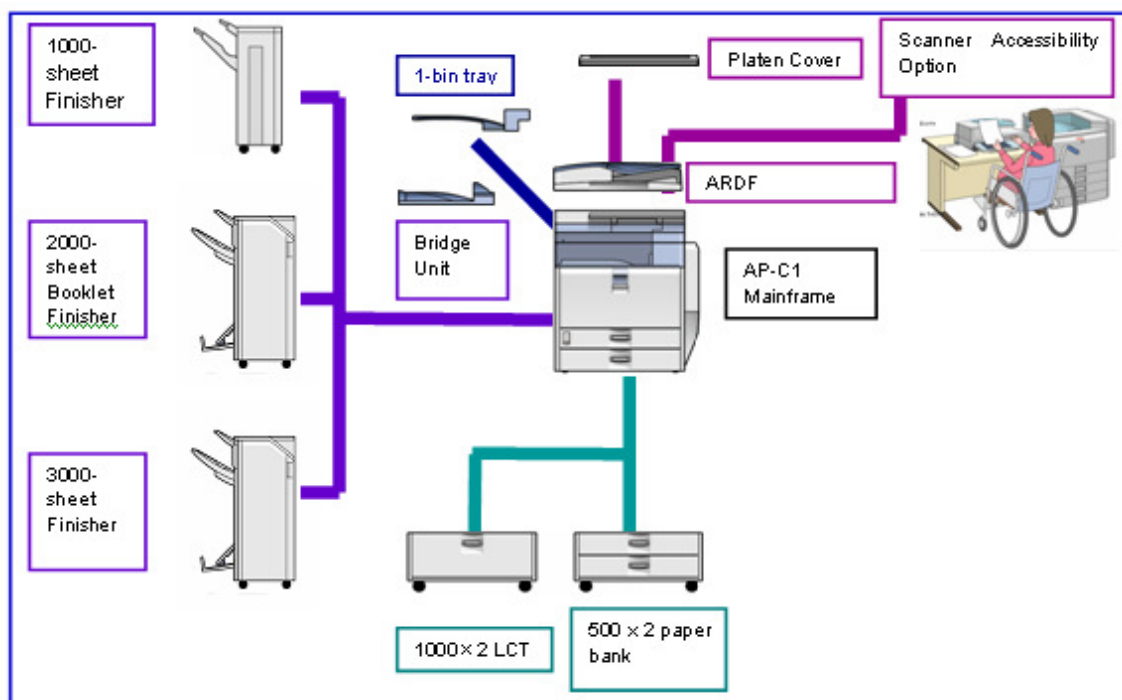
❐ You can install the following:

- ➢ The platen cover or the ARDF
- ➢ One of the three finishers (a finisher requires the bridge unit)
  - *The finishers also require the LCT or paper tray unit.*
- ➢ One-bin tray
- ➢ The two-tray paper feed unit (also called a 'paper bank') or the LCT

Paper Handling Options

■ **New items**

- ADF

- Scanner accessibility option

- 2000-sheet booklet finisher, 3000-sheet finisher (similar to V-C1)

- One-bin tray

■ **Same as AT-C1**

- Platen cover, paper tray unit, LCT, bridge unit, 1000-sheet finisher

■ **To install a finisher, the bridge unit must be installed.**

■ **If the 1000-sheet or booklet finisher is installed, you must also install the LCT or paper feed unit.**

- If not, the paper exit from the copier will not be at the correct height to go into the finisher.

❏ There is no optional jogger unit for the finishers.

Fax Options

- **Fax Option: New Item**

- **Optional G3 unit : New Item**

- **SAF memory (32MB): Same as J-C2/TH-C1/AT-C1**

- **Handset: Same as J-C2/TH-C1/AT-C1**

- **Fax Stamp Ink: Same as A-C3, J-C1, AT-C1**

Printer/Scanner Options (1)

■ **Printer/scanner is a standard part of the machine, not an option.**

- USB and Ethernet are built in.

■ **Wireless LAN (IEEE 802.11b): Same as AT-C1**

■ **IEEE 1284: Same as AT-C1**

■ **IEEE 1394: Same as AT-C1**

■ **Bluetooth: Same as AT-C1**

■ **PostScript3 option: New Item**

- Required to use the PDF Direct Print Function

Printer/Scanner Options (2)

- **USB Host: Same as AT-C1**

  - Required to attach PictBridge

- **Media Link Board: Same as AT-C1**

- **Video Link Board: Same as AT-C1**

  - Required to attach the Fiery controller

- **PictBridge: Same as AT-C1**

Printer/Scanner Options
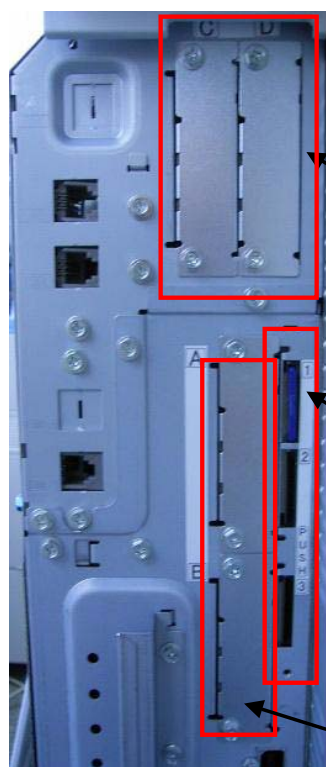
Board
Slots C and D

SD Card
Slots 1 to 3

Board
Slots A and B

- **I/F Card Slots**
  - Slot A: IEEE1284, IEEE1394, IEEE802.11, Bluetooth, or Remote Communication Gate
  - Slot B: USB Host interface
  - Slot C: Not used
  - Slot D:File Format Converter
- **SD Card Slots**
  - Slot 1: Standard printer/scanner application
  - Slot 2: Applications
    - PostScript 3, Data Overwrite Security Unit, PictBridge
  - Slot 3: Service (installing the Browser Unit, updating the firmware).

❒ In this model, the IEEE 1394 option goes in the same slot as the other printer interface options.

❒ Because of this, only one of the printer interface options can be installed in this model.

Security Options

- **HDD Data Overwrite Security Unit: Same as AT-C1**

- **Copy Data Security Unit: Same as AT-C1**

Other Options

- **Java VM Card: Same as AT-C1**

- **Web Browser Option (SDK): Same as AT-C1**

- **Optional counter Interface: Same as AT-C1**

  - This is a 20-pin interface. It is required when you attach a key counter.

- **Key Counter Bracket: Same as AT-C1**

- **NRS interface: Same as AT-C1**

TARGETS

Reliability Targets

- **Unit life (2 prints per job): 3000K or 5 years**

- **Average Copy Volume per month (copy + fax + print):**

  - B222: 10K

  - B224: 15K

- **Max Copy Volume per month: 50K (Target Color Ratio: 30%)**

- **PM cycle: 80K (Target Color Ratio: 30%)**

Yield Targets

- **Toner**
  - Cartridge Capacity
    - Black: 510g /cartridge
    - Cyan / Magenta / Yellow: 400g /cartridge
  - Target Yield (A4/LT, 5% coverage)
    - Black: 23K outputs /cartridge
    - Cyan / Magenta / Yellow: 17K outputs /cartridge
- **Staples**
  - Corner stapler: 5,000 staples per cartridge (all finishers)
  - Booklet stapler: 2,000 staples per cartridge

❐ The toner bottles are not compatible with other products.

Replacement for PCU Components

	80 k	160 k	240 k	320 k
Drum unit	Yes	Yes	Yes	Yes
Developer		Yes		
Development unit				Yes
PCU				(Yes)

■ **At 320 k, you can do either of the following (depending on your local service policy):**

  ● Replace the PCU as a complete unit.

  ● Replace the individual components (drum unit, development unit). The new development unit contains developer.

❒ At the moment, CMY development units are EM parts, not PM parts. It is not clear how this will be handled at this time.

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APOLLON-C1 TRAINING

SPECIFICATIONS

❏ Go through the machine's specifications, using the slides. Emphasize the points listed below.

General Specifications 1

■ **Resolution:**

- Scan: 600 dpi

- Print: 600 dpi

■ **Gradation:**

- Scan: 4 bits/pixel

- Print: 4 bits/pixel, 2 bits/pixel, 1 bits/pixel

■ **Maximum Original Size: A3/11" x 17"**

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

General Specifications 2

- **Print Paper Size:**

  - Tray 1: A4/8.5" x 11" (LEF)

  - Tray 2: Min A5 (LEF)/8.5" x 11", Max A3/11" x 17"

  - By-pass: Min 90 x 148 mm, Max 305 x 600 mm/12" x 23.6"

  - Optional Tray: Min A5 (LEF)/8.5" x 11", Max A3/11" x 17"

  - LCT: A4/8.5" x 11" (LEF)

- **Printing Paper Weight:**

  - Standard tray: 60 to 216 g/m^2 (16 to 57 lb.)

  - Optional paper tray: 60 to 216 g/m^2 (16 to 57 lb.)

  - By-pass tray: 52 to 253 g/m^2 (14 to 67 lb.)

  - Duplex unit: 60 to 169 g/m^2 (16 to 45 lb.)

Print Paper Size
  ❒ For details, refer to "Supported Paper Sizes" in the service manual.

General Specifications 3

- **Print Paper Capacity (80 g/m^2, 20 lb):**
  - Standard tray: 500 sheets x 2
  - By-pass tray: 100 sheets
  - Optional paper feed tray: 500 sheets x 2
  - LCT: 2000 sheets

- **Output Paper Capacity:**
  - Standard exit tray: 500 sheets minimum (face down)
  - 1-bin Tray: 125 (80 g/m^2)
  - 2000-sheet booklet finisher: 250 + 2000 sheets (80 g/m^2)
  - 3000-sheet booklet finisher: 250 + 3000 sheets (80 g/m^2)

General Specifications 4

■ **Copy speed**

● Normal (ADF 1 to 1, LT/ A4 LEF)

• B222: 35 cpm (color/black & white)

• B224: 45 cpm (black & white) or 40 cpm (color)

● Thick 1 (169 g/m2 or less)

• B222/B224: 25 cpm (color/black & white)

● Thick 2 (220 g/m2 or less)

• B222/B224: 17.5 cpm (color/black & white)

● Thick 3 (253 g/m2 or less)

• B222/B224: 15 cpm (color/black & white)

❒ Why is colour slower for B224? The line speed is the same.
  ➢ Answer: Insufficient fusing can occur at 45 cpm if there are 4 toner layers on the paper. At 40 or 35 cpm, there is no problem.

General Specifications 5

- **First copy (normal mode):**
  - B222
    - Color: 8 seconds or less (A4/LT LEF)
    - Black & white: 4.9 seconds or less (A4/LT LEF)
  - B224
    - Color: 7 seconds or less (A4/LT LEF)
    - Black & white: 4.5 seconds or less (A4/LT LEF)
- **Warm-up time:**
  - B222:
    - 45 seconds or less (23 °C, 50%)
  - B224:
    - 60 seconds or less (23 °C, 50%)

General Specifications 6

■ **Memory**

- ● RAM: 1024 MB

- ● Hard disk: 80 GB

- ● No optional memory, except for the fax unit.

❒ The memory is standard. There is no optional additional memory for the copier.
❒ The fax option has an additional memory module. The purpose is explained in the Fax section of the course.

About 'Thin Paper'

■ **This machine does not support thin paper.**

■ **'Thin paper' is an additional paper weight setting that the user can select at the operation panel if the 'plain paper' setting causes problems.**

- For example, if a certain type of paper is being curled because the fusing temperature is too high, then you can ask the customer to use the 'thin paper' setting.

- Then you can use SP mode to reduce the fusing temperatures that are used for the 'thin paper' setting.

- You can also change the transfer current settings, if the transfer of toner is insufficient.

❒ This is the same situation as for the Athena-C1 series. But the fusing unit is different, so the types of problems that occur will be different from the Athena-C1.

❒ Copy quality is not guaranteed for thin paper, and wraparound jams can occur in the fusing unit.

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APOLLON-C1 TRAINING

INSTALLATION

❒ In this section, get the trainees to install the machine and all the options.
❒ Install at least one machine with all options as a complete system.
❒ Make sure that the class follows all notes and cautions in the procedures.

OVERVIEW

What do I do first?

- **First install the paper tray unit or LCT.**

- **Then install the copier.**

- **Then install the controller options.**

- **Then install the paper handling options.**

  - The flow chart shows the correct order to install these items.

B222 Service Manual, Installation, Copier Installation, Installation Flow Chart
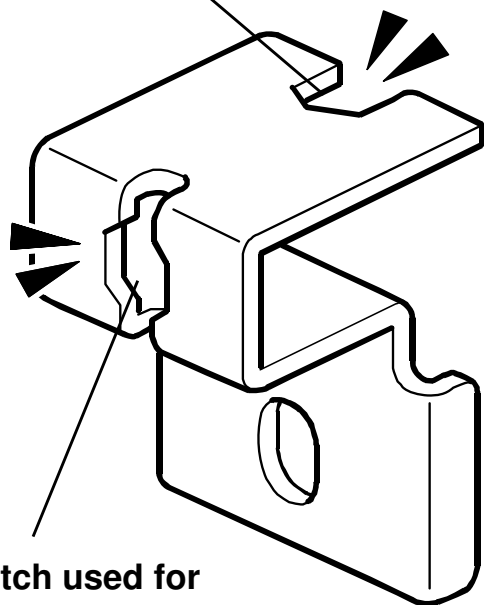
PAPER TRAY UNIT, LCT

Important Notes

■ **You must lift the copier and put it on top of the paper tray unit or LCT.**

  ● Always lift with two persons. The copier is too heavy for one person.

  ● Do not try to lift the copier with the paper tray unit or LCT installed. You will damage the lifting handles.

Securing Brackets

Notch used for installing the tray heater

Notch used for installing the paper tray unit or LCT

■ **The securing bracket contains two notches.**

- One of these notches is used as a tool when you install the paper tray unit or LCT.

- The other notch is used as a tool when you install the tray heater.

- So, do not install the securing brackets until after you install the tray heater.

Install the Paper Tray Unit and LCT

■ **Do the procedures in the service manual.**

- ● Paper Tray Unit: B222 Service Manual, Installation, Paper Feed Unit

- ● LCT: B222 Service Manual, Installation, LCT

■ **Install a tray heater in each unit:**

- ● Procedure: B222 Service Manual, Installation, Tray Heater

B222 Service Manual, Installation, LCT/Paper Feed Unit

❒ Ask the class to install the Paper Tray Unit and the LCT.

❒ Only one can be installed on each machine at the same time, so install them on different machines in the classroom.

❒ Make sure that all students get a chance to install each unit.

B222 Service Manual, Installation, Tray Heater

❒ Install a tray heater in each unit, so that the class understands how to use the securing bracket (see the previous slide).

❒ If the location has a high humidity, it may be necessary to install tray heaters.

❒ Unlike the Bellini-c3, there is only one way to connect the heaters.

MAIN COPIER – IMPORTANT POINTS ABOUT INSTALLATION

❒ First, we will look at important points about installing the copier.
❒ Then you will install your copier and peripherals.

Development Unit: Except GSA (-58) and Europe (-67/26) models

Tape

Image Transfer Belt Lever

Stopper

Drum Positioning Plate Lever
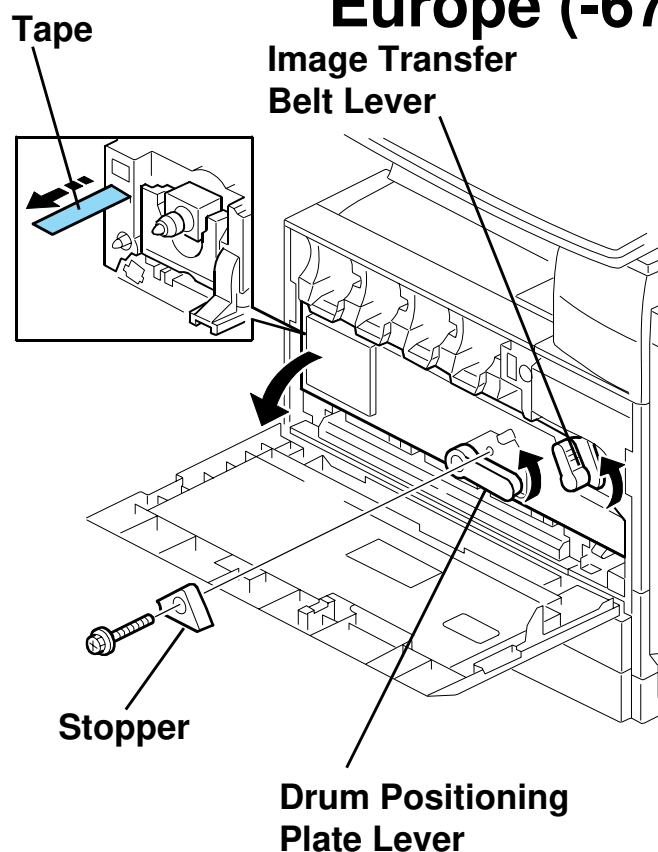
■ **Turn the two levers as shown.**

● The stopper locks the drum positioning plate lever.

■ **Remove the tape from all four development units.**

● Hold the development unit with your hand, then pull the tape.

● IMPORTANT: Remove the tape from all four development units before you turn the main switch on.

● The development units can be severely damaged if you do not remove the tape.

■ **Then put the two levers back in their original positions.**

❒ In European and GSA (USA government) models, the tape is removed at the factory. So steps 2 to 7 of this part of the installation procedure are not needed.

Toner Bottles

**Toner
Bottle**
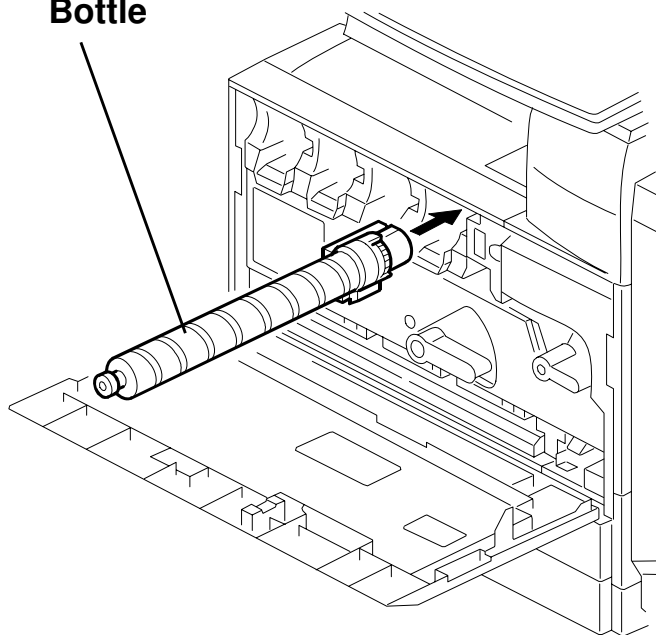
◼ **Shake each bottle 5 or 6
times before you install it.**

Paper Trays
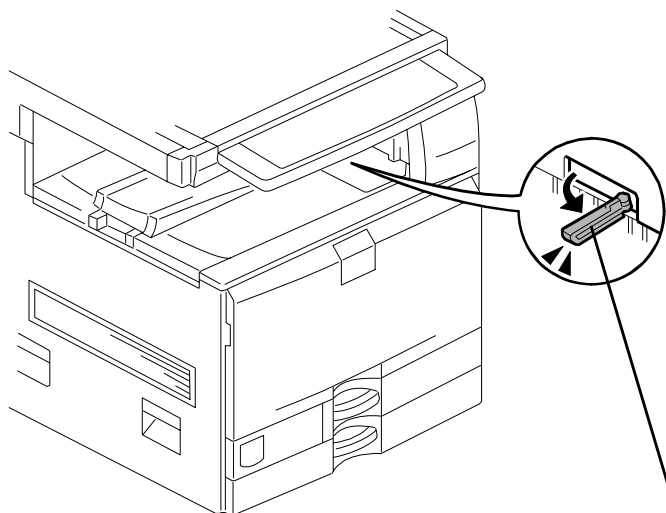
■ **Make sure the guides are at the correct positions for the paper size used by the customer.**

● The service manual explains how to adjust the guides.

■ **Pull out the feeler for the output tray full detection mechanism.**

Feeler

Fire Prevention Cover

■ **When the copier is installed on the floor without the optional paper tray unit or a table, attach the cover at the right side of the copier.**

Initializing the Developer

■ **This is done automatically after you turn the power on for the first time.**

■ **When it is finished, the LED on the Start key goes green.**

  ● If the initialization does not finish correctly, you can use SP 3014 001 to see what the problem is.

■ **Make some test copies.**

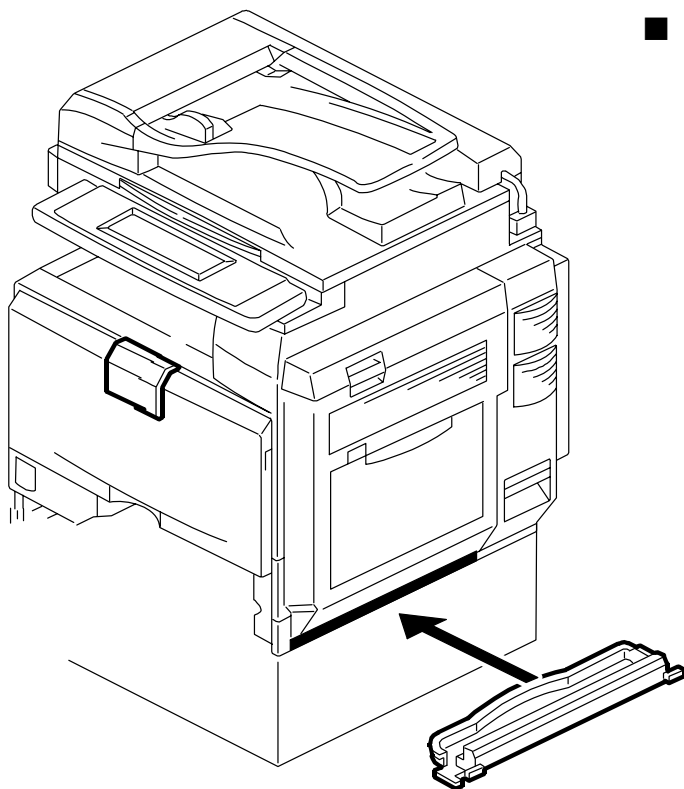■ **Then do the ACC procedure.**

  ● User tools > Maintenance > ACC > Start

B222 Service Manual, Troubleshooting, Process Control Error Conditions

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

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

Accessing Service Mode

■ **Practise entering and exiting service mode.**

❒ Make sure that everybody knows how to access SP mode.

SP Settings (1)

■ **Counting method: SP5-045-001**

- Specifies whether the counting method used in meter charge mode is based on developments or prints.

  - The default setting is 'developments'.

- NOTE: You can set this one time only.

■ **A3/11" x 17" double counting: SP5-104-001**

- The default setting is 'single counting'. When you have to change this setting, contact your supervisor.

■ **Supply names: SP 5-841**

- Input the product name of the toner, staples, and other supplies.

- These names appear on the screen when the user presses the Inquiry button in the user tools screen.

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

SP Settings (2)

■ **Service Tel. No. Setting: SP5-812-001 through 004**

- 001: Service station telephone number

- 002: Service station fax number. This number is printed on the counter list when meter charge mode is selected. This lets the user fax the counter data to the service station.

- 003: Supplier of consumables

- 004: Sales representative

■ **Hard disk: At installation, it is not necessary to format the hard disk or transfer the stamp data.**

- After the hard disk is replaced, you must transfer the stamp data (SP 5853), but formatting is not necessary.

INSTALL THE COPIER

❒ The class will now install their machines.

Install the Machine

■ **Procedure:**

  ● B222 Service manual, Installation, Copier Installation

❒ First, have the trainees install their machines.
❒ Make sure that the class follows all notes and cautions in the procedures.
❒ Why is there no circuit breaker in this machine? Other colour copiers have them.
  ➢ This machine was designed so that electrical leaks do not occur, and so a circuit breaker is not necessary. In the other models, a circuit breaker is installed because there is a chance that leaks may occur. The B222 series has extra safety measures built in.

INSTALLING THE CONTROLLER OPTIONS

Why do we Install These Now?

- **If you install some of the paper handling options first, it will be necessary to remove them before you can install the controller options.**

    - In particular, if you install a finisher, some of the slots for controller options will be impossible to access, and you must remove the finisher to install the controller options.

Controller Options - Purpose of the Slots (1)

Board Slots C and D

SD Card Slots 1 to 3

Board Slots A and B

■ **4 slots for boards (only 3 are used)**

● A: IEEE1284, IEEE1394 (FireWire), IEEE802.11 (Wireless LAN), Bluetooth, or Remote Communication Gate

● B: USB Host interface

● C: Not used

● D: File format converter
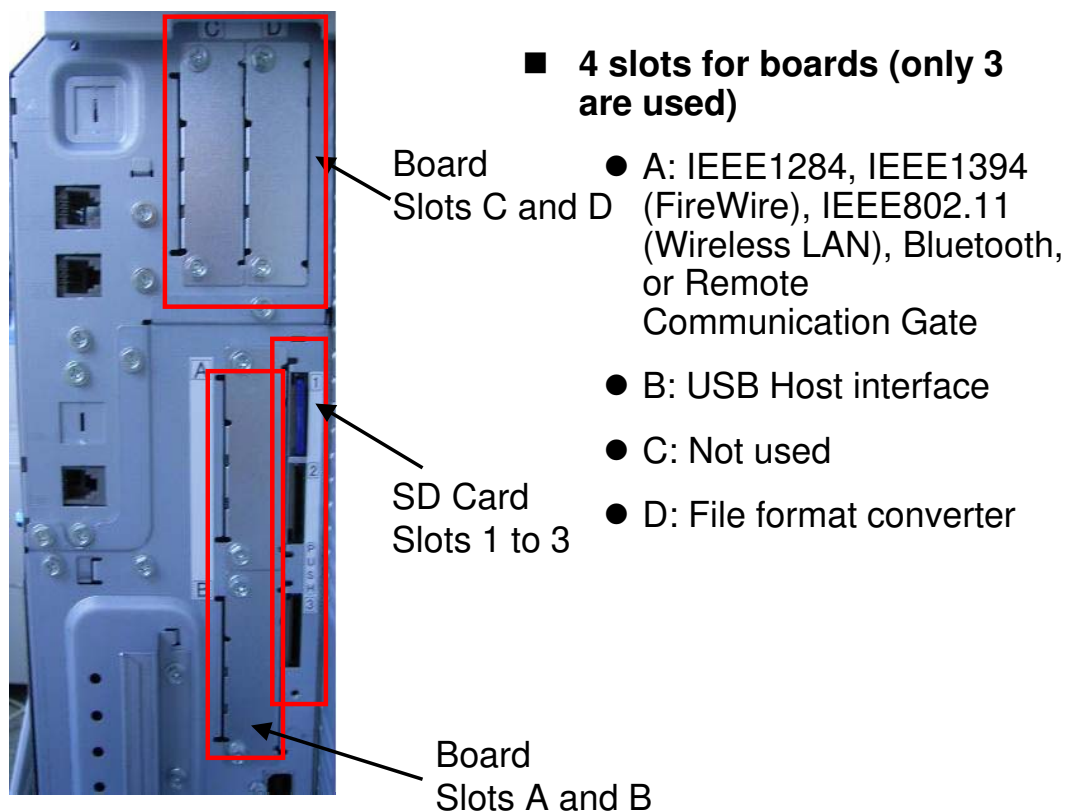
❒ In the B230 series, the IEEE1394 board was in a different slot from the other interfaces, so two optional interfaces could be installed. But with the B222 series, this is not possible – all interface boards go in the same place, as usual for a GW machine.

❒ Also, the slot assignments are not the same as the B230.

❒ In the photo, board slot C is on the left, and board slot C is on the right.

Controller Options - Purpose of the Slots (2)
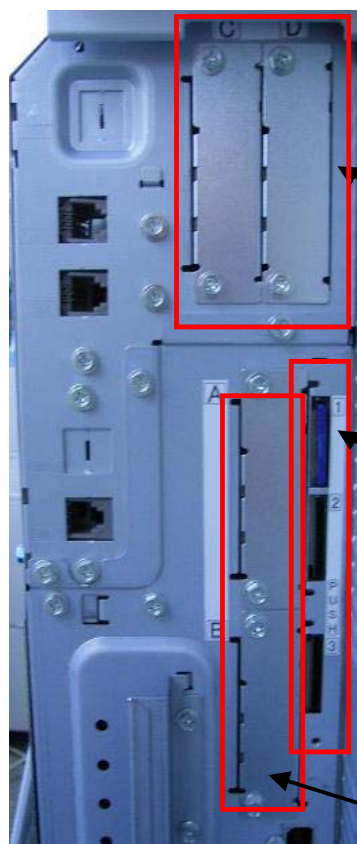
Board
Slots C and D

SD Card
Slots 1 to 3

Board
Slots A and B

■ **3 slots for SD cards**

● Slot 1: Used for the standard printer/scanner application only.

● Slot 2: Used for one of the optional applications:

  • PostScript 3, Data Overwrite Security Unit, PictBridge

● Slot 3: Used for installing the Browser Unit, or for service only (for example, updating the firmware).

SD Card Slots

■ **Slot 1**

- The printer/scanner card goes here.

- The printer/scanner kit is a standard part of the machine, so do not remove this card.

■ **Slot 2**

- One of these can be installed.

  • PostScript 3, Data Overwrite Security Unit, PictBridge

- To install more than one, you must merge the software onto one card.

  • Procedure: We will study later in this section

- Do not copy the PostScript card onto another card. This violates Adobe's copyright.

❒ Slot 2 is the only SD card slot available for applications.

❒ You can copy applications from slot 3 to a card in slot 1 or slot 2. If you use slot 1, you can only copy to the printer/scanner card that is already in slot 1. Do not put another SD card in slot 1.

SD Card Slots

■ **Slot 3**

- It is used for installing new firmware.

- It is also used during the installation procedure for the browser unit.

  - The machine copies firmware from the SD card to the hard disk during the procedure.

  - You must remove the SD card from slot C3 after you install the browser unit.

❒ Slot 2 is the only SD card slot available for applications.

Copying Applications

■ **There are only 3 SD card slots, but only one slot for applications (slot 2).**

■ **If you want to use more than one application, you must copy the application from the original card to another SD card.**

■ **See the service manual for the detailed procedure.**

■ **Basic points:**

● Put the source card in slot 3, and copy it to the card in slot 1.

• Use the card that is already in slot 1 (printer/scanner card). Do not put another SD card in slot 1.

• This card has enough space for the PictBridge and DOS applications.

● Do not copy the PostScript application. This card must stay in slot 2.

Procedure: B222 Service Manual, Installation, Controller, SD Card Appli Move

❐ For this model, the printer/scanner card in slot 1 has enough space for the PictBridge and the DOS applications. Use the card that is already in slot 1 (printer/scanner card). Do not remove the printer/scanner card from slot 1.

❐ If you want to use slot 2, you must first turn the machine power off, remove the SD card from slot 1, and turn the power on again. You can then do the procedure, and the application will go to the card in slot 2.

❐ The procedures in the manual assume that you use slot 1.

Storing the Original SD Cards after Merging
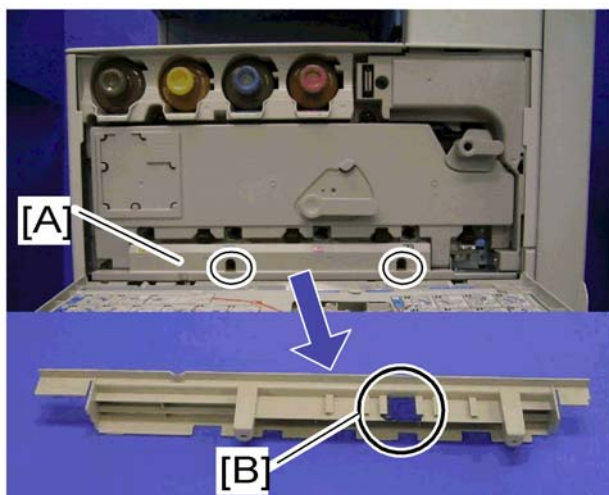
■ **After you copy an application, the original SD card is de-activated.**

- ● It can be re-activated with the 'Undo Exec' procedure in the service manual.

  - • Put the original card in slot 3, and copy back from slot 1 (or slot 2).

■ **But the customer must keep it as a proof of purchase.**

■ **The original cards can be stored in a secret compartment at the front of the machine.**

- ● Remove cover [A] and store them at [B].

B222 service manual, Installation, Controller Options, SD Card Appli Move

❒ If you want to use slot 2, you must first turn the machine power off, remove the SD card from slot 1, and turn the power on again. You can then do the procedure, and the application will be copied froms the card in slot 2.

Install The Controller Options (1)

■ **General Notes**

- Unplug the machine's power cord before you install a controller option.

- After you install a controller option, check that the machine can detect it.

  - User Tools > Printer Settings > List Test Print > Config. Page

  - All installed options are shown in the "System Reference" column.

B222 service manual, Installation, Controller Options

❒ Have the class install these options. They should study the installation procedures, and do as many of them as possible.

Install The Controller Options (2)

■ **File Format Converter**

- Unlike with the B230 series, it is not necessary to install the fax board. The architecture of the B222 series is different.

■ **Copy Data Security Unit**

- If you install this option, you cannot use scanner or fax functions. Also, reduction ratios of less than 50% are disabled.

- Set the following user tool to 'On':

    • System Settings > Administrator Tools > Copy Data Security Option

- If the customer removes this unit, and turns the power on, the machine will issue an SC165 error if the "Data Security for Copying" feature is set to "ON".

    • This prevents unauthorized users from removing the unit and trying to make copies of protected documents.

B222 service manual, Installation, Controller Options

❑ Have the class install these options. They should study the installation procedures, and do as many of them as possible.

What does the Copy Data Security Unit do?

❑ The machine makes gray-out output and sounds the buzzer when making copies of prints that are printed with the RPCS driver with "Unauthorized Copy Prevention".

Install The Controller Options (3)

■ **Data Overwrite Security Unit: Must be type D**

- ● Make sure that you have a type D unit.

  - • If you have installed the wrong type by mistake, you must replace the controller NVRAM inside the copier before you install the correct DOS unit. After you install the unit, print an SMC report and check that you have installed the correct type.

- ● Before you can install this unit, the customer must store some names and passwords related to authentication.

- ● Follow the procedure in the service manual carefully, or the installation will fail.

B222 service manual, Installation, Controller Options

❒ Have the class install these options. They should study the installation procedures, and do as many of them as possible.

TRANSPORTING THE MACHINE

Moving the Machine a Short Distance

■ **Remove all trays from the optional feed unit or LCT.**

B222 Service manual, Installation, Copier Installation, Moving the Machine

Moving the Machine a Long Distance

■ **Move the scanner carriage from home position.**

  ● Use SP 4806 001.

  ● This prevents dust from getting into the scanner.

■ **Remove the toner bottles.**

■ **Remove the paper from the paper trays, and secure the bottom plates with tape.**

■ **Empty the toner collection bottle, and secure the bottle with tape.**

■ **Attach shipping tape to the covers, or tightly wrap the machine with shrink-wrap.**

B222 Service manual, Installation, Copier Installation, Transporting the Machine

❒ To move the shift tray to the shipping position, you can also use dip switches, as explained in the service manual for the booklet finisher.

❒ There are no SP or dip switch settings for the other finishers.

After Moving the Machine a Long Distance

■ **Do the "Auto Color Registration" as follows. This optimizes color registration.**

● First, do "Forced Line Position Adj. Mode c" (SP2-111-3).

● Then, do "Forced Line Position Adj. Mode a" (SP2-111-1).

■ **To check if SP 2-111-1 was successful, watch the screen during the process. A message is displayed at the end.**

● Also, you can check the result with SP 2-194-10 to -12.

■ **Make sure that the side fences in the trays are correctly positioned, to prevent color registration errors.**

❑ SP 2111-1 and –3 are used at other occasions, after replacing certain parts. We will see this again.

B222 Service Manual, Troubleshooting, Process Control Error Conditions
B222 Service Manual, Troubleshooting, Troubleshooting Guide

❑ For SP 2194, see these sections of the service manual.

PAPER HANDLING OPTIONS – IMPORTANT POINTS

What Order do I Install These In?

- **The best order is as follows:**

  - One-bin tray

  - Bridge unit

    - Must be installed if you will install a finisher, or the paper cannot be fed to the finisher.

  - Finisher (and Punch Unit if applicable)

    - The punch unit cannot be installed in the 1000-sheet finisher.

  - ARDF or Platen cover

❒ The installation procedure for the scanner accessibility option was not available at the time of writing. It is scheduled for release as a technical bulletin.

Installing the Bridge Unit
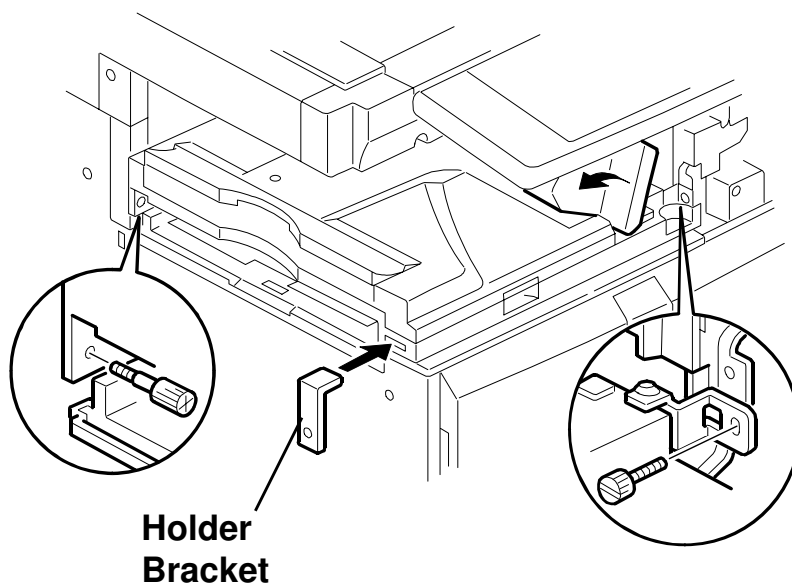
**Holder
Bracket**

■ **If you cannot install the finisher immediately, install the holder bracket
as shown.**

■ **If you do not do this, then the user could damage the bridge unit if
they pull up the bridge unit tray.**

■ **When you install the finisher, you will need this bracket during the
installation procedure.**

❒ The holder bracket is item 4 in the accessories. This is used in the finisher installation.
But, we should install this bracket when we install the bridge unit, if we do not install a
finisher immediately. If not, the users could break the bridge unit if they push the
machine using the bridge unit as a pushing place.

Before you Install a Finisher

■ **Before you install a finisher, you must install the following:**

● Bridge unit

● Paper feed unit or LCT (needed so that the machine is at the correct height to feed paper into the finisher).

❒ All finishers require the bridge unit.
❒ If the finisher does not have the paper feed unit or LCT, the paper exit from the copier main body is not at the correct height to feed paper into the finisher.

1000-sheet Finisher: Rear Joint Bracket

**Do not use
this one**

Use this one
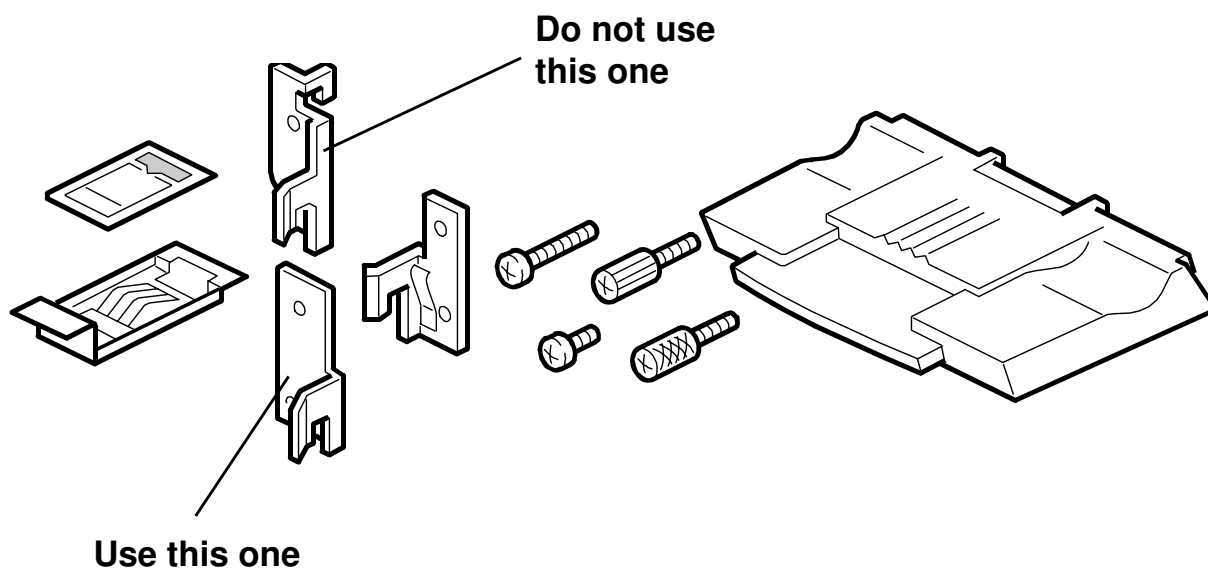
- ■ **Use the correct 'rear joint bracket'.**
- ■ **The other one is for use with another copier model.**

INSTALL THE PAPER HANDLING OPTIONS

Install the Paper Handling Options

■ **Install these options:**

- One-bin tray

- Bridge unit

- Finisher and Punch Unit

  - The punch unit cannot be installed in the 1000-sheet finisher.

  - There are no finisher adapters for this model.

- ARDF

❐ Now, have the trainees install the options, in the order given on the slide.
❐ Ensure that all members of the class practice installing each option.
❐ Make sure that the class follows all notes and cautions in the procedures.

Other Options

■ **Mechanical counter**

- After you install the mechanical counter and enable it with SP 5987, then SC610 occurs if you try to remove it. This is to prevent falsification of the counter setting.

■ **Key counter**

■ **Key counter interface**

■ **Scanner anti-condensation heater**

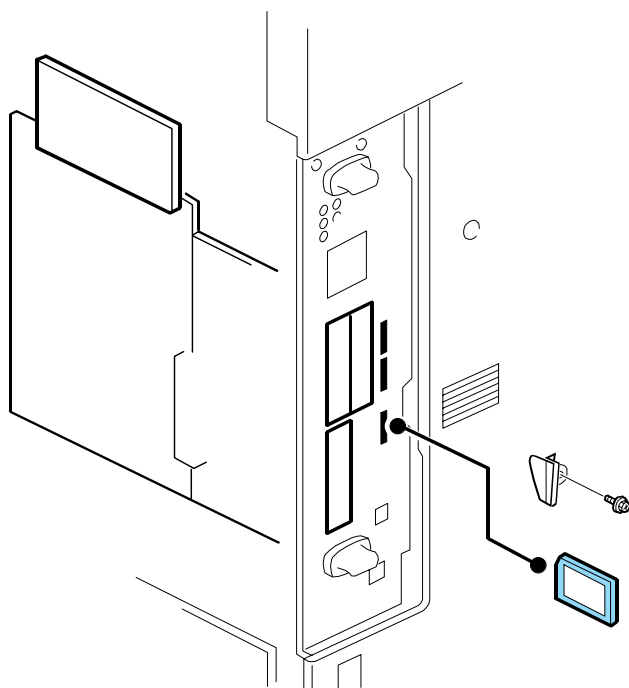❒ If there is time, ask the class to install these items.

UPDATING THE FIRMWARE

UPGATING THE FIRMWARE

B222 service manual, service tables, Firmware Update

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

Downloading New Software

- **All firmware is on SD cards.**

- **The firmware SD card plugs into SD card slot 3.**

- **Update the firmware.**

  - It is recommended to update only one module at a time.

  - Verify the update was successful

- **Update the operation panel firmware.**

  - Controller firmware and operation panel firmware cannot be updated at the same time.

❒ Make sure that the class reads the 'Before you Begin' section, which explains how to handle SD cards.

❒ The 'Updating Firmware' section has the main firmware download procedure. Have the class try it on their machines.

  ➢ If an error occurs, an error code appears. A table in the manual explains these codes (Handling Firmware Update Errors section).

  ➢ If power fails during the update, insert the card once again and switch on the machine to continue the firmware download automatically from the card. The menu will not appear on the screen, because an error message will be displayed.

Notes

❒ The Engine module contains firmware for the line position adjustment process.

❒ The finisher module is for the booklet finisher only.

Backing Up NVRAM Data

- **Copy the data to an SD card.**

- **The SD card plugs into slot 3.**

- **Use SP5824 001**

  - SP 5825 001 copies the data from the SD card to the machine.

- **The data is copied to a folder in the SD card, into a file with the filename taken from the machine's serial number**

  - Example, Serial Number "B2340017", filename is NVRAM\B2340017.NV

  - This ensures that data from a different machine is not copied back by accident.

  - An SD card can hold NVRAM data from more than one machine.

- **Write the machine's serial number on the card for reference when you wish to copy the data back.**

B222 service manual, service tables, Firmware Update, NVRAM Data Upload/Download

❒ Write the serial number of the machine on the card, so that you will be able to copy the correct data back to the machine.

❒ Data cannot be copied back to the machine if the machine's serial number does not match the file name on the card.

Backing Up the Address Book Data

- **Copy the data to an SD card.**

- **The SD card plugs into slot 3.**

- **Use SP5846 051**

  - SP 5846 052 copies the data from the SD card to the machine.

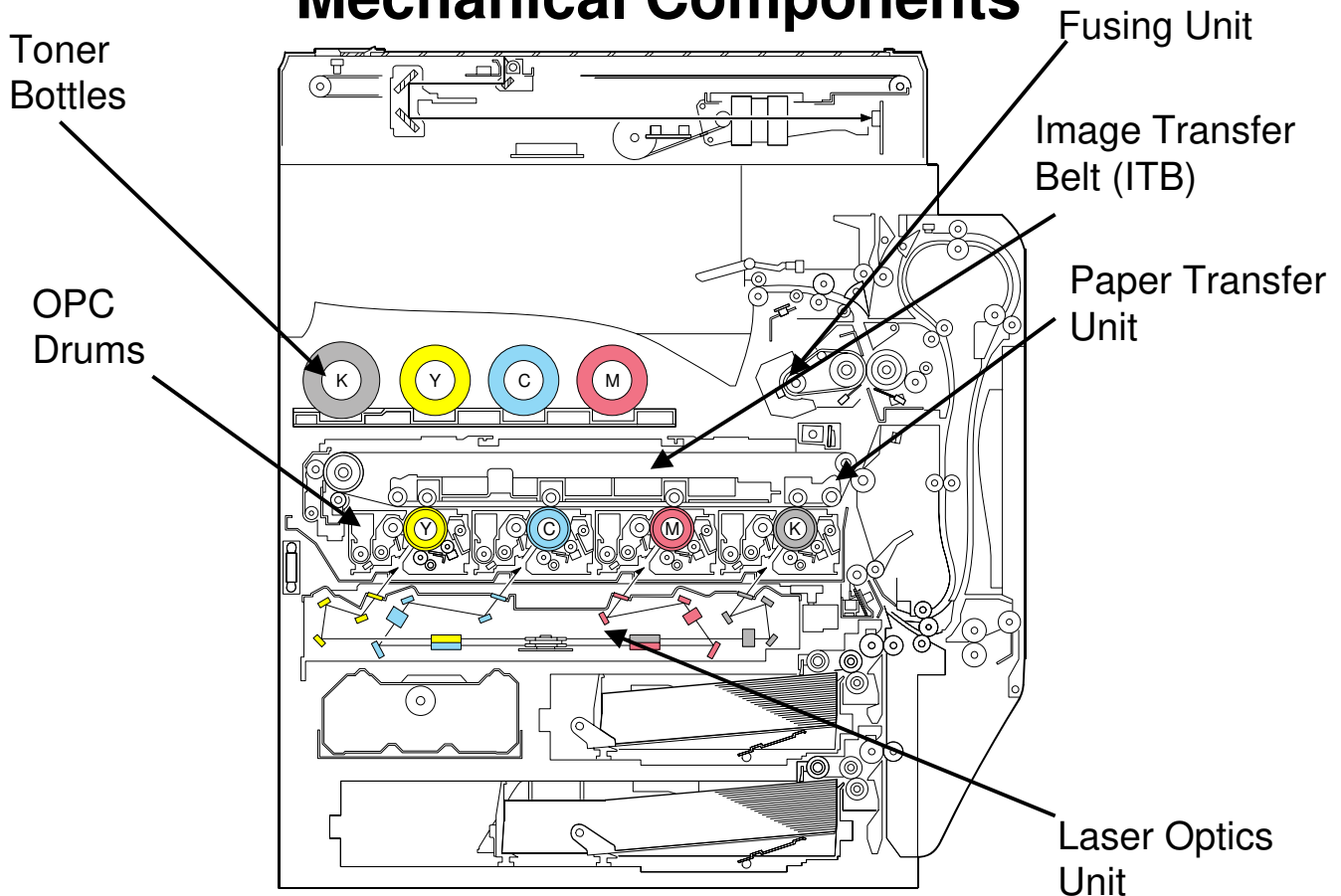*B222 service manual, service tables, Firmware Update, Address Book Upload/Download*

RICOH

APOLLON-C1 TRAINING

MACHINE OVERVIEW

❒ In this section, we will take a quick look at the machine.
❒ Also, we will see the main differences between this machine and the Athena-C1 (B230) series copiers.

Introduction to the Apollon-C1 Engine

Mechanical Components

Toner Bottles

OPC Drums

Fusing Unit

Image Transfer Belt (ITB)

Paper Transfer Unit

Laser Optics Unit

B222 service manual, Detailed Section Descriptions, Overview

❒ This is a view of the internal structure of the machine.

❒ There are 4 OPC drums.

❒ Laser beams write latent images on the drums. There is one laser beam for each drum (B222), or two beams per colour (B224).

❒ Four toner images are transferred from the OPC drums to the image transfer belt, on one rotation of the belt.

❒ At the paper transfer unit, the four toner images are pushed off the belt onto the paper.

❒ The paper feeds up to the fusing unit, and out of the machine.

This looks weird - Why are the toner bottles in a different order, from left to right, than the OPC drums?

❒ The black toner bottle is bigger, so it cannot be put at the right hand end of the toner bottle rack (the bottle is too big), so it is at the left end.

Mechanical Component Overview (1)

■ **Laser optics unit**

- There are four laser diode units, and four sets of optics. One for each toner color (KYCM). Each polygon mirror reflects light from two LD units.

■ **PCU**

- There are four units, one for each toner color. Each PCU includes a drum unit and a development unit.

■ **Toner bottles**

- Toner is supplied from the toner bottles to the development units by toner supply pumps (one for each colour).

Mechanical Component Overview (2)

■ **Image transfer unit**

  ● Bias rollers opposite the OPC drums transfer toner from the drums to the transfer belt. Four toner images are super-imposed onto the belt.

■ **Paper transfer roller unit**

  ● The ITB drive roller pushes the toner from the transfer belt to the paper (the transfer roller is an idle roller).

■ **Fusing unit**

  ● This is a belt-type fusing unit. A heating roller, out of the paper feed path heats a belt. Then the belt heats the hot roller. This type of unit warms up the rollers more quickly than a conventional two-roller system.

  ● The fusing belt is heated by an induction heating (IH) system, not a fusing lamp. The pressure roller contains a fusing lamp.

Paper Path

Bridge Unit

Standard Output Tray
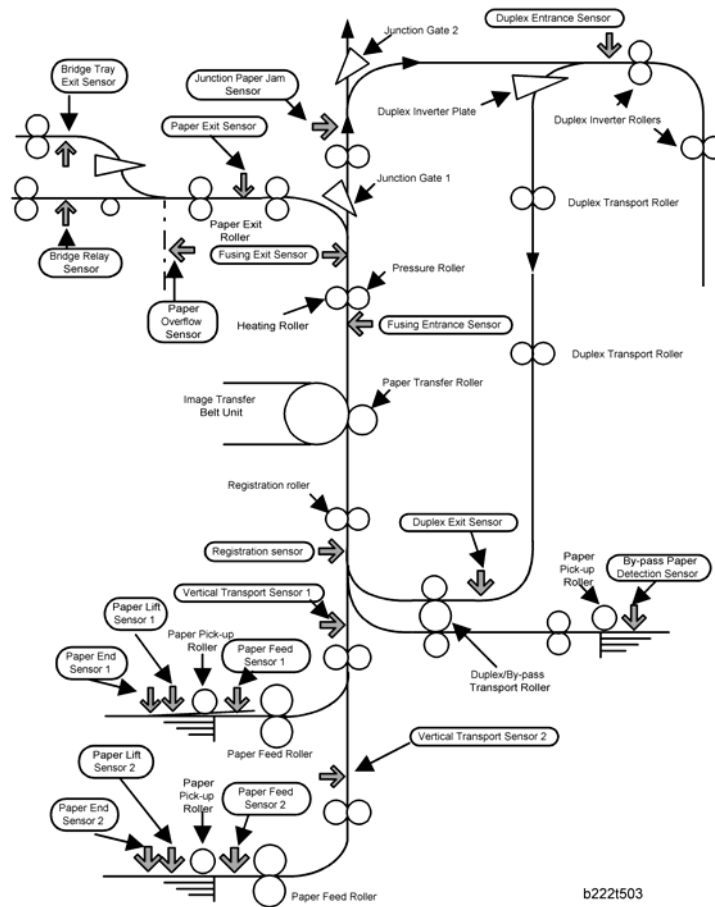
Proof Tray

Shift Tray

Booklet Tray

One-bin Tray

Inverter

Duplex

Bypass Tray

Paper Feed Trays
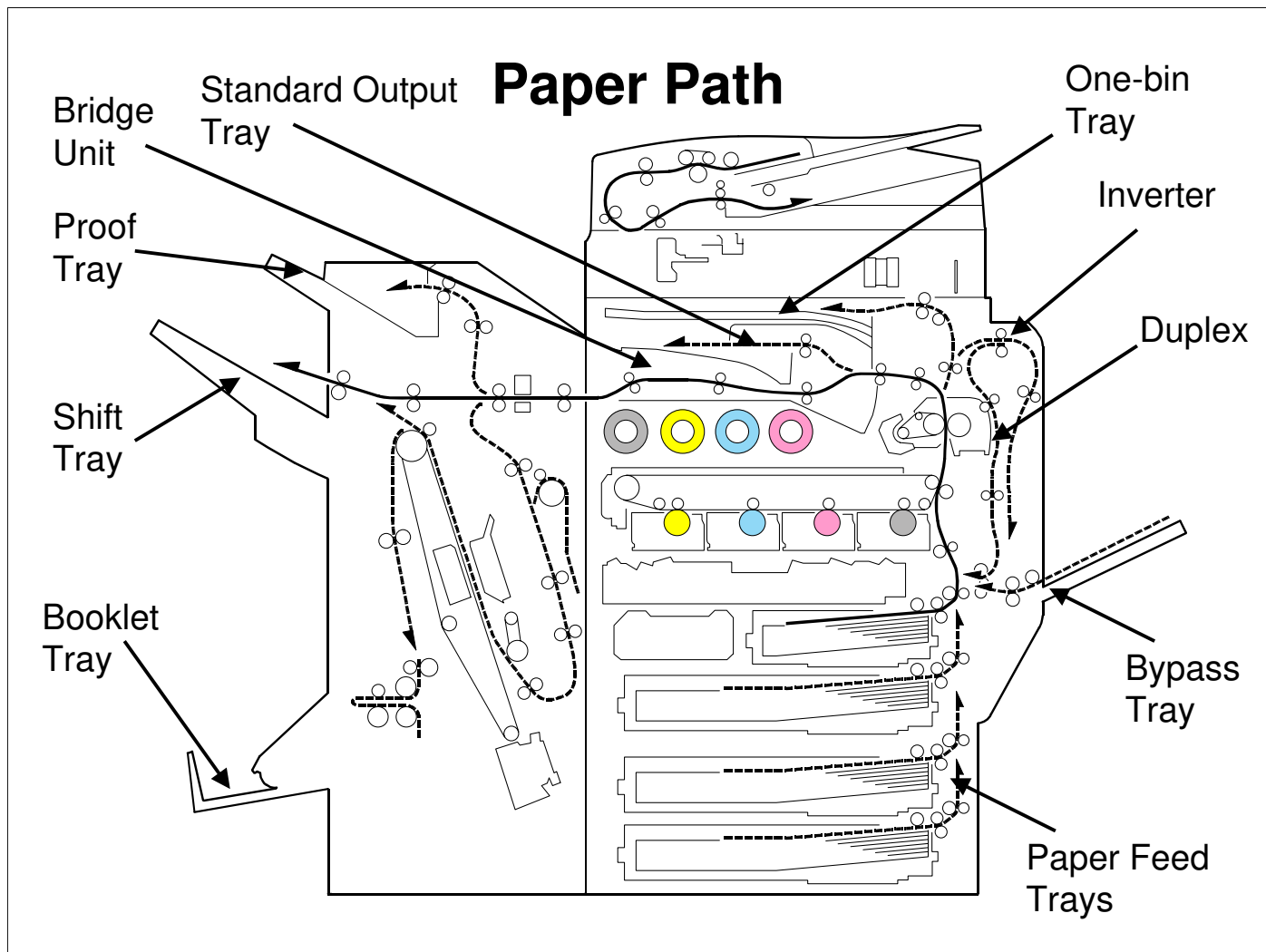
B222 service manual, Detailed Section Descriptions, Overview, Paper Path

❐ This shows the path of paper through the machine, with an optional booklet finisher installed.

❐ Demonstrate the following feed paths on the diagram.

> ➢ Up from the paper feed trays
> ➢ In from the bypass tray
> ➢ Out at the top of the machine (to the standard output tray, or to the one-bin tray)
> ➢ To the duplex unit, via the inverter
> ➢ To the finisher, via the bridge unit.
> ➢ Out through the finisher's proof tray, shift tray, and booklet tray.

Jam Sensor Locations

Bridge Tray Exit Sensor

Junction Paper Jam Sensor

Duplex Entrance Sensor

Junction Gate 2

Paper Exit Sensor

Duplex Inverter Plate

Duplex Inverter Rollers

Paper Exit Roller

Junction Gate 1

Duplex Transport Roller

Bridge Relay Sensor

Fusing Exit Sensor

Pressure Roller

Paper Overflow Sensor

Heating Roller

Fusing Entrance Sensor

Duplex Transport Roller

Paper Transfer Roller

Image Transfer Belt Unit

Registration roller

Registration sensor

Duplex Exit Sensor

Paper Pick-up Roller

By-pass Paper Detection Sensor

Vertical Transport Sensor 1

Paper Lift Sensor 1

Paper Pick-up Roller

Paper Feed Sensor 1

Paper End Sensor 1

Duplex/By-pass Transport Roller

Paper Lift Sensor 2

Paper Feed Roller

Vertical Transport Sensor 2

Paper Pick-up Roller

Paper Feed Sensor 2

Paper End Sensor 2

Paper Feed Roller

b222t503

B222 service manual, Troubleshooting, Jam Detection

❒ The class should be aware of this diagram. It shows the locations of the sensors in the machine that detect paper jams.

➤ The grey arrows show the sensors.

Drive Layout

Development
Clutch

Toner
Transport
Motor

Drum/Development
Drive Motor
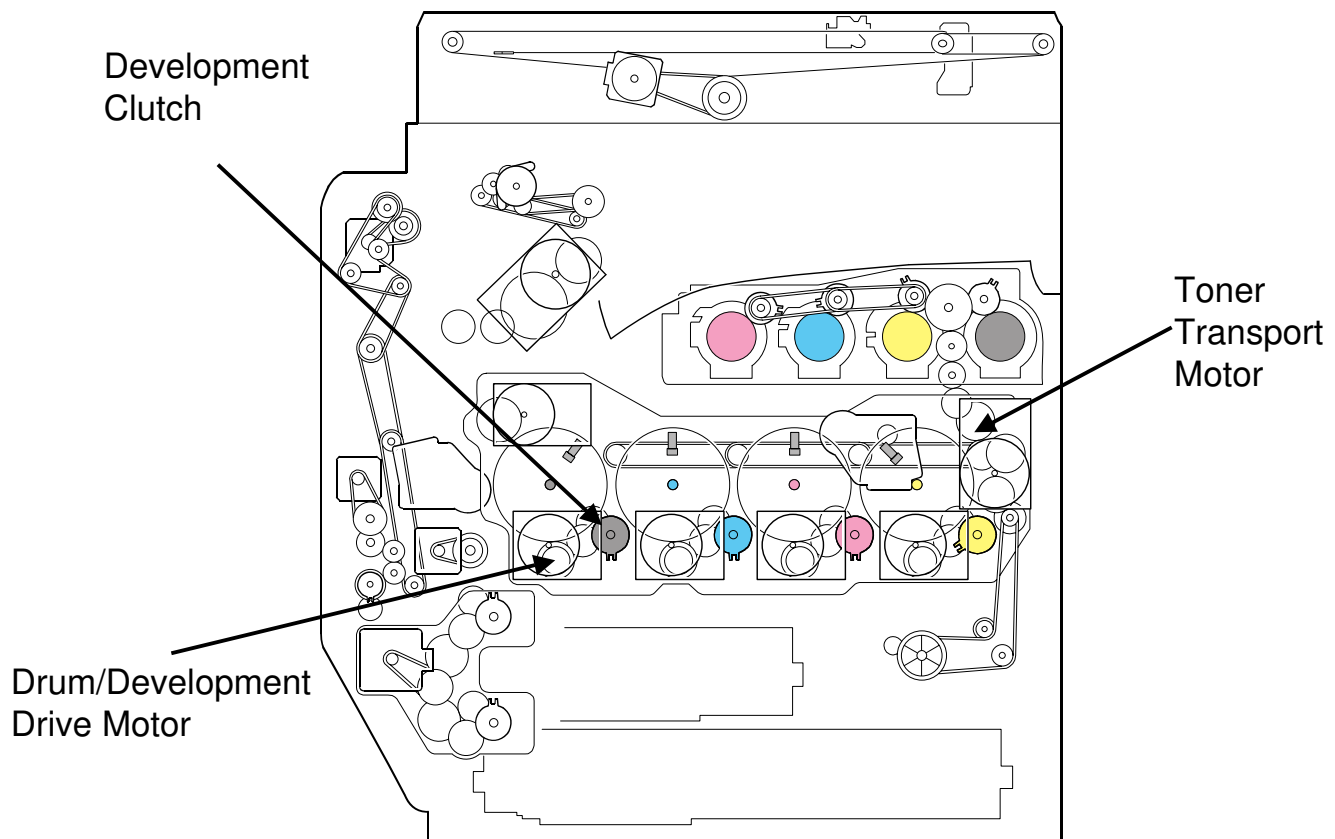
B222 service manual, Detailed Section Descriptions, Overview, Drive Layout

❒ This shows the main motors in the machine.

❒ The service manual describes the functions of each of these motors, and other components not shown on this slide. Also, we shall see each mechanism in detail during the training course.

❒ Notes:

  ➢ There is a development clutch for each colour, because, for each colour the same motor controls the PCU and the development unit.

  ➢ This motor is the drum/development drive motor. There is one of these motors for each colour.

  ➢ The toner transport motor does a lot of things. It drives the toner attraction pumps and the toner collection coils from the PCUs, from the transfer belt unit, and inside the toner collection bottle. Also rotates the toner bottles.

Board Structure
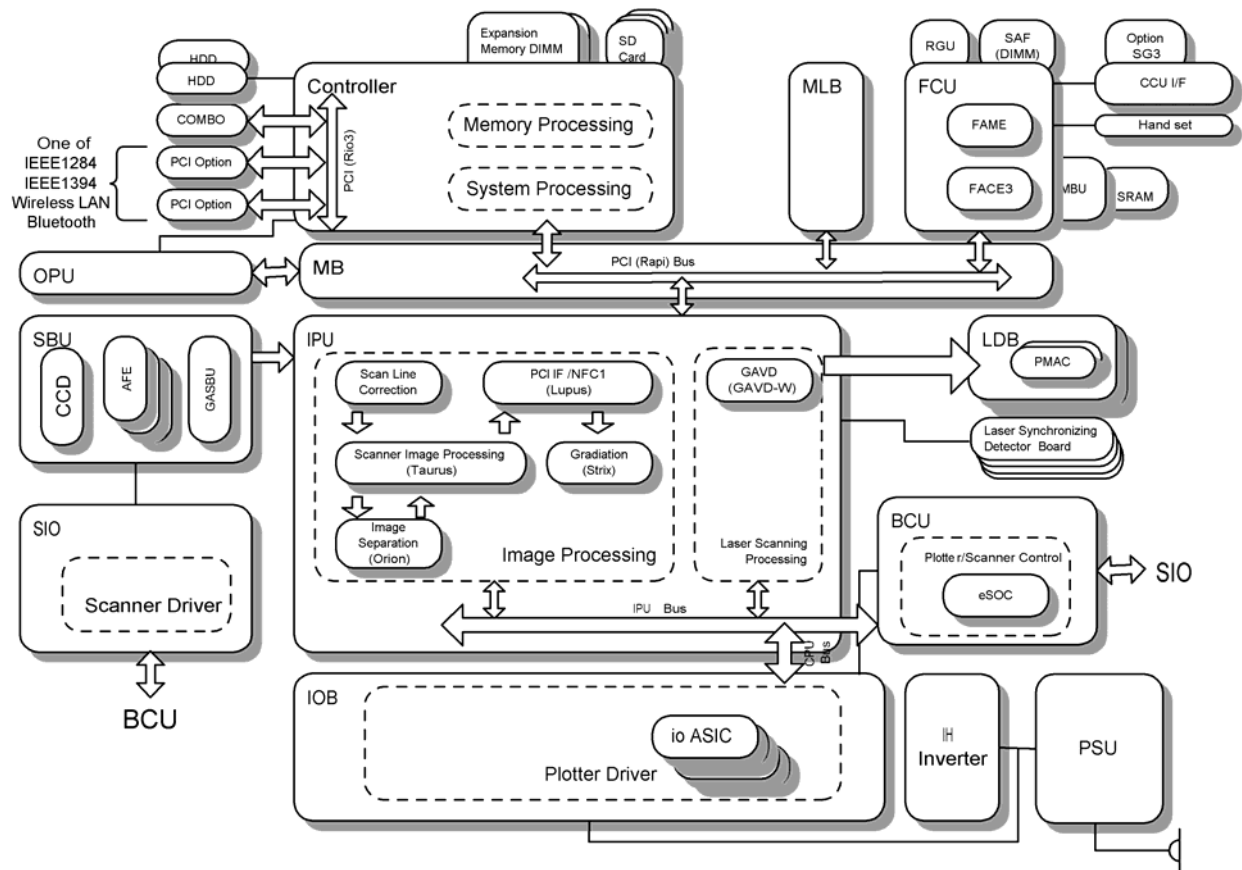
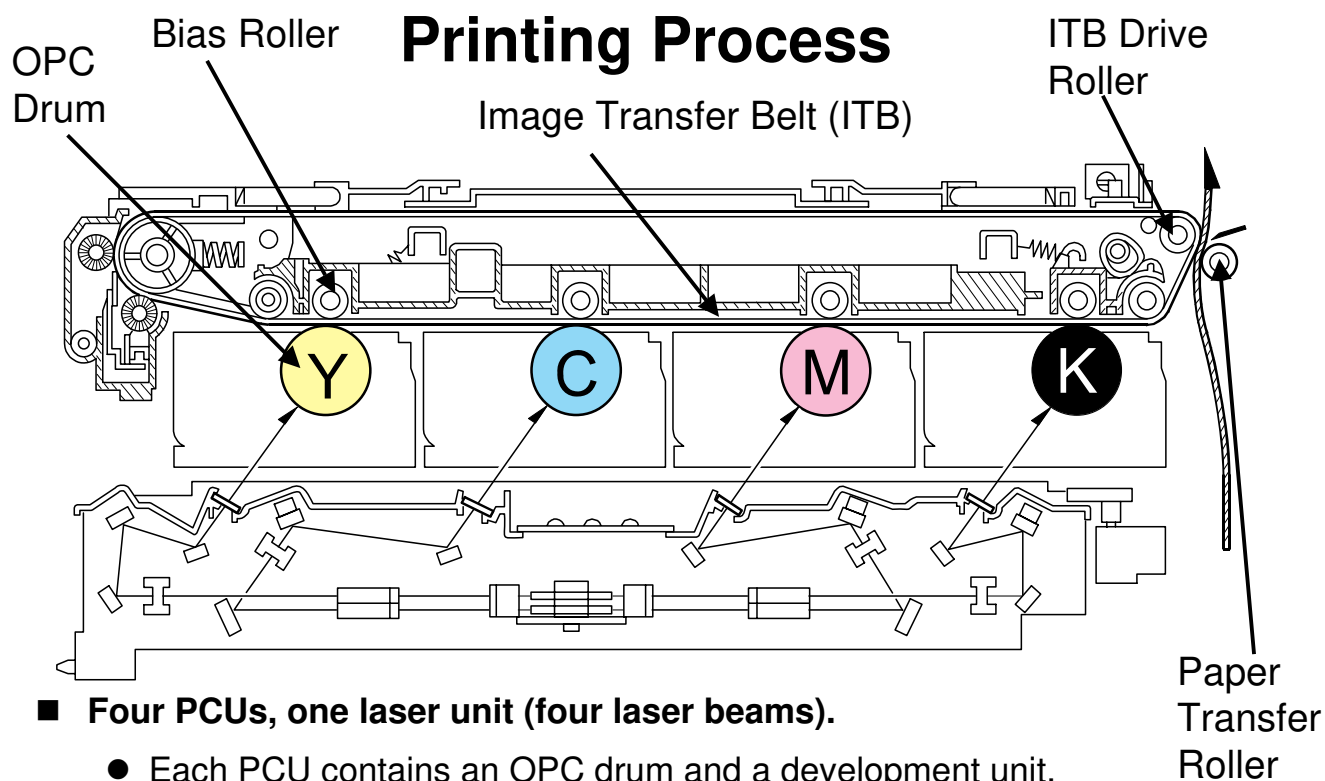*B222 service manual, Detailed Section Descriptions, Overview, Board Structure*

❒ This shows a schematic of the electrical layout of the machine.

❒ The service manual has details about what the components do, and what the acronyms mean (such as BCU). The main points are on the next slide.

Main Boards

- **The BCU is the main board. It controls the machine.**

- **The controller handles the network and printer interfaces, and the operation panel.**

- **The SBU contains a CCD.**

- **The IPU board processes the image data.**

- **The IOB contains driver circuits for motors.**

- **The motherboard connects the controller board to the IPU.**

- **The FCU (fax controller unit) controls the fax option.**

❒ In this machine:
  - ➢ The BCU and IPU are separate boards (in the B230, it is a combined BICU board)
  - ➢ The mother board is part of the machine (in the B230 it is part of the optional fax unit).

OPC Drum   Bias Roller

Printing Process

ITB Drive Roller

Image Transfer Belt (ITB)

Y   C   M   K

Paper Transfer Roller

■ **Four PCUs, one laser unit (four laser beams).**

   ● Each PCU contains an OPC drum and a development unit.

■ **Bias rollers above each OPC drum pull the four developed toner images to the ITB, to deposit a four-colour image on the ITB.**

■ **The four colours are transferred to the paper at the same time by the ITB drive roller. The paper transfer roller does not have a charge.**

B222 service manual, Detailed Section Descriptions, Overview, Printing Process

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

❏ More details of the printing process are in this section of the manual.

❏ The ITB drive roller pushes the toner from the ITB onto the paper. The paper transfer roller does not pull the toner.

ID Sensors
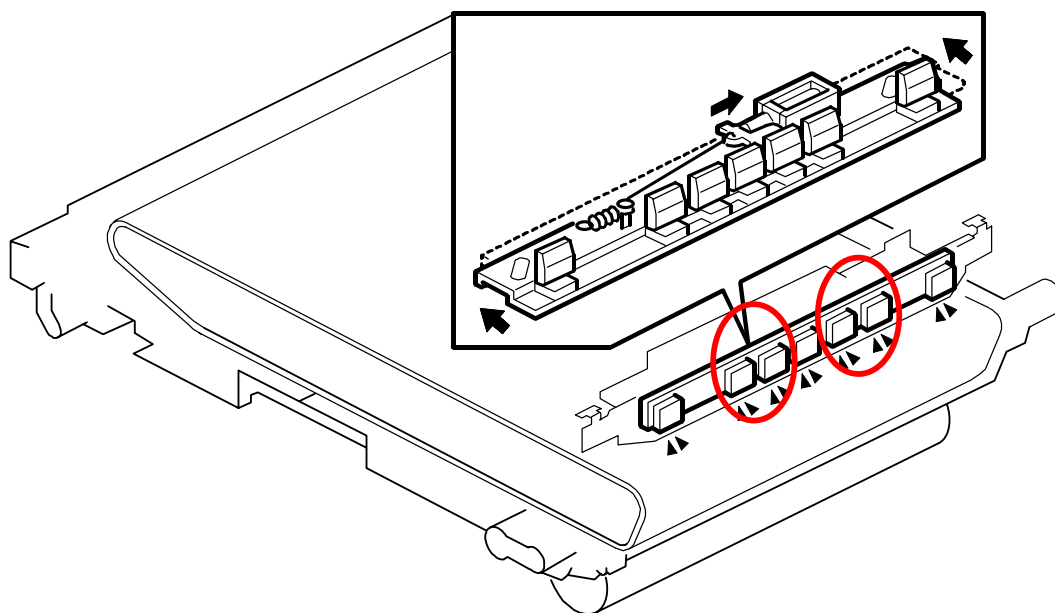
- **Seven ID sensors, on the ID sensor board:**
  - Three for line position adjustment: Left end, middle, right end
  - Four for process control: In the red circles as shown above
- **When the sensors are not used, the solenoid moves the shutter to cover the sensors. This prevents dust on the sensors.**

Process Speeds

■ **Plain paper, middle thick paper**

● 600 x 600 dpi, 1-bit or 2-bit

• B222: 154 mm/s (35 cpm), B224: 205 mm/s (45 cpm b/w, 40 cpm colour)

● 600 x 600 dpi, 4-bit

• B222/B224: 77 mm/s (17.5 cpm)

■ **OHP/Thick paper**

● 600 x 600 dpi , 1-bit or 2-bit

• B222/B224: 115 mm/s (25 cpm b/w, 22.5 cpm colour)

● 600 x 600 dpi, 4-bit

• B222/B224: 77 mm/s (17.5 cpm)

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Feed Line Speed

❐ The process speed is the feed speed from registration roller to the fusing unit.
❐ The process speed affects various machine parameters, as can be seen if you take a quick look through the SP tables.
❐ What is 'middle thick paper'? See the next slide.
❐ Some SP modes also have adjustments for 'FINE'. This refers to 600 x 600 dpi 4-bits per pixel resolution (some people will call this 2400 dpi resolution).
❐ The B224 has two laser beams per colour. This allows the faster line speed. Only one beam per colour is used for OHP/thick paper.
  ➢ At 600 x 600 dpi 4-bit, only one laser beam is used per colour.
❐ In the printer driver, there are three quality settings.
  ➢ High Speed: This is the same as 600 x 600 1-bit
  ➢ Speed: This is the same as 600 x 600 2-bit
  ➢ Quality: This is the same as 600 x 600 4-bit
❐ Why is colour slower for B224? The line speed is the same.
  ➢ Answer: Insufficient fusing can occur at 45 cpm if there are 4 toner layers on the paper. At 40 or 35 cpm, there is no problem.

Paper Weights

- **Thin paper: Less than 60 g/m^2 (16 lb)**

- **Normal plain paper: 60 – 90 g/m^2 (16 – 24 lb.)**

- **Middle Thick: 90 – 105 g/m^2 (24 – 28 lb.)**

- **Thick 1: 105 – 169 g/m^2 (28 – 45 lb.)**

- **Thick 2: 169 – 220 g/m^2 (45 – 58 lb.)**

- **Thick 3: 220 – 253 g/m^2 (58 – 67 lb.)**

❒ This machine does not support thin paper.
❒ 'Thin paper' is an additional paper weight setting that the user can select at the operation panel if the 'plain paper' setting causes problems.
❒ These specifications are not exactly the same as the Athena-C1 (B230) series copiers.
  ➢ The maximum weight for plain paper (90 g/m2) is different.

New Unit Detection Mechanisms

■ **Image Transfer Belt Unit, Fusing Unit**

- These units each have a fuse.

- When the machine detects that the fuse is intact, the machine determines that a new unit is installed.

- Then a short time later, the fuse blows.

■ **PCU, Development Unit**

- The development unit (as part of the PCU, or as a separate development unit) contains an ID chip.

- The ID chip contains information that tells the machine that the unit is new.

■ **Toner Collection Bottle**

- The machine uses the 'bottle full sensor' to determine if the bottle was replaced.

- This only works if the bottle is in a 'full' or 'near-full' condition.

❏ The ID chip in the development unit contains all the counters for the PCU (drum unit counters, development unit counters).

❏ If we replace the development unit as a separate unit, the new ID chip does not contain the drum counters for the drum unit that is still in the machine. (You can see them as 'previous unit counters', stored in SP7906, but these will not be updated when the new drum is used).

❏ Normally, the development unit is replaced at 320k, and the drum unit is replaced at 80k. So this should normally not be a problem, unless the development unit breaks. This counter storage method may be changed for future models.

Comparing the Apollon-C1 with the Athena-C1

Installation Procedure

■ **Main copier engine: Almost the same**

■ **Paper handling options:**

- Some options are not used in the Athena

- The procedures for the options that are used with the Athena are almost the same

■ **Controller options**

- The procedures are almost the same, but the board slot assignments are different.

- The SD card slot assignments are the same.

- File format converter - no need to install the fax board

Differences in the Mechanisms (1)

■ **Drum/development unit drive:**

- Athena: The three color units (CMY) are driven by one motor, with one home position sensor to cover all three units

- Apollon: Each color has a motor and a clutch, and a gear home position sensor

■ **Different process speeds**

- Apollon is faster

- Apollon also has a 'fine' mode (77 mm/sec) - only used for 4-bit 600 dpi

Differences in the Mechanisms (2)

■ **Laser unit**

● Athena: One laser beam per colour

● Apollon (B224 only): Two beams per colour (only one beam is used for ohp/thick paper

  • No extra adjustments

● Terminology changes in the laser unit:

  • The F theta lens is now called the L1 lens

  • The WTL is now called the L2 lens

Differences in the Mechanisms (3)

■ **Bypass tray feed system:**

- ● Athena: Feed roller and friction pad

- ● Apollon: Feed and reverse rollers

■ **Fusing unit**

- ● Athena: Fusing lamps in heating and pressure rollers

- ● Apollon: Fusing lamp for the pressure roller, IH (induction heating) coil for the heating roller

■ **Duplex mechanism is slightly different**

Printed Circuit Boards

■ **Main Board**

- Apollon: BCU with separate IPU board for image processing

- Athena: BICU (the IPU circuits are on the BICU, there is no IPU board)

■ **Motherboard**

- Apollon: Connects the controller to the machine, through the IPU board

- Athena: Connects the optional fax unit to the BICU board

Options

■ **The Apollon has no 500-sheet finisher and no shift tray**

■ **The booklet finisher, ADF, 1-bin tray, and fax unit are different**

  ● The booklet finisher is the same as the Venus-C1

■ **IEEE1394**

  ● Athena: This goes in a different slot from the other printer interfaces. As a result, you can install two optional printer interfaces.

  ● Apollon: The IEEE1394 goes in the same slot as the other optional interfaces (the same as other GW models)

Replacement Procedures

■ **There are many differences in the replacement procedures.**

■ **The following sections are similar, with some changes in the procedures and some additional procedures. But the changes are not major, so if you know the Athena-C1 series, you do not need to study these sections in detail.**

- Exterior covers (operation panel, ozone filters, inner tray are mainly new procedures)

- Scanner: Most procedures have differences, except the scanner wires. Note that when you replace the exposure glass, the dot goes at the front (in the Athena, it goes at the rear)

- Paper feed for the main unit (the bypass tray is mainly new)

- Image transfer and paper transfer

- PCU

- Laser (the shutter motor is new)

- Drive unit (almost all of this is new)

- Electrical components

❐ The sections not shown on the slide (for example, fusing) have many changes and should be studied in detail.

Practical Work

Practical Work

■ **Look at the following diagrams**

 ● Point-to-point

 ● Electrical component layout

❒ Introduce the point-to-point and electrical component layout diagrams.
❒ Have the trainees locate the electrical components on the machines and on the p-to-p diagram.
   ➢ We will discuss all the major components in the relevant sections of the course. There is no need to study this in detail now.
❒ Have the trainees remove the covers and locate the major components of the copier main body.
❒ Point out as many of the components on the list as you think necessary.

Replacement (1)

■ **Do the procedures in this section:**

  ● Removal and Adjustment, Exterior Covers

❐ Have the trainees remove and replace the parts in these sections of the manual.
❐ Remind them to follow all notes and cautions in the manual.

Replacement of Electrical Components

■ **Take care when replacing these parts. Follow the instructions in the manual.**

- ● BCU

- ● Controller board

- ● Mother board

- ● Hard disk

- ● NVRAM

    - • There are two NVRAMs, one for the BCU and one for the controller. The replacement procedures are different.

❒ The next few slides will go over the important points. Then the class will remove the parts.

Replacing an NVRAM (1)

■ **Before you replace an NVRAM, try to do the following:**

- Print the SMC report

- Copy the contents of the NVRAM to an SD Card (SP 5824 001)

- For the controller NVRAM, make a backup copy of the address book data.

■ **If you cannot do this, then after installing the new NVRAM, you can use a backup that you made on a previous visit.**

- But you cannot get back settings that were made after that visit.

- If you do not have a backup copy on an SD card, then the memory reset (SP 5801 001) resets the memory to the defaults. Then you can input the necessary changes to the defaults.

Replacing an NVRAM (2)

■ **To copy data back from the SD card to NVRAM, you must use SP 5825 001.**

- ● There are two NVRAMs in this model, but the same SPs are used to make backups of each NVRAM.

- ● You can store data from both NVRAMs on the same card. The machine understands which is the correct data when you restore the data to the NVRAM from the SD card.

■ **IMPORTANT: If you replace the NVRAM on the controller board, the Data Overwrite Security Unit will not work. The user must buy a new one.**

Hard Disk Removal

■ **Remove the hard disk.**

■ **After installing the new disk:**

- Copy the stamp data to the disks from the firmware: SP5853. Then switch the machine power off/on.

- It is not necessary to format the hard disk.

❒ Have the class remove and replace the hard disk.
❒ The stamp data is copied directly from the firmware, not from SD or flash cards.

Hard Disk Removal

- **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. Custom-made stamps must be re-made and stored 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.

- **If the customer is using the Data Overwrite Security feature, the DOS function must be set up again.**

- **If the customer is using the optional Browser Unit, this option must be installed again.**

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.

Replacement (2)

■ **Do the procedures in these sections:**

● Removal and Adjustment, Electrical Components

- Controller box: Take care not to damage the flat cable. Remove it, as shown in the manual.

- BICU, Controller Board:

  – Remove the NVRAM from the old board and install it on the new board.

 – The dip switches on the new board must be the same as on the old board. Do not change the dip switch settings.

❒ Have the trainees remove and replace the parts in these sections of the manual.
❒ Remind them to follow all notes and cautions in the manual.

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APOLLON-C1 TRAINING

SCANNER

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

Optical Path

ADF Exposure
Glass

Main Exposure
Glass

Exposure
Lamp

CCD
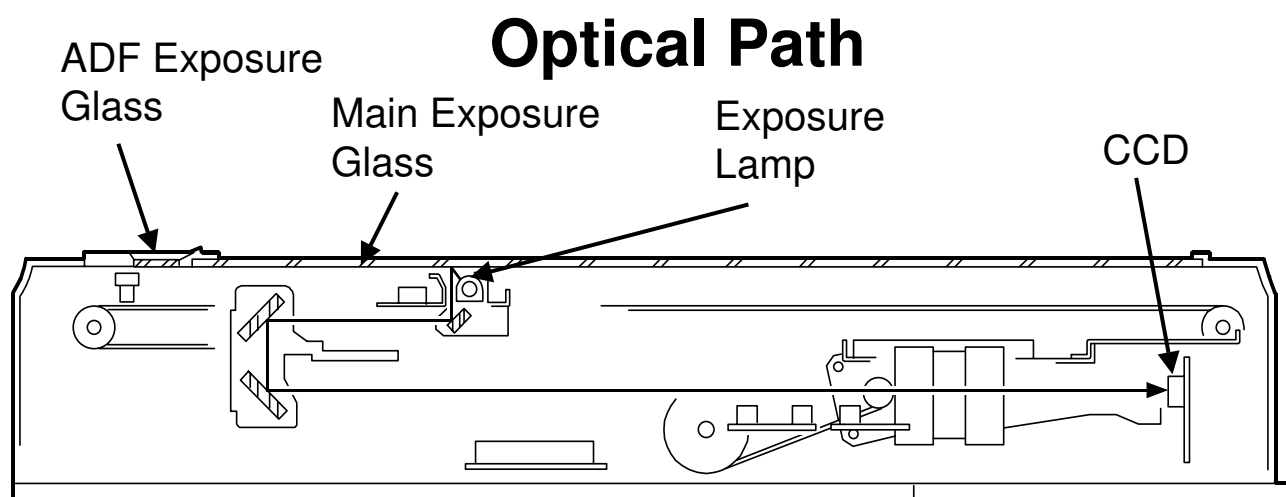
- **One exposure lamp**

- **600 dpi color CCD**

- **Anti-condensation heater is optional**

- **No adjustments required in the field for the CCD and lens block**

B222 Service Manual, Detailed Section Descriptions, Scanning, Overview

❒ Outline the optical path.
❒ The service manual shows the important components of the scanner.
❒ In platen mode, the original is fed to 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
HP Sensor

Scanner Drive

Scanner Motor
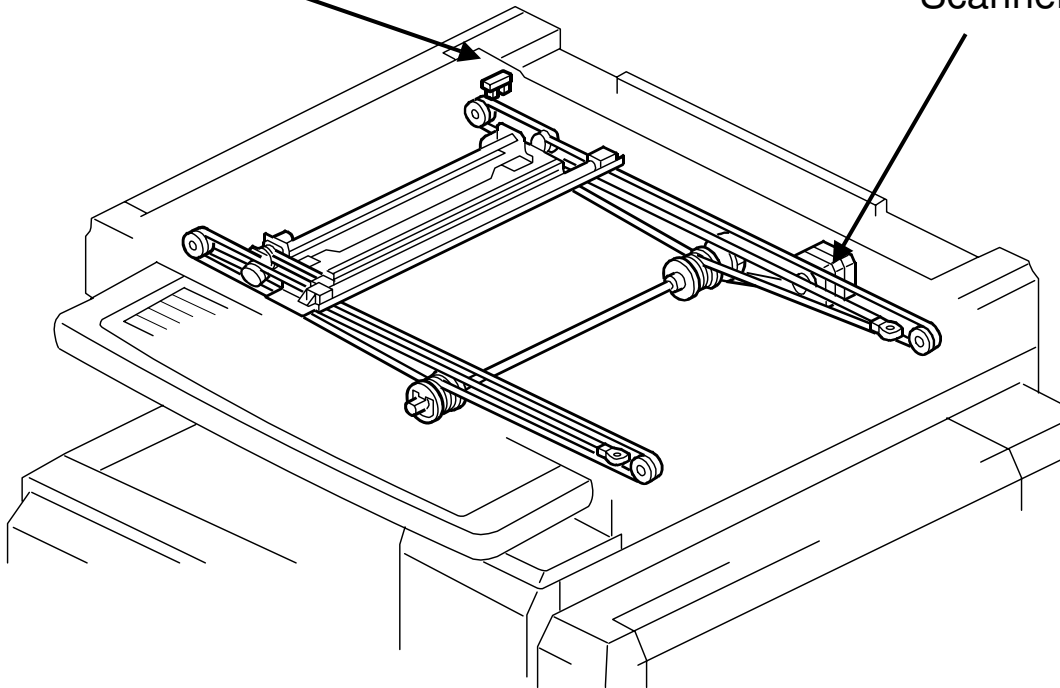
■ Motor and wire drive mechanism

B222 Service Manual, Detailed Section Descriptions, Scanning, Scanner Drive

❒ Describe the mechanism. Point out the following:

❒ 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 service manual explains how the scanner motor speed and image processing control the magnification.

Original Size Detection

Platen Cover
Sensor

Width
Sensors
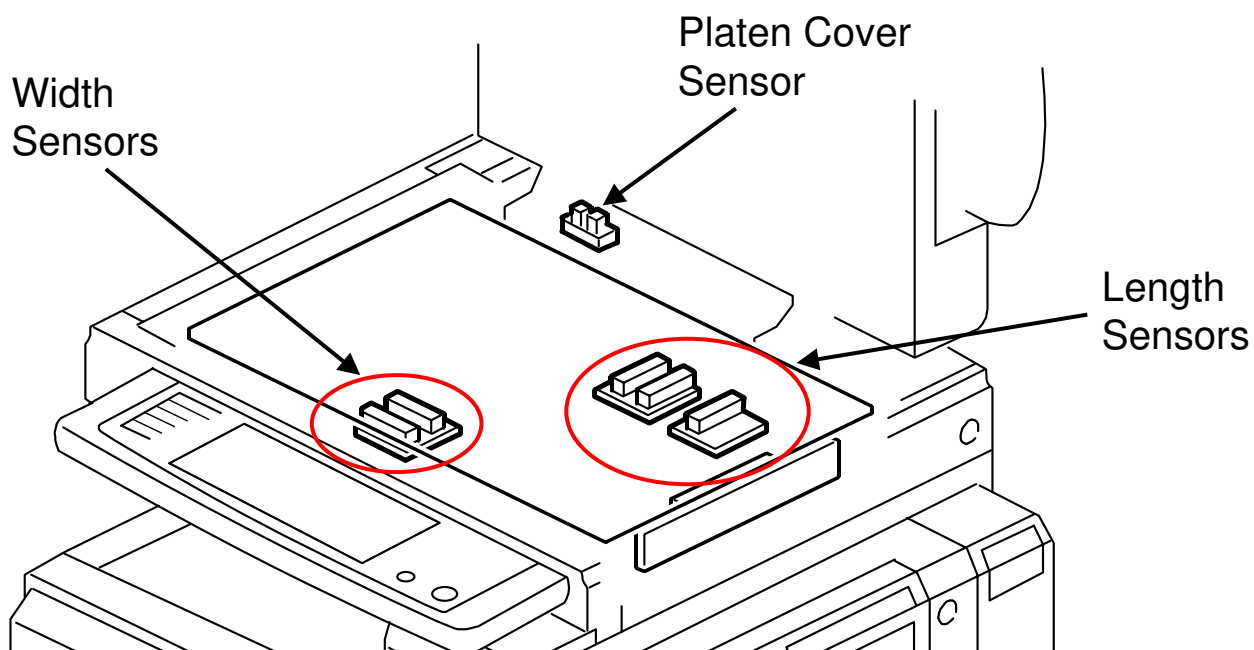
Length
Sensors

■ **Reflective photosensors detect the size.**

B222 Service Manual, Detailed Section Descriptions, Scanning, Original Size Detection

❒ Describe the APS sensors.
  ➢ There are two width sensors and three length sensors (Europe models have three
    sensors, USA models have two sensors). The service manual shows where these
    sensors are located.
  ➢ The CPU checks the sensors when the platen cover sensor detects that the cover
    is being closed.
  ➢ If the cover stays open during copying, the CPU checks the sensors when the
    Start key is pressed.

Original Size Detection – SP Modes

■ **5126: Determines which F size is detected**

■ **4303: Determines what original size the machine detects if the sensors detect no paper.**

- 0: Original not detected

- 1: A5/HLT SEF (16K SEF if enabled with SP 4305)

- 2: A5/HLT LEF (16K LEF if enabled with SP 4305)

■ **4305: Allows 8K and 16K original sizes to be detected**

- 0: USA and international sizes detected

- 3: 8K detected instead of A3/B4, 16K detected instead of A4/B5/A5

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

SP 5126

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

SP 4303

❒ This SP determines what happens when all sensors are off (such as when A5 sideways is set - too small for the sensors to detect).

SP 4305

❒ Ask the class to look at the SP table. Settings 1 and 2 are a bit strange. They let the machine detect A4 if the original is SEF, and LT if it is LEF (or the other way around).

Replacement and Adjustment

■ Do the following procedures

- ● Scanner Components: B222 Service Manual, Replacement and Adjustment, Scanner

- ● Image Adjustments (Scanner): B222 Service Manual, Replacement and Adjustment, Image Adjustments

  - • Do these adjustments after you replace one of these parts: Lens Block, Scanner Motor, Scanner Wires

■ Exposure Glass

- ● The mark must be at the front left corner.

■ Exposure Lamps

- ● Do not touch the new lamp directly by hand. Grease spots will cause poor scanning quality.

B222 Service Manual, Replacement and Adjustment, Scanner

Replacement
- ❒ Have the trainees remove and replace the parts in this section of the manual.
- ❒ Remind them to follow all notes and cautions in the manual.
- ❒ Note that the copy adjustments must be done after replacing the lens block, APS sensors, scanner motor or scanner wires. There is no need to do these in the class, unless the trainees need some practise.

Replacement and Adjustment

■ SBU

- Adjust the following SP modes after you replace the sensor board unit:

    - SP4–008 (Sub Scan Mag): See "Image Adjustment: Scanning".

    - SP4–010 (Sub Mag Reg.): See "Image Adjustment: Scanning".

    - SP4–011 (Main Scan Reg): See "Image Adjustment: Scanning".

    - SP4–688 (DF: Density Adjustment): Use this to adjust the density level if the ID of outputs made in the DF and Platen mode is different.

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APOLLON-C1 TRAINING

IMAGE PROCESSING

❐ The image processing functions will be explained briefly.

How the Image Gets Processed

■ **The CCD (Charged Coupled Device) generates three analog video signals.**

■ **The SBU (Sensor Board Unit) converts the three analog signals to 10-bit digital signals. It sends these signals to the BICU board.**

■ **The IPU board processes the image. Then the image data (4 bits/pixel) goes to the printer engine.**

B222 service manual, Detailed Section Descriptions, Image Processing

❐ Ask the class to read the service manual if they want more. There isn't much there anyway, and there are not a lot of adjustments. Because of this, we do not discuss image processing in great detail.

SP Modes

- **1001: Leading edge registration (printer): Changes the registration clutch timing**

- **1002: Side-to-side registration (printer): Changes the laser main scan start timing**

- **2103: Erase margin adjustment: Erases data from the image**

- **4008: Sub scan magnification (scanner motor speed)**

- **4010: Leading edge registration (scanner): Changes the scanner motor timing**

- **4011: Side-to-side registration (scanner): Changes the CCD main scan start timing**

SP Modes

- **4400: Scanner erase margin for book scanning**

- **4688: ADF density adjustment: Adjust if the density in ADF mode is different from book mode**

- **4994: Text/photo detection method for scanning to PDF**

- **5610: Recalls or overwrites the factory settings for ACC**

- **5611: Determines the proportions of CMY toner in two-color mode for red, green and blue**
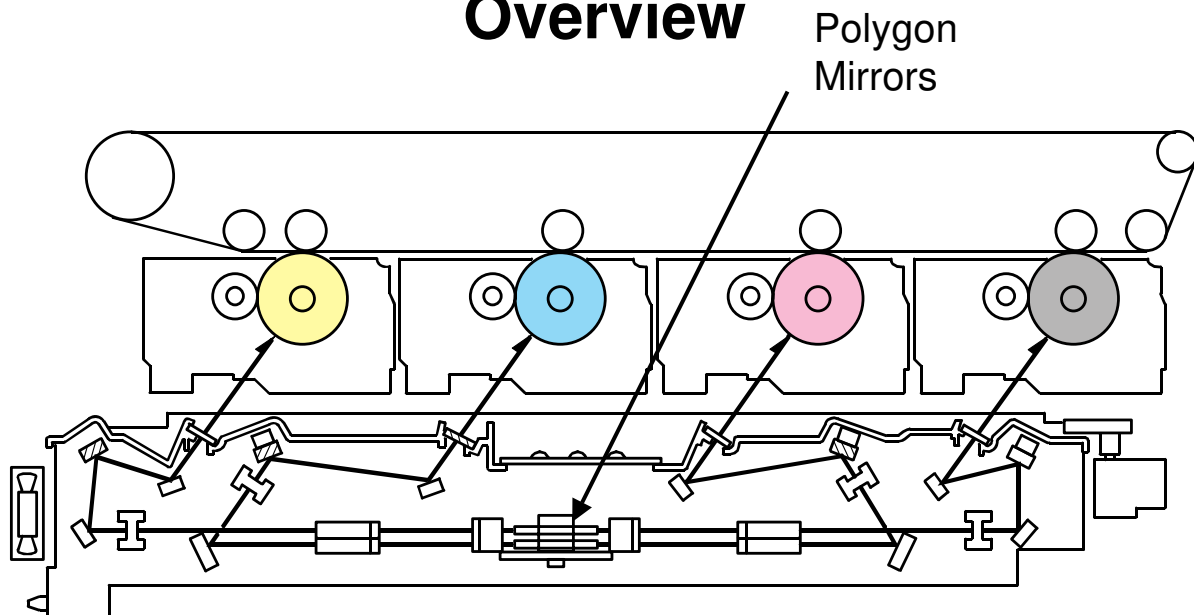
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APOLLON-C1 TRAINING

LASER EXPOSURE

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

Date of change	Version History	Description

# Overview

Polygon Mirrors

- **B222: One laser beam for each colour**

- **B224: Two laser beams per colour (except for OHP/Thick paper, and for all paper types at 600 x 600 dpi 4-bit mode)**

- **Maximum resolution is 600 dpi**

- **Two polygon mirrors attached to the same motor.**

  - The upper mirror reflects yellow and black.

  - The lower mirror reflects magenta and cyan.

B222 service manual, Detailed Section Descriptions, Laser Exposure, Overview/Optical Path

❒ Have the class look at the diagram in the manual. The optical components should be familiar to those who have worked on recent models.

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

❒ The B224 has two laser beams. The machine adjusts the laser beam pitch automatically. There is no adjustment for the technician.

Optic Components

LD Units:
Y, C, K, M

Synch:
K/M (Start)

Synch:
Y/C (End)

Synch:
Y/C
(Start)
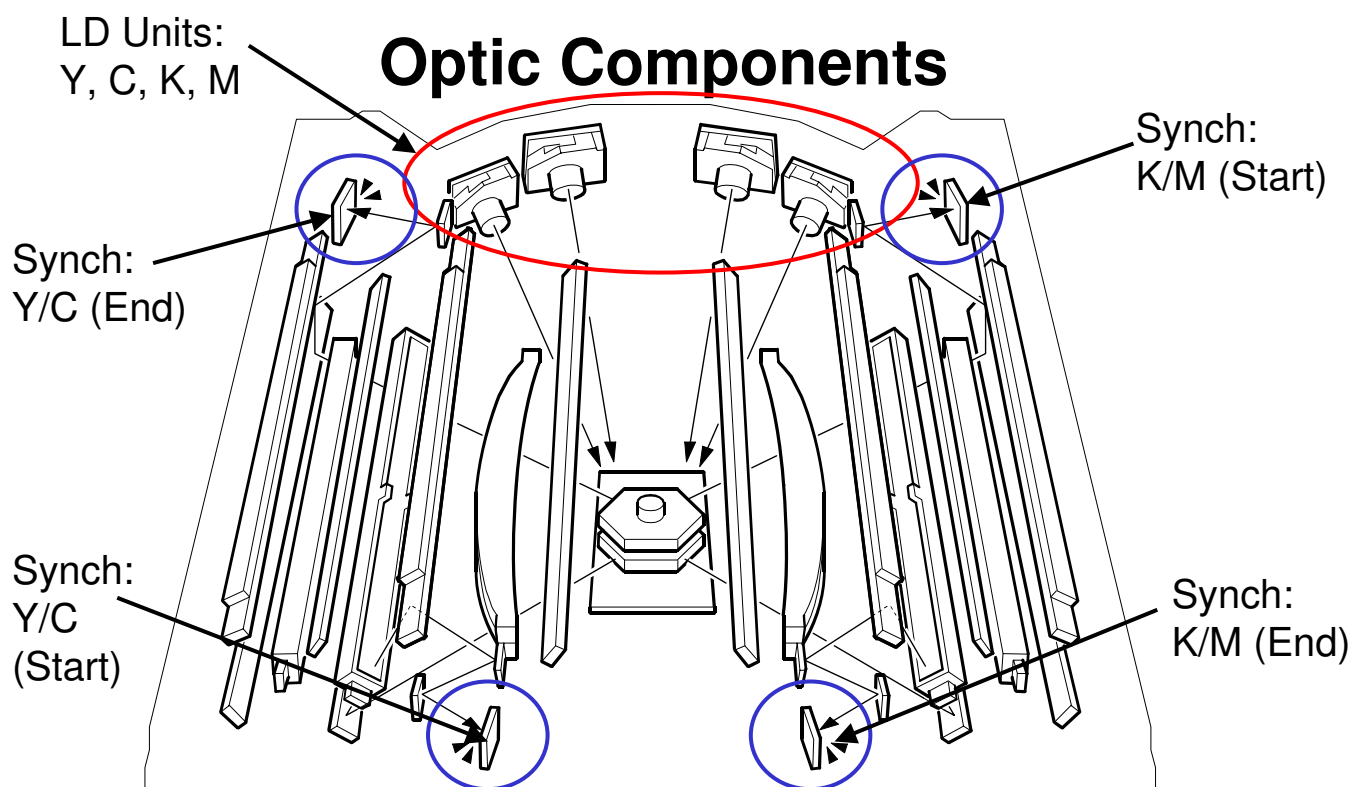
Synch:
K/M (End)

- **Four LD units, one for each colour.**
- **Four laser synchronization detector boards:**
  - Each board is used by 2 colours
  - Each colour is detected at the start and at the end of the main scan

B222 service manual, Detailed Section Descriptions, Laser Exposure, Overview/Optical Path

❐ The LD units (shown in the red circle) are Y, C, K, M from left to right in the diagram.
❐ The lasers go immediately to the polygon mirrors.
  ➢ Laser exposure for black and magenta starts from the rear side of the drum. But for yellow and cyan it starts from the front side of the drum. This is because the LD units for black and magenta are on the other side of the polygon mirror from the units for yellow and cyan.
❐ The four laser synch detector boards (shown in blue circles) will be explained in more detail on the next slide.

Laser Synchronization Detectors

Synch:
K/M (Start)

Synch:
Y/C (End)

Synch:
Y/C
(Start)
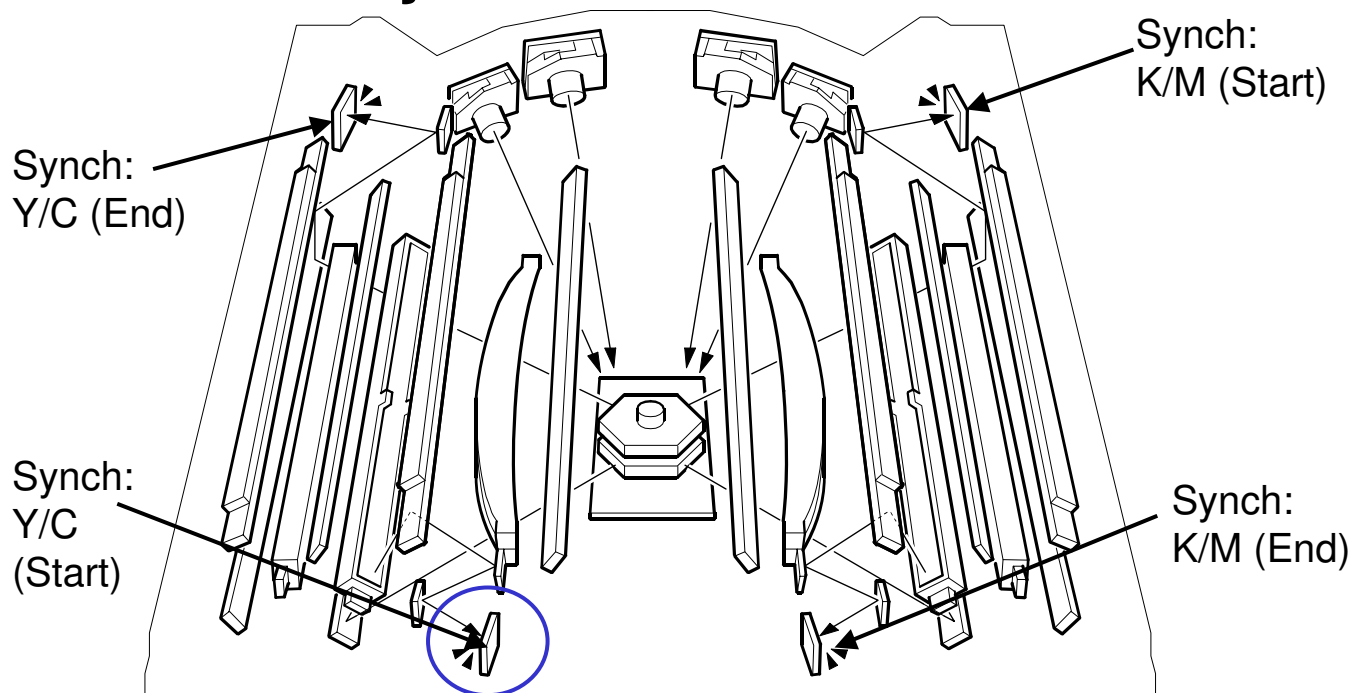
Synch:
K/M (End)

■ **Scanning start and end detection for each colour.**

■ **Each board handles two colours.**

● To determine which colour beam hits the board, the machine checks the timing.

B222 service manual, Detailed Section Descriptions, Laser Exposure, Laser Synchronization Detectors

❒ For magenta and black, the LSD at the rear detects the start of the main scan.

❒ For yellow and cyan, the LSD at the front detects the start of the main scan.

❒ With a detector at the start and at the end, it is possible to make sure that the number of pulses for each colour is the same. This reduces colour registration errors in the main scan direction.

❒ To do this, the machine measures the number of clock pulses between start and end detection.

❒ If the number is not correct, the LD clock frequency is adjusted automatically.

➢ If the board at the end position is defective, you must disable the detection feature with SP2-186-1, until you can replace the defective part.

LD Safety Switches
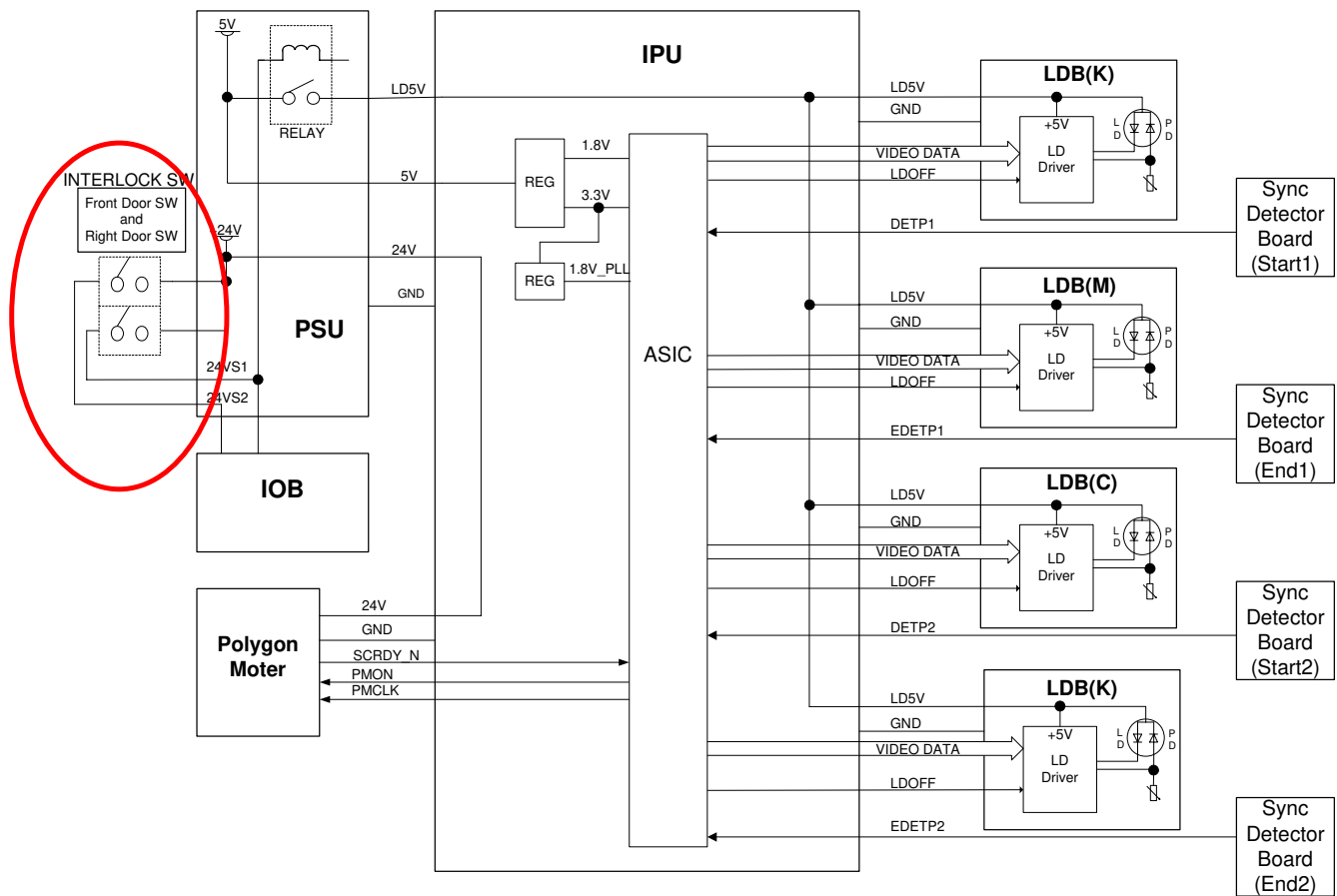
B222 service manual, Detailed Section Descriptions, Laser Exposure, LD Safety Switches

❒ Make sure that the class understands how the cover switches cut the laser power.

❒ The switches used are the front and right front door.

❒ Have the class follow the circuit on the diagram.

  ➢ The circuit is for the B222. The B224 is the same, except that there are two laser diodes on each LDB.

Automatic Line Position Adjustment

Front   Center   Rear
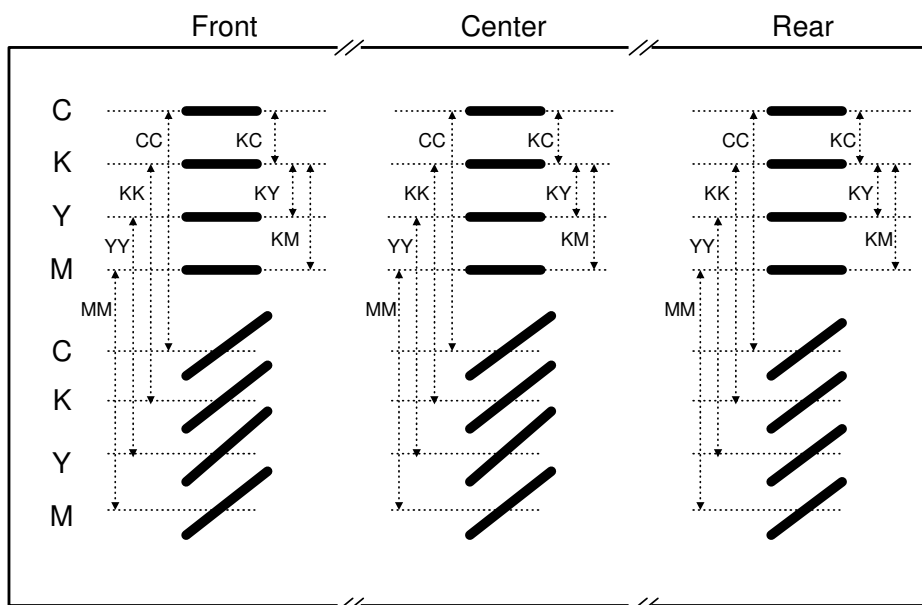
- **During automatic line position adjustment, the line patterns above are created eight times on the transfer belt.**

B222 service manual, Detailed Section Descriptions, Laser Exposure, Automatic Line Position Adjustment

❒ The spaces between the lines (CC, KK, YY, MM, KC, KY, KM) are measured by the front, center, and rear ID sensors. The controller takes the average of the spaces. Then it adjusts the following positions and magnification.
   ➢ Sub scan line position for CMY
   ➢ Main scan line position for CMY
   ➢ Magnification ratio for KCMY
   ➢ Skew for CMY
❒ The transfer belt-cleaning unit cleans the transfer belt after the patterns are measured. SC 285 shows if an error is detected three times consecutively.

Automatic Line Position Adjustment

■ **The spaces between the lines (CC, KK, YY, MM, KC, KY, KM) are measured by the front, center, and rear ID sensors. The controller takes the average of the spaces. Then it adjusts the following positions and magnification.**

- Sub scan line position for CMY

- Main scan line position for CMY

- Magnification ratio for KCMY

- Skew for CMY

■ **This process prevents:**

- Color registration errors

- Skew

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

ID Sensors
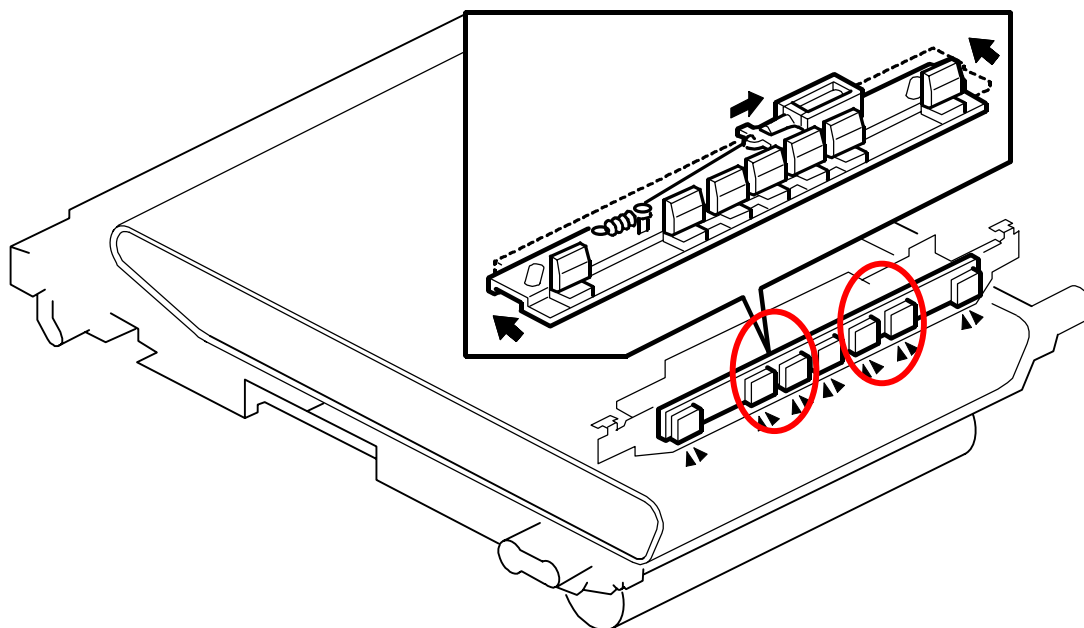
- **Seven ID sensors:**
    - Three for line position adjustment: Left end, middle, right end
    - Four for process control: In the red circles as shown above
- **When the sensors are not used, the solenoid moves the shutter to cover the sensors. This prevents dust on the sensors.**

More about the Adjustments

■ **Sub scan line position for CMY**

- The adjustment of the sub-scan line position for YCM is based on the line position for K (color registration).

  • The machine measures the gaps between the lines of each color in the pattern on the transfer belt.

  • If the gaps for a color are not correct, the machine moves the image of the color up or down the sub scan axis.

  • To do this, it changes the laser write timing for that color.

■ **Main scan line position for CMY**

- If the machine detects that the image is out of position in the main scan direction, it changes the laser write start timing for each scan line.

■ **Magnification adjustment for KCMY**

- If the machine detects that magnification adjustment is necessary, it changes the LD clock frequency for the required color.

■ **Skew for CMY**

- The adjustment of the skew for YCM is based on the line position for K.

Adjustment Conditions (1)

■ **Initial:**

- Immediately after the power is turned on, or when the machine recovers from the energy saver mode.

- Done either once or twice (or not done), depending on:

  - Time since the previous line position adjustment

  - Temperature change since the previous line position adjustment

- The machine checks the above conditions at power on/recovery. Then, line position adjustment is done if one of the conditions occurs.

❒ The service manual explains the SP settings that can be used to adjust the behaviour of the machine.

Adjustment Conditions (2)

■ **During a job:**

- ● The job is interrupted and the adjustment is done once, depending on:

  - • Time since the previous line position adjustment

  - • Temperature change since the previous line position adjustment

  - • Number of prints since the previous line position adjustment

- ● The machine checks the above conditions every 30 pages (SP 3512 001). Then, line position adjustment is done if one of the conditions occurs.

❐ The service manual explains the SP settings that can be used to adjust the behaviour of the machine.

Adjustment Conditions (3)

■ **At the end of a job:**

● The adjustment is done once, depending on:

- Time since the previous line position adjustment

- Temperature change since the previous line position adjustment

- Number of prints since the previous line position adjustment

● The machine checks the above conditions at the end of each job. Then, line position adjustment is done if one of the conditions occurs.

❒ The service manual explains the SP settings that can be used to adjust the behaviour of the machine.

Adjustment Conditions (4)

■ **When the front door is opened and closed:**

- The adjustment is done once, depending on:

  - Time since the previous line position adjustment

  - Temperature change since the previous line position adjustment

- The machine checks the above conditions after the front door is opened/closed. Then, line position adjustment is done if one of the conditions occurs.

❒ The service manual explains the SP settings that can be used to adjust the behaviour of the machine.

Adjustment Conditions (5)

■ **In standby mode (but not in energy saver mode):**

● The adjustment is done once, depending on:

- Time since the previous line position adjustment

- Temperature change since the previous line position adjustment

- Number of prints since the previous line position adjustment

● The machine checks the above conditions in standby mode every 10 minutes (SP 3512 002). Then, line position adjustment is done if two of the conditions occurs.

- Time and number of prints, or temperature and number of prints

Adjustment Conditions (6)

■ **New PCU or transfer belt unit**

- When the machine detects a new PCU or Image Transfer Belt Unit, line position adjustment is automatically done twice.

■ **If the main scan magnification changes**

- This is detected by the main scan synchronization detectors at each end of the scan line for each color.

- If the magnification changes by more than 1% (SP2-193-010), line position adjustment is done.

Adjustment Conditions (7)

■ **Forced line position adjustment:**

- You can do this at any time with SP 2111.

  - It must be done after installing a new laser optics unit or polygon mirror, or after moving the machine.

- There are three adjustments.

  - 2111 001: Fine adjustment, twice

  - 2111 002: Fine adjustment, once

  - 2111 003: Rough adjustment, once

- Normally, do SP 2111 003 first. Then do SP 2111 001.

  - The screen displays the results of SP 2111 001. Also, you can see SP 2194 010 to 012.

  - If you do the rough adjustment, then you must follow immediately with the fine adjustment.

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

Line Position Adjustment and Process Control

■ **Sometimes, the conditions for the process control self check and for line position adjustment both occur at the same time.**

■ **In these cases, the following occurs:**

  ● The process control pattern is developed on the transfer belt first.

  ● Then the line position adjustment pattern is developed on the belt.

     • In some cases, this pattern is made twice, as we saw earlier.

  ● The process control and line position adjustment patterns on the belt go past the ID sensors, and the ID sensors read the patterns as they go past.

  ● As a result, the process control and line position adjustment procedures are done at about the same time.

❐ The line position adjustment pattern is made twice in some cases, as we saw earlier (see the Adjustment Conditions slides 1 and 6).
❐ In theory, the two processes can be done at the same time:
  ➢ The ID sensors used for process control are different from the sensors used for line position adjustment
  ➢ Because of this, the sensor patterns for both processes can both be put on the transfer belt at the same time. (the patterns do not overlap)
❐ But, the laser cannot adjust its strength quickly enough across the main scan to put the patterns on the belt at the required image densities.

Main Scan Skew Correction

Y   **C**   **M**

L2 Lens

L2 Lens Positioning Motor
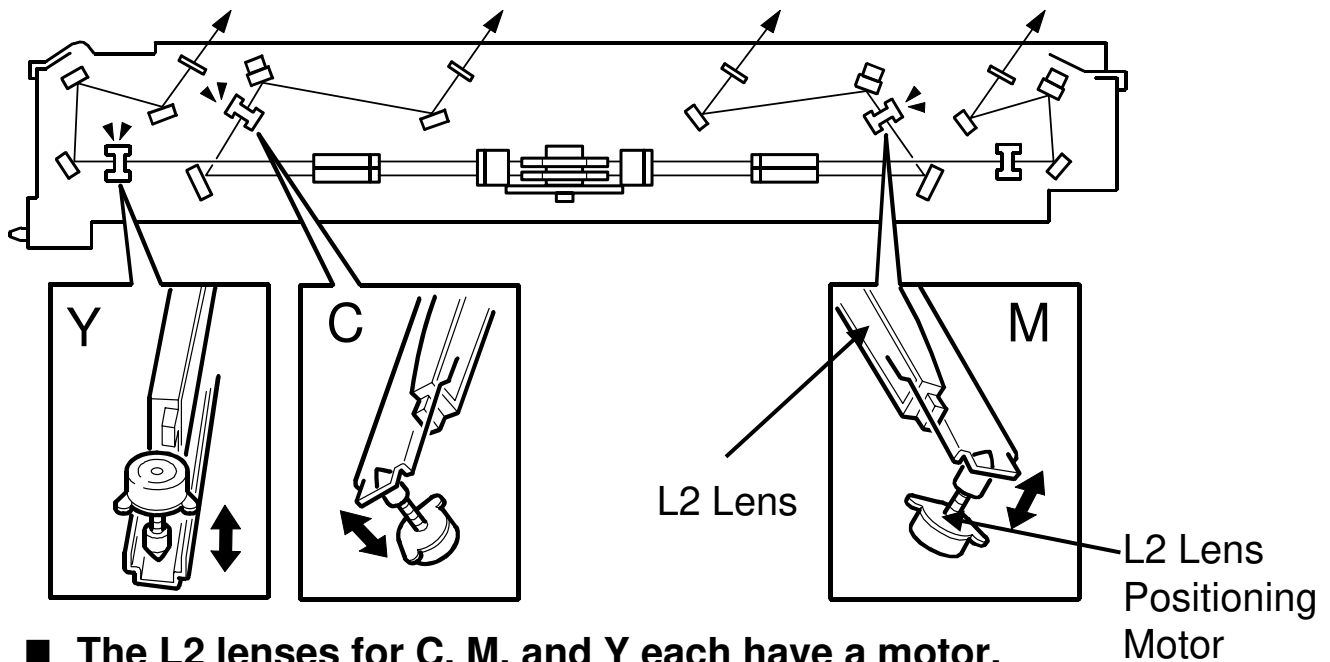
- **The L2 lenses for C, M, and Y each have a motor.**

- **The angle of each L2 lens can be adjusted by these motors.**

- **The angle of the L2 lens for black is not changed.**

❐ The L2 lens positioning motors for magenta, cyan, and yellow adjust the angle of the L2 lenses for these three colours, based on the L2 lens position for black.

Shutter

Shutter Open

Shutter Closed

Cam
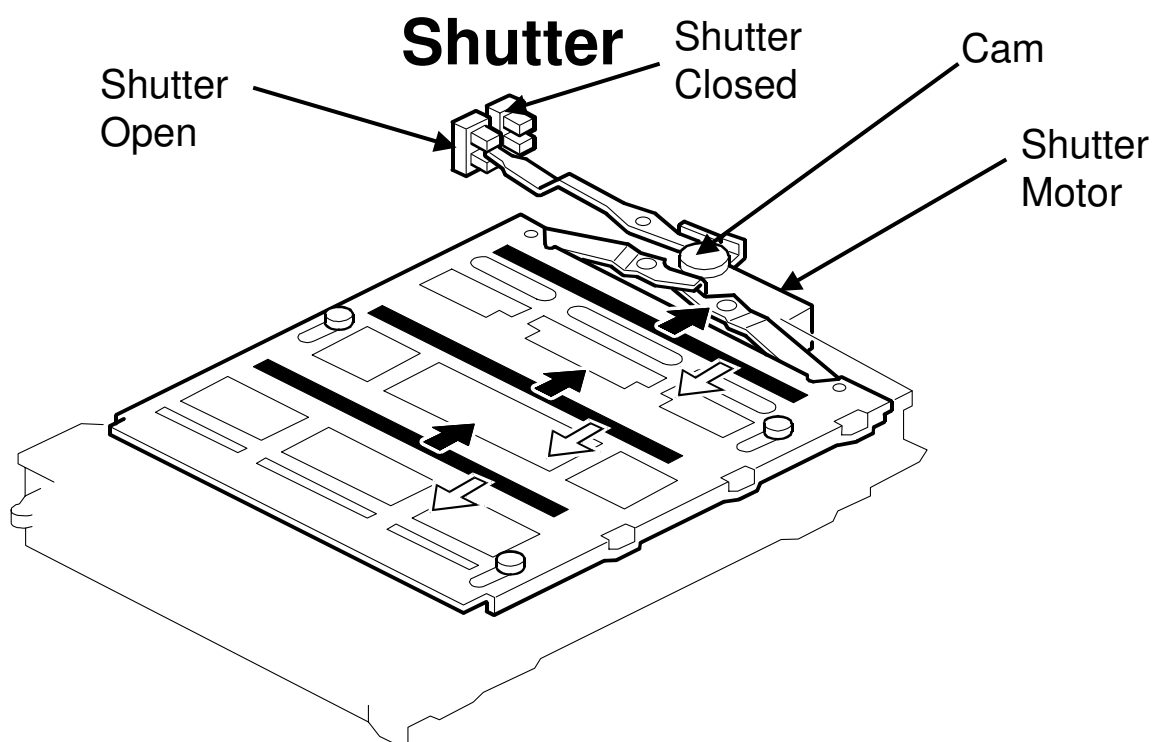
Shutter Motor

- **The shutter stops dust and toner from entering the laser optics unit.**

- **The shutter opens when the polygon motor starts, and closes after the polygon motor stops.**

- **The motor moves the shutter through a cam.**

- **Two sensors detect when the shutter is open and closed.**

B222 service manual, Detailed Section Descriptions, Laser Exposure, Shutter Mechanism

❐ This mechanism makes sure that the shutter is only open when the laser is writing. At all other times, the shutter is closed, to stop dust and toner getting in.

Service Remarks

- **SWITCH THE POWER OFF AND UNPLUG THE POWER CORD BEFORE STARTING WORK ON THE LASER UNIT**

- **Do not loosen the LD board securing screws.**

- **Do not adjust any of the VRs.**

- **Do not open the optical housing unit except when absolutely necessary for servicing.**

- **Do not touch the faces of the polygon mirrors.**

- **To avoid damage to the polygon motor, switch the machine off and wait 3 minutes to allow the motor to stop rotating before removing it.**

Laser Optics Housing Unit Replacement (1)

■ **First, prepare the new laser optics housing unit.**

- ● Remove the tag and sponge padding.

■ **Then, before you switch the machine off, you must make some SP adjustments.**

- ● These adjustments move the L2 lens positioning motors back to home position.

- ● If this is not done, the motors in the new unit will be at the home position, but the SP setting could be different. This could cause errors in skew correction.

- ● After you install the new unit, you will do the forced line position adjustment, and this will set up the motors and SPs correctly.

■ **Note: If you forget to do these SP adjustments, there is a recovery procedure in the manual.**

■ **Then you can remove the old unit and install a new one.**

■ **After you install the new unit, do the SP adjustments, and the line position adjustment, as explained in the manual.**

B222 Service Manual, Replacement and Adjustment, Laser Optics

❒ This is a bit tricky, so go over the main points with the class, on this slide, before they start the procedures.
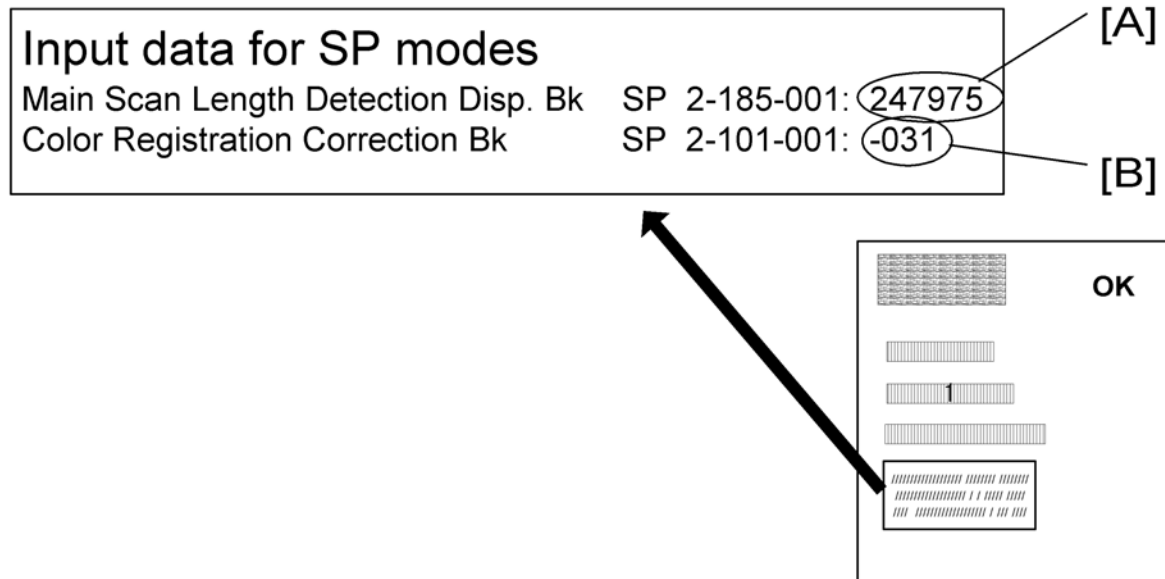
Laser Optics Housing Unit Replacement (2)

Bracket
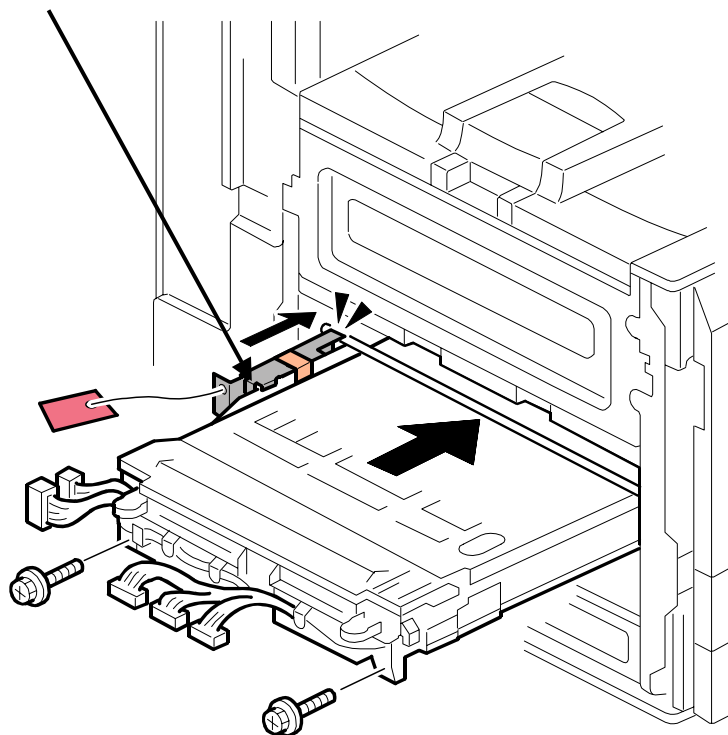
■ **When you install the new unit, do not remove the bracket until near the end of the installation procedure (the correct time is stated in the manual).**

● This bracket protects a capacitor on the unit. If the bracket is removed too early, you can break the capacitor on the corner of the main frame when you install the new unit.

Laser Optics Housing Unit Replacement (3)

Input data for SP modes
Main Scan Length Detection Disp. Bk   SP 2-185-001: 247975   [A]
Color Registration Correction Bk   SP 2-101-001: -031   [B]

OK

1

- The sheet that is packed with the new laser optics housing unit clearly shows which numbers to store in the SP modes.

- If that is not enough, look at the replacement procedure in the service manual for a full explanation.

Replacement (1)

■ **Do the following procedures**

● Laser Unit Components: B222 Service Manual, Replacement and Adjustment, Laser Optics

● Image Adjustments (Registration): B222 Service Manual, Replacement and Adjustment, Image Adjustments

  • These image adjustments must be done after replacing the laser optics housing unit or the polygon mirror motor.

❐ Have the trainees remove and replace the parts in this section of the manual.
❐ Remind them to follow all notes and cautions in the manual.
❐ See the next slide for more notes.

Replacement (2)

■ Laser Optics Housing Unit

- When you install the new unit, do not remove the bracket until near the end of the installation procedure (the correct time is stated in the manual).

- After you install a new unit, you must input values from a decal and make test prints, as explained in the manual.

- Then you must do the forced line position adjustment (SP 2111 003, then 2111 001).

■ Polygon Mirror Motor

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

❒ Have the trainees remove and replace the parts in this section of the manual.
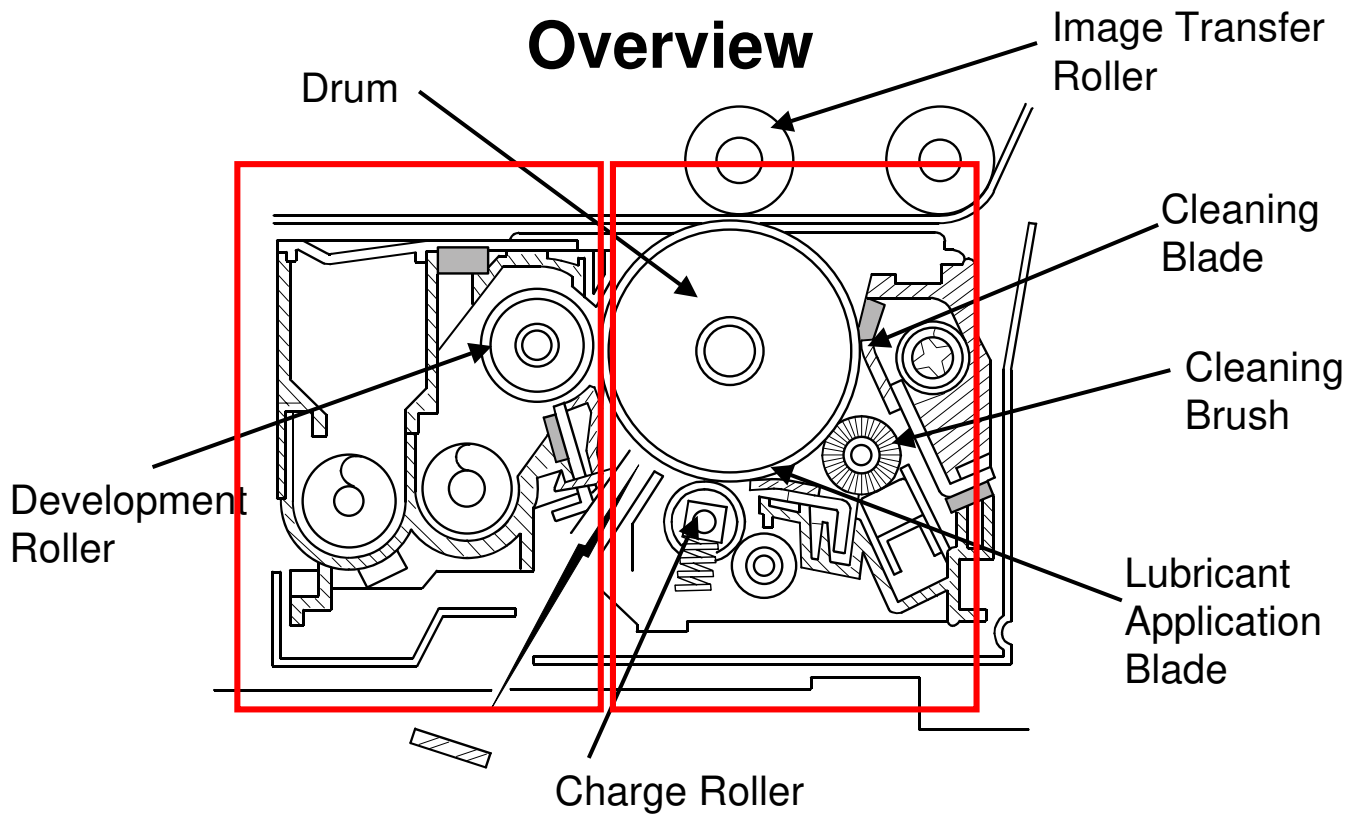❒ Remind them to follow all notes and cautions in the manual.

SP Modes

- **2193: Conditions for line position adjustment**

- **2194: Displays the results for automatic line position adjustment**
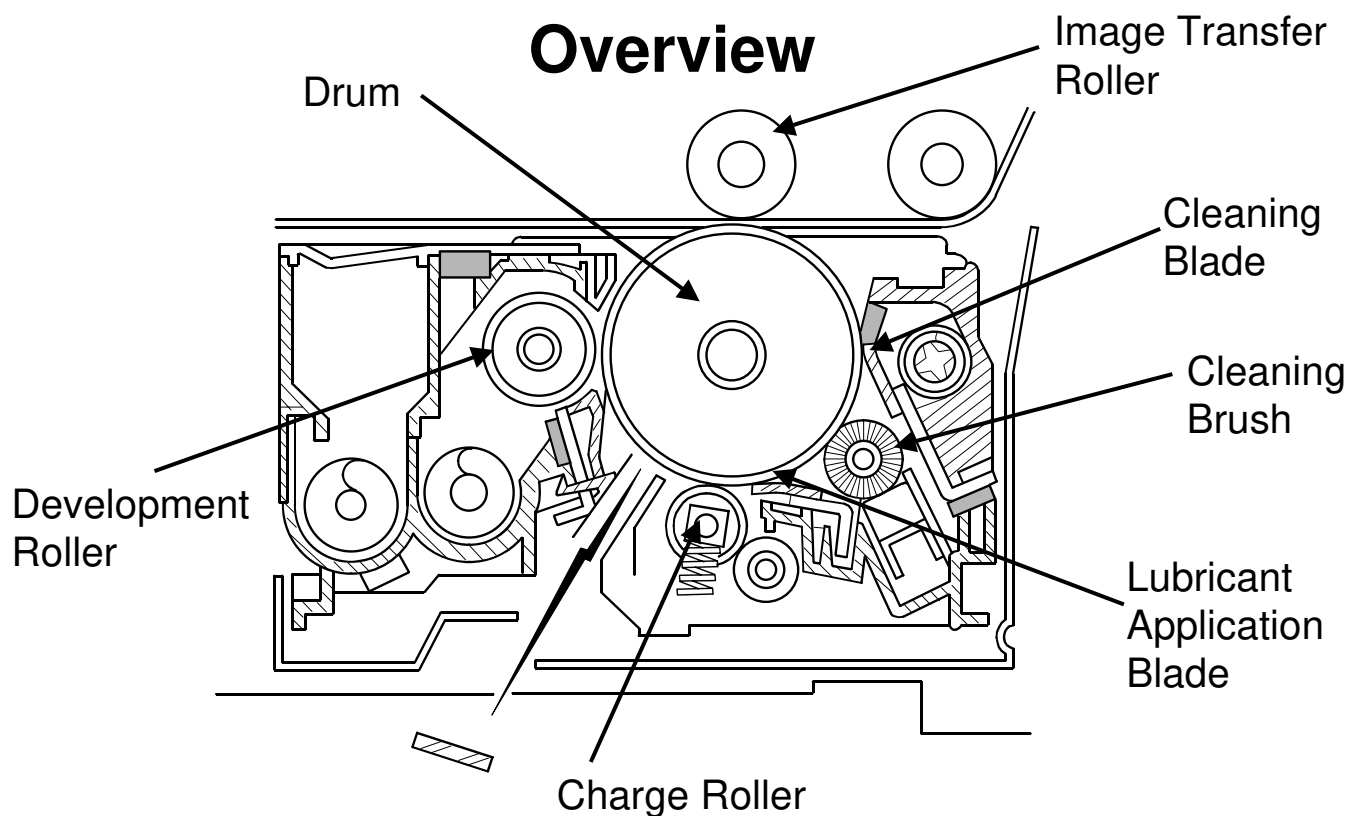
APOLLON-C1 TRAINING

PCU

Overview

Drum

Image Transfer Roller

Cleaning Blade

Cleaning Brush

Development Roller

Lubricant Application Blade

Charge Roller

■ **PCU = Development unit + Drum unit**

❐ The PCU is divided into two parts, as shown by the red boxes on this slide. These two parts are the development unit (on the left) and the drum unit (on the right).

Overview

Drum

Image Transfer
Roller

Cleaning
Blade

Cleaning
Brush

Development
Roller

Lubricant
Application
Blade

Charge Roller

- **One PCU for each colour.**

  - Each PCU has the same components, but they are not interchangeable
    (you cannot use a PCU for yellow in the cyan position, for example).

- **Four colours are developed at the same time.**

B222 Service Manual, Detailed Section Descriptions, PCU, Overview

❐ This shows the most important components of the PCU.

❐ The image transfer roller pulls the toner off the PCU and onto the transfer belt.

❐ Interchangeability of units: The drum units for Y, C, and M are the same (except for the
labels on the front), but the front panel for the K drum unit is different.

Drum Drive

Drum Gear
Position
Sensor - K
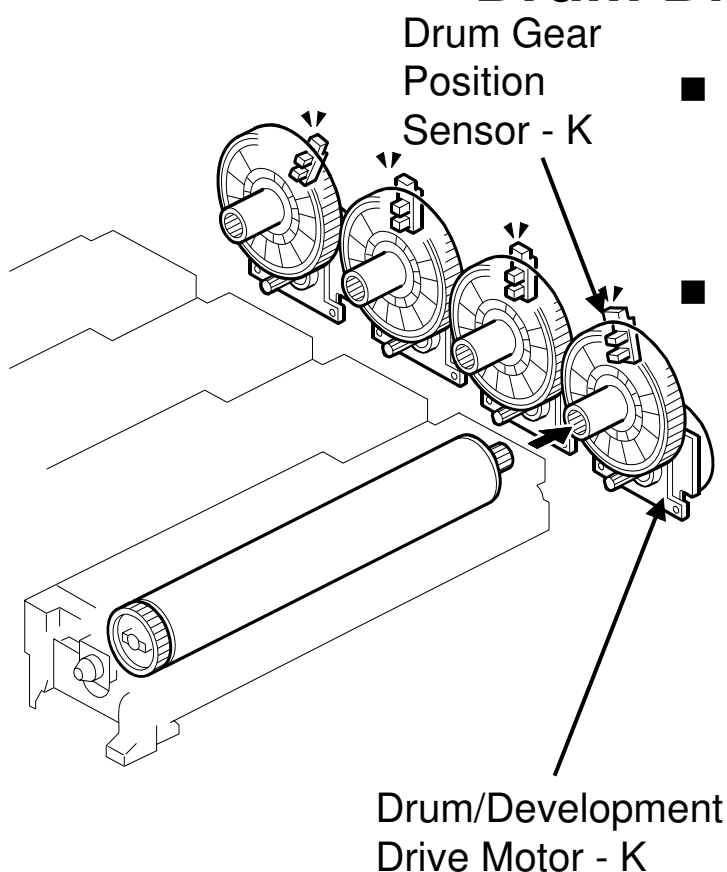
■ **Each PCU has a drum/development drive motor, and a development clutch.**

■ **Each drum also has a drum gear position sensor**

● This sensor detects when the motor is not working.

● It also makes sure that the drum gear for each PCU is at the correct angle when printing starts.

● This prevents variations in print quality caused by incorrect gear meshing at the start of the job.

Drum/Development
Drive Motor - K

B222 Service Manual, Detailed Section Descriptions, PCU, Around the Drum, Drum Drive

❒ The drum units are not interchangeable. We do not recommend that you install a C drum in the location for M, for example.

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

❒ In the B230 series (Athena-C1), the three color PCUs are all driven by the same motor. This is also a good method for preventing color registration errors, and it is better for reduced energy consumption. However, with one motor for each colour, the adjustment can be more precise. But this is a difficult mechanism to implement and calibrate in the factory, so it is only employed for higher spec models, such as the B222 series.

When are the Drum Gear Positions Checked?

- **The machine automatically checks the drum gear position at these times. This is called the 'drum phase adjustment'.**

  - When a new PCU is installed.

  - When a new image transfer belt unit is installed.

  - If the machine detects a shift in the drum positions during the automatic line position adjustment.

- **Can also be done manually with SP 1902.**

  - Must be done after you take out and put back the drive unit.

  - See the SP table for full details on this SP.

Charge Roller

Drum

Charge
Roller

Charge Roller
Cleaning Roller
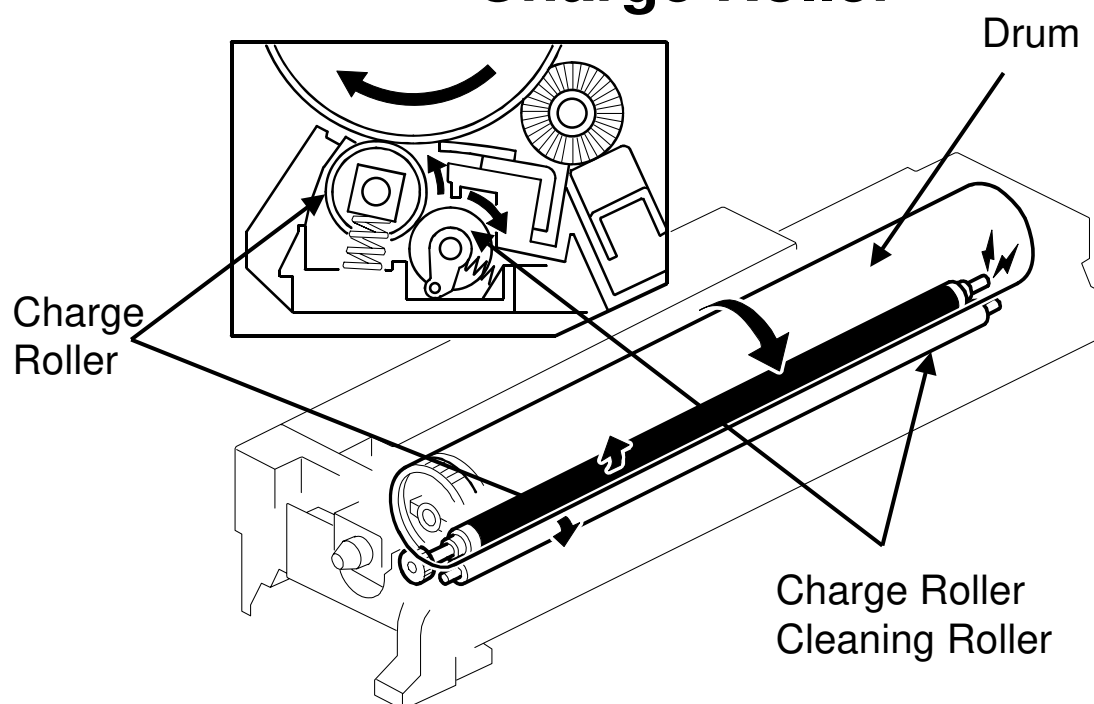
- ■ **The roller does not contact the drum (there is a very small gap between roller and drum).**

- ■ **The cleaning roller always contacts the charge roller.**

B222 Service Manual, Detailed Section Descriptions, PCU, Around the Drum, Drum Charge and Quenching

Charge Roller Voltage

■ **The charge roller gives the drum surface a negative charge.**

■ **An ac voltage is also applied to the charge roller, at a constant current.**

  ● The ac voltage helps to ensure that the charge given to the drum is as uniform as possible.

■ **The high voltage supply board - C.B, at the rear of the machine, supplies the ac and dc to the charge roller.**

■ **The machine automatically controls the charge roller voltage if automatic process control is enabled (this occurs if SP3-041-1 is set to "CONTROL").**

■ **However, if process control is switched off, (this occurs if SP3-041-1 is set to "FIXED"), the dc voltage is the value stored in SP2-005-1 to -12 (do not adjust in the field unless advised to do so).**

B222 Service Manual, Detailed Section Descriptions, PCU, Around the Drum, Drum Charge and Quenching

Quenching

■ **The laser exposes all areas of the drum at the end of each job.**

■ **This removes any charges remaining on the drum.**

Drum Cleaning

Lubricant Application Blade

Cleaning Blade
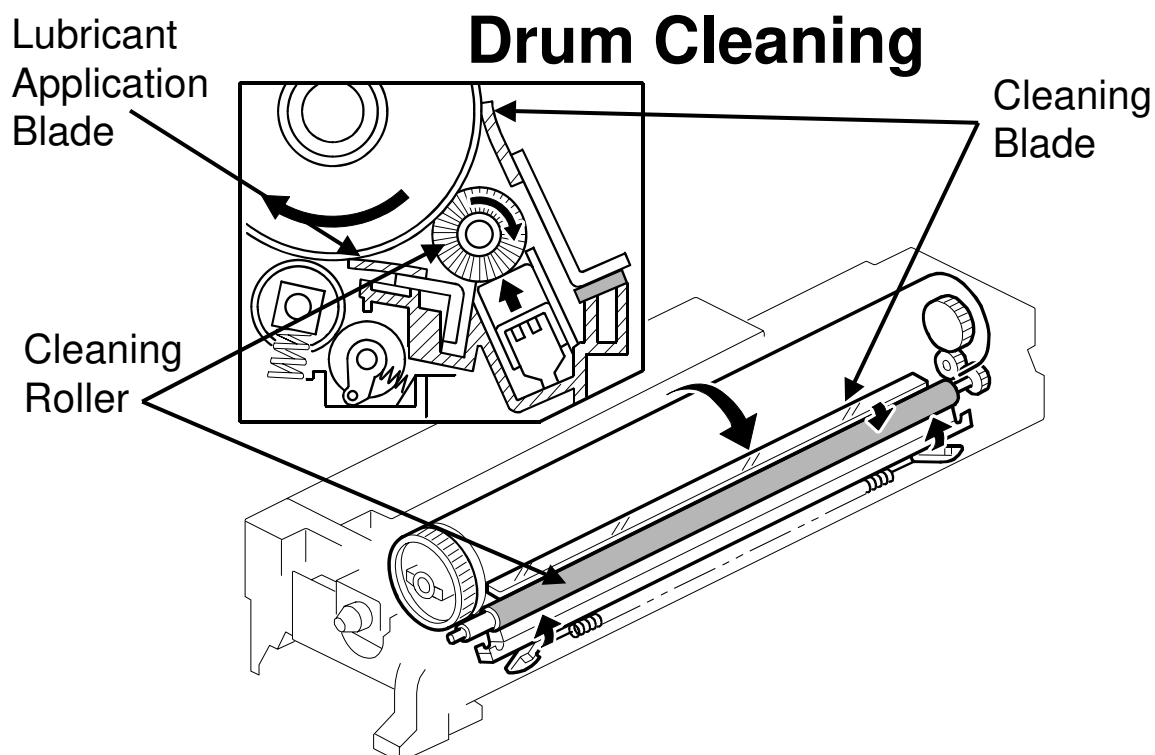
Cleaning Roller

- ■ **The cleaning blade removes remaining toner from the drum.**

    - ● This toner falls onto a collection coil, and is discarded.

- ■ **The cleaning roller applies lubricant to the drum.**

- ■ **The lubricant application blade makes sure that the lubricant is applied evenly.**

B222 Service Manual, Detailed Section Descriptions, PCU, Around the Drum, Drum Cleaning
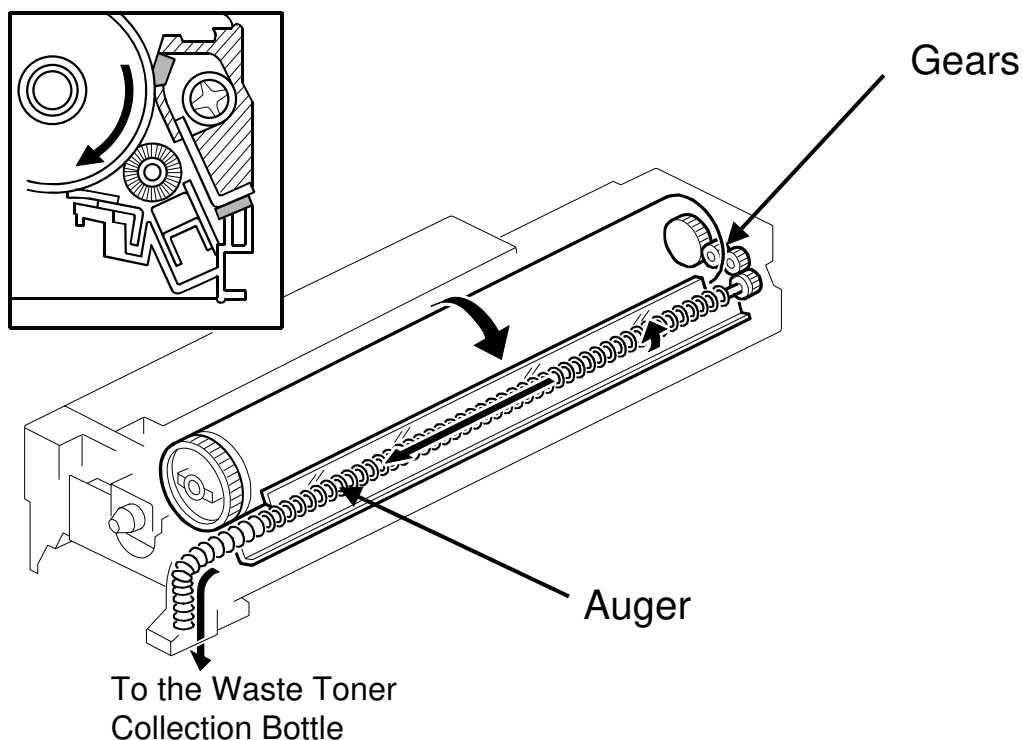
❏ The toner collection mechanism from the PCU is on the next slide.

Drum Cleaning – Reverse Rotation

■ **At 0.5 seconds after the end of the job, the image transfer belt motor reverses for 40 ms.**

- This removes toner at the edge of the cleaning blade.

- This reverse rotation is done if the temperature is above the value of SP 3517 (default 40 °C)

❒ The reverse rotation at the end of the job is controlled by SP2901 and 2902 (do not adjust, DFU).
  ➢ It is also done for the image transfer belt at the same time, for the same purpose.

Waste Toner Transport from PCU

Gears

Auger

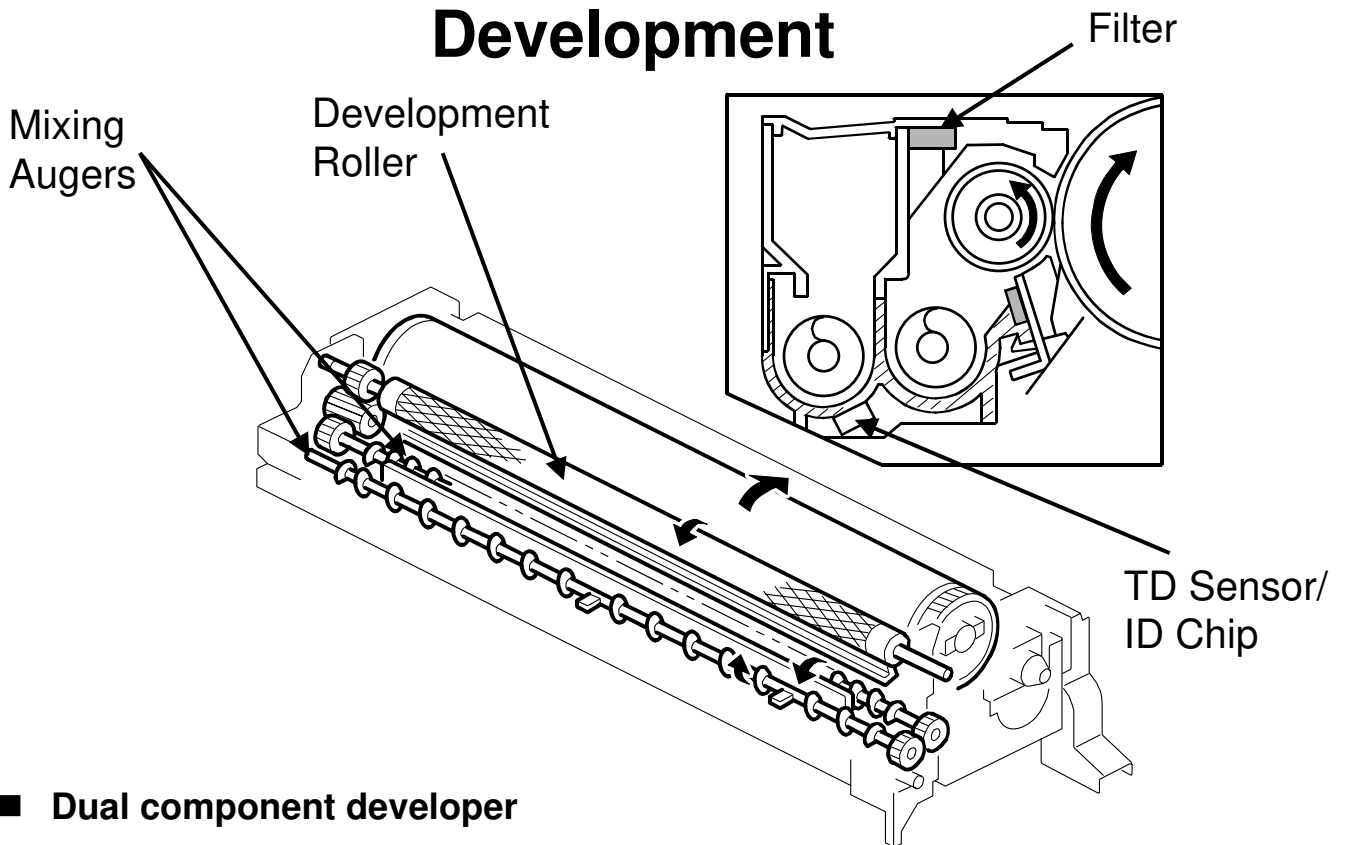To the Waste Toner
Collection Bottle

■ **The gears at the end of the drum drive the toner collection auger.**

B222 Service Manual, Detailed Section Descriptions, PCU, Around the Drum, Drum Cleaning

❐ The waste toner collection bottle and collection mechanism is described in a later section.

Development

Mixing
Augers

Development
Roller

Filter

TD Sensor/
ID Chip

■ **Dual component developer**

■ **TD sensor in each development unit**

- The TD sensor contains the ID chip that contains information about the PCU.

B222 Service Manual, Detailed Section Descriptions, PCU, Development, Development Operation

❒ The filter makes sure that pressure does not build up inside the development unit.

Development Drive

Development Clutch

Drum/Development Drive Motor - K
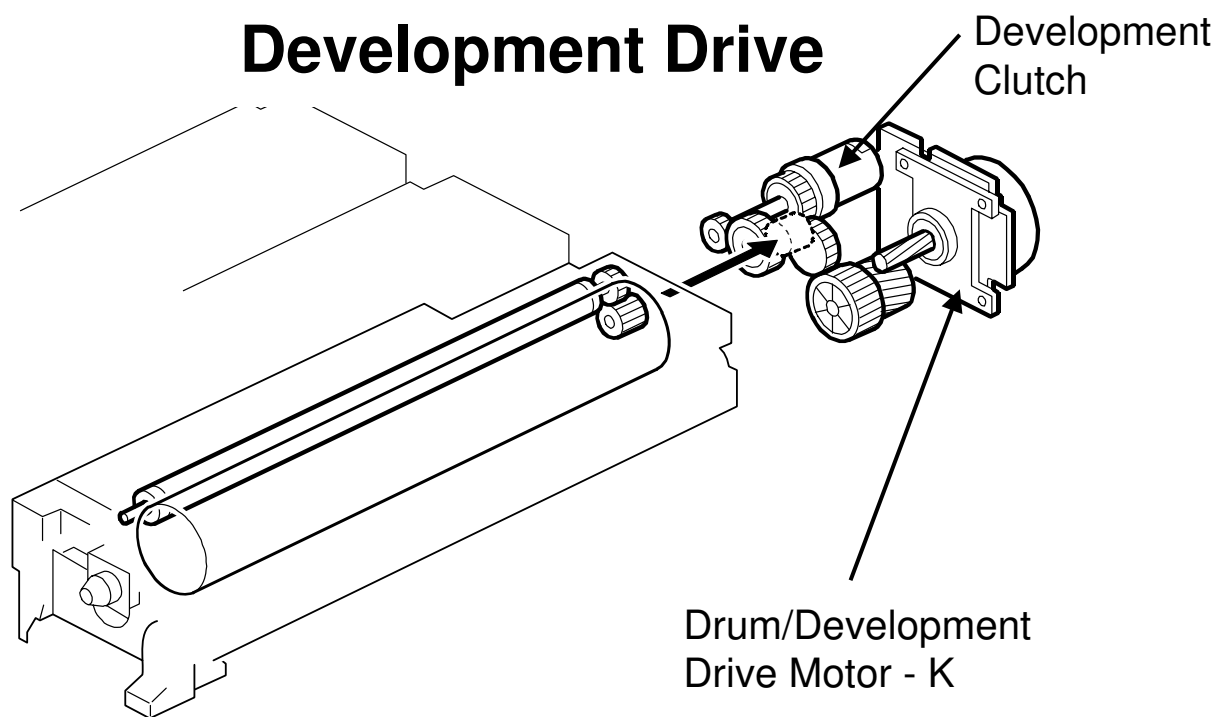
■ **For each PCU, the drum/development drive motor controls the development unit.**

● This motor also controls the drum, so a clutch is necessary.

● Each PCU has a motor and a clutch.

B222 Service Manual, Detailed Section Descriptions, PCU, Development, Drive

❐ The mechanism for black is shown as an example.

Developer Agitation

Mixing Augers

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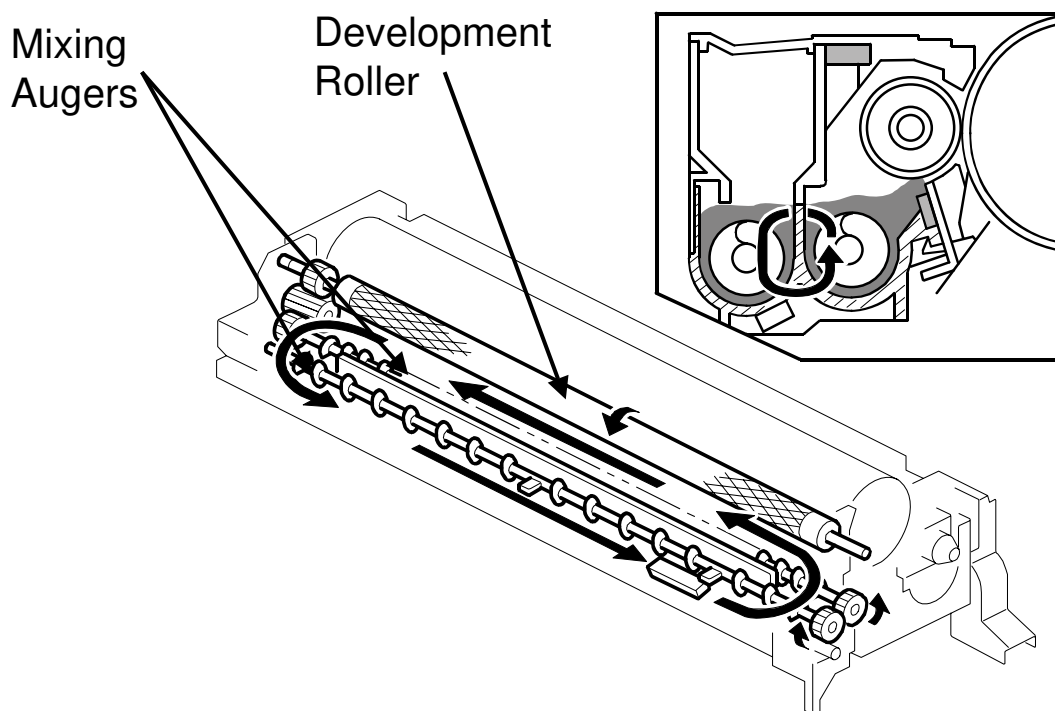
- **Two augers circulate the toner in the development unit during development, during toner supply, and during process control self checks.**

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

Developer Damage during Storage

■ **If the developer was stored at more than 50 °C, the developer can become solid.**

■ **If this occurs, you will get a developer initialization error at installation.**

■ **At this time, you must do the following procedure:**

  ● You should also do this procedure when you install a new development unit.

■ **1. Remove the (old) development unit.**

■ **2. Keep the (new) development unit level and shake it several times from side to side.**

■ **3. Install it in the machine.**

Refresh Mode

■ **While making prints with low coverage, the developer is agitated with less toner consumption and the toner carrier attraction tends to increase. This may cause low image density or poor transfer (white dots).**

■ **To prevent this, the coagulated toner or overcharged toner must be consumed. To do this, 'refresh mode' is done when the total number of prints with low coverage gets to a certain level.**

■ **In 'refresh mode', the machine makes a band for each color to consume some of the toner in the development unit and add fresh toner from the cartridge.**

❒ SP 3516 controls this feature. Do not adjust.

New Unit Detection (1)

■ **The TD sensor assembly contains the ID chip for the PCU. This chip tells the machine if the PCU is new or not.**

■ **When the machine detects a new PCU, the machine automatically does the following:**

- PM counter clear for items related to the PCU

- Developer initialization

- Charge roller voltage control

- Process control

- Line position adjustment

B222 Service Manual, Detailed Section Descriptions, PCU, Development, New Unit Detection

❒ SP 3901: Turns new PCU detection off

New Unit Detection (2)

- **If you install a new drum unit only, the machine does not detect it automatically.**

  - Then, you must reset the PM counter for the drum unit.

  - To do this, set SP 3902 009 (K), 010 (Y), 011 (C), or 012 (M) to 1 before you start to work on the machine.

- **If you install new developer only, the machine does not detect it automatically.**

  - Then, you must reset the PM counter for the developer.

  - To do this, set SP 3902 005 (K), 006 (Y), 007 (C), or 008 (M) to 1 before you start to work on the machine.

  - Then the developer is also initialized automatically after you turn the power on again.

- **If you install a new development unit, or a new PCU, the machine detects it automatically. Do not change SP 3902.**

B222 Service Manual, Detailed Section Descriptions, PCU, Development, New Unit Detection

❒ During developer initialization, the developer is agitated for 30 seconds (SP 3021: do not adjust)

ID Chip

■ **The ID chip is part of the TD sensor assembly.**

■ **The ID chip contains counters and other data about the PCU, drum unit, and development unit.**

■ **If you replace the development unit with a new one, the counter information for the drum unit is not kept on the new ID chip.**

❐ This is a machine limitation. It may change in the future.

Replacement and Adjustment (1)

- ■ **Do the following procedures**
  - ● B222 Service Manual, Replacement and Adjustment, Image Creation
    - • Do the PCU, Drum Unit and Development Unit, and Developer procedures.

- ■ **Developer**
  - ● If you add new developer, do not forget to set SP 3902-xxx to 1 before you switch the power off.
    - • The number xxx depends on the colour of the developer.
  - ● If you do not do this, the new developer will not be initialized.
    - • SP 3014 001 tells you the results of developer initialization.

- ■ **Developer, Development Unit**
  - ● Do the ACC procedure after the developer initialization is finished.
    - • User tools > Maintenance > ACC > Start

Replacement
- ❐ Have the trainees remove and replace the parts in this section of the manual.
- ❐ Remind them to follow all notes and cautions in the manual.

- ❐ Developer is only supplied in bags. The plastic developer container component of the PCU is not supplied as a consumable part. This is a cost reduction measure; the plastic containers are expensive.
- ❐ Do the ACC procedure after developer initialization. This ensures that the machine's color characteristics are maintained.

Troubleshooting, Process Control Error Conditions
- ❐ An explanation of the codes displayed by SP3014 001 is in this section of the service manual.

Replacement and Adjustment (2)

■ **Do the following procedures**

- ● B222 Service Manual, Removal and Adjustment, Drive Unit

  - Gear unit: Do the drum phase adjustment with SP 1902 after you put the drive unit back in the machine.

    – Do it every time you put the gear unit back, not only when you install a new one. The machine must check that the unit is installed correctly.

APOLLON-C1 TRAINING

PROCESS CONTROL

❐ Process control will be described briefly in this section.

Overview

What is Done?

- ■ **This machine has two forms of process control.**

    - ● Potential control

    - ● Toner supply control

- ■ **Process control uses these components:**

    - ● Seven ID sensors

        - • Four sensors are used for process control. Another three sensors are used for automatic line position adjustment

    - ● Toner density sensor

❒ Line position adjustment: This process prevents color registration errors and skew. It is described in the Laser Exposure section.
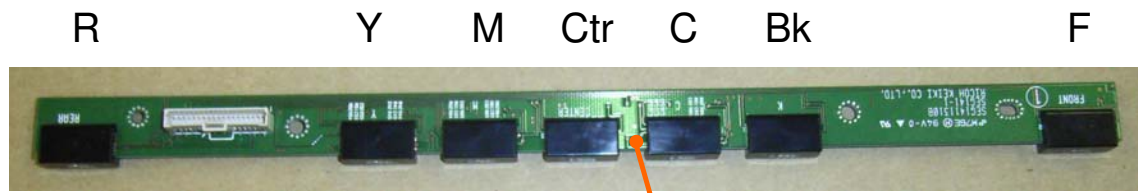
ID Sensors
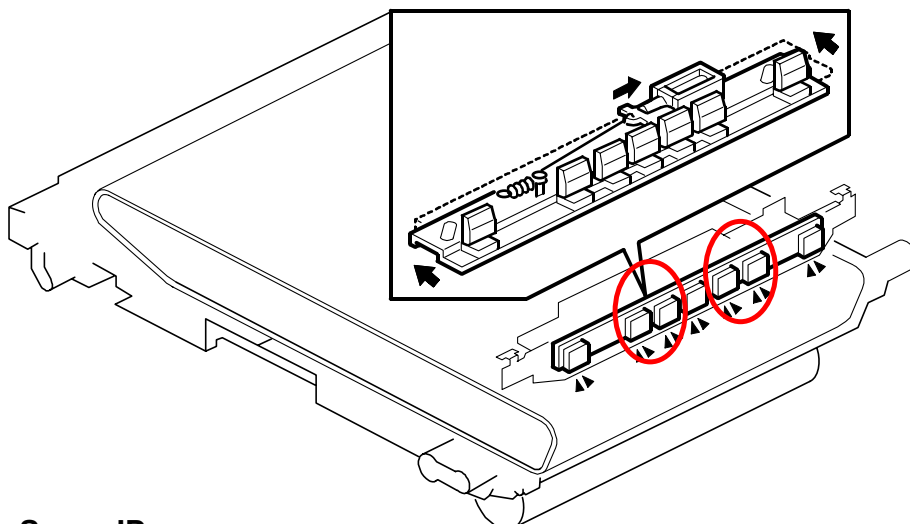
- ■ **Seven ID sensors:**
  - Three for line position adjustment: Left end, middle, right end
  - Four for process control (one for each colour toner): In the red circles as shown above
- ■ **When the sensors are not used, the solenoid moves the shutter to cover the sensors. This prevents dust on the sensors.**
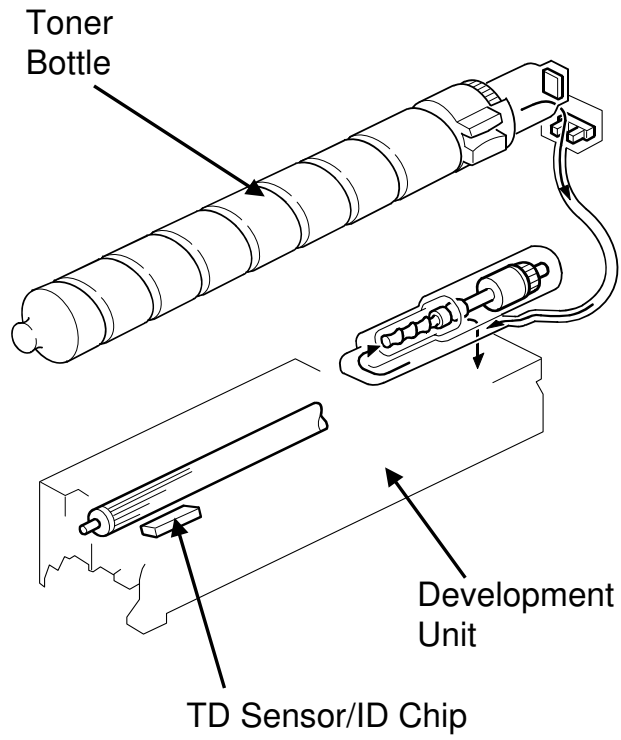
ID Sensors

R   Y   M   Ctr   C   Bk   F

ID Sensor Board

❏ R: Rear, F: Front

TD Sensor

Toner
Bottle

■ **Each development unit
has a TD sensor.**

Development
Unit

TD Sensor/ID Chip

Potential Control

Overview

■ **The machine determines the best possible V_D, V_B, and V_L, based on current machine conditions.**

  ● V_D: Drum potential without exposure – to adjust this, the machine adjusts the charge roller voltage.

  ● V_B: Development bias

  ● V_L: Drum potential at the strongest exposure – to adjust this, the machine adjusts the laser power

■ **At the same time, the machine also determines V_{TREF}: Reference TD sensor output, used for toner supply control.**

When is it Done? (1)

■ **Initial:**

● Immediately after the power is turned on, or when the machine recovers from the energy saver mode.

● Done if one of these conditions occurs:

• Temperature has changed by more than a certain amount since the previous adjustment.

• Humidity has changed by more than a certain amount since the previous adjustment.

• 200 b/w or 100 full colour prints were made since the previous adjustment (SP 3511 005/006).

• The machine was not used for more than 6 hours (SP 3522 002).

❒ The threshold levels are set by SP modes, as explained in the service manual.
❒ No process control before or after ACC.

When is it Done? (2)

■ **At the end of a job:**

● Done if 250 b/w or 100 full colour prints were made since the previous adjustment (SP 3515 001/002).

■ **During a job:**

● Done if 500 b/w or 200 full colour prints were made since the previous adjustment (SP 3515 003/004).

• The machine checks the above condition every 30 pages (SP 3512 001). Then, line position adjustment is done if the condition occurs.

❑ The intervals are set by SP modes, as explained in the service manual.

❑ You cannot adjust the intervals with SP 3515 001 to 004. These SPs only show the current settings. To change the current settings, you must adjust SP 3511 001 to 004 (base value) and SP 3511 022 to 029 (coefficients)

When is it Done? (3)

■ **In standby mode (but not in energy saver mode):**

- Done if one of these conditions occurs:

  - Temperature has changed by more than a certain amount since the previous adjustment.

  - Humidity has changed by more than a certain amount since the previous adjustment.

  - 200 b/w or 100 full colour prints were made since the previous adjustment (SP 3511 005/006).

  - The machine was not used for more than 6 hours (SP 3531 001).

- The machine checks the above conditions in standby mode every 10 minutes (SP 3512 002). Then, process control is done if one of the conditions occurs.
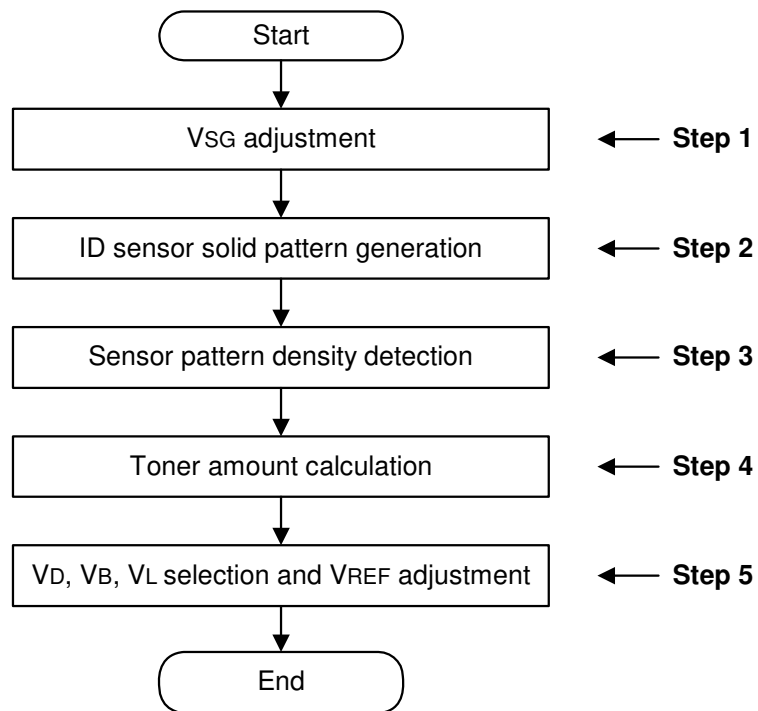
When is it Done? (4)

■ **After toner end recovery**

■ **After developer initialization:**

- Developer initialization occurs automatically in the following conditions:

  - After a new development unit has been installed

  - After new developer is installed and SP 3902-005 to 008 is done

■ **Forced (manual execution):**

- Use SP 3011 001

- Process control counters (SP 3510) are not reset after a forced execution

❒ Details of how to install developer were covered in the PCU section of the course.

What Values are used if Potential Control is Disabled?

- **If potential control is disabled (SP3-041-001 is set to 0), V_D and V_B are fixed by SP mode settings.**

    - SP2-005 for V_D , SP2-229 for V_B

    - For toner supply: Fixed supply mode is used (V_{TREF} is not used)

- **If LD power control is disabled (SP3-041-002 is set to 0), the LD power is fixed by an SP mode setting.**

    - SP2-221 for V_L

What is Done?

Start

V_{SG} adjustment   ← **Step 1**

ID sensor solid pattern generation   ← **Step 2**

Sensor pattern density detection   ← **Step 3**

Toner amount calculation   ← **Step 4**

V_D, V_B, V_L selection and V_{REF} adjustment   ← **Step 5**

End

Step 1: V$_{SG}$ Adjustment

■ **ID sensor: Calibrated so that the signal when reading the bare transfer belt is 4.0 ± 0.5 Volts**

- ● This compensates for changes in the image transfer belt and ID sensor.

- ● All 7 sensors on the ID sensor board are calibrated at this time.

- ● SP 3325: Displays the results of the calibration

■ **This step is always done during initial process control.**

■ **But it is not always done during a job or at job end.**

- ● More than 500 prints (SP3-511-007) must be made since the last V$_{SG}$ adjustment. This is to reduce the total time used for process control.

■ **SC400 is displayed if VSG is out of adjustment range sequentially 3 times.**

■ **SP3321: Forced VSG Adjustment for each sensor**

❒ SP 2140 to 2145 are for designer use only. They cannot be used in the field to troubleshoot problems with the ID sensor.

Steps 2 to 4: Toner Amount for Each Grade
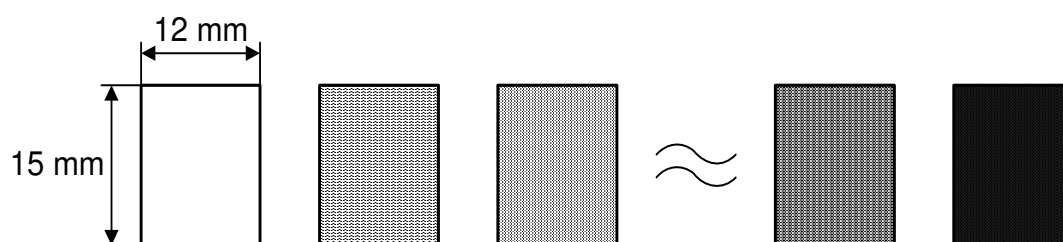
- ■ **10 solid grades between white and 100% C, M, Y, or K**

- ■ **Each grade is made by changing the development bias and charge roller voltage.**

  - ● The difference between development bias and charge roller voltage is always the same. But the development potential changes for each grade.

- ■ **ID sensor: Measures the light reflected from each grade**

- ■ **The machine calculates the amount of toner per unit area required to make each grade.**

More On Steps 2-4

- **The machine makes a 10-grade pattern on the image transfer belt.**

- **The development potential changes for each grade.**

  - The development potential is the difference between the development bias and the charge remaining on the drum where the laser writes a black area.

  - The development bias changes for each grade, so the development potential also changes.

- **The ID sensor measures the light reflected from each pattern.**

  - From this, the machine can calculate how much toner is deposited on the transfer belt for each of the 10 grades.

 - This is expressed as M/A (mass per unit area), in mg/cm^2.

Step 5: Determining VD, VB, and VL

■ **The machine plots the 10 calculations of M/A against the development potential that was used to make each of the grades, and draws a line through them.**

■ **Then, it determines the development potential that would be required to deposit 0.40 mg/cm^2 of toner. 0.40 is known as the 'target M/A'.**

● SP3-501 adjusts this but it is not recommended.

■ **This development potential is then used to determine the best values of VD, VB, and VL to use with the machine in its current condition. This process ensures that enough toner is deposited to make black pixels.**

M/A [mg/cm^2]

0.40

Dev. Potential
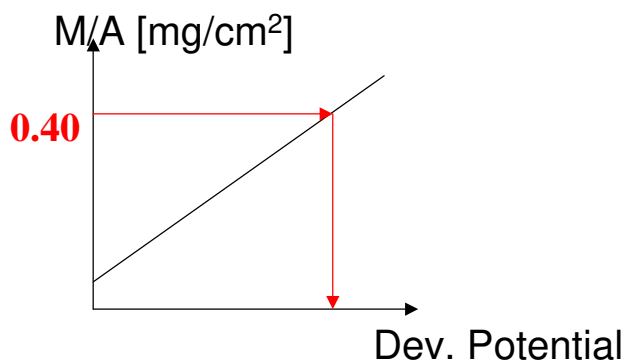
❒ SP 3241: These settings determine how the machine sets the charge roller voltage, based on the development bias

➢ Default: Charge roller voltage = Dev bias + 140 V

❒ SP 3242: These settings determine how the machine sets the LD power, based on the charge voltage. These SPs set the coefficients that are used in the calculation. There is no further information on this.

Step 5: Determining VTREF

M/A

Target Development Gamma Range

Current Development Gamma
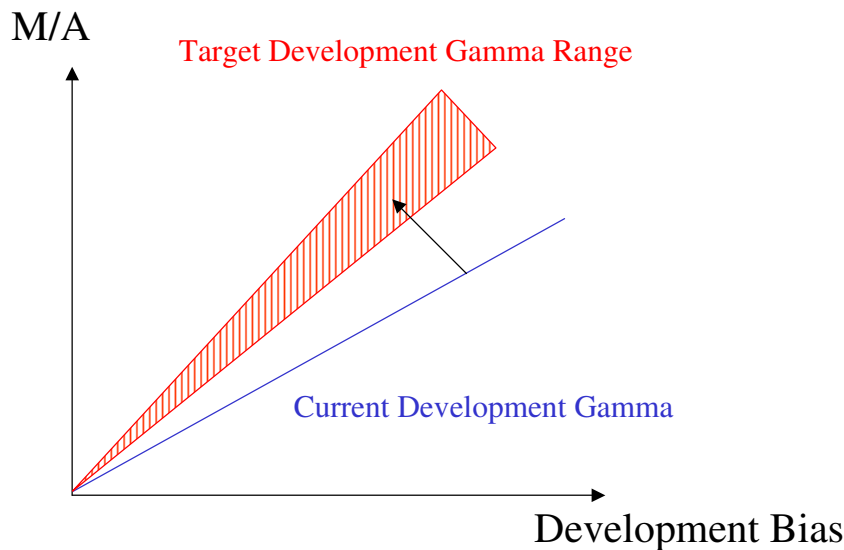
Development Bias

- **The development gamma must be within the range indicated above in red.**

- **VTREF is adjusted so that development gamma falls within this range.**

❏ The slope of the line is the development gamma, which is equivalent to the development potential.

❏ If the slope is too steep, the development potential will be too high, and the applied development bias will cause the mass of toner per area to be too high.

❏ If the slope is too shallow, the development potential will be too low, and not enough toner will be attracted to the latent image with the standard development bias.
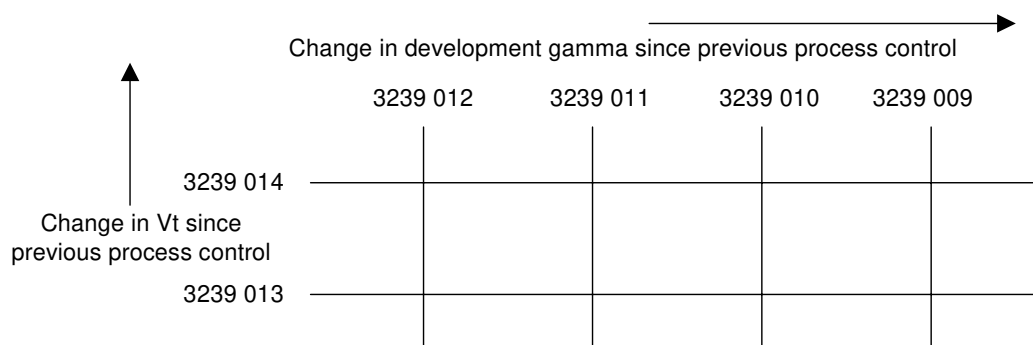

VTREF Correction

- **In this model, VT$_{REF}$ compensation is not done by generating the pattern during a print job.**

- **In this model, VT$_{REF}$ is corrected for pixel coverage.**
  - The correction is done during process control.
  - It is based on these three factors:
    - Average coverage since the previous process control
    - Change in development gamma since the previous process control
    - Change in VT since the previous process control

Details about Vtref correction

❒ At the process control self check, Vtref is corrected as follows.

❒ New Vtref = Vtref at developer initialization + Vtref correction.
  - ➢ SP 3222 001 to 004 displays new Vtref
  - ➢ SP 3222 005 to 008 displays Vtref at developer initialization
  - ➢ SP 3222 009 to 012 displays the Vtref correction.

❒ To get the new Vtref, the Vtref correction is always applied to the 'Vtref at developer initialization'. It is not applied to the current Vtref (the Vtref that was determined at the previous process control).

How is the Vtref correction calculated?

❒ At process control, the machine determines the changes in development gamma and in Vt since the previous process control.

❒ The ranges of these two factors are divided up by threshold levels (two for Vt, and four for gamma) as shown below. The result can be thought of as an aray of squares. As shown below

❒ Then, in each of the 'squares' in the diagram below, there is a different correction to apply to Vtref.

Change in development gamma since previous process control

3239 012   3239 011   3239 010   3239 009

3239 014

Change in Vt since
previous process control

3239 013

❒ Finally, a correction is applied, based on average pixel coverage since the previous process control.
  - ➢ The correction is a multiplication coefficient. It depends on the settings of SP 3224.
  - ➢ Low coverage: SP 3224 005 to 008
  - ➢ Medium coverage: No correction
  - ➢ High coverage: SP 3224 001 to 004

Toner Density Adjustment Mode
Overview

■ Process control adjusts the toner density so that the density of each color in the image is correct.

■ But, sometimes, process control adjusts the toner density too slowly, and the first few copies after process control have incorrect toner densities.

■ Users of older models have complained about this.

■ In this new model, a new process was included to take care of this. It is called 'toner density adjustment mode'.

■ It brings toner concentrations to the correct values much more quickly.

Toner Density Adjustment Mode
What is Done?

- **The machine makes sensor patterns and checks the current development gamma.**

- **Development gamma too low: If the following condition occurs, the machine increases the toner density. To do this, it supplies toner to the development unit.**

  - Current gamma < Target gamma - 0.2 (SP3-239-012)

- **Development gamma too low: If the following condition occurs, the machine decreases the toner density. To do this, it consumes some of the toner in the development unit.**

  - Current gamma $\geq$ Target gamma + 0.2 (SP3-239-009)

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

Toner Density Adjustment Mode
When is it Done?

■ **After power-on (toner supply mode only, no consumption): SP 3043 001**

■ **Developer initialization: SP 3043 002**

■ **Before ACC: SP 3043 004**

- ● In this way, the customer can execute the toner density adjustment mode, if they think that colour balance is not good. It becomes part of the ACC process.

■ **At end of job (toner supply mode only, no consumption): SP 3043 006**

■ **The machine has a forced toner density adjustment mode (SP 3011 002).**

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

Toner Supply Control

Overview

- **Uses these components:**

  - TD sensor: Detects how much toner there is in the developer

  - ID sensor: Measures the density of standard sensor patterns during process control.

  - Pixel counter: Counts pixels to determine how much toner for each colour is used on the page

- **The result of toner supply control determines how long the toner supply clutch turns on for.**
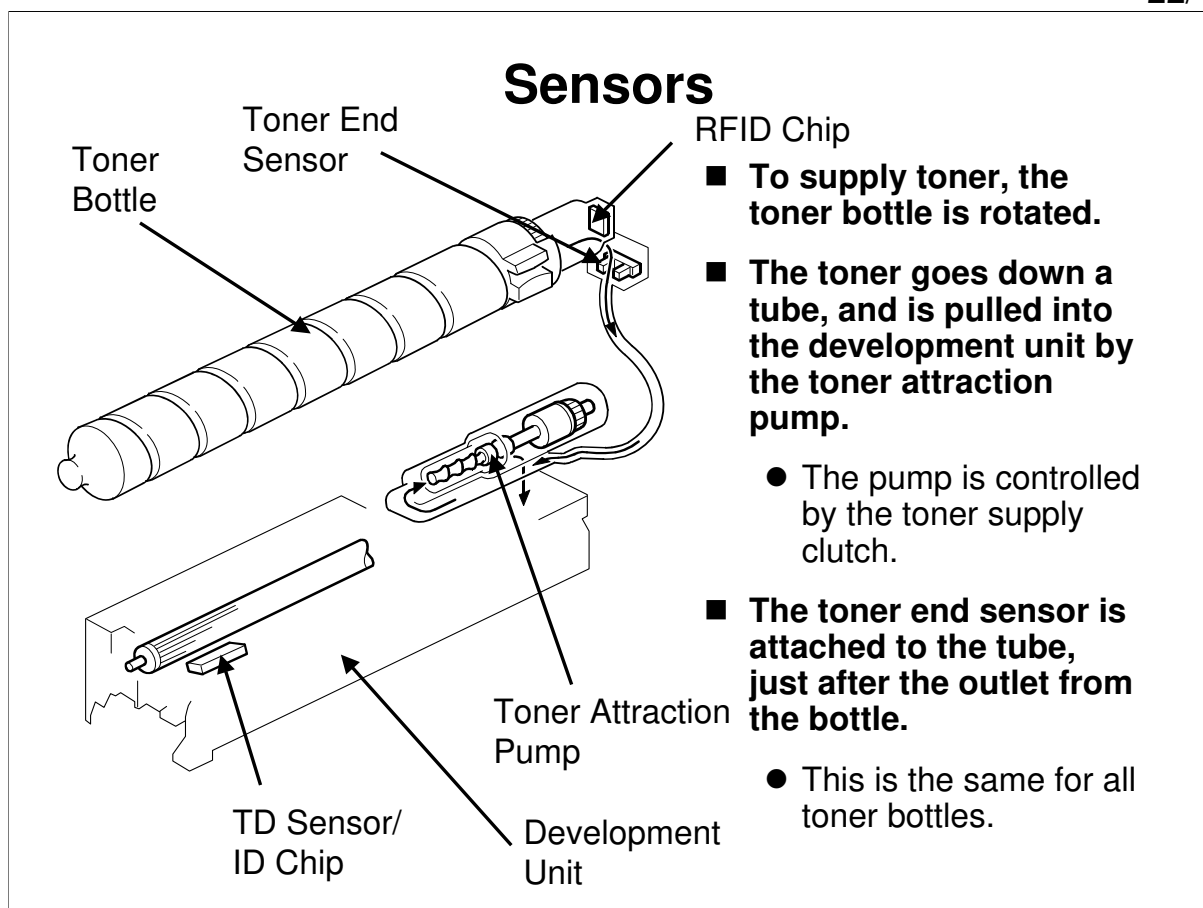
  - This determines the amount of toner supplied.

- **This is done before every development for each color.**

Toner Supply Control Modes

- **This machine uses 3 toner supply modes. The mode used depends on SP3-044-001 to –004.**
  - You can select a different mode for each colour, if necessary.
- **PID control mode: This is the default mode.**
  - Uses the TD sensor, ID sensor, and pixel count.
  - VTREF is adjusted by process control.
- **PID control mode with fixed VTREF**
  - The machine changes to this mode if the ID sensor breaks.
  - Uses only the TD sensor.
  - VTREF is fixed at the value stored in SP3-222-001 to –004.
- **Fixed supply mode**
  - The machine changes to this mode if the TD sensor breaks.
  - The amount of toner supply depends on SP3-401-001 to –004.
    - The default is 70% of normal supply, to prevent excessive supply of toner.

❐ PID: Proportional Integral Differential

Sensors

Toner Bottle

Toner End Sensor

RFID Chip

TD Sensor/ ID Chip

Development Unit

Toner Attraction Pump

- **To supply toner, the toner bottle is rotated.**

- **The toner goes down a tube, and is pulled into the development unit by the toner attraction pump.**

  - The pump is controlled by the toner supply clutch.

- **The toner end sensor is attached to the tube, just after the outlet from the bottle.**

  - This is the same for all toner bottles.

B222 service manual, Detailed Section Descriptions, Toner Supply, Overview

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

Toner Near-end Detection

■ **To detect toner near-end, the machine uses the following counters:**

  ● Operation time counter of the toner attraction pump

  ● Pixel counter

■ **If one (or both) of these counters detect that the remaining toner amount is 50 g or less, the machine enters the near-end condition.**

❐ The two counter values on the slide are stored in the RFID chip on the toner cartridge, and copied to the NVRAM on the BCU.

❐ The toner attraction pump is part of the toner supply mechanism. It pulls toner down from the toner bottle and into the development unit. We will see the mechanism in more detail in the 'Toner Supply' section of the course.

Toner End Detection

■ **To detect toner end, the machine uses the TD sensor (there is one below each toner bottle).**

  ● Toner end is detected if both of these conditions occur:

    • $V_T – V_{TREF} \geq 0.5$ (SP3-101-021)

    • $SUM(V_T – V_{TREF}) \geq 10$ (SP3-101-026)

■ **The machine must be in a toner near-end condition. If it is not, then the machine does not check for toner end.**

What Happens if Toner End is Detected?

■ **If toner end is detected for black, the toner bottle must be replaced or the machine cannot print.**

■ **If toner end is detected for C, M, or Y, the machine can print in black and white only. Color print jobs cannot be started.**

- If C, M, or Y toner ends during a color-printing job, the job is suspended until toner is supplied.

- If new color toner is not installed, the user can print black-and-white jobs only.

Toner End Recovery

- **The machine assumes that the toner cartridge was replaced if either of the following occurs when the near-end or end status exists:**

  - The front door is opened and closed.

  - The main switch is turned off and on.

- **Then the machine starts to supply toner to the development unit.**

- **Then, the machine clears the toner near-end or end status if the toner end sensor detects that toner was supplied.**

- **The machine tries to supply toner for a maximum of 5 times (SP 3-102). If the sensor still does not detect toner, there is no recovery from toner end.**

Developer Initialization

■ **Developer initialization must be done if developer or the development unit is replaced.**

■ **The machine performs developer initialization automatically when it detects a new development unit or PCU.**

■ **But, it must be done manually when replacing developer.**

● The procedure was explained in the PCU section of the course.

■ **Steps**

● The machine agitates the developer for 30 s (SP 3021-001 to 004: do not adjust)

● The machine adjusts Vcnt (control voltage for TD sensor) so that Vt (TD sensor output) becomes within 2.7 ± 0.2.

  • The machine keeps this as Vtref if it is successful. SC372 to SC375 is displayed if it fails sequentially 3 times.

● The result of developer initialization can be checked with SP3-014.

❒ During developer initialization, the machine forcibly supplies toner because there is no toner inside the toner transport tube at installation. Then the machine does the process control self check.

SP Modes

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

Temperature and Humidity Settings (1)

■ **SP 2013 007, 008, 009: Displays the current temperature and relative humidity, and the absolute humidity**

- This absolute humidity is now being used by the machine to correct the charge roller current.

- The machine uses a scale of 5 levels of absolute humidity, and applies the corrections that are set for that level.

  • The corrections can be adjusted with SP mode.

- These levels are called LL, ML, MM, MH, and HH.

- The current level is displayed with SP 2013 001.

Temperature and Humidity Settings (2)

- **SP 2013 003 to 006: These thresholds determine the thresholds between the five levels. Defaults are:**

  - Below 4.3 g/m^3: LL

  - 4.3 to 11.3 g/m^3: ML

  - 11.3 to 18 g/m^3: MM

  - 18 to 24 g/m^3: MH

  - Above 24 g/m^3: HH

- **SP 2013 002: This can be used to force the machine to detect one of the five levels**

  - The temperature and humidity sensors will not be used in this case.

❒ Transfer current uses different SPs to set the thresholds, as explained in the Transfer section of the course.

Potential Control – Charge Roller

■ **2005: Charge roller dc voltage if potential control is disabled with SP 3041 001**

  ● 3631: Displays the current dc voltage

■ **2006: Charge roller ac voltage, if SP 2012 is set to 1. Otherwise, this is decided by process control.**

  ● 3641: Displays the current ac voltage

■ **2007 to 2011: Charge ac current adjustment for environmental conditions**

  ● Environmental conditions are detected with the temperature and humidity sensors, and determined by the settings of SP 2013.

■ **3241: These settings determine how the machine sets the charge roller voltage, based on the development bias**

  ● Default: Charge roller voltage = Dev bias + 140 V

Potential Control – Laser Power

■ **2221: Adjusts the laser power, if LD power control is disabled with SP 3041 002**

● 3651: Displays the current laser power

■ **3242: These settings determine how the machine sets the LD power, based on the charge voltage**

Potential Control – Development Bias

- **2229: Development bias if potential control is disabled with SP 3041 001**
  - 3621: Displays the current bias

Potential Control – TD Adjustment

■ **3043: Controls toner density adjustment**

● Already discussed

Potential Control – Execution Timing

- **3511, 3512, 3522, 3531: Execution intervals and thresholds**

  - Explained already

- **3513, 3514, 3515: Displays the intervals and conditions currently used to determine when to do the next process control**

Potential Control – Others

- **3611: Displays the current and target development gammas**
- **Enable/disable**
  - 3041 001: Potential control, enable/disable
  - 3041 002: LD power control, enable/disable
  - 3041 003: What type of process control is done before ACC (default: TD adjustment only)
- **Forced process control**
  - 3011 001: Normal process control, manual execution
  - 3011 002: Toner density adjustment mode, manual execution
  - 3321: ID sensor initialization
- **Results**
  - 3012: Process control results
  - 3014: Developer initialization results (4 digits, YMCK)
  - 3325: ID sensor initialization result

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

❒ If the machine cannot bring the development gamma within the target range, nothing happens (no SC code), because the machine cannot detect the current gamma after adjusting Vtref.

Toner Supply

- **3044: Toner supply method (one setting for each colour)**

- **3401: Toner supply rate for fixed supply mode**

- **3411: Displays the current toner supply rate**

Toner Supply

■ **Forced toner supply**

- 3015: Execution, supplies toner to the development unit

- 3016: Duration of forced toner supply

■ **3201: Displays Vt (SP 3238: Vt target)**

■ **3221: Displays Vtcnt**

■ **3222: Displays Vtref**

Toner Near-end/End

■ **3045: Disables the toner end alert on the display panel.**

■ **3101 013 to 016: Toner near-end threshold (near-end detected if remaining toner falls below this amount: default 50 g)**

■ **Consumed/remaining toner**

- ● 3101 005 to 008: Displays the consumed amount of each color toner, calculated by toner pump activation

- ● 3101 009 to 012: Displays the remaining amount of each color toner, calculated by toner pump activation

- ● 3101 028 to 031: Displays the consumed amount of each color toner, calculated by pixel count

- ● 3101 032 to 035: Displays the remaining amount of each color toner, calculated by pixel count

- ● 3101 040 to 043: Pixel mass per unit area, used to calculate toner consumption by pixel count

Toner Near-end/End

■ **Near-end detection thresholds**

- 3101 021: Vt – Vtref threshold for near-end detection
- 3101 026: Delta Vt sum threshold for near-end detection

■ **3102: Number of attempts to supply toner for toner end recovery**

■ **3131: Number of times toner end was detected for each colour**

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APOLLON-C1 TRAINING

TONER SUPPLY

❒ In this section, the mechanical components of the toner supply system will be described.

❒ Toner supply control was explained in the Process Control section of the course.

Overview
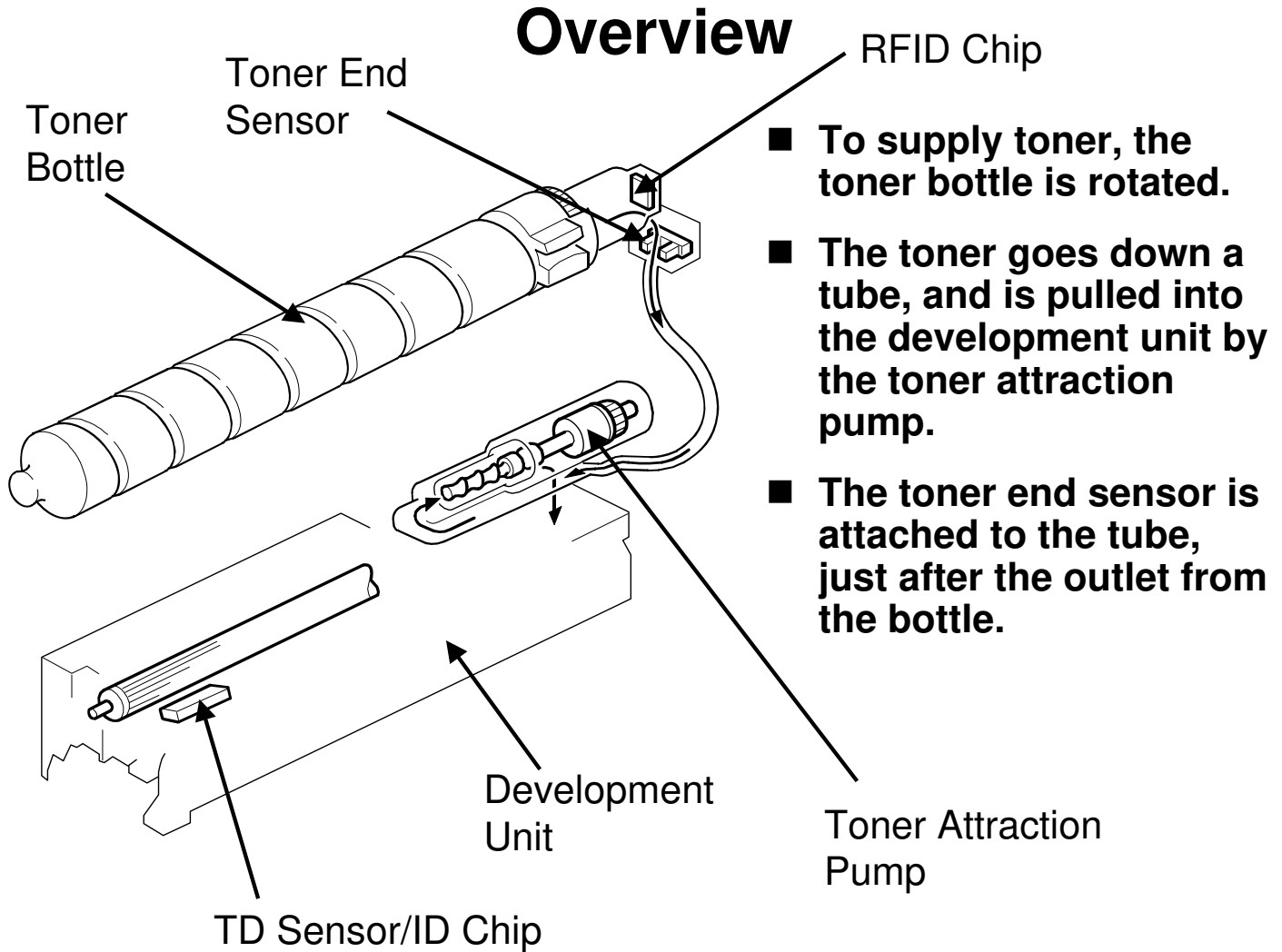
Toner Bottle

Toner End Sensor

RFID Chip

Development Unit

TD Sensor/ID Chip

Toner Attraction Pump

- **To supply toner, the toner bottle is rotated.**

- **The toner goes down a tube, and is pulled into the development unit by the toner attraction pump.**

- **The toner end sensor is attached to the tube, just after the outlet from the bottle.**

B222 service manual, Detailed Section Descriptions, Toner Supply, Overview

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

Toner Bottle Rotation
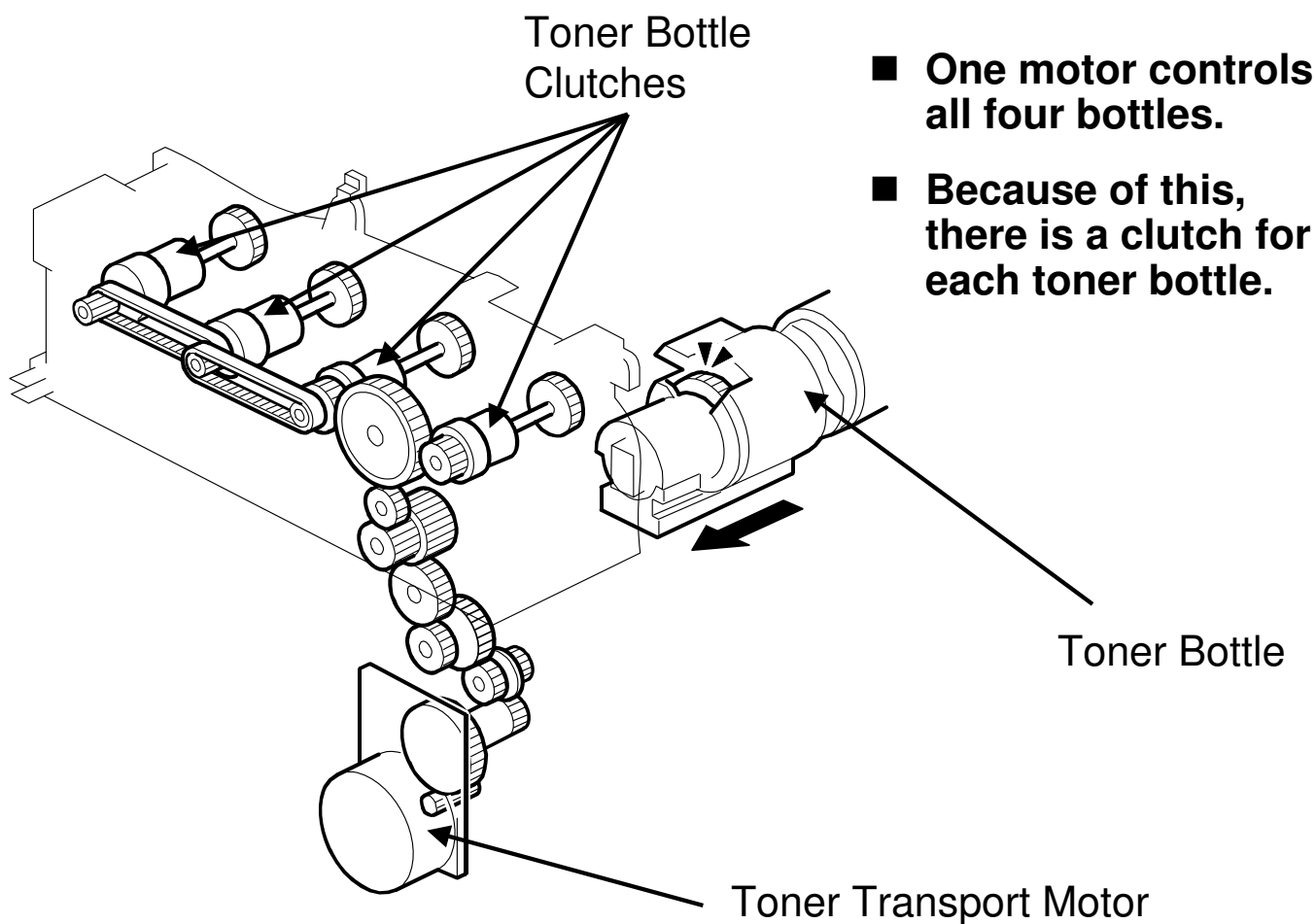
Toner Bottle
Clutches

- **One motor controls all four bottles.**

- **Because of this, there is a clutch for each toner bottle.**

Toner Bottle

Toner Transport Motor

❐ The name of the clutch is the 'toner bottle clutch'. The toner supply clutches control the toner attraction pumps, as we shall see later.

Toner Bottle

Transport Tube

Shutter

Toner Bottle
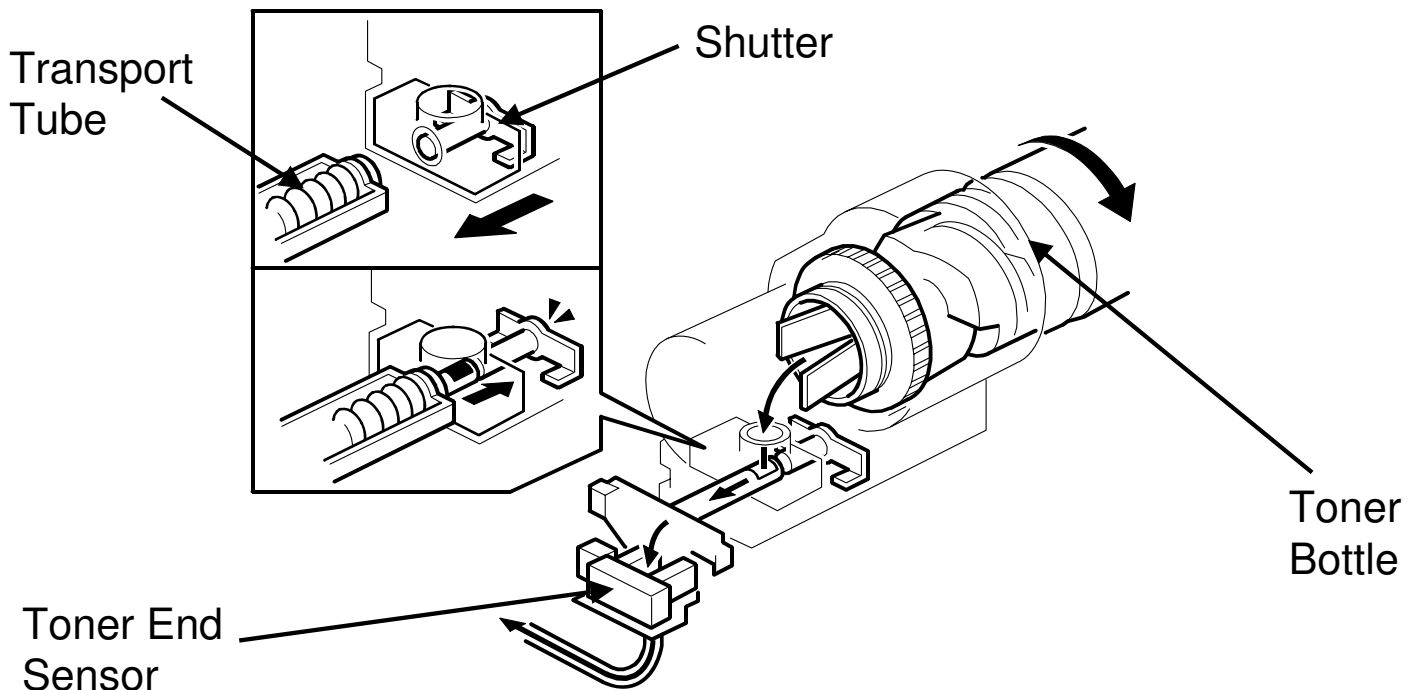
Toner End Sensor

- **When the toner bottle is installed, the transport tube pushes the shutter. This opens the bottle, and toner can leave the bottle.**

- **The spiral grooves in the bottle help to feed toner out of the rotating bottle.**

- **The toner goes through the toner end sensor.**

B222 service manual, Detailed Section Descriptions, Toner Supply, Toner Supply Mechanism

❐ This slide shows how toner is supplied from the toner bottle.
❐ Toner near-end and end detection were discussed in the Process Control section of the course.

Toner Attraction Pumps

Toner Transport
Motor

Toner Supply
Clutches
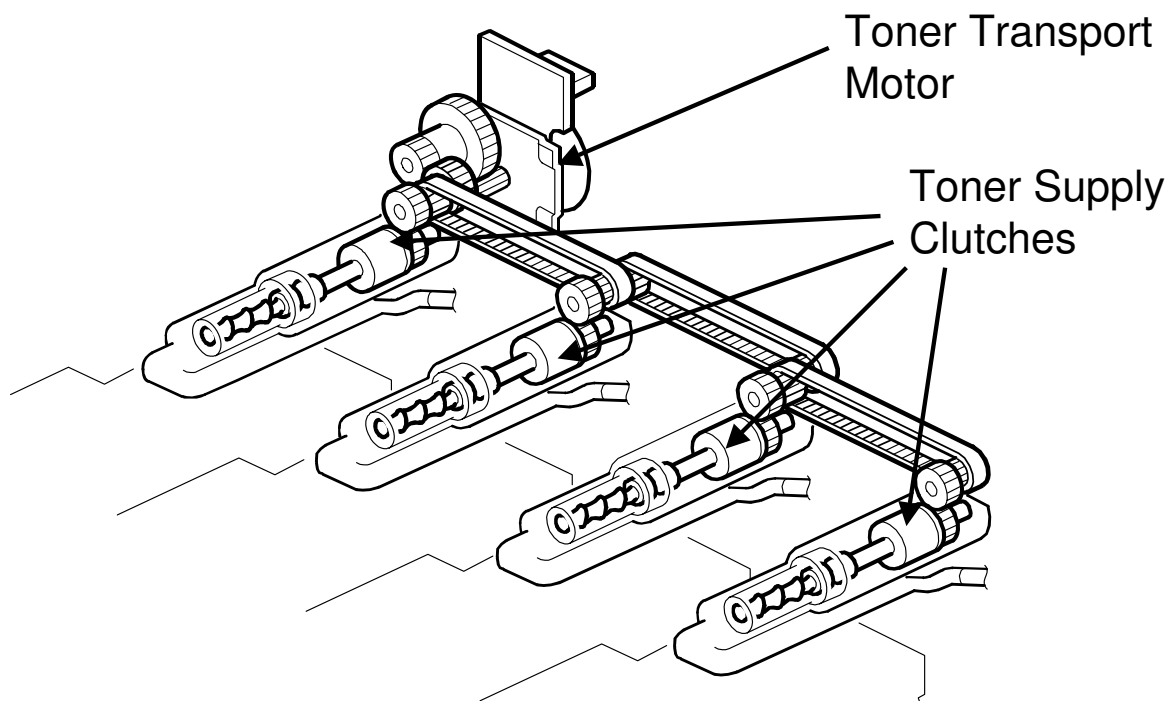
■ **One motor controls all four pumps.**

■ **Because of this, there is a clutch for each pump.**

B222 service manual, Detailed Section Descriptions, Toner Supply, Toner Supply
Mechanism

❒ This is the same motor that rotates the toner bottles.

Pump Mechanism

Toner Supply
Clutch

Tube (From the
Toner Bottle)

Rotor

Shutter
(Pump)

Shutter
(Development Unit)
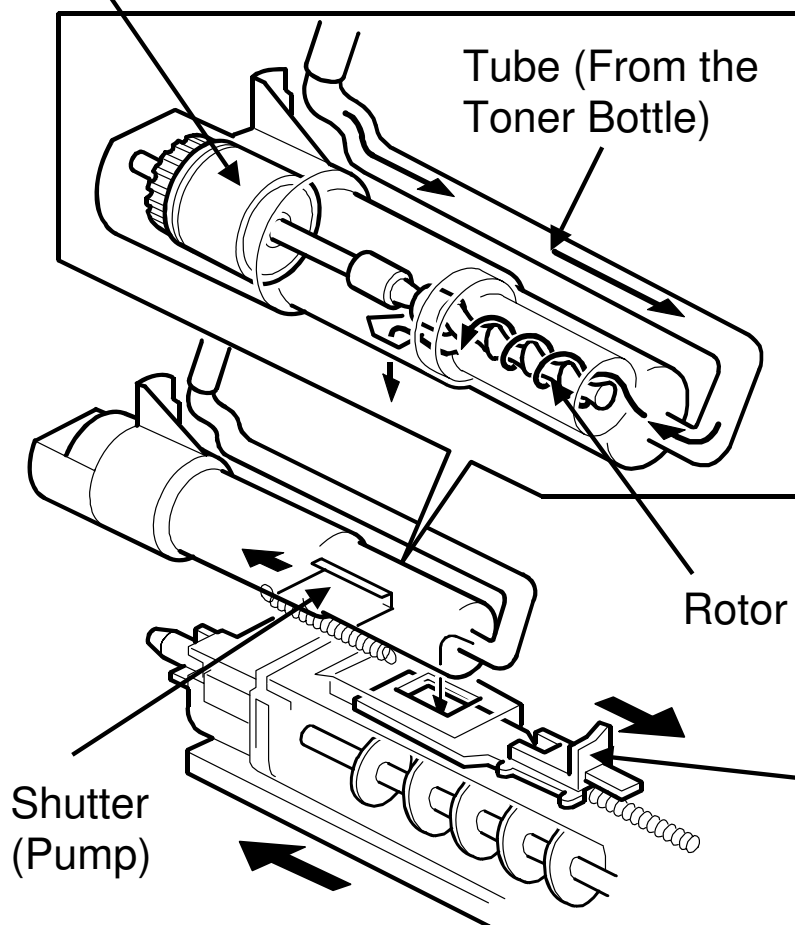
- **The pump pulls toner in from the toner bottle and drops it into the development unit.**

- **The shutter on the pump opens when the PCU is installed in the machine.**

  - At the same time, the pump pushes open the shutter on the development unit.

B222 service manual, Detailed Section Descriptions, Toner Supply, Toner Supply Mechanism

❒ The four pumps are the same.
❒ Springs close the two shutters when the PCU is pulled out of the machine.

Radio Frequency ID Chip

RFID Chip
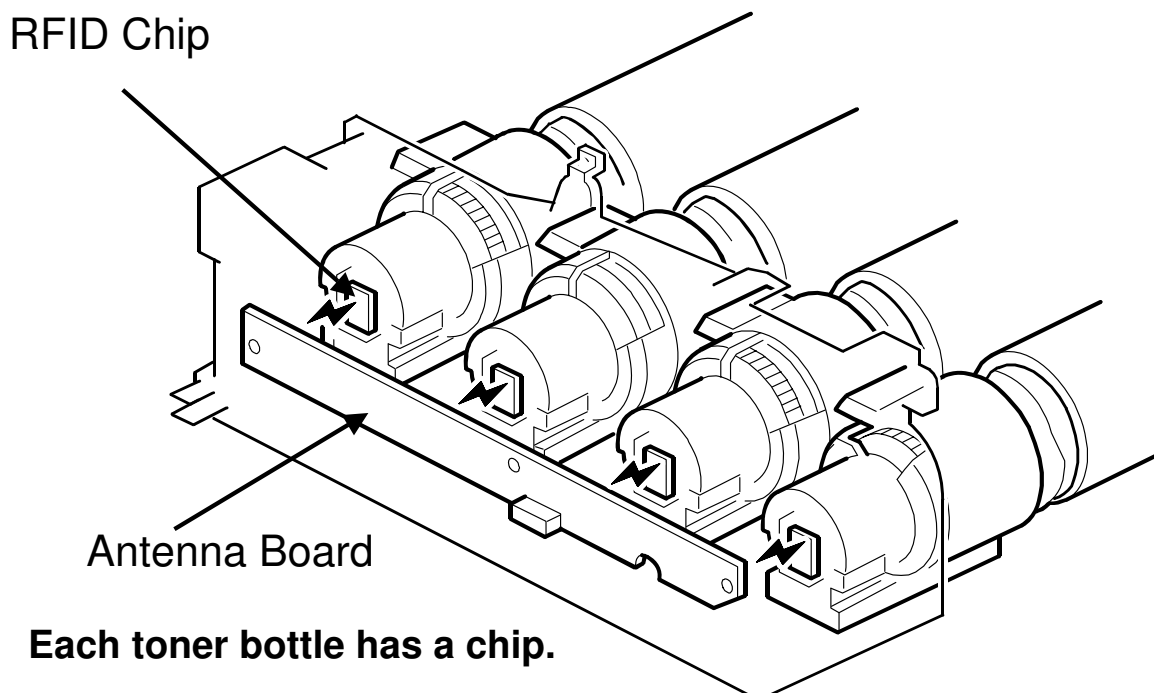
Antenna Board

- ■ **Each toner bottle has a chip.**

    - ● This chip contains data on the amount of toner consumed from the bottle, and is used for toner bottle detection (the machine uses it to detect if the bottle installed or not).

- ■ **It sends its data to the RFID antenna board.**

- ■ **There is no electrical contact. The data is sent by wireless communication.**

B222 service manual, Detailed Section Descriptions, Toner Supply, Toner Cartridge

❒ The chip stores the time for the toner supply clutch, not the toner bottle clutch.

❒ The toner supply clutch controls the amount of toner that is transferred. The toner bottle clutch only rotates the bottle.

Radio Frequency ID Chip Diagram

BiCU

eSOC

IOB

TRIO2-1

TRIO2-2

INT

RESET

TxD

RxD

Tag

Antena Board

Antena

CPU
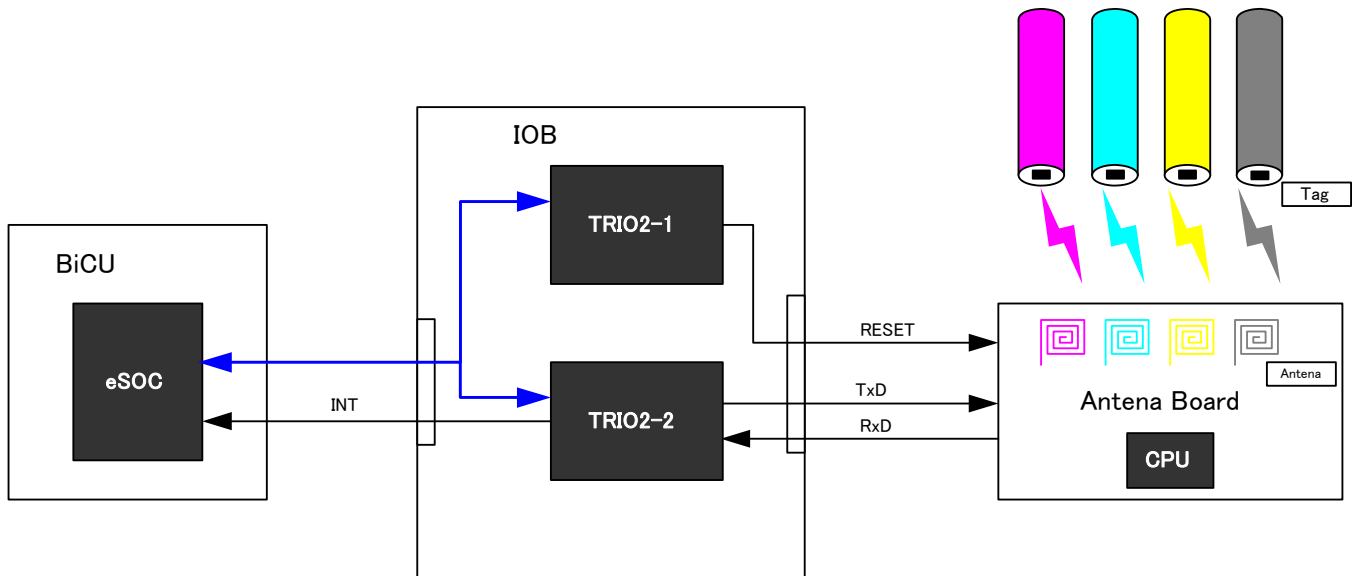
❒ Here is a schematic diagram of the RFID circuit.

Replacement

■ Do the following procedures

- ● B222 Service Manual, Replacement and Adjustment, Image Creation

  - • Do the Toner Supply Tube Fan, Toner Pump Unit, and Toner End Sensor procedures.

■ Toner Supply Tube Fan

- ● When you install the new fan, make sure that the decal faces the rear of the machine.

■ Toner Pump Unit

- ● Use a sheet of paper as described in the manual.

  - • This sheet of paper prevents toner and screws from falling into the laser optics housing unit through cutouts in the frames.

- ● There are many notes and cautions in this procedure. Follow them carefully.

SP Modes

- **3045: Disables the toner end alert on the display panel.**

- **3101 005 to 008: Displays the consumed amount of each color toner, calculated by toner pump activation**

- **3101 009 to 012: Displays the remaining amount of each color toner, calculated by toner pump activation**

- **3101 028 to 031: Displays the consumed amount of each color toner, calculated by pixel count**

- **3101 032 to 035: Displays the remaining amount of each color toner, calculated by pixel count**

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APOLLON-C1 TRAINING

WASTE TONER COLLECTION

❏ In this section, the mechanical components of the toner supply system will be described.

❏ Toner supply control was explained in the Process Control section of the course.

From the PCUs

Toner Transport Motor

Toner Collection Bottle

Coil

Waste Toner from the PCUs

- **Waste toner from the four PCUs falls onto a coil.**

  - The toner transport motor drives this coil.

- **This coil moves the waste toner to the toner collection bottle.**
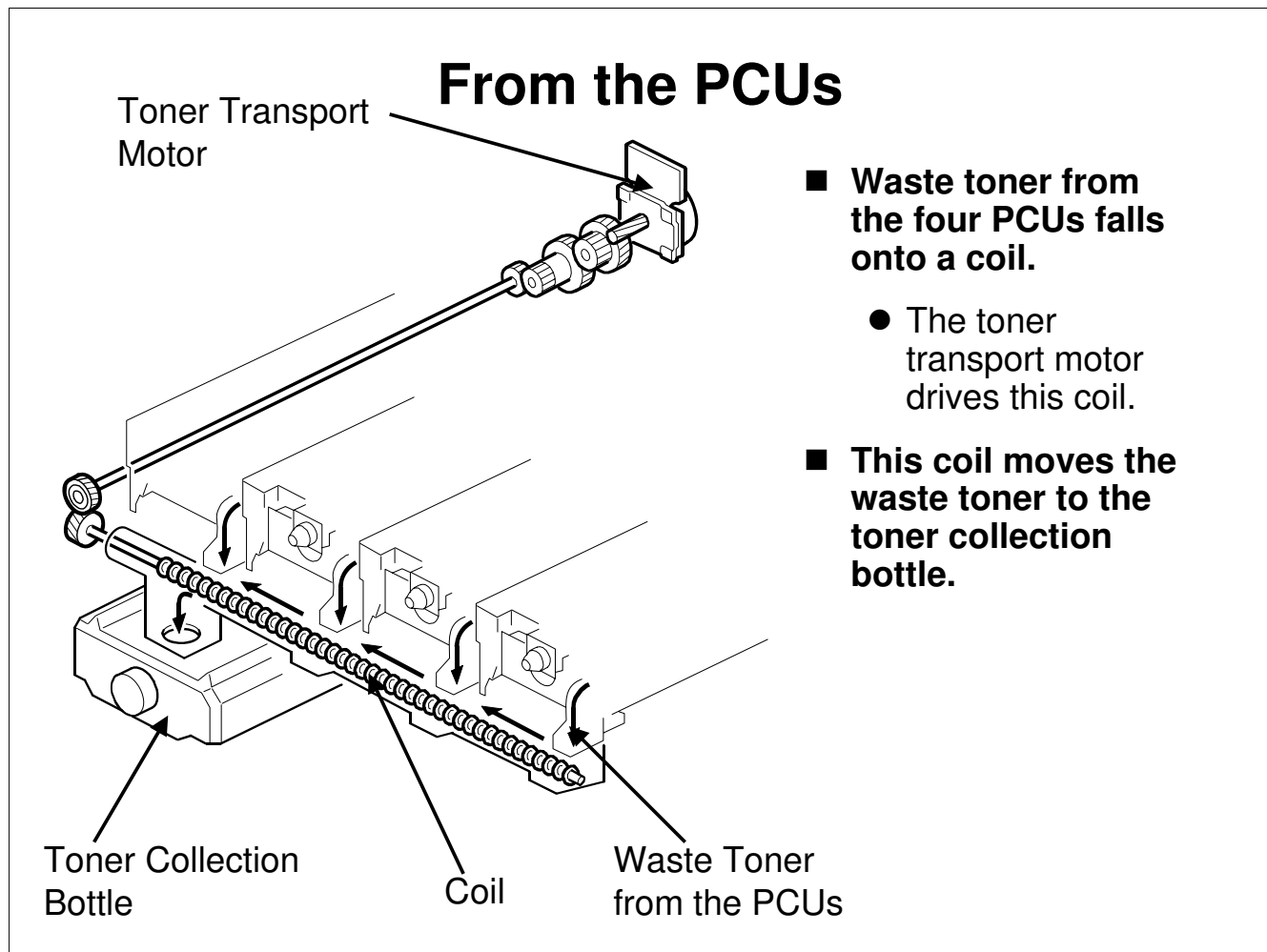
B222 service manual, Detailed Section Descriptions, Waste Toner Collection, Toner Collection Path and Drive

❐ For details on how waste toner is collected inside the PCUs, see the PCU section of the course.

❐ The PCUs are from left to right: Y, C. M, K

From the Image Transfer Belt

Toner Transport
Motor

Waste Toner
from the Transfer Belt
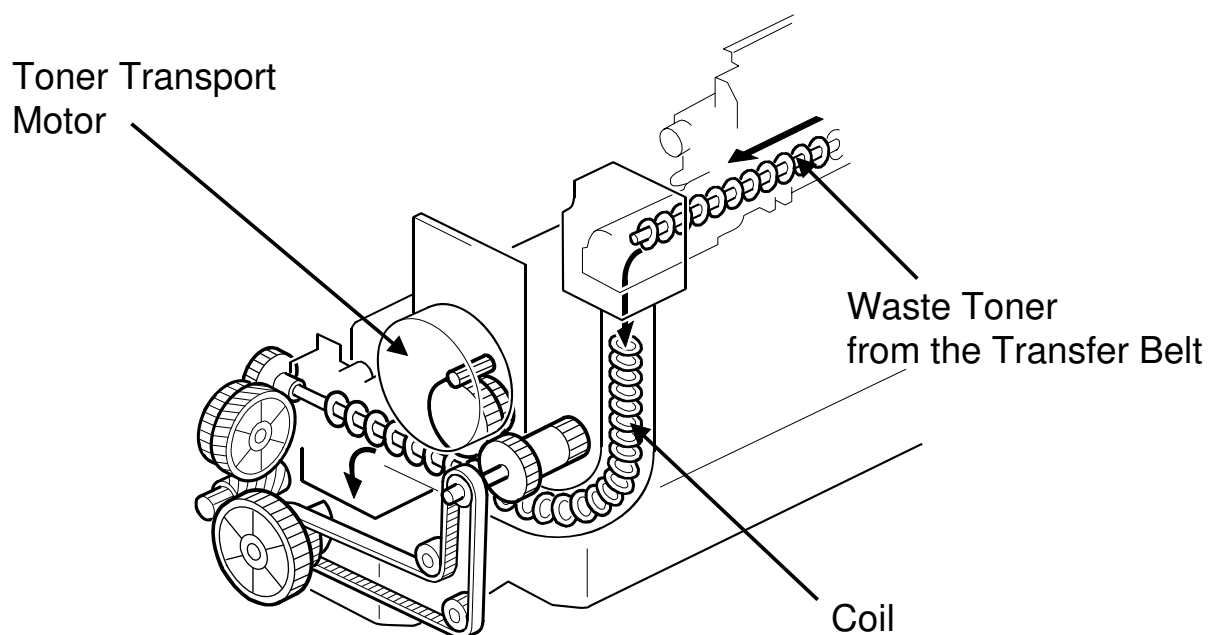
Coil

■ **Waste toner from the transfer belt falls into a coil.**

● The toner transport motor drives this coil.

■ **This coil moves the waste toner to the toner collection bottle.**

*B222 service manual, Detailed Section Descriptions, Waste Toner Collection, Toner
Collection Path and Drive*

❒ For details on how waste toner is collected inside the transfer unit, see the Transfer
section of the course.

Toner Distribution in the Bottle

Toner Transport
Motor
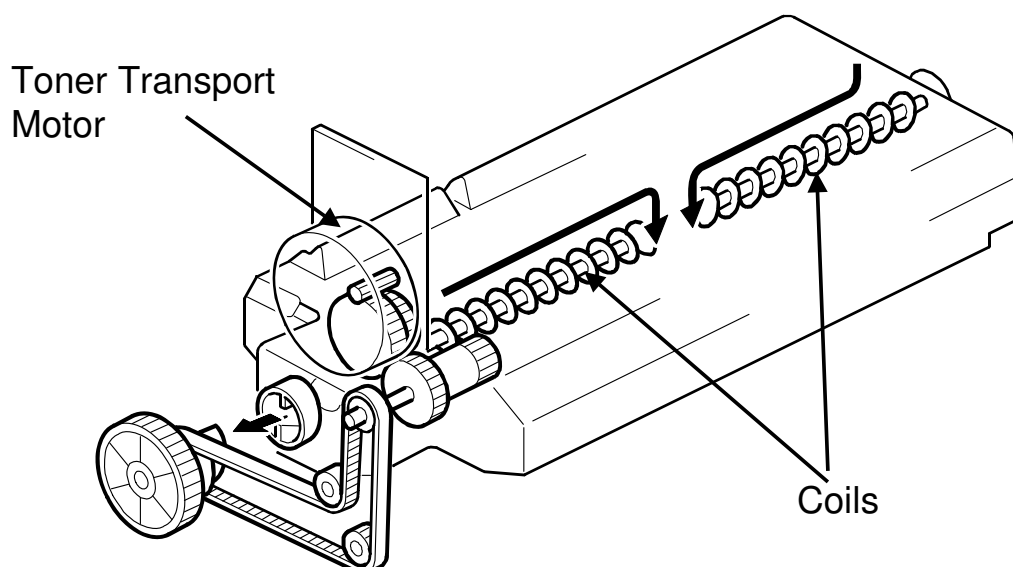
Coils

■ **The two coils in the bottle distribute the toner evenly inside the toner collection bottle. This makes sure that toner does not pile up at the ends of the bottle.**

● The toner transport motor drives the coils.

■ **This is necessary because the waste toner from the PCUs comes in at one end of the bottle and the waste toner from the transfer belt comes in at the other end.**

B222 service manual, Detailed Section Descriptions, Waste Toner Collection, Toner Collection Path and Drive

❒ The coils pull the toner in from the ends of the bottle and move it to the center.

❒ This makes sure that toner does not pile up at the ends of the bottle.

❒ The toner transport motor is a <u>very busy motor</u>.

Toner Bottle Detection/Full Detection
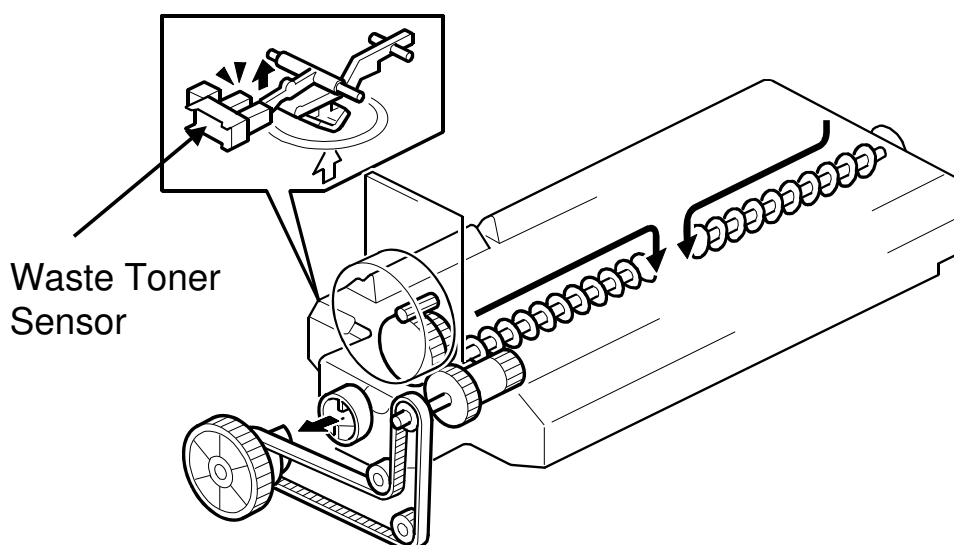
Waste Toner
Sensor

■ **A projection on the bottle activates the bottle set switch (at the rear of the machine).**

■ **When the waste toner sensor detects the actuator, the 'near-full' 'condition occurs.**

■ **The machine can make 500 more copies. Then the 'full' condition occurs and the machine stops.**

B222 service manual, Detailed Section Descriptions, Waste Toner Collection, Toner Bottle Detection/Full Detection

❒ The bottle set switch mechanism is not shown. It is at the rear of the machine (same as the waste toner sensor).

➢ Show the projection on the bottle to the class. Also, go to the machine and show them the sensor, inside the machine at the rear.

Replacement

■ **Do the following procedures**

● B222 Service Manual, Replacement and Adjustment, Image Creation

- Do the Toner Collection Bottle procedure.

■ **Notes**

● If you replace the bottle after the machine detects that it is full or near-full, the machine automatically resets the PM counter for the bottle after replacement.

● But, if you replace a bottle that is not full or near-full, then you must reset the PM counter for this unit. To do this, set SP 3902 017 to 1 before you start to work on the machine.

SP Modes

- ■ **3800: Displays some data concerning the toner collection bottle**

- ■ **3900: Disables bottle-full detection for the toner collection bottle**

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APOLLON-C1 TRAINING

TRANSFER

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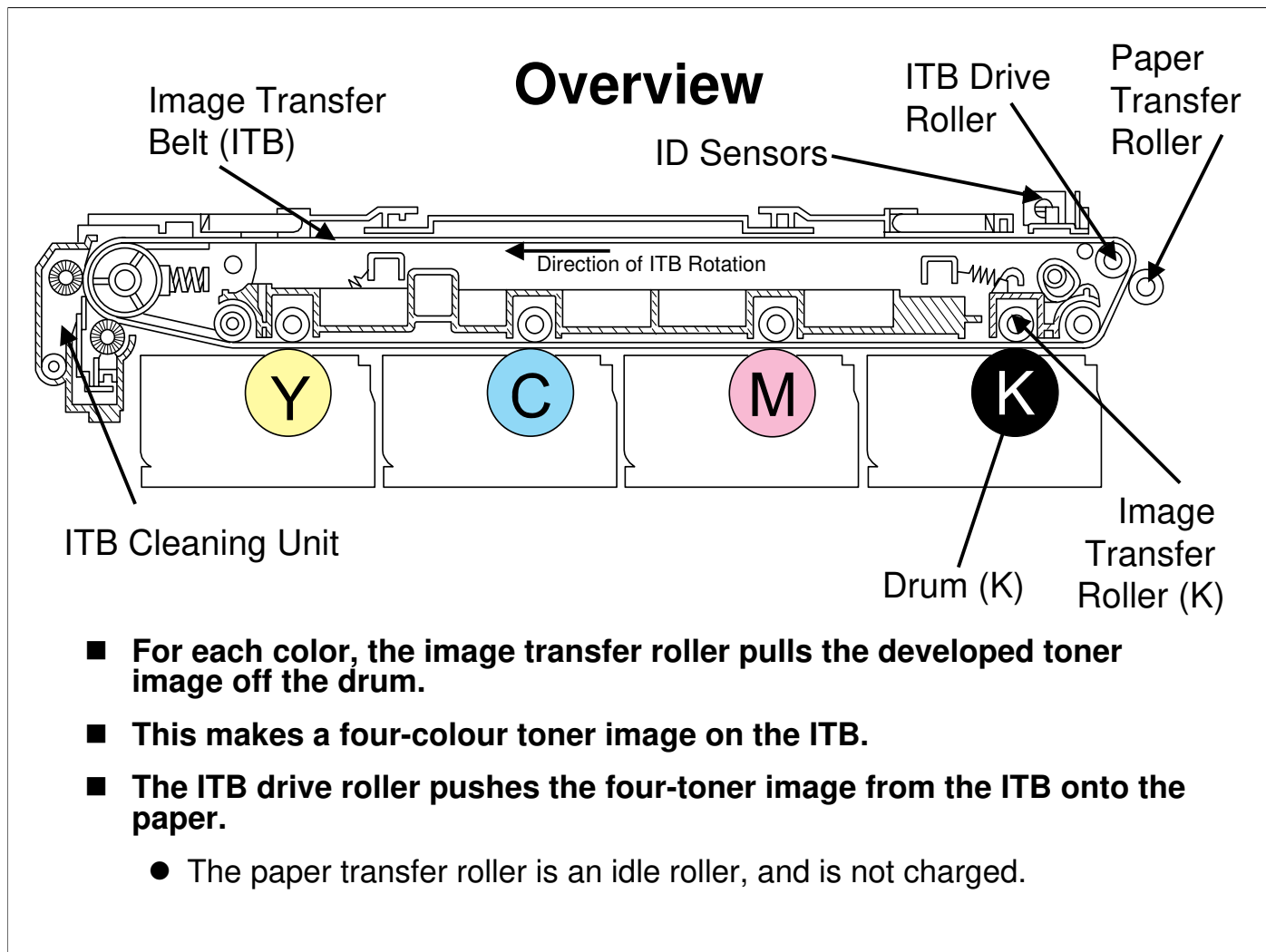
Overview

Image Transfer Belt (ITB)

ITB Drive Roller

Paper Transfer Roller

ID Sensors

Direction of ITB Rotation

Y   C   M   K

ITB Cleaning Unit

Drum (K)

Image Transfer Roller (K)

- **For each color, the image transfer roller pulls the developed toner image off the drum.**

- **This makes a four-colour toner image on the ITB.**

- **The ITB drive roller pushes the four-toner image from the ITB onto the paper.**

  - The paper transfer roller is an idle roller, and is not charged.

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Image Transfer, Overview

❒ All four colour toners are pulled onto the ITB on the same rotation of the ITB.

❒ The paper transfer roller does not pull the toner off the ITB. In this machine, the ITB drive roller pushes the toner off the ITB and onto the paper.

❒ Used toner collected by the ITB cleaning unit goes to the used toner collection bottle.
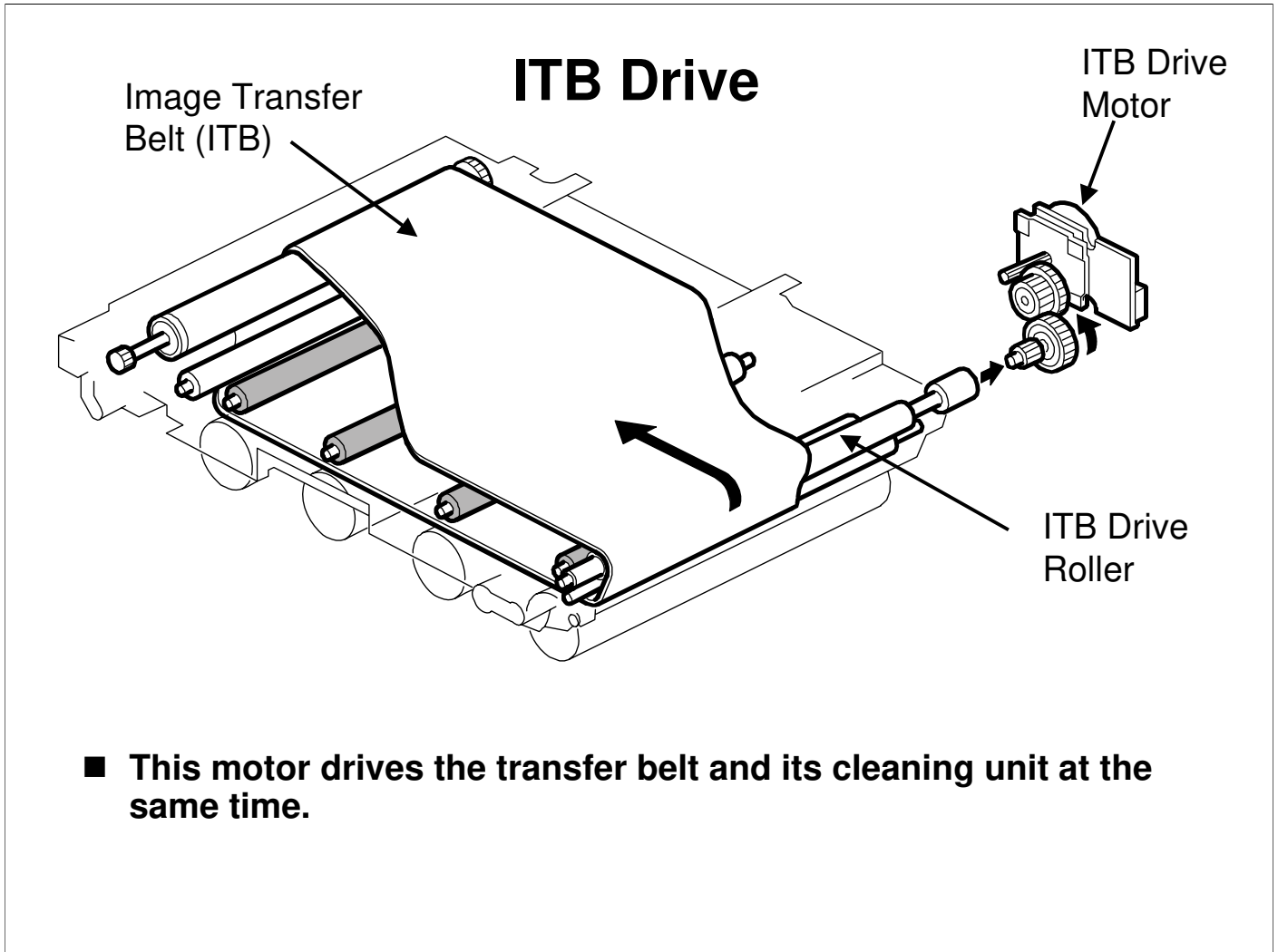
ITB Drive

Image Transfer
Belt (ITB)

ITB Drive
Motor

ITB Drive
Roller

■ **This motor drives the transfer belt and its cleaning unit at the same time.**

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation,
Image Transfer, ITB Drive

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

Speed Control
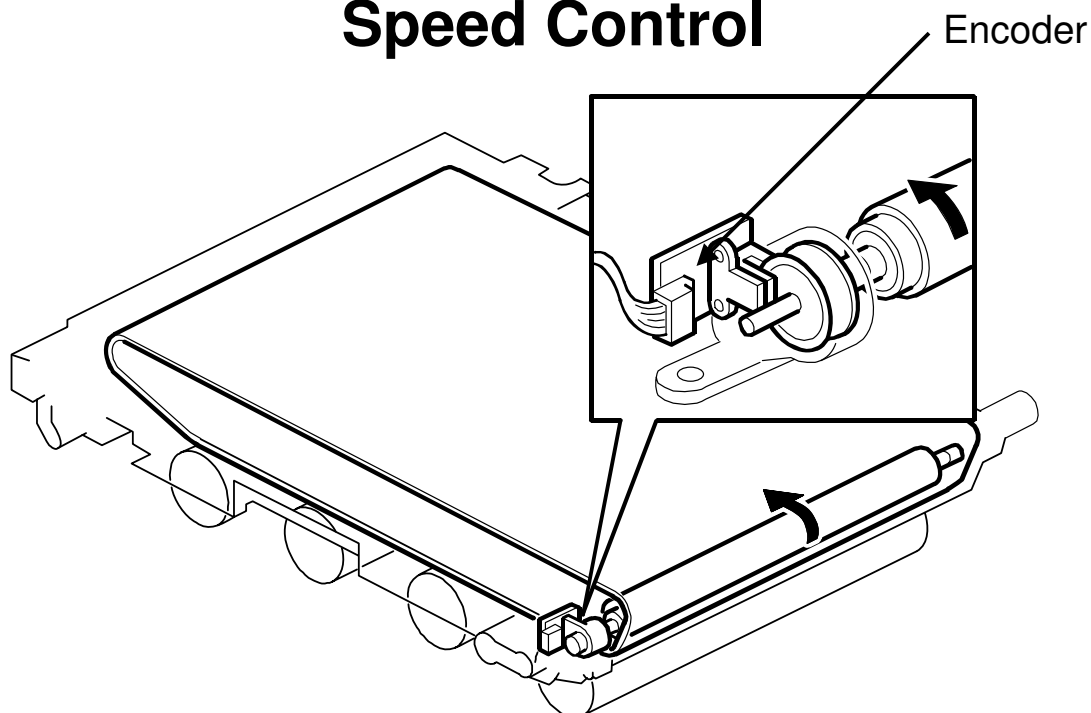
Encoder

- **The encoder monitors the belt speed.**

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

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation,
Image Transfer, ITB Drive

❏ The speed of the belt depends on the process speed (see 'Process Speeds' in the Machine Overview section of the course).

❏ The machine ignores unusually high or low readings from the encoder that exist only for a short time.

  ➢ The service manual shows this in more detail.

Current Supplied to the ITB

Grounding
Roller

Image Transfer
Rollers
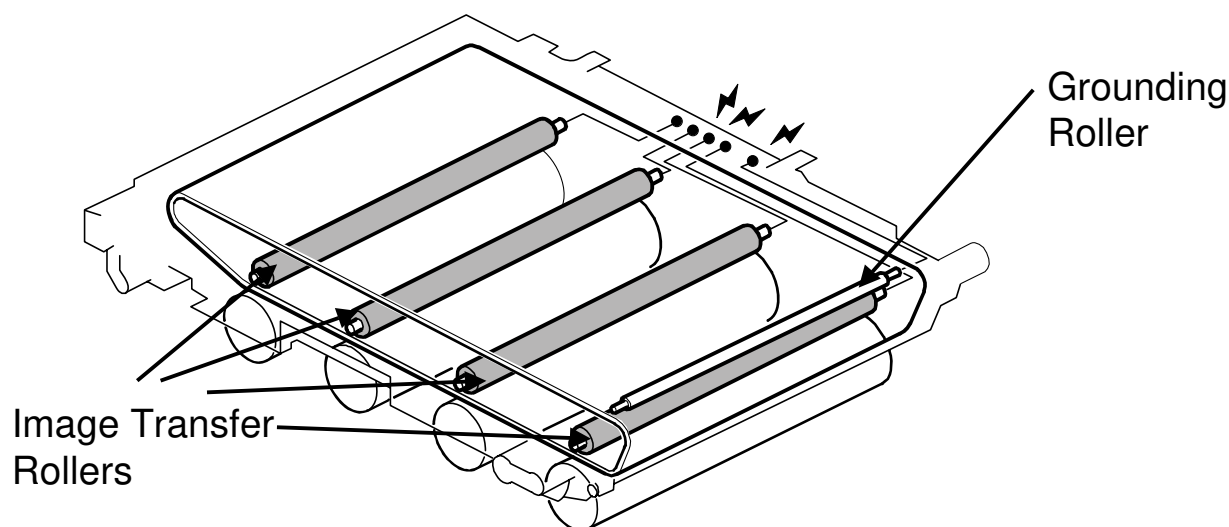
- **The image transfer rollers pull the toner off the drum.**

- **The grounding roller grounds the transfer belt.**

- **The terminals from the high voltage supply board come in at the rear of the ITB unit.**

- **The current is automatically corrected for paper size, temperature, and humidity.**

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Image Transfer, ITB Current

❒ The temperature/humidity sensor is at the rear lower right side of the machine. See the component layout diagrams.

❒ We will look at the supply to the ITB drive roller again later in this section.

Cleaning Brush **Transfer Belt Cleaning**
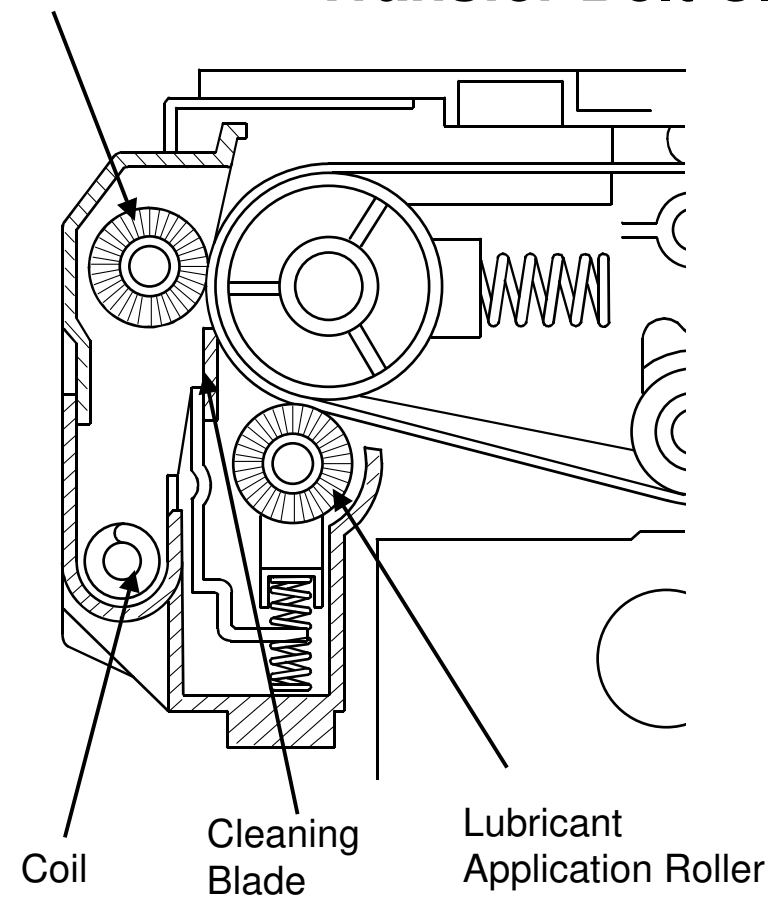
- **The cleaning brush loosens toner that remains on the ITB after transfer.**

- **The blade scrapes this toner off the belt.**
  - This toner falls onto a collection coil, and is discarded.

- **At 0.5 seconds after the end of the job, the image transfer belt motor reverses for 30 ms.**
  - This removes toner at the edge of the cleaning blade.

Coil

Cleaning Blade

Lubricant Application Roller

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Image Transfer, Transfer Belt Cleaning

❒ The waste toner collection bottle and collection mechanism were described in an earlier section.
❒ The reverse rotation at the end of the job is controlled by SP2903 and 2904 (do not adjust, DFU).
  ➢ It is also done for the OPCs at the same time, for the same purpose.

Transfer Belt Cleaning Drive

Gear

Cleaning
Brush

Coil

Lubricant Application
Roller
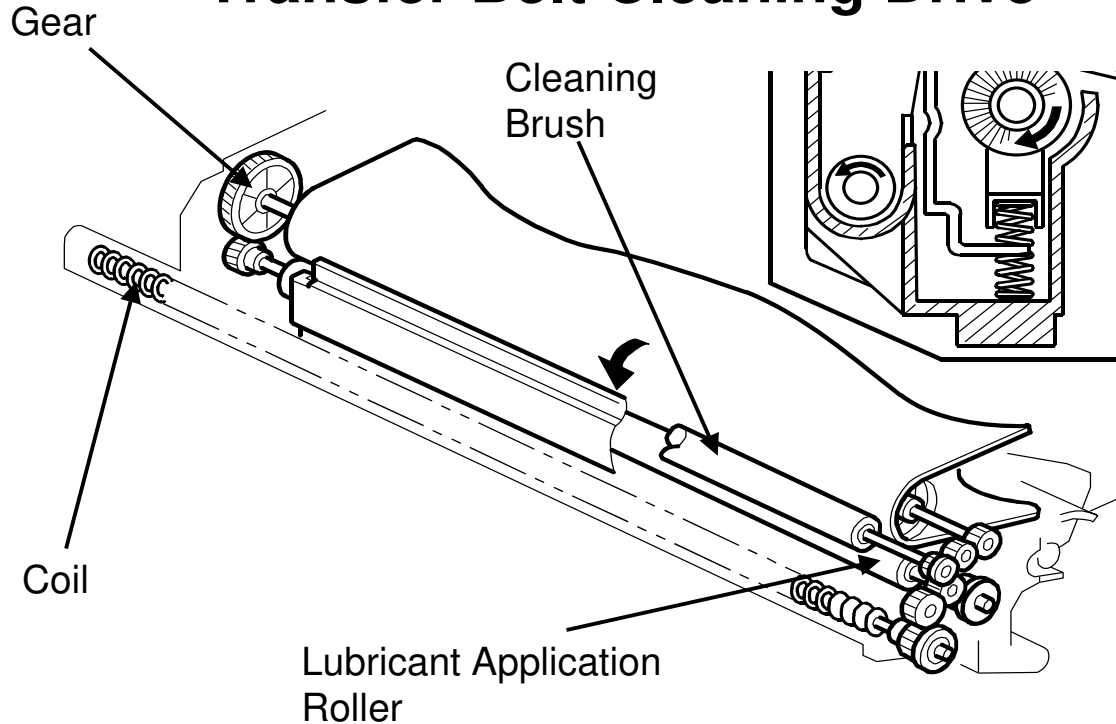
■ **The ITB drive motor drives the cleaning unit components
through a gear at the rear left.**

*B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation,
Image Transfer, Transfer Belt Cleaning*

❒ This shows how the gear at the rear left of the transfer belt drives the cleaning unit..

ITB Contact and Release - 1

Cam — ITB Contact Sensor

ITB Contact Motor
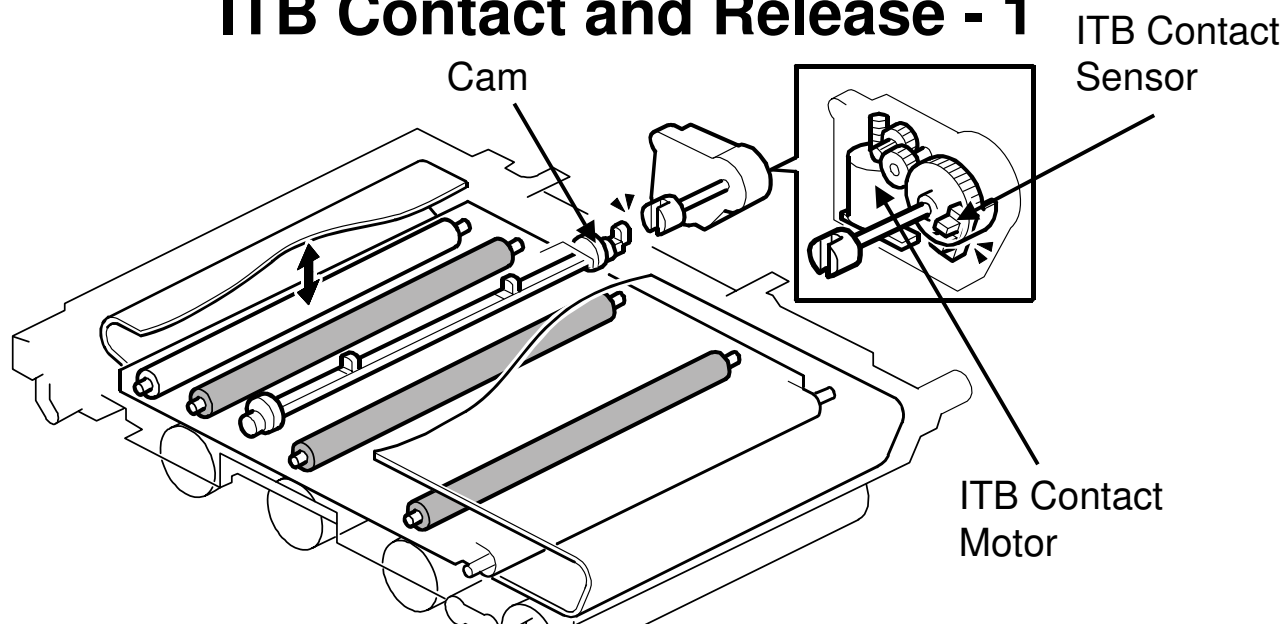
- **The belt always contacts the K drum.**

    - To move the belt away from the K drum, turn the release lever counterclockwise. Do this to remove the transfer belt unit, or you will damage the K drum.

- **The belt contacts the CMY drums for color printing only.**

    - If a black-and-white page comes in the middle of a colour job, the belt does not move away from the CMY drums.

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Image Transfer, ITB Contact

❐ This mechanism makes the drums and transfer belt life longer.

❐ If a black-and-white page comes in the middle of a colour job, the belt does not move away from the CMY drums.

   ➤ This keeps the printing speed at the maximum, because it takes time for the motor to move the belt up and down.

   ➤ This operation can be changed by adjusting SP 2907 001, as shown on the next slide.

❐ If a color page appears in the same job after black-and-white pages, the machine waits until the previous page has left the transfer unit. Then it moves the belt up against all four drums.

❐ The ITB contact sensor detects the status of the ITB (contacting K only, or contacting all four drums).

ITB Contact and Release - 2

- **SP 2907 001: Default setting is zero**

  - If a black-and-white page comes in the middle of a colour job, the belt does not move away from the CMY drums.

- **Change the SP to 1:**

  - The belt moves away for the first black-and-white print in the middle of a colour job.

  - This is essentially the same as the default setting.

- **Change the SP to 2:**

  - The belt moves away for the second consecutive black-and-white print in the middle of a colour job.

  - It does not move away for the first black-and-white print.

- **Change the SP to 3:**

  - The belt moves away for the third consecutive black-and-white print in the middle of a colour job.

  - It does not move for the first or second black-and-white print.

This shows how the machine can be set up for different operations when black-and-white prints come in the middle of a set of color pages.
- ❐ If you change the SP to a higher value, the machine will operate faster, but there will be more wear and tear on the color drums.
  - ➢ It takes about 2 seconds to move the ITB away from the colour drums, and about 5 seconds to move the ITB into contact with the colour drums.

For colour pages, the ITB always contacts all drums. If one colour page comes in the middle of a black-and-white job, the ITB immediately moves into contact with the color drums. SP 2907 has no effect in this case.

ITB Contact and Release - 3

Cam

ITB Contact
Sensor
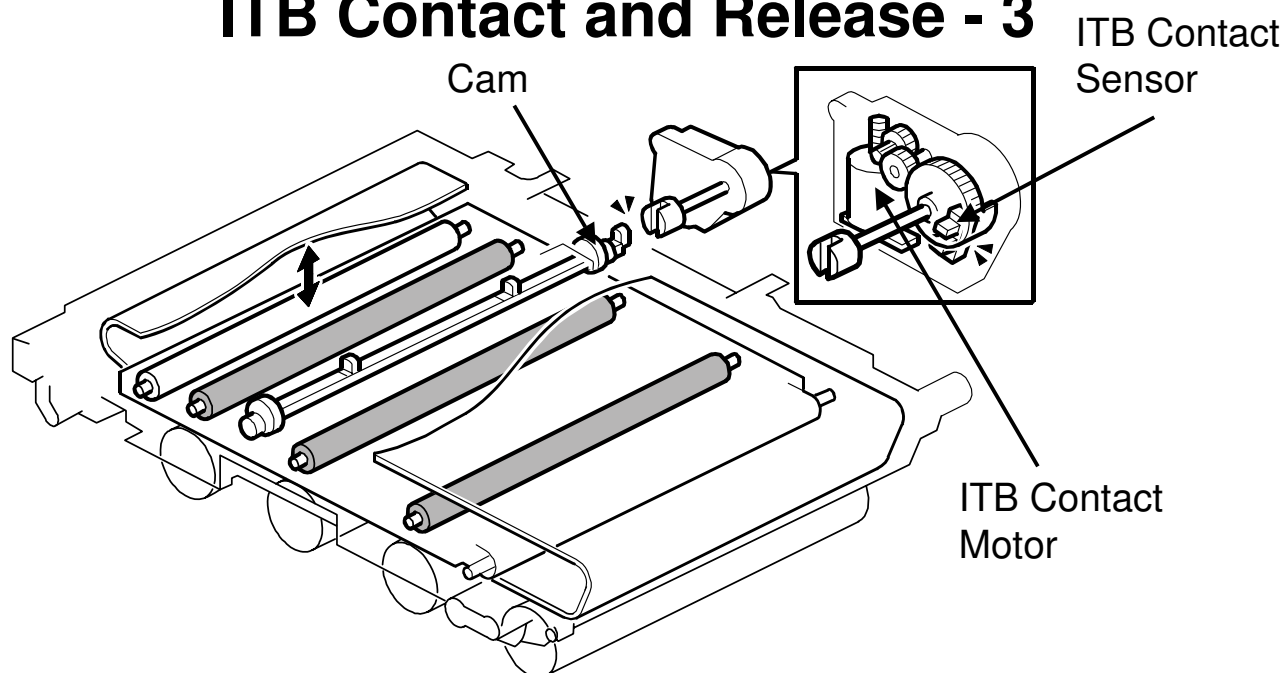
ITB Contact
Motor

■ **The motor moves the left end of the belt up and down, through a cam.**

- Up: The belt contacts all four drums
- Down: The belt contacts the K drum only

■ **The sensor detects when the belt contacts all four drums.**

- Sensor off: ITB contacts all drums

❏ The service manual explains how the sensor and motor operate to initialize the machine, and during different types of printing.

➢ See the 'Transfer Belt Sensor' section.

ITB Contact and Release - 4
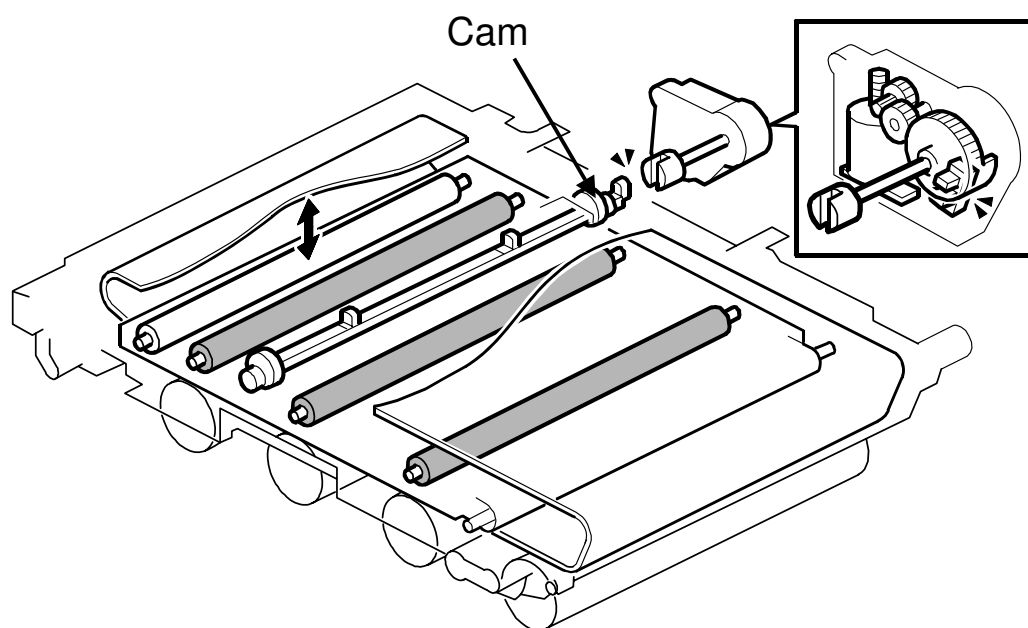
Cam

- ■ **If a power failure occurs with the belt touching all 4 drums, the belt stays in this position, and you cannot remove the ITB.**

- ■ **Open out the controller box, then turn the cam until the belt is fully lowered.**

Paper Transfer Unit
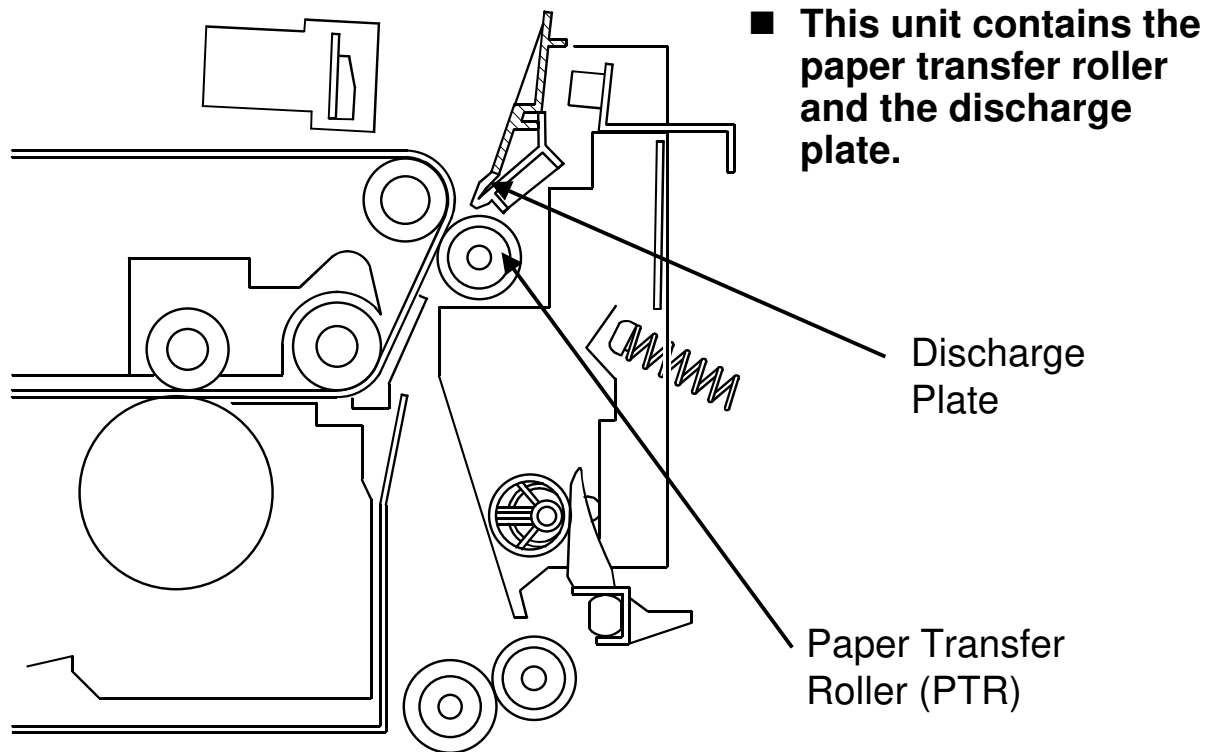
■ **This unit contains the paper transfer roller and the discharge plate.**

Discharge Plate

Paper Transfer Roller (PTR)

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Paper Transfer and Separation, Overview

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

PTR Mechanism

Discharge Plate

ITB Drive Roller

P.P

P.P

Paper

PTR
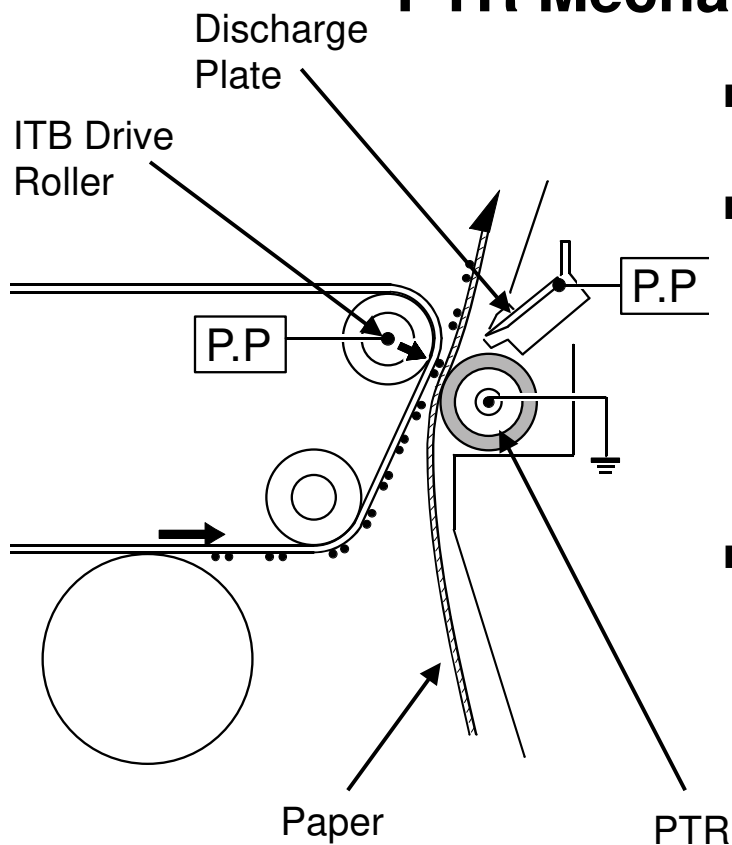
- **The PTR rotates by friction with the transfer belt.**

- **The ITB drive roller pushes the toner off the belt, and onto the paper.**

  - The PTR is grounded. It does not pull the toner off the belt, like in some models.

- **The discharge plate removes charge from the paper after it goes past the PTR.**

  - This makes the paper separate from the transfer belt.

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Paper Transfer and Separation, PTR Drive

❒ Note that there are two power packs (P.P. in the diagram).

  ➢ The high voltage supply board supplies the ITB drive roller. It also supplies the image transfer rollers above each drum.

   Image transfer rollers - positive charge

   ITB drive roller – negative charge

 ➢ The high voltage supply board – discharge plate supplies the discharge plate with ac and dc voltage.

Discharge Plate

PTR

GND

High Voltage
Supply Board –
Discharge
Plate
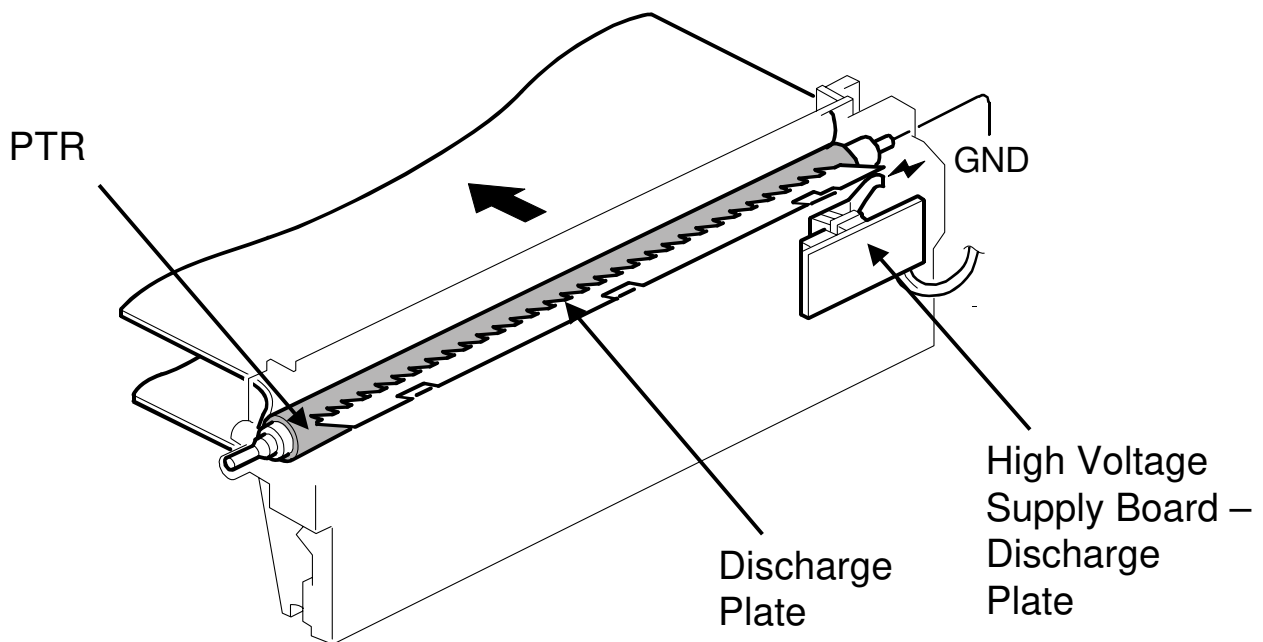
Discharge
Plate

- **The PTR is grounded.**

- **The high voltage supply board – discharge plate supplies ac and dc to the discharge plate.**

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation, Paper Transfer and Separation, PTR Drive

PTR Contact Mechanism

PTR
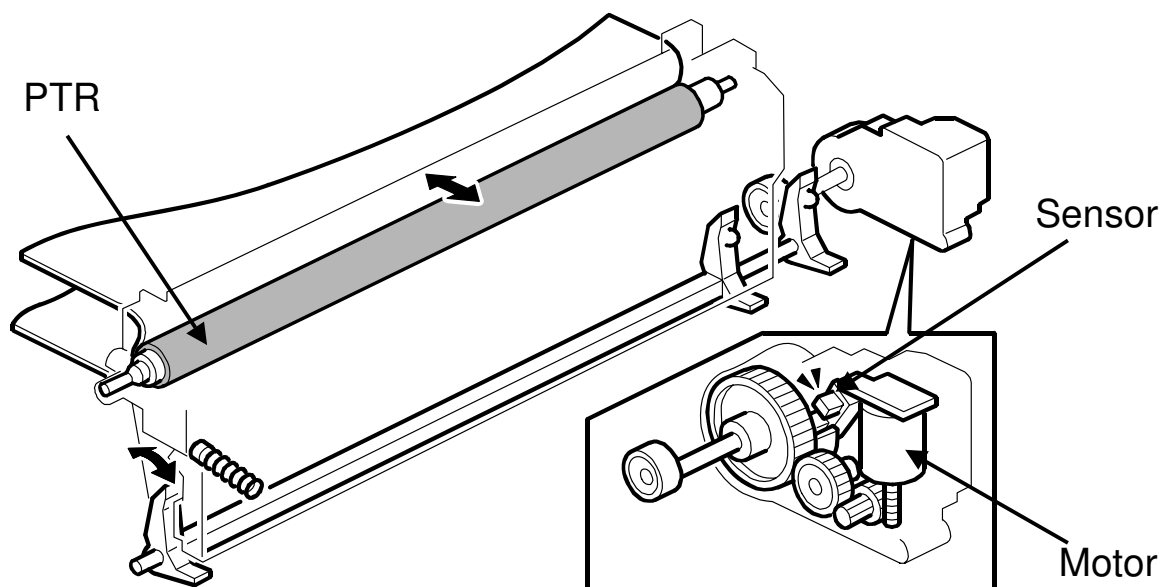
Sensor

Motor

■ **Paper transfer roller contact motor: Moves the PTR into contact and away from the transfer belt, through a spring.**

■ **Paper transfer roller HP sensor: Detects when the PTR contacts the transfer belt.**

■ **The PTR contacts the transfer belt at all times, except during line position adjustment and process control.**

B222 service manual, Detailed Section Descriptions, Image Transfer and Paper Separation,
Paper Transfer and Separation, PTR Contact and Separation

❒ During line position adjustment and process control, patterns are developed on the transfer belt. The PTR is moved away from the belt at this time, or the PTR will remove the patterns before they get to the ID sensors.

New Unit Detection

- **The new unit contains a fuse, that blows a short time after the new unit is installed.**

  - If the machine detects an intact fuse, followed shortly by a blown fuse, the machine automatically detects the new unit and resets the counters.

  - This is necessary because in Japan, the transport company staff may replace the unit, depending on the service contract.

- **If individual components of the ITB unit are replaced, and not a complete unit, the machine does not detect them automatically.**

  - If you replace the cleaning unit, you must reset the PM counter for this unit. To do this, set SP 3902 015 to 1 before you start to work on the machine.

Temperature and Humidity Settings

■ **The image transfer, paper transfer, and separation plate currents are affected by temperature and humidity.**

- The machine uses readings of ambient temperature and humidity (relative humidity) to calculate the absolute humidity.

- Then the machine adjusts the currents based on the calculation.

❒ These temperature and humidity readings are also used by process control, as described in the Process Control section of the course.

Other Correction Factors (1)

■ **Paper width**

■ **Paper weight**

- Thin paper: 60 g/m^2 (16 lb)

- Normal plain paper: 60 – 81 g/m^2 (16 – 22 lb.)

- Middle Thick: 82 – 105 g/m^2 (22 – 28 lb.)

- Thick 1: 106 – 169 g/m^2 (28.5 – 44.9 lb.)

- Thick 2: 170 – 219 g/m^2 (45 – 58 lb.)

- Thick 3: 220 – 253 g/m^2 (58.5 – 67 lb.)

❐ Some of these corrections can be adjusted. The adjustments will be explained at the end of this section, in the SP mode slides.

Thin paper

❐ This machine does not support thin paper.

❐ 'Thin paper' is an additional paper weight setting that the user can select at the operation panel if the 'plain paper' setting causes problems.

  ➢ For example, if a certain type of paper is being curled because the fusing temperature is too high, then you can ask the customer to use the 'thin paper' setting.

  ➢ Then you can use SP mode to reduce the fusing temperatures that are used for the 'thin paper' setting.

  ➢ You can also change the transfer current settings, if the transfer of toner is insufficient.

Other Correction Factors (2)

■ **Print type (black-and-white, full colour)**

  ● For the image transfer, different currents are applied for each toner colour.

  ● Higher currents are applied for C and Y, because these two are applied last.

  ● K and M toner already on the paper mean that more current is needed to transfer the C and Y toners correctly.

■ **Leading and trailing edges**

  ● These may require a different current that the image area, to ensure that paper separates correctly.

■ **Side 1, Side 2 (duplex)**

❐ Some of these can be adjusted. The adjustments will be explained at the end of this section, in the SP mode slides.

Replacement – Image Transfer Unit (1)

- **Do the following procedures**

  - B222 Service Manual, Replacement and Adjustment, Image Transfer

- **Image Transfer Belt Unit**

  - The ITB is in contact with the K drum before you turn the switch off. Take care not to damage the K drum.

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

  - If the power failed in the middle of a colour job, with the ITB in contact with all four drums, then the belt touches all 4 drums, and you cannot remove the ITB.

    - Open out the controller box, then turn the cam until the belt is fully lowered. (see the next slide). After that, the ITB contacts the K drum only.

Cam for the Image Transfer Belt Unit
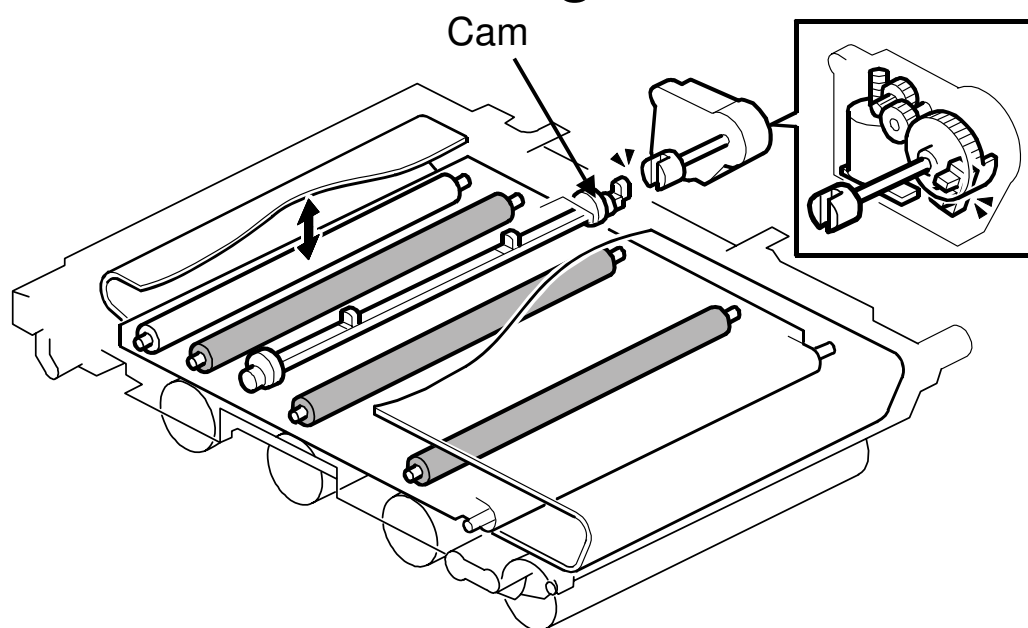
Cam

- ■ **If a power failure occurs with the belt touching all 4 drums, the belt stays in this position, and you cannot remove the ITB.**

- ■ **Open out the controller box, then turn the cam until the belt is fully lowered.**
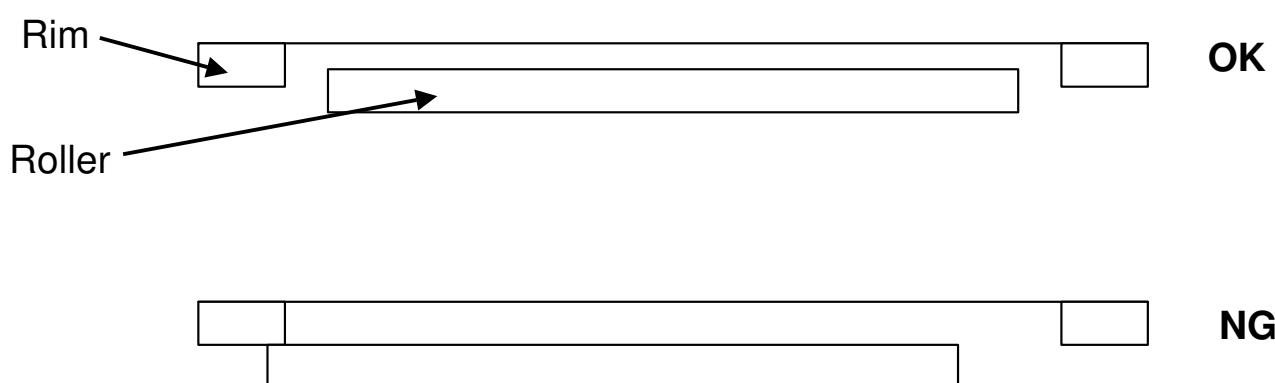
Replacement – Image Transfer Unit (2)

■ **Image Transfer Belt Cleaning Unit**

- If you will install a new belt cleaning unit, set SP 3902-015 to 1 before you turn off the power switch.

    - If you do this, then the machine will reset the PM counter for the belt cleaning unit automatically, after you turn the power on again.

    - Do not use SP3902 if you replace the complete ITB unit. This is because the new ITB unit has a new unit detection mechanism.

Replacement – Image Transfer Unit (3)

■ **Image Transfer Belt**

- ● When you install the belt, make sure that you clean the rollers and install it correctly, as explained in the service manual.

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

Rim

Roller

OK

NG

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

Replacement – Image Transfer Unit (4)

■ **Image Transfer Belt (continued)**

● The painted number on the belt must be at the rear side.

Replacement – Image Transfer Unit (5)

■ **Image Transfer Belt (continued)**

● Put "Lubricant Powder" (B132 9700) on the surface of the image transfer belt [A], while you turn the drive gear [B] at a constant speed, as shown.

• The straight arrow in the picture shows belt movement direction.

• Lubricant powder prevents the image transfer cleaning blade from turning up.
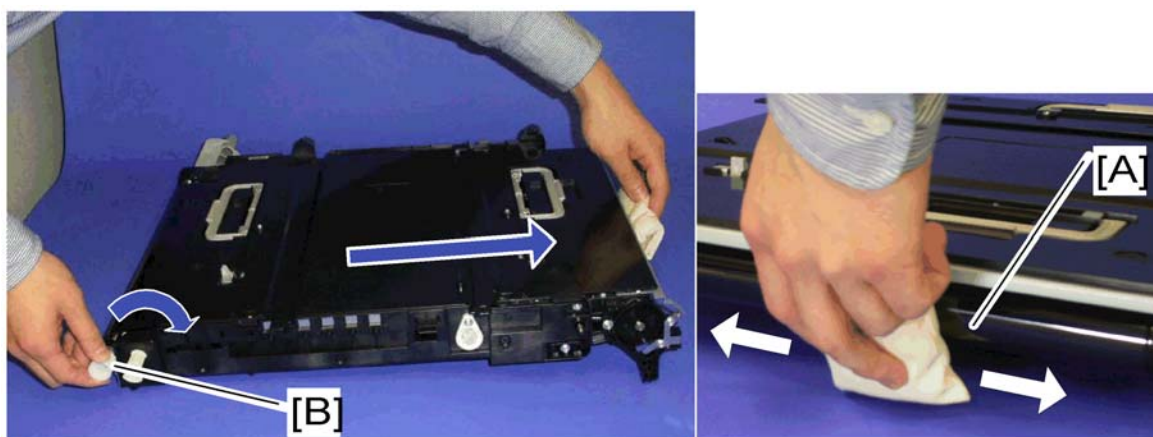
Replacement – Paper Transfer Unit

- ■ **Do the following procedures**

  - ● B222 Service Manual, Replacement and Adjustment, Paper Transfer

- ■ **Paper Transfer Roller Unit or Paper Transfer Unit**

  - ● If you will install a new unit, set SP 3902-016 to 1 before you turn off the power switch.

    - • If you do this, then the machine will reset the PM counter for the unit automatically, after you turn the power on again.

- ■ **ID Sensor Board**

  - ● Note the cleaning procedure (every 320k).

  - ● If you install a new board, input the values from the decal into SP 3362 as shown in the service manual.


```
✳SA150729001AX✳        SP3-362-016=0.212   SP3-362-013=1.00
                       SP3-362-017=0.234   SP3-362-014=1.11
                       SP3-362-018=0.256   SP3-362-015=0.99
```
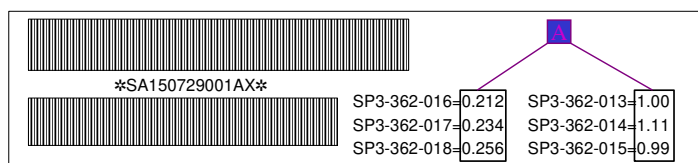
SP Modes – Temperature and Humidity Settings (1)

■ **SP 2241: Displays the current temperature and relative humidity, and the absolute humidity**

- This absolute humidity is now being used by the machine to correct the image and paper transfer currents.

- The machine uses a scale of 5 levels of absolute humidity, and applies the corrections that are set for that level.

  - The corrections can be adjusted with SP mode.

- These levels are called LL, ML, MM, MH, and HH.

SP Modes – Temperature and Humidity Settings (2)

- **SP 2302 003 to 006: These thresholds determine the thresholds between the five levels. Defaults are:**

  - Below 4.3 g/m^3: LL

  - 4.3 to 11.3 g/m^3: ML

  - 11.3 to 18 g/m^3: MM

  - 18 to 24 g/m^3: MH

  - Above 24 g/m^3: HH

- **SP 2302 002: This can be used to force the machine to detect one of the five levels**

  - The temperature and humidity sensors will not be used in this case.

❒ Process control uses different SPs to set the thresholds, as explained in the Process Control section of the course.

SP Modes – Paper Width Thresholds

- **The machine corrects the paper transfer current for paper width.**

- **There are five ranges for paper width. A different correction can be applied for each width.**

  - S1: 297 mm or more

  - S2: From 257 to 297 mm

  - S3: from 210 to 257 mm

  - S4: From 148 to 210 mm

  - S5: 148 mm or less

- **SP 2308: Controls the thresholds between the five paper width ranges.**

SP Modes – Image Transfer (1)

■ **2351: ITB current for black-and-white prints**

● There are settings for different paper weights.

■ **2357: ITB current for full color prints**

● There are settings for different paper weights, and for each toner colour.

■ **2381 to 2385: Corrections to the ITB current for absolute humidity**

● These corrections are applied to the values of SP 2351, 2357, and 2314.

❒ ITB: Image transfer belt

SP Modes – Image Transfer (2)

- **2311 001: Correction for ITB current for non image areas (applied between pages)**

- **2314: ITB current used for making ID sensor patterns**

- **2316 001: Current applied to the ITB immediately after power on or the cover open/closed**

<div style="border:1px solid">

SP Modes – Paper Transfer (1)

- **2403: Basic PTR current, plain paper, black-and-white prints**
- **2407: Basic PTR current, plain paper, full colour prints**
- **Corrections to 2403 and 2407:**
  - 2411: Corrections based on paper width, for size ranges S1 to S5
  - 2421: Corrections for the leading edge
    - 2422: Switchover timing from leading edge to main image area
  - 2423: Corrections for the trailing edge
    - 2424: Switchover timing from main image area to trailing edge.
  - 2431 to 2435: Corrections for absolute humidity (five ranges LL to HH)

</div>

❐ PTR: Paper transfer roller
❐ S1 to S5: Five paper width ranges, described earlier in this section.
❐ LL, ML, MM, MH, HH: Five humidity ranges, described earlier in this section.

Adjustments for other paper weights
❐ Thin paper
  ➢ Basic PTR current: 2453 (black-and-white), 2457 (colour)
  ➢ Paper width correction: 2461
  ➢ Leading edge correction: 2471 (switchover timing: 2472)
  ➢ Trailing edge correction: 2473 (switchover timing: 2474)
  ➢ Absolute humidity correction: 2481 to 2485
❐ Thick 1 paper
  ➢ Basic PTR current: 2502 (black-and-white), 2507 (colour)
  ➢ Paper width correction: 2511
  ➢ Leading edge correction: 2521 (switchover timing: 2522)
  ➢ Trailing edge correction: 2523 (switchover timing: 2524)
  ➢ Absolute humidity correction: 2531 to 2535
❐ Thick 2 paper
  ➢ Basic PTR current: 2553 (black-and-white), 2558 (colour)
  ➢ Paper width correction: 2561
  ➢ Leading edge correction: 2571 (switchover timing: 2572)
  ➢ Trailing edge correction: 2573 (switchover timing: 2574)
  ➢ Absolute humidity correction: 2581 to 2585
❐ OHP
  ➢ Basic PTR current: 2603 (black-and-white), 2608 (colour)
  ➢ Paper width correction: 2611
  ➢ Leading edge correction: 2621 (switchover timing: 2622)
  ➢ Trailing edge correction: 2623 (switchover timing: 2624)
  ➢ Absolute humidity correction: 2631 to 2635
  ➢ No corrections for side 2 duplex – most people don't make duplex copies on OHPs

Continued on the notes page for the next slide (Blank slide)

Blank Slide

■ This is a blank slide.
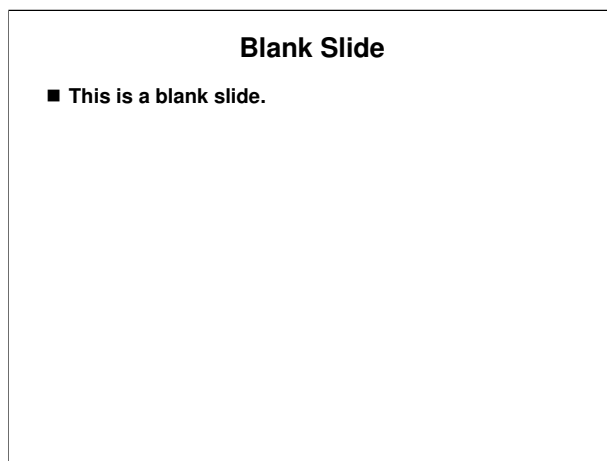
❏ Thick 3 paper
  ➢ Basic PTR current: 2651 (black-and-white), 2652 (colour)
  ➢ Paper width correction: 2653
  ➢ Leading edge correction: 2654 (switchover timing: 2655)
  ➢ Trailing edge correction: 2656 (switchover timing: 2657)
  ➢ Absolute humidity correction: 2658 to 2662
❏ Special 1 paper
  ➢ Basic PTR current: 2753 (black-and-white), 2757 (colour)
  ➢ Paper width correction: 2761
  ➢ Leading edge correction: 2771 (switchover timing: 2772)
  ➢ Trailing edge correction: 2773 (switchover timing: 2774)
  ➢ Absolute humidity correction: 2781 to 2785
❏ Special 2 paper
  ➢ Basic PTR current: 2803 (black-and-white), 2807 (colour)
  ➢ Paper width correction: 2811
  ➢ Leading edge correction: 2821 (switchover timing: 2822)
  ➢ Trailing edge correction: 2823 (switchover timing: 2824)
  ➢ Absolute humidity correction: 2831 to 2835
❏ Special 3 paper
  ➢ Basic PTR current: 2852 (black-and-white), 2857 (colour)
  ➢ Paper width correction: 2861
  ➢ Leading edge correction: 2871 (switchover timing: 2872)
  ➢ Trailing edge correction: 2873 (switchover timing: 2874)
  ➢ Absolute humidity correction: 2881 to 2885

SP Modes – Paper Transfer (2)

■ **2311 002: Correction for PTR current for non image areas (applied between pages)**

■ **2326: Current applied for cleaning the PTR**

- This is done at the end of each job.

■ **2930 to 2939: These control the upper limit voltages for the PTR**

- 2930: Threshold between high and low resistance at the PTR.

    • This is measured at the start of each job.

    – The paper transfer current used to measure this can be adjusted with SP 2311 003.

    • It affects the upper limit voltage for the PTR.

- 2931 to 2939: Upper limit voltages for the PTR, for each paper weight, and for high and low resistance.

SP Modes – Discharge Plate

■ **2401: Separation DC voltage for plain paper**

■ **Corrections to 2401:**

    ● 2421: Corrections for the leading edge

       • 2422: Switchover timing from leading edge to main image area

    ● 2431 to 2435: Corrections for absolute humidity

Adjustments for other paper weights

❒ Thin paper

    ➢ Basic DC voltage: 2451

    ➢ Leading edge correction: 2471 (switchover timing: 2472)

    ➢ Absolute humidity correction: 2481 to 2485

❒ Thick 1 paper

    ➢ Basic DC voltage: 2501

    ➢ Leading edge correction: 2521 (switchover timing: 2522)

    ➢ Absolute humidity correction: 2531 to 2535

❒ Thick 2 paper

    ➢ Basic DC voltage: 2551

    ➢ Leading edge correction: 2571 (switchover timing: 2572)

    ➢ Absolute humidity correction: 2581 to 2585

❒ OHP

    ➢ Basic DC voltage: 2601

    ➢ Leading edge correction: 2621 (switchover timing: 2622)

    ➢ Absolute humidity correction: 2631 to 2635

❒ Thick 3

    ➢ Basic DC voltage: 2650

    ➢ Leading edge correction: 2654 (switchover timing: 2655)

    ➢ Absolute humidity correction: 2658 to 2662

❒ Special 1 paper

    ➢ Basic DC voltage: 2751

    ➢ Leading edge correction: 2771 (switchover timing: 2772)

    ➢ Absolute humidity correction: 2781 to 2785

❒ Special 2 paper

    ➢ Basic DC voltage: 2801

    ➢ Leading edge correction: 2821 (switchover timing: 2822)

    ➢ Absolute humidity correction: 2831 to 2835

❒ Special 3 paper

    ➢ Basic DC voltage: 2851

    ➢ Leading edge correction: 2871 (switchover timing: 2872)
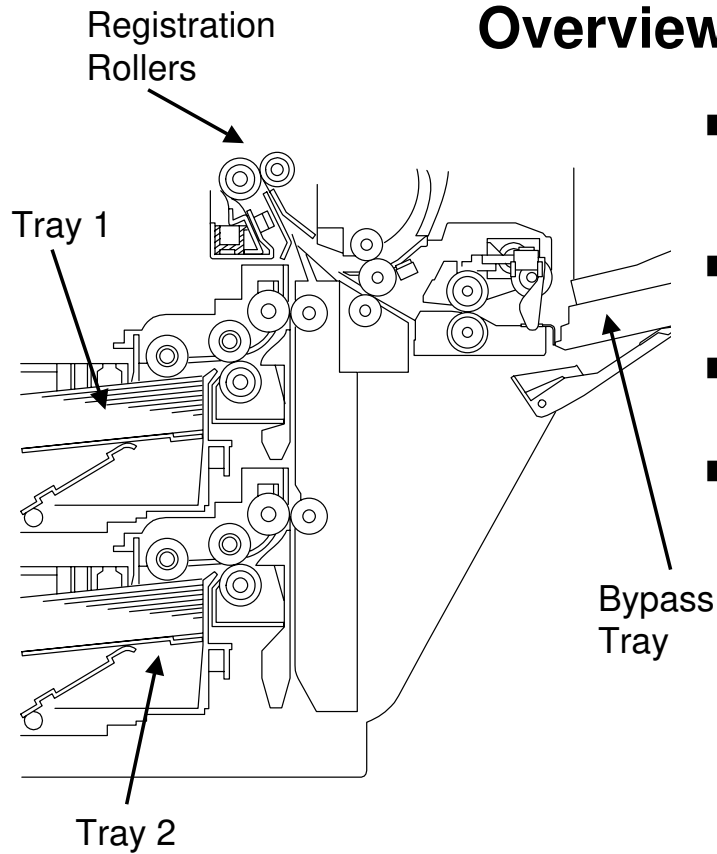
    ➢ Absolute humidity correction: 2881 to 2885
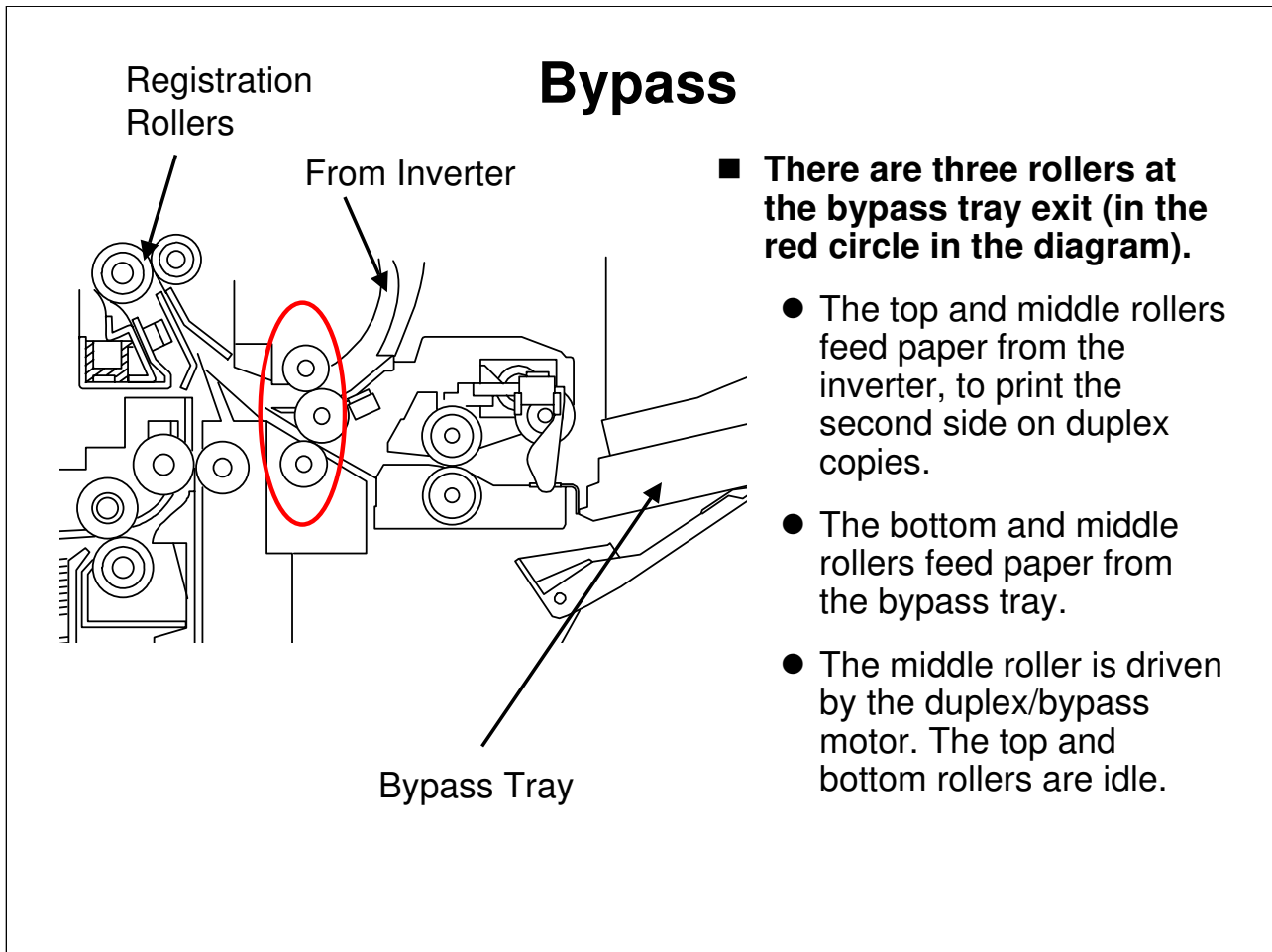
RICOH

APOLLON-C1 TRAINING

PAPER FEED

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

Overview

Registration Rollers
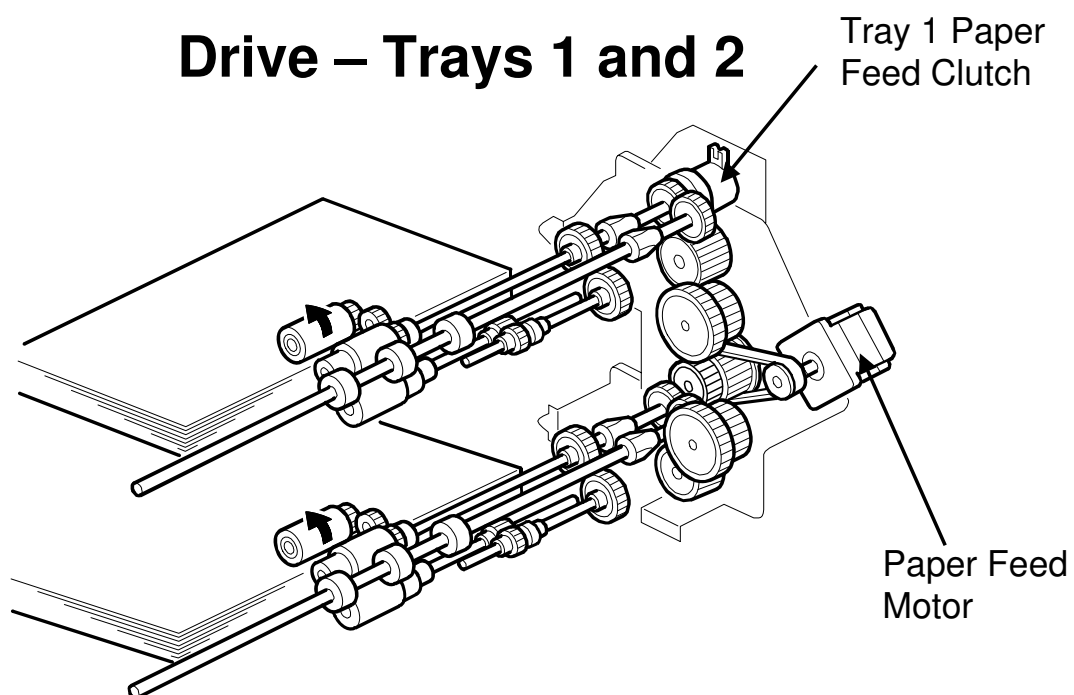
Tray 1

Tray 2

Bypass Tray

- **Trays 1 and 2 and bypass tray: Feed roller and friction pad system**

- **Tray 1: A4 and letter paper only**

- **Tray 2: Supports many sizes**

- **Capacity**

  - Tray 1 and 2: 500 sheets each

  - Bypass: 100 sheets

B222 service manual, Detailed Section Descriptions, Paper Feed, Overview

Bypass

Registration Rollers

From Inverter

Bypass Tray

■ **There are three rollers at the bypass tray exit (in the red circle in the diagram).**

- The top and middle rollers feed paper from the inverter, to print the second side on duplex copies.

- The bottom and middle rollers feed paper from the bypass tray.

- The middle roller is driven by the duplex/bypass motor. The top and bottom rollers are idle.

❐ This is a close-up view of the bypass tray exit.

Drive – Trays 1 and 2

Tray 1 Paper
Feed Clutch

Paper Feed
Motor

- **One motor controls the two trays. Each tray has a clutch.**
  - During paper feed, the clutch stays on until the registration sensor detects the paper.
- **If the tray is in the machine, the pick-up roller always touches the top sheet of paper.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Drive

Drive - Bypass

Duplex/Bypass
Motor
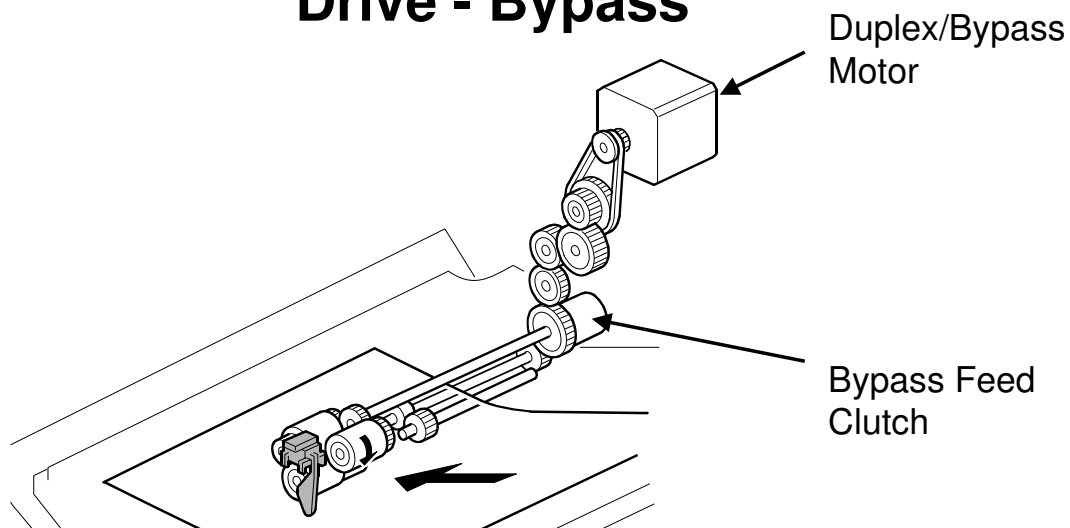
Bypass Feed
Clutch

- ◼ **The duplex/bypass motor drives the feed roller, through the bypass feed clutch.**

- ◼ **When the bypass solenoid turns on, the pick-up roller drops onto the top sheet of paper and feeds it into the machine.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Drive

Tray Detection – Trays 1 and 2

Lever

Pick-up
Roller
(moves down)

Paper Lift
Sensor
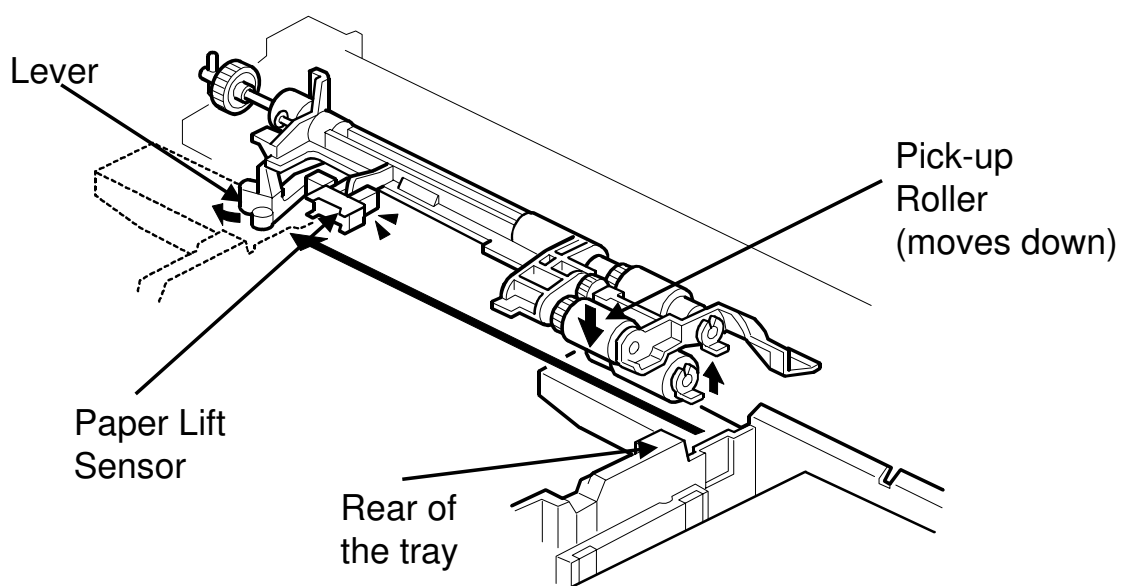
Rear of
the tray

■ **The tray set switch (part of the paper size switch) detects when the tray is inserted.**

■ **The rear of the tray pushes the lever, and the pick-up roller drops on top of the top sheet of paper.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Pick-up

❒ The tray set switch is in the center of the tray at the rear. It is shown on the slide for the Paper Size Detection mechanism.

Paper Pick-up – Trays 1 and 2

Paper Feed Sensor
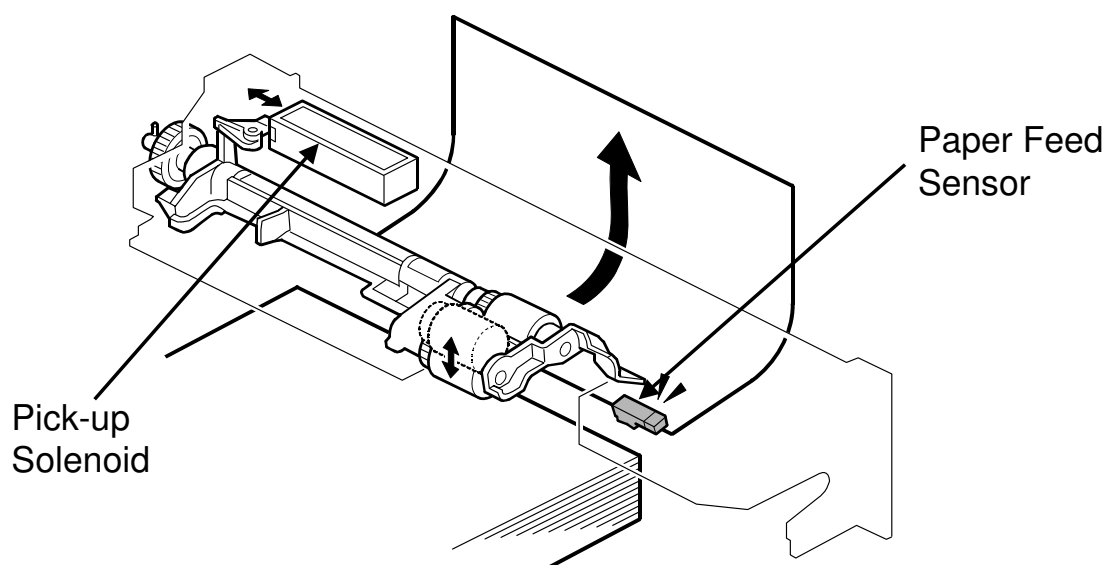
Pick-up Solenoid

- **When the paper feed sensor detects the trailing edge of the paper as it goes into the machine, the pick-up solenoid turns on and off briefly.**
- **This lifts and lowers the pick-up roller.**
- **This action improves pick-up.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Pick-up

❐ Note that the action of the solenoid is different from the bypass tray.

➢ Trays 1 and 2: When the solenoid turns on, the pick-up solenoid moves up away from the top sheet of paper.

➢ Bypass tray: When the solenoid turns on, the pick-up roller moves down onto the top sheet of paper.

Tray Lift – Trays 1 and 2
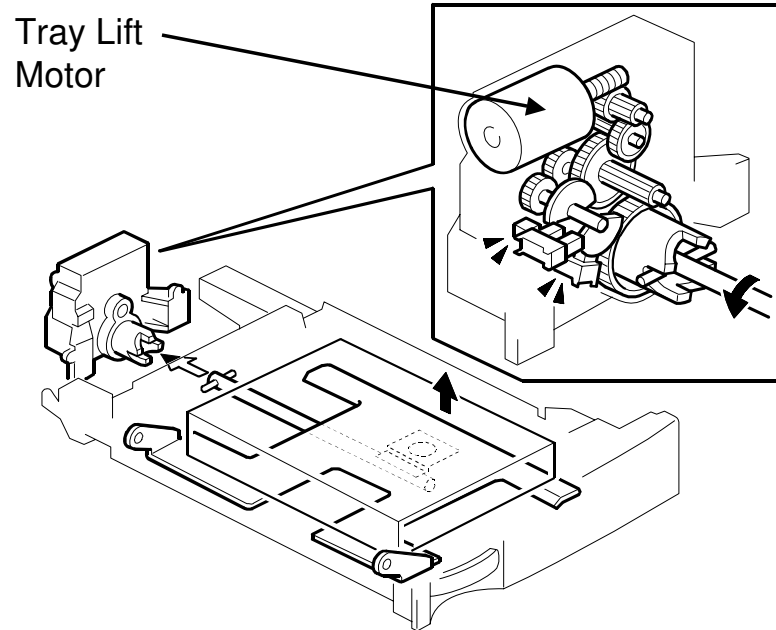
Tray Lift
Motor

■ **When the tray is detected, the tray lift motor turns on until the paper lift sensor detects the top of the stack.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Lift

❒ The paper lift sensor is shown on an earlier slide.

Paper Size Detection – Trays 1 and 2

Paper Size
Switch
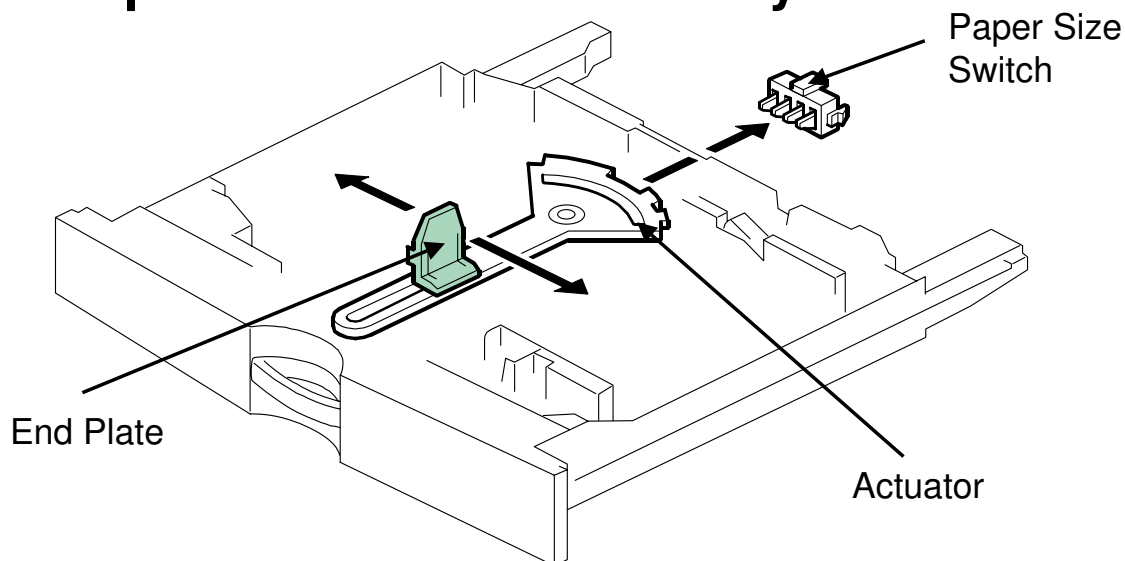
End Plate

Actuator

- **Tray 2: The sensor detects the paper size. The actuator position depends on the end plate position.**

- **Tray 1 can only have A4 or LT.**

  - Depends on SP 5-181-1.

  - The sensor functions only as a tray set switch.

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Size Detection (Trays 1 and 2)

❒ The sensor functions as a tray set switch and a size detector in tray 2.
  ➢ The three switches on the left detect paper size. The switch on the right is a tray set sensor.
❒ Only the length is detected directly.
❒ The actuator has patterns of studs on the rear.
❒ These studs turn the paper size switches on/off.
  ➢ This also tells the cpu that the tray is in the machine.
  ➢ The settings of SP 5-181 determine how the machine interprets the sensor readings for paper sizes that are almost the same. See the table in the service manual for details.
    There are two sets of paper sizes in this table: North America, and Europe/Asia. SP 5131 determines which of these sets of sizes is used.
    If the customer uses paper sizes that are not in the table, the size must be selected with a user tool: System Settings - Tray Paper Settings - Tray Paper Size (Tray 2).
❒ If the fence is moved, a different set of studs moves to the switches, and the machine detects a different paper size.

Size Detection – SP Modes

- **SP 5181**

  - Some paper sizes are almost the same and cannot be distinguished by the sensors.

  - To select which size is detected, use SP 5181.

    - Tray 2: SP 5181 002 to 005

- **SP 5131**

  - There are two sets of paper sizes in this table: North America, and Europe/Asia. SP 5131 determines which of these sets of sizes is used.

- **SP 5112 (for trays 2, 3, and 4)**

  - If the user cannot select a non-standard paper size with the user tool, set this SP to 1.

  - Auto paper size detection is disabled if the user selects a non-standard paper size.

❒ SP 5112: Trays 3 and 4 are the optional two-tray paper feed unit.

Paper Size Detection – Bypass Tray
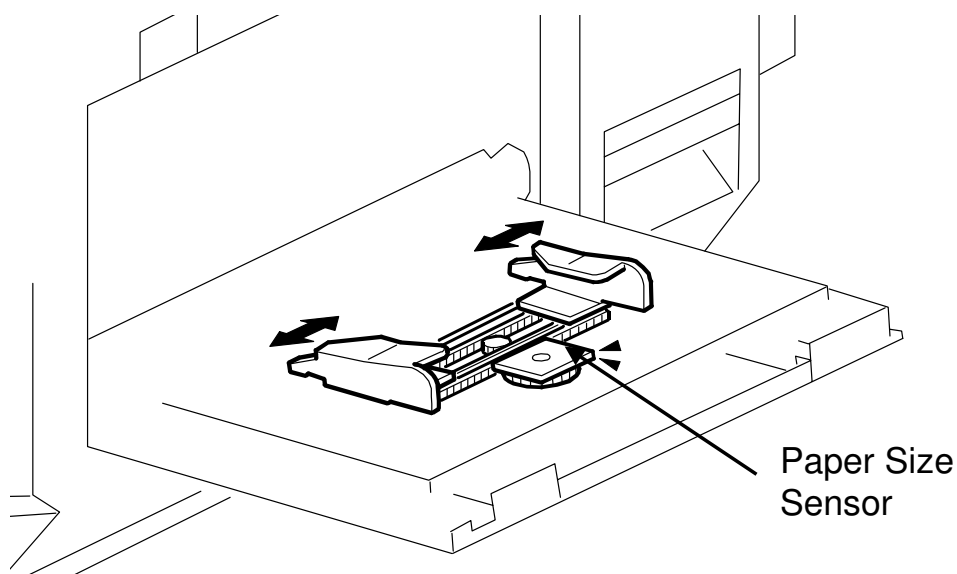
Paper Size Sensor

■ **The position of the side plates determines that size that is detected by the paper size sensor.**

B222 service manual, Detailed Section Descriptions, Paper Feed, By Pass Paper Size Detection

❒ If the detected size is less than 8.5 inches in width, the sensors cannot detect the size.

❒ SP 1007 tells the machine what size to detect in this case (either Letter or Legal SEF).

Remaining Paper Detection – Trays 1 and 2

Tray Lift Motor

Shaft

Paper Height Sensors
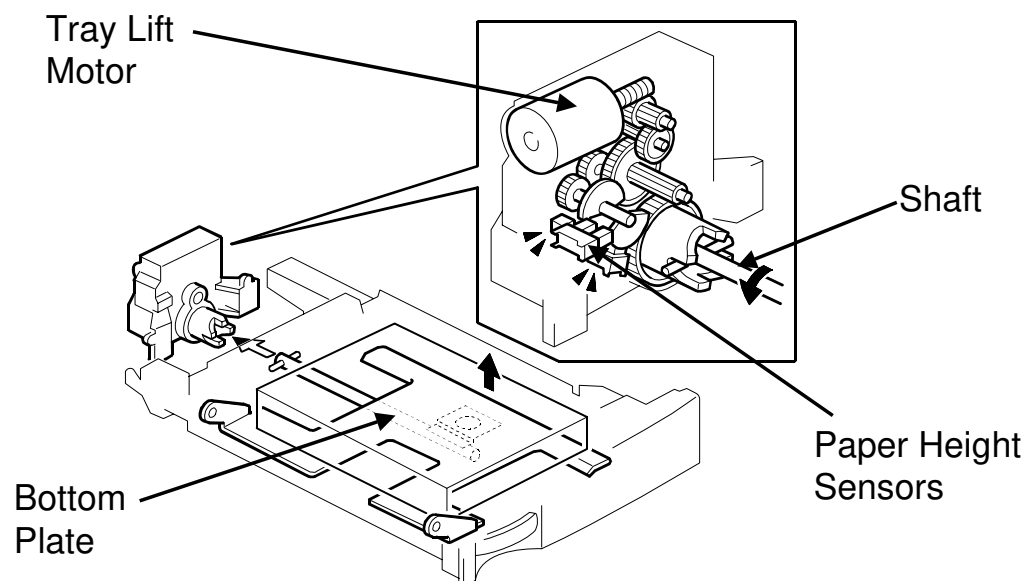
Bottom Plate

- **The lift motor assembly contains two height sensors, and two semi-circular actuators.**

- **When paper is used up, the bottom plate is lifted and the shaft rotates. This changes the positions of the actuators.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Height Detection

❐ The manual shows how the machine interprets the readings from the height sensors.

Paper End Detection – Trays 1 and 2

Paper End
Sensor
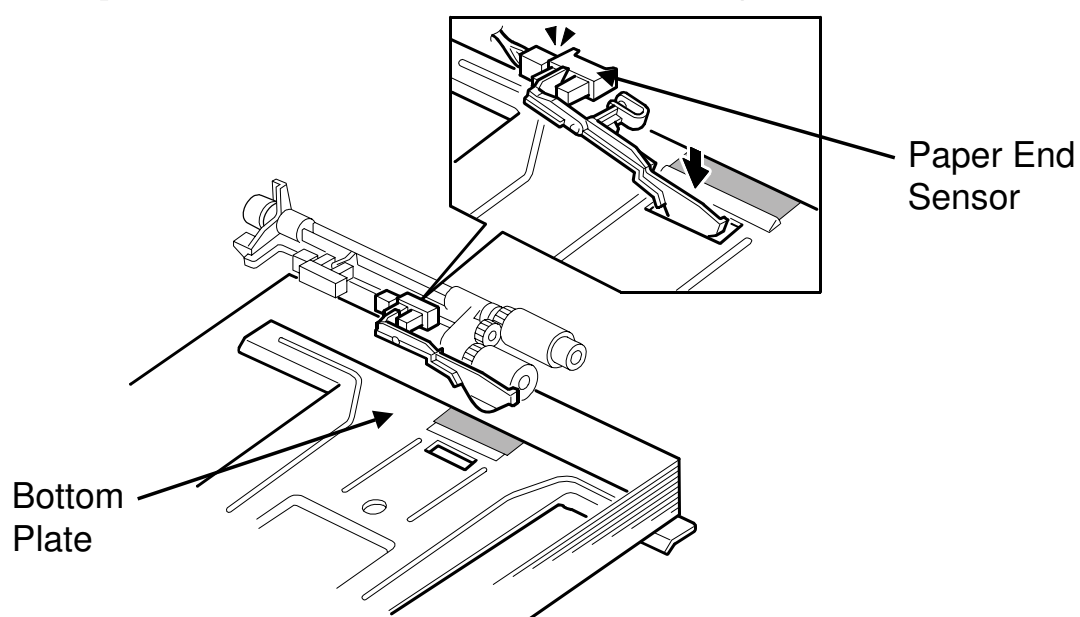
Bottom
Plate

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

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper End Detection

Registration

Registration
Rollers

■ **The registration motor drives the registration rollers.**

Registration
Motor
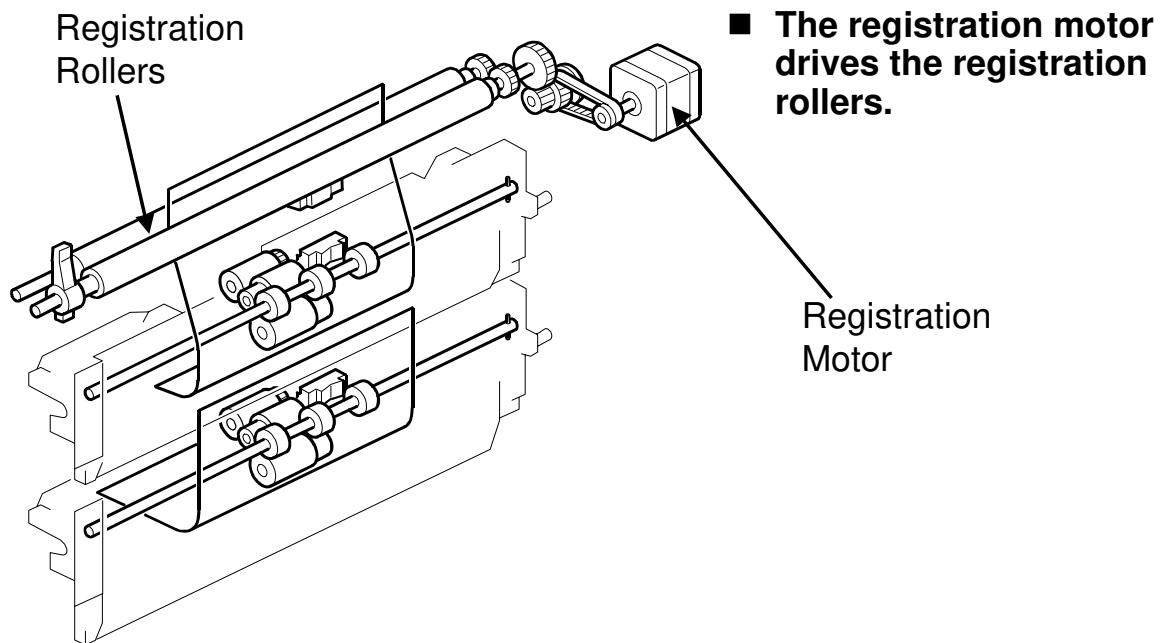
B222 service manual, Detailed Section Descriptions, Paper Feed, Registration

Tray Lock - Front
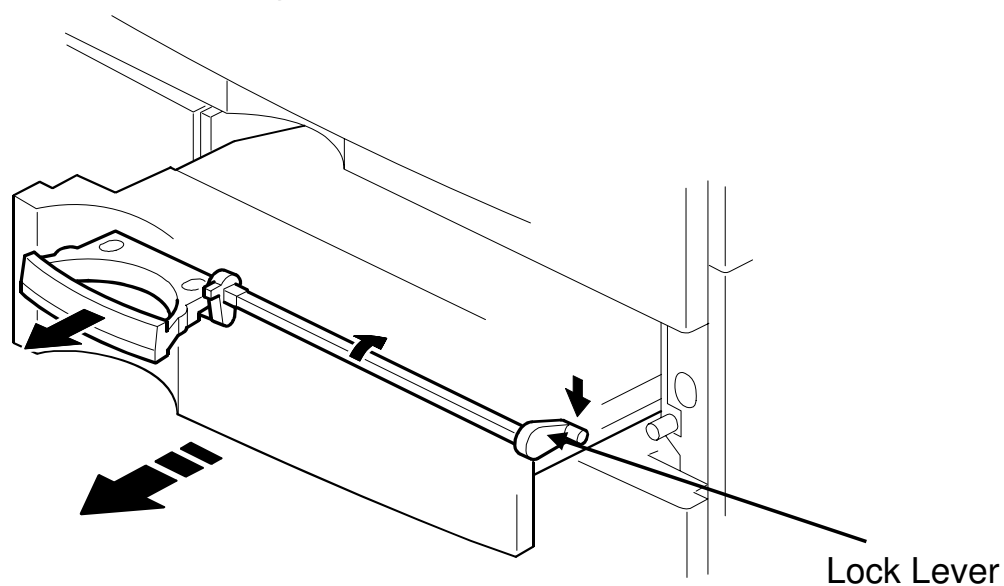
Lock Lever

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

B222 service manual, Detailed Section Descriptions, Paper Feed, Tray Lock Mechanism

❒ Demonstrate this on the machine.

Tray Lock - Rear

Tray Lock Solenoid

Lock Lever
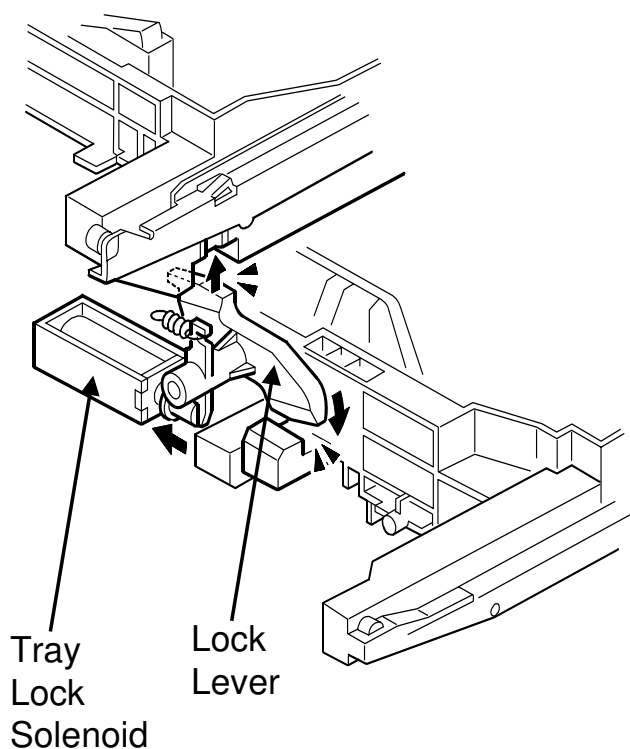
- ■ **If the user pulls out a tray when there is a paper jam, the paper tears, and it is difficult to get the jammed paper out of the machine.**

- ■ **So, if there is a paper jam, the tray lock solenoid turns on and the trays cannot be removed.**

  - ● The lever turns counter-clockwise (as shown in the diagram) and locks both trays at the same time.

- ■ **The lock only activates when a jam occurs.**

  - ● Occurs for all types of copy jams in the main copier.

- ■ **The lock is released when the machine detects that the jam is removed.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Tray Lock Mechanism

Paper Dust Collection

Registration
Idle Roller

Mylars

Dust
Container
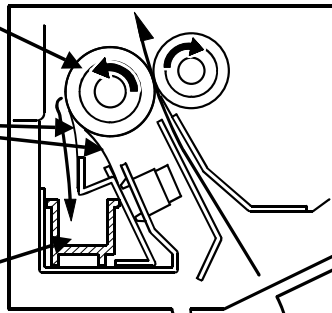
■ **The mylars remove paper dust from the registration idle roller.**

B222 service manual, Detailed Section Descriptions, Paper Feed, Paper Dust Collection

Replacement

■ **Do the following procedures**

● B222 Service Manual, Replacement and Adjustment, Paper Feed

■ **Notes**

● Bypass paper size switch: Take care to install the switch correctly. After installation, test that the switch was installed correctly. There is a procedure in the manual.

❒ Have the trainees remove and replace the parts in this section of the manual.
❒ Remind them to follow all notes and cautions in the manual.

SP Modes

- **1003: Paper buckle at the registration roller**

- **5150: Increases the maximum possible paper length that can be fed from the bypass tray.**

- **5179: Paper size error message for the by-pass tray, on/off**

  - If this is changed to 'on', a paper size error message is displayed when a paper jam occurs because the user put the paper in the bypass tray the wrong way around (LEF instead of SEF, for example)
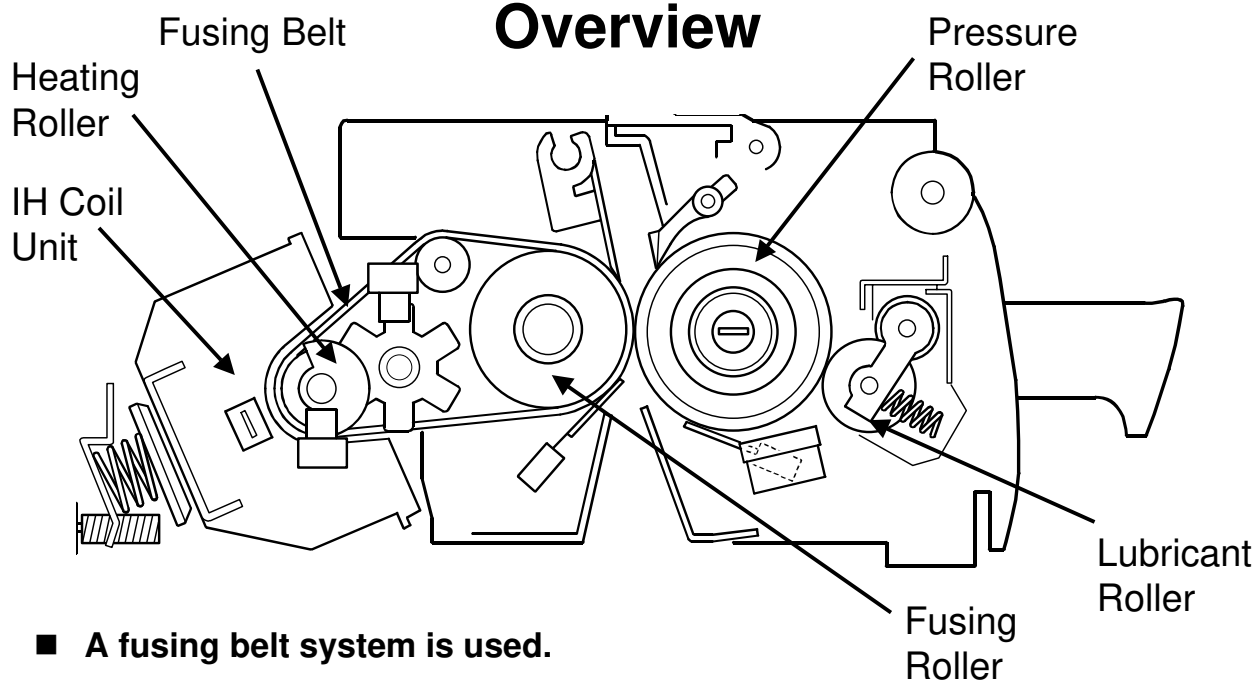
RICOH

APOLLON-C1 TRAINING

FUSING

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

Overview

Fusing Belt

Heating Roller

IH Coil Unit

Pressure Roller

Lubricant Roller

Fusing Roller

- **A fusing belt system is used.**

- **The pressure roller contains a lamp.**

- **The heating roller is heated by an IH (induction heating) coil.**

- **The fusing belt heats the fusing roller.**

- **The lubricant roller supplies oil to the pressure roller. This reduces friction with the thermistor (the thermistor contacts the roller).**

B222 service manual, Detailed Section Descriptions, Fusing, Overview

❒ The lubricant roller has a cleaning roller, to remove toner.
❒ The IH coil heats the heating roller more quickly than a fusing lamp system.
❒ The pressure roller thermistor contacts the pressure roller, so lubrication is necessary to reduce friction.
  ➢ The other thermistor is near the heating roller/fusing belt, but does not contact.

Temperature Control Components

Thermopile

Heating Roller

Thermostat

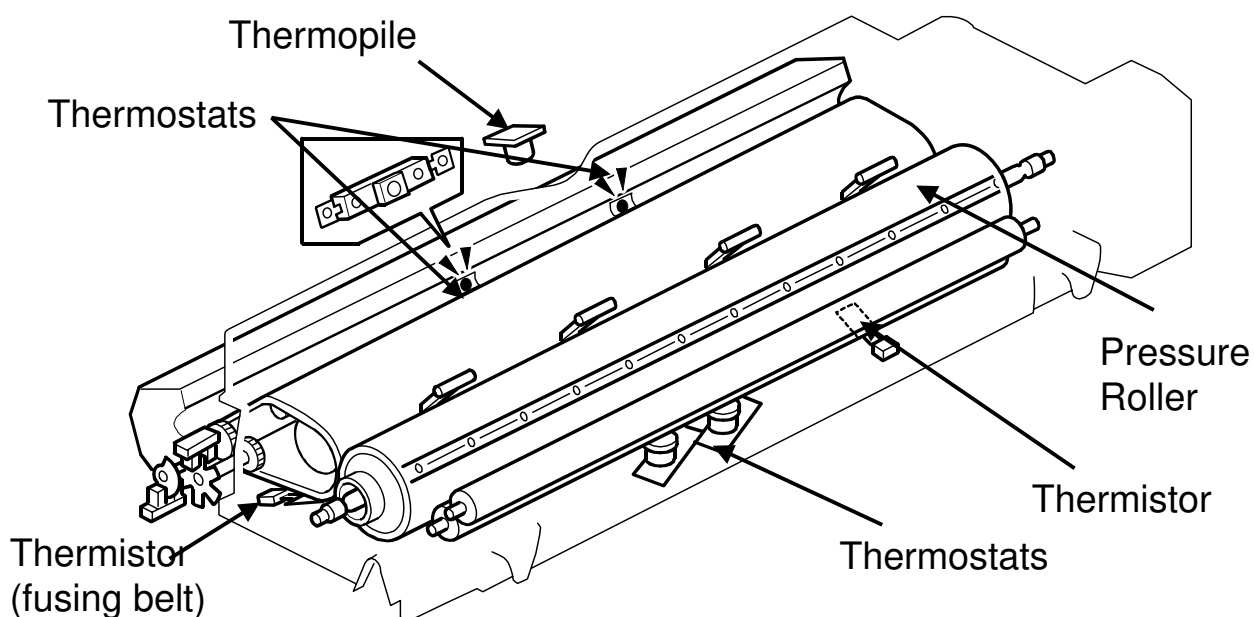Thermistor (Fusing Belt)

Pressure Roller

Thermostat
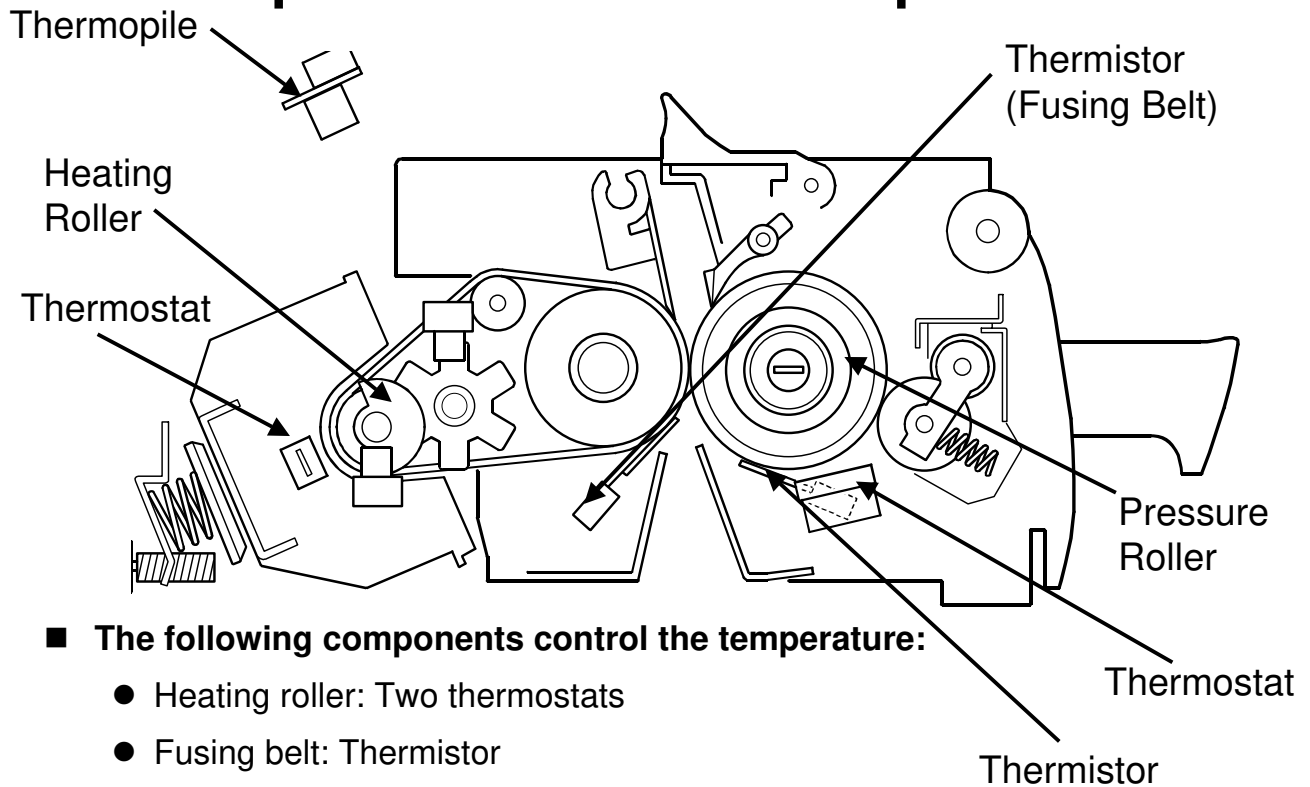
Thermistor

■ **The following components control the temperature:**

- Heating roller: Two thermostats
- Fusing belt: Thermistor
- Pressure roller: Thermistor and two thermostats
- Above the fusing unit: Thermopile

B222 service manual, Detailed Section Descriptions, Fusing, Overview

❒ The thermopile detects the temperature at the center of the fusing unit, and the thermistors detects the temperature at the ends.
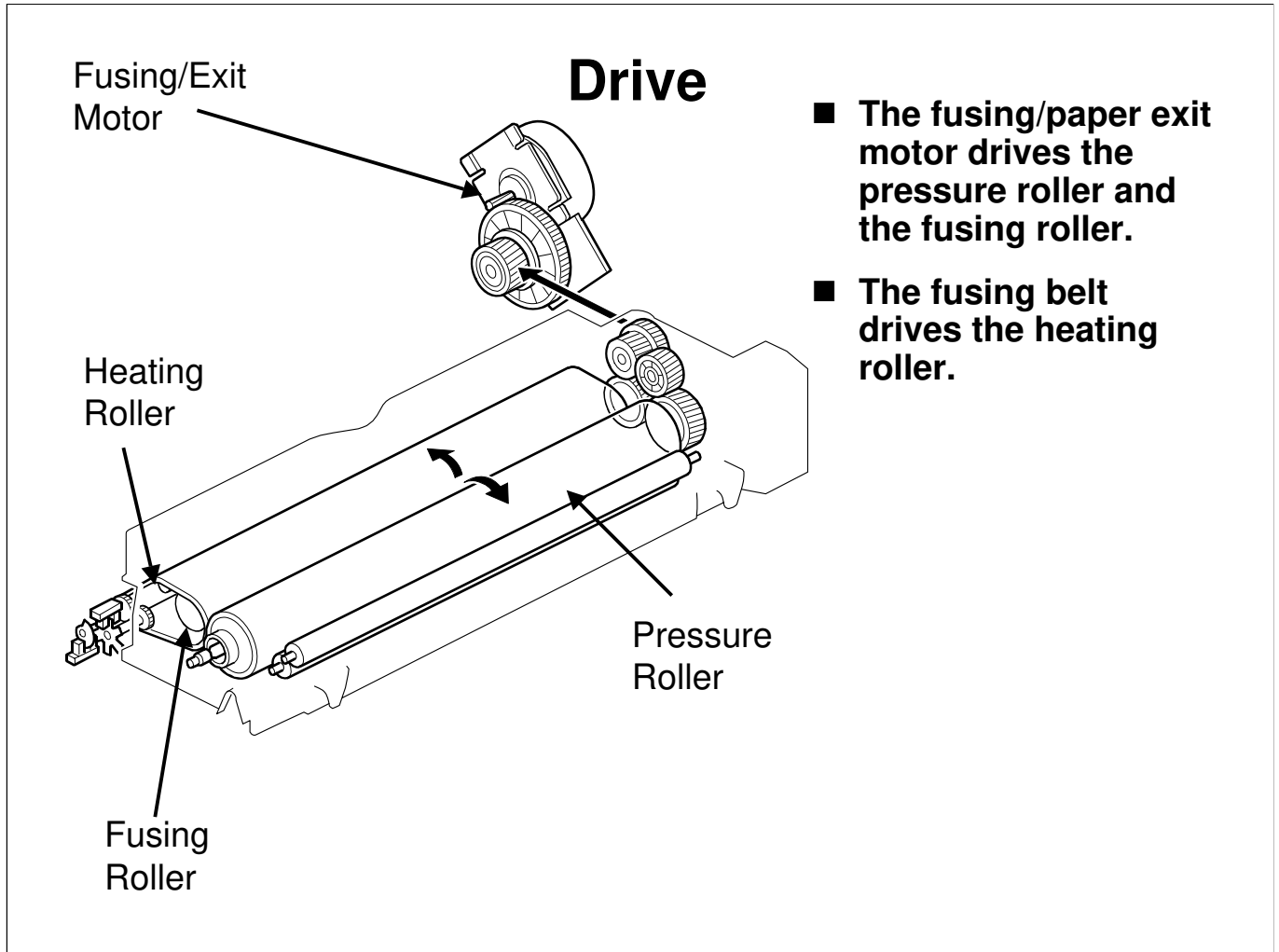
Temperature Control Components

Thermopile

Thermostats

Pressure
Roller

Thermistor

Thermistor
(fusing belt)

Thermostats

■ **The following components control the temperature:**

● Heating roller: Thermostat

● Fusing belt: Thermistor

● Pressure roller: Thermistor and two thermostats

● Above the fusing unit: Thermopile

*B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control*

❒ Here is a three-dimensional drawing of the fusing unit.

❒ The thermopile detects the temperature at the center of the fusing unit, and the thermistors detects the temperature at the ends.

❒ The fusing belt thermistor does not contact the fusing belt.

❒ The pressure roller thermistor does contact the pressure roller, so there is a lubrication roller.

Drive

Fusing/Exit Motor

Heating Roller

Pressure Roller

Fusing Roller

■ **The fusing/paper exit motor drives the pressure roller and the fusing roller.**

■ **The fusing belt drives the heating roller.**

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Unit Drive

❒ Paper passes vertically through the fusing unit, between the fusing roller and the pressure roller.
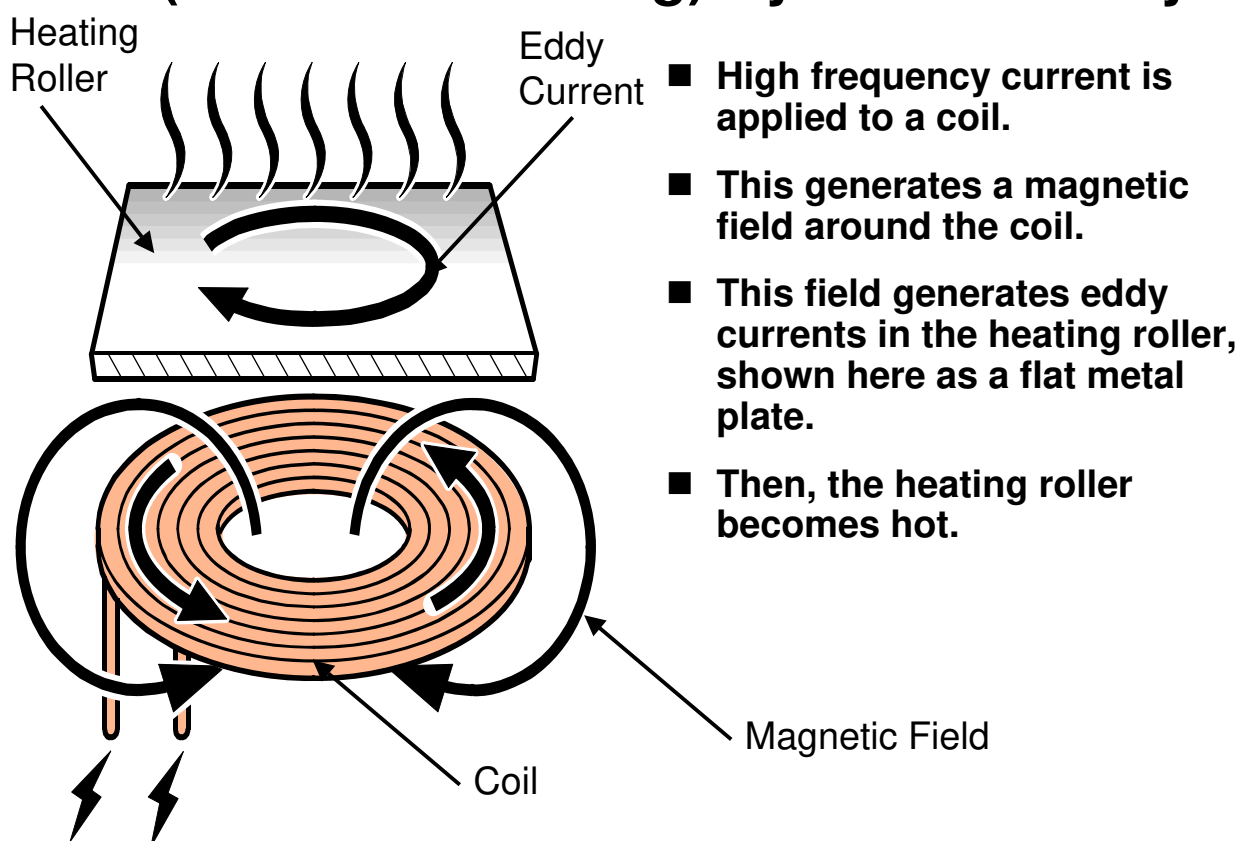
Lubrication

Pressure
Roller

Cleaning
Roller
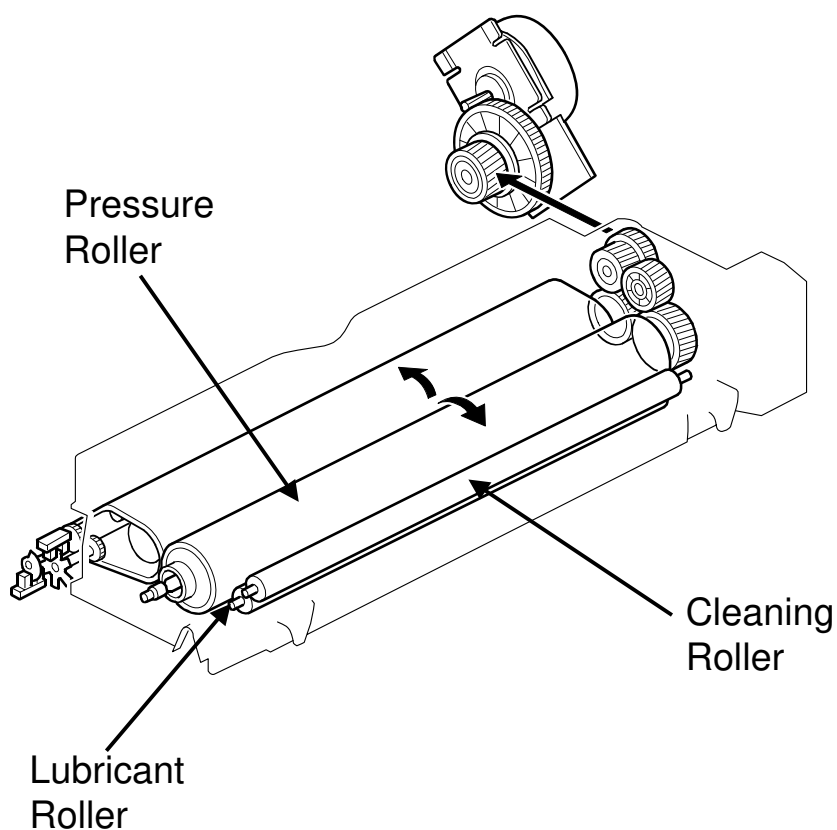
Lubricant
Roller

- ■ **The lubricant roller contains silicone oil.**

- ■ **It applies this oil to the pressure roller.**

- ■ **This oil is necessary to reduce friction with the pressure roller thermistor, which contacts the pressure roller.**

- ■ **The cleaning roller cleans the lubricant roller, to remove toner.**

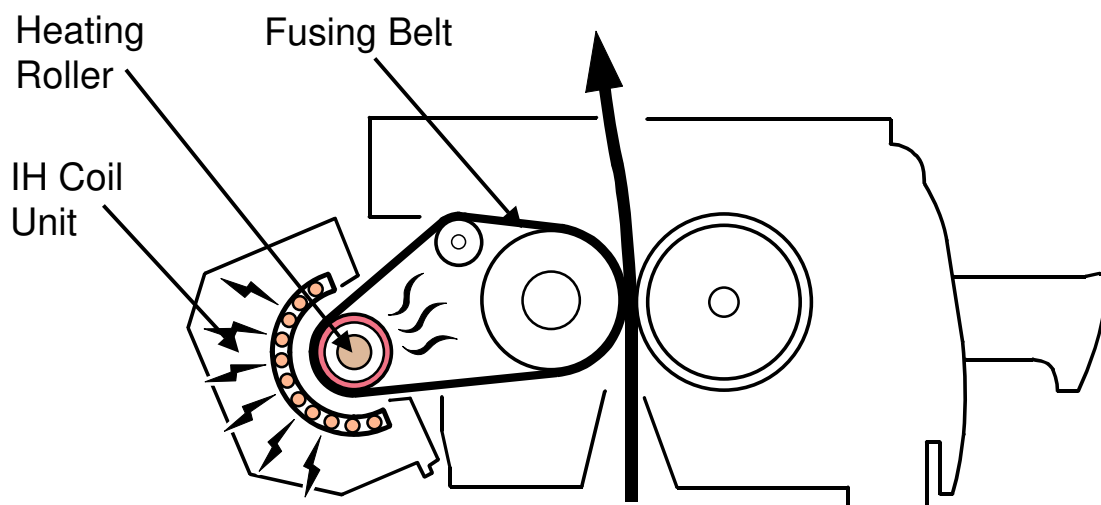*B222 service manual, Detailed Section Descriptions, Fusing, Fusing Unit Drive*

IH (Induction Heating) System - Theory

Heating
Roller

Eddy
Current

Coin

Magnetic Field

- **High frequency current is applied to a coil.**

- **This generates a magnetic field around the coil.**

- **This field generates eddy currents in the heating roller, shown here as a flat metal plate.**

- **Then, the heating roller becomes hot.**

B222 service manual, Detailed Section Descriptions, Fusing, IH (Induction Heating) System

❏ This slide shows the basic theory.

❏ The surface of the heating roller is represented here by a flat metal plate.

IH (Induction Heating) System – This Machine

Heating Roller

Fusing Belt

IH Coil Unit

- **The IH coil unit heats the heating roller.**

  - During warm-up, 1250 W is applied to the IH coil unit.

  - During paper feed/copying, 950 W is applied

- **The heating roller heats the fusing belt.**

*B222 service manual, Detailed Section Descriptions, Fusing, IH (Induction Heating) System*

❒ This slide shows how the IH coil system heats up the fusing unit in this machine.

Correction for Paper Size

Bronze
Plate

Ferrite
Roller
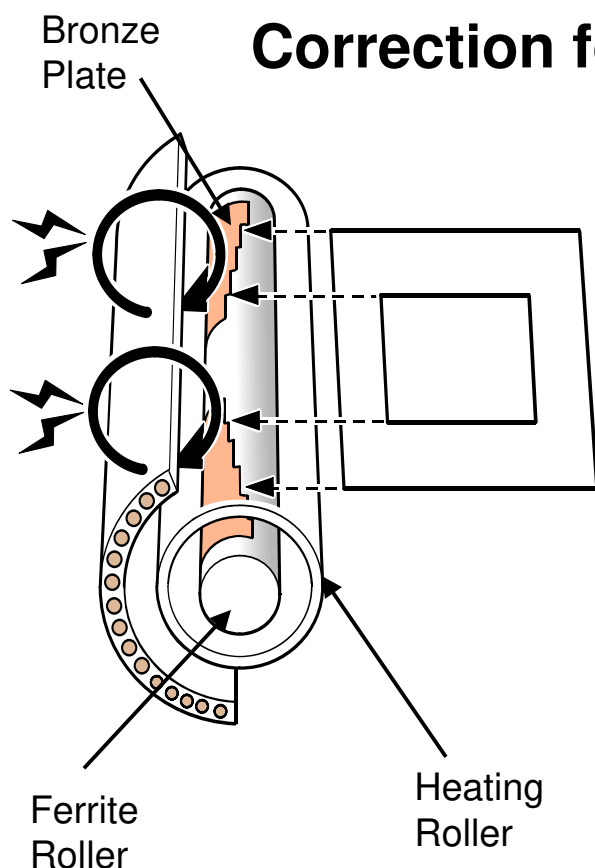
Heating
Roller

- The heating roller is hollow, with a ferrite roller in the core.

- The ferrite roller has a bronze plate around it, cut in a step-wise pattern.

- Parts of the roller that are covered with the bronze plate do not heat up as much as other parts.

- So, at the start of a job, the ferrite roller is rotated to the position that matches the paper size for the job.

- Then, the parts outside the paper width are not heated so much.

- This prevents overheating of parts of the heating roller that do not have paper passing over them during fusing.

B222 service manual, Detailed Section Descriptions, Fusing, IH (Induction Heating) System

Correction for Paper Size

Ferrite Roller Home Position Sensor

Ferrite Roller

Bronze Plate
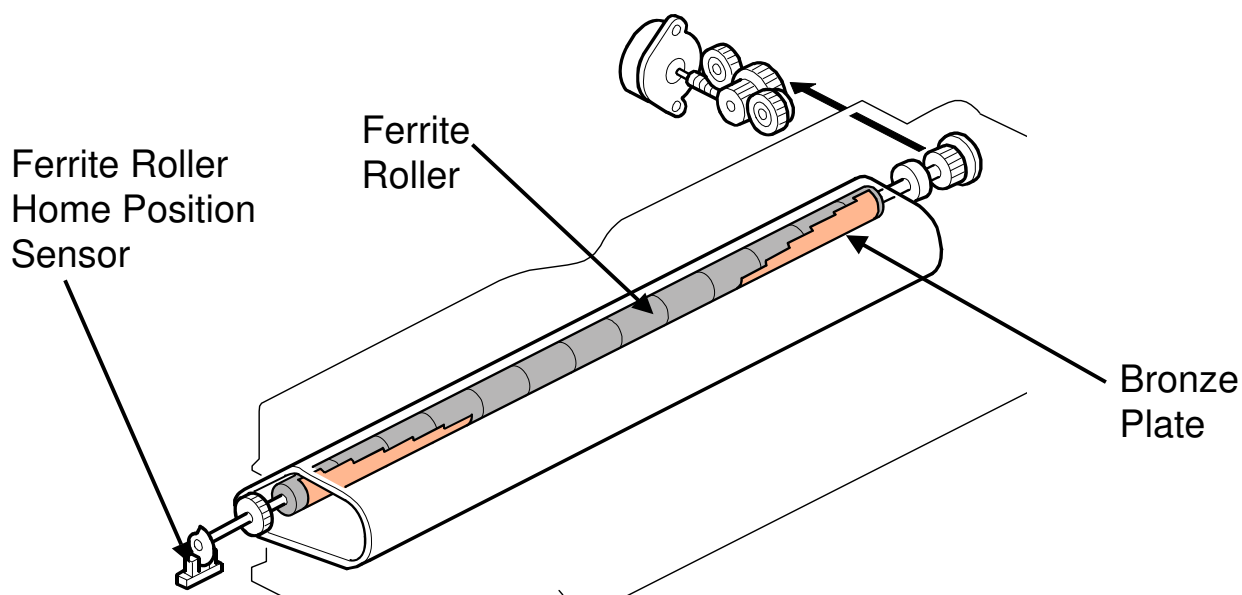
- **The ferrite roller motor rotates the ferrite roller to the correct position at the start of the job. This depends on the paper size.**

- **The ferrite roller does not rotate during printing.**

- **At the end of the job, the ferrite roller rotates to home position, detected by the home position sensor.**

B222 service manual, Detailed Section Descriptions, Fusing, IH (Induction Heating) System

❒ There are seven different positions for the ferrite roller, corresponding to seven different paper sizes. See the service manual for details.

❒ Ferrite roller home position: In addition to the information on the slide, home position is detected after the roller rotates 40 times, and after 500 sheets are printed (controlled by SP 1917).
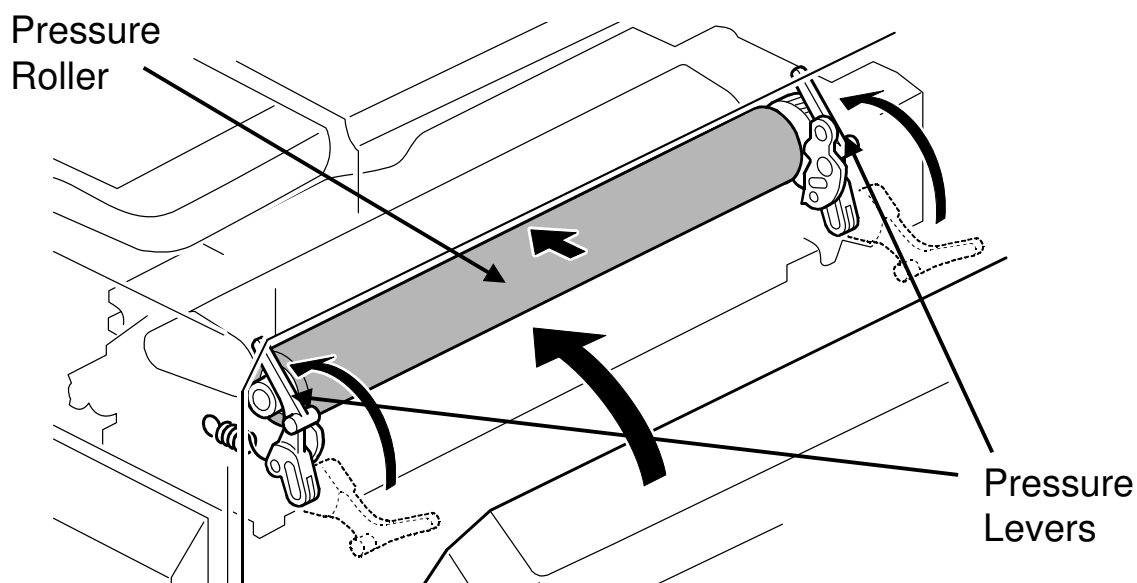
Fusing Belt Sensor

Fusing Belt
Sensor

Ferrite Roller
Home Position
Sensor
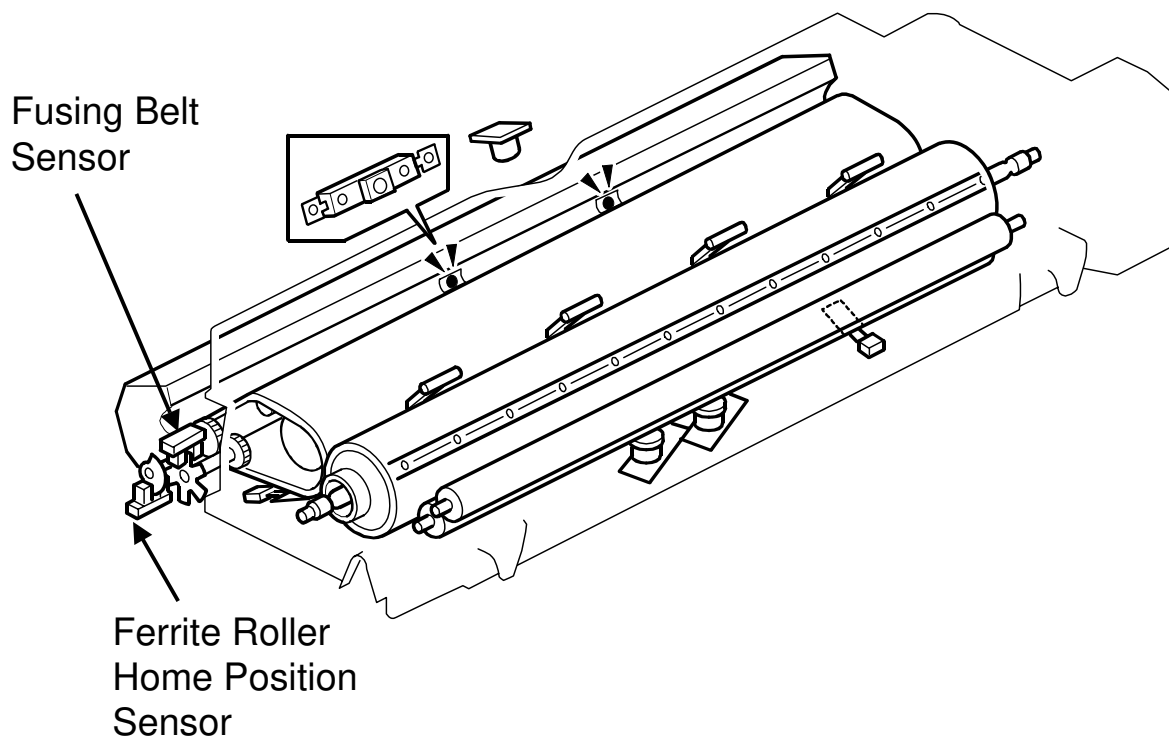
■ **The fusing belt sensor detects if the heating roller stops rotating.**

■ **If the heating roller does not rotate, it will overheat.**

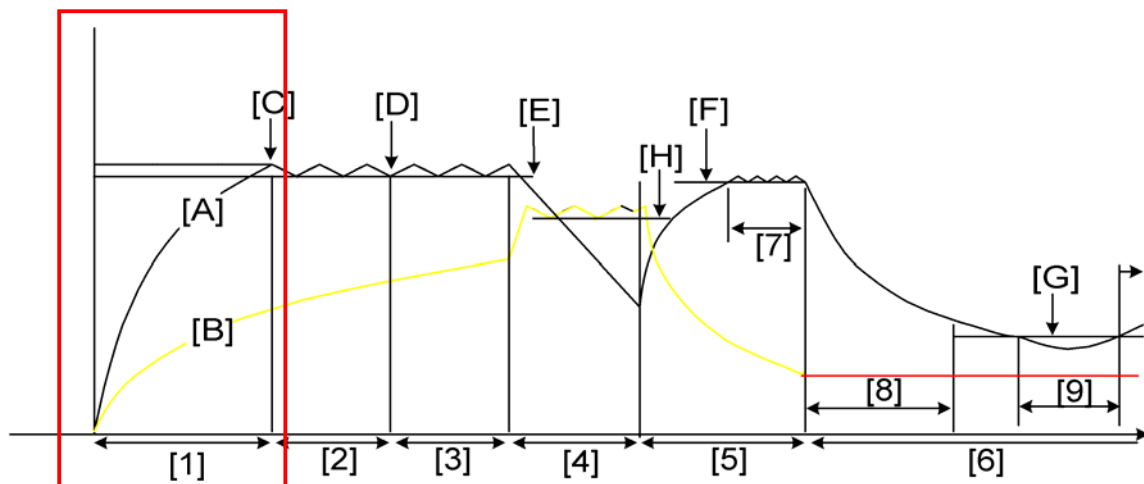*B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control*

Pressure Release

Pressure
Roller

Pressure
Levers

- ■ **The pressure levers apply the correct pressure from the pressure roller.**

- ■ **When the cover is opened, the pressure is released, and paper jams can be removed easily.**

B222 service manual, Detailed Section Descriptions, Fusing, Pressure Release Mechanism

Fusing Temperature Control - 1

- **[1] Warmup mode**

  - The IH coil unit warms up the heating roller.

  - The target temperature depends on the room temperature.

  - When the thermopile and the two thermistors detect the set temperature, warmup mode ends.

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

❒ Explain the phases of temperature control briefly, as shown on the next few slides.
  ➢ This is a simplified summary.
  ➢ The service manual has full details, including information on the SPs that can be used to change the target temperatures, corrections, and so on.
❒ Key to symbols in the diagram
  ➢ [A]: Heating roller temperature
  ➢ [B]: Pressure roller temperature
  ➢ [C]: Heating roller target temperature for the ready condition
  ➢ [D]: Extra idling target temperature
  ➢ [E]: Idling target temperature
  ➢ [F]: Heating roller target temperature for the print condition
  ➢ [G]: CPM down threshold temperature
  ➢ [H]: Pressure roller target temperature
  ➢ [1] to [9]: Stages 1 to 9, as explained in the following slides

Fusing Temperature Control - 2
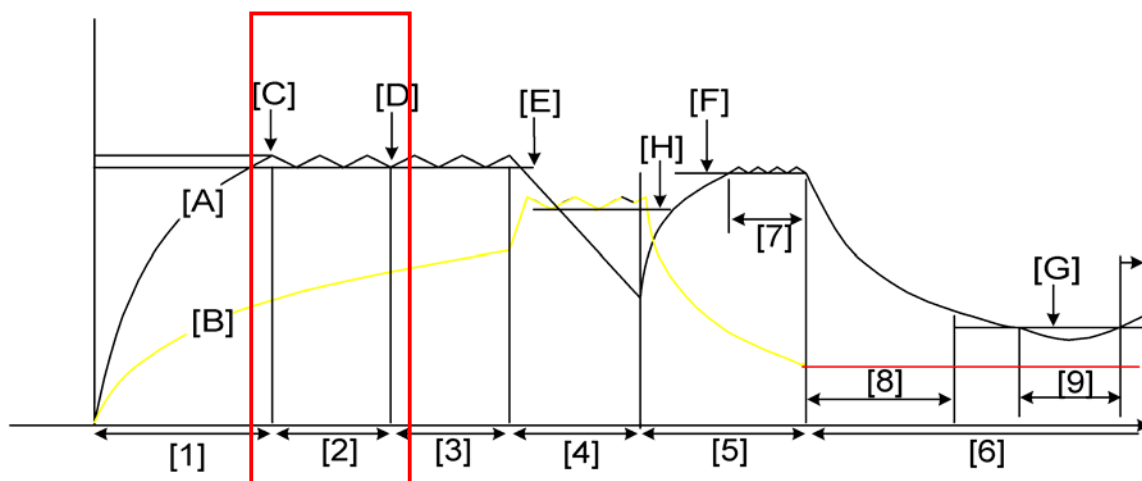
- **[2] 'Extra' idling**

    - This is idling after warmup. The 'extra' probably means that it is not the same as the idling that is done during standby mode (after the machine gets to the ready condition, and between jobs), controlled by SP 1115.

    - The IH coil controls the temperature of the heating roller during this phase.

    - The target temperature depends on the room temperature.

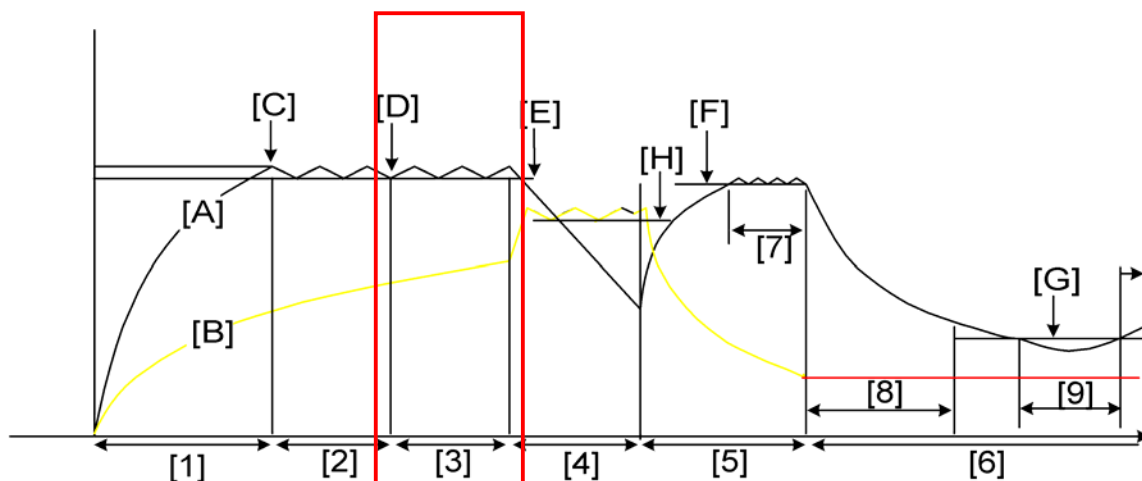*B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control*

❐ Key to symbols in the diagram
   ➢ [A]: Heating roller temperature
   ➢ [B]: Pressure roller temperature
   ➢ [C]: Heating roller target temperature for the ready condition
   ➢ [D]: Extra idling target temperature
   ➢ [E]: Idling target temperature
   ➢ [F]: Heating roller target temperature for the print condition
   ➢ [G]: CPM down threshold temperature
   ➢ [H]: Pressure roller target temperature
   ➢ [1] to [9]: Stages 1 to 9, as explained in the following slides

❐ Duration of extra idling:
   ➢ Depends on the ambient temperature, and the settings of SP 1103 016 to 018

Fusing Temperature Control - 3

- **[3] Maintain mode for ready condition**

    - The IH coil controls the temperature of the heating roller during this phase.

    - The room temperature is not used during this phase.

    - This phase lasts for 60 seconds after the target temperature of phase [2] is reached. Then, the machine has got to the ready condition, and it goes to phase [4].

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

❒ Key to symbols in the diagram
  ➢ [A]: Heating roller temperature
  ➢ [B]: Pressure roller temperature
  ➢ [C]: Heating roller target temperature for the ready condition
  ➢ [D]: Extra idling target temperature
  ➢ [E]: Idling target temperature
  ➢ [F]: Heating roller target temperature for the print condition
  ➢ [G]: CPM down threshold temperature
  ➢ [H]: Pressure roller target temperature
  ➢ [1] to [9]: Stages 1 to 9, as explained in the following slides

Fusing Temperature Control - 4
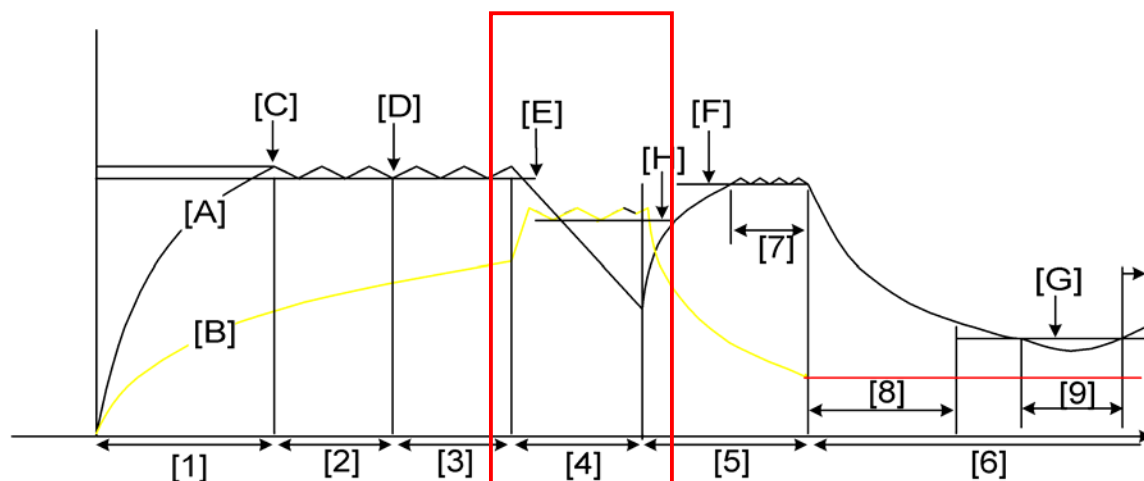

- **[4] Standby mode**

  - During this phase, the IH coil turns off, and the pressure roller fusing lamp is used.

  - The pressure roller is kept at a target temperature.

  - Idling is done for 0.7 s every 60 minutes (adjustable with SP 1115).

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

❒ Key to symbols in the diagram
  - ➢ [A]: Heating roller temperature
  - ➢ [B]: Pressure roller temperature
  - ➢ [C]: Heating roller target temperature for the ready condition
  - ➢ [D]: Extra idling target temperature
  - ➢ [E]: Idling target temperature
  - ➢ [F]: Heating roller target temperature for the print condition
  - ➢ [G]: CPM down threshold temperature
  - ➢ [H]: Pressure roller target temperature
  - ➢ [1] to [9]: Stages 1 to 9, as explained in the following slides

Fusing Temperature Control - 5
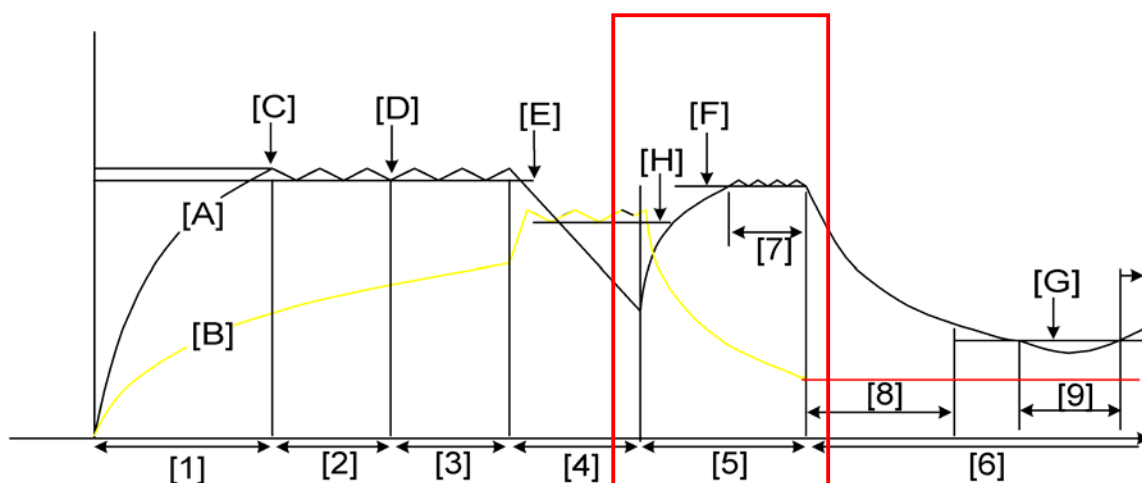

- **[5] Print ready mode**

  - This phase begins when a new job starts.

  - The pressure roller lamp turns off and the IH coil unit turns on.

  - When the job starts, the IH coil heats the fusing unit. The target temperature depends on the room temperature and the paper type.

  - When the thermopile detects the required temperature, the machine waits for a short interval ([7], set by SP 1910, 5 sec for middle thick paper, 0 sec for others). Then paper feed and image creation start.

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

[5] Print ready mode – additional note
- ❐ During this recovery period, the engine rotates at 77 mm/sec (SP 1911)
- ❐ If a job does not come within 10 seconds after the start of phase 5, the machine goes back to phase [4] standby mode (the IH coil turns off, and the pressure roller fusing lamp is used).

- ❐ Key to symbols in the diagram
  - ➤ [A]: Heating roller temperature
  - ➤ [B]: Pressure roller temperature
  - ➤ [C]: Heating roller target temperature for the ready condition
  - ➤ [D]: Extra idling target temperature
  - ➤ [E]: Idling target temperature
  - ➤ [F]: Heating roller target temperature for the print condition
  - ➤ [G]: CPM down threshold temperature
  - ➤ [H]: Pressure roller target temperature
  - ➤ [1] to [9]: Stages 1 to 9, as explained in the following slides

Fusing Temperature Control - 6
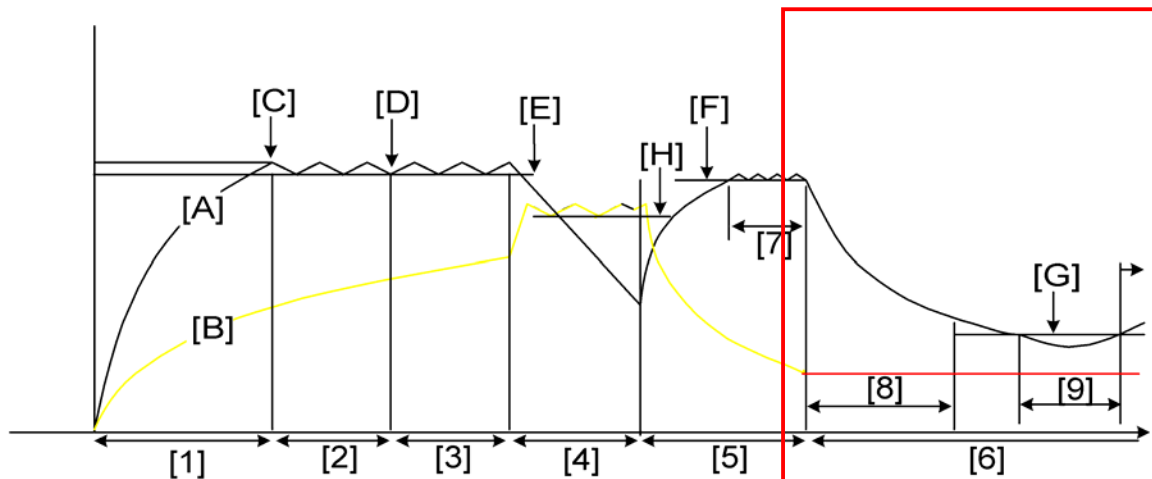
■ **[6] Print mode**

● The IH coil unit maintains the correct temperature.

● During interval [8], the copy speed is not reduced.

● Then, during interval [9], if the temperature is too low, CPM is reduced to prevent insufficient fusing, which could cause offset (partially fused toner spots on the paper). This mode is only used at line speeds of 205 (B224) or 154 (B222) mm/s (plain/middle thick paper, 600 x 600 dpi).

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

[6] Print mode – additional note

❒ The target temperature is increased for the first print. See SP 1915 for details.

❒ Remember the correction for paper size that we discussed earlier, with the ferrite roller. This is how the machine corrects for paper size.

❒ Key to symbols in the diagram

➢ [A]: Heating roller temperature
➢ [B]: Pressure roller temperature
➢ [C]: Heating roller target temperature for the ready condition
➢ [D]: Extra idling target temperature
➢ [E]: Idling target temperature
➢ [F]: Heating roller target temperature for the print condition
➢ [G]: CPM down threshold temperature
➢ [H]: Pressure roller target temperature
➢ [1] to [9]: Stages 1 to 9, as explained in the following slides

Fusing Temperature Control

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

■ **The components that are used to control the temperature depend on the machine's operating mode.**

● During machine ready mode: Heating roller and pressure roller thermistors.

● During standby mode, and energy saver mode: Pressure roller thermistor only.

● During printing, and in print ready and paper feed ready modes: Heating roller thermistor only.

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

❐ The service manual has a table that shows the default fusing control temperatures for different paper types and operating modes.

> *In addition, SP 9911 controls the pressure roller temperature upper and lower limits, if the IH coil receives more than 93% of full power.*

❐ Machine ready: After the power switch is turned on, the machine warms up. When the machine ready temperatures are detected, jobs can start.

❐ Paper feed ready: The machine can feed paper (for example, after recovery from energy saver mode).

❐ Print ready: A job can start (for example, after recovery from energy saver mode).

❐ Standby mode: This is between jobs, before energy saver mode starts.

Fusing Temperature Corrections

- **Corrections for ambient temperature (SP 1112)**

    - If the room temperature is below 17 °C, the heating roller temperature is increased by 5 °C (default).

    - If the room temperature is above 30 °C, the heating roller temperature is decreased by 0 °C (default).

- **If the room temperature is below 17 °C, and plain paper is used, the fusing temperature is decreased 10 minutes after the job starts (SP 9965 003).**

    - The amount of the temperature decrease is 5 °C (adjustable with SP 9965 004 to 007 for different paper types and room temperature conditions).

        - This prevents overheating, because the machine previously increased the fusing temperature by 5 °C (SP 1112, see above).

    - If the interval between jobs is 30 seconds or more (SP 9965 001 and 002), this fusing temperature decrease is cancelled.

        - Also cancelled if the paper type changes to thick or OHP, or if a paper jam occurs.

CPM Down Mode

■ **If the temperature of the fusing unit is too low, this could cause offset (partially fused toner spots on the paper).**

■ **To prevent this, CPM is reduced.**

■ **To do this, the machine adjusts the gaps between each sheet of paper.**

■ **This mode is only used for the maximum line speed.**

  ● 205 (B224) or 154 (B222) mm/s (plain/middle thick paper, 600 x 600 dpi)

■ **CPM down mode can be turned on or off with SP1-916-025 (default: "OFF" for B222, "ON" for B224).**

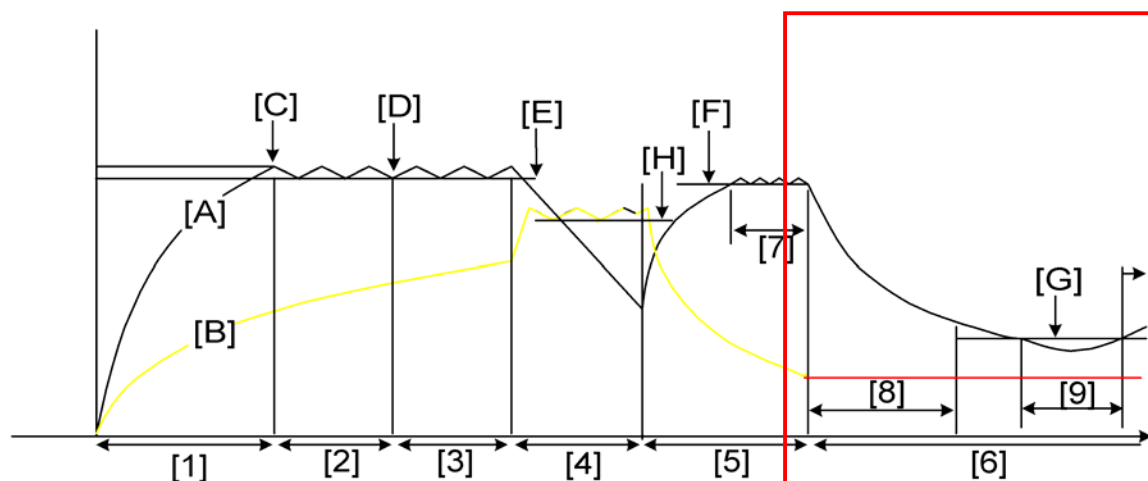*B222 service manual, Detailed Section Descriptions, Fusing, CPM Down System*

CPM Down Mode

■ **There are 2 steps.**

● Step 1: Only for full color mode using middle thick paper

- The power to the IH coil and the room temperature are monitored.

  – The efficiency of the IH coil depends on the amount of power that it receives.

- CPM is reduced if certain combinations of IH coil power and room temperature measurement are detected.

  – Reduced to 25 or 20 cpm (B222), 30 or 25 cpm (B224)

- Step 1 lasts for 20 seconds (SP 1916-023), then step 2 starts.

● Step 2: All jobs on plain or middle thick paper at full line speed

- CPM is reduced if the fusing temperature goes below the set temperature for the paper type.

  – Reduced to 25 cpm (B222), 30 cpm (B224)

❒ The amount of speed reduction is controlled by SP settings, as explained in the service manual.

CPM Down Mode

- **CPM down mode only activates during interval [9].**

  - If the temperature is too low, CPM is reduced.

- **This mode is only used at line speeds of 205 (B224) or 154 (B222) mm/s (plain/middle thick paper, 600 x 600 dpi).**

B222 service manual, Detailed Section Descriptions, Fusing, Fusing Temperature Control

❒ This slide shows when CPM down mode is done.

❒ It is not done until the start of interval [9].

❒ At what temperature does CPM down start? How low is 'too low'? This is specified by the settings of SP 1916 017 (plain paper), 018 (middle thick, b/w), and 019 (middle thick, colour)

Overheat Protection

- **The heating roller or pressure roller temperature becomes higher than 215 °C for one second or more**

  - SC 543 and SC 553 for the heating roller or SC 563 for the pressure roller.

- **The heating roller or pressure roller temperature reaches 220 °C.**

  - SC 544 and SC 554 for the heating roller or SC 564 for the pressure roller.

- **If the thermistors/thermopile fail, then the thermostats and thermofuse are additional safety measures.**

  - See the service manual for temperature cut-off information.

New Unit Detection

■ **The new unit contains a fuse, that blows a short time after the new unit is installed.**

  ● If the machine detects an intact fuse, followed shortly by a blown fuse, the machine automatically detects the new unit and resets the counters.

  ● This is necessary because in Japan, the transport company staff may replace the fusing unit, depending on the service contract.

■ **If individual components of the fusing unit are replaced, and not a complete unit, the machine does not detect them automatically.**

  ● Then, you must reset the PM counters for the fusing unit.

  ● To do this, set SP 3902 014 to 1 before you start to work on the fusing unit.

Replacement

■ **Do the following procedures**

● B222 Service Manual, Replacement and Adjustment, Fusing

■ **IMPORTANT: Turn off the main switch and wait until the fusing unit cools down before you start. The fusing unit can cause serious burns.**

■ **Notes**

● Pressure roller, bushings for fusing unit rollers: Make sure that you install these correctly, as shown in the manual.

❒ Have the trainees remove and replace the parts in this section of the manual.
❒ Remind them to follow all notes and cautions in the manual.

❒ Turn off the main switch and wait until the fusing unit cools down before beginning any of the procedures in this section. The fusing unit can cause serious burns.
❒ There is only one fusing lamp.

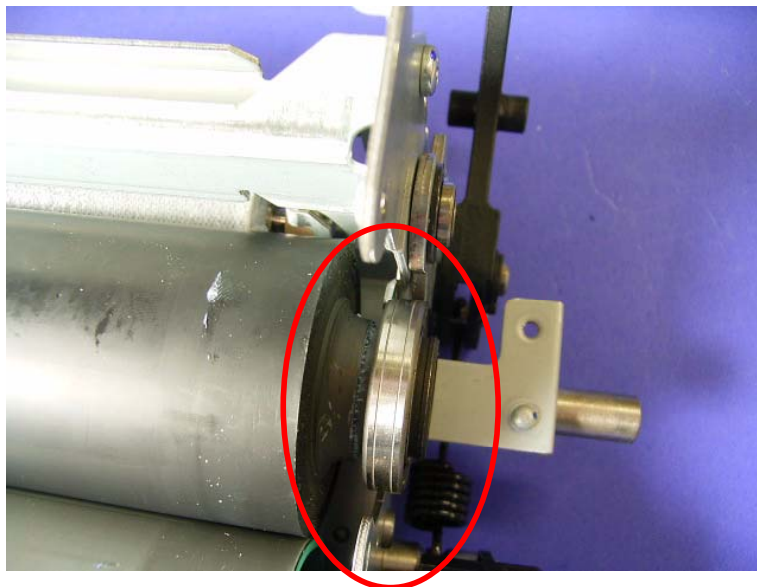# Notes for Replacement
Pressure Roller - 1

2 mm　　　　　　　　　2 mm

Rear　　　　　　　　　　　　　　　　Front

Apply half-way around,
not all the way around

■ **Barrierta S552R**

● Front: 2 mm from the notch

● Rear: 2 mm from the step

*B222 Service Manual, Replacement and Adjustment, Fusing, Pressure Roller and Pressure
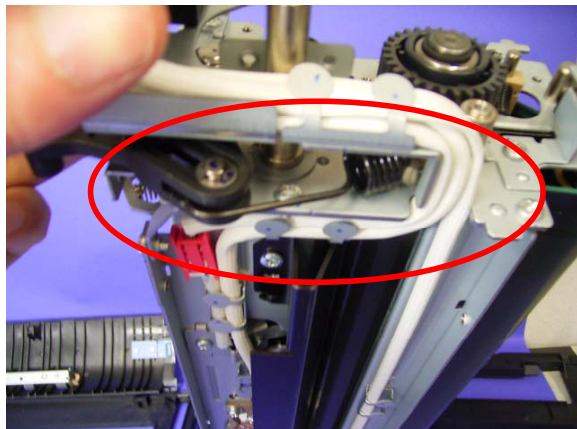Roller Bearing*
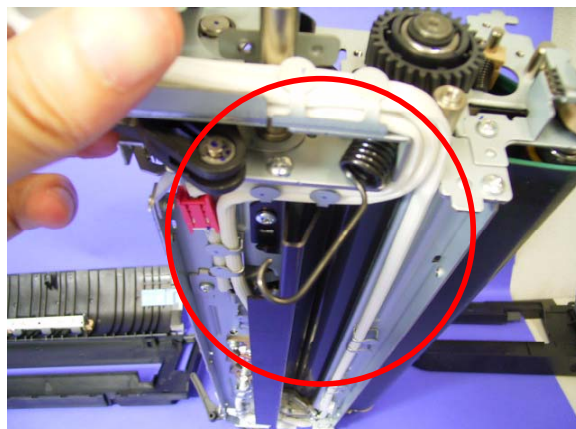
Notes for Replacement
Pressure Roller - 2

■ **At the front side, set the bushing correctly.**

B222 Service Manual, Replacement and Adjustment, Fusing, Pressure Roller and Pressure Roller Bearing

Notes for Replacement
Pressure Roller - 3

Correct   Incorrect

■ **Hook the spring on the upper frame correctly.**

B222 Service Manual, Replacement and Adjustment, Fusing, Pressure Roller and Pressure Roller Bearing

Notes for Replacement
Fusing Roller

Rear   Front
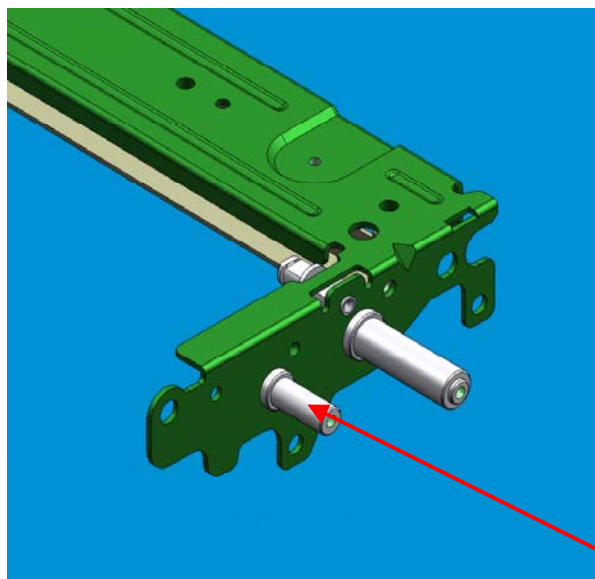

■ **Barrierta S552R**

● Front: 3 spots, 3 mm in diameter, 2-3 mm from the notch

● Rear: 3 spots, 3 mm in diameter, 2-3 mm from the step

B222 Service Manual, Replacement and Adjustment, Fusing, Fusing Belt, Heating Roller,
Heating Roller Bushing and Fusing Roller

Notes for Replacement
Fusing Roller Idle Gear

■ **Barrierta S552R**

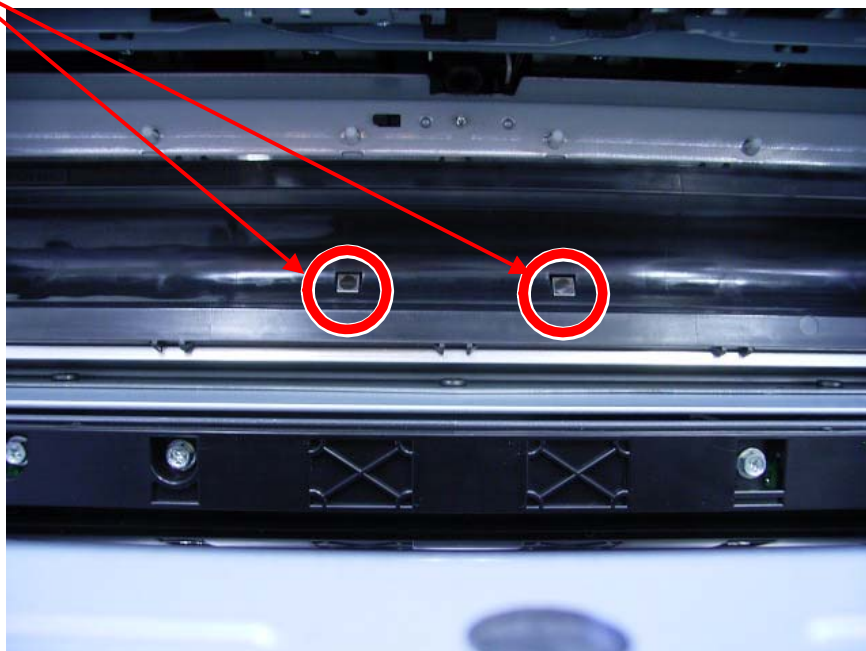● 1 spot, 3 mm in diameter, on the idle gear shaft

Idle Gear
Shaft

B222 Service Manual, Replacement and Adjustment, Fusing, Fusing Roller One-way Clutch and Idle Gear

Notes for Replacement
IH Coil Unit

Thermostats

■ **Do not push the thermostats on the IH coil unit. They break easily.**

B222 Service Manual, Replacement and Adjustment, Fusing, IH Coil Unit

Notes for Replacement
Fans

- **Make sure that you install all the fans the correct way round, as shown in the manual.**

- **If you install a fan the wrong way around, the fusing unit will not have sufficient air flow through it.**

❒ Each procedure in the manual has instructions on how to install the fan correctly.

SP Modes - 1

■ **Fusing Idling**

- 1115 001: Interval between idling when in standby mode (default 60 minutes)

  • This prevents hot roller deformation

- 1115 002: Duration of idling in standby mode (default 2 seconds)

SP Modes - 2

■ **1106: Displays the temperatures inside the fusing unit**

■ **1109: Nip band test**

- If the nip band width is not correct, replace the pressure roller or add a new fusing unit. There is no nip band width adjustment.

■ **1113: Interval before the machine goes to standby mode after getting to ready mode or after recovering from energy saver mode**

- Default: After 60 seconds if no job starts after getting to the ready mode from standby mode (1113 001)

- Default: After 10 seconds if no job starts after getting to the ready mode from energy saver mode (1113 001)
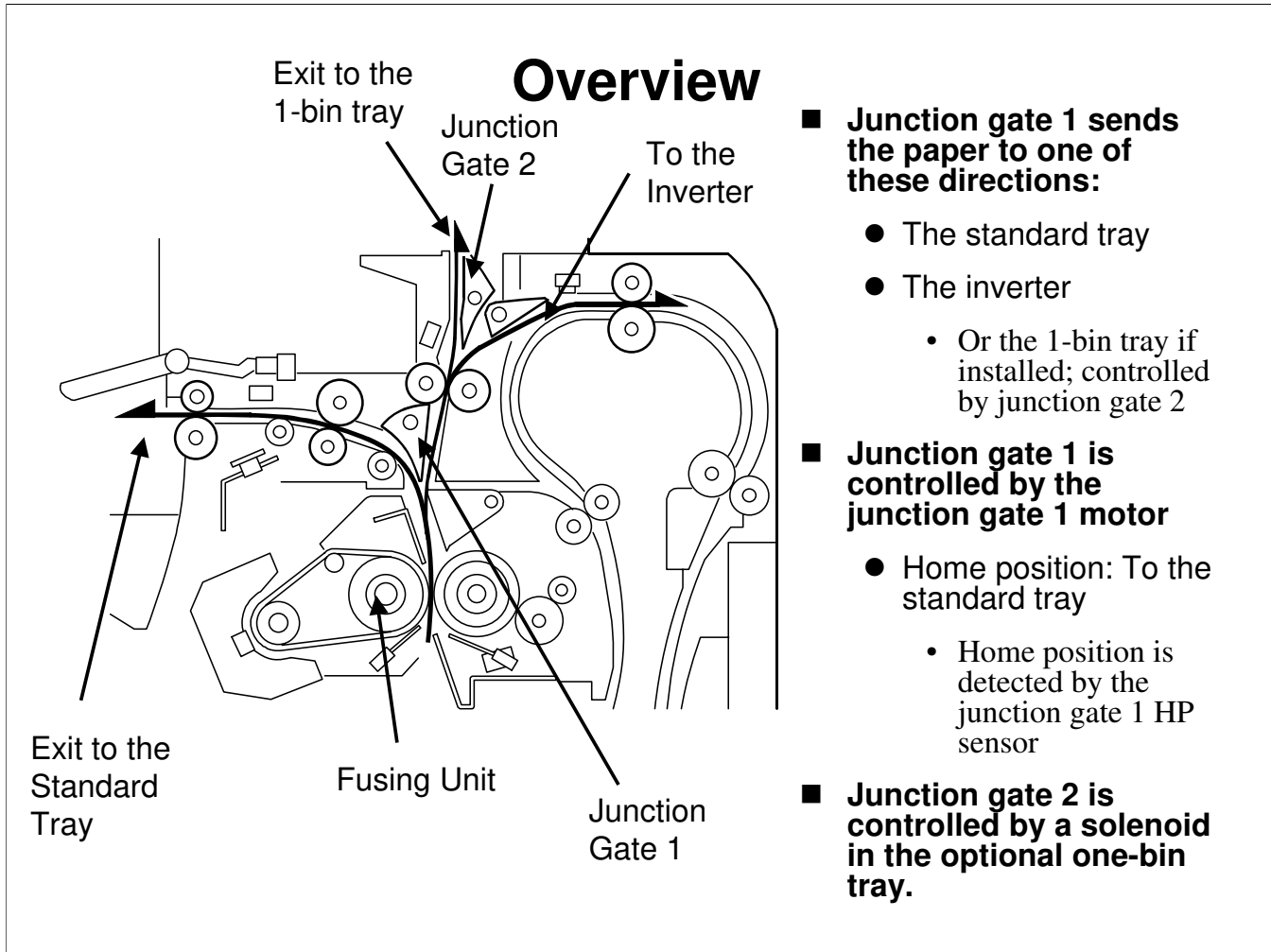
Fusing Unit Jams

■ **Normally, the user will remove fusing unit jams.**

■ **But, if SP 1159 is changed to 'on', the machine stops if a jam occurs in the fusing unit for three consecutive paper feeds. Then, SC559 appears. The technician must remove the jam.**

RICOH

APOLLON-C1 TRAINING

PAPER EXIT

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

Overview

Exit to the 1-bin tray

Junction Gate 2

To the Inverter

Exit to the Standard Tray

Fusing Unit

Junction Gate 1

- **Junction gate 1 sends the paper to one of these directions:**
  - The standard tray
  - The inverter
    - Or the 1-bin tray if installed; controlled by junction gate 2
- **Junction gate 1 is controlled by the junction gate 1 motor**
  - Home position: To the standard tray
    - Home position is detected by the junction gate 1 HP sensor
- **Junction gate 2 is controlled by a solenoid in the optional one-bin tray.**

B222 service manual, Detailed Section Descriptions, Paper Exit, Overview

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

❒ Junction gate 2 is controlled by a solenoid in the optional one-bin tray. It does not operate if the one-bin tray is not installed, and the path to the one-bin tray remains closed.

Junction Gate – To the Standard Tray
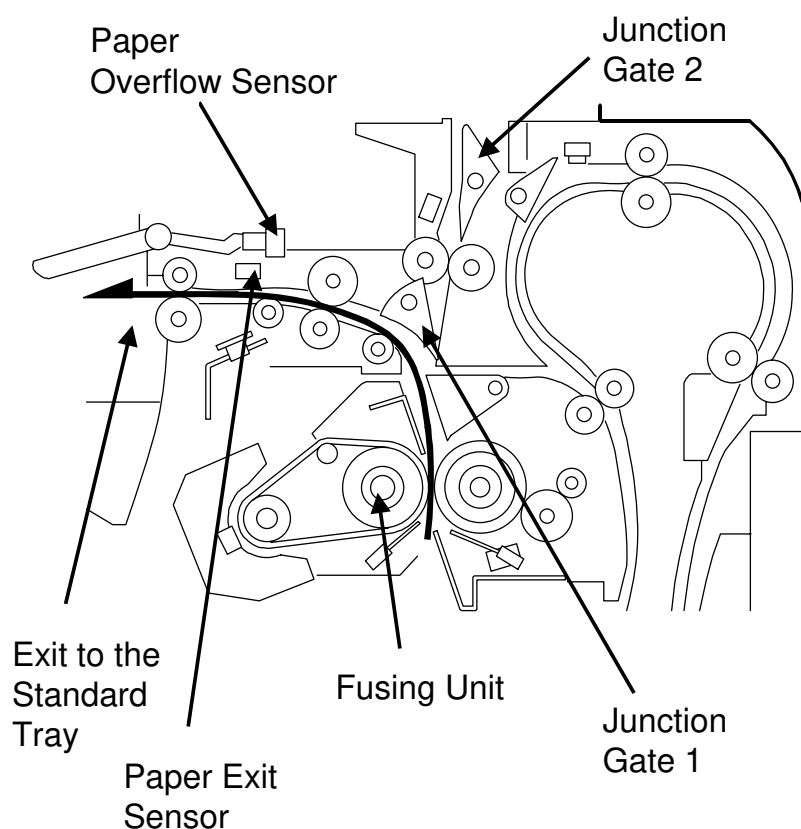
- **To feed paper to the standard tray, the junction gate is at the default position.**

- **The paper exit sensor detects jams.**

- **If the paper overflow sensor remains activated, the machine detects that the tray is full.**

B222 service manual, Detailed Section Descriptions, Paper Exit, Junction Gate Mechanism

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

Junction Gate – To the Standard Tray
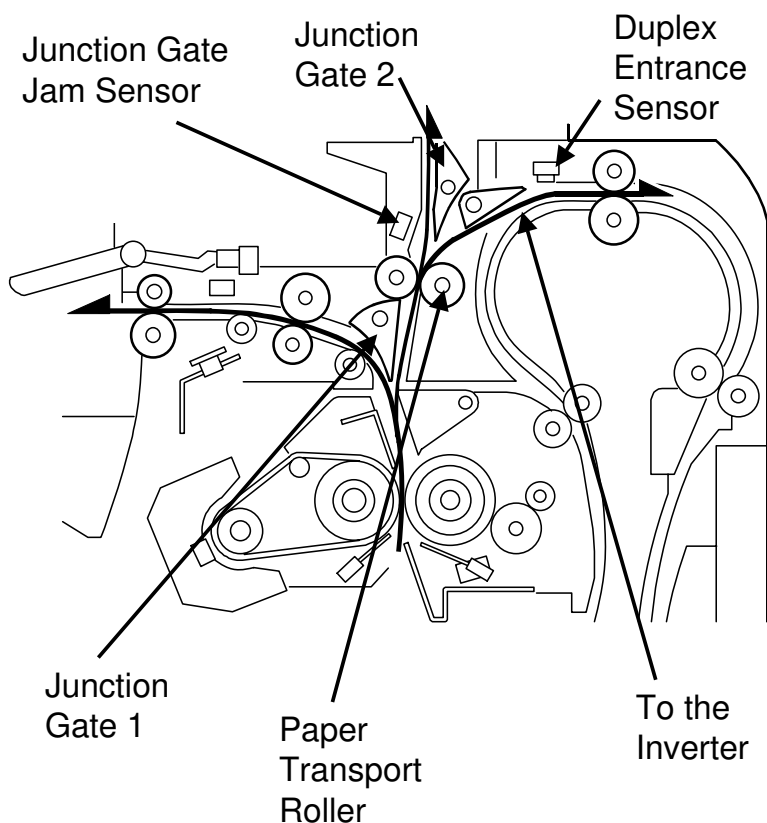
Fusing/Paper
Exit Motor
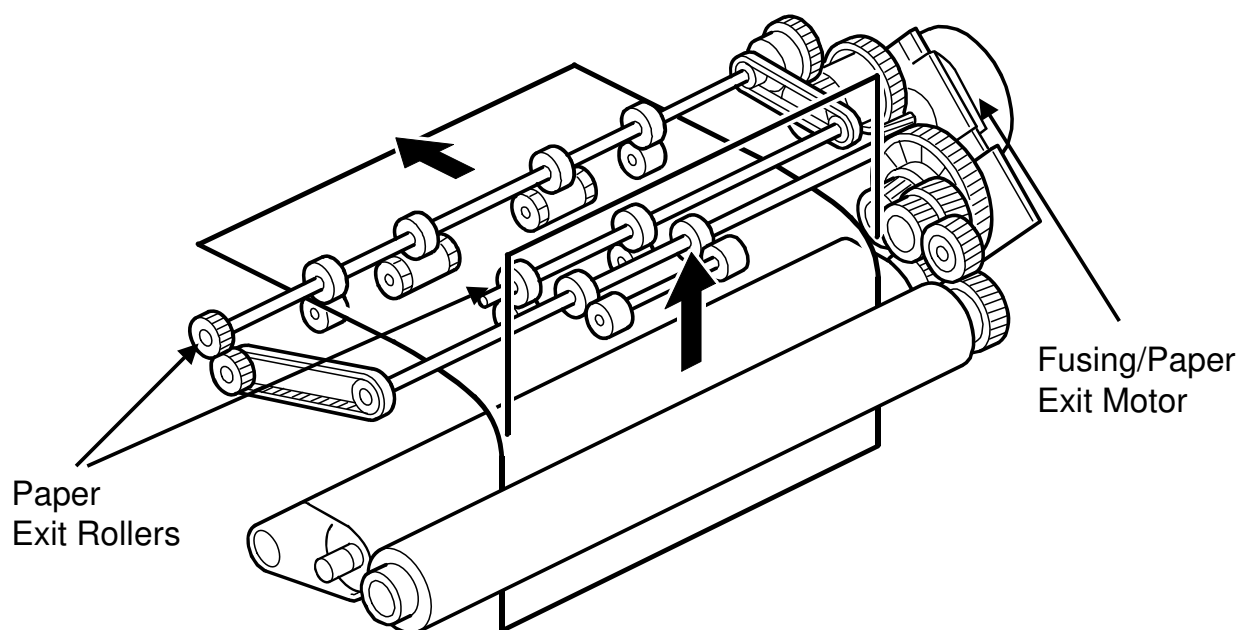
Paper
Exit Rollers

■ **The fusing/paper exit motor drives the paper exit rollers.**

B222 service manual, Detailed Section Descriptions, Paper Exit, Junction Gate Mechanism

❒ Here is a three-dimensional view of the mechanism.
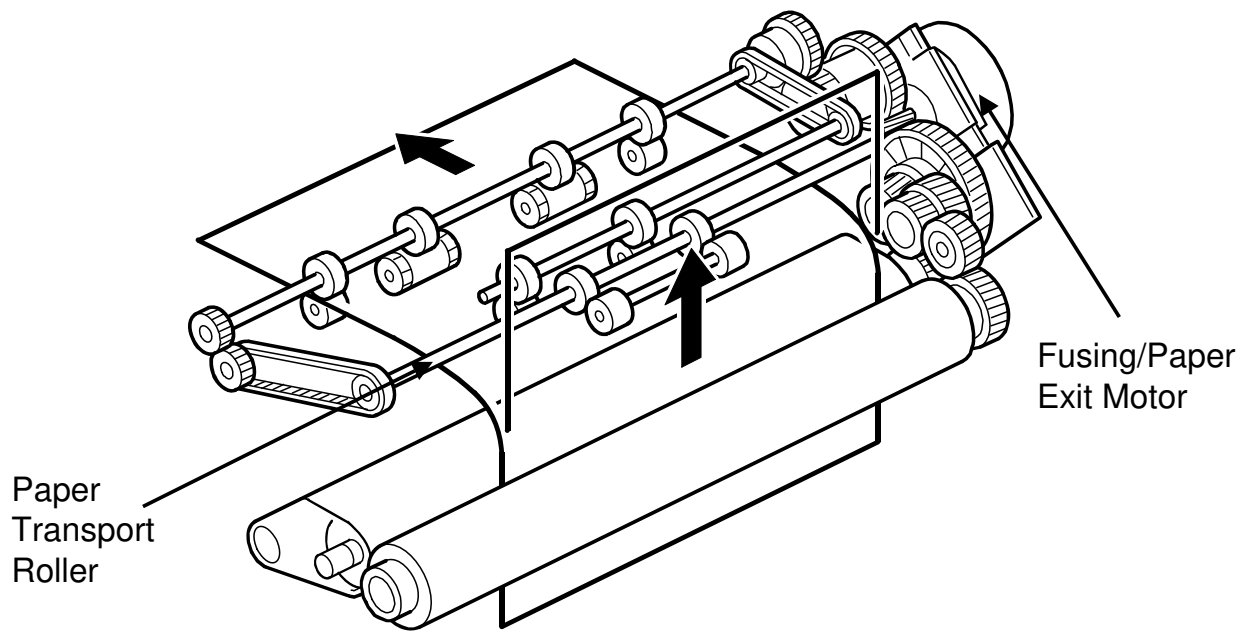
Junction Gate – To the Inverter

Junction Gate Jam Sensor

Junction Gate 2

Duplex Entrance Sensor

Junction Gate 1

Paper Transport Roller

To the Inverter

■ **To feed paper to the inverter tray, junction gate 1 moves away from home position.**

■ **If the optional one-bin tray is installed, junction gate 2 sends the paper to the inverter.**

  ● Junction gate 2 is controlled by a solenoid in the optional one-bin tray.

B222 service manual, Detailed Section Descriptions, Paper Exit, Junction Gate Mechanism

❒ Duplex entrance sensor: Detects jams in the inverter path
❒ Junction gate jam sensor: Detects jams in the exit to the one-bin tray

Junction Gate – To the Inverter

Fusing/Paper
Exit Motor

Paper
Transport
Roller

- ■ **The paper transport roller feeds the paper up to the inverter.**

- ■ **The fusing/paper exit motor drives the paper transport roller.**

B222 service manual, Detailed Section Descriptions, Paper Exit, Junction Gate Mechanism

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

Junction Gate – To the One-bin Tray

Junction Gate 2
(inside the copier)

Solenoid
(inside the one-bin tray)
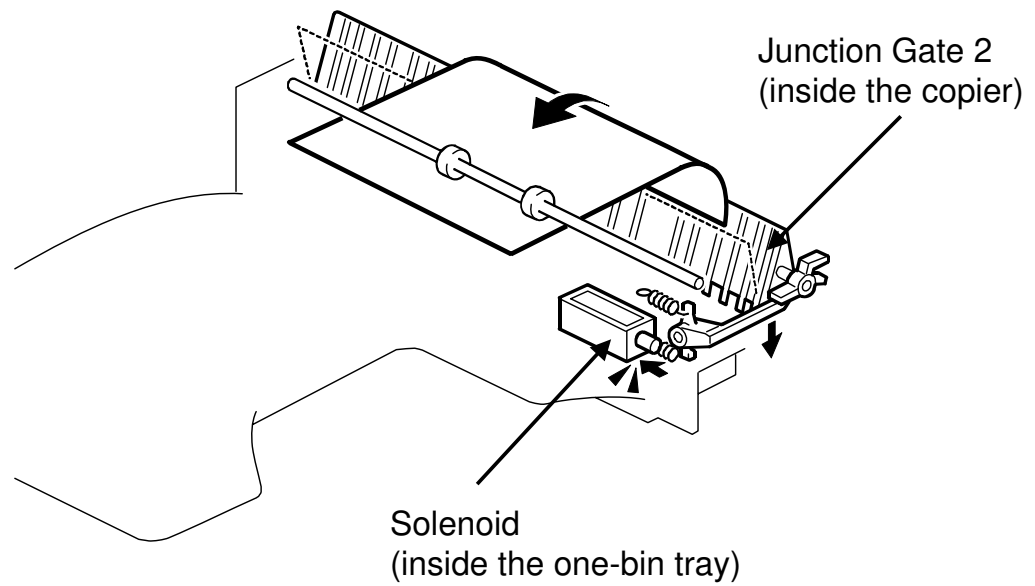
■ **The junction gate solenoid in the one-bin tray unit operates junction gate 2 in the main copier to send paper to the one-bin tray.**

RICOH

APOLLON-C1 TRAINING

DUPLEX

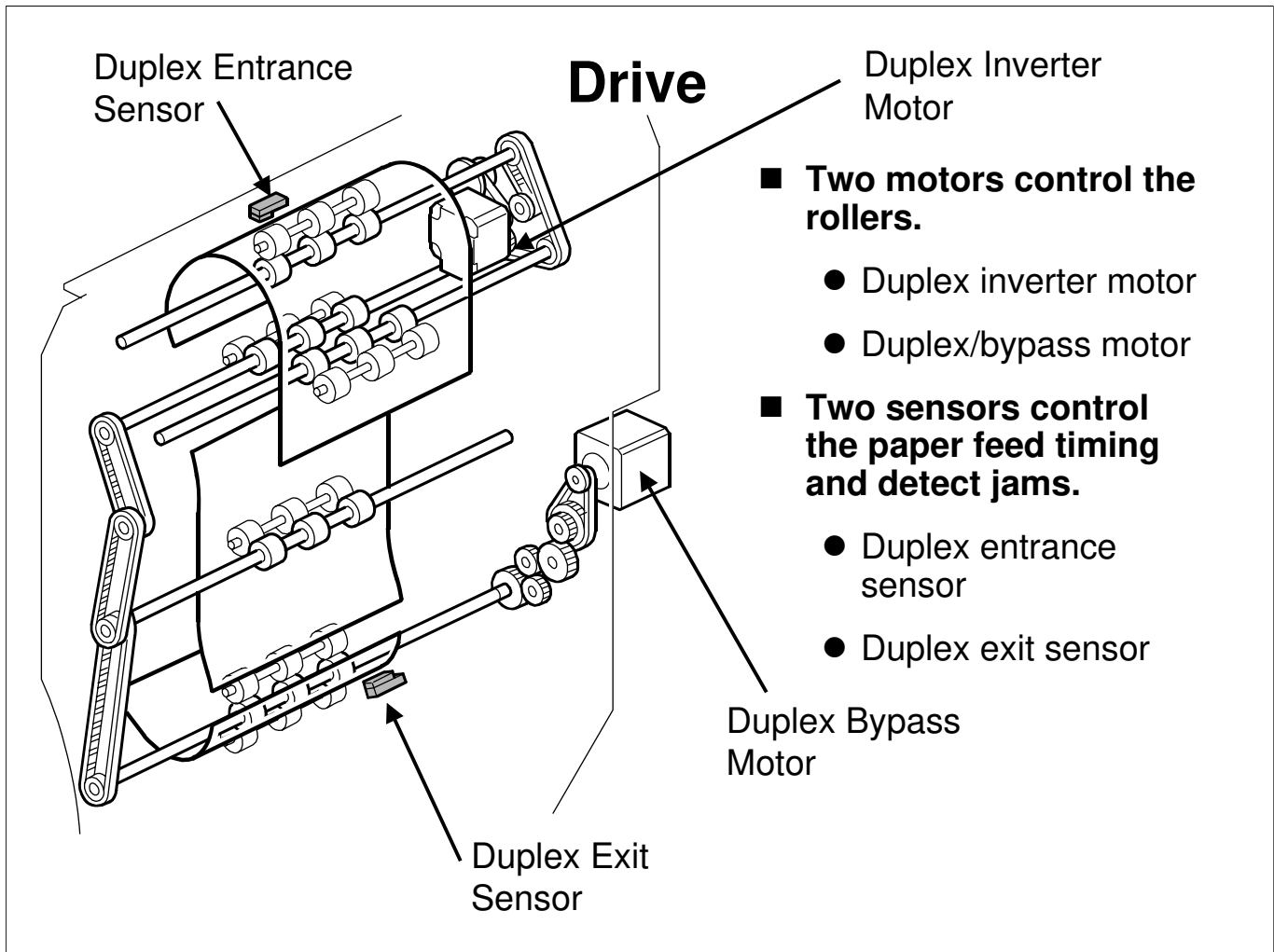❒ In this section, the duplex mechanism will be described.

Overview

- **To print on the second side, the machine feeds the paper to the inverter.**

- **The inverter rollers then reverse feed, and the paper goes to the duplex unit.**

- **The duplex transport rollers feed the inverted paper down to the registration rollers.**

- **After both sides are printed, the machine feeds the paper out to the standard tray.**

Standard Tray

Inverter

Inverter Rollers

Fusing Unit

Duplex Transport Rollers

Registration Rollers
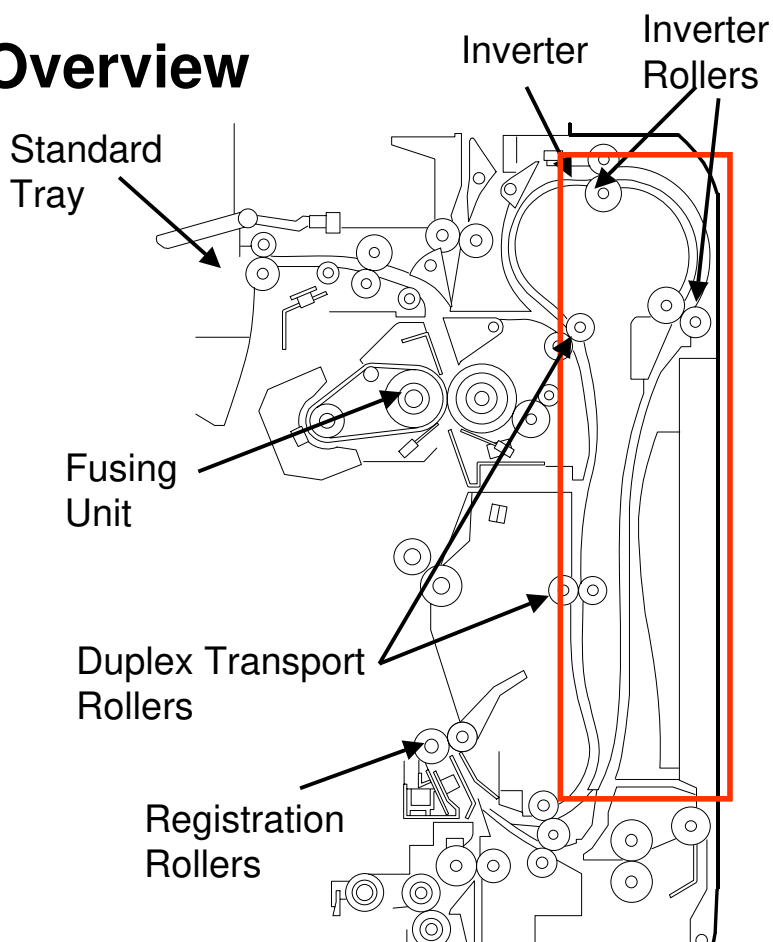
B222 service manual, Detailed Section Descriptions, Duplex Unit, Overview

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

Duplex Entrance
Sensor

Drive

Duplex Inverter
Motor

■ **Two motors control the rollers.**

● Duplex inverter motor

● Duplex/bypass motor

■ **Two sensors control the paper feed timing and detect jams.**

● Duplex entrance sensor

● Duplex exit sensor

Duplex Bypass
Motor

Duplex Exit
Sensor

B222 service manual, Detailed Section Descriptions, Duplex Unit, Duplex Drive

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

Service manual correction

❒ There are two rollers [C] in the diagram in the service manual. The motor [A] drives the upper roller [C], not the lower roller.

❒ The duplex/by-pass motor [D] also drives duplex transport rollers [C].

❒ There is a one-way clutch on the shaft of the top of the two rollers [C], where it meets the timing belt of motor [A]. Because of this,when the motor [A] feeds the paper into the inverter, the top roller [C] does not turn.

❒ Then after inverting, motor [A] changes direction, and the paper goes back into the machine. For some longer paper sizes, the previous sheet is still feeding when this happens,so motor [A] must stop while motor [D] is still feeding the previous sheet down to the registration roller. This is why we have two motors ([A], [D]) controlling one roller (upper of the two rollers [C]).
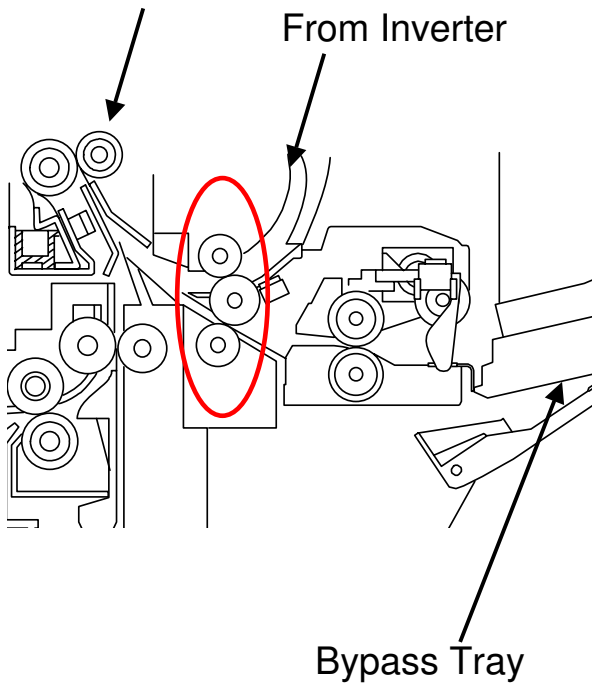
Duplex/Bypass Motor

Registration Rollers

From Inverter

Bypass Tray

- **There are three rollers at the bypass tray exit (in the red circle in the diagram).**

  - The top and middle rollers feed paper from the inverter.

  - The bottom and middle rollers feed paper from the bypass tray.

  - The middle roller is driven by the duplex/bypass motor.

    - The top and bottom rollers are idle.

  - Because of this, the duplex/bypass motor can turn in both directions.

    - Clockwise: Feed from bypass tray

    - Counter-clockwise: Feed from inverter

  - But the bypass tray cannot be used in duplex mode.

❐ This is a close-up view of the bypass tray exit.

Inverter Feed Path

Junction
Gate 1

Inverter
Rollers

Inverter
Feed Path

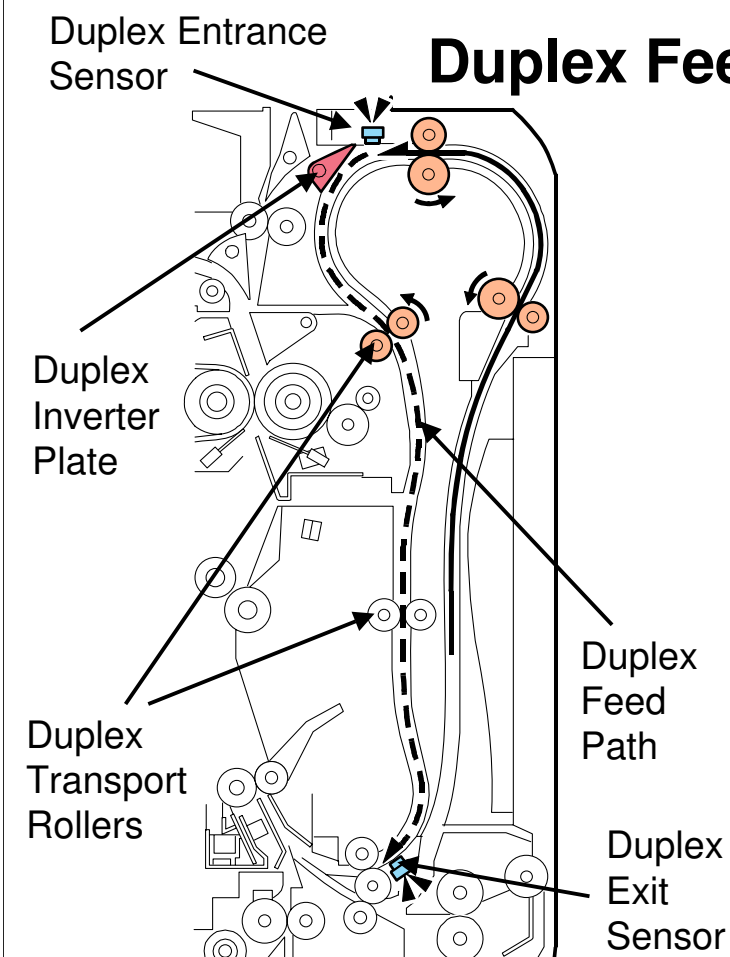- ■ **Junction gate 1 opens.**
  - ● Controlled by the junction gate 1 motor.
- ■ **The inverter rollers feed the paper into the inverter.**
  - ● These rollers are controlled by the duplex inverter motor.

Duplex Feed Path

Duplex Entrance Sensor

Duplex Inverter Plate

Duplex Transport Rollers

Duplex Feed Path

Duplex Exit Sensor

- **When the duplex entrance sensor detects the trailing edge of the paper, the inverter rollers stop.**

- **Then the inverter rollers change direction to feed the paper back into the machine, down the duplex feed path.**

- **The duplex inverter plate opens to let the paper into the duplex feed path.**
  - Controlled by the duplex inverter solenoid.

- **The duplex transport rollers feed the paper through the duplex feed path.**
  - Controlled by the duplex inverter motor.

- **The duplex exit sensor detects the leading edge of the paper at the end of the duplex feed path.**

Interleaving

■ **The number of sheets of paper that can be in the paper feed path at the same time depends on the paper length.**

● Up to A4/LT LEF: Three sheets

● From A4/LT LEF to 400 mm long: Two sheets

● Longer than 400 mm: One sheet (no interleaving)

B222 service manual, Detailed Section Descriptions, Duplex Unit, Duplex Operation
❒ The service manual shows details of how interleaving is done in this model.

Replacement

■ **Do the following procedures**

- ● B222 Service Manual, Replacement and Adjustment, Duplex Unit

❏ Have the trainees remove and replace the parts in this section of the manual.
❏ Remind them to follow all notes and cautions in the manual.