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D115/D116
Service Training

Product Overview

S-C4.5

Slide 1

Draft started: 19 November 2010

First draft completed: 22 November 2010

Machine Appearance

Slide 2

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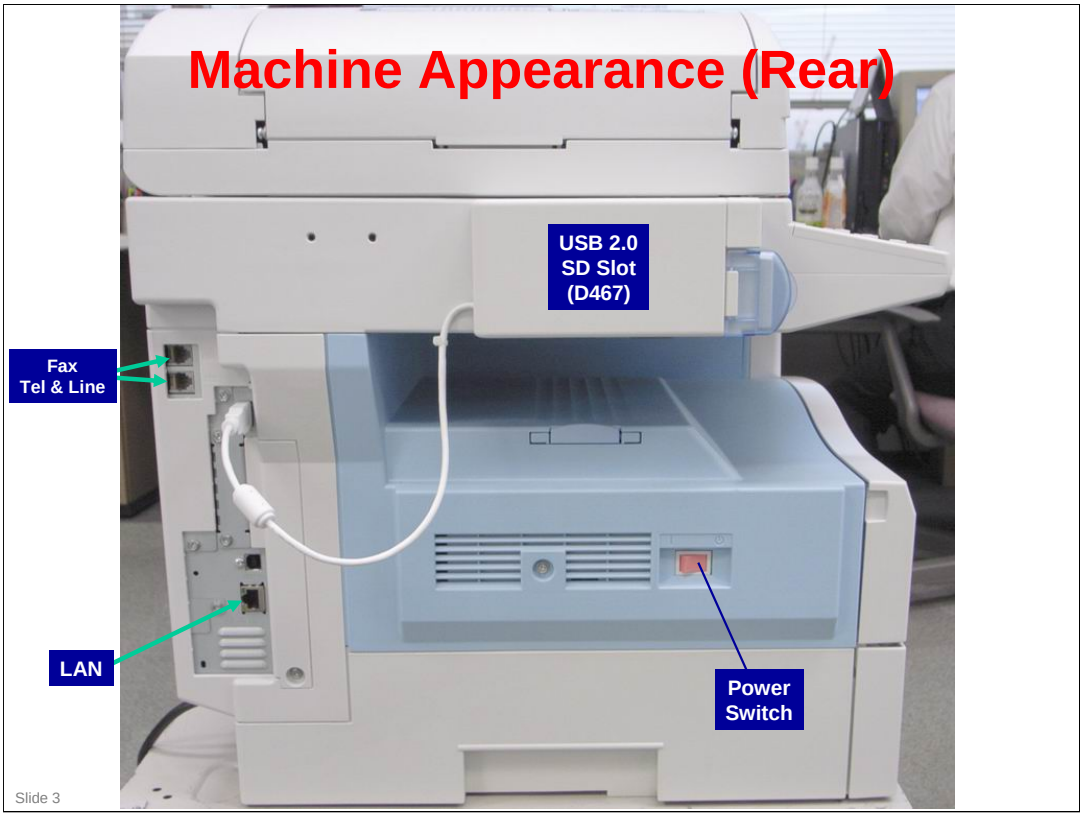
Machine Appearance (Rear)
USB 2.0
SD Slot
(D467)
Fax
Tel & Line
LAN
Power
Switch
Slide 3

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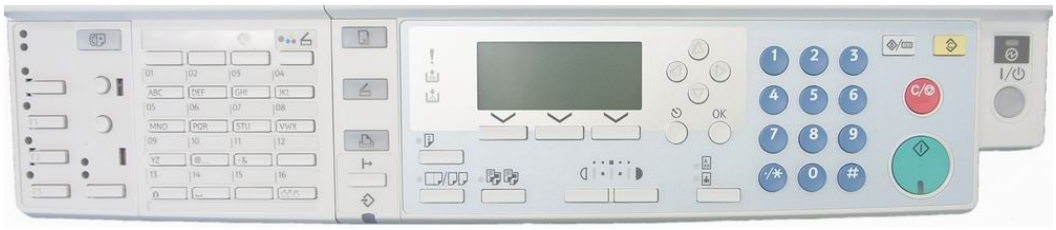
Operation Panel



- FAX functions on left side of panel above are standard on D115 and D116 models.
- Note that unlabeled section on left is labeled with relevant language for region in which machine is to be used.

Slide 4

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New for this Model

- **The major technical enhancement for the D115/D116 is Increased copy speed**
  - 17 cpm → 20 cpm

Slide 5

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Who Will Use This Model

- **Small office users (3-10 people) or individuals (as a personal business machine).**
- **Mid to large sized offices (10-50 people) as a work group division printer/scanner.**
- **Mid to large sized offices as a business personal machine.**
- **This machine has these benefits:**
  - Compact size
  - Quick warm up time
  - Color scan to E-mail feature
  - Standard duplex printing (both scan and print)
  - Copier/printer/color scanner

Slide 6

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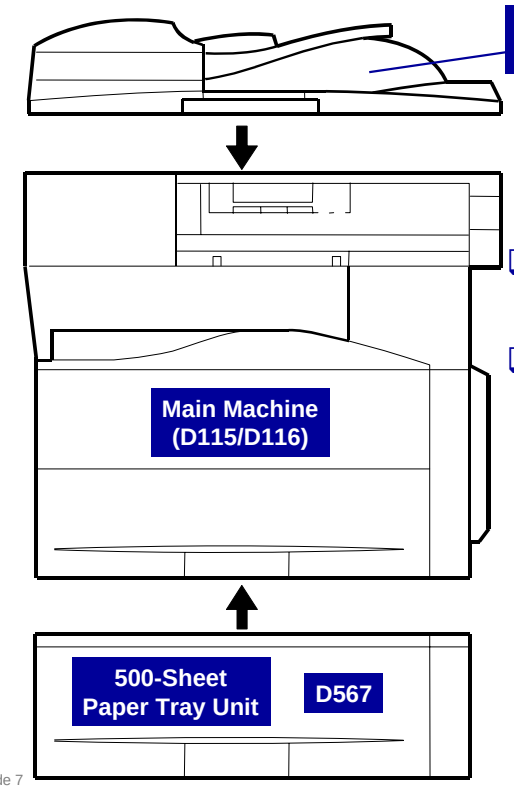

Machine Configuration - 1/3

- **ARDF (B872)**
  - Standard on D115/D116
- **500-Sheet Paper Tray Unit (D567)**
  - Two may be used together.
  - Note that - when using two D567 units - a tray heater may only be installed on upper of two units (nearest the main machine).

Slide 7

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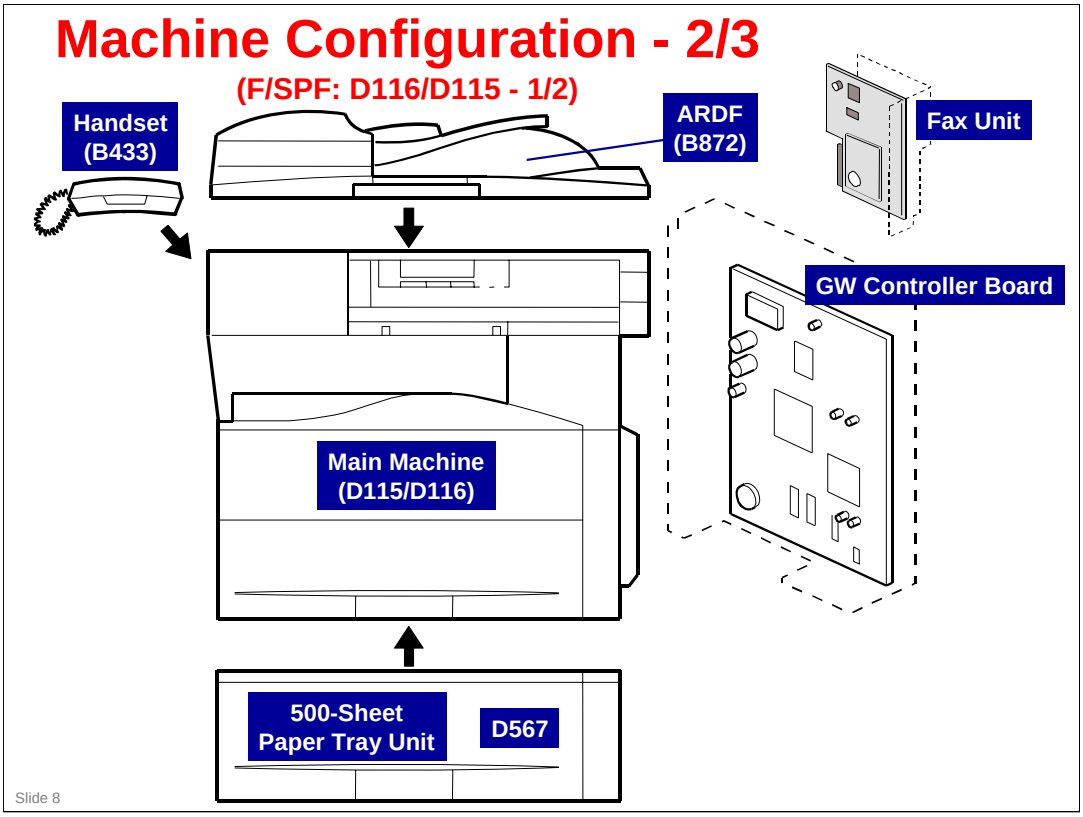
Machine Configuration - 2/3
(F/SPF: D116/D115 - 1/2)
Handset (B433)
ARDF (B872)
Fax Unit
GW Controller Board
Main Machine (D115/D116)
500-Sheet Paper Tray Unit
D567
Slide 8

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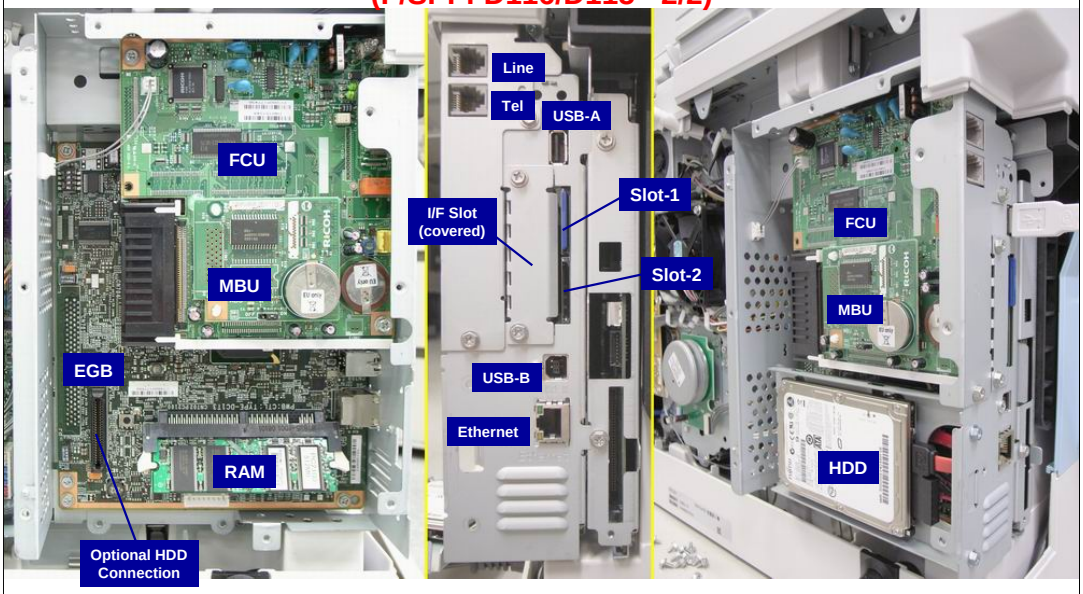
Machine Configuration - 3/3

(F/SPF: D116/D115 - 2/2)



- MBU - Memory Board Unit / FCU - Fax Control Unit / EGB - Main Engine Board
- HDD - Hard Disk Drive / RAM - Random Access Memory
- Be sure to remove all thirteen cover screws to access the EGB, MBU, FCU, & RAM boards.

Slide 9

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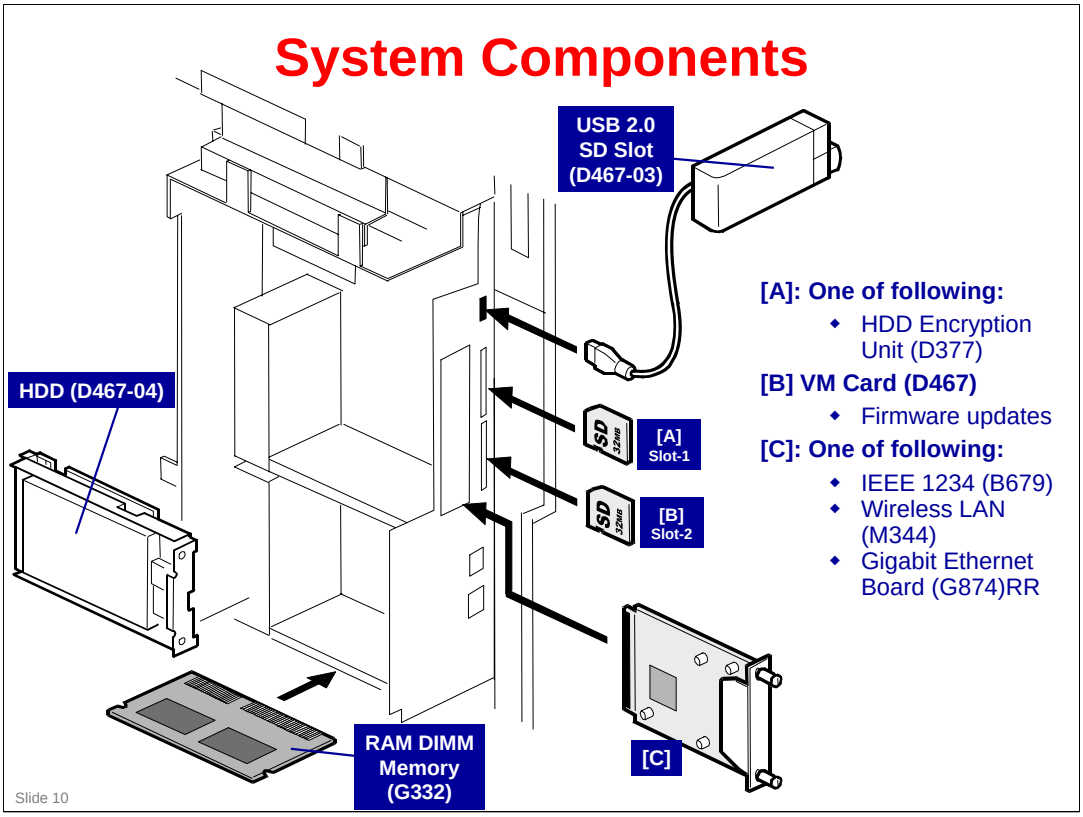
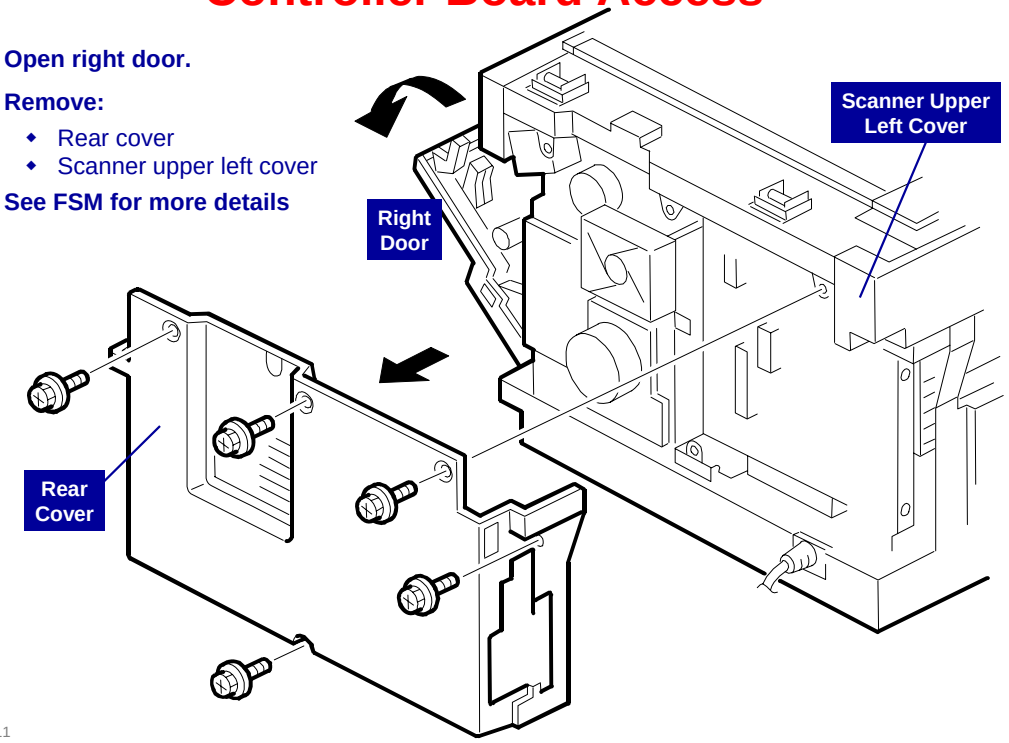


RAM DIMM memory distributed with the printer.

Controller Board Access

- Open right door.
- Remove:
  - Rear cover
  - Scanner upper left cover
- See FSM for more details



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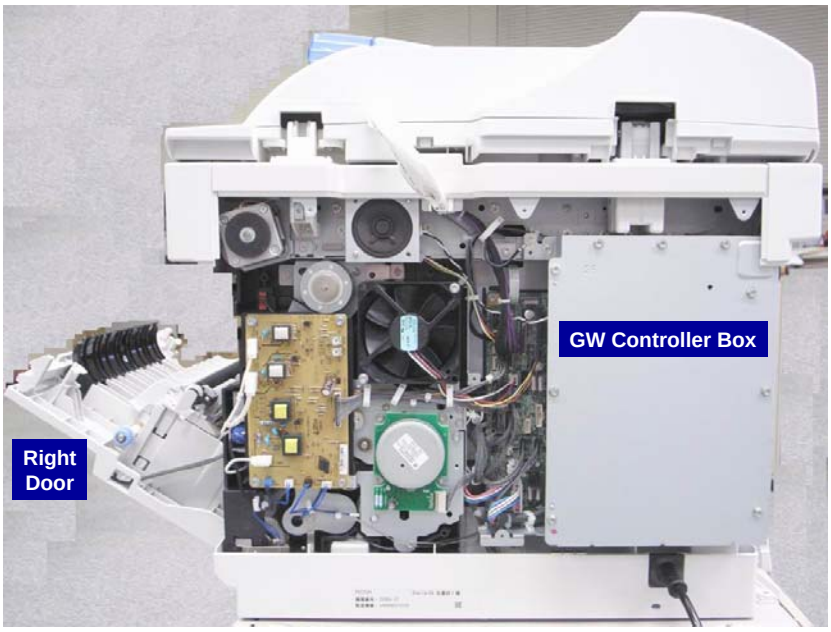
Optional HDD - 1/3



❑ To install the HDD Unit (Hard Disk Drive), first remove the rear cover of the machine, and then the GW Controller Box cover (thirteen screws).

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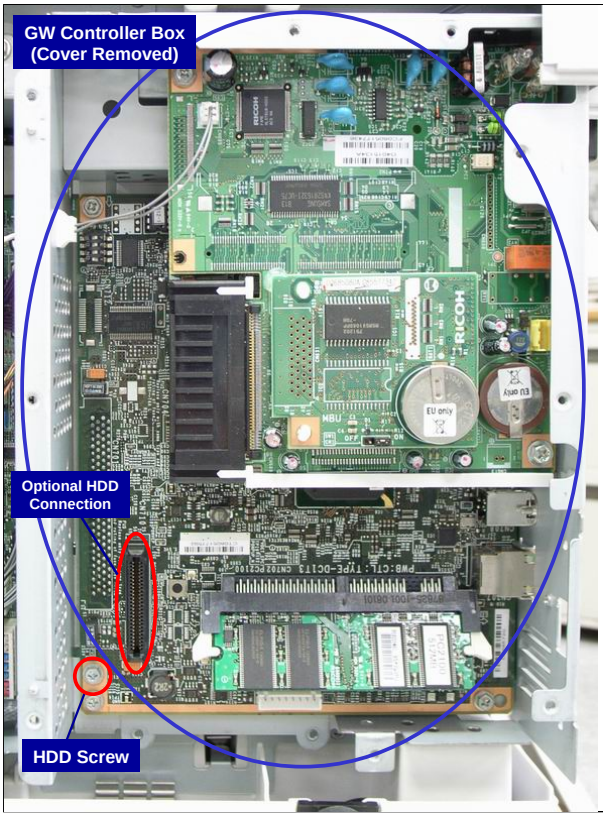

Optional HDD - 2/3

- **Note: Before plugging in the optional HDD unit, the screw indicated at left must first be removed.**
- **After removing the indicated screw, plug in the HDD unit and then reattach the screw (which holds the HDD unit against the Main Engine Board), as well as the other two HDD screws (see next slide).**

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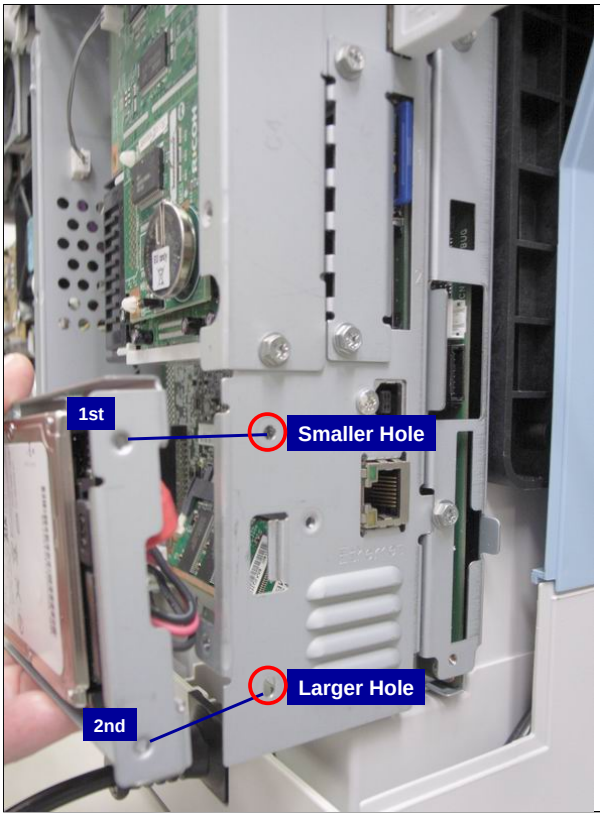

Optional HDD - 3/3

- **When attaching the two HDD Unit screws from the end of the GW controller box, attach the screw into the smaller hole first, and the larger hole secondly.**
  - This allows for adjustment and easier attachment.

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Service Training
Specifications
Slide 15

General Specifications

- **Configuration: Desktop**
- **Copy Process: Laser scanning & electrophotographic printing**
- **Copy speed: 20 ppm**
  - A4 / 8½" x 11"; 100% (printing from memory)
- **Warm up: (basic) 10 seconds / (other) approximately 30 seconds**
- **First copy time: 7.5 seconds or less**
- **Copy paper capacity:**
  - Paper tray: 250 sheets
  - Optional paper tray: 500 sheets x 2
  - Bypass: 100 sheets
- **Toner Yield: 7,000 copies per toner bottle**

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More Specifications

- **For a more detailed description of machine's specifications, refer to specifications section of FSM (Field Service Manual), noting in particular the following:**
  - Copy paper size
  - Copy paper weight
  - Power consumption and machine dimensions
  - Copy paper capacity
  - Original paper size
  - Paper feed

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Machine Configuration - 1/2

- **There are two machines in this series – D115 and D116. Machine configuration varies depending on version.**
- **Examine machine configurations in specifications section of FSM for more details, briefly:**
  - D116 - Fax Model (F)
  - D115 - Printer/Scanner and Fax Model (SPF)
- **Other connectivity options are also available (depending on machine version).**

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Machine Configuration - 2/2

- B872 - ARDF
- D567 - Paper Tray Unit
- D467-03 - USB-2.0/SD Slot - Type B (only for D069)
- D577 - HDD Option, Type 201
- B446-83 - PCU (Photo Conductor Unit), Type 1515
- D461 - Accessibility Handle, Type C
- G874-01 - 1000 base-T

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Service Training

Installation

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Before You Start

- **Read Installation chapter of FSM before installing machine, noting:**
  - Environment (ventilation, temperature range, etc.)
  - Space and power requirements.
  - Accessory check (for model you will install).
- **Before installing optional units, be sure to:**
  - **Switch machine off and remove power cord and network cable.**
- **Keep system parameter report. You will need it for any future troubleshooting of machine.**

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Installation

- **Install machine. See "Installation" of FSM.**
- **Install optional paper tray unit and optional paper tray unit heater.**
- **Be sure to keep in mind the following when you install machine and paper tray unit:**
  - You do not need to pull toner bottle holder completely out of machine.
  - Do not remove inner cap of toner bottle.
  - Do not use force to turn toner bottle after you have set it in toner bottle holder. Machine will turn bottle.
  - Remove all tape from machine.

Slide 22

Service Program Mode

- **Standard maintenance work requires utilization of SP modes. There are two kinds of SP modes for this machine:**
  - SP Mode (Service Program mode)
  - SSP Mode (Special Service Program mode)
    - » SP & SSP modes are for service technician only. Do not let users access SP & SSP modes.
- **Read the Service Program section of FSM. Then try entering some of the SP and SSP modes (after you have finished installing the machine).**

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D115/D116
Service Training
Machine Overview and Machine Operation
Slide 24

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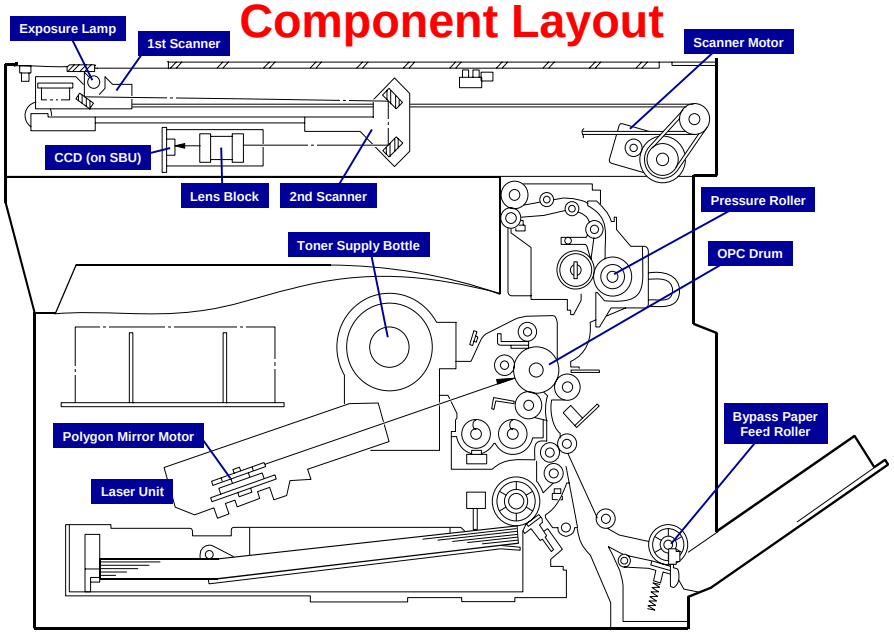
Component Layout



❑ For more details on component parts, see the FSM (Field Service Manual).

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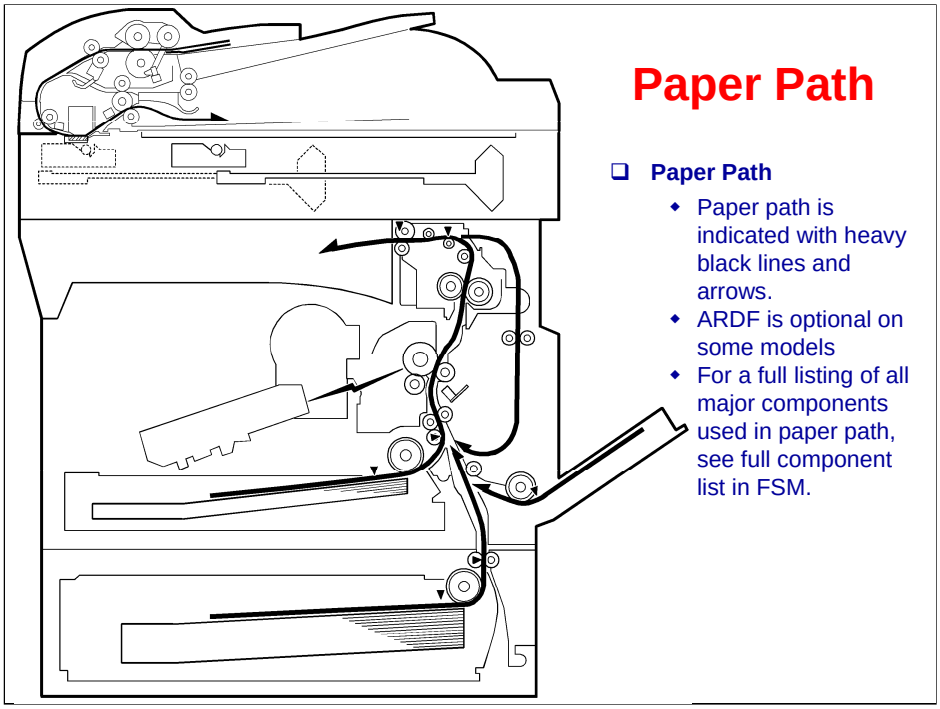

Paper Path

- **Paper Path**
  - Paper path is indicated with heavy black lines and arrows.
  - ARDF is optional on some models
  - For a full listing of all major components used in paper path, see full component list in FSM.

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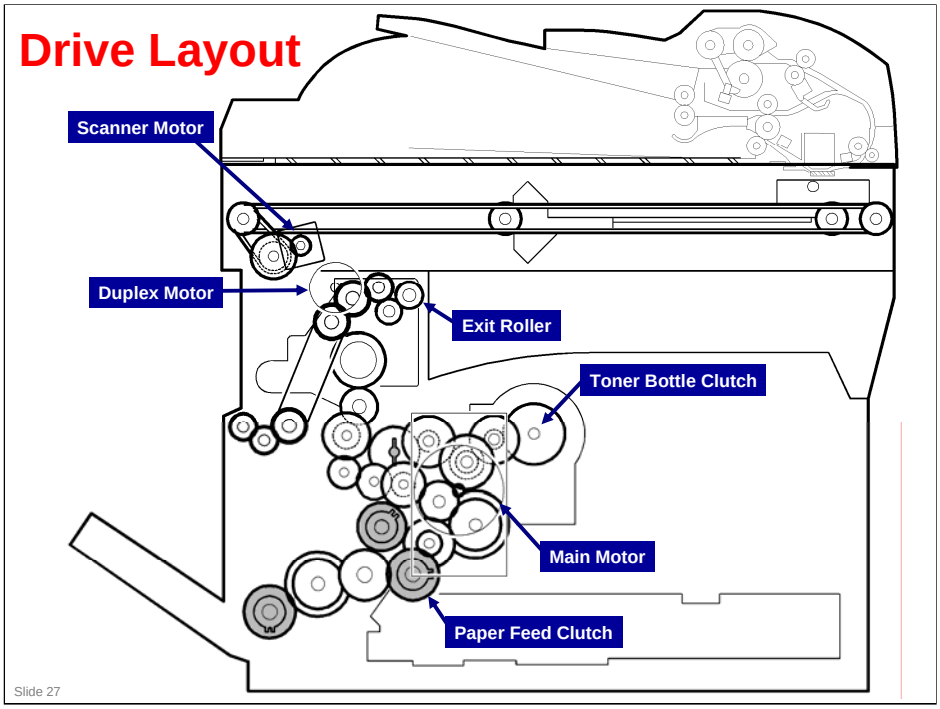
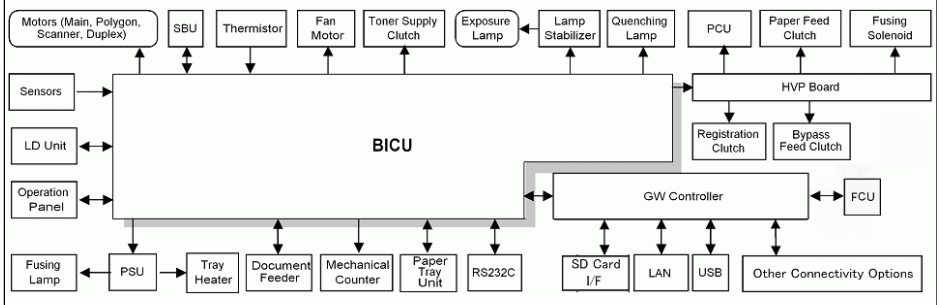


Drive Layout

- ❑ The slide shows some of the drive components. For more details and information, refer to the FSM.

Block Diagram



❑ **For additional details, refer to the FSM (Field Service Manual)**

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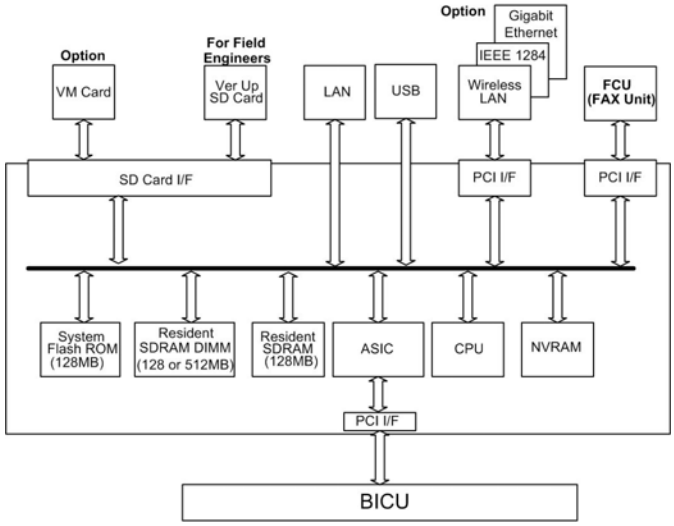
Block Diagram (for GW Controller)



- For additional details, refer to the FSM.

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NVRAM Upload/Download

- **This section depends on which model you have. There are two different procedures.**
  - SP5-824-1 (NVRAM Upload) - From the BICU to a flash memory card
  - SP5-825-1 (NVRAM Download) - From a flash memory card to the BICU
- **Practice as outlined in NVRAM Data Upload/Download (SP5-824/825) section of Service Tables.**

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Adjusting Copy Image

- **Adjust copy image area at these times:**
  - After clearing engine data (SP-5801-2).
  - If you replace any of these: First scanner or second scanner, lens block, scanner motor, polygon mirror motor, paper tray.
- **Do adjustments as outlined in "Adjusting Copy Image Area" in the Replacement and Adjustment section of FSM**

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Operating Instructions

- **While these are user operations, service technicians should also be generally familiar with them.**
- **Read these if you're not already familiar with them:**
  - User Tools: General settings
  - Placing originals and copying

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Service Training

Scanning and Image Processing

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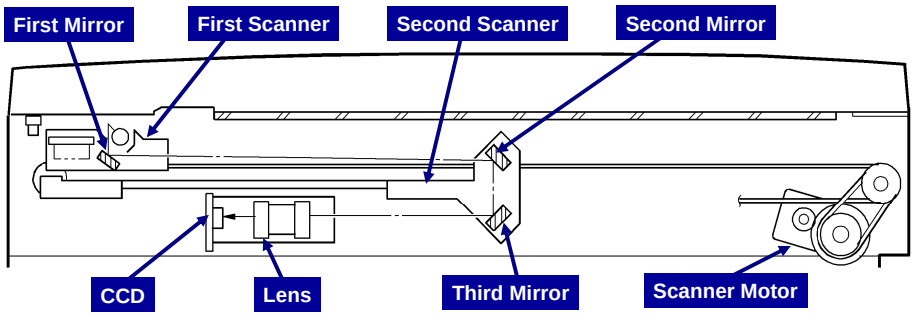
Scanning - Overview



- HP sensor makes sure scanner is at home position.
- To copy, original is illuminated by xenon exposure lamp. Then 1st, 2nd, and 3rd mirrors move reflected light to lens block. After this, lens transmits it to CCD.
- 1st scanner has a reflector. This helps to not let shadows get on pasted originals.

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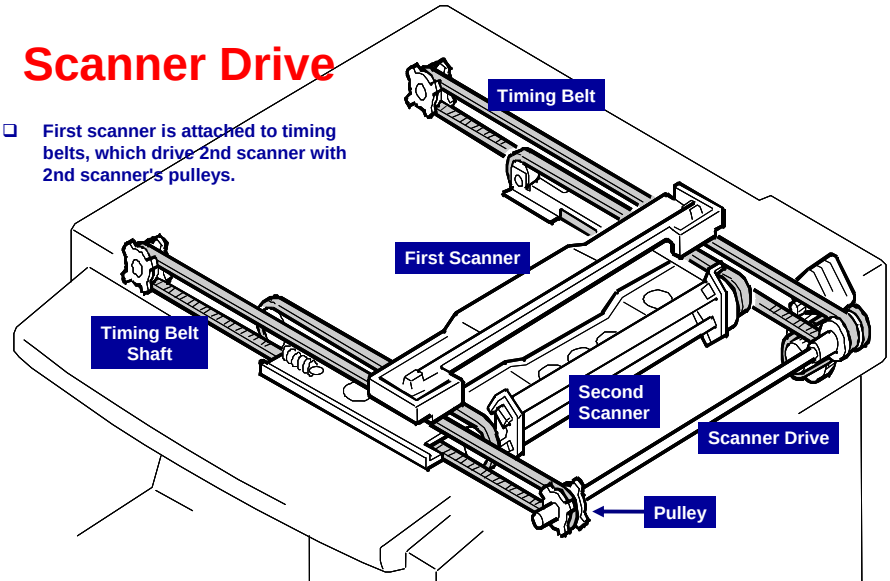
Scanner Drive

- First scanner is attached to timing belts, which drive 2nd scanner with 2nd scanner's pulleys.



- When scanning in book mode, 2nd scanner moves at half speed of 1st scanner. (Scanner speed is faster for reduction printing, and slower for enlargement printing.)
- Magnification can be adjusted in sub-scan direction.

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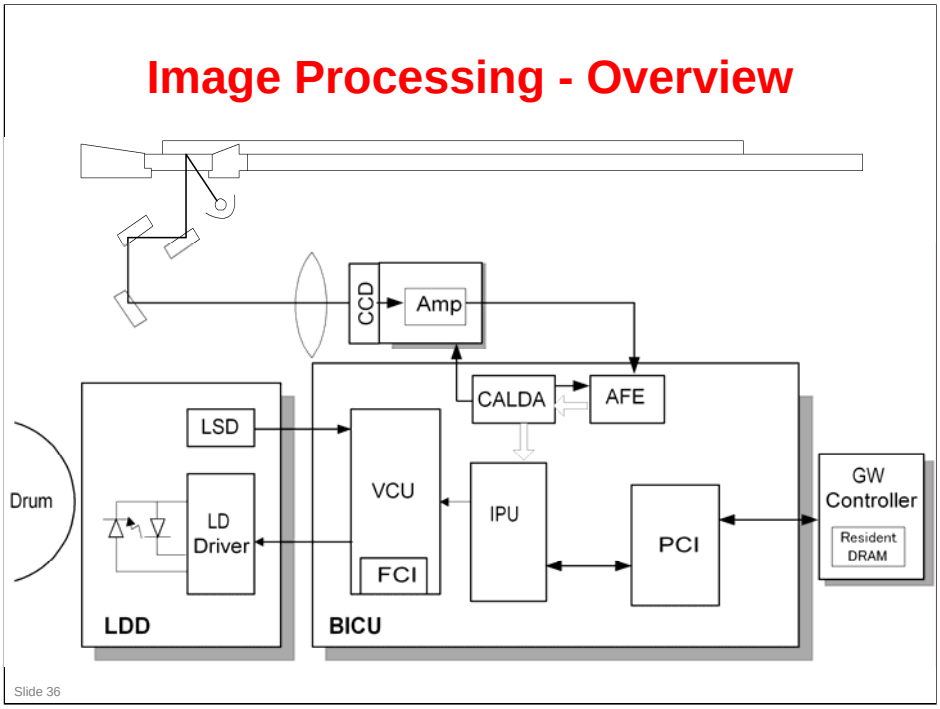
Image Processing - Overview
CCD
Amp
CALDA
AFE
LSD
Drum
LD
Driver
VCU
FCI
IPU
PCI
GW
Controller
Resident
DRAM
LDD
BICU
Slide 36

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Image Processing - Overview

- **Changing Modes:**
  - You cannot switch modes at these times:
    - » When accessing user tools.
    - » When scanning an original
- **Practice switching modes and getting multi-access. (Refer to Operating Instructions, General Settings Guide)**
- **To learn more about image processing, refer to the Core Technology Manual**

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Laser Exposure and PCU
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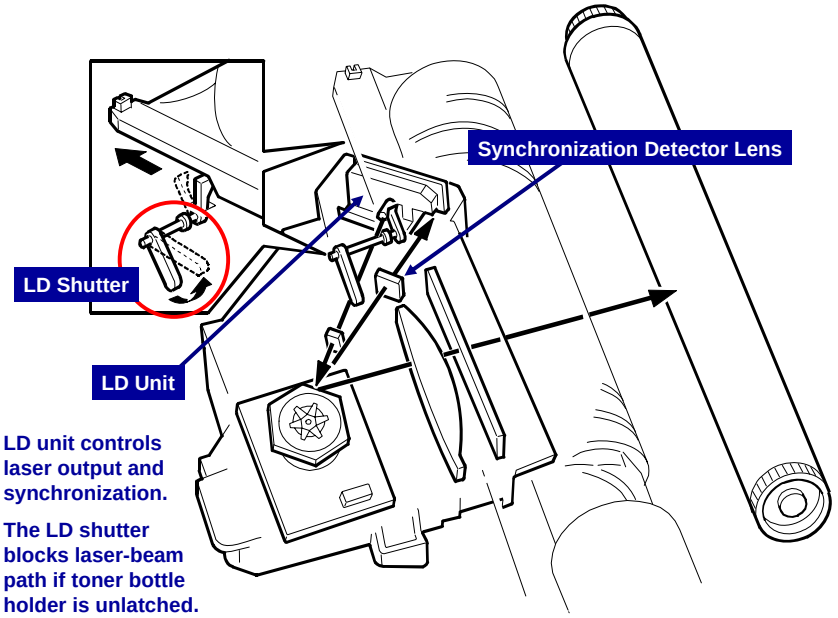
Laser Unit Overview



- LD unit controls laser output and synchronization.
- The LD shutter blocks laser-beam path if toner bottle holder is unlatched.

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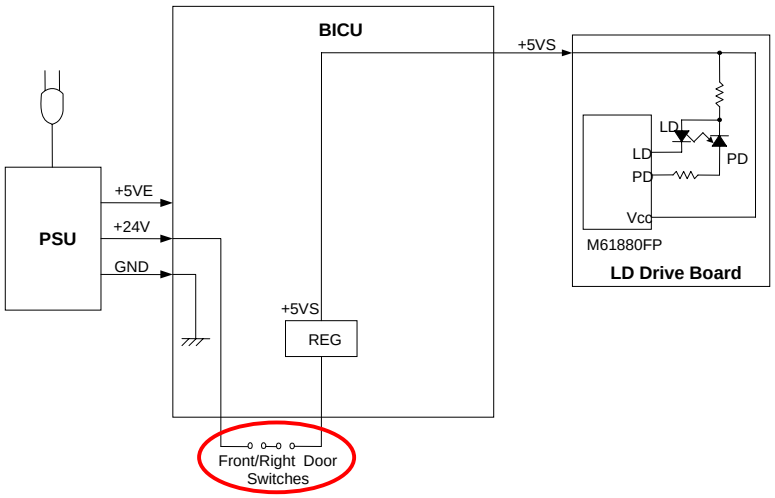
LD Safety Switches



- **Safety switches are installed at front and right doors. Machine will cut power to LD drive board if either door is opened. Corresponding switch cuts power supply (+5VS) to laser diode.**

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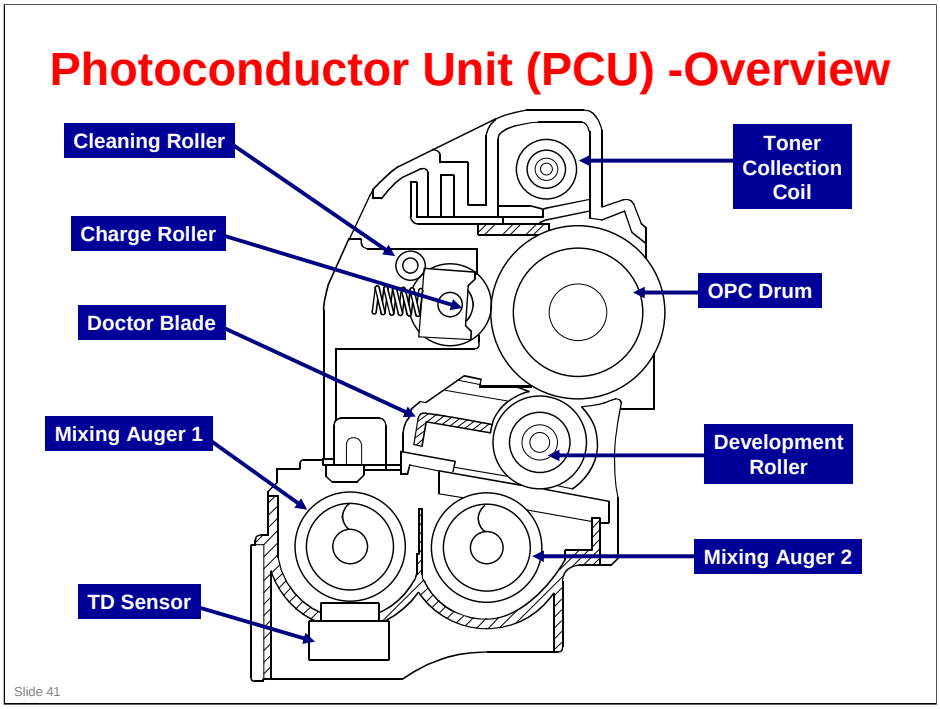
Photoconductor Unit (PCU) -Overview
Cleaning Roller
Charge Roller
Doctor Blade
Mixing Auger 1
TD Sensor
Toner Collection Coil
OPC Drum
Development Roller
Mixing Auger 2
Slide 41

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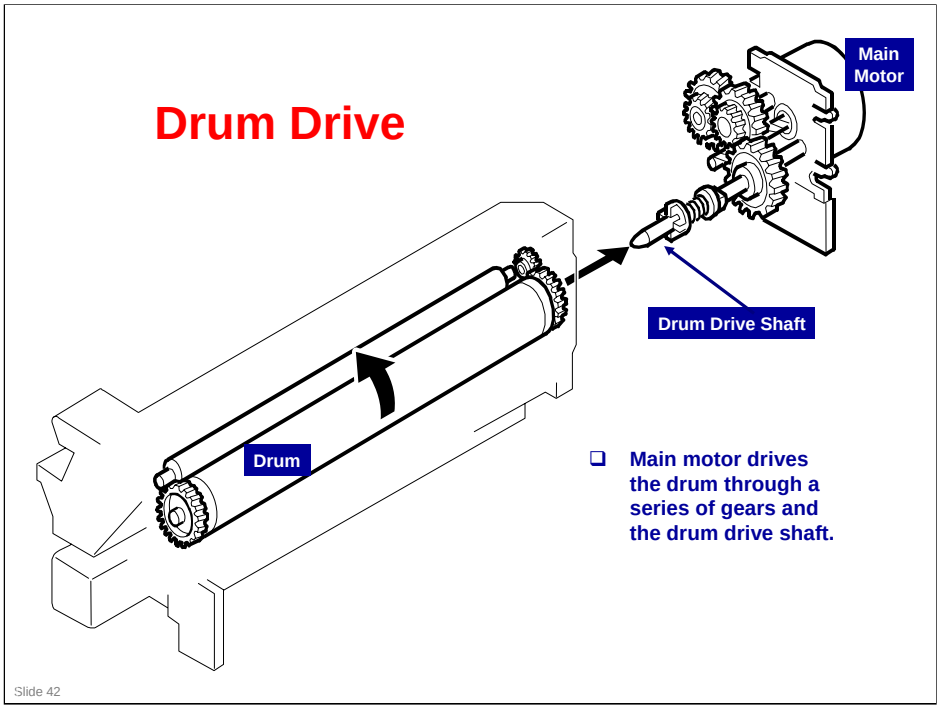
Drum Drive
Main Motor
Drum Drive Shaft
Drum
Main motor drives the drum through a series of gears and the drum drive shaft.
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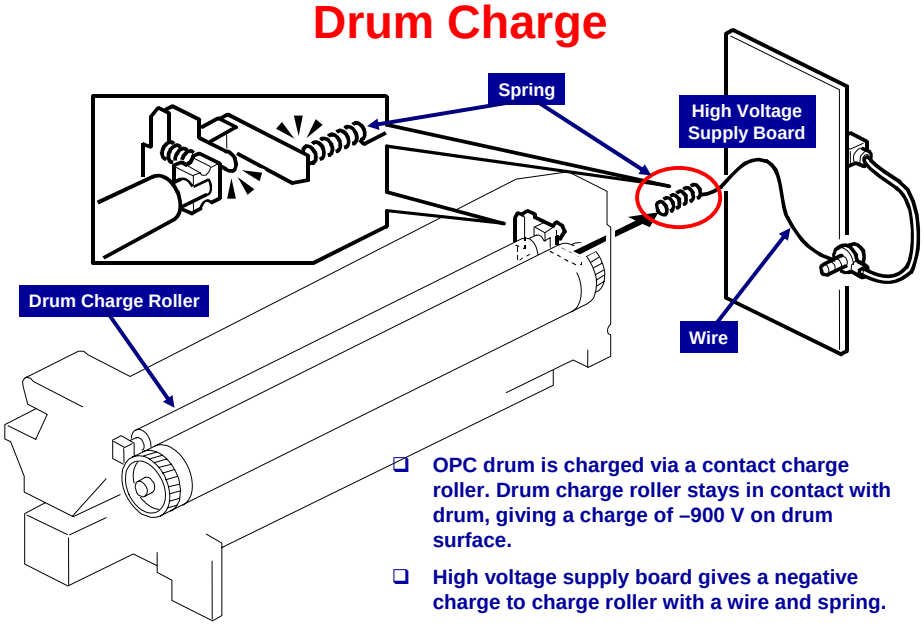
Drum Charge



- OPC drum is charged via a contact charge roller. Drum charge roller stays in contact with drum, giving a charge of –900 V on drum surface.
- High voltage supply board gives a negative charge to charge roller with a wire and spring.
- Default base charge is –1650V. This can be adjusted with SP 2001 1.

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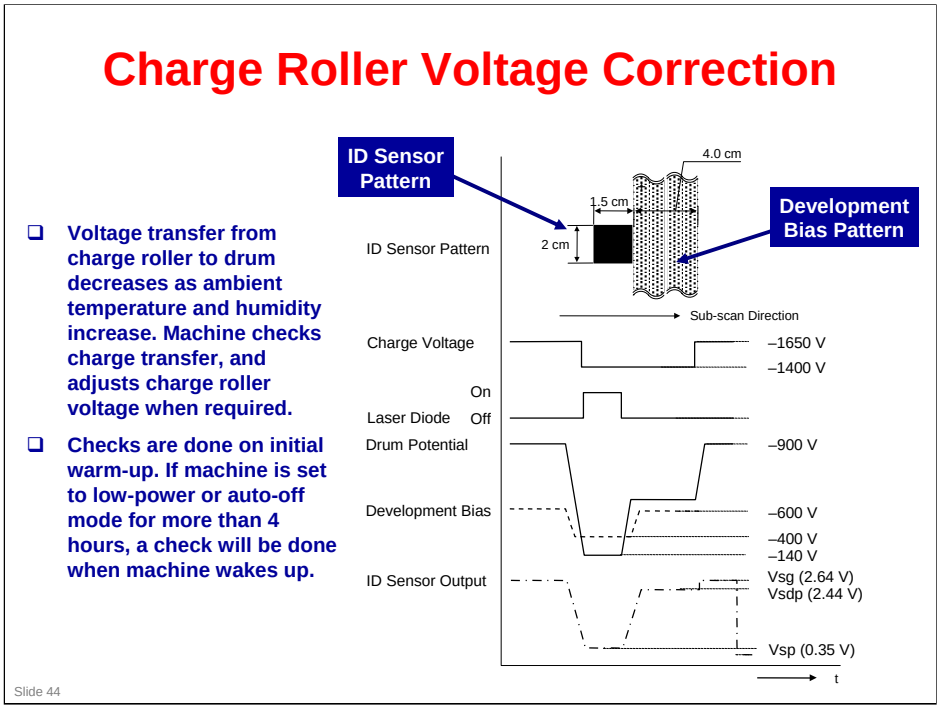
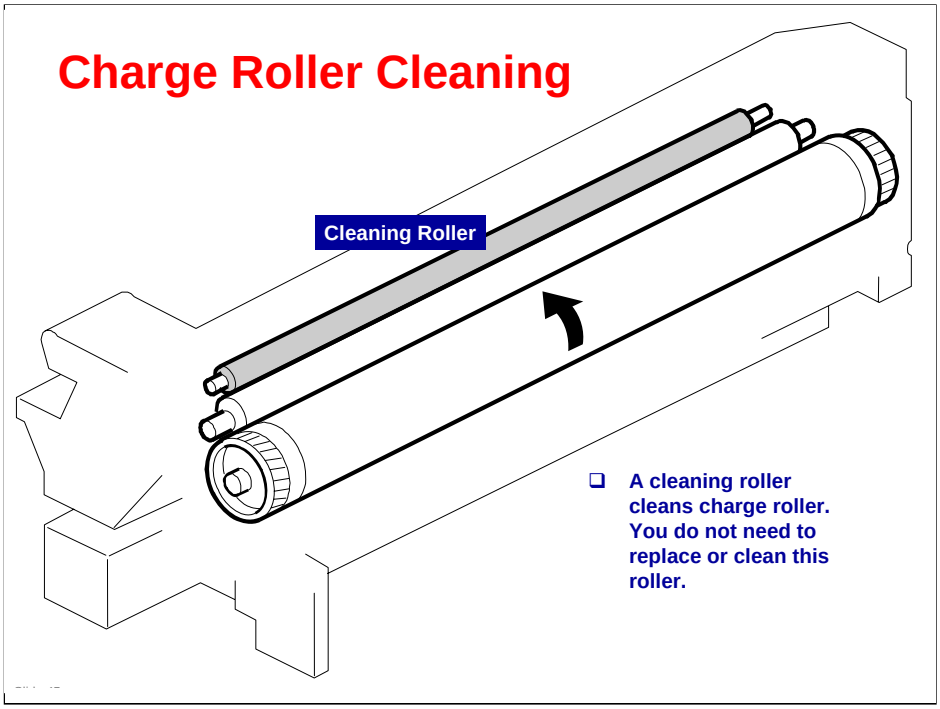


Procedure:

- Right after the machine creates the ID sensor pattern for toner density control, the development bias pattern is created.The development bias is decreased to –400 V.
- The ID sensor measures the development bias pattern's density (Vsdp) and the bare drum's voltage (Vsg).
- The FCU compares the results and adjusts the roller voltage accordingly.
  - Vdsp/Vsg > 0.95: Decreases the negative charge on the charge roller by +50 V.
  - Vdsp/Vsg < 0.90: Increases the negative charge on the charge roller by –50 V.
- Use SP 2221 to see the current ID sensor values.


Charge Roller Cleaning
Cleaning Roller
A cleaning roller cleans charge roller. You do not need to replace or clean this roller.

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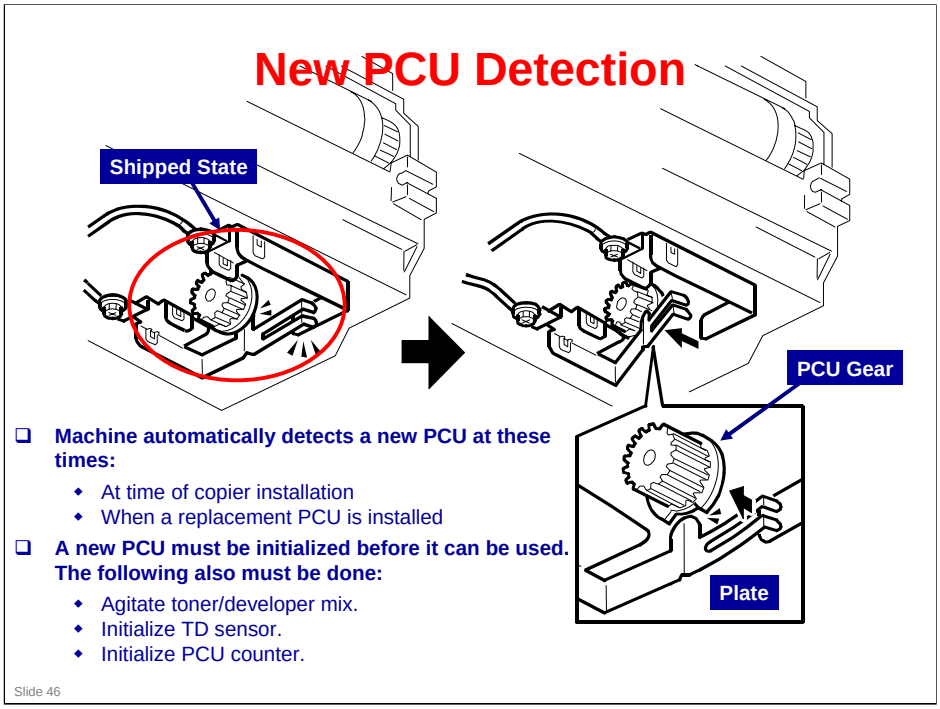

- The machine automatically detects a new PCU and performs initialization. In the shipped state, the connection plates are pressed together and make a complete circuit. This tells the CPU that the PCU is new and must be initialized. When the PCU gear rotates, the top connection plate gets free and breaks the circuit.

- Pre-installed PCUs do not use this mechanism. A factory-set flag tells a new machine to initialize the PCU when the machine is switched on for the first time.


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Service Training
Development
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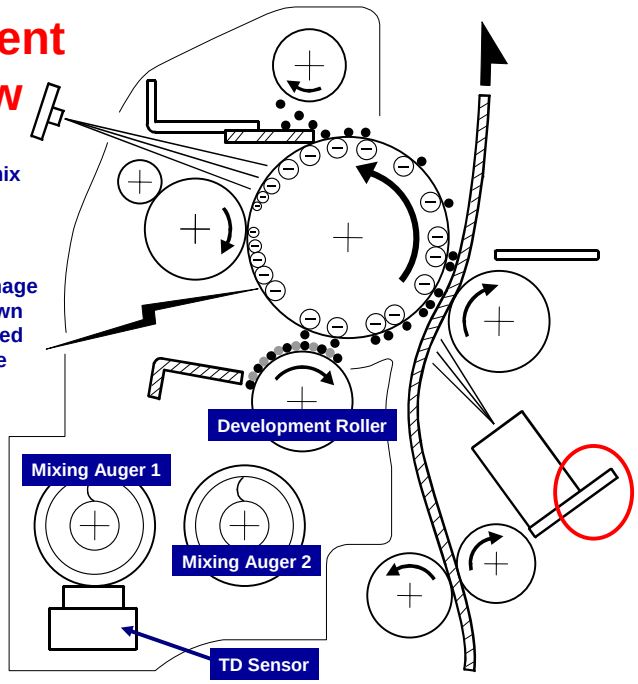
Development Overview

- Two mixing augers mix the developer (carrier/toner mix).
- TD (toner density) sensor and the ID (image density) sensor (shown in a red circle) are used to control copy image density.



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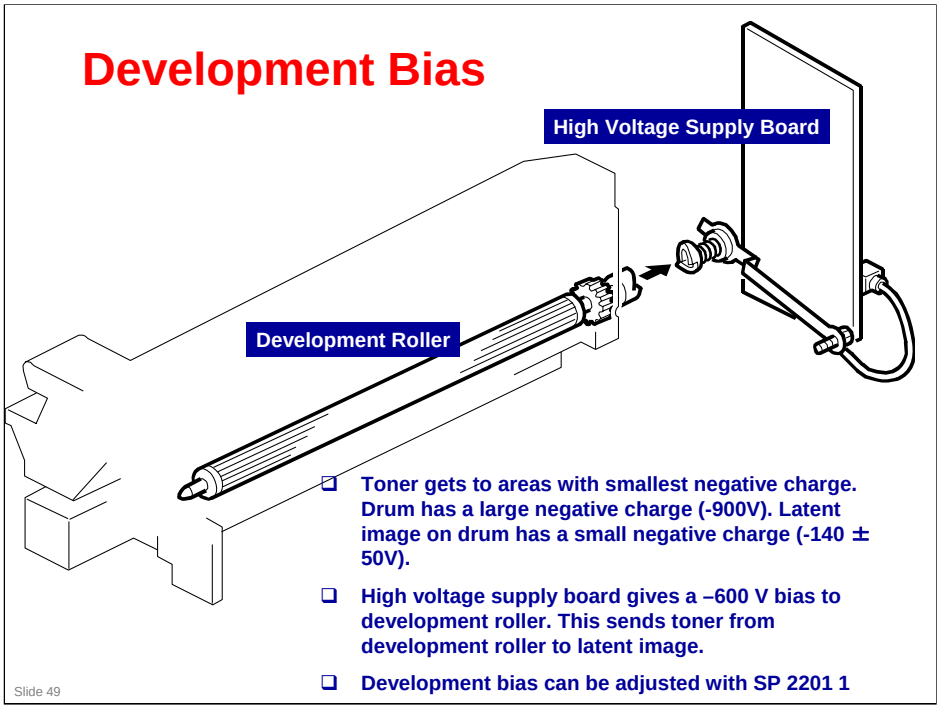
Development Bias



- Toner gets to areas with smallest negative charge. Drum has a large negative charge (-900V). Latent image on drum has a small negative charge (-140 ± 50V).
- High voltage supply board gives a –600 V bias to development roller. This sends toner from development roller to latent image.
- Development bias can be adjusted with SP 2201 1

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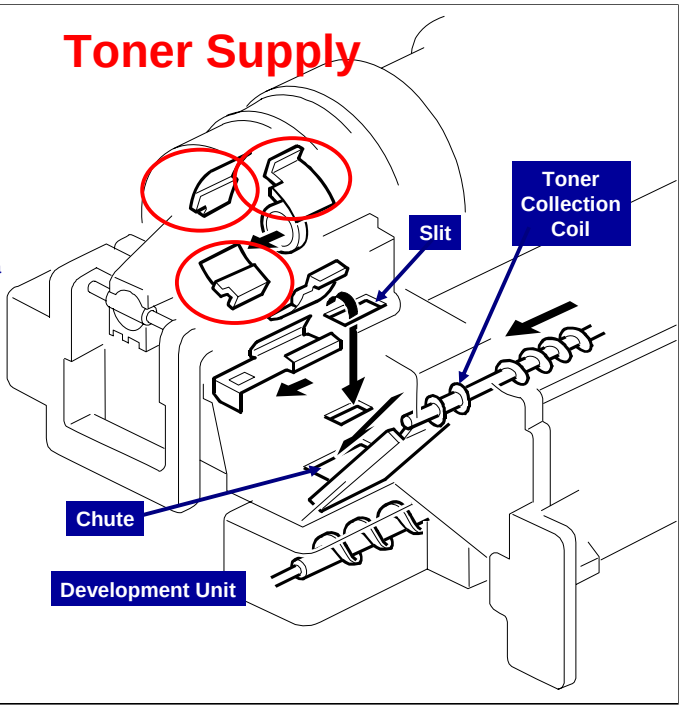
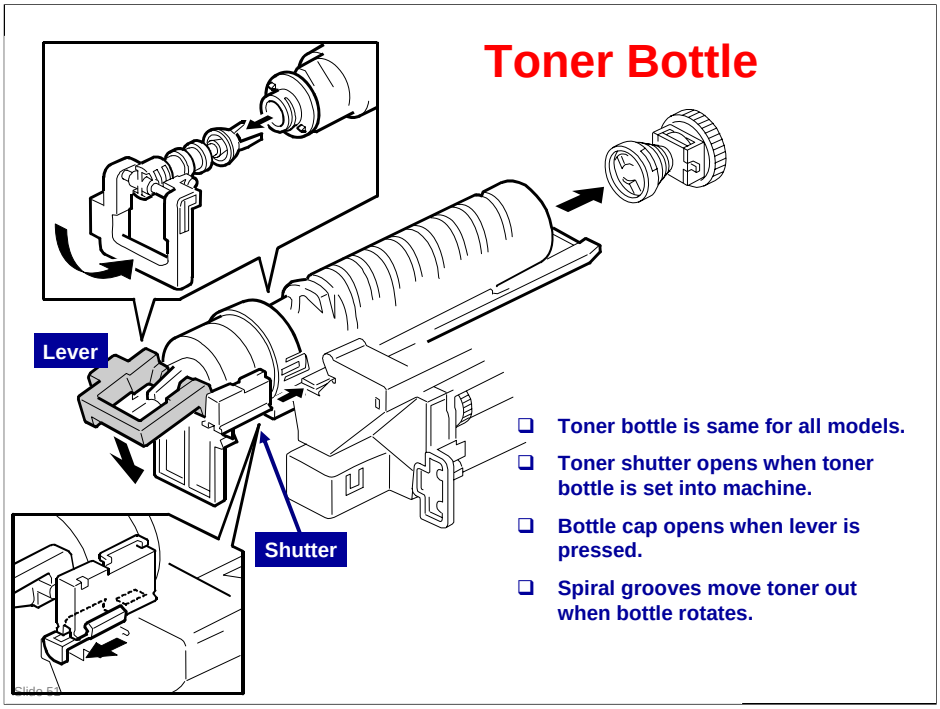
Toner Supply

- Toner path is same for all models. There are two sources of toner: new toner and recycled toner.
- A shutter is pushed open by PCU body when a toner bottle is set in machine. Toner bottle cap is held with a chuck. Cap comes off when lever is pushed.
- Spiral grooves move toner out of bottle. Mylar blades (circled in red) move toner through a slit into development unit. This happens when clutch turns toner bottle.
- Toner collection coil recycles toner it gets from OPC drum. Recycled toner moves down chute and goes into development unit through a slit.



Slide 50


Toner Bottle
Lever
Shutter
Toner bottle is same for all models.
Toner shutter opens when toner bottle is set into machine.
Bottle cap opens when lever is pressed.
Spiral grooves move toner out when bottle rotates.

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Toner Density Control

- **Toner concentration in developer is controlled with these values:**
  - Vts: TD sensor initial set of 1.25V. (Used as reference voltage when Vref is not available).
  - Vref: Toner supply reference voltage (calculated value; periodically updated).
  - Vt: Actual output from TD sensor.
  - Vsg/Vsp: Values from ID sensor, where Vsp is voltage of a test pattern ("ID sensor pattern"), and Vsg is voltage of bare drum.
- **Toner is given to development unit if Vt is more than reference voltage**

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Toner Density Control

Reference Voltage

- Vts is used as the reference if the PCU has just been installed, or if ID sensor correction is set “off” with SP 2927. Vref is used as the reference at all other times.

Toner Density Sensor Initial Setting

- The Vts for this machine is 1.25 V. The machine adjusts the sensor so that it reads out 1.25V for TD sensor initialization when a new PCU is installed.

Toner Concentration Measurement

- The machine checks concentration every copy cycle, comparing Vt against the reference voltage to do this.

Vsp/Vsg Detection

- An ID sensor pattern is made on the drum by the charge roller and laser diode. The ID sensor detects the pattern density (Vsp) and the density of the bare drum (Vsg). Detection is done at the same time as (and immediately before) charge-roller voltage detection.
- You can set ID sensor control “off” with SP 2927.

Calculation of Vref

- Vref is calculated based on the ID sensor output (Vsp/Vsg) and the present reference voltage (Vref or Vts) – Vt.

Toner Supply Determination

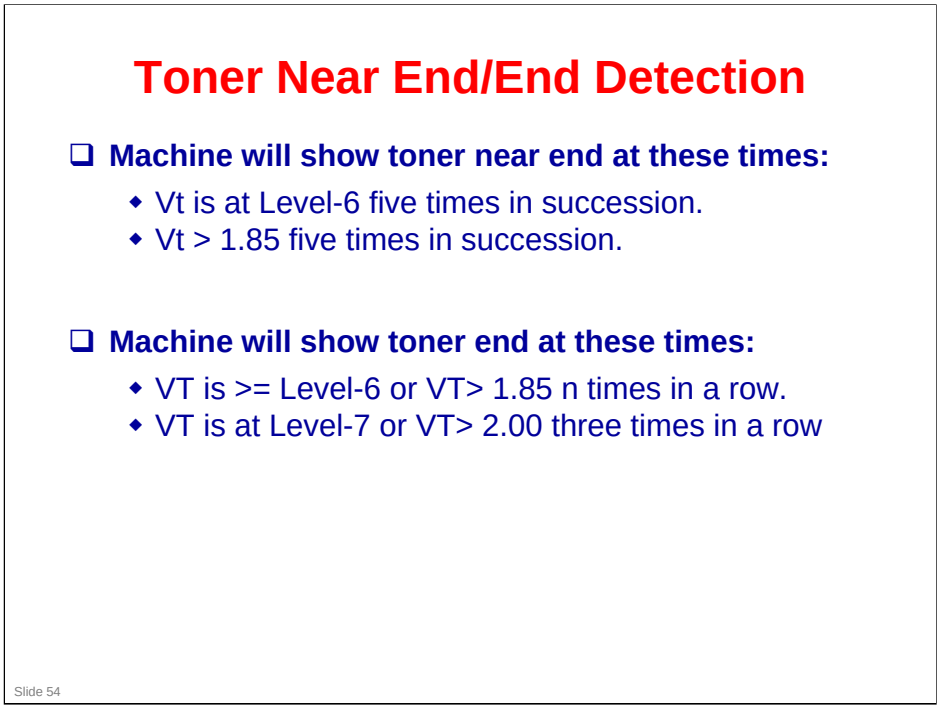
- The machine gives toner if Vt gets to more than the reference voltage. You can see current Vt and reference voltage values with SP 2220.
- You can see other ID sensor values with SP 2221.

Toner Errors

- **Sensor errors occur at these times:**
- **ID Sensor:**
  - Vsg ≤ 2.5 (when Vsg is read)
  - Vsg < 3.5 (at maximum power)
  - Vsp ≥ 2.5
  - Vt ≥ 2.64 or Vt < 0.20
- **You can see current readings with SP 2221**
- **TD Sensor**
  - TD < 0.20 V
  - TD > 2.64 V
- **If machine gets error readings 10 times in succession, SC 390 will be shown. You can see current value with SP 2220**

Slide 53

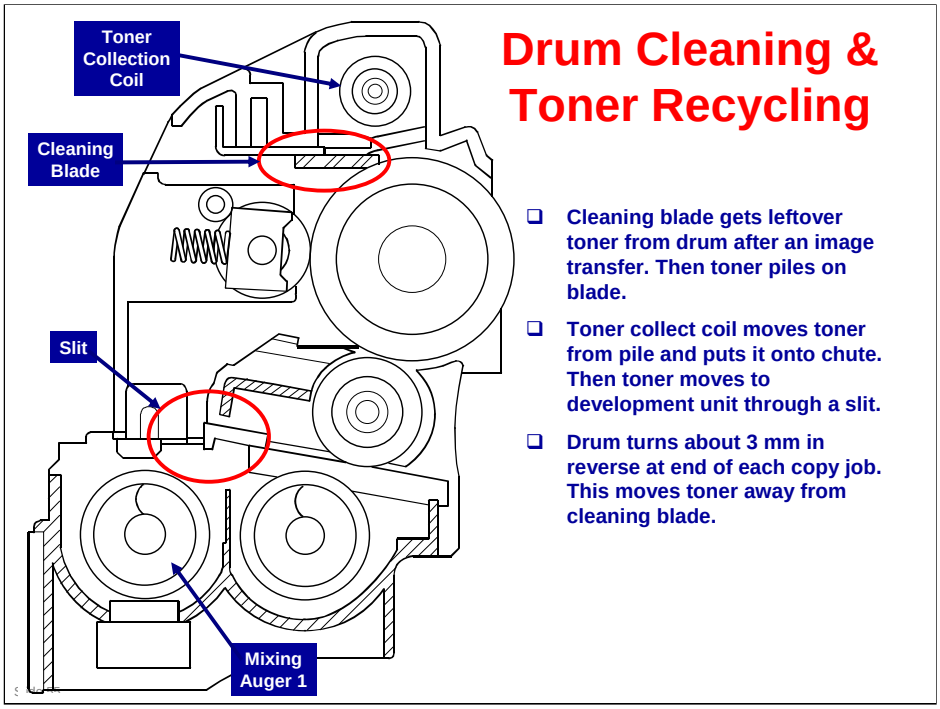
.



Toner Near End/End Detection

•n is the number of sheets that can be printed before toner near end gets to toner end. n is set to 50 by default.

•You can change the value of n to 20 with SP 2213.


Toner Collection Coil
Cleaning Blade
Slit
Mixing Auger 1
Drum Cleaning & Toner Recycling
Cleaning blade gets leftover toner from drum after an image transfer. Then toner piles on blade.
Toner collect coil moves toner from pile and puts it onto chute. Then toner moves to development unit through a slit.
Drum turns about 3 mm in reverse at end of each copy job. This moves toner away from cleaning blade.

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SP Modes

- SP 2214: Developer initialization.
- SP 2802: Forced developer churning.
- SP 2908: Forced toner supply.
- SP 2921: Toner supply mode.
- SP 2926: Standard Vt.
- SP 2928: Toner end clear

Slide 56

.

Replacement and Adjustment

- **Do this removal procedure:**
  - See “Toner Supply Clutch” in the FSM
- **Preventive Maintenance.**
  - You must clean toner bottle holder after you replace the PCU.
- **Learn more:**

Core Technology Manual

  - Development process
  - Development bias
  - Toner supply

Slide 57

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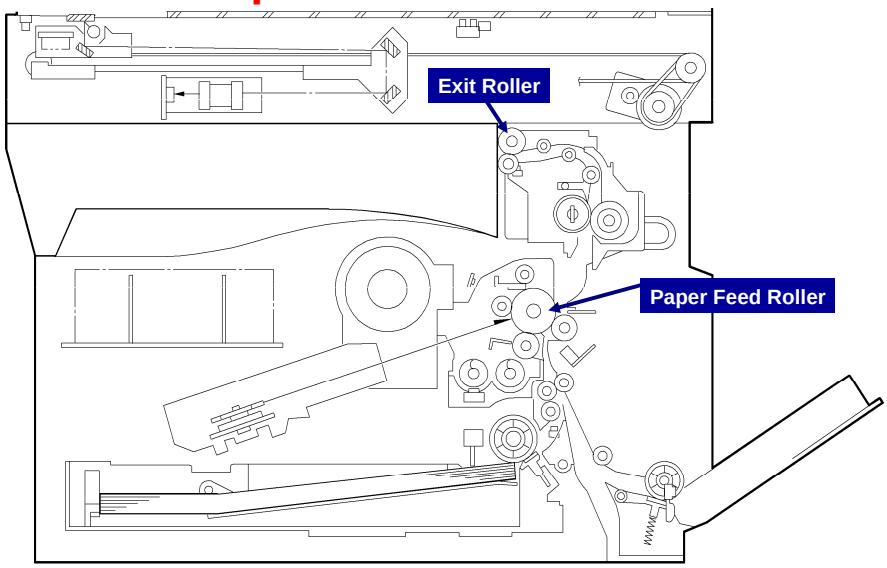
RICOH
D115/D116
Service Training
Paper Feed
Slide 58

Paper Feed - Overview



- See the FSM for a more complete list of components.

Slide 59

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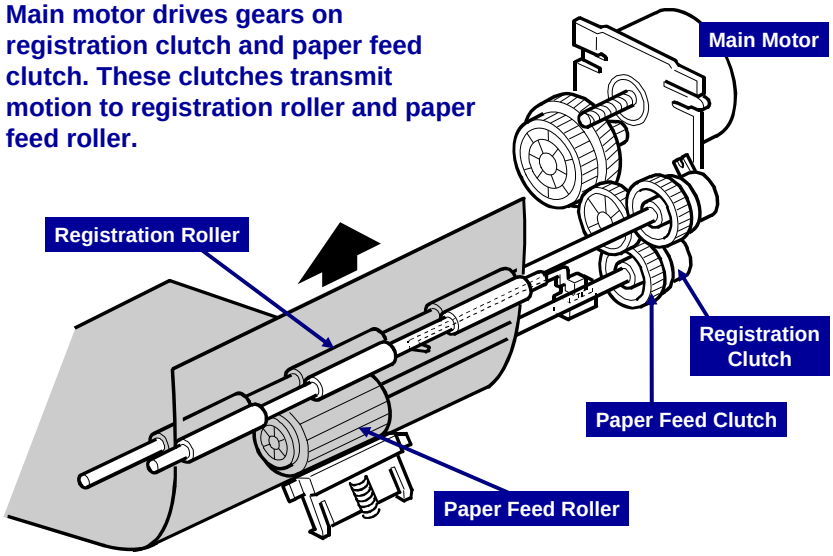
Drive Mechanism - From Paper Tray

- Main motor drives gears on registration clutch and paper feed clutch. These clutches transmit motion to registration roller and paper feed roller.



Slide 60

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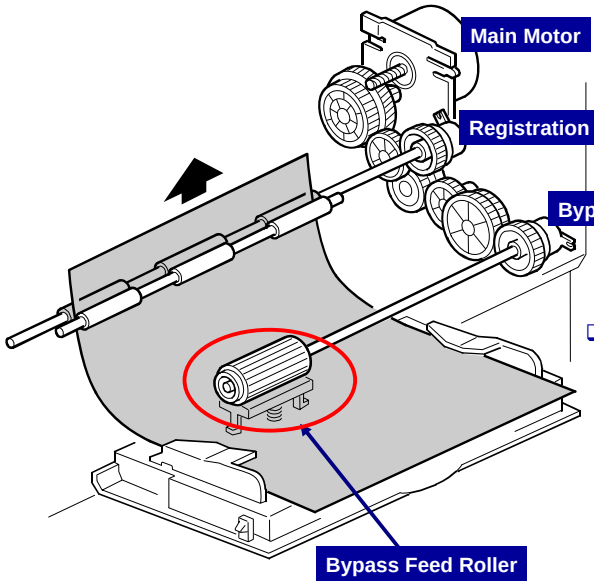
Drive Mechanism - Bypass Tray



- Main motor drives gears of registration clutch and bypass feed clutch. Bypass feed clutch moves bypass feed roller.

Slide 61

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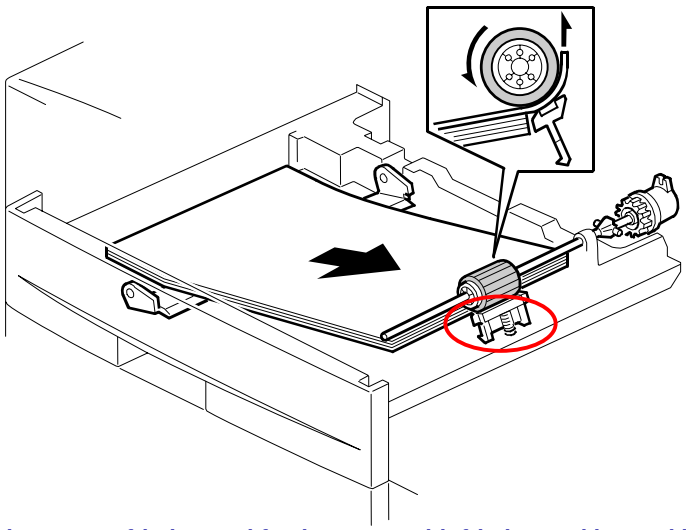
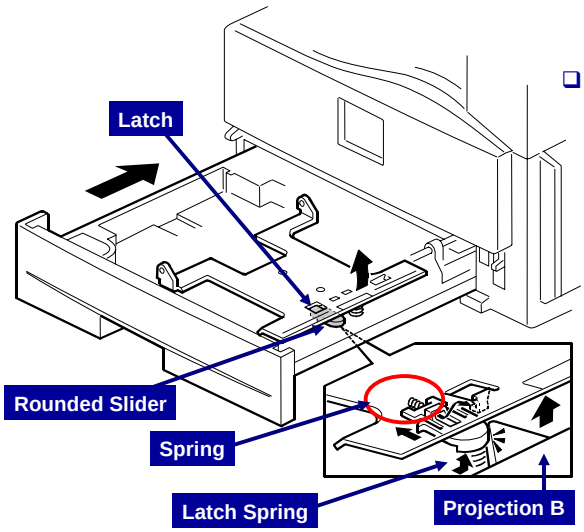
Paper Feed And Separation



- Machine uses a friction-pad feed system, with friction pad located inside paper tray.

Slide 62

Paper Lift Mechanism



- Protrusion on frame pushes rounded slider in against spring when tray is closed (by sliding it into machine). This retracts latch, allowing spring to push plate up.

Slide 63

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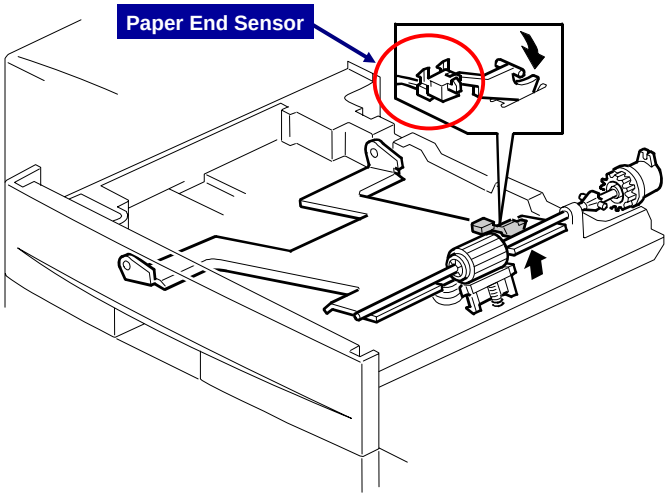
Paper End Detection-Main Tray



- Feeler goes into cutout when paper runs out, activating paper end sensor.

Slide 64

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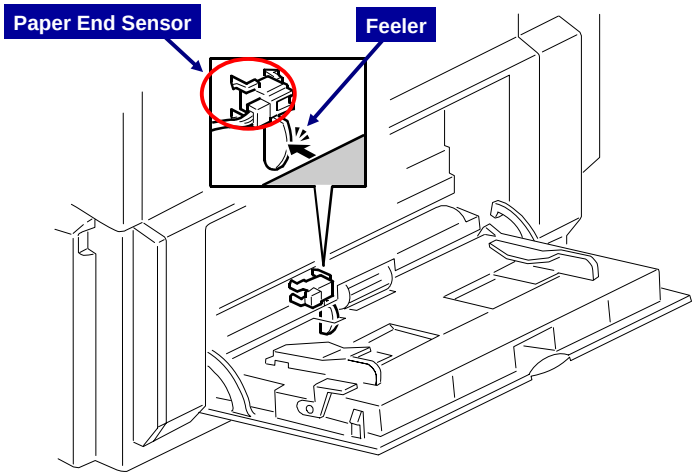
Paper End Detection - Bypass Tray



- Feeler goes into cutout when paper runs out, activating paper end sensor.

Slide 65

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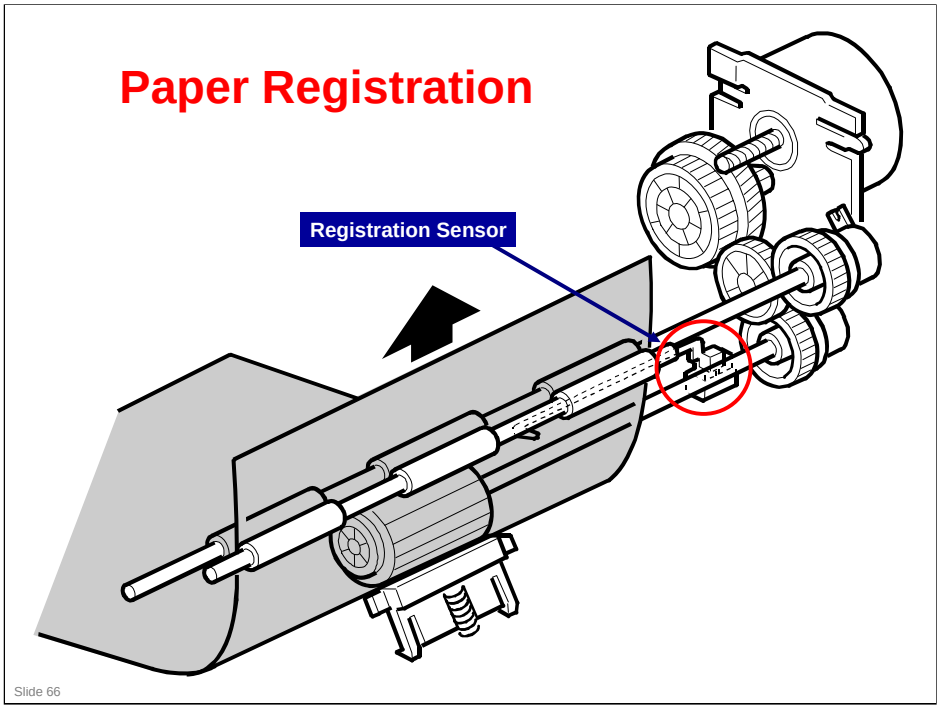
Paper Registration
Registration Sensor
Slide 66

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Image Transfer and Paper Separation

- Image transfer and paper separation will be covered.

In this section you will do these things:

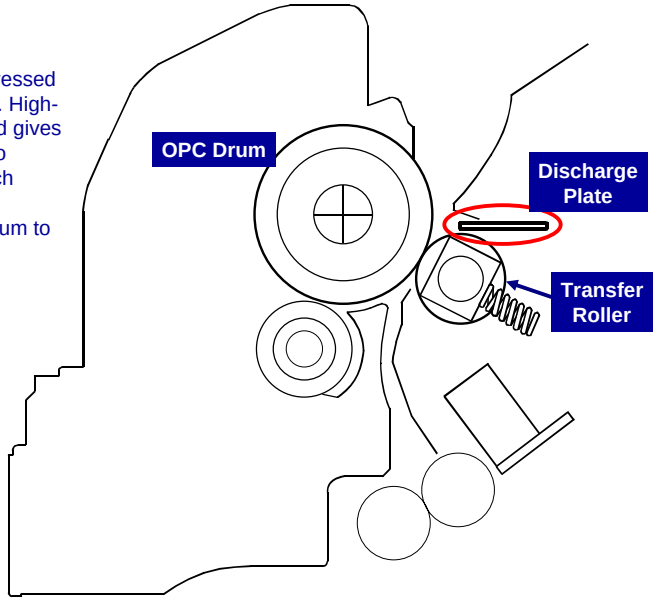
- Examine how paper is fed through the machine.
- Examine transfer current.

When you finish this section, you should know the answers to these questions:

- How is paper fed through the machine?
- How is the transfer roller cleaned?

Overview

- **Overview**
  - Transfer roller is pressed against OPC drum. High-power supply board gives a positive charge to transfer roller, which causes toner to be transferred from drum to paper.
  - Machine uses following two paper separation techniques:
    - » Drum's curvature helps separate paper.
    - » Discharge plate removes paper's charge.



Slide 68

Transfer Current Timing

- **Machine has two transfer current levels: Low and High.**
  - Low level: High voltage supply board supplies 10µA to transfer roller before image transfer starts. This prevents transfer roller from getting positively charged toner on drum surface.
  - High level: High voltage supply board supplies high level of current to transfer roller at time of image transfer. This allows transfer roller to move toner to paper.
  - High voltage supply board does not supply current when trailing edge of paper has passed transfer roller. High voltage supply board supplies low level current if machine prints more pages.
- **Transfer Current Timing**
  - Transfer current level can be adjusted with SP 2301.
  - Examine default current settings. If transfer current level is not adjusted correctly, the following may happen:
    - » Parts of page being printed may have ghost images.
    - » OPC drum could be damaged.

Slide 69

Transfer Roller Cleaning

- **Toner can get onto transfer roller at these times:**
  - If you print on paper that is smaller than image size
  - During paper jams.
- **You must clean roller so toner will not get onto back of other prints.**
- **High voltage supply unit gives a negative charge to transfer roller. Toner with negative charge moves back to drum. Then high voltage unit provides a positive current. Toner with a positive charge moves back to drum.**
- **Roller is cleaned at these times:**
  - When power is switched on.
  - After you clear a paper jam.
  - At the end of a job, if at least 10 print jobs have been made since last clean cycle.
- **You can change current for cleaning procedure with SP 2301-4.**

Slide 70

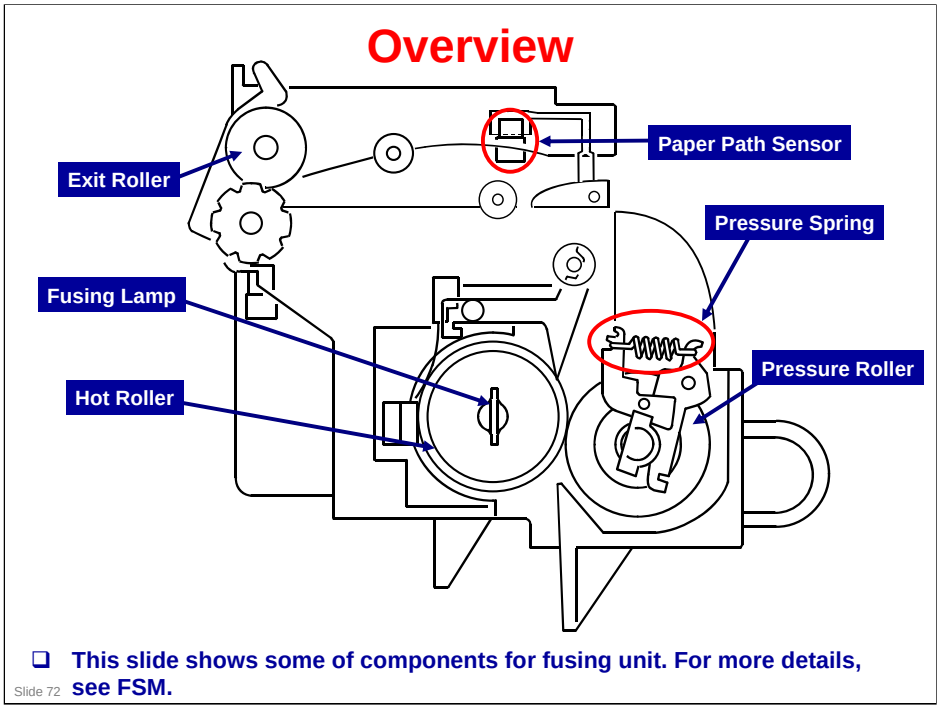
RICOH

RICOH

D115/D116
Service Training

Fusing and Paper Exit

Slide 71


Overview
Exit Roller
Paper Path Sensor
Pressure Spring
Fusing Lamp
Hot Roller
Pressure Roller
This slide shows some of components for fusing unit. For more details, see FSM.
Slide 72

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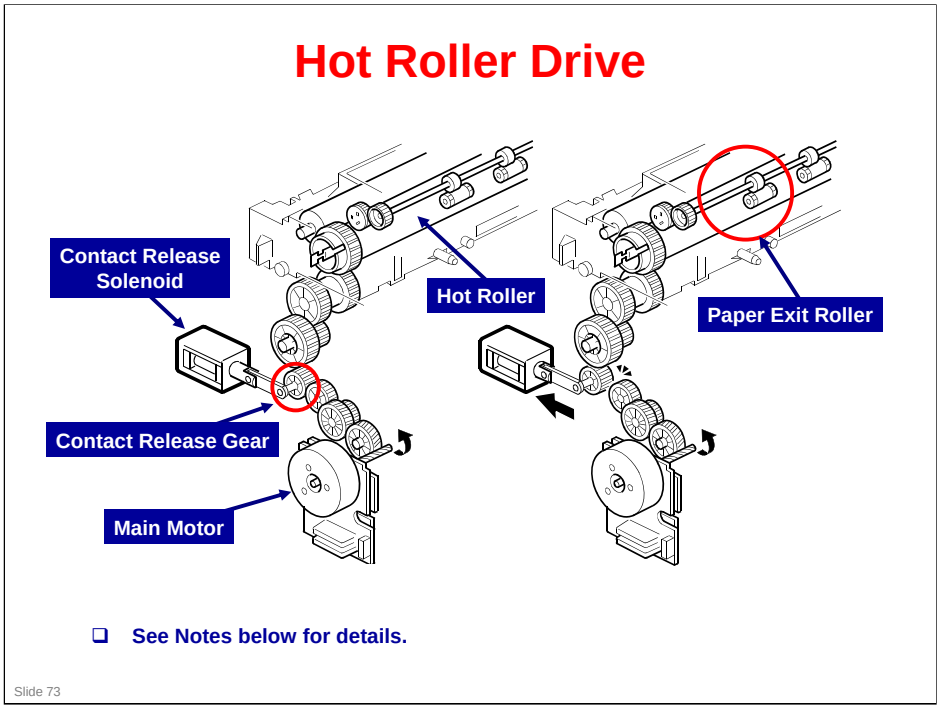


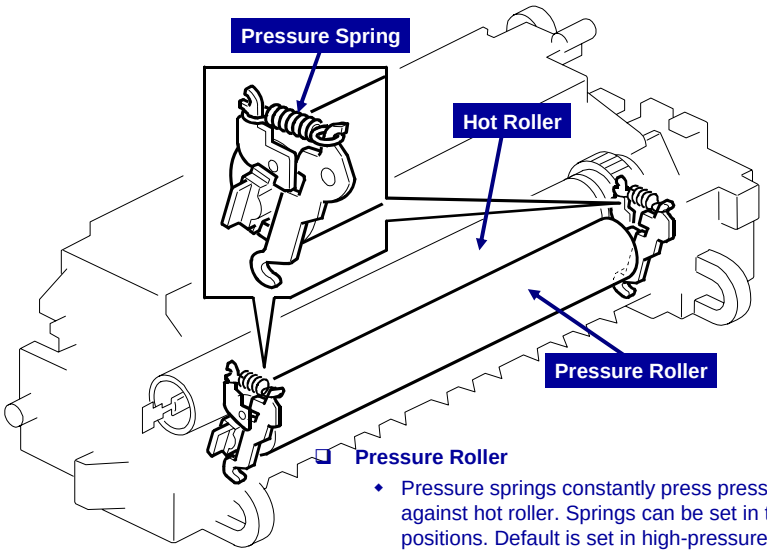
Hot Roller Drive Mechanism

- The main motor drives the hot roller through a gear train. One of the gears in the gear train is the contact-release gear. This gear is linked to the contact-release solenoid. When the contact-release solenoid is activated, it separates the contact-release gear from another gear in the gear train.
- Drive power of the main motor is not transmitted to the hot roller.
- Drive power of the main motor is not transmitted to the paper exit roller. This roller is driven by the exit motor.

Contact/Release Control

- The contact-release solenoid comes on at these times:
  - When the copier warms the hot roller.
  - When the hot roller temperature is 18°C or higher.
  - Fusing idling (SP 1103 1) is set to "No."
- Control is based on these:
  - The copier takes a shorter time to heat the hot roller when the roller isn't turning.
  - The temperature of the hot roller surface may get uneven when the hot roller temperature is low and the roller does not turn.

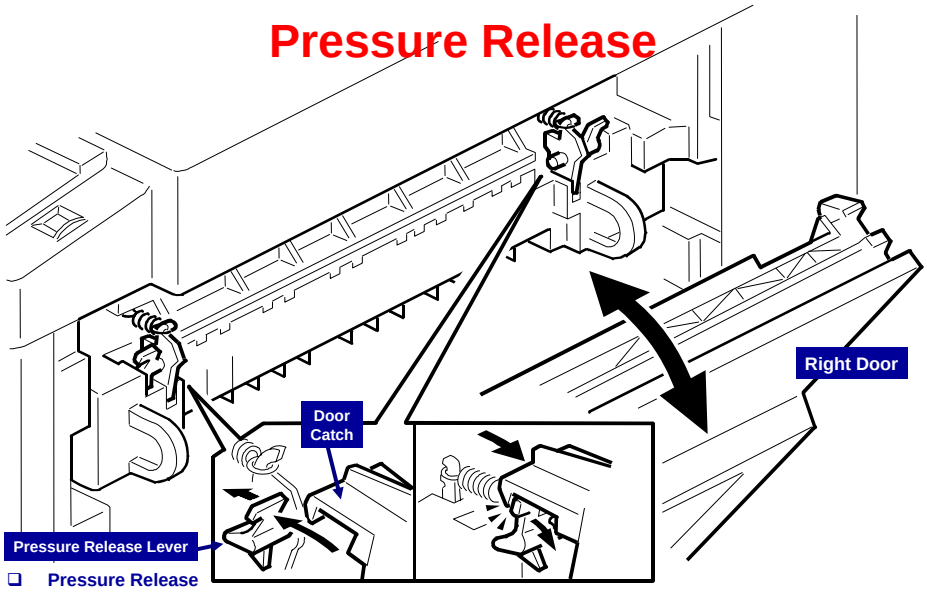
Pressure Roller



- **Pressure Roller**
  - Pressure springs constantly press pressure roller against hot roller. Springs can be set in two different positions. Default is set in high-pressure (lower position) position.
  - You can move springs to low-pressure (upper position) position if you want to lower the pressure.

Slide 74

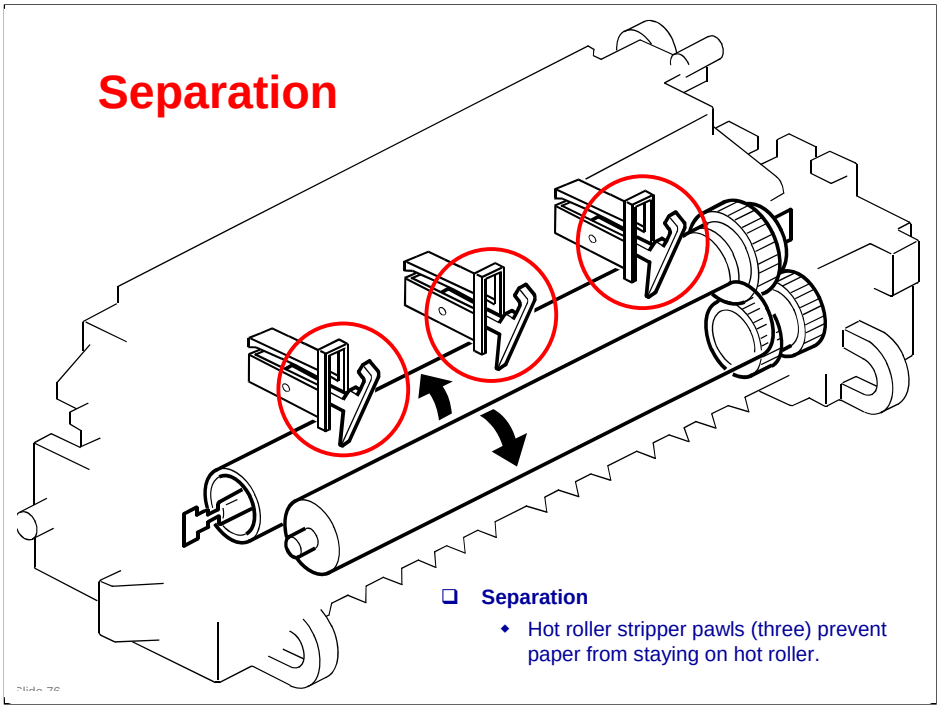
Pressure Release



❑ **Pressure Release**

- When right door opens,(on each side) it pulls open door catch (on each side). This releases pressure on pressure roller, allowing pressure roller to turn freely, assisting in removal of jams.
- When right door closes, pressure release lever pushes door catch closed. This allows normal pressure to return.

Slide 75


Separation
Separation
Hot roller stripper pawls (three) prevent paper from staying on hot roller.

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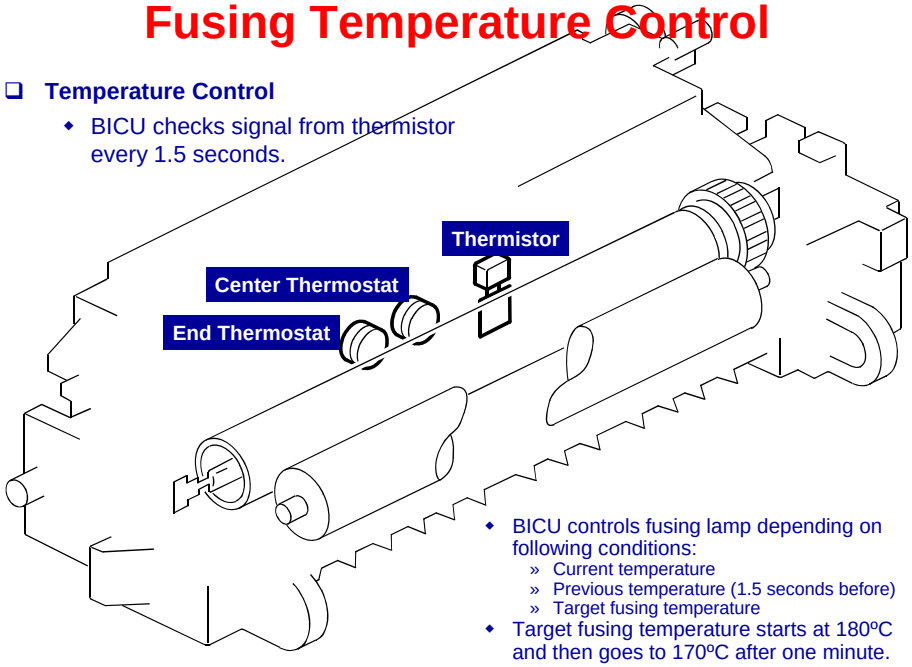
Fusing Temperature Control

- **Temperature Control**
  - BICU checks signal from thermistor every 1.5 seconds.



- BICU controls fusing lamp depending on following conditions:
  - » Current temperature
  - » Previous temperature (1.5 seconds before)
  - » Target fusing temperature
- Target fusing temperature starts at 180ºC and then goes to 170ºC after one minute.

Overheat Protection

- **BICU checks fusing temperature through thermistor. Copier has five features to safeguard machine from overheating.**

- **Feature 1**
  - BICU switches fusing lamp off when fusing temperature gets too high.
- **Feature 2**
  - BICU (Base engine & Image Control Unit) stops machine when thermistor detects an abnormal condition. Then machine will show one of these SC codes:
    - » SC 543, SC 544, SC 545, SC 546
- **Feature 3**
  - BICU stops machine if thermistor does not work correctly, and then shows SC 541
- **Feature 4**
  - Thermostat near center cuts power to fusing lamp at 160ºC. Thermo-switch near end cuts power to fusing lamp at 170ºC. These thermo-switches are on same circuit as fusing lamp.
- **Feature 5**
  - BICU stops machine if exhaust fan does not work correctly. Then machine shows SC 590.
  - A defective exhaust fan could cause machine to overheat.

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Energy Saver Modes

- **All models have these energy saver modes:**
  - Low power mode
  - Night/off mode
- **All models exit energy saver mode at these times:**
  - When power switch is switched on.
  - When originals are set on document feeder.
  - When platen cover is opened.
- **Timers**
  - Engine controller activates energy saver when in low power mode. (Timers are user-settable.)
  - Energy saver timer and auto off timer start at same time when machine ends all jobs, or when user ends all manual operations.
    - » Auto off timer does not wait for energy saver timer.

Slide 79

Replacement and Adjustments

- **Do these removal procedures: (Reference fusing unit in FSM)**
  - Fusing unit.
  - Exit sensor.
  - Hot roller stripper pawls.
  - Hot roller and fusing lamp.
  - Thermoswitch and thermistor.
  - Pressure roller.
  - Nip band adjustment.
  - Contact release solenoid.
- **All parts for fusing unit have same PM intervals. You must replace or clean these components at PM 90 K.**

Slide 80

Replacement and Adjustments

- All parts for the fusing unit have the same PM intervals. You must replace or clean these components at PM 90 K.

Duplex Unit

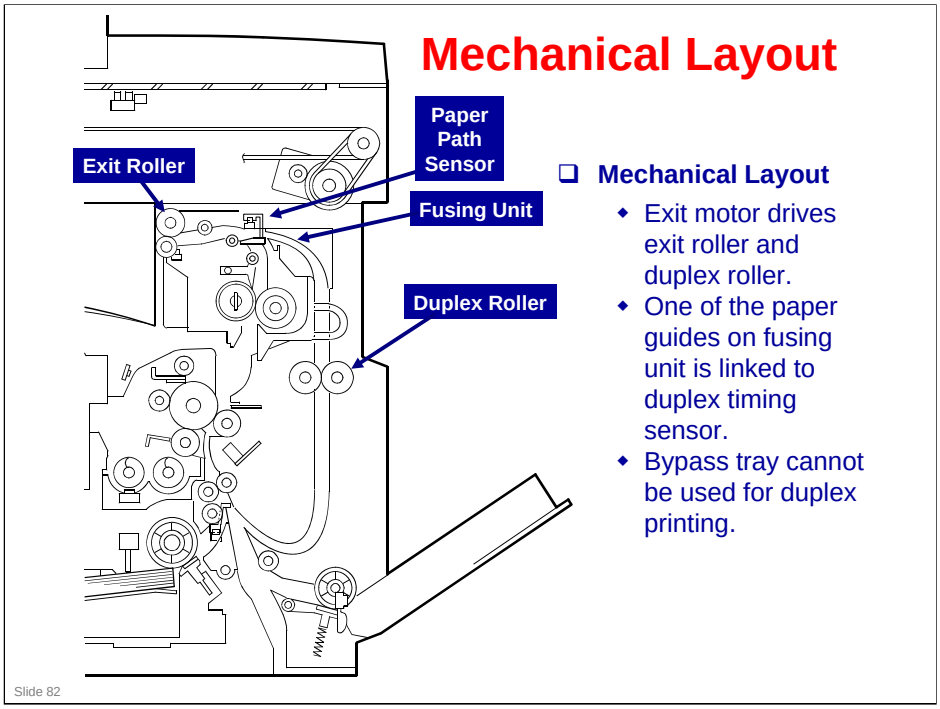
- ❑ The duplex unit will be covered.

In this section you will do these things:

- ❑ Examine the duplex print procedure.
- ❑ Examine the adjustments for the duplex unit.
- ❑ Learn the SP modes used in the duplex unit.

When you finish this section, you should know the answers to these questions:

- ❑ How is duplex printing done with this machine?
- ❑ What do I need to replace or adjust in the duplex unit?


Mechanical Layout
Paper Path Sensor
Exit Roller
Fusing Unit
Duplex Roller
Mechanical Layout
Exit motor drives exit roller and duplex roller.
One of the paper guides on fusing unit is linked to duplex timing sensor.
Bypass tray cannot be used for duplex printing.
Slide 82

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Duplex Printing Process

- **Read about duplex printing process in Duplex Unit of FSM.**
- **Examine function of following in duplex print process:**
  - Main motor and exit motor
  - Hot roller and pressure roller
  - Duplex timing sensor
  - Exit roller
  - Duplex roller
  - Registration sensor
  - OPC drum

Slide 83

.

Adjustment/SP Modes

- **SP Modes: Examine these SP modes in the FSM:**
  - SP 1001: Leading edge registration
  - SP 1002: Side to side registration
  - SP 1003: Paper feed timing
  - SP 2301: Transfer current timing
  - SP 7504 60: Registration duplex: Off
  - SP 7504 123: Duplex inverter: Off
  - SP 7504 125: Duplex inverter: On

Slide 84

In this section you will do these things:

- ❑ Examine the mechanical layout for the ARDF.
- ❑ Examine the feed process.
- ❑ Review the replacement and adjustment procedures.

When you finish this section, you should know the answers to these questions:

- ❑ Are the optics fixed or do they move for original scanning?
- ❑ What paper sizes can the ARDF handle?

Specifications

- **Paper sizes:**
  - A4 SEF, A5 SEF
  - 8½" x 5½“ SEF, 8½“ x 14“ SEF
- **Paper weight: 52-105 g/m² (14-28 lb)**
- **Tray Capacity: 50 sheets (80 g/m², 21 lb)**
- **Transport: Roller transport**
- **Feed order: Top first**
- **Separation: FRR (Feed and Reverse Roller)**
- **Original transport: Roller transport**
- **Reproduction range: 50-200%**
- **Power source: 24 and 5 Vdc from the copier**

Slide 86

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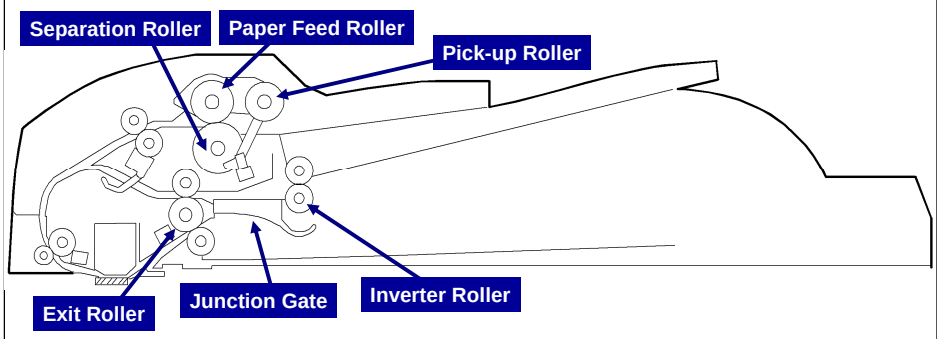
Mechanical Layout



- **Mechanical Layout**
  - This slide shows some of components for ARDF.

Slide 87

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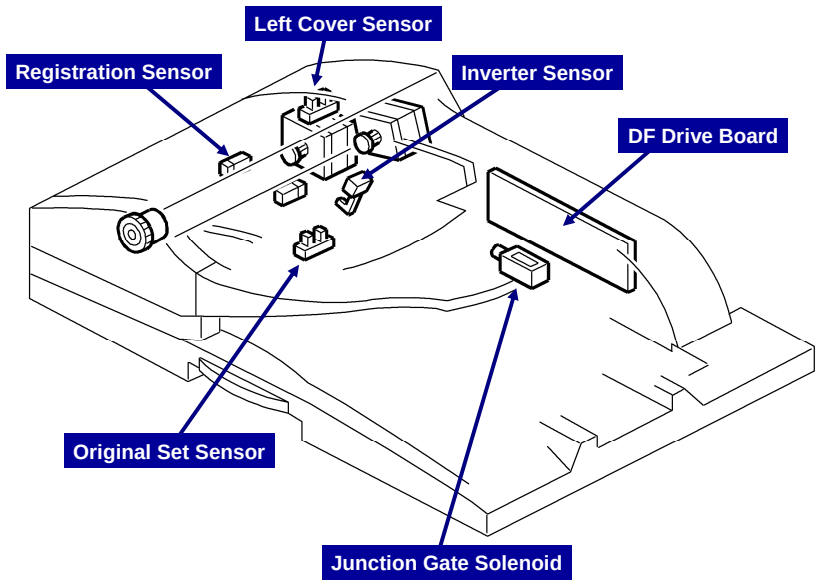
Electrical Component Layout - 1



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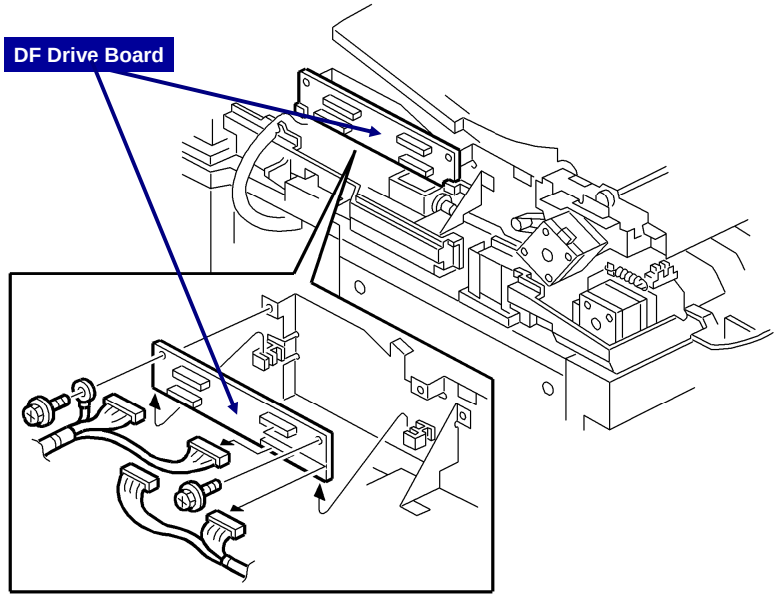
Electrical Component Layout-2



Slide 89

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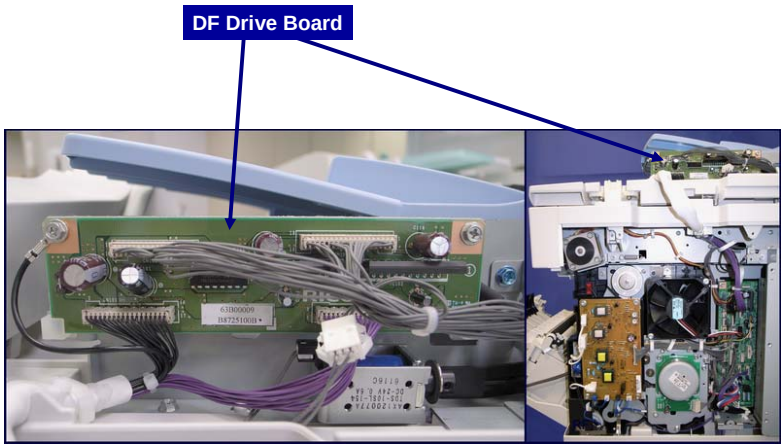
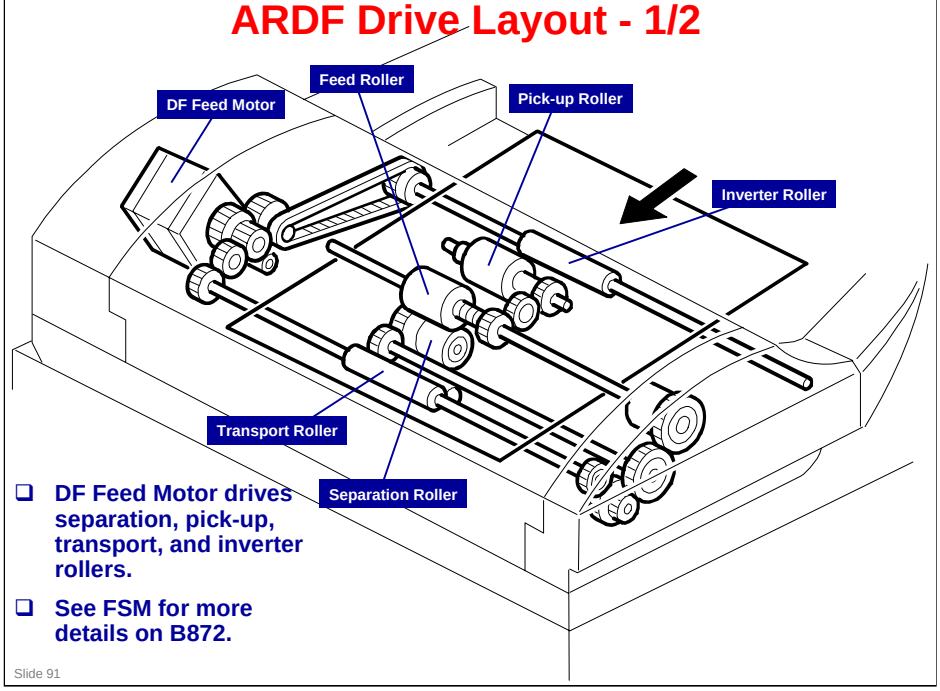
Electrical Component Layout - 3



Slide 90

ARDF Drive Layout - 1/2



- DF Feed Motor drives separation, pick-up, transport, and inverter rollers.
- See FSM for more details on B872.

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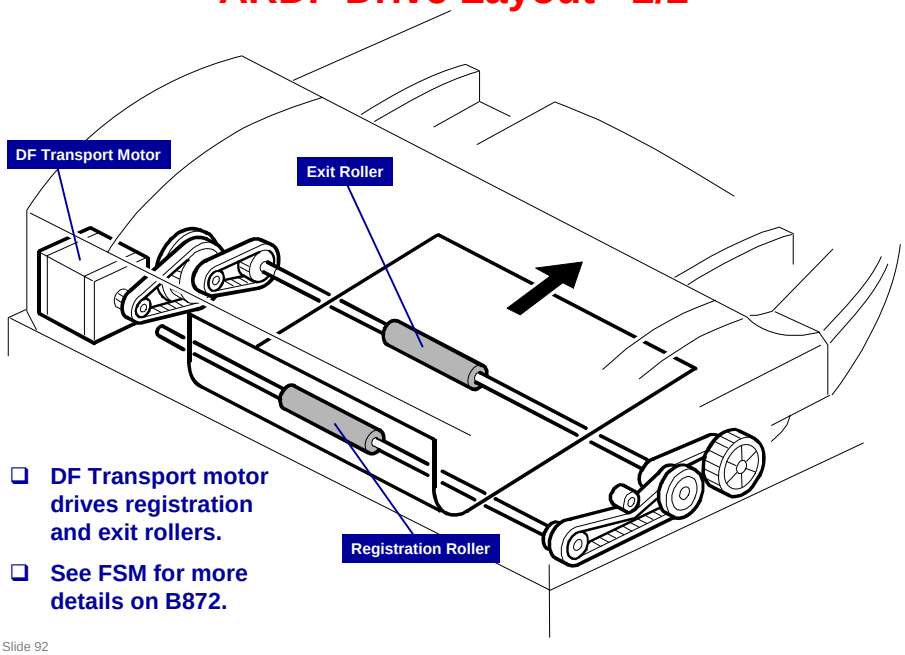
ARDF Drive Layout - 2/2



- DF Transport motor drives registration and exit rollers.
- See FSM for more details on B872.

Slide 92

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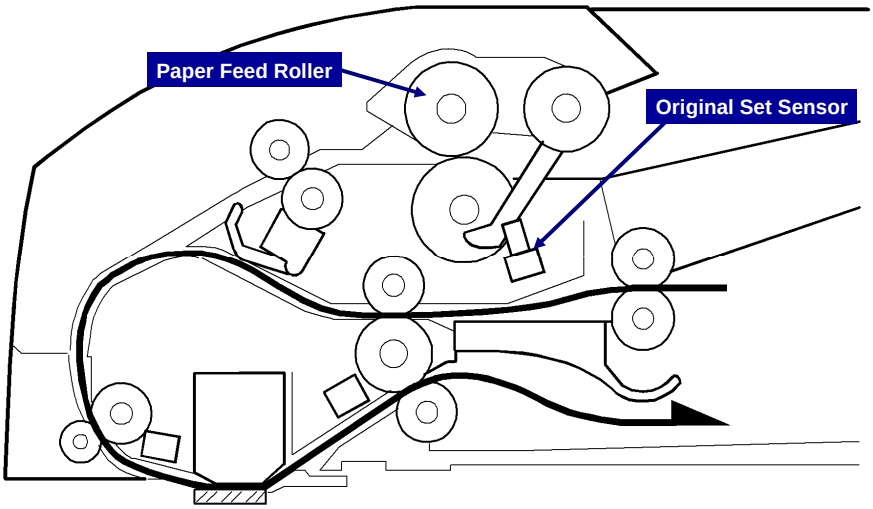
Paper Transport - Pick up and Feed



- **Original Size Detection**
  - Original pushes down feeler of original set sensor when original is placed on feeder table.
  - ARDF does not detect paper sizes.

Slide 93

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Paper Transport Pickup and Separation

- **Separation:**
  - ARDF uses FRR (feed & reverse roller) system.
  - DF-Feed Motor drives DF pickup roller, DF feed roller, DF separation roller, and transport roller.
  - Pickup roller drives top sheet(s) between feed and separation roller, where top sheet is separated and fed to transport rollers.
- **Clutch Operation:**
  - DF feed clutch stops feeding when original is fed to inverter tray in double-sided mode. If DF feed clutch didn't stop pick-up, feed, and separation rollers in double-sided mode, next original would be fed while first original was at inverter tray and an original jam would occur.

Slide 94

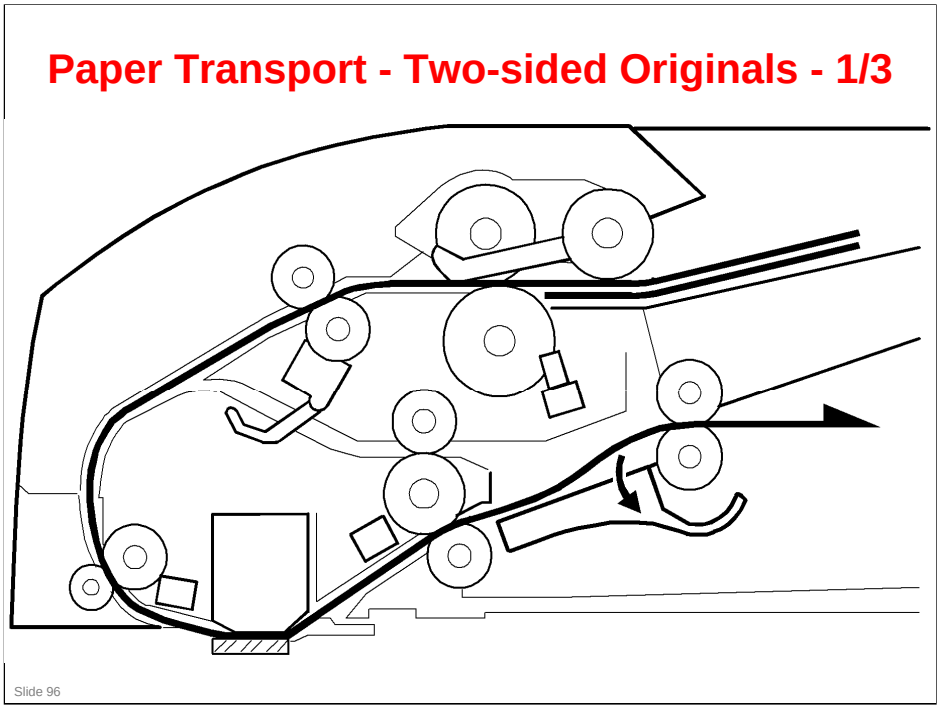
Paper Transport - Two-sided Originals

- **Two-sided Transport Details**
  - After original has been fed to registration sensor by transport roller, DF feed motor briefly stops.
  - After scanner moves to DF scan position, front side of original is scanned.
  - When exit sensor detects leading edge of original, junction gate solenoid is activated, opening junction gate.
  - Original is then transported towards inverter table.
  - After trailing edge of original passes exit sensor, junction gate solenoid switches off and junction gate is closed.
  - Following feeding of original onto inverter table, feed and transport motors stop.
  - Feed motor rotates in reverse and original is fed to exit roller by inverter roller.
  - Feed motor stops briefly to adjust original skew. After adjusting, original is fed again by exit roller and registration roller to the scanning area (where reverse side will be scanned).
  - Original is then sent to inverter table again to be turned over, enabling duplex output to be properly stacked front side down in exit tray.

Slide 95

See ARDF illustrations on following pages.

Paper Transport - Two-sided Originals - 1/3



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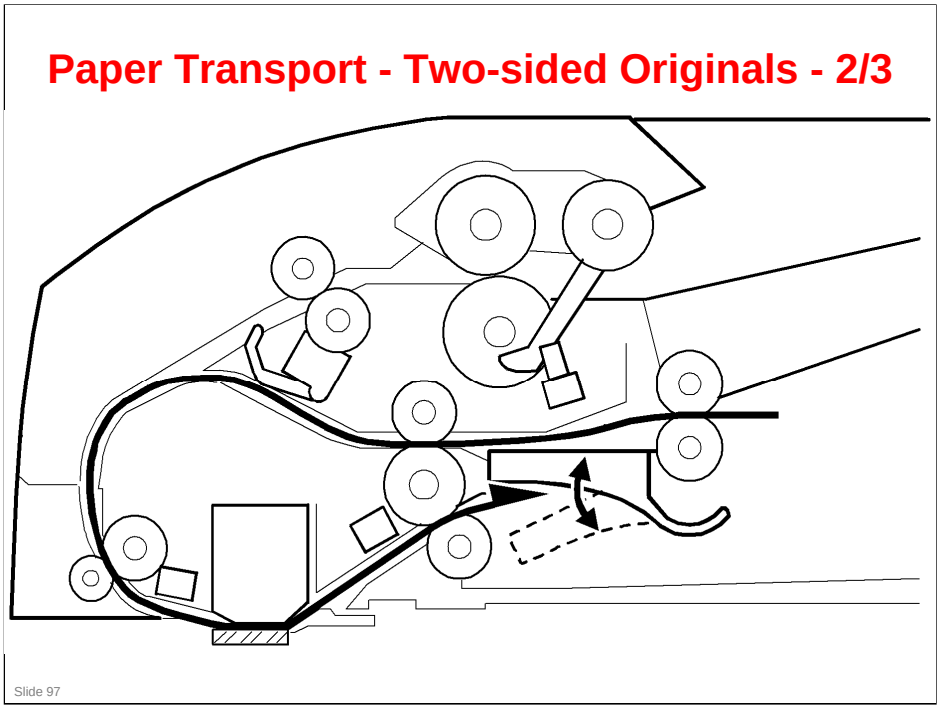
Paper Transport - Two-sided Originals - 2/3



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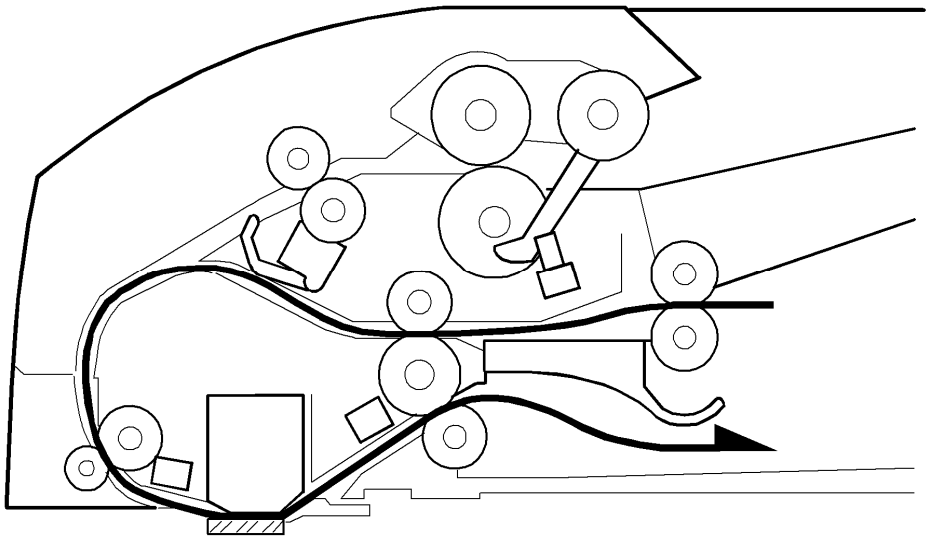
Paper Transport - Two-sided Originals - 3/3



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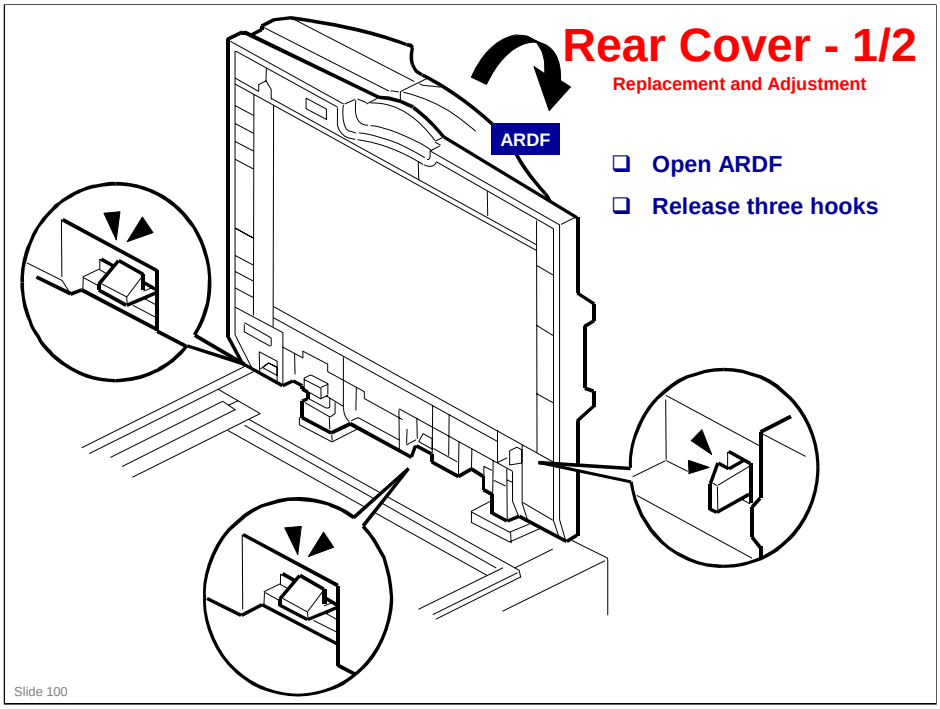
Replacement and Adjustment

- **Before you start:**
  - Remove exterior cover and original table. (See Replacement and Adjustment section of ARDF (B872) FSM)
- **Practice removal procedures for the following as outlined in FSM**
  - Pick-up roller
  - Paper feed roller
  - Separation roller
  - DF feed motor
  - DF feed clutch
  - Sensors
  - DF drive board

Slide 99


Rear Cover - 1/2
Replacement and Adjustment
ARDF
Open ARDF
Release three hooks
Slide 100

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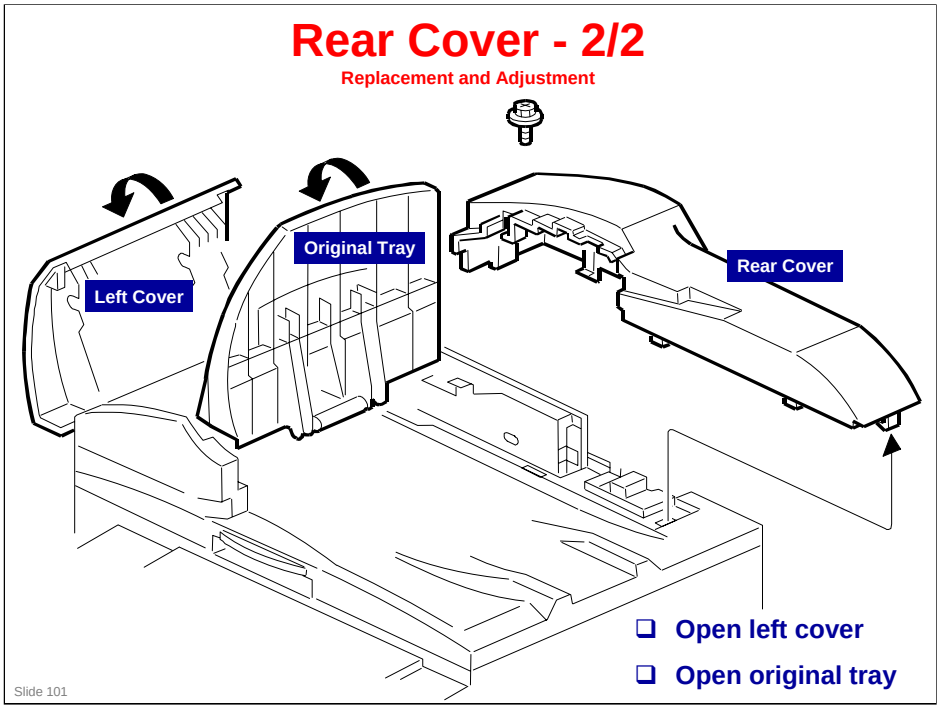
Rear Cover - 2/2
Replacement and Adjustment
Original Tray
Left Cover
Rear Cover
❑ Open left cover
❑ Open original tray
Slide 101

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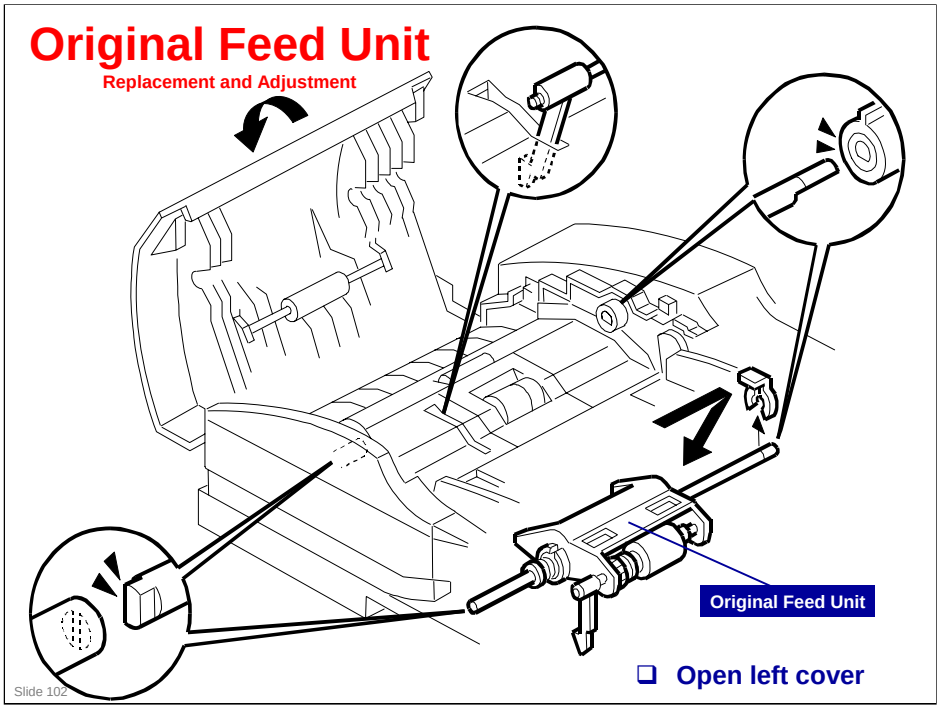
Original Feed Unit
Replacement and Adjustment
Original Feed Unit
❑ Open left cover
Slide 102

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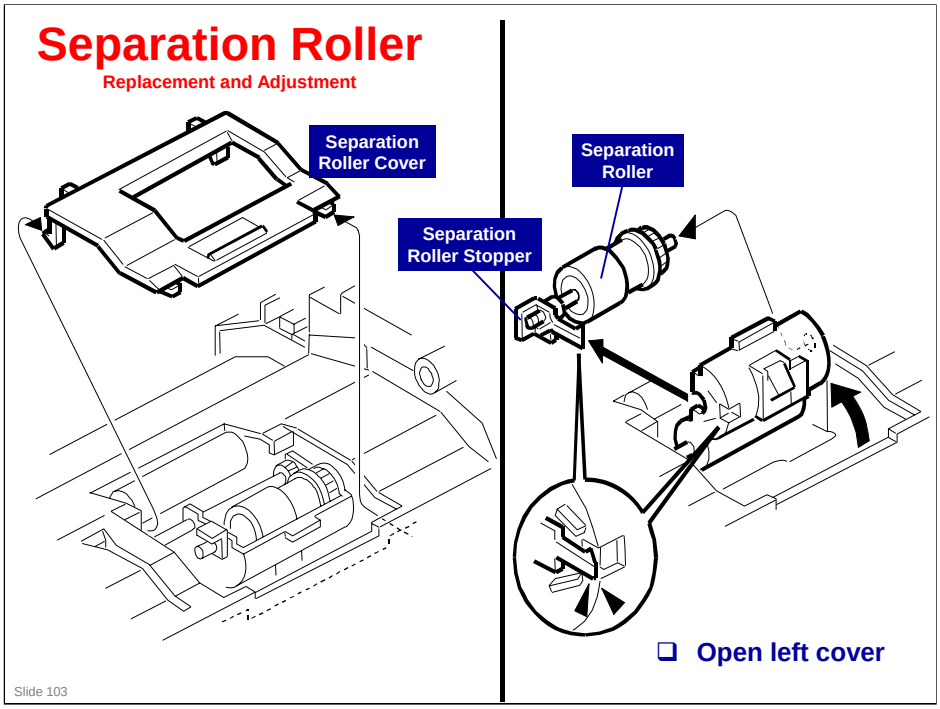
Separation Roller
Replacement and Adjustment
Separation Roller Cover
Separation Roller
Separation Roller Stopper
❑ Open left cover
Slide 103

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SP Modes and SC Codes

- **These SP modes are used for the ARDF:**
  - SP 6006 1: Side to side/front registration
  - SP 6006 2: Leading registration
  - SP 6006 3: Trailing erase
  - SP 6006 5: Sub-scan magnification
  - SP 6009 1: ARDF free run in duplex mode
  - SP 6009 3: ARDF free run in simplex mode
  - SP 6910 1: ARDF shading time
- **These SC codes are for the ARDF. They are all level "B" error codes:**
  - SC 760: DF gate error 1
  - SC 761: DF gate abnormal 2
  - SC 762: DF gate abnormal 3
- **Do the above SP modes if you are unfamiliar with them.**

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Preventive Maintenance

- **These need to be replaced at PM interval 90K:**
  - Separation roller
  - Pick-up roller
  - Feed roller
- **Clean remaining parts when necessary.**

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Paper Tray Unit (D567)

- ❑ The optional paper tray unit will be discussed.

In this section you will do these things:

- ❑ Examine the mechanical layout for the paper tray unit.
- ❑ Examine drive and paper lift.
- ❑ Learn how the paper tray unit detects the paper end.
- ❑ Replace the friction pad and feed roller.

When you finish this section, you should know the answers to these questions:

- ❑ What feed mechanism does the paper tray unit use?
- ❑ How is the paper end detected?
- ❑ Which components will I need to replace?

Overview

- **Paper tray unit is an option for this machine.**
- **Paper tray unit uses standard mechanisms for these:**
  - Paper feed (friction pad method)
  - Paper lift (springs)
  - Paper end detection (feeler method)
- **Paper tray unit does not have any mechanism to detect paper size. If you want to change paper size, you must set new paper size in machine memory with a user tool. This will prevent timing jams.**

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Specifications

- **Paper sizes:**
  - A4 SEF
  - 8½" x 11" SEF
  - 8½" x 13" SEF
  - 8½" x 14" SEF
- **Paper weight: 60-90 g/m² (16-24 lb)**
- **Tray Capacity: 500 sheets**
- **Paper feed system: Feed roller and friction pad**

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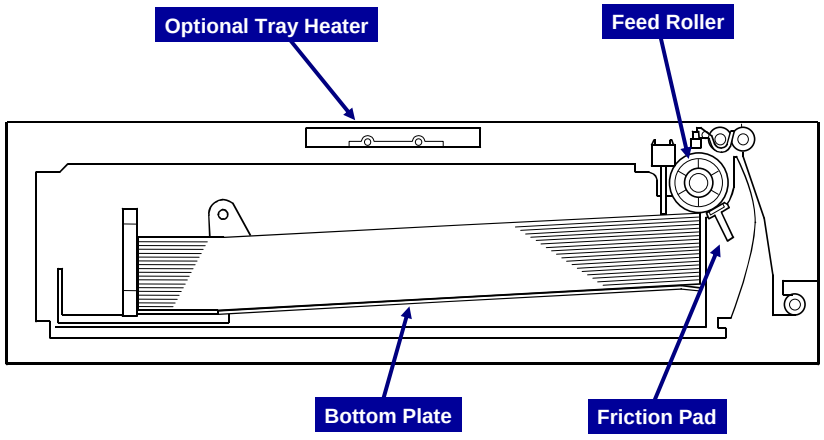
Mechanical Component Layout



Slide 109

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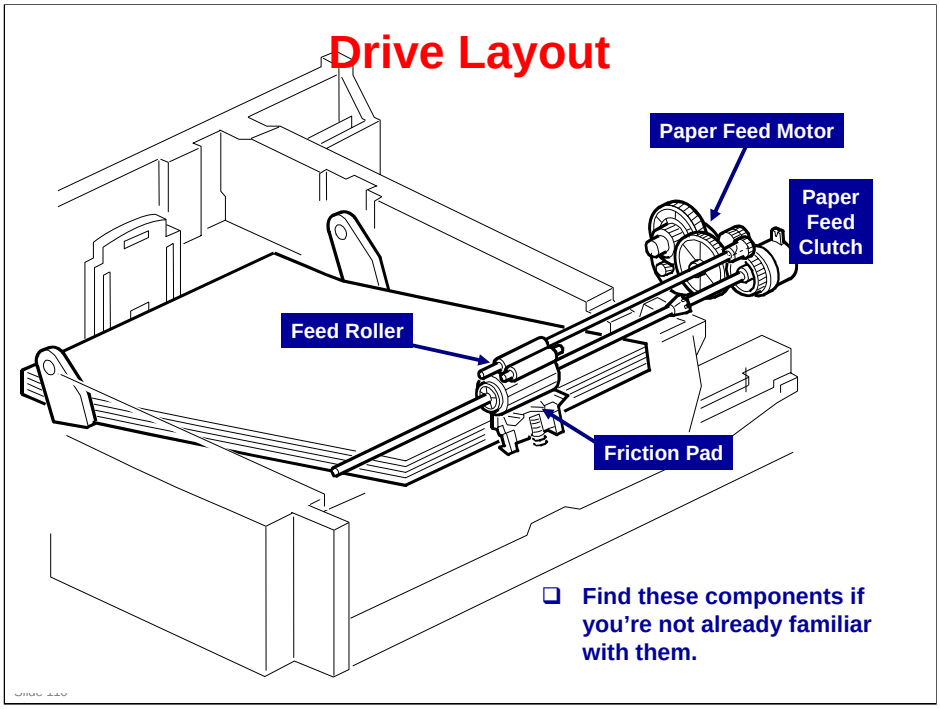
Drive Layout
Paper Feed Motor
Paper Feed Clutch
Feed Roller
Friction Pad
Find these components if you're not already familiar with them.

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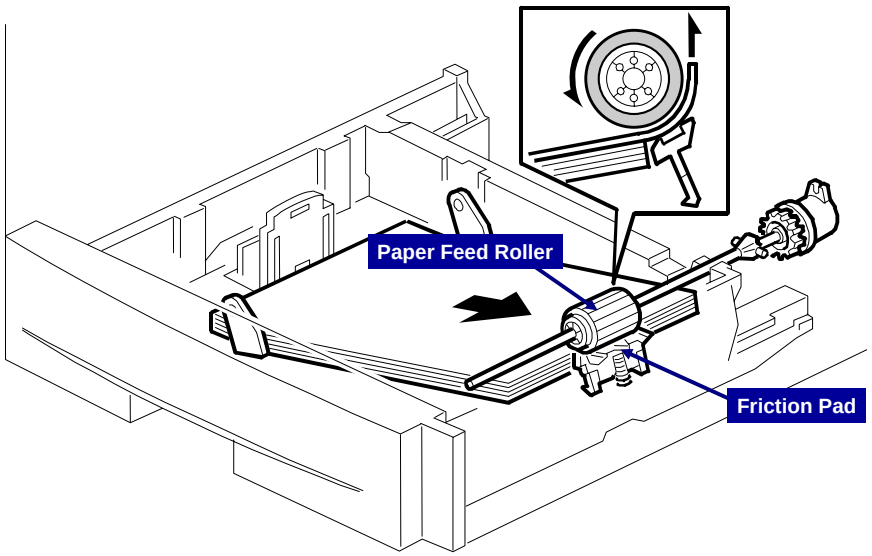
Paper Feed and Separation



- Find these components if you're not already familiar with them.

Slide 111

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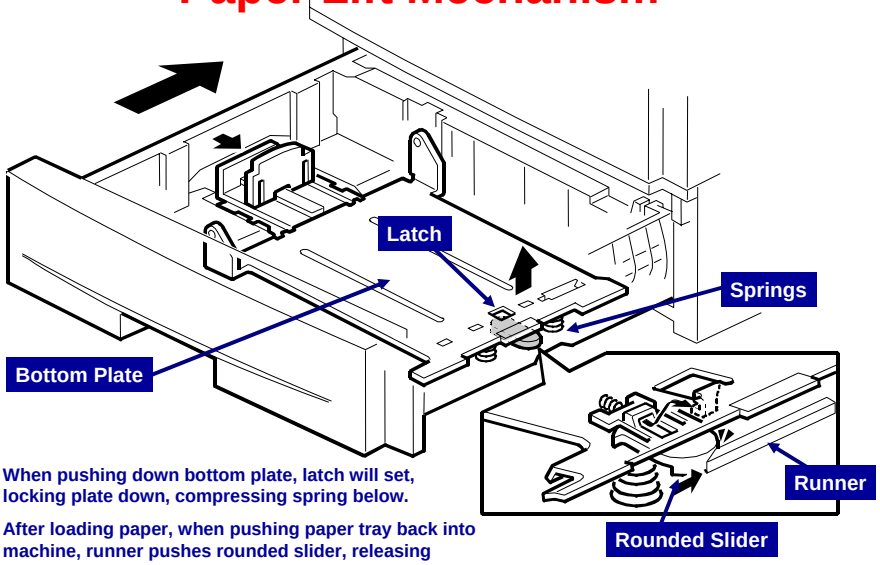
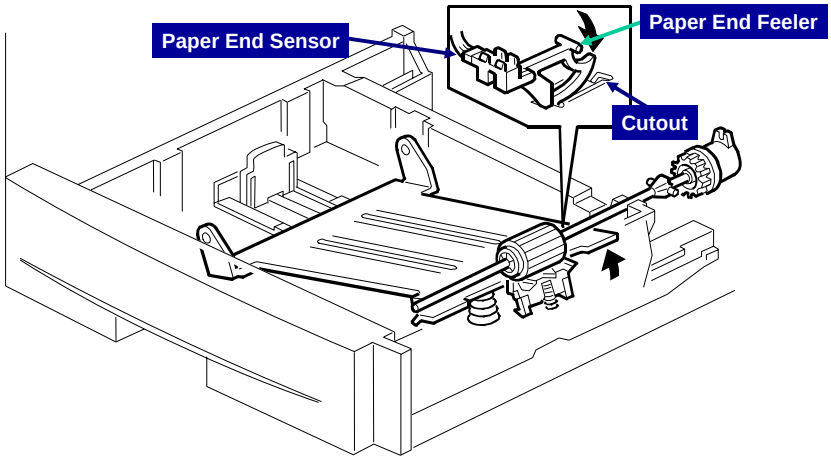
Paper Lift Mechanism



- When pushing down bottom plate, latch will set, locking plate down, compressing spring below.
- After loading paper, when pushing paper tray back into machine, runner pushes rounded slider, releasing latch. Then compressed springs push plate up and keep latch retracted (preventing plate from becoming locked down under a full load of paper.)

Slide 112

Paper End Detection



- If there is paper in tray, feeler will push up and sense this. If there is no paper in tray, feeler drops in the cutout and activates sensor.
- Feeler is rounded and moves when tray is pushed in or out, preventing feeler from getting caught in tray.

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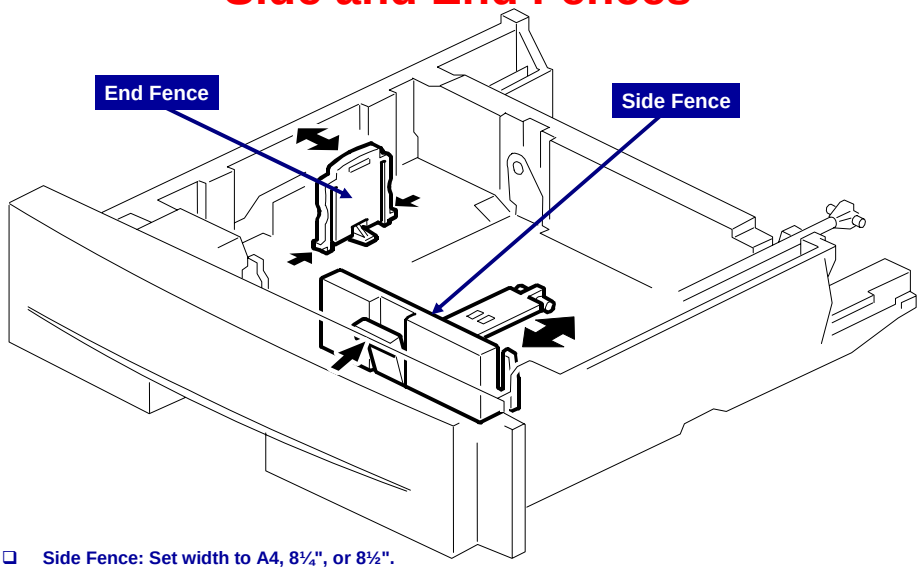
Side and End Fences



- Side Fence: Set width to A4, 8¼", or 8½".
- End fence: Set from 11" to 13", with standard settings at 11", A4, and 13". To feed 14" paper, end fence must be removed (and stored in an internal storage compartment).
- You can secure both fences with screws at standard positions.

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Replacement and Adjustment

- **Examine how to remove paper tray unit from machine before you do replacement procedures. (Read Paper Tray Unit section of FSM.)**
- **You will usually have to replace these (PM interval every 120K) in the field due to normal wear and tear. Practice these removal procedures:**
  - Feed roller and friction pad
  - Sensors
  - Drive block
  - Paper feed motor
  - Paper feed clutch
  - Tray main board
  - Clean the bottom plate when necessary

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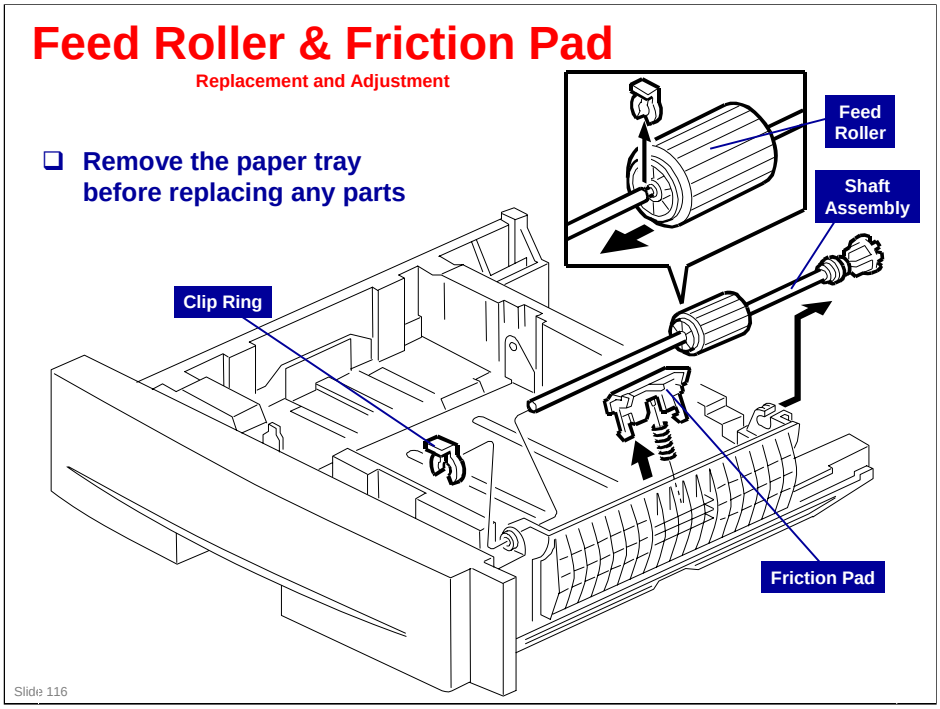
Feed Roller & Friction Pad
Replacement and Adjustment
Remove the paper tray before replacing any parts
Feed Roller
Shaft Assembly
Clip Ring
Friction Pad
Slide 116

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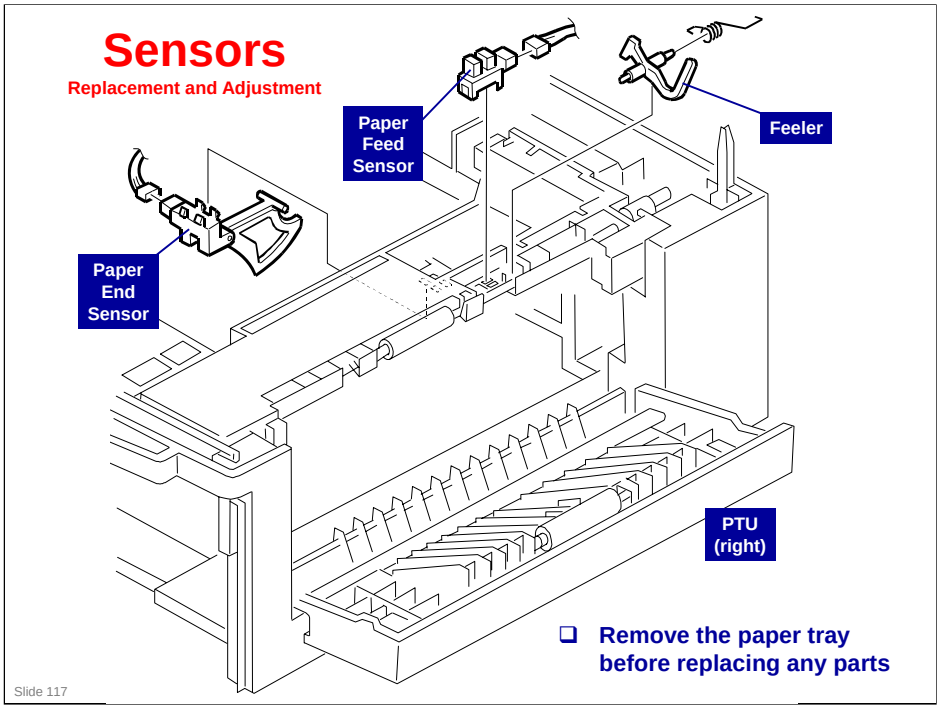
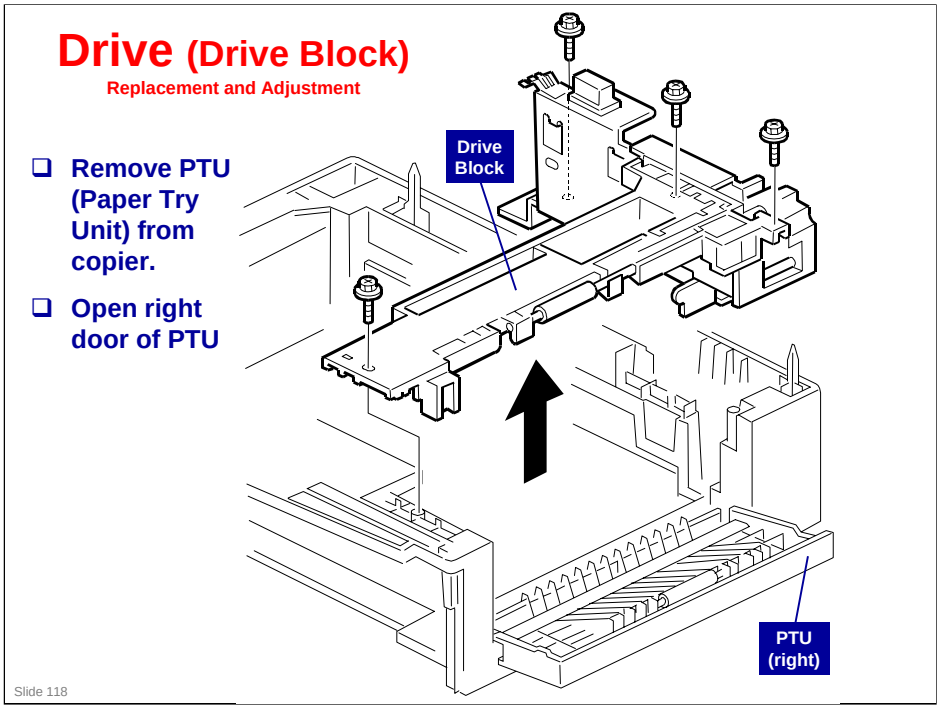


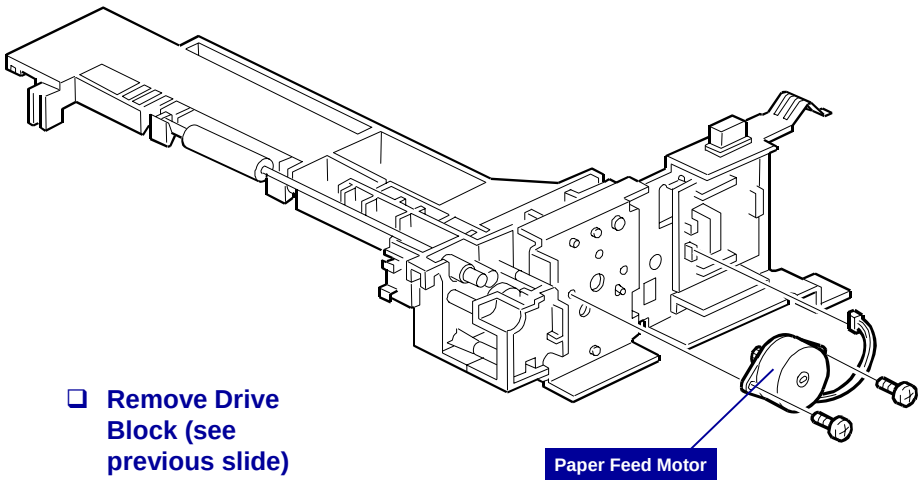
PTU - Paper Tray Unit



PTU - Paper Tray Unit

Drive (Paper Feed Motor)

Replacement and Adjustment



- Remove Drive Block (see previous slide)

Paper Feed Motor

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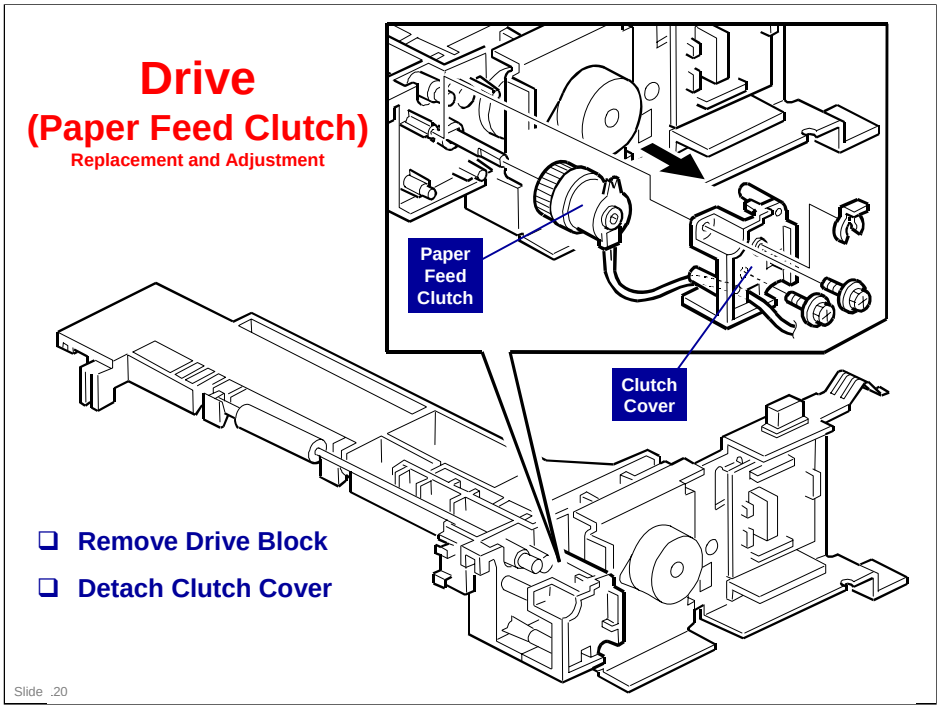
Drive
(Paper Feed Clutch)
Replacement and Adjustment
Paper Feed Clutch
Clutch Cover
❑ Remove Drive Block
❑ Detach Clutch Cover
Slide_20

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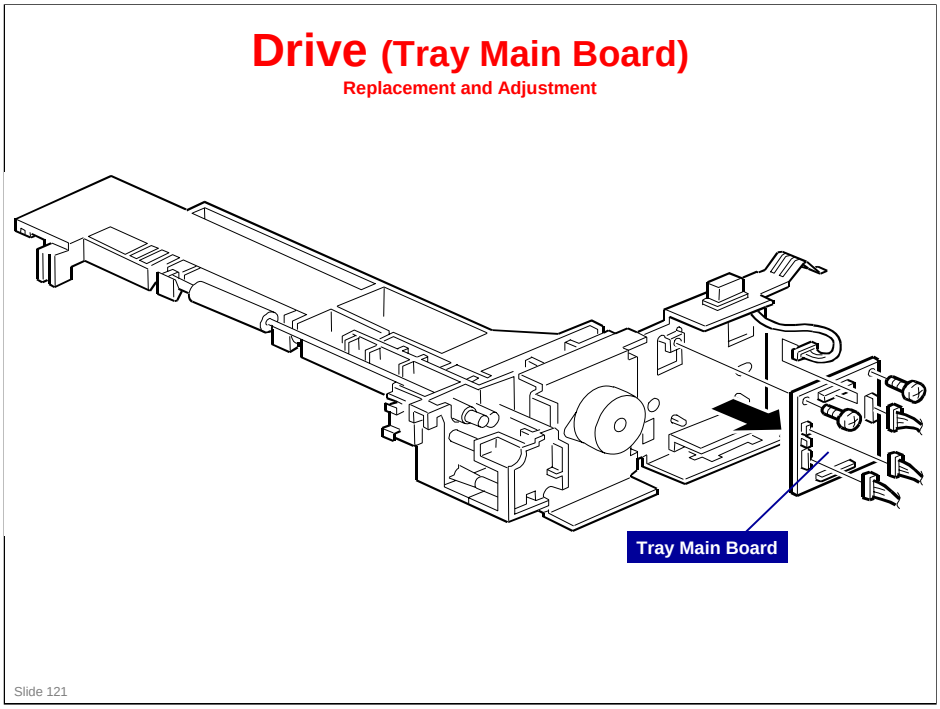
Drive (Tray Main Board)
Replacement and Adjustment
Tray Main Board
Slide 121

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D115/D116
Service Training

Fax Unit

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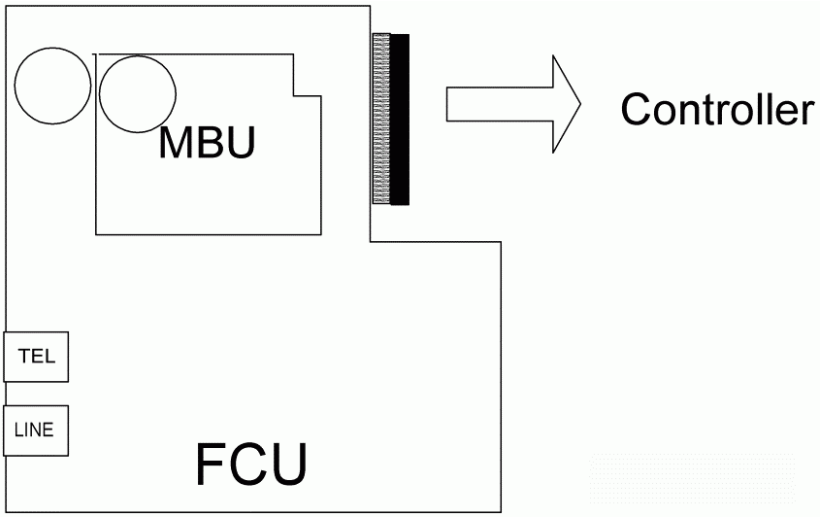
Fax Unit - Overview



- Basic fax unit consists of two PCBs: one FCU and one MBU.
- FCU controls all fax communications and fax features (together with controller board). MBU contains ROM and SRAM. Also, FCU has an NCU circuit.

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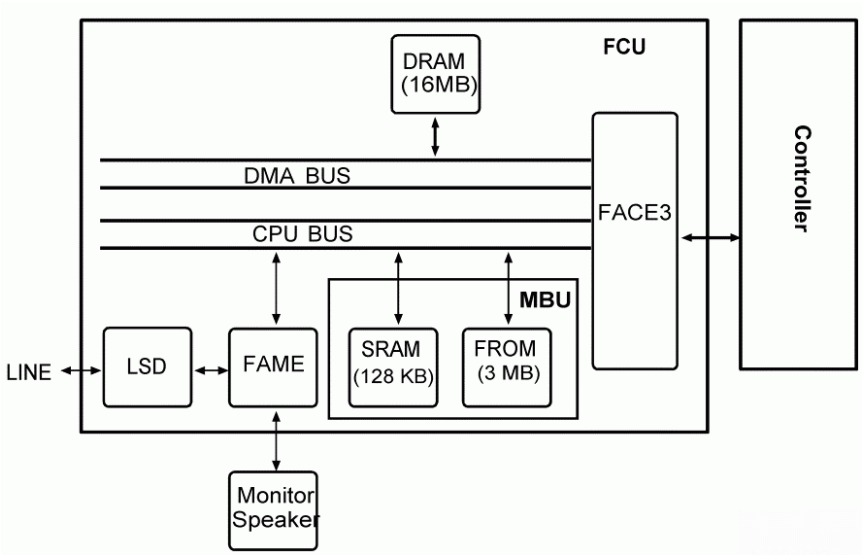
FCU Board



- FCU (Facsimile Control Unit) controls fax communications, video interface to base copier's engine, and all the fax options.

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FCU Details - 1/2

- **FCU (Facsimile Control Unit) controls fax communications, video interface to base copier's engine, and all fax options.**
- **FACE3 (Fax Application Control Engine)**
  - CPU
  - (DCR) Data Compression and Reconstruction
  - DMA control
  - Clock generation
  - DRAM backup control
- **Modem (FAME)**
  - V.34, V33, V17, V.29, V.27ter, V.21, and V.8
- **DRAM**
  - 16 MB of DRAM is shared as follows.
    - » SAF memory: 4MB
    - » Working memory: 4MB
    - » Page memory: 8MB
  - SAF memory is backed up by a rechargeable battery.
- **Memory Back-up**
  - Rechargeable battery backs up SAF memory (DRAM) for 12 hours.

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FCU Details - 2/2

- **MBU**
  - Flash ROM on this board contains FCU firmware, and SRAM contains system data and user parameters. Even if FCU is changed, system data and user parameters are kept on MBU board.
- **ROM**
  - 3MB flash ROMs for system software storage
- **SRAM (Static Random Access Memory)**
  - 128 KB SRAM for system and user parameter storage is backed up by lithium battery.
- **Memory Back-up**
  - Lithium battery backs up system parameters and programmed items in SRAM, in case base copier's main switch is turned off.
- **Switches**
  - SW1
    - » Switches SRAM backup battery on/off.

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Specifications - Fax

- **Type: Desktop type transceiver**
- **Circuit: PSTN, PBX**

Original size:

- **Book (face down)**
  - Maximum length: 297 mm (11.7 inch)
  - Maximum width: 216 mm (8.5 inch)
- **ADF (face up)**
  - Length: 128-1200 mm (5.0-47.2 inch)
  - Width: 105-297 mm (4.1-11.7 inch)
- **Transmission time: G3, 3 seconds at 28.8K bps**
- **Look in specifications section of fax manual pages for more details.**

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Specifications:

- The fax unit can scan at these resolutions:
  - 200 x 100 dpi (standard)
  - 200 x 200 dpi (detail)
  - 200 x 400 dpi (fine)

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D115/D116
Service Training

Preventive Maintenance

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Before You Start

- **Make sure you understand all warnings and precautions before you service machine.**
- **Most parts have a PM interval of 90 K (PCU has a PM interval of 45 K).**
- **Some parts require cleaning only. You do not need to replace these parts.**
- **You must clear PM counter with SP 7804 after you do a PM schedule.**
- **Refer to:**
  - Preventative maintenance section of FSM
  - How to clear the PM counter (SP 7804-1)

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Copy Image Adjustments - Overview

- **Copy image adjustments need to be done after doing the following:**
  - Memory all clear
  - Replacement of first or second scanner
  - Replacement of lens block
  - Replacement of polygon mirror
  - Replacement of paper tray

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Printing Adjustments

- **Leading edge registration: Check this for each paper tray. Use SP 1001 and make sure registration is set to correct tolerance levels.**
- **Side to side registration: Use SP 1002 and make sure registration is set to correct tolerance levels.**
- **Blank margin: Adjust leading edge and left edge margins only if you could not correctly adjust registration.**
- **Use SP 5902 to print test pattern to check adjustments.**
- **Blank margin**
- **Adjust margins in this order**
  - Trailing edge
  - Right edge
  - Leading edge
  - Left edge

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Scanning Adjustments

- Leading edge registration: Use SP 4010 for this adjustment.
- Sub-scan magnification: Use SP 4008 for this adjustment.
- Main scan magnification: Use SP 4009 for this adjustment.
- Scan Auto Adjustment - See Scan Auto Adjustment in the Preventive Maintenance chapter of the FSM.
- Do registration and blank margin adjustments for printing before scanner is adjusted. Use A4 test chart to perform all adjustments.

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D115/D116
Service Training

Troubleshooting

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Overview

- SC codes refer to hardware or firmware malfunctions of copy/print engine. SC codes are shown on LCD screen of operation panel.
- This machine has four levels of service call conditions. Make sure you note which codes can be cleared by user and which codes cannot be cleared by user.
- Examine these before you replace any component in the machine:
- If the problem is with circuit boards: Disconnect and then reconnect all connectors before you replace a circuit board.

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Sensor/Switch Open Errors

- Examine Service Call Conditions in Troubleshooting Unit. This table explains symptoms machine will exhibit when a sensor or switched circuit is in an open condition.
- Open front or right door. Make sure "Close Front/Right Cover" message is indicated on screen.
- Do some open sensor examples from Troubleshooting unit. Use caution not to damage any connectors.

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Blown Fuse Conditions

- Read Blow Fuse Conditions section of Troubleshooting Unit of FSM. It shows what happens if a power supply board fuse burns out.
- Pull copy tray out and simulate a blown fuse condition.

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Machine Functions

- **Do these practical assignments to learn more about how to troubleshoot machine:**
  - Test patterns: Print several different test patterns indicated in the "Test Pattern Print (SP 5902-1)" section of Service Tables unit in FSM.
  - Output check: Use output check mode to test operation of polygon motor, main motor, and fan motor.
  - Free run
    - » Scanner, SP 4013
    - » Machine, SP 5802
    - » Printer, SP 5901
    - » ARDF, SP 6009

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Sensors and Switches

- **Practice these to learn how to troubleshoot sensors and switches:**
  - Input check: This lets you check condition of most sensors and switches in machine.
  - ID sensor analysis (SP 2221) lets you check these:
    - » Vsg (displayed as Vg)
    - » Vsp (displayed as Vp)
    - » Power (displayed as PW. This is the power for the light source.)
    - » Vsdp (displayed as Vg-Vp. This value does not have any error conditions.)
    - » Vt

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End of Course

Slide 139