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MODEL S-P3 TRAINING
Machine Code: M080

Version 1.0

- This course is for the S-P3 printer.

Modifications

- Started 28 March, 2011.
- First draft 11 April, 2011.
- Release version – 10 May, 2011.

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M080 Series Training

Model S-P3

1) Product Outline

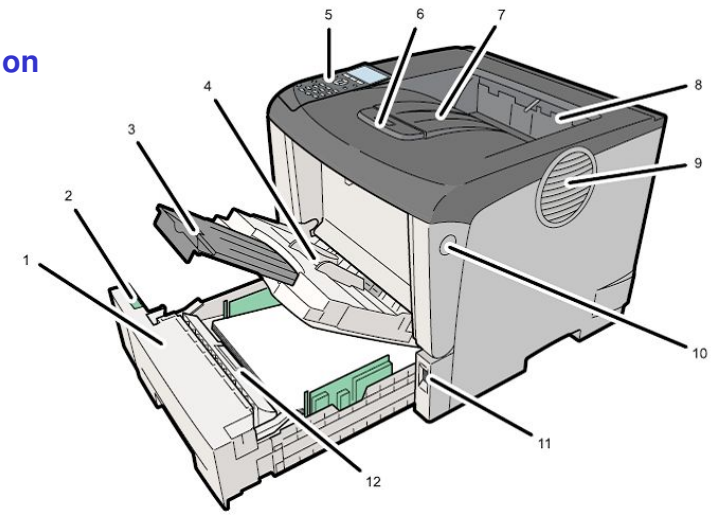
No additional notes.

Date of change	Version History	Description
28-2-2008	2.0	New model added (S-P1L). The following slides were changed: Slides 2, 11 The following slides were added: Slides 20 to 27

Exterior Components 1

1. Standard Paper Feed Tray
2. Paper Size Dial
3. Bypass Tray Extension
4. Bypass Tray
5. Operation Panel
6. Tray Extension
7. Standard Tray
8. Paper Exit Cover
9. Vents
10. Front Cover Release Button
11. Power Switch
12. Friction Pad

(Descriptions below in the notes section)

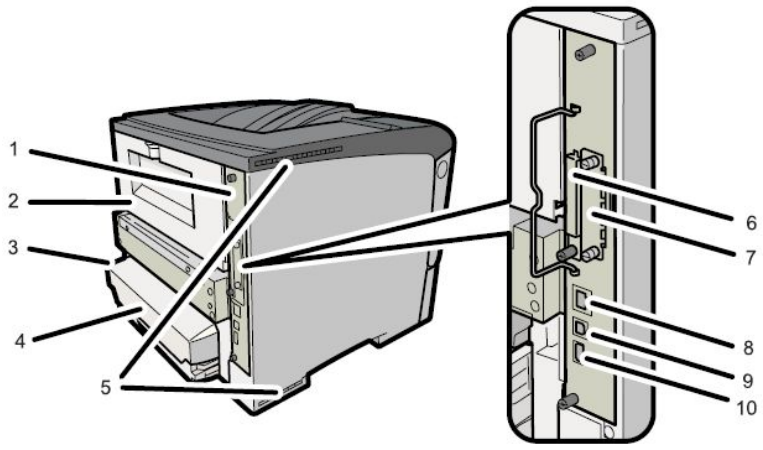


1. Standard Paper Feed Tray
   500 sheet capacity
2. Paper Size Dial
   Adjust according to the size and feed direction of the paper.
3. Bypass Tray Extension
   Pull out when loading paper that is longer than B5 on the bypass tray.
4. Bypass Tray
   100 sheet capacity
5. Operation Panel
   Has keys for printer control and a display that shows the printer status.
6. Tray Extension
   Pull out if loading paper longer than B5.
7. Standard Tray
   Prints are delivered here print side down.
8. Paper Exit Cover
   Open to remove jammed paper.
9. Vents
   Heat is released through these vents.
10. Front Cover Release Button
    Press to open the front cover.
11. Power Switch
    Turns the power on and off.
12. Friction Pad
    Clean it if multi-sheet feeds occur.

Exterior Components 2

1. **Controller Board**
2. **Rear Cover**
3. **Power Connector**
4. **Paper Tray Cover**
5. **Intake Vent**
6. **SD Card Slots**
7. **Optional Interface Board Slot**
8. **Ethernet Port**
9. **USB Port B**
10. **USB Port A**

(Descriptions below in the notes section)



1. Controller Board
   Install internal options (SDRAM, HDD) directly on the controller board. Plug in cables, SD cards, and optional interface boards via slots and plugs (see 6 through 10).
2. Rear Cover
   Remove to replace the fusing unit.
3. Power Connector
   Connect the power cord here.
4. Paper Tray Cover
   Keeps paper in the tray free of dust.
5. Intake Vent
   Inlets for cool air. Instruct the user not to obstruct the intake vents. (Doing so can result in malfunctions caused by build up of heat inside the printer.)
6. SD Card Slots
   Remove the cover to install SD cards here.
7. Optional Interface Board Slot
   Insert an optional Wireless LAN interface unit, Gigabit Ethernet board, or 1284 interface board in this slot.
8. Ethernet Port
   Use to connect the printer to a network.
9. USB Port B
   Use to connect the printer to a computer.
10. USB Port A
    Use to connect optional USB devices such as the authentication card reader.

Operation Panel

- **This is the new operation panel.**

Upgraded Panel :
- ✓ 4-Line display
- ✓ Number keys standard

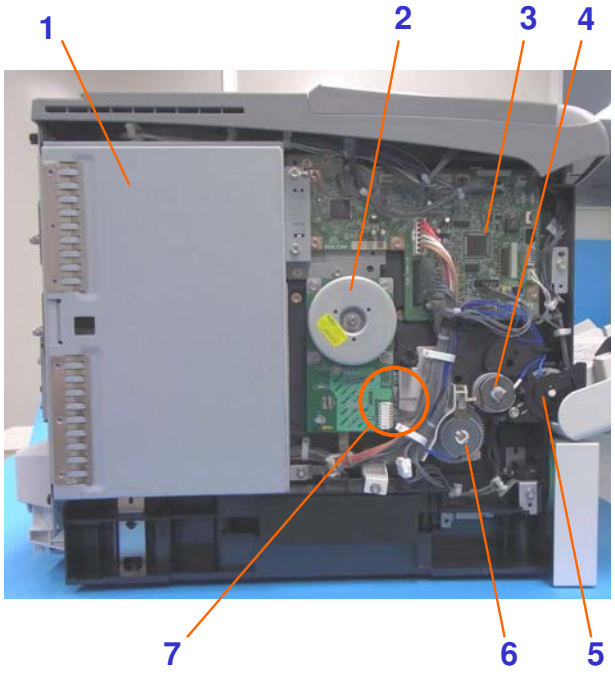
Number key pad

Previous Model (S-P2)

- The S-P3 has a number key pad, which enables users to input numbers such as PIN codes easily.

Interior Components

1. Controller case
2. Main motor
3. Engine board
4. Relay clutch
5. By-pass feed clutch
6. Paper feed clutch
7. Registration clutch (behind harness guide and main motor board)



No additional notes.

Product Lineage & Changes

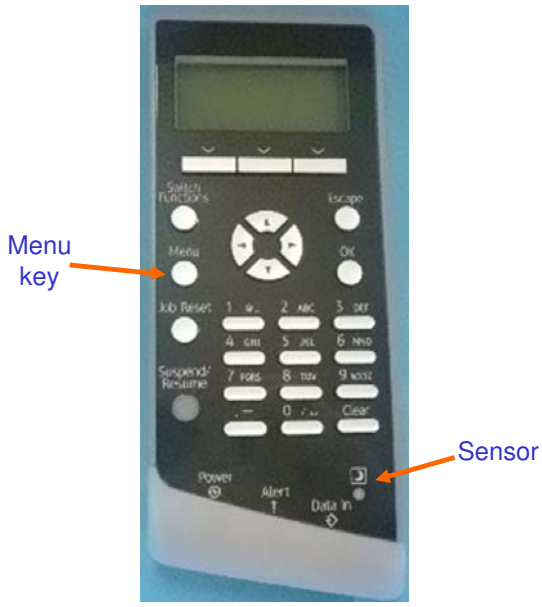
- **Predecessor Models: Model S-P1c, Model S-P2**
- **Current Model: Model S-P3 (M080)**

- **New to Model S-P3 (relative to Model S-P2)**
  - Operation panel
    - » 10-Key standard, 4-Line display
  - Eco sensor
  - Firmware
  - HDD (optional)
    - » comes with data overwrite security and encryption unit
  - Other service parts, including AIO, are common with S-P2.

No additional notes.

Eco Night Sensor

- The printer will automatically go into Auto Off mode if the Eco Night Sensor detects a low amount of light in the room.
- By default the Eco Night Sensor is inactive. It can be turned on via the Menu key.



No additional notes.

Basic Specifications - 1

- **Warm up time: 19 seconds or less**
- **First print time: 6.9 seconds or less**
- **Optional HDD capacity: 80GB**
- **Built-in Connectivity**
  - USB 2.0
  - Ethernet
- **Printing speed**
  - 36 ppm (A4-SEF) / 37 ppm (LT-SEF)
- **Printer memory**
  - Standard: 256 MB
  - Maximum: 512 MB

No additional notes.

Basic Specifications - 2

- **Maximum print width: A4/LT**
- **Paper tray capacity**
  - 550 sheets (standard)
  - 100 sheets (bypass tray)
- **Output tray capacity: 250 sheets**
- **AIO Cartridge:**
  - Average 15K/cartridge (A4/5% coverage)
- **Weight**
  - 17.5 kg / 38.6 lb (with AIO)
  - 15.5 kg / 34.2 lb (without AIO)

- Paper tray and output tray capacities assume 75 g/m^2 (20 lb) paper.

Maintenance Kit

- **The Maintenance Kit consists of the following, which should be replaced at 90k intervals.**
  - Fusing Unit (one - for the main unit)
  - Transfer Roller (one - for the main unit)
  - Friction Pads (one each for standard and optional trays)
  - Paper Feed Rollers (one each for standard and optional trays)
- **The user or a technician can do the maintenance**

No additional notes.

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2) Installation

No additional notes.

Overview

No additional notes.

Who is Responsible for Installation?

- The customer installs the printer, the optional paper feed and duplex units, and the controller options.

No additional notes.

Accessing Service Mode

- **To enter Service Mode, (with the power already on and the machine warmed up) hold down both arrow keys for five seconds, release, and then press Enter.**
- **Alternately, hold down the Suspend/Resume and Escape buttons as the power is switched on (saving time under certain conditions).**
- **There are two types of SP mode**
  - Engine SP modes
  - Controller SP modes

No additional notes.

SP Settings

- **Service Tel. No. Setting: SP5-812-001 and 002**
  - 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.

No additional notes.

Install the Printer

No additional notes.

Install the Printer

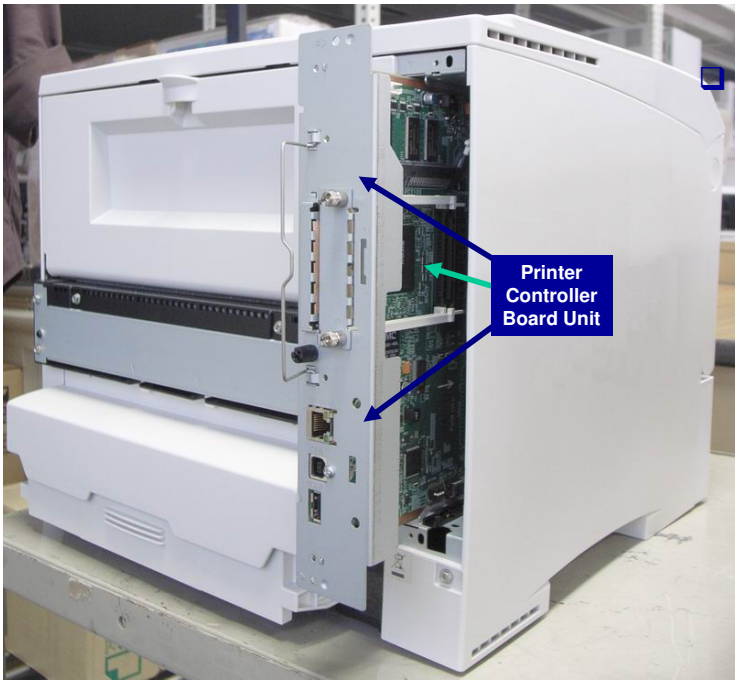
- **For instructions, refer to the Quick Installation Guide**
- **Obey all notes and cautions.**
  - Learn how to lift the printer correctly.
- **Keep the cartridge level and do not shake it...**
  - when the tape is removed
  - after you remove the tape
  - when you put the cartridge in the machine.
- **Print configuration sheet when installation is completed.**
  - For instructions on how to read the configuration sheet: Software Guide - Making Printer Settings with the Control Panel - List/Test Print Menu - Interpreting the Configuration Page
- **Connect the machine to a computer with a USB cable.**
  - Instructions are in the Quick Installation Guide.

- The configuration sheet makes sure that the printer operates correctly. It is not a test for the connection between the printer and the computer.
- To change the display language, use the User Tools as shown in the Quick Installation Guide.

Installing the Controller Options

No additional notes.

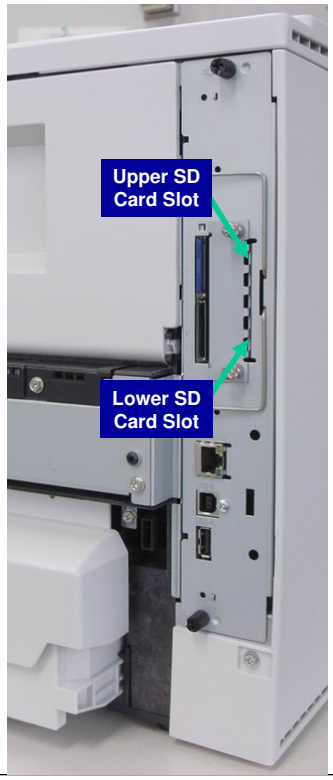
Printer Control Board Options



- **The following options are installed in or on the Printer Controller Board, shown at left**
  - 1. Optional memory
  - 2. SD card (VM Card, or Data Storage Card)
  - 3. Interface board (IEEE 802.11b or Gigabit Ethernet)
  - 4. Hard disk

No additional notes.

SD Card Slots



- **Upper Slot**
  - Use for Data Overwrite Security installation.
  - Also, use for moving SD card applications (SP5873).
- **Lower Slot**
  - The VM Card or Data Storage Card goes here.
    - » To install more than one of these, you must merge the software onto one card.
  - The technician also uses this slot to install new firmware.

No additional notes.

Copying Applications

- **If you want to use more than one application in one slot, you must copy the application from the original card to another SD card.**
- **See the service manual for the detailed procedure.**
  - Service Tables - SD Card Application Move
- **Basic point:**
  - Put the source card in slot 2 (lower slot), and copy it to the card in slot 1 (upper slot).

No additional notes.

Storing the Original SD Cards after Merging

- **After you copy an application, the original SD card is deactivated.**
  - It can be re-activated with the 'Undo Exec' procedure in the service manual.
    - » Put the original card in slot 2, and copy back from slot 1.
- **But the customer must keep the original SD card as a proof of purchase.**
  - There is no secret compartment inside the machine. The user must keep it in a safe place.

No additional notes.

Installing the Controller Options

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.
  - » Menu Key > List/Test Print > Config. Page
  - » All installed options are shown in the “Connection Equipment” area.

No additional notes.

Install the Memory Options

- **Try installing the options. The procedures are in the Operation Manual (Hardware Guide - Installing Options).**
  - Install the memory unit
    - » The machine already includes 64 MB memory as standard equipment. You can remove this and add 128 or 256 MB.
  - Install the hard disk
- **SP 7836 shows the size of the memory in the machine.**

No additional notes.

Install IEEE802.11b or Gigabit Ethernet Option

- Installation procedure: Hardware Guide - Installing Options
- Print the configuration page to make sure that the machine can find the board.
- You can install only one of these options.
  (There is only one interface option slot.)

No additional notes.

Install the VM Card or Data Storage Unit

- Try installing one of these options. The procedure is in the Operation Manual (Hardware Guide - Installing Options).

No additional notes.

Updating the Firmware

No additional notes.

Firmware

- **The firmware is on an SD card.**
- **There are several modules (see below).**
  - For more details, see service manual
    - » Service Tables – Firmware Update
- **All of the following firmware modules for this machine can go on one card**
  - Engine
  - Network DocBox
  - Printer
  - System
  - Network Support
  - Update Mode Err.
  - Verify Data

No additional notes.

Firmware Update

- **Make sure that your machine has the most recent firmware.**
- **Try the procedures in the service manual.**
  - Procedures:
    - » Download: Service Tables – Firmware Update
  - There are two card slots. Use the lower of the two card slots.
  - The bottom line of the display is a progress bar.
  - After approximately 90 seconds, the update finishes and the display shows 'Power Off/On'.
    - » If this does not happen, turn the machine off and do the procedure again.

No additional notes.

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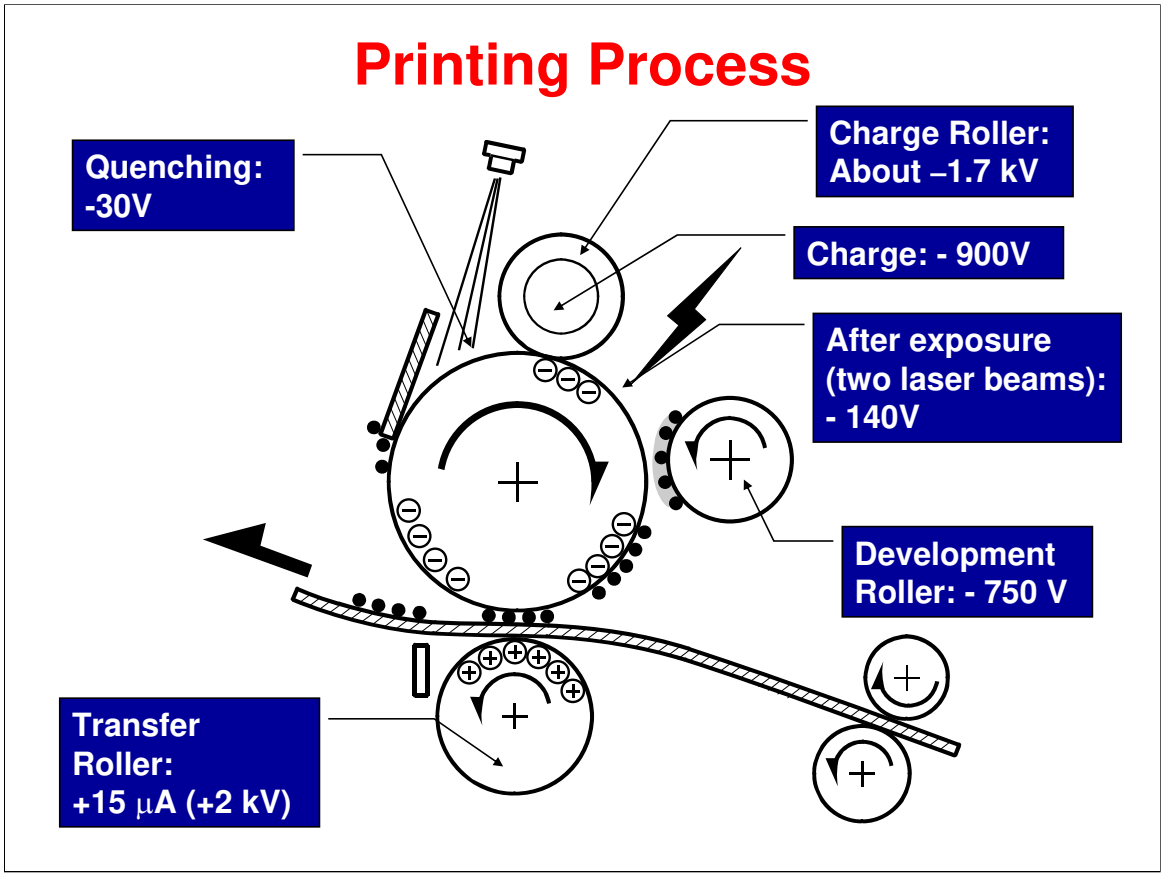
3) Machine Component Overview

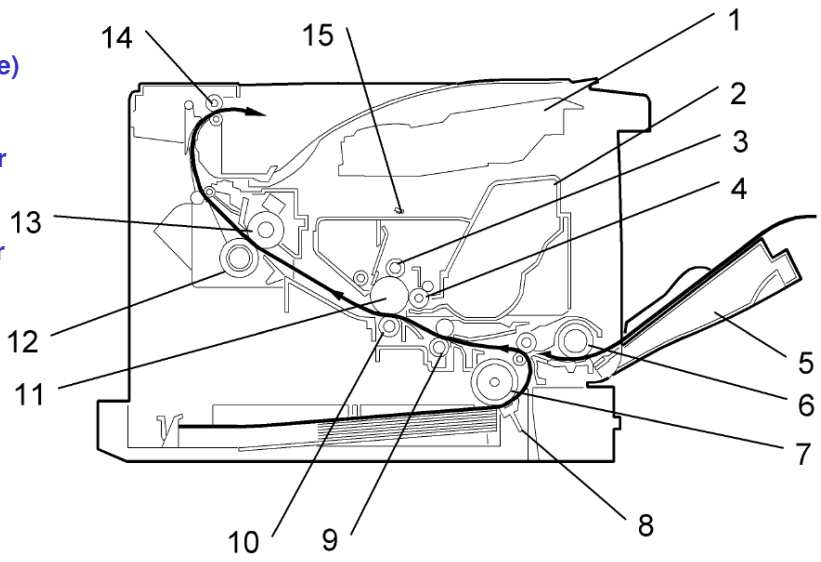
No additional notes.



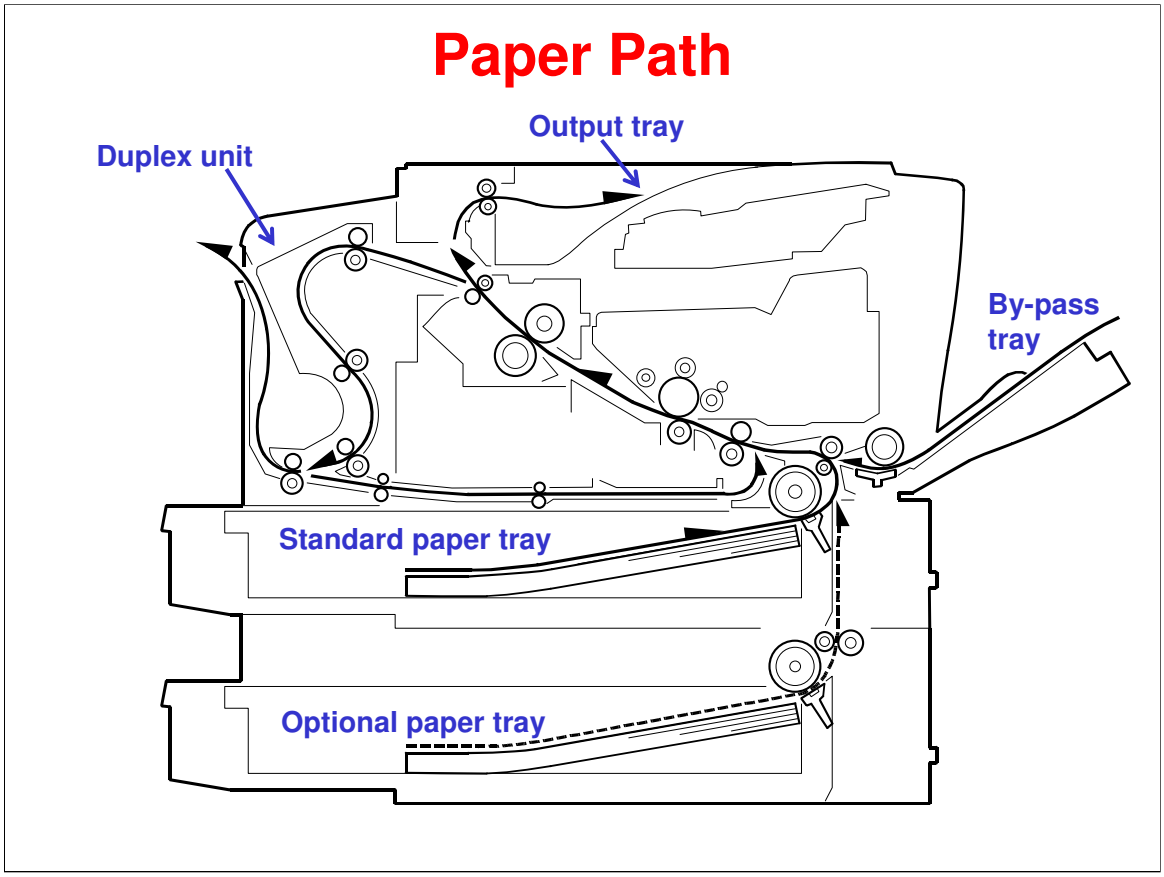
- These are all standard processes for printers and copiers. Refer to the Core Technology Manual for details.

Mechanical Components

1. Laser unit
2. Cartridge (AIO-type)
3. Charge roller
4. Development roller
5. By-pass feed tray
6. By-pass feed roller
7. Paper feed roller
8. Friction pad
9. Registration roller
10. Transfer roller
11. Drum
12. Pressure roller
13. Hot roller
14. Paper exit roller
15. Quenching lamp



❑ Locate the mechanical components on the machine.



- Study the paper feed paths.
  - Paper feed-in paths: Paper tray, by-pass tray, optional tray
  - Paper feed-out paths: Normal feed, duplex feed

    The junction gate and solenoid send paper to the duplex tray. These components are in the duplex unit.

Electrical Components

- **Study the electrical component layout diagrams.**
- **For the functions of the electrical components, please refer to the component list.**
- **Go to your machine. Find the components on the diagrams.**
  - Removing covers: Replacement & Adjustment – Covers
    - » See the Maintenance Unit for detailed photos
  - Before working on the machine, read the cautions (Replacement & Adjustment – General).

No additional notes

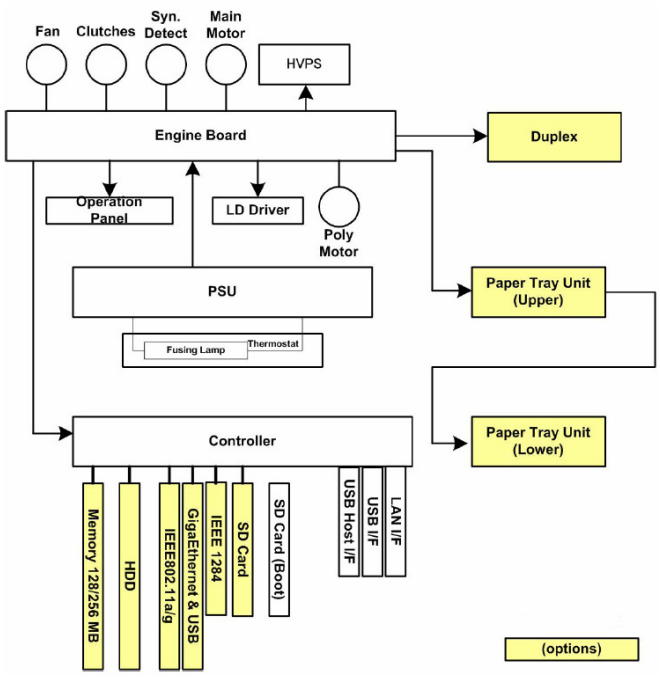
Boards

- **Engine board: Controls the printer engine**
  - If you replace the engine board, remove the NVRAM from the old board and put it on the new one.
- **Controller board: Controls the interfaces between the printer and the computer**
  - This is a GW controller
- **NVRAM upload/download**
  - Service Manual - Service Tables - NVRAM Upload/Download

No additional notes.

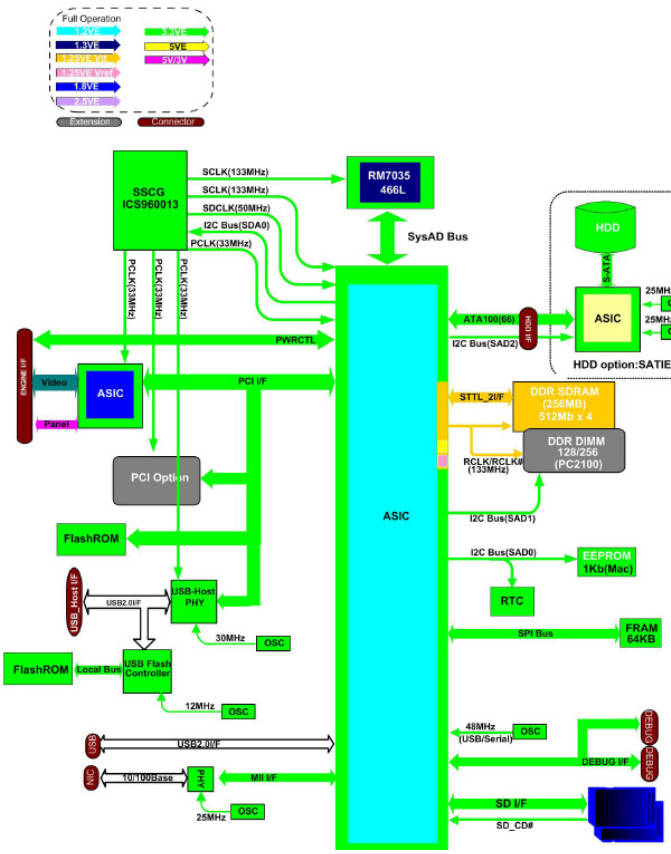
Block Diagram

- The engine board controls all the mechanical components.
- The printer controller board connects to the engine board through a PCI bus.
- The IEEE 802.11a/g Interface Unit (M344) and Gigabit Ethernet Board (G874) cannot be installed at the same time.



No additional notes.

Controller Board



- **Details are in the notes below**

- The controller controls all applications. Optional features can be added via SD cards.
- ASIC. Contains the dedicated GW controller chips of the shared resources (the CPU, memory, and HDD hardware) for the copying and printing functions.
  - CPU. The central processing unit that controls the operation of the controller board.
  - SD Card Slot. Service slot for firmware version updates, moving applications to other SD cards, and downloading/uploading NVRAM contents.
  - SDR SDRAM. The image memory for the printer functions where image compression, image rotation and other operations are done.
  - Board Option Slots. One slot (CN710) is available for the optional HDD unit and another slot (CN703) is available for either the IEEE 802.11a/g, IEEE 1284 Interface Unit or Gigabit Ethernet Board.
  - Flash ROM. Stores the program.
  - USB. The interface for USB 2.0. Supports both low-speed and high-speed modes. USB support is built into the controller. No installation is required for the USB function.
  - NIB. The Ethernet interface connection. Ethernet support is built into the controller. No installation is required for the Ethernet function.
  - EEPROM. Stores the data for the SP code settings.
  - NVRAM. The memory that stores the system configuration and other information.

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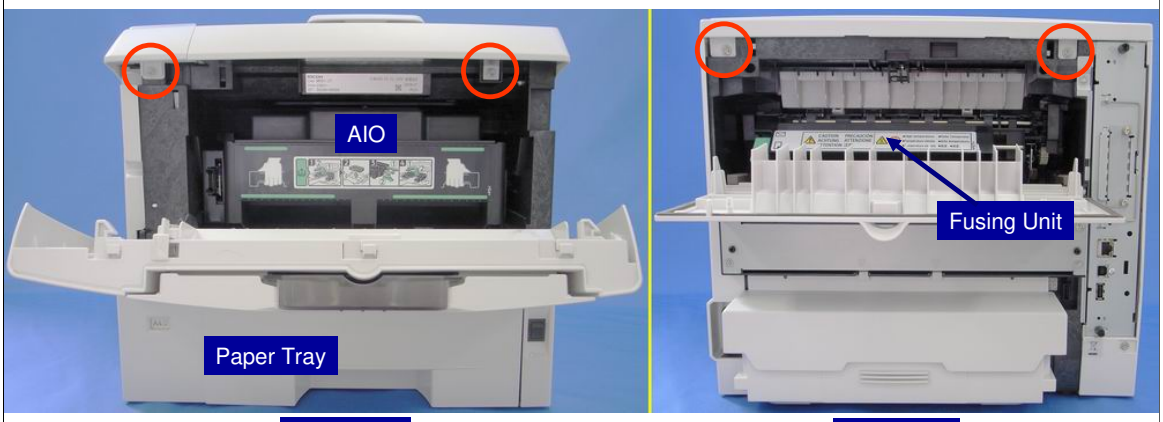
4) Maintenance

No additional notes.

Top Cover Screw Removal

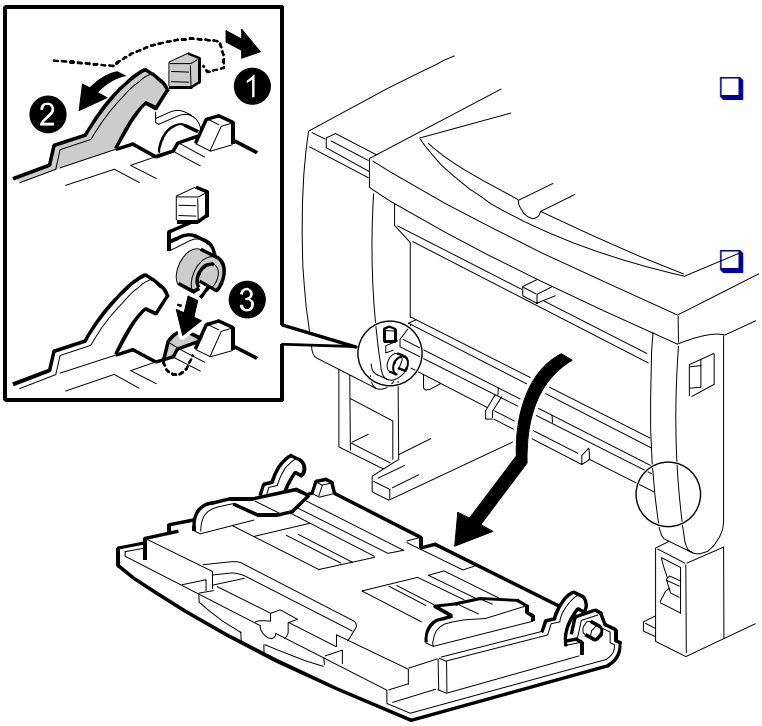


Front View | Rear View

- To remove the top cover, remove all four screws - two at the front (left photo) and two at the back (right photo).
- Be sure to half-open the Exit Guide Plate (see next slide) when either partially or fully removing the top cover.

No additional notes.

By-pass Tray Unit Removal



- Following the correct procedures, the By-pass Tray Unit is easily removed.
- Note that the paper tray must first be removed so that the By-pass Tray can open wide (low enough) to the point where the hinges will disconnect.

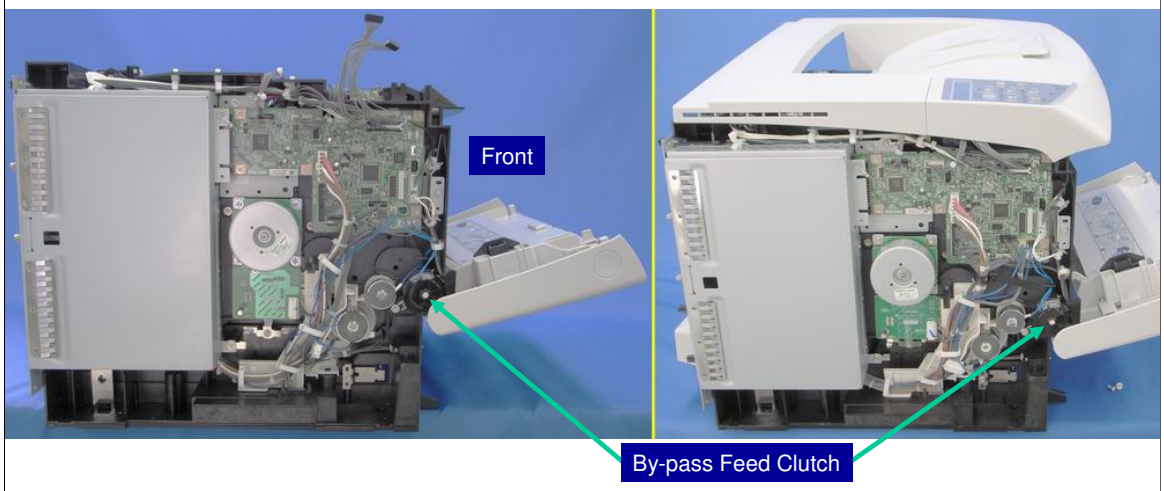
No additional notes.

Removing Operation Panel

- Push tabs with fingers after partially removing Top Cover.
- After pulling Operation Panel away from Top Cover, disconnect two connectors to fully remove Operation panel.
- View of top of machine with Top Cover and Operation Panel fully removed.

No additional notes.

Removing Left Cover

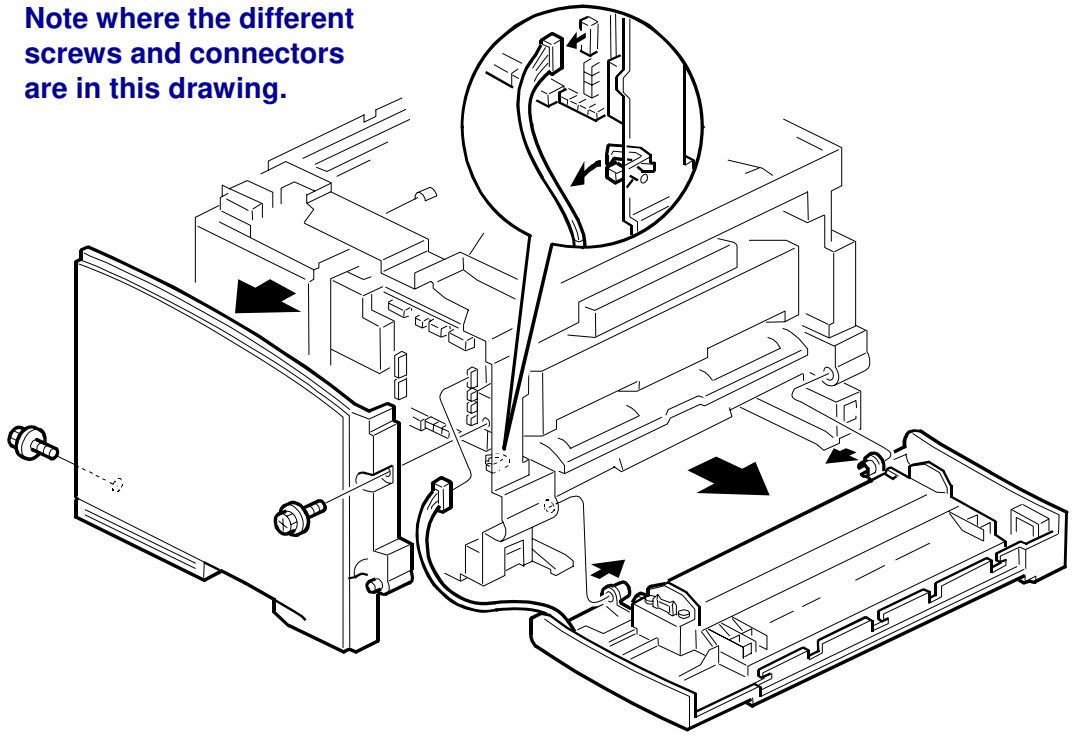


- Note that (with caution) the left cover can be removed after loosening the top cover (without removing it - right picture above).
- When removing and replacing By-pass Feed Clutch, carefully pull the corner of the front cover down until enough clearance is made to slide the By-pass Feed Clutch off of, and then back onto, the shaft.

No additional notes.

Exterior Covers - 1/2

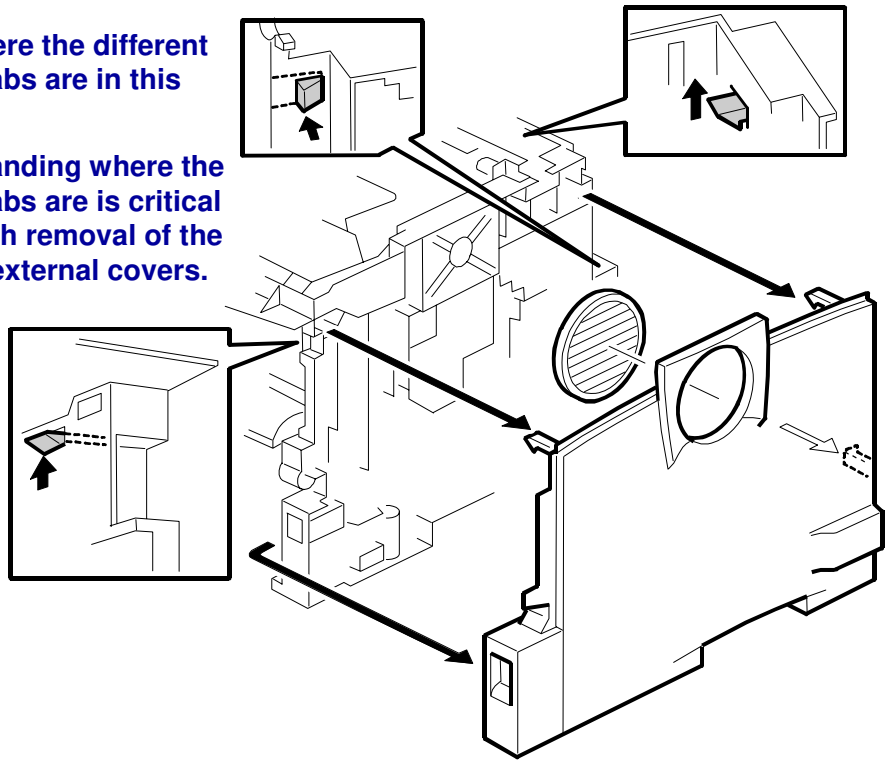
- Note where the different screws and connectors are in this drawing.



No additional notes.

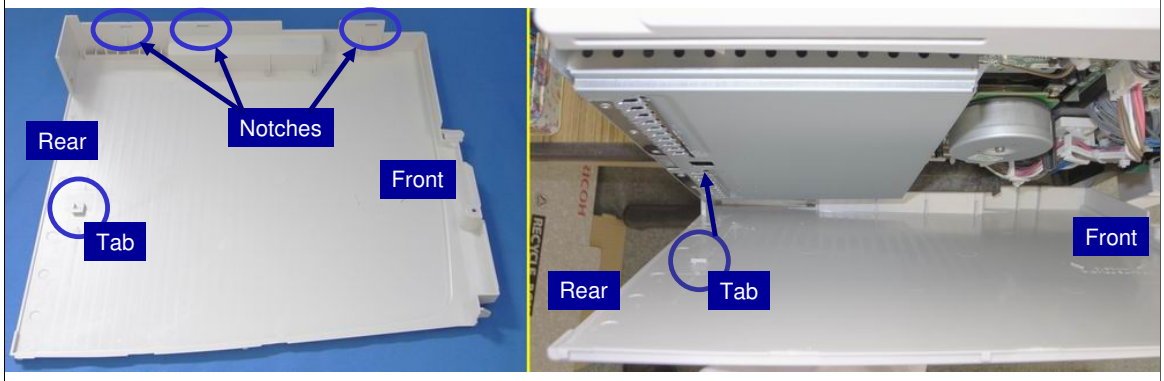
Exterior Covers - 2/2

- Note where the different plastic tabs are in this drawing.
- Understanding where the plastic tabs are is critical to smooth removal of the various external covers.



No additional notes.

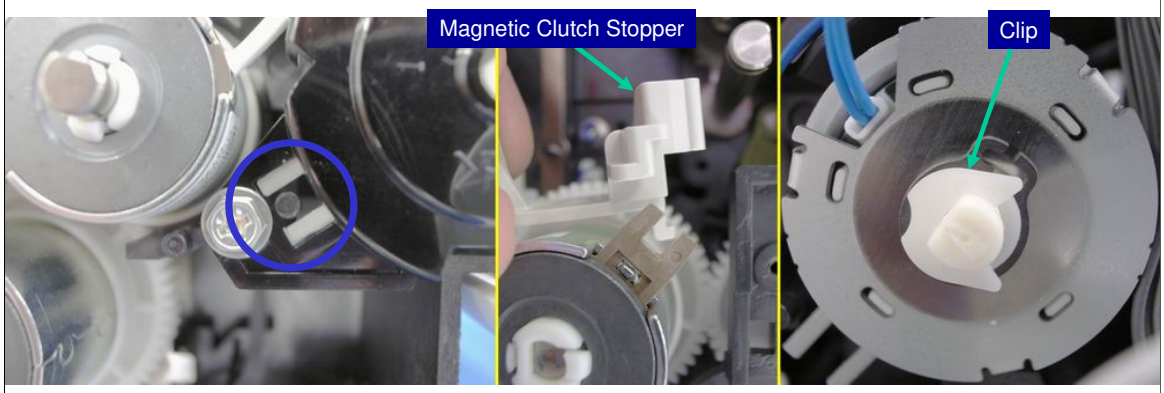
Left Cover Tab & Hole Alignment



- **Be sure to line up the notches in the bottom of the left cover (with tabs on bottom edge of machine) and the tab (with the hole on the side of the machine) when reinstalling the left cover.**
  - The cover must drop down slightly to allow tab to fit into hole in sheet metal of machine.

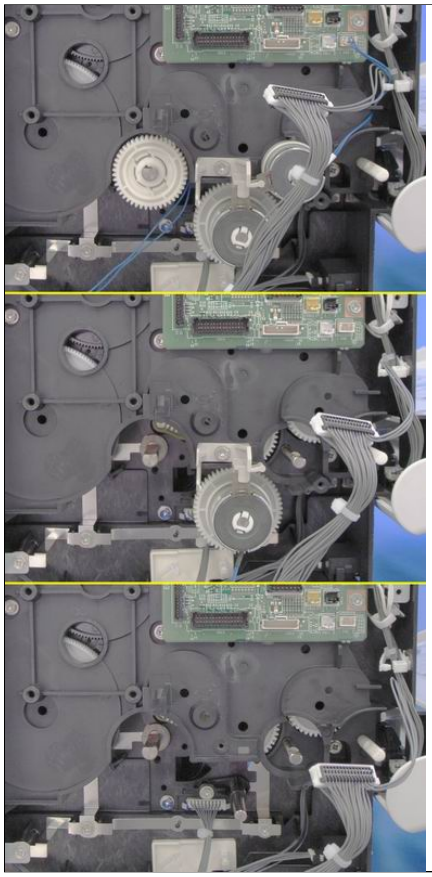
No additional notes.

Magnetic Clutch Stopper & Clips



- **When reinstalling the clutches, always verify that clips and magnetic clutch stoppers are correctly installed.**
  - Note: The Magnetic Clutch Stopper pictured in middle image is more easily installed with the Paper Feed Clutch first (before the Registration Clutch), although both the Paper Feed Clutch and the Registration Clutch can be replaced independently of each other.

No additional notes.

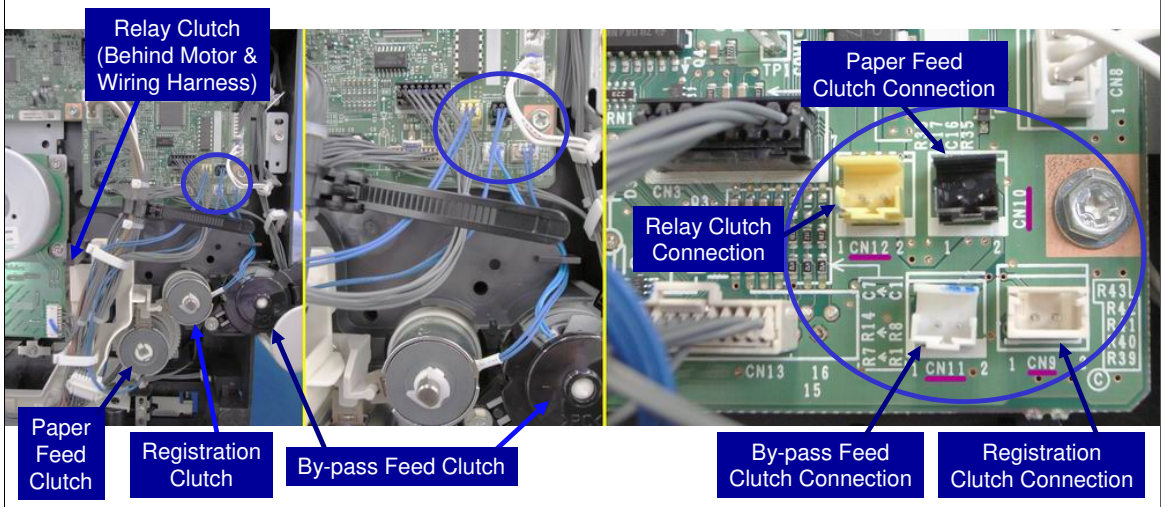


Clutch Removal

- **View with Motor and By-pass Feed Clutch removed.**
- **View with only Paper Feed Clutch installed.**
  - Note that holder and screw are still attached. Paper Feed Clutch is more easily installed before installing the Registration Clutch.
- **View with all four clutches removed.**

Note: All four of the clutches can be removed with only the left cover removed, but caution must be exercised when getting the By-pass Feed Clutch past the protruding part of the front cover (visible in lower right side of all three photos above.

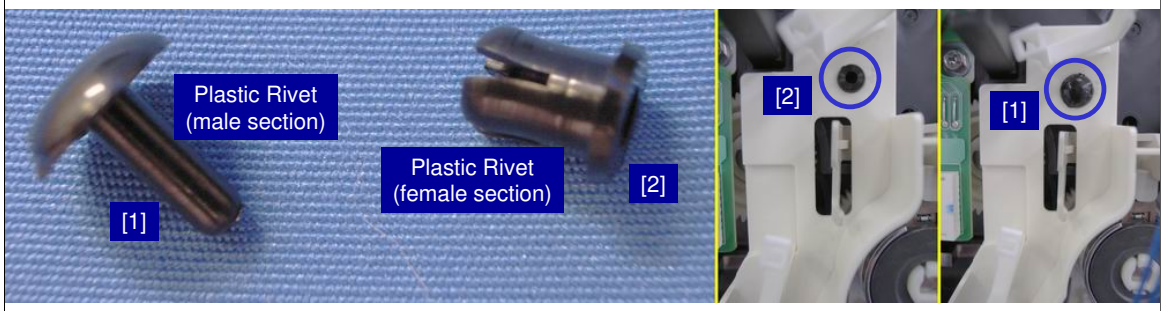
Clutch Wire Connections



- **There are four clutch connectors:**
  - Relay Clutch (CN-12)
  - Paper Feed Clutch (CN-10)
  - By-pass Feed Clutch (CN-11)
  - Registration Clutch (CN-9)
- **Before disconnecting clutch wires from the board, make careful note of plug colors and positions.**
- **When reconnecting clutch wires, ensure that they are plugged into the correct sockets.**

No additional notes.

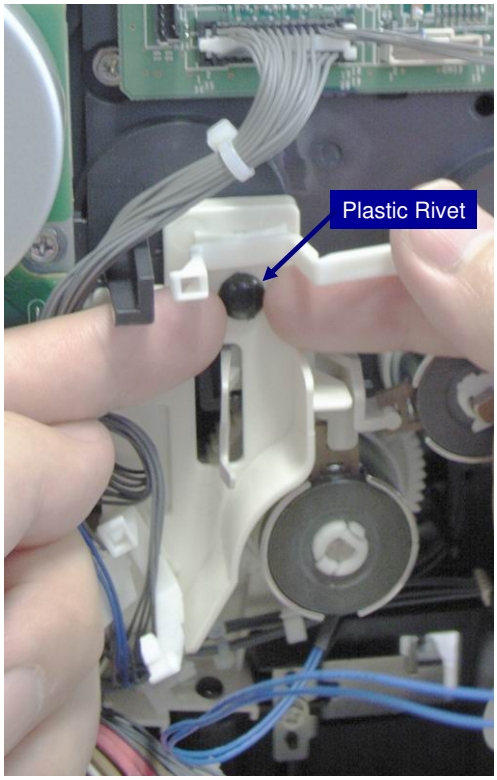
Wiring Harness Removal - 1/2



- **Remove male section of plastic rivet before female section.**
  - To remove the male section [1] of the plastic rivet, pull the edges of the head with your fingernails.
    - » Using one (index) finger from each hand may work best for this - see next slide for example.
  - After the male section is removed, the female section [2] is easily removed.
- **When attaching, first attach the female section [2] of the plastic rivet first, and then the male section [1], which is easily pushed in with a thumb.**

No additional notes.

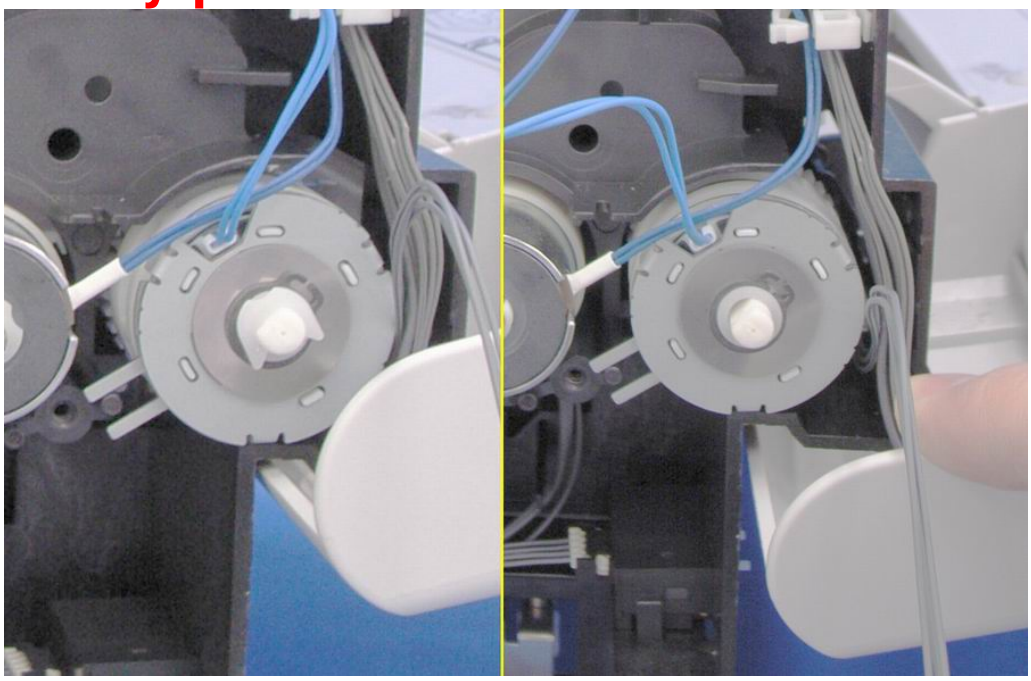
Wiring Harness Removal - 2/2



- The most effective and expedient way of removing the plastic rivet is usually by using one (index) finger from each hand (as shown in photo).

No additional notes.

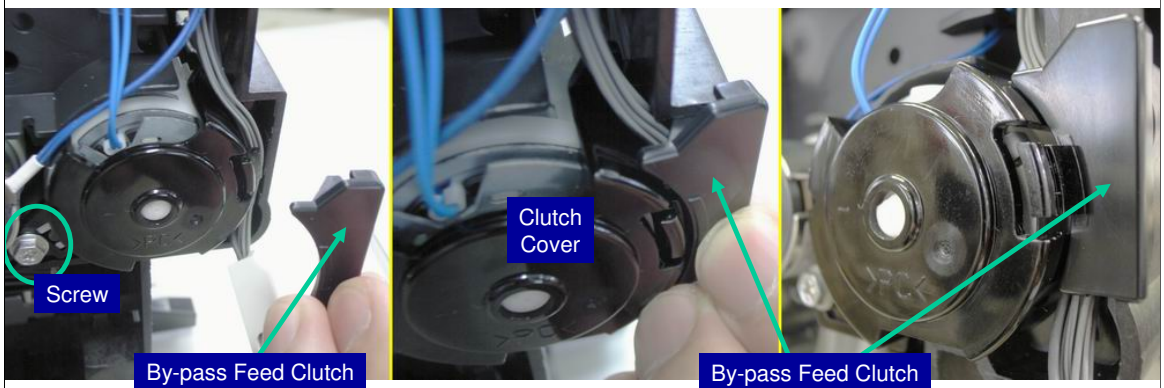
By-pass Feed Clutch Removal



- When removing the By-pass Feed Clutch with front cover still attached, carefully push corner of cover down (as shown above) while removing (and installing) the clutch.

No additional notes.

By-pass Feed Clutch Wire Cover

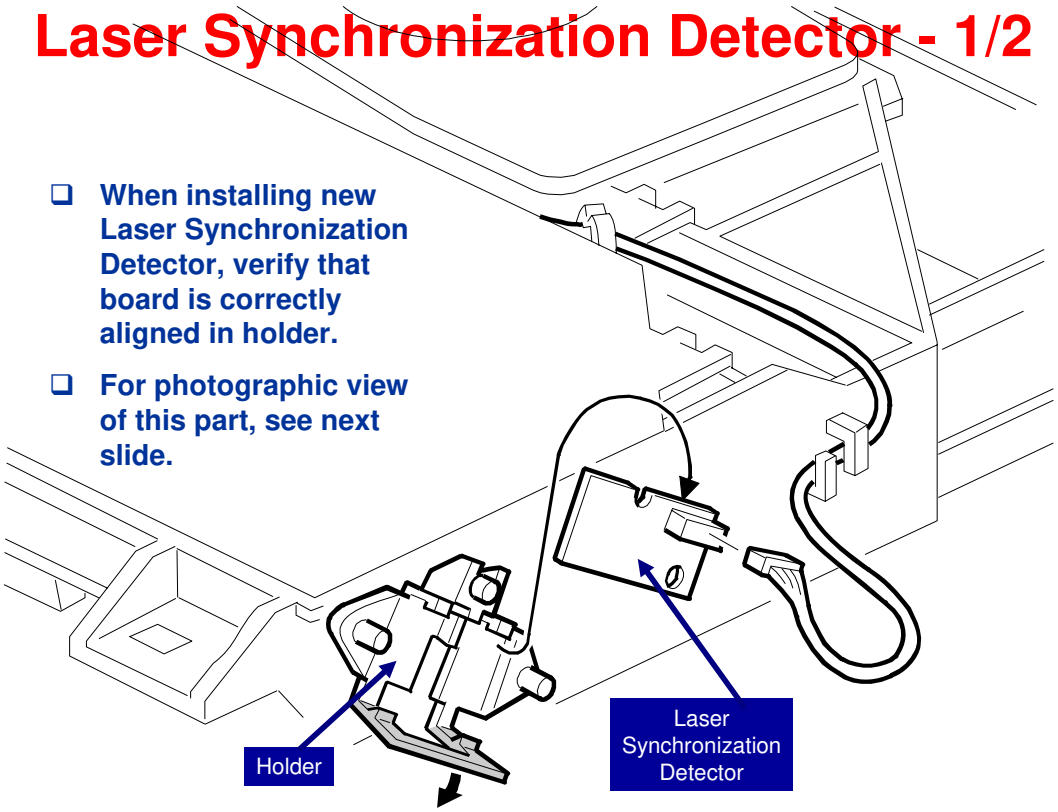


- **The By-pass Feed Clutch Wire Bundle Cover easily comes off when removing the By-pass Feed Clutch Cover.**
- **When reinstalling the Bypass Feed Clutch cover and Wire Bundle Cover, first install the cover with the retaining screw (left above) loosely attached.**
- **Push the wire cover on as shown above, and then tighten the cover screw (left above).**

No additional notes.

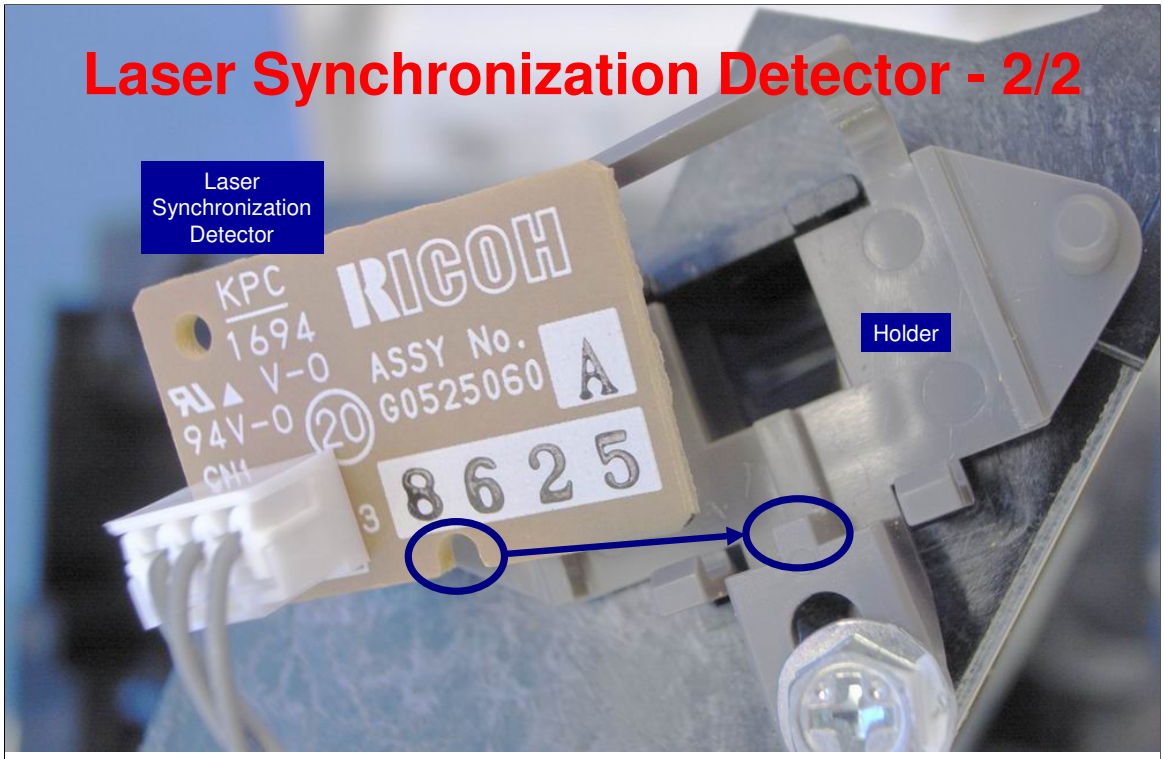
Laser Synchronization Detector - 1/2

- When installing new Laser Synchronization Detector, verify that board is correctly aligned in holder.
- For photographic view of this part, see next slide.



No additional notes.

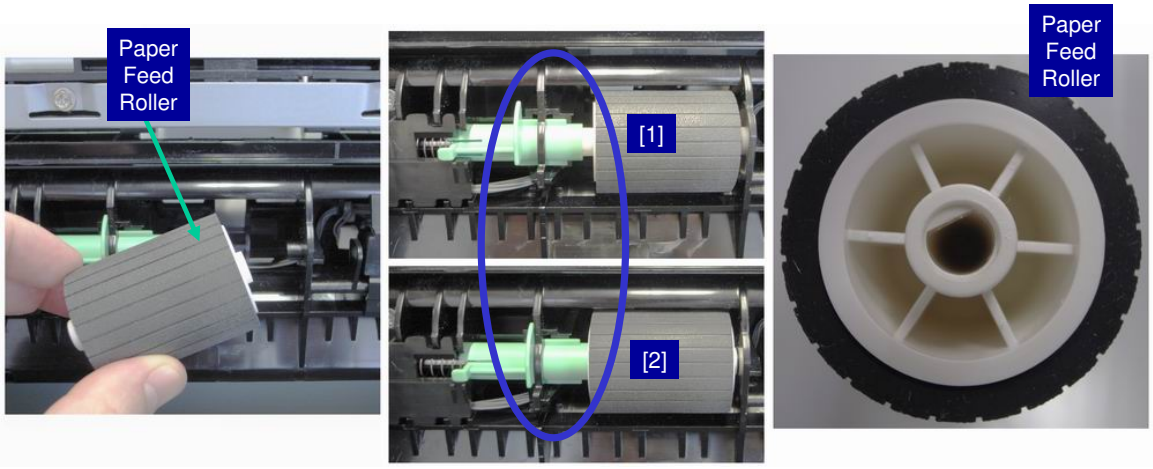
Laser Synchronization Detector - 2/2



When installing new Laser Synchronization Detector, verify that notch is correctly aligned board is fully installed in holder.

No additional notes.

Replacing Paper Feed Roller



- When installing a new Paper Feed Roller, ensure that shaft is correctly oriented in Paper Feed Roller holder.
- After installing the Paper Feed Roller, if the shaft looks like [1] above, then rotate the roller (carefully, from the side - do not directly touch the rubber of the roller) until it pops into the correct position (as indicated in [2] above).

No additional notes.

Principles

- **The user does maintenance every 90k.**
- **The maintenance kit for the user contains all PM parts.**
- **Make sure that engine SP mode 5930 001 (meter charge) is set correctly:**
  - If the service contract is for the user to do PM, set meter charge to 'no‘ (the default setting).
  - If the service contract is for the technician to do PM, set meter charge to 'yes'.

No additional notes.

If PM is Done by the User

- **Set SP 5930 001 (meter-charge) to 'no' (if not already set to 'no' - the default setting).**
- **When the PM counter is 90k, the machine tells the user to replace the maintenance kit. Then, the user does the PM.**
- **After the user replaces the fusing unit, the machine automatically resets the PM counter and removes the "Replace Maintenance Kit" warning.**

- How does the machine detect a new fusing unit was installed? See the Fusing and Paper Exit section of this course.

If PM is Done by a Technician - 1/2

- **Set SP-5930-001 (meter-charge) to 'yes'.**
- **This disables the user's "Replace Maintenance Kit" warning at 90k.**
- **After you replace the fusing unit components, reset the PM counters with engine SP mode 7804.**
  - It is not automatically reset if SP-5930-001 is set to yes.
- **The alerts can be enabled if you set SP 5930 002 to 'yes'.**

No additional notes.

If PM is Done by a Technician - 2/2

- **How does the technician know when to do PM?**
  - The technician must find the current value of the counter. To do this, speak to the user.
  - The user then pushes the Menu key and reads the value on the display over the telephone.
    - » If meter-charge mode is set to 'yes', the counter is the first item on the display after the user pushes the Menu key.
    - » If meter charge mode is set to ‘no’, this counter is not displayed when the Menu key is pressed.
  - If the counter is 90k or more, it is time for PM.

No additional notes.

Counters

- **Engine service mode has four counters:**
  - SP 7993: Shows the engine total counter (also called 'Total counter' in the service mode menu)
  - SP 7001: Shows the total number of engine cycles made (called 'Operation time' in the menu). Not reset at PM
  - SP 7803: Shows the PM Counter, based on engine cycles, as above. Reset at PM.

No additional notes.

The User Says It's Too Early for PM?

- The PM interval is 90k prints.
- However, if the user prints many one-page jobs or two-page jobs, the PM interval can be less than 90k.
- For the machine, three-page jobs are 'usual' when it calculates the PM counter.
- During a one-page job or two-page job, the engine makes more idle turns than in a three-page job.
- Because of this, the PM interval can get to 90k more quickly.

No additional notes.

User Maintenance Kit Contents

- **User Maintenance Kit**
  - Maintenance Kit Type SP 4100
- **Kit Contents:**
  - Fusing unit x 1
  - Transfer roller x 1
  - Paper feed roller for the standard tray x 1
  - Paper feed rollers for the optional PFU x 2
  - Friction pad - standard tray x 1
  - Friction pads - optional trays x 2
    - » Change this even if there is an envelope feeder installed in the tray.

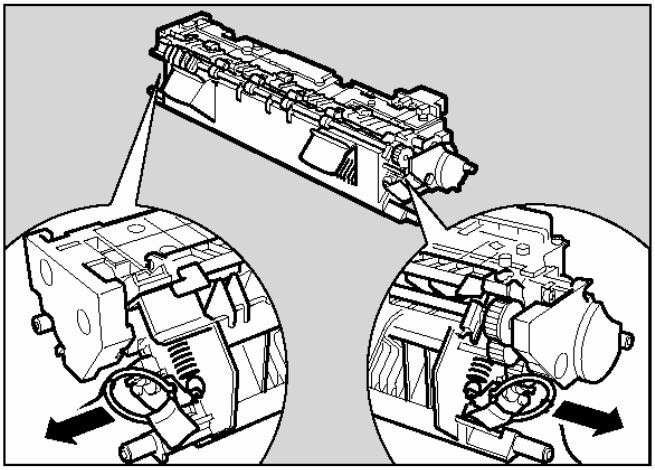
No additional notes.

User PM Procedures

- **Do a maintenance procedure on the machine.**
  - CAUTION: Let the fusing unit become cool before you start.
- **Do the procedures in the operation manual, to understand what the user must do.**
  - Hardware Guide - Replacing Consumables and Maintenance Kit - Replacing the Maintenance Kit
- **Think about problems that users could have and errors that they could make.**

No additional notes.

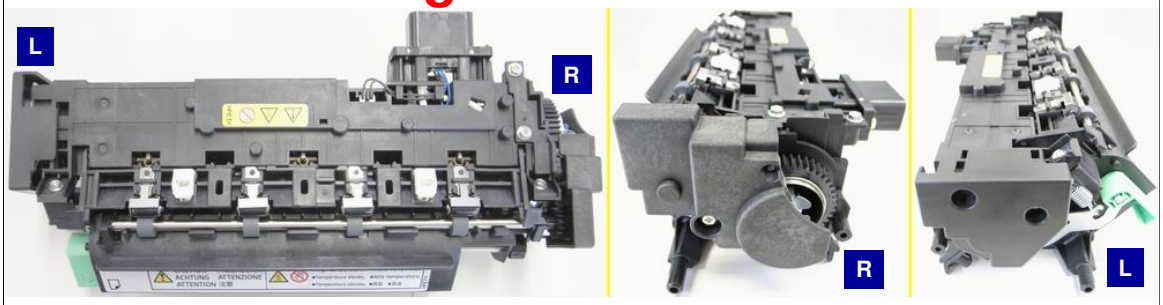
Fusing Unit - Replacement Installation



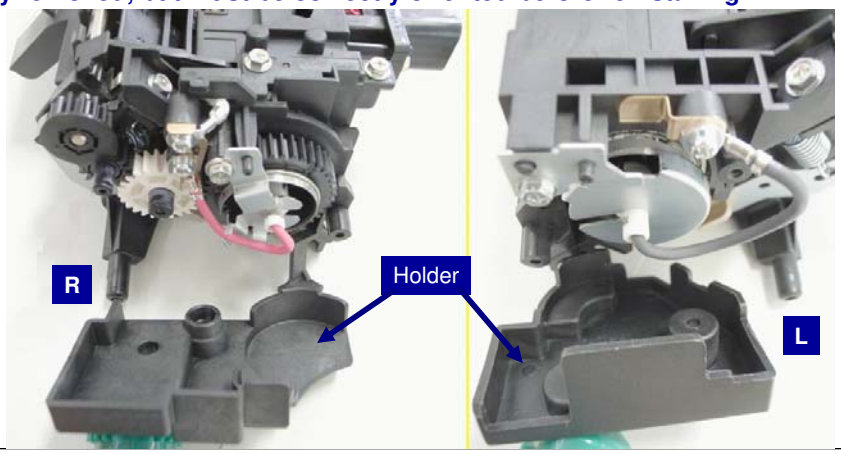
- **When you pull out these rings (during installation of a new Fusing Unit), the hot roller contacts the pressure roller.**
- **Before installation, the hot roller and pressure roller are kept separate, to avoid damage to the pressure roller.**

- The pressure roller becomes flattened at the contact point with the hot roller if the two rollers are kept in contact for long periods during storage and transport.

Fusing Unit - Overview

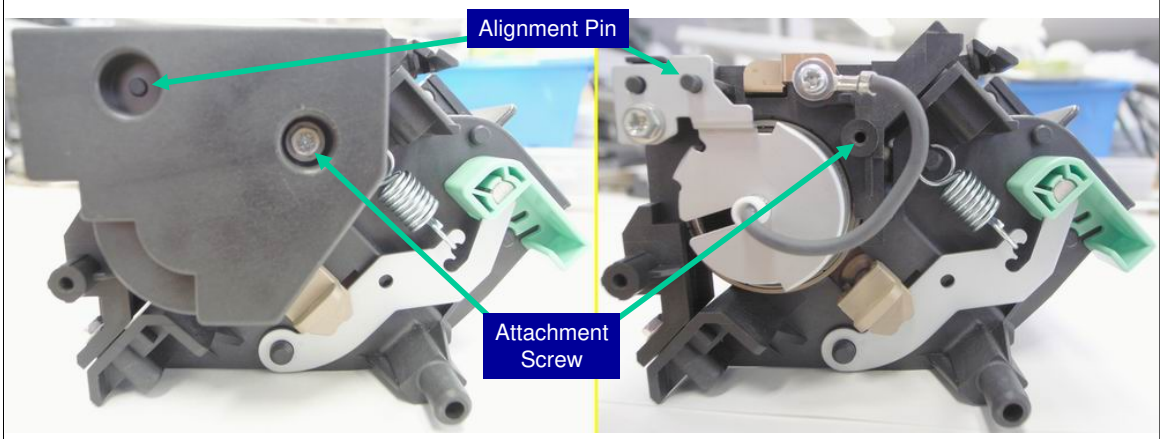


- Different views of the Fusing Unit. Note the correct orientation of the end caps, which are easily removed, but must be correctly oriented before reinstalling.



No additional notes.

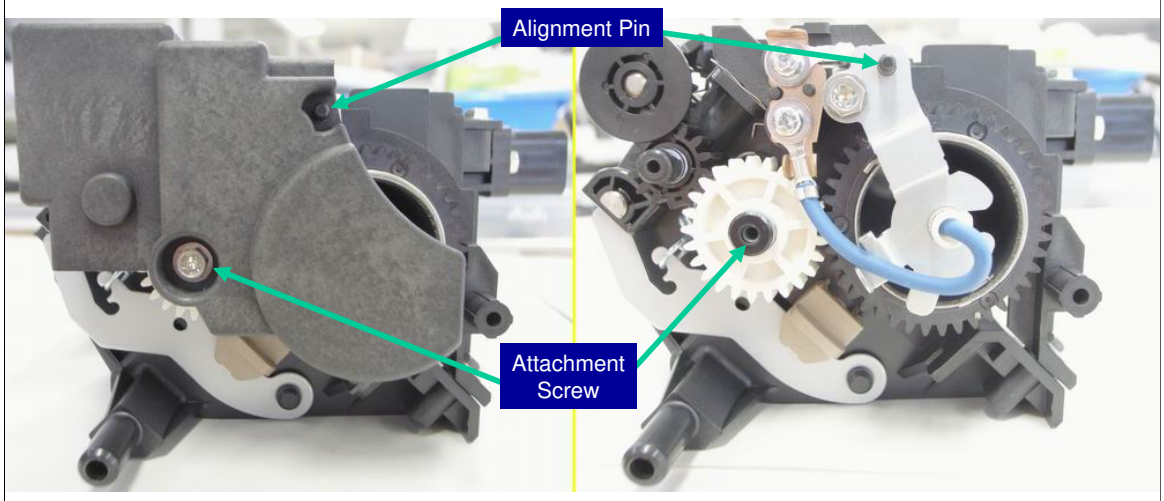
Fusing Unit - Left Side



- When removing the end cap, note the orientation, and then (when reinstalling) make sure the alignment pin goes into the appropriate hole.
- There is one attachment screw per end cap.
- Also carefully align the fusing lamp holders when reinstalling.

No additional notes.

Fusing Unit - Right Side



- When removing the end cap, note the orientation, and then (when reinstalling) make sure the alignment pin goes into the appropriate hole.
- There is one attachment screw per end cap.
- Also carefully align the fusing lamp holders when reinstalling.

No additional notes.

Fusing Unit Lamp

- Note that the 240V model uses the fusing lamp shown above, with red & black wire connections.
- The 120V model has blue & black wire connections.

No additional notes.

PM Done by the Technician

- **PM table: Service Manual - Maintenance - Service Maintenance**
- **The service policy of your company controls which procedure you use to change the fusing unit components. The possible procedures are:**
  - Replace the fusing unit as one unit
  - Replace each component one at a time, as specified in the PM table.
- **You must reset the PM counter manually after you complete the PM.**

No additional notes.

Technician PM Procedures

- **Do the PM procedures. Removal procedures are in the Replacement and Adjustment - Fusing section of the service manual.**
  - Hot Roller
  - Bushings - Hot Roller
  - Pressure Roller
  - Bushings - Pressure Roller:
  - Fusing Thermistor
  - Hot Roller Strippers
- **CAUTION: Let the fusing unit become cool before you start.**

No additional notes.

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M080 Series Training

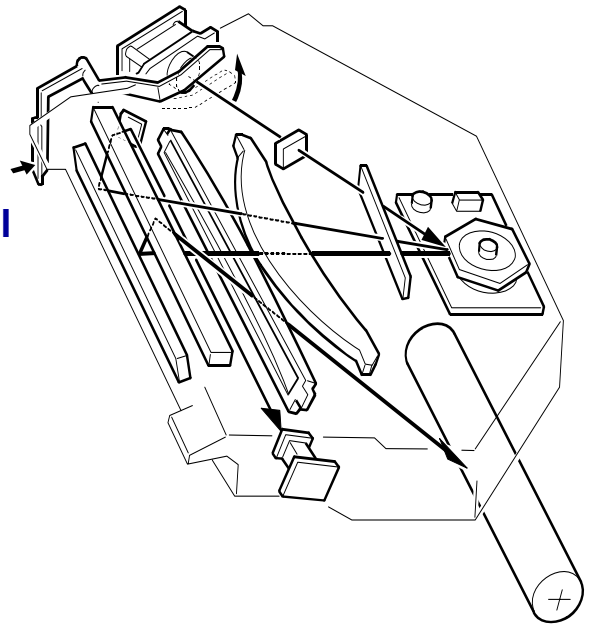
Model S-P3

5) Laser Exposure

No additional notes.

Laser Optics

- Two laser beams
- 16 possible greyscales
- Automatic power control
- Mechanical shutter
- Safety switches



Two laser beams

- The gap between the beams is mechanically adjusted at the factory. There are no motors.

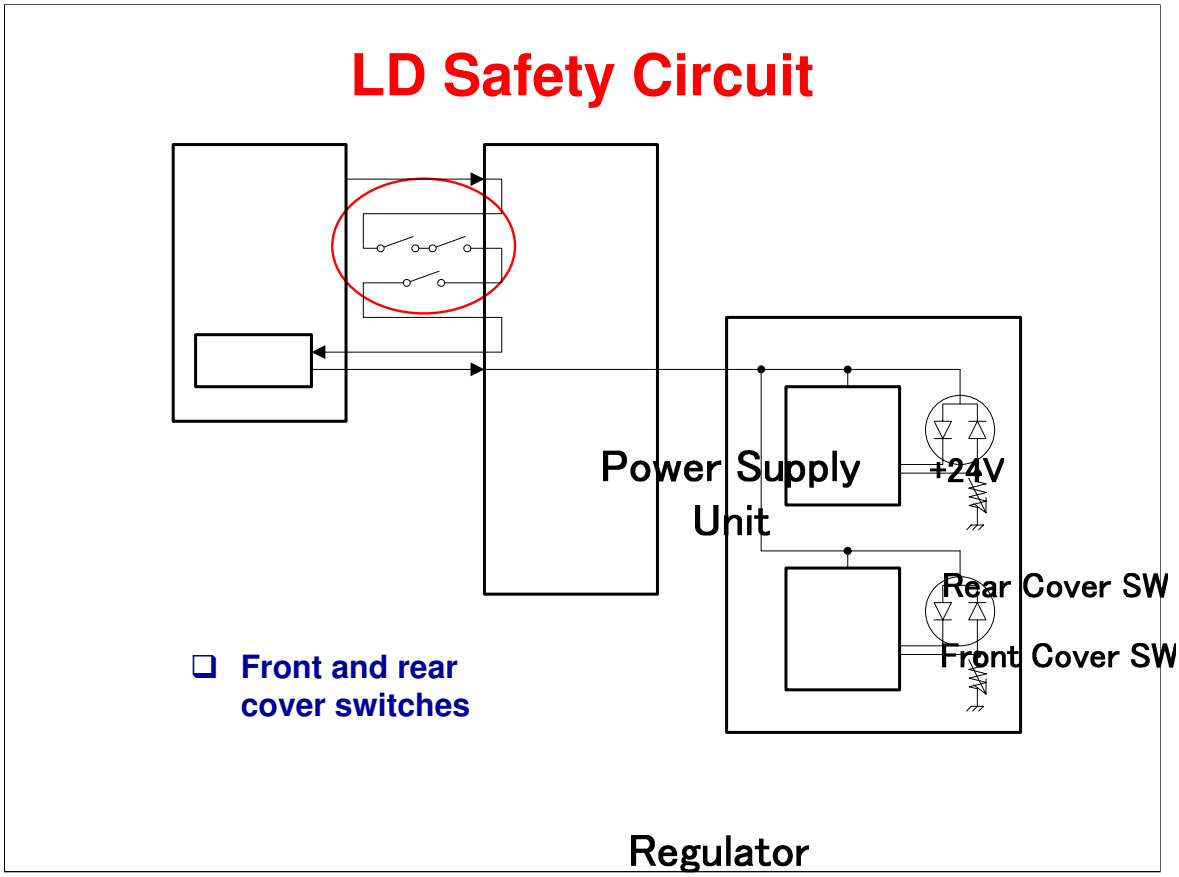
Shutter

- There is a mechanical shutter to stop the laser beam.

Safety Switches

- Safety switches stop power to the laser beam when covers are open.

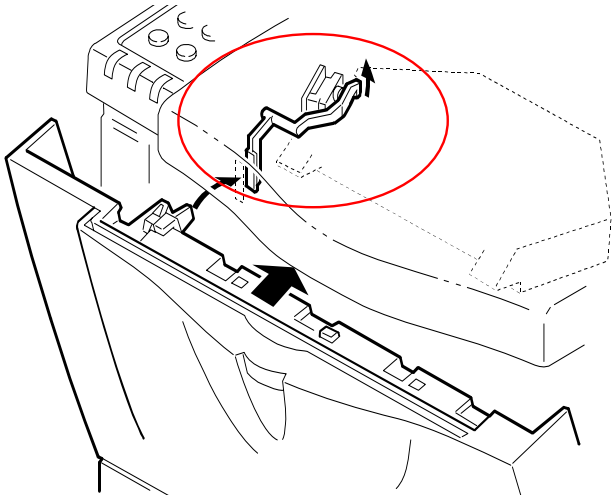
LD Safety Circuit



- Front and rear cover switches

- When the front or rear cover is open, the cover switches do not let power get to the laser diode.
- They stop the +24 V supply to the regulator that supplies the +5V power for the laser diodes.

Laser Shutter



- If the front cover is open, the shutter stops the laser beam.
- This is for safety if the cover switch circuit breaks..

No additional notes.

SP Modes

- 1002: Side to side registration
- 2112: Main scan magnification

No additional notes.

Practical Work

- **Cover switches**
  - See how the covers push the switches
  - Examine the circuit on the point-to-point diagram
- **Mechanical Shutter**
  - Find and examine the mechanical shutter mechanism on the machine.

No additional notes.

Practical Work

- **Note the location of the laser caution decal.**
  - See Service Manual - Replacement and Adjustment - Laser Unit - Caution Decal Locations
- **Do the replacement procedures in the service manual**
  - Replacement and Adjustment - Laser Unit
- **Do not adjust the variable resistors on the laser diode drive board.**
- **After you replace the laser diode unit, adjust the laser beam pitch.**

IMPORTANT: Read the safety notice in the service manual, and examine the warning labels.

Replacement Procedures

- Obey all notes, cautions, and warnings in the manual.
- Do not adjust the variable resistors on the laser diode drive board.

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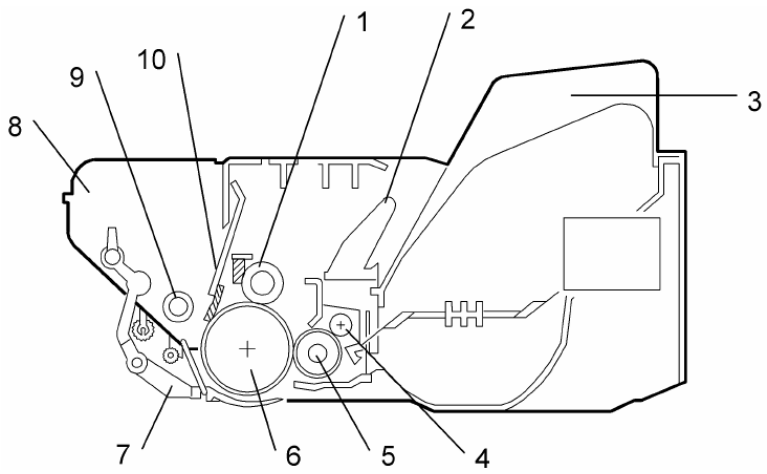
Model S-P3

6) AIO Cartridge

No additional notes.

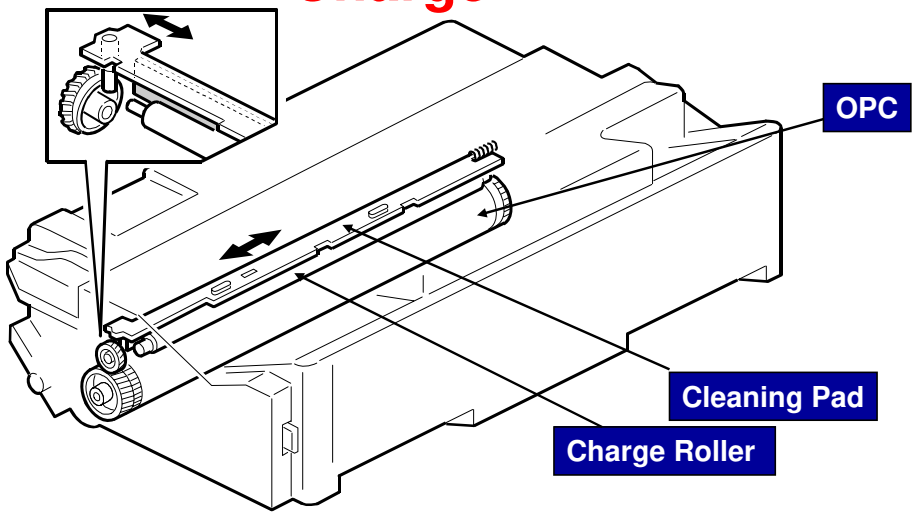
Cartridge Components

1. Charge roller
2. Developer tank
3. Toner tank
4. Reverse roller
5. Development roller
6. Drum
7. Drum shutter
8. Waste toner tank
9. Toner collection roller
10. Cleaning blade



- This type of cartridge is known as an AIO (all-in-one) cartridge. This is because it contains the drum, the development unit, and many other important engine components.
- Remove the cartridge. Find as many of the components as possible.

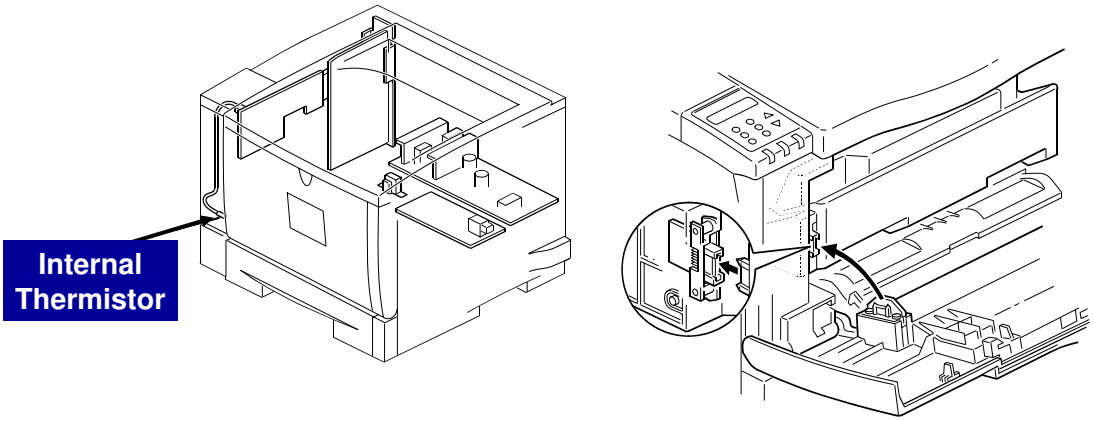
Charge



- **A charge roller is used**
- **The cleaning pad always touches the charge roller.**
- **The machine automatically adjusts charge roller voltage for temperature**

- The charge roller gives the drum surface a negative charge of approximately -900V.
- The cleaning pad cleans the surface of the charge roller. It always touches the charge roller. A cam moves the cleaning pad from side to side as the drum turns.

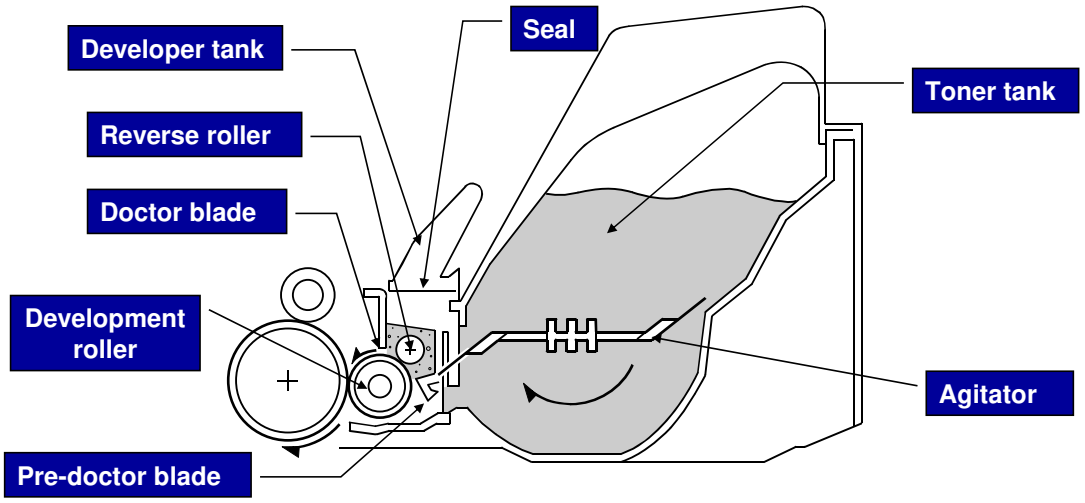
Internal Thermistor



- This thermistor measures the temperature inside the machine.
- The machine uses this temperature to correct the charge voltage and transfer roller current.
- The thermistor is built into the connector between the ID chip and the engine board.

No additional notes.

Development



- **Two-component development, one development roller**
- **No TD or ID sensor: Toner supply is controlled mechanically by the reverse roller, pre-doctor blade and doctor blade**

This slide shows the main points about the development unit.

- The development roller bias is –750 V
  - If the user adjusts the Image Density (User tools - Maintenance menu), the development bias will change. The laser power and charge roller voltage will also change.
- This two-component system uses no TD or ID sensors, which is different from other two-component toner systems.
  - Toner density is mechanically controlled, by the reverse roller, pre-doctor blade and doctor blade.
- The developer tank seal is removed at installation.

Installing a New Cartridge

- **At these times, keep the cartridge level and do not shake it:**
  - *While you remove the seal* to release the developer
  - *After you remove the seal* to release the developer
- **You can shake the cartridge and hold it at an angle before you remove the seal.**
- **The user replaces the cartridge.**

Shake the cartridge before you remove the seal, not while or after you remove the seal.

- In a new cartridge, there is no toner on the drum. When you remove the seal, developer is suddenly applied to the drum. If the cartridge is shaken or not level at this time, developer will not be applied smoothly across the drum. This causes image density to be not constant for 20 or 30 prints.

Why does this occur?

- The cartridge has a number of compartments across its width.
- If you do not hold the cartridge level at this time, all the developer will go into the compartments at one end. This will cause copy quality across the page to be not constant.
- The background will be dirty where the developer collected, and it will be pale where there is not much developer. However, this problem will only continue for 20 to 30 prints.

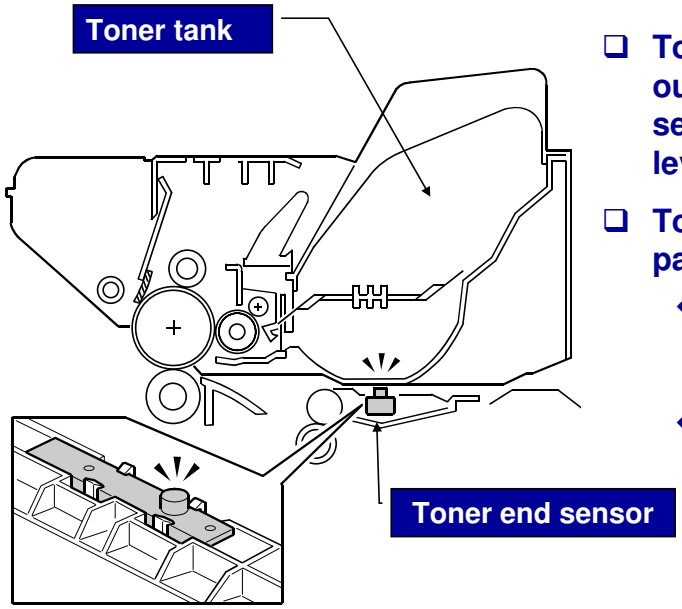
Toner Near-end and End Detection

- **There are two factors**
  - Output from the toner end sensor
  - The time that the main motor has rotated since the current AIO cartridge was first installed

No additional notes.

Toner Near-end & End Detection

Toner End Sensor



- **Toner near-end: When the output from the toner end sensor falls below a given level.**
- **Toner end: Detected 200 pages after near-end**
  - If there is a high coverage ratio, the toner may run out before 200 pages.
  - Because of this, the print quality of the final 200 pages is not guaranteed

Toner near-end

- Detected when the output from the toner end sensor is below a given level.
- The toner end sensor is at the bottom of the hopper, not at the bottom of the development area. Because of this, toner end and near-end are detected before the toner near the development roller has all gone.
- The sensor is not a part of the cartridge.

Toner Near-end and End Detection
Main Motor Rotation Time

- **The machine monitors the length of time the main motor has been running.**
- **When this count exceeds a limit, toner near-end occurs.**
  - Warning messages are only displayed if meter charge mode is enabled, if SP 5930 003 is also set to 'yes'.
- **After this, when the main motor rotation count has increased by enough for an additional 200 pages (A4 at 2 pages per job), toner end occurs and printing stops.**
  - If there is a high coverage ratio, the toner may run out before 200 pages.
  - Because of this, the print quality of the final 200 pages is not guaranteed.

No additional notes.

Toner Near-end and End Detection
Messages on the Display - 1

- **"Replace Print Cartridge Soon": One of the following**
  - Toner near-end (based on the toner end sensor)
  - The print cartridge is near end of its service life (based on main motor rotation).
- **"Replace Print Cartridge" flashes and alternates with "Ready".**
  - The print cartridge is at the end of its service life (200 pages after near end is detected by main motor rotation) but some toner still remains (toner end sensor did not detect toner near end).
- **"Replace Print Cartridge" remains in the display: One of the following**
  - Toner end (200 pages after the toner end sensor detects near end)
  - The used toner tank is full (based on main motor rotation).

No additional notes.

Toner Near-end and End Detection
Messages on the Display - 2

- **When these messages are displayed, printing can continue, but printing quality cannot be guaranteed. This is because the toner can run out suddenly if toner coverage was high after near-end was detected.**
  - "Replace Print Cartridge Soon":
  - "Replace Print Cartridge" alternates with "Ready".
- **When the following message remains in the display, printing cannot continue and the display does not change until a new AIO unit is installed.**
  - "Replace Print Cartridge"

No additional notes.

Toner Near-end and End Detection
Messages on the Display - 3

- **If the alerts do not display, check the settings of SP 5930 001 and 003. These must both be set to 'yes'.**
  - These SPs do not affect the alerts that are triggered by the toner end sensor.
  - They only affect the alerts that are triggered by the main motor rotation count.

No additional notes.

Images Getting Pale Suddenly?

- **In most machines, the image gets slowly lighter when the toner cartridge becomes empty.**
- **But with this type of cartridge, the image can suddenly get light immediately before the cartridge is empty.**
- **What to do if a customer complains about this sudden change in image density?**
  - To prevent this symptom, decrease the value of SP mode 2213.
    - » Then, the level of toner in the cartridge will not get sufficiently low for prints to get pale suddenly.
    - » However, the user will make fewer prints per cartridge after toner near-end is detected.

No additional notes.

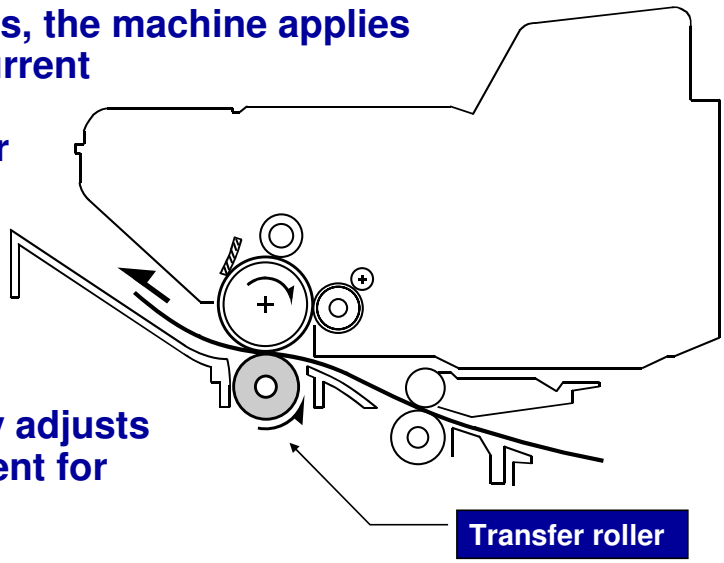
The AIO Cartridge is not Empty at Toner End

- **When toner end is detected, a small amount of toner still remains in the cartridge.**
  - As mentioned in the previous slide, prints become pale very quickly when toner runs out, so there is a safety gap between detected toner end and actual toner end.
- **Some users might want to use all the toner up, and not waste any.**
- **If a user wants to print with the AIO until all toner is used up, then set SP 3927 to 1.**
  - But then, there is no toner end detection, and the user must watch the print quality and change the AIO when prints become too light.

No additional notes.

Image Transfer

- **The user replaces the transfer roller.**
  - There is a new one in the maintenance kit
- **At given times, the machine applies a negative current to clean the transfer roller**
- **The machine automatically adjusts transfer current for temperature**



Transfer current

- The high voltage supply applies a positive current (+18 µA) to the transfer roller.

Transfer roller cleaning

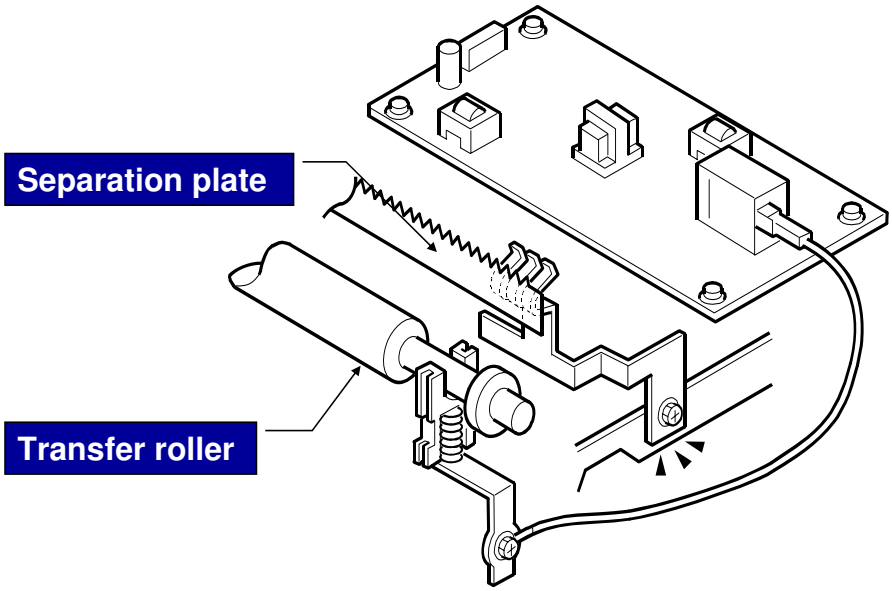
- To clean the transfer roller, the high voltage supply applies a negative current (-3 µA) to the transfer roller.

Are the Rear Side of Prints Dirty?

- **Did the user switch on Auto Continue?**
  - This is possibly the cause of the problem. Disable this feature if the user agrees.
    - » User Tools – System Menu – Auto Continue

- In Auto Continue mode, the machine continues to print, even if there is no paper that agrees with the size and type specified in the driver. Because of this, a large image could be printed on smaller paper, and some toner could get on the transfer roller.
- Does the machine clean the transfer roller if this occurs? No. The machine does not do a check to see if the image is larger than the paper.
- Auto Continue is normally disabled. The user can enable it with a user tool. If the rear sides of prints are dirty, see if the user has enabled this feature.

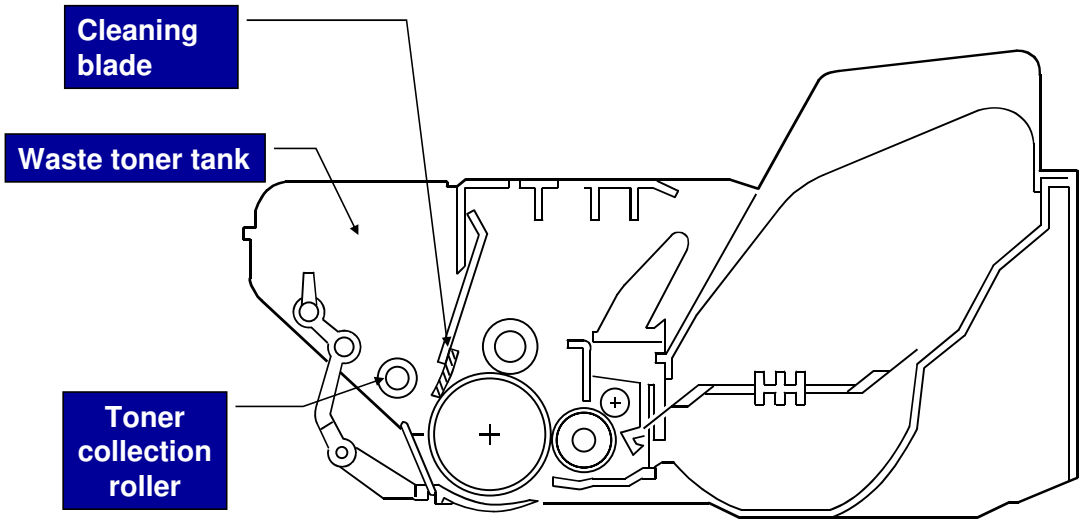
Separation from the OPC



- The separation plate helps to remove the paper from the drum after image transfer.

No additional notes.

Drum Cleaning



- The cleaning blade removes remaining toner on the drum.
- The toner collection roller moves the toner to the used toner tank.
- The machine does not detect used toner overflow with a sensor.

There is no used toner overflow detection. How does the machine prevent used toner tank overflow?

- See the next slide.

Toner Overflow Prevention

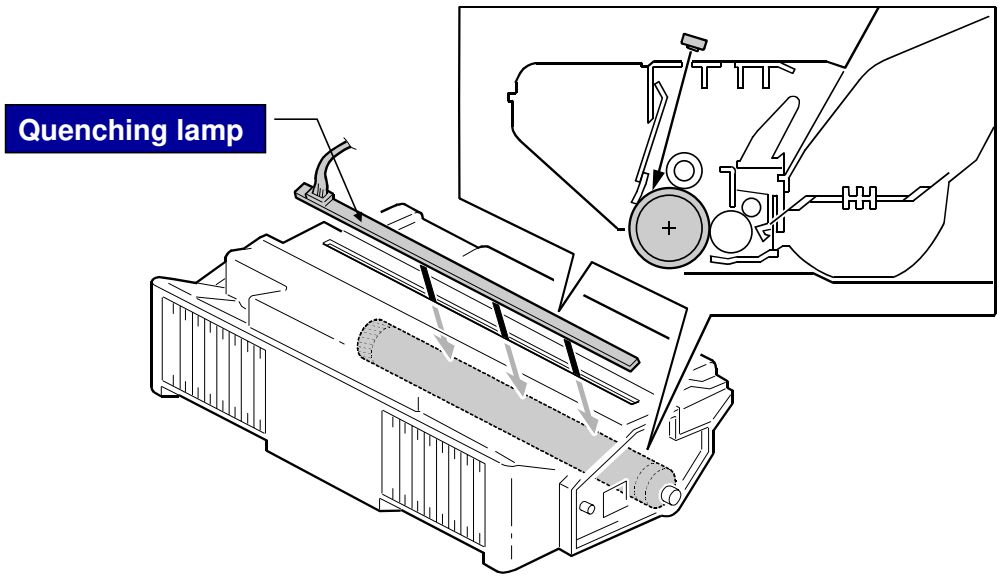
- **The life of the AIO cartridge is 15k prints. The used toner tank will not get full until after that time.**
- **So, if the AIO is replaced at 15k, there will be no overflow, and no overflow detection is necessary.**
- **However, as a safety precaution, you can enable SP3923. Then, after a certain number of prints are made with the same AIO cartridge, printing will not be possible until a completely new AIO is installed.**
- **This feature is a safety measure to prevent the used toner tank from becoming full.**
  - There is no toner overflow detection mechanism.
- **This feature is normally disabled.**

Possible Symptoms from Drum Cleaning

- **Poor cleaning blade lubrication can cause these problems:**
  - Grey banding parallel to the paper feed direction
  - Cleaning blade flipping caused by friction between the blade and the drum
  - Noise caused by friction between the blade and the drum
- **For a solution to this problem, set engine SP 3926 to Yes.**

No additional notes.

Quenching



- Find the quenching lamp in the machine.
  - **It is not a part of the cartridge. It is above the cartridge.**

- Light from the quenching lamp (LED array) strikes the drum by passing through the slit at the top of the cartridge.

Engine SP Modes

- **2001: Charge roller voltage. Usually, do not adjust**
- **2201: Development bias. Usually, do not adjust**
- **2213: Number of prints after toner near-end**
- **2301: Adjusts the transfer roller current**
- **2910: Enables/disables automatic correction of charge and transfer roller voltages for temperature**
  - The temperature is measured at the internal thermistor.

- These engine service modes are related to the processes in and around the cartridge. Make sure that you can find these in the engine service program menu.
- If you wish to change any of the values, keep a note of the original value so that you can re-set the machine to its original settings.

Engine SP Modes

- 2980: Displays the waste toner counter
- 3923: Sets printing to stop (or not to stop) when the main motor rotation counter gets to a set value
- 3926: Lubricates the cleaning blade with a small amount of toner every 50 prints
- 3927: Determines whether to allow printing when toner end is detected, to ensure that every last bit of toner is used up

No additional notes.

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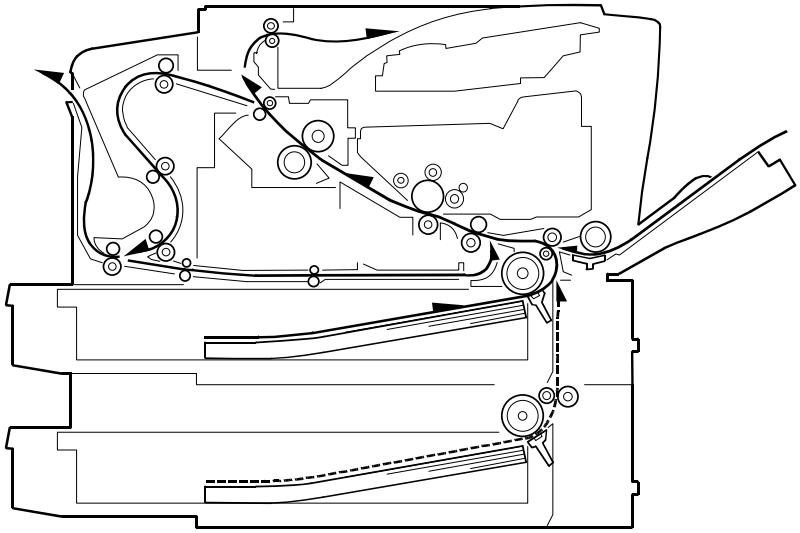
Model S-P3

7) Paper Feed

No additional notes.

Mechanical Components



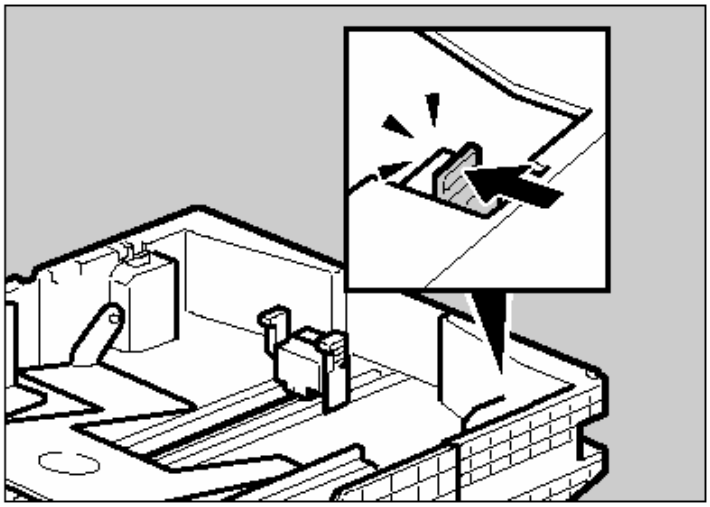
- Standard tray and by-pass tray: Both use a friction pad and feed roller mechanism
- Paper tray capacity: 550 sheets
- By-pass tray capacity: 100 sheets

No additional notes.

Paper Tray

No additional notes.

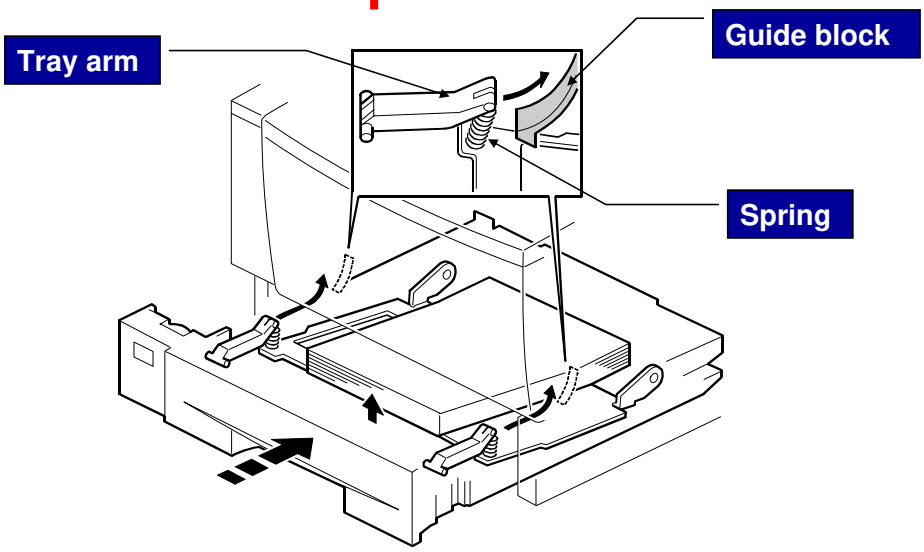
Extending the Tray



- Take out the tray and try this for yourself.
  Procedure: Operating Instructions (Hardware Guide) - Paper and Other Media – Loading Paper

- Extend the tray when adding paper longer than A4/LT
- To use longer paper, release the catches at both sides, then extend the tray and re-lock the catches.

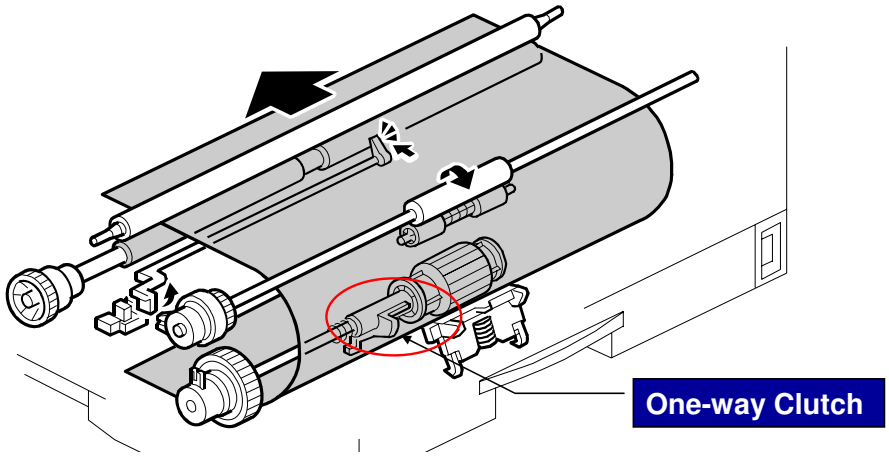
Paper Lift



- **The guide blocks on the machine lift the tray arms up.**
- **The springs attached to the arms lift the bottom plate.**
  - The main motor does not drive this mechanism.
- **The springs lift the paper until the top of the stack touches the feed roller.**

No additional notes.

Feed and Registration



- **Friction pad and feed roller, driven by the main motor**
- **Paper buckle at registration: Adjustable with engine SP mode 1003**
- **Registration adjustment – can be adjusted with a user tool (Maintenance menu – Registration), in addition to the usual SP modes (1001, 1002).**

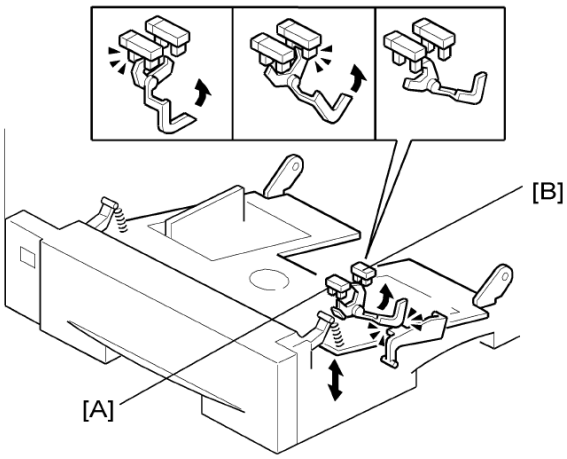
Mechanism

- This is a friction pad and feed roller system.
  - The friction pad pressure cannot be adjusted.
- The main motor drives all the rollers.

Remaining Paper Detection

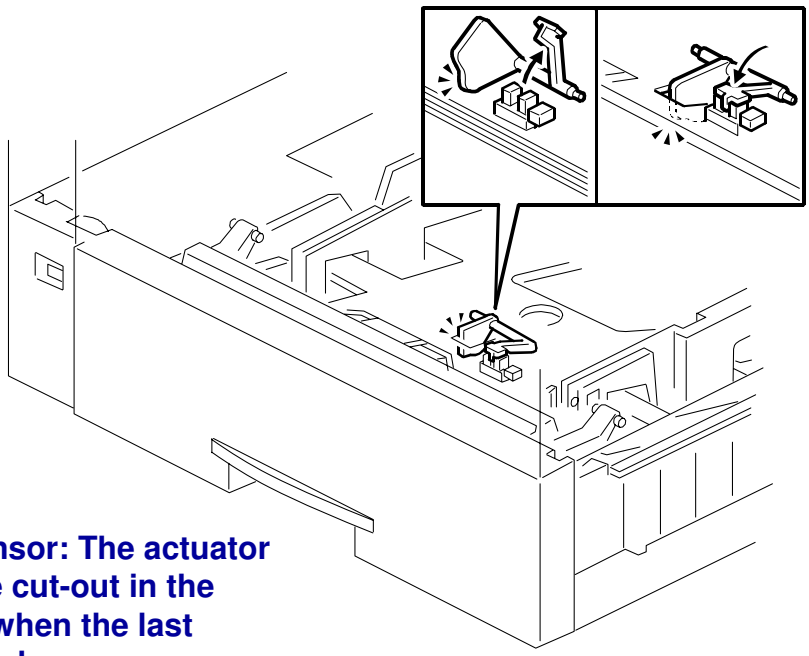
- Two sensors detect how much paper remains in the tray
  [A] Remaining paper sensor 1
  [B] Remaining paper sensor 2

Amount of paper	Sensor 1	Sensor 2
1-50 sheets (10%)	Off	Off
51-250 sheets (50%)	Off	On
251- 450 sheets (90%)	On	On
451-550 sheets (100%)	On	Off



- Remaining paper detection: The amount of paper remaining in the tray affects the position of the two height sensor actuators attached to the paper lift shaft.
- The number of sheets is approximate. This also depends on paper thickness.

Paper End Detection



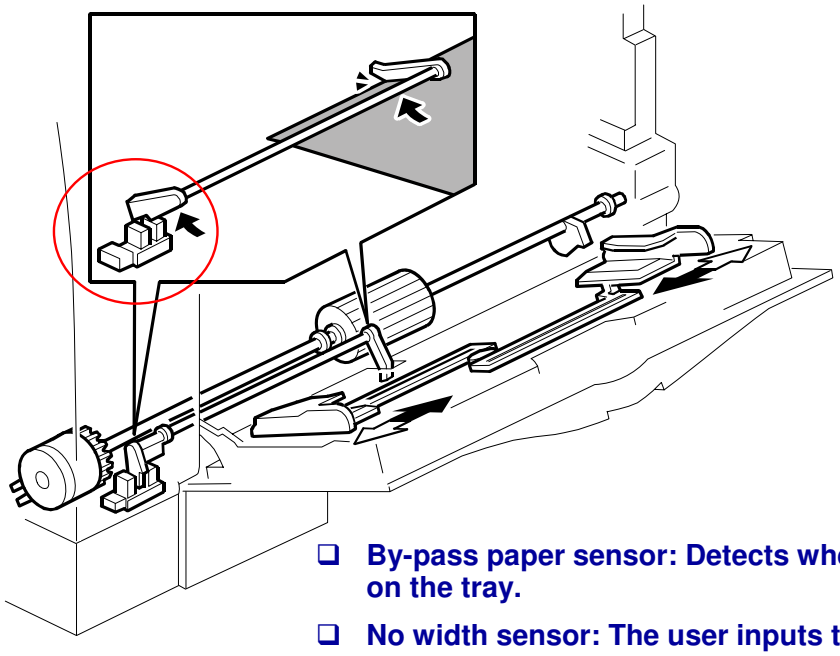
- **Paper end sensor: The actuator drops into the cut-out in the bottom plate when the last sheet of paper has gone**

No additional notes.

By-pass Tray

No additional notes.

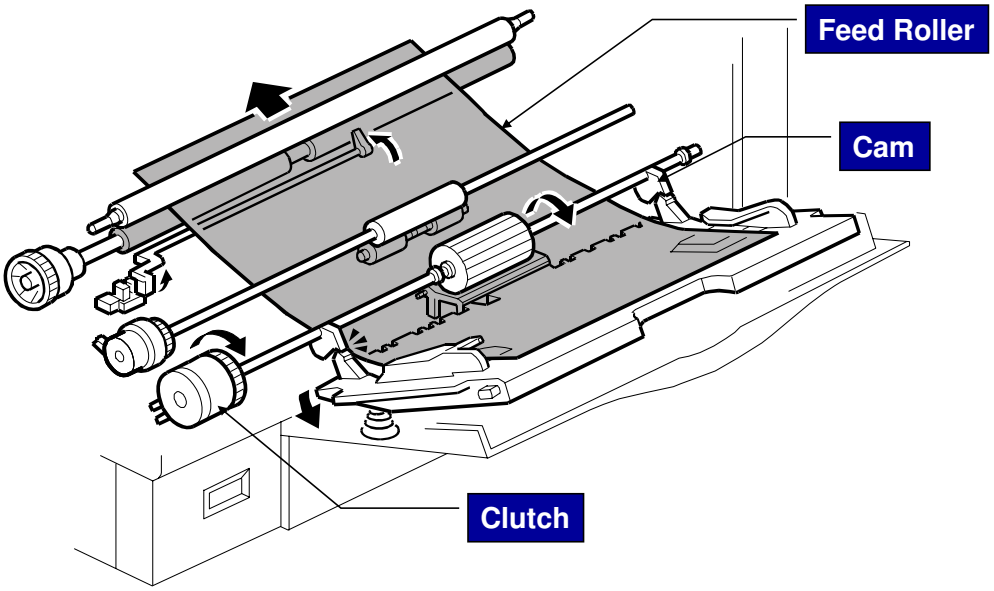
Paper Sensor



- By-pass paper sensor: Detects when paper is put on the tray.
- No width sensor: The user inputs the paper size at the operation panel.

No additional notes.

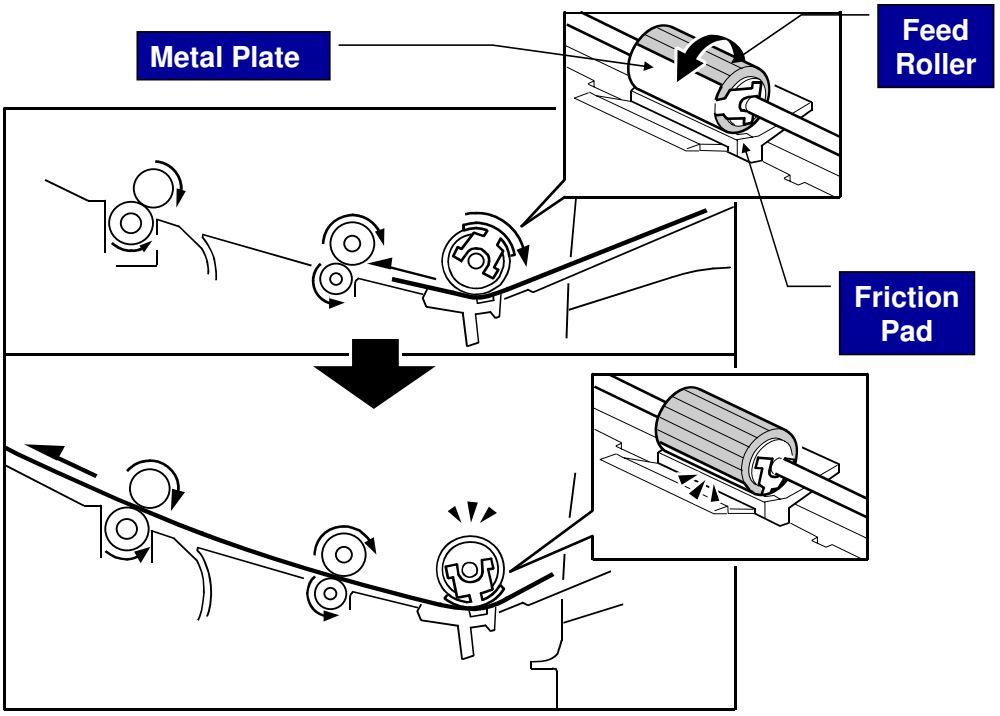
Feed



- **Clutch: Transfers drive from the main motor to the feed roller.**
- **Cams on the feed roller shaft move the bottom plate up, and this pushes the paper stack against the feed roller.**

- The cams release the bottom plate. Then, the bottom plate presses the stack of paper against the feed roller. Then, the cams move the plate down to move the stack away from the feed roller, to ensure that there is no double feed.

Preventing Friction in the By-pass Tray



- To prevent bad effects from too much friction between the feed roller and friction pad when the feed roller is not turning, the feed roller contains a metal plate.
- The by-pass feed clutch stops at the correct time so that the plate points down when the roller stops, and paper feeds smoothly.
- If the rubber points down, there is too much friction with the paper, and feed is not smooth.

SP Modes

- **Engine SP modes**
  - 1001: Leading edge registration
  - 1003: Adjusts the paper buckle at the registration roller
  - 1902: Determines the number of bypass feed roller rotations when 'Transparencies' has been selected
    - » Set this to 2 if there are feed problems with OHPs.
  - 2113: Sub scan magnification

- These engine service modes are related to paper feed. Make sure that you can find these in the engine service program menu.
  - ➢ For normal paper, the by-pass tray feed roller turns twice to feed the paper to the relay roller, then it stops.

Registration Adjustment

- **Registration can be adjusted by the user in this model.**
  - Maintenance menu - Registration
  - Operating Instructions (Hardware Guide) - Adjusting the Printer - Adjusting Tray Registration

No additional notes.

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Model S-P3

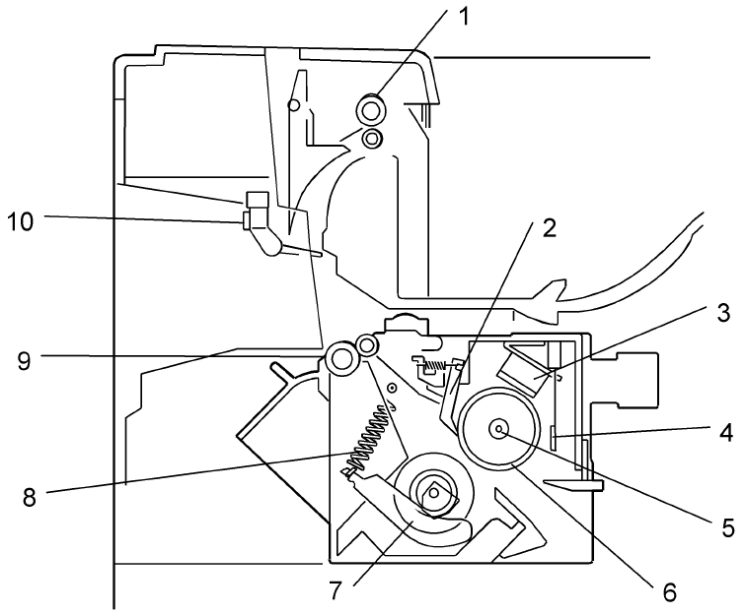
8) Fusing and Paper Exit

No additional notes.

Date of change	Version History	Description
28-2-2008	1.1	Small change to slide 18, due to wording on screen in SP mode.

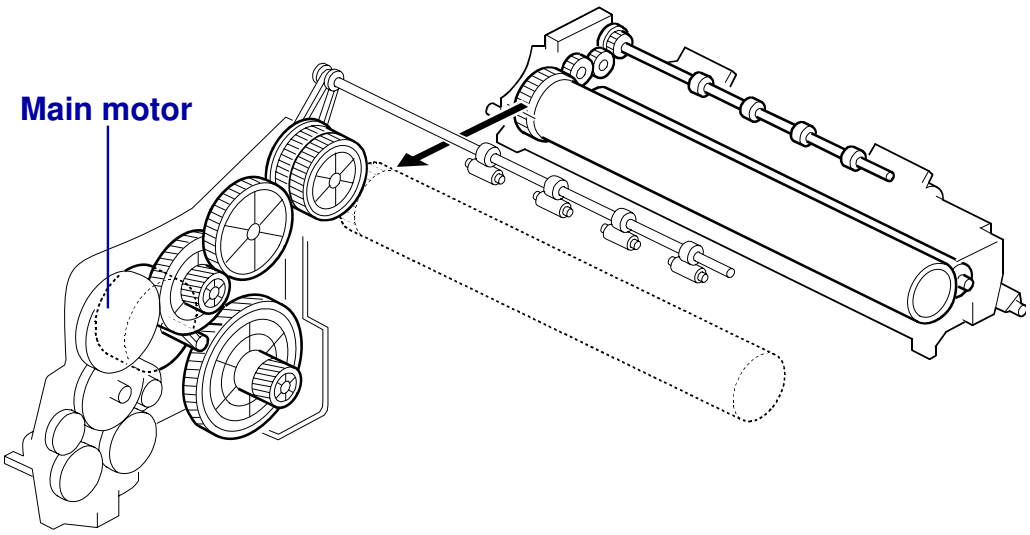
Components

1. Paper exit roller
2. Hot roller strippers
3. Thermostat
4. Thermistor
5. Fusing lamp
6. Hot roller
7. Fusing pressure roller
8. Pressure spring
9. Fusing exit roller
10. Paper exit sensor



No additional notes.

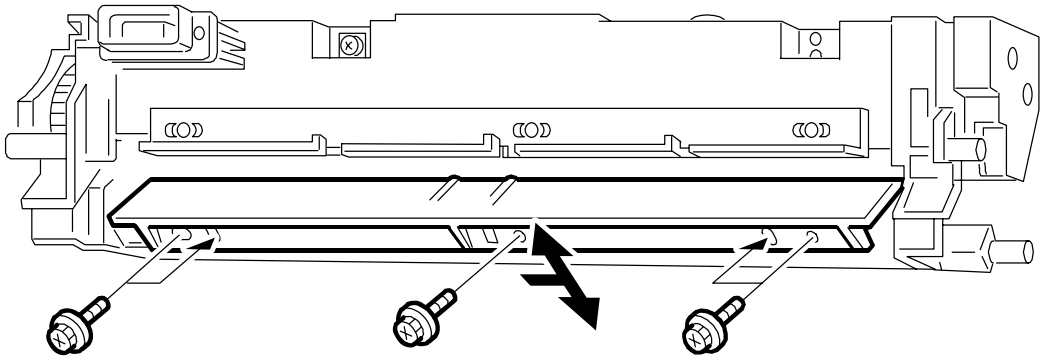
Drive



- Driven by the main motor
- No fusing nip adjustment

No additional notes.

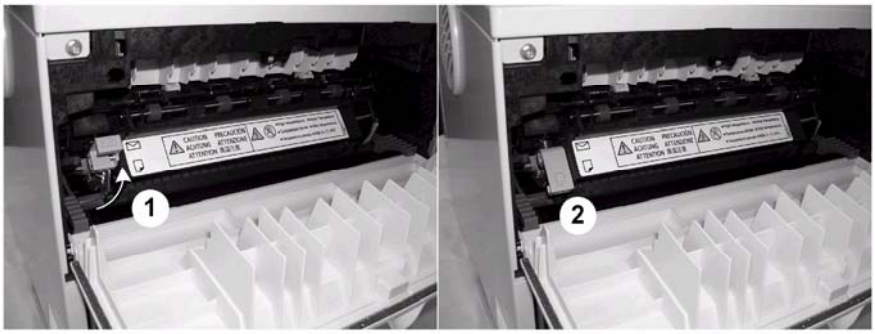
Fusing Entrance Guide



- **Default position: Outermost holes.**
- **Change the position if paper becomes creased while going through the fusing unit.**

- If creasing occurs frequently in the fusing unit, remove all screws and slide the entrance guide to the right. Replace the two end screws only. Do not replace the middle screw.

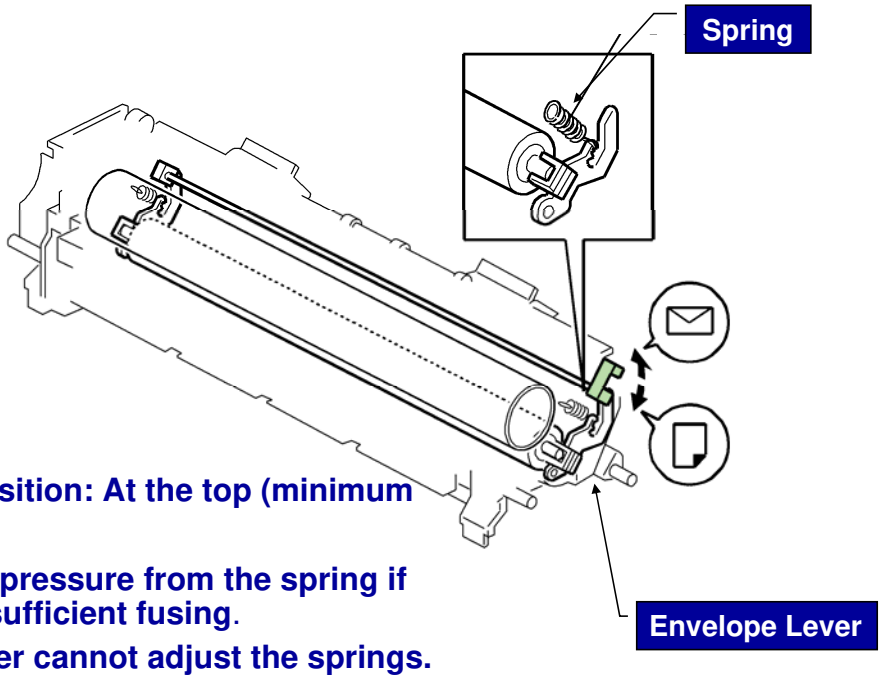
User Fusing Pressure Adjustment



- **The user adjusts fusing pressure with the 'envelope lever'. Normally this lever should be down.**
  - Raise the lever (1) to decrease the pressure between the hot roller and pressure roller. This prevents jams and wrinkling when printing on envelopes.
    - » Envelopes are thicker and need less pressure.
  - Lower the lever (2) for all other print jobs.

- For how to use this lever, see the Operating Instructions (Hardware Guide – Troubleshooting – Using the Envelope Lever).

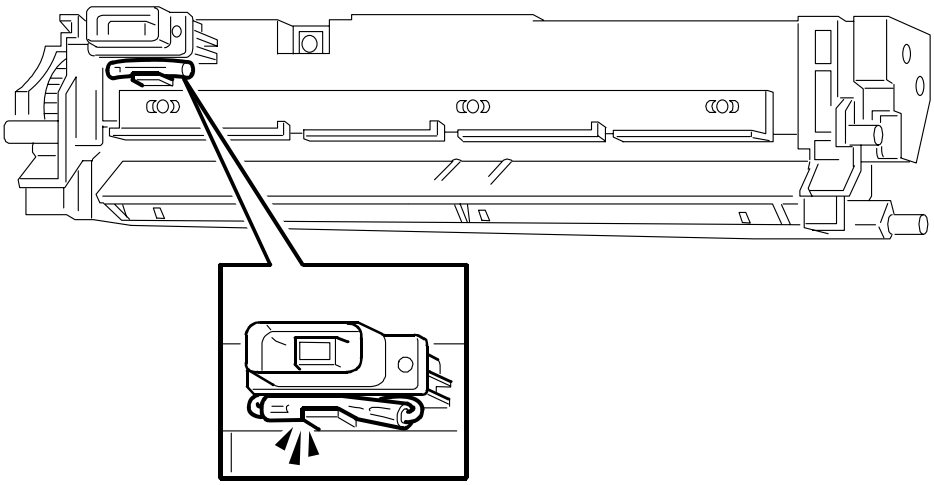
Adjusting the Pressure between the Hot Roller and Pressure Roller



- **Factory position: At the top (minimum pressure)**
- **Adjust the pressure from the spring if there is insufficient fusing.**
  - **The user cannot adjust the springs.**

- The drawing also shows the correct positions of the envelope lever for paper and for envelopes.
- The envelope lever does not adjust the pressure. It only adjusts the gap between the rollers. See the next slide for more about this lever.

New Fusing Unit Detection

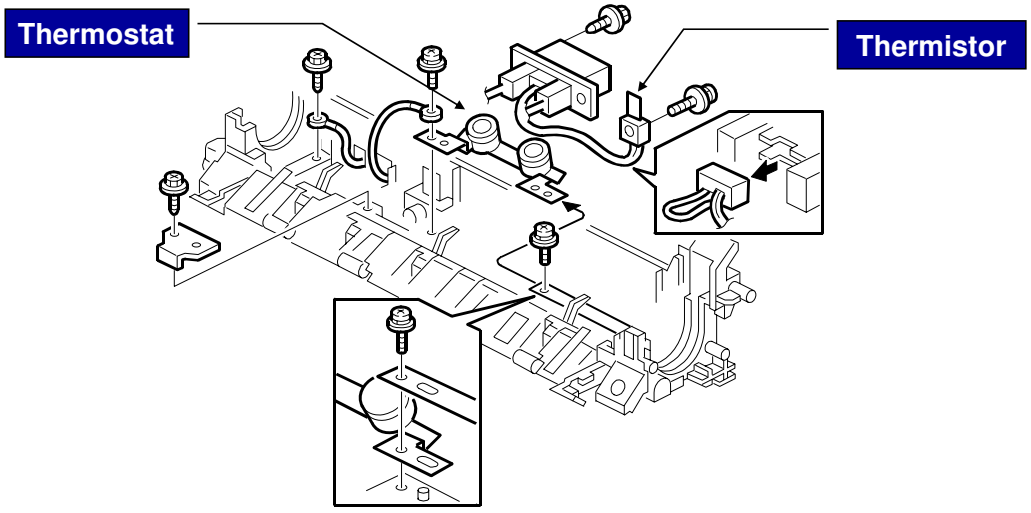


- **User maintenance kit: In a new fusing unit, the connector contains a fuse, which blows shortly after the machine is turned on.**
  - The technician's spare part does not have this fuse circuit
- **The CPU has enough time to detect this fuse, and uses this to tell when a new fusing unit has been installed.**

Two types of fusing unit spare part

- There are two types: User maintenance kit, and service part
- The fusing unit that the technician uses as a spare part is different from the fusing unit in the user maintenance kit. Only the fusing unit in the maintenance kit has this detection mechanism.
  - Some service contracts require that you replace the individual components of the fusing unit one at a time, and not as a complete unit. This was covered in the Maintenance section of the course.

Fusing Temperature Control

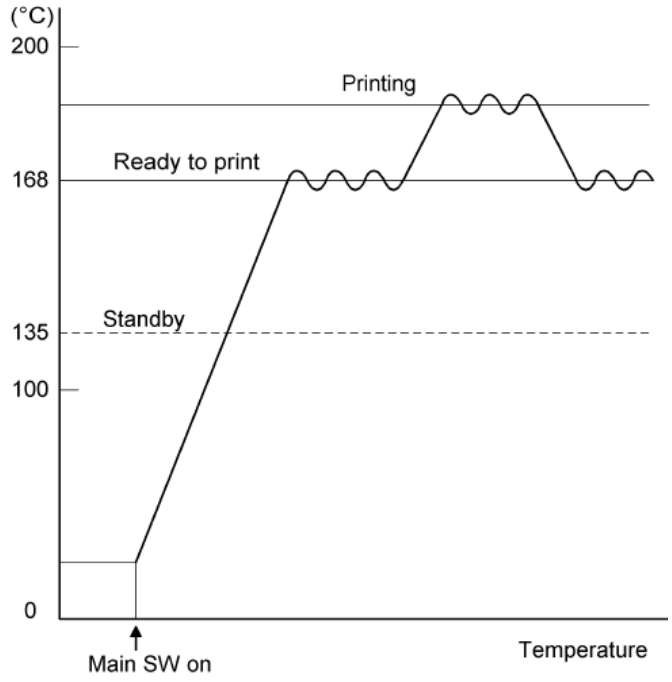


- **Thermistor: Measures the fusing unit temperature**
- **Thermostat: Prevents overheating**

Overheat Protection:

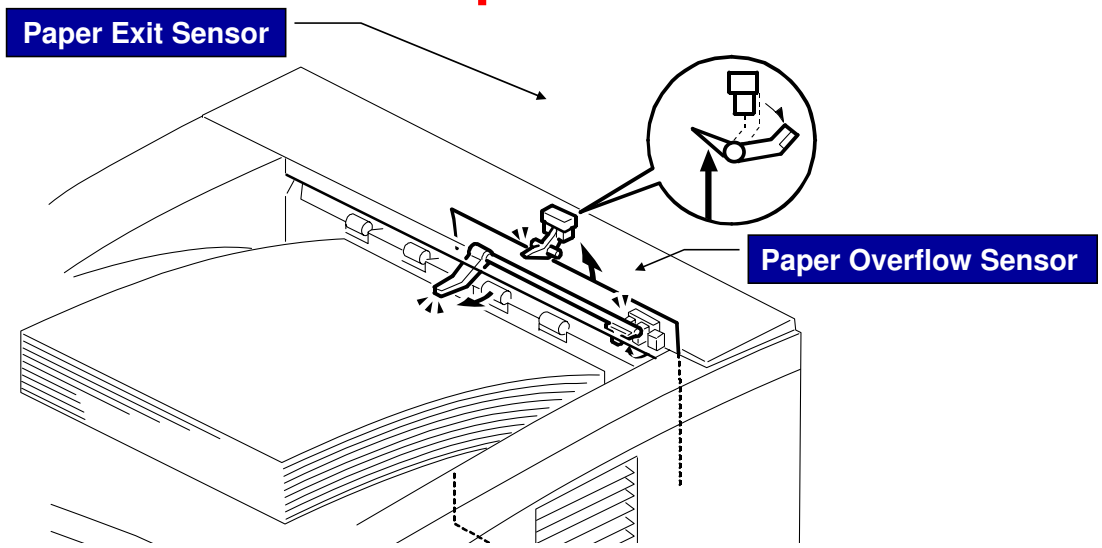
- If the hot roller temperature becomes greater than 245 °C, the CPU cuts off the power to the fusing lamp. At this time, SC543 will be generated.
- If the thermistor overheat protection fails, there is a thermostat in series with the common ground line of the fusing lamp. If the temperature of the thermostat becomes greater than 210 °C, the thermostat opens, removing power from the fusing lamp. At this time, the machine stops operation.

Fusing Temperature Control



- When the main switch turns on, the CPU turns on the fusing lamp using the soft start process. (The soft start process prevents the room lights from flickering.) The lamp stays on until the thermistor detects the ready temperature. Then the CPU maintains this temperature using on-off control. To start printing, the CPU raises the temperature to the printing temperature.

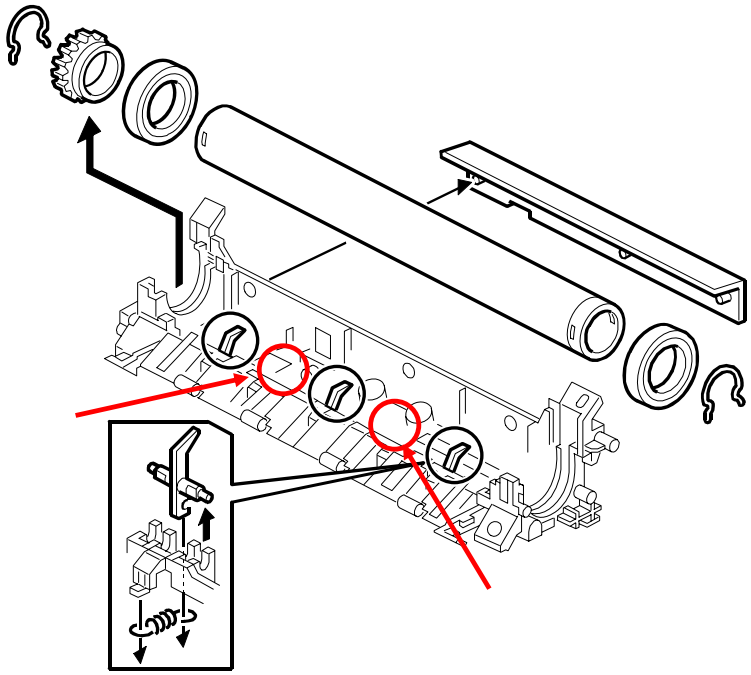
Paper Exit



- Paper exit sensor: Detects paper jams
- Paper overflow sensor: Printing stops when the paper stack has reached a given thickness

No additional notes.

Are Users Having Trouble with Narrow Paper?



- **There are three hot roller strippers; one in the middle, and one at each end.**
- **For some paper sizes, only the one in the middle touches the paper.**
- **If this is causing problems, install two extra hot roller strippers at the locations shown in red.**

- For some narrow paper sizes, only one of the three strippers will be working to separate the paper from the hot roller. Adding the two extra strippers will reduce the chances of jams in the fusing unit.

Jams when Duplex Printing on Thin Paper?

- **User Tools - Maintenance Menu - Curl Prevention**
  - Reduces the fusing temperature to prevent thin paper from curling.
    - » This is a common problem with thin paper, when printing on the second side in duplex mode.
  - If curl prevention is enabled, it is done except when OHP or thick paper is selected.
  - If curl prevention is switched on, toner could be fused to the paper incompletely, so it should be used with caution.
- **This adjustment is also possible with SP 1911**

No additional notes.

Energy Saving

- **When the machine is not being used, the energy saver feature reduces power consumption by switching off the fusing lamp.**
- **Entering Auto-off Mode**
  - Auto-off mode starts after the machine has been idle for a specified time.
  - The operator can set the time on the System menu. ([Menu] > "System"]. Several settings are available: Off, 1, 5, 15, 30, 45, 60 minutes. (Default: 5 minutes)
  - When the machine is in auto-off mode, the CPU turns off the fusing lamp. The +5VE line is active in auto-off mode; however, the +24V and +5V lines are not active.
- **Leaving Auto-off Mode**
  - The machine leaves auto-off saver mode when one of the following events occur:
    - Print command received from the PC
    - Any cover opened and closed
    - Any operation panel key is pressed

No additional notes.

SP Modes Related to Fusing

- **Engine SP mode**
  - 1104: On/off or phase control
  - 1106: Shows the fusing temperature
  - 1910:
    - » Roller turn: Idles the hot roller for 20 s after warm up. Use this if the first few prints are not fused enough
    - » Normal: Printing goes ahead after the hot roller reaches the ready temperature (less than 20 s is required

- If you wish to change any of the values, keep a note of the original value so that you can re-set the machine to its original setting.

SP 1913 - Fusing Unit Jams

- Normally, the user will remove fusing unit jams.
- But, if SP 1913 is changed to 'yes (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.

No additional notes.

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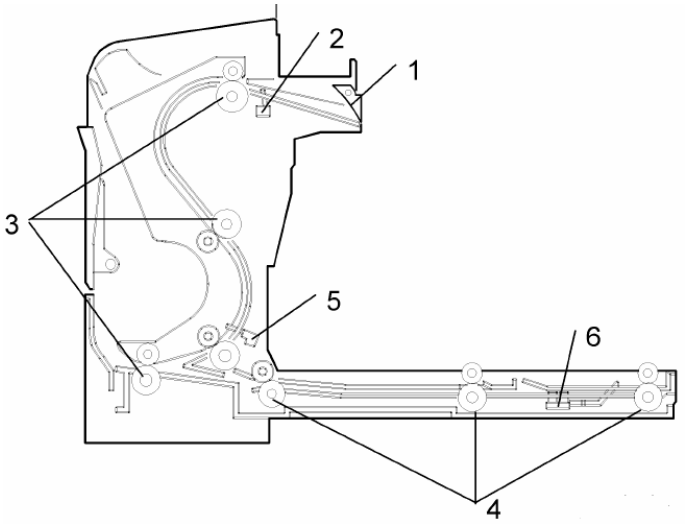
Model S-P3

9) Optional Duplex Unit

No additional notes.

Duplex Unit Components

1. Junction gate
2. Entrance sensor
3. Inverter rollers
4. Transport rollers
5. Transport sensor
6. Exit sensor

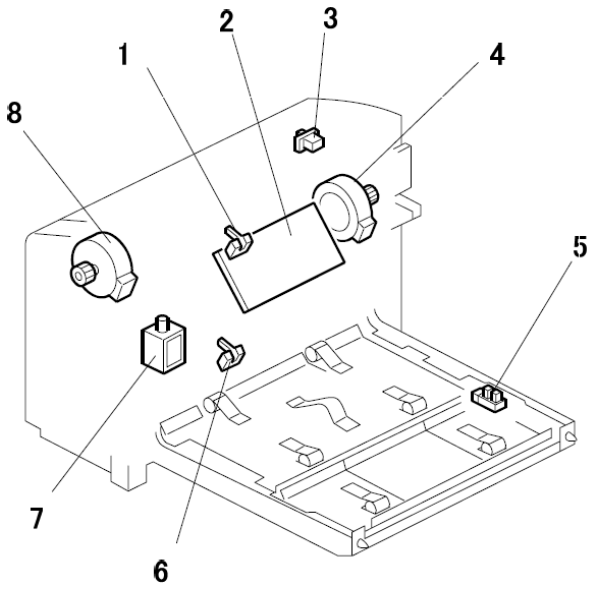


Note the following points:

- The junction gate and the solenoid are both included in the duplex unit.
- Two motors, the inverter motor and the transport motor, drive all the duplex unit mechanisms.

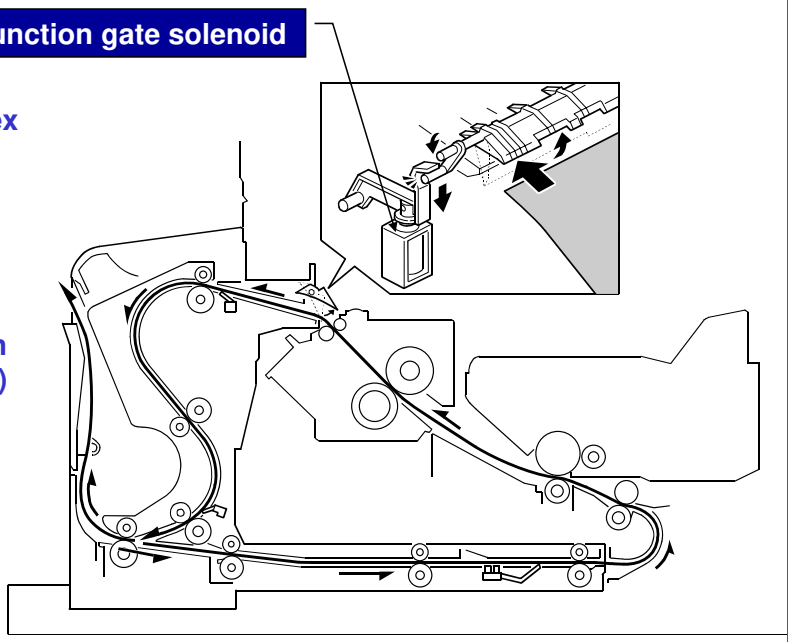
Duplex Unit Electrical Components

1. Entrance sensor
2. Duplex main board
3. Cover switch
4. Transport motor
5. Exit sensor
6. Inverter sensor
7. Inverter gate clutch
8. Inverter motor



No additional notes.

Paper Feed and Inversion



- Study how the duplex unit works.
- Refer to the G893 Service Manual (Detailed Descriptions → Duplexing → Feed-in and Exit Mechanism)

- Junction gate solenoid: Sends the paper to the output tray or to the duplex unit.

Paper Feed Timing - Interleaving

- **Longer than A4/LT LEF: Only one page can pass through at a time (that is, no interleaving is done).**
- **A4/LT LEF or shorter: Three pages can go through the duplex unit at once (this is known as 'interleaving'). The copier interleaves the pages; this gives maximum throughput**
- **For details, see the G893 service manual (Detailed Descriptions → Duplexing).**

- This is not vital information for servicing the machine, but it will help you understand how it works.
- The service manual shows how the paper travels through the machine. The sides of each page are printed in a special order that makes the throughput as fast as possible.

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10) Optional Paper Tray Unit and Optional Envelope Feeder

No additional notes.

Mechanical and Electrical Components

- **Look at the component layout diagrams.**
  - G894 service manual → Detailed Descriptions → Overview → Mechanical Components
  - G894 service manual → Detailed Descriptions → Overview → Electrical Components
- **Go to your machine and find the components indicated on the diagrams.**

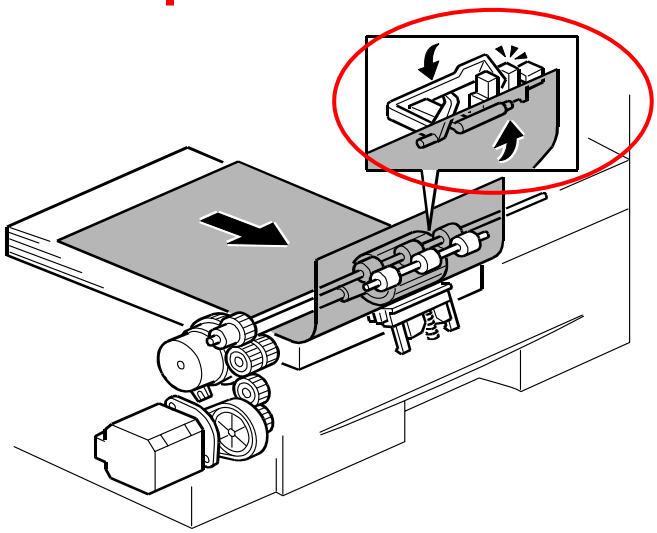
- The feed mechanism uses a friction pad and feed roller system

Mechanisms

- **The following are exactly the same as for the main body of the printer.**
  - Paper Feed and Separation
  - Tray Lift
  - Paper Size Detection
  - Remaining Paper Detection
  - Paper End Detection
- **The optional paper tray unit contains a paper feed sensor. The printer does not have this sensor.**
  - This sensor detects the paper feeding vertically upwards from the paper tray. It detects jams at the exit from the paper tray unit.
  - The sensor is in the frame, not in the actual tray, so the tray is exactly the same as the machine's built-in tray.

No additional notes.

Paper Feed Sensor



- This sensor detects the paper feeding vertically upwards from the paper tray. It detects jams at the exit from the paper tray unit.
- The sensor is in the frame, not in the tray.

No additional notes.

Envelope Feeder

- **This optional unit is a tray that slides into the optional paper feed unit.**
- **If two optional trays have been installed, the envelope feeder must go into the top tray.**
  - In this case, the user has both an envelope feeder and an optional paper tray.

No additional notes.

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Model S-P3

11) Troubleshooting

No additional notes.

Memory All Clear

- **Engine Settings - Engine SP 5801**
  - Access SP 5801, press Enter, then switch off/on
  - Various sub-menus for various resets
- **Controller Settings - Controller SP 1003**
  - Resets items in the System menu of the user tools

No additional notes.

Service Call Conditions - 1/2

- **There are four levels of service call conditions:**
- **Level-A**
  - Fusing unit SCs shown on operation panel. Machine is disabled. User cannot reset the SC.
- **Level-B**
  - These SCs disable only features using defective item. Normally invisible to user, they are indicated on operation panel when defective feature is used.
- **Level-C**
  - SCs not shown on operation panel, but recorded internally.
- **Level-D**
  - SCs indicated on operation panel. To reset, turn operation switch or main power switch off and then on. SCs are shown again if error repeats.
- **For reset procedures, see next slide.**

No additional notes.

Service Call Conditions - 2/2

Reset Procedures

- **Level A reset procedure:**
  - 1. Do SP5810 and press [#Enter].
  - 2. When "execute" is displayed, press [#Enter] again.
  - 3. Press [Escape].
  - 4. Turn the machine power off/on.
- **Level B reset procedure:**
  - Set the main power switch to “off” then to “on”.
- **Level C reset procedure:**
  - Recorded only.
- **Level D reset procedure:**
  - Set the operation switch or the main power switch to “off” then to “on”.

No additional notes.

Self Diagnostics

- **This is automatically done just after the power has been switched on.**
- **Engine SP 7832: Result of diagnostics**

- Just after the main power is switched on, the machine runs a diagnostic check.
- This section shows how the machine carries out the self diagnostic tests, and how the machine behaves if a test fails.
- The diagnostics are done automatically every time the machine is switched on.

Test Patterns

- Select the test pattern with SP 5902-3.
- After selecting a pattern, the display automatically shifts to SP 5902.
- Print the test pattern
  - One page only: SP 5902-1
  - More than one page: SP 5902-2
- Practice printing several of the test patterns.
- Reset SP 5902-3 to 'not specified' after printing. This is to avoid the pattern being repeated on the user's printouts.

No additional notes.

Printing Reports

- Engine: Engine SP 5990
- Controller: Controller SP 1004

No additional notes.

SP Modes - Tests

- **5802: Free run**
- **5803: Input tests**
- **5804: Output tests**

- Free run
  - Avoid prolonged or unnecessary use of free runs, which can cause machine wear and other problems.
- Output tests
  - To avoid mechanical or electrical damage, do not leave the electrical components running continuously for a prolonged period of time.

SP Modes - Others

- 5832: Initializes the hard disk
- 7401: Shows the number of SC codes that were detected
- 7403: The 10 most recent SC codes
- 7502: Total number of jams
- 7504: Jam detection counters (by location)
- 7506: Jam counters (by paper size)
- 7507: Jam history
- 7807: Resets counters for SC code and jams

No additional notes.

User Tools

- **Maintenance Menu**
  - Image Density
  - Registration
  - Curl Prevention
- **System Menu**
  - Prt Error Report
  - Memory Overflow

- This is a list of user tools that are related to troubleshooting.
- Image Density: If the user adjusts this setting, the development bias will change. The laser power and charge roller voltage will also change.

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Environmental Conservation

Technology for Environmental Conservation

Energy Saving

Paper Saving

- This section explains the technology used in this machine for environmental conservation, and the default settings of related functions.

Technology for Environmental Conservation

**: New or modified function
*: Has this function
Blank: Does not have this function

Environmental Technology/Feature	Description	New model S-P3	Old model S-P2
1. QSU	- Reduction of warm-up time (Energy saving) - Reduction of CO_2 emissions	*	*
2. Hybrid QSU			
3. IH QSU			
4. Paper-saving features	- Allows documentation to be managed digitally, cutting down on paper consumption. - Improves machine productivity when printing out duplex (double-sided) images.	* (option)	* (option)
5. High-speed duplex output	- Improves machine productivity when printing out duplex (double-sided) images	* (option)	* (option)
6. Ozone reduction design	- Low ozone emissions	*	*
7. PxP (polymerized) toner	-Energy saving - Conservation of materials/resources (reduced toner consumption)		
8. Noise reduction design	- Low noise	*	*
9. Minimization of harmful substances	- Minimization of harmful substances	*	*
10. Environmentally-friendly toner bottle	- Conservation of materials/resources		
11. Toner recycling			
12. Recycle-friendly design			

- This slide explains what technologies are used for conserving the environment in this product.
- Items 4 and 5 require the optional duplex unit.
- Items 10, 11, and 12 do not apply because of the AIO design.

Brief Descriptions of the Technologies

- **1. QSU (Quick Start-up)**
  - This technology reduces both the amount of energy consumed while in Standby mode (the Ready condition) is reduced, as well as the time it takes for the machine to warm up to the Ready condition.
  - This is made possible through the utilization of dual fusing lamp heating, low fusing point toner, a pressure roller with a "sponge" surface layer, and a thin surface layer hot roller.
- **2. Hybrid QSU**
  - This technology adds an additional circuit to conventional QSU Technology, which allows the benefits of reduced energy consumption and reduced warm-up time described above to be extended to high-speed machines.

No additional notes

Brief Descriptions of the Technologies

- **3. IH QSU**
  - This technology incorporates IH (Inductance Heating) technology into conventional QSU technology, which allows the benefits of reduced energy consumption and reduced warm-up time to be extended to color machines.
- **4. Paper-saving features**
  - 1) The duplex (double-sided) and Combine features reduce paper consumption.
    2) The Document Server and other electronic document management features reduce paper consumption by offering an electronic method for storing and managing important documents.

No additional notes

Brief Descriptions of the Technologies

- **5. High-speed duplex output**
  - 1) Enables high-speed duplex printing through the utilization of the Duplex Interleaf and high-speed Inverter Transport features.
  - 2) Enables quick printing of duplex jobs through the use of Duplex Scanning.
- **6. Ozone reduction design**
  - Greatly reduces the machine's ozone emissions to near-zero levels by utilizing:
    1) A charge roller/belt instead of a corona wire
    2) An image transfer roller/belt instead of a corona wire-based transfer system

No additional notes

Brief Descriptions of the Technologies

- **7. PxP (polymerized) toner**
  - "PxP toner" is a fine-particle, polyester resin based toner, manufactured using a Ricoh-original polymerization method instead of the conventional pulverization method.
  - This allows the toner to fuse at a lower temperature, which reduces the impact on the environment and contributes to achieving even higher image quality than before.
  - PxP toner also has other benefits, including a reduction in the amount of toner needed to develop the image, as well as an approximate 35% reduction in CO_2 emissions during the toner manufacturing process.

No additional notes

Brief Descriptions of the Technologies

- **8. Noise reduction design**
  - 1) The machine and its components are designed to minimize the overall noise generated by the machine. As a result, all noise levels conform to the local laws and regulations as well as user requirements in each market in which the products are sold.
  - 2) Reduces the noise generated by the polygon mirror motor.
- **9. Minimization of harmful substances**
  - 1) Products sold in the EU conform to the RoHS Directive.
  - 2) Products sold in China conform to China's version of the RoHS Directive.
  - 3) In addition, Ricoh imposes strict internal standards for limiting the presence of harmful substances.

No additional notes

Brief Descriptions of the Technologies

- **10. Environmentally-friendly toner bottle**
  - A changeover from PS/PP/HDP to PET plastics allows approximately 40 percent by weight of the toner bottle to be recycled, and also reduces CO_2 emissions that occur during the toner bottle manufacturing process.
- **11. Toner recycling**
  - Enables effective use of resources by recycling (reusing) the toner left over on the drum surface after image transfer.
- **12. Recycle-friendly design**
  - To maximize the recycling ratio of machine and component materials, as well as the ease of performing the recycling in the field, machine sections and components are designed so that the recyclable parts can be separated out easily.
  - In addition, components are designed so that they can be reused for as long as possible after the machine has reached its operational lifetime.

No additional notes

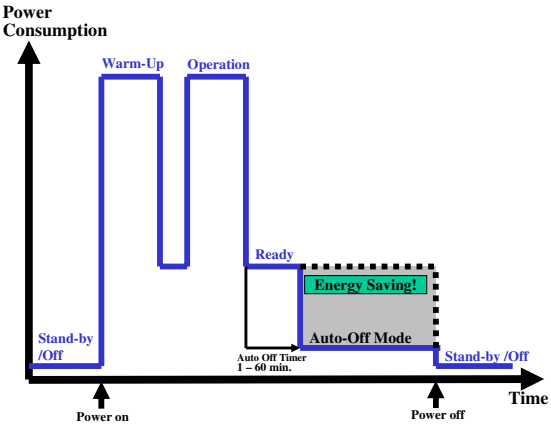
Quick Start-up

- **QSU reduces the operating temperature, because of these improvements in fusing unit technology**
  - Reduced thickness of the hot roller (5mm=>3mm)
  - Low melting-point toner (165C => 155C)
- **This also means that the warm-up time and recovery time from energy saver modes are also reduced.**
  - Warm-up time (5min=>3min)
  - Recovery time (30sec =>10sec)

- Through major reductions in warm-up time and recovery time from energy saver modes (Low power, Off/Sleep), QSU (Quick Start Up) Technology has eliminated the traditional trade-off between energy saving and convenience of speed.
- The IH (induction heating) method used in the Apollon series is also a part of this technology.

2. Energy Saving

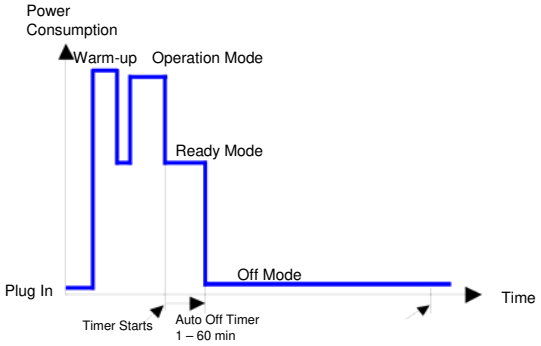
2.1 Overview – 1



Energy Saver Modes	Description
Auto Off Mode	No power is supplied to the printing engine and very little to the controller.

No additional notes

2. Energy Saving
2.2 Overview – 2 (System Settings)



1) Timer settings and recovery time (System settings => Timer setting)

Mode	Timer	Default	Setting options	Recovery time
Auto Off Mode	Auto Off Timer	1 minute	1 minute 5 minutes 15 minutes 30 minutes 45 minutes 60 minutes	12 seconds

- "Auto Off" mode settings can be adjustable with User Mode (Menu > System > Auto Off).
- **Auto Off Mode On/Off**
  - You can specify whether or not to use Auto Off Mode.
    On (Default)
    Off
- **Auto Off Timer**
  - Specify time for entering the Auto Off mode.
    1 minute (Default)
    5 minutes
    15 minutes
    30 minutes
    45 minutes
    60 minutes
- We recommend that the default settings should be kept.
  - If the customer requests that the setting should be changed, please explain that their energy costs could increase, and that they should consider the effects on the environment of extra energy use.
  - If it is necessary to change the setting, please try to make sure that the Auto Off timer is not too long. Try with a shorter setting first, such as 5 minutes, then go to a longer one (such as 30 minutes) if the customer is not satisfied.
  - If the time is set to the maximum value, the machine will not begin saving energy until 60 minutes has expired after the last job. This means that after the customer has finished using the machine for the day, energy will be consumed that could otherwise be saved.
  - If you change the settings, the energy consumed can be measured using SP8941, as explained later in this presentation.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.2 Energy Saver Mode: Condition of LEDs

❑ **Condition of LEDs on the operation panel**

Mode	Operation Switch LED	Energy Saver LED	Main Power LED
Auto-Off Mode	Off	Off	On

No additional notes

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

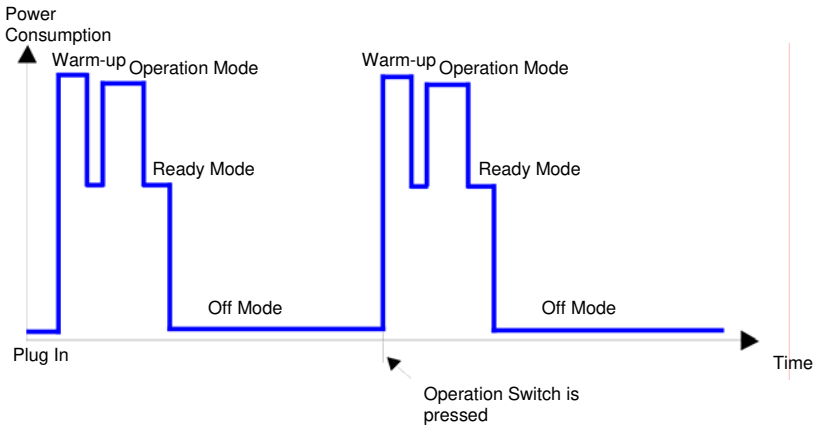
- **The machine enters auto-off mode when one of the following is done.**
  - The auto off timer runs out after the last job.
  - The operation switch is pressed to turn the power off.
- **When the machine enters auto off mode, no power is supplied to the printing engine, and almost none to the controller.**
- **Recovery time**
  - Less than 12 seconds

No additional notes

2. Energy Saving

2.2 Energy Saver Mode: Off Mode – 2

- **The machine recovers to the ready condition if the operation switch is pressed.**



- This timing chart shows what happens if the operation switch is pressed while the machine in off mode.
- Power consumption during warm-up may be much higher than shown in this diagram.

2. Energy Saving
2.3 Energy Save Effectiveness – 1

- With the data from SP 8941:Machine Status, and the power consumption values from the specifications, we can estimate the amount of energy that is used by the machine.
  - 8941-005: Auto-Off mode time
- This should only be used as a reference value, because the power consumption specifications are measured in a controlled environment with a constant power supply.
- To get an exact measurement at the customers site, a watt meter must be used to measure the actual energy consumed.

No additional notes

2. Energy Saving

2.3 Energy Save Effectiveness – 2

(1) At the start of the measurement period, read the values of SP 8941:001-005 (Machine Status), measured in minutes.

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

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

(4) Power consumption figures for each model are acquired from "Publication System of MSDS_&_PEI (PRODUCT ENVIRONMENT INFORMATION)" database.
S-P3:

Mode/condition	Power consumption:
Operating mode	560.3W
Stand by/Ready	117W
Off/Sleep mode	3W

No additional notes

2. Energy Saving

2.3 Energy Save Effectiveness – 3

(5) Multiply this by the power consumption spec for each mode and convert the result to kWh (kilowatt hours)

(6) This is a simulated value for power consumed.

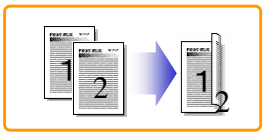
Example calculations:

Mode/condition	SP8941: Machine Status	Time at Start (min.) (1)	Time at End (min) (2)	Running time (hour) (2) – (1)/60 = (3)	Power Consumption Spec. (W) (4)	Power consumption (KWH) (3) x (4)/1000 = (5)
Operating	001: Operating Time	21089	21386	5	560.3	2.8
Stand by (Ready)	002: Standby Time	306163	308046	31.4	117.0	3.67
Energy save	003: Energy Save Time	N/A	N/A	N/A	N/A	N/A
Low power	004: Low power Time	N/A	N/A	N/A	N/A	N/A
Off/Sleep	005: Off mode Time	508776	520377	193.4	3.0	0.58
Total (6)						7.05

- This machine doesn't have "energy save" and "low power modes".

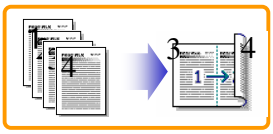
3. Paper Saving
3.1 Measuring the Paper Consumed – 1

1. Duplex: Reduce paper volume in half!



2. Combine: Reduce paper volume in half!

3. Duplex + Combine: Using both features together can further reduce paper volume by 3/4!



No additional notes

3. Paper Saving
3.1 Measuring the Paper Consumed – 2

- **To check the paper consumption, look at the total counter and the duplex counter.**
  - Total counter : SP 8581 001
  - Single-sided with duplex mode : SP 8421 001
  - Double-sided with duplex mode : SP 8421 002
  - Book with with duplex mode : SP 8421 003
  - Single-sided with combine mode : SP 8421 004
  - Duplex with combine mode : SP 8421 005
- **The total counter counts all pages printed.**
- **The duplex and combine counter counts all pages printed with duplex and combine mode.**

- SP8421-002 and -003 are not used on this product. (They are for MFP machines only.)

3. Paper Saving

3.1 Measuring the Paper Consumed – 3

- **How to calculate the paper reduction ratio, when compared with Single-sided copying, with no 2-in-1 combine mode**
- **Paper reduction ratio (%) = Number of sheets reduced: A/Number of printed original images: B x 100**
  - Number of sheets reduced: A
    = Output pages in duplex mode/2 + Number of pages in Single-sided with combine mode + Number of pages in Duplex with combine mode x 3/2
    A = (②+③+④)/2 + ⑤+⑥ x 3/2
  - Number of printed original images: B
    = Total counter＋ Number of pages in Single-sided with combine mode ＋ Number of pages in Duplex with combine mode
    B = ①+⑤+⑥

① **Total counter**	**: SP 8581 001 (pages)**
② **Single-sided with duplex mode**	**: SP 8421 001 (pages)**
③ **Double-sided with duplex mode**	**: SP 8421 002 (pages)**
④ **Book with with duplex mode**	**: SP 8421 003 (pages)**
⑤ **Single-sided with combine mode**	**: SP 8421 004 (pages)**
⑥ **Duplex with combine mode**	**: SP 8421 005 (pages)**

In the above formula:

- Sheet: A sheet of paper
- Page: A side of a sheet of paper. In duplex mode, one sheet is two pages
  - Output page: One side of a sheet of output paper
- Original Image: An image of one original page (or, an image of one side of a two-sided original)
  - For one sheet of output paper in two-in-one copying, four original pages are copied onto two output pages.

- SP8421-002 and -003 are not used on this product. (They are for MFP machines only.)