RICOH

**Model OP-P1**
**(M133/M144/M145/M146/M162/M163/M164)**
**Model OP-MF1**
**(M134/M135/M141/M142/M143/M147/M148/M149/M150/M151/**
**M165/M166/M167/M168/M169/M191)**
**Service Training**

Slide 1

Version 1.1

**These models are for the following regions**

- M133, M134, M135, M141, M142, M143, M144, M191: China
- M162: India
- M164, M169: Asia
- M163, M165, M166, M167, M168: India and South America
- M145, M146, M147, M148, M149, M150, M151: Europe and North America

**TTP version information**

- Version 1.0: China only (M133, M134, M135, M141)
- Version 1.1: Worldwide models introduced. The following slides were modified (slide numbers are the numbers used in version 1.0)
  - Changes related to the increased number of models: Slides 1, 5, 6, 7, 8, 9, 14, 18 (one line deleted), 21, 22, 26, 27, 29, 30, 31, 35, 38, 39, 41, 43, 48 to 58, 75, 108, 109; also, a slide was inserted after slide 6
  - AIO refill is not for EU/NA models: Slides 4, 12, 13, 70, 81, 83
  - Tray cover, Scan to USB, handset: Slides 7 to 9
  - Front door switch: Slides 25, 67
  - Changes to external component and operation panel diagrams (these are now slides 8 to 16)
  - Other changes: Slides 13, 14, 105, 119
- Version 1.2: Wireless LAN models and M191 for China introduced. The following slides were modified (slide numbers are the numbers used in version 1.1)
  - Changes related to the increased number of models: Slides 1, 4, 5, 6, 7, 8, 10, 17, 18, 75, 80, 86
  - Minor change to diagram (model code numbers such as M133 are now obscured): Slides 34, 35, and 36

# Course Contents



Slide 2

**- A note to the training supervisor -**

**This course was written assuming the following requirements. Modify as necessary depending on your situation.**

- Preparation
  - Prior to starting this course, prepare the following items. -
    - Training machines in the shipping boxes
    - A set of service tools
    - Field Service Manual
    - User's Manuals
- Requirements for trainees
  - Prior to starting this course, the following training or equivalent should be completed.

    *Fax basics course*

    *Copier basics course*
  - The trainee should also be familiar with the Core Technology Manual and be able to reference it during training.
- Time required to complete this course: 6 hours or less.


**No additional notes**

## Main Points about this Series

- **The OP-P1/MF1 series is the successor to the BL-P1/MF1 series.**
- **Print speed for all models is 22 ppm (A4/LT).**
- **Installation and maintenance is done by the customers.**
- **All models except the Europe and North America models (M145, M146, M147, M148, M149, M150, and M151): Customers can refill the AIO with toner, and the used toner can be discarded.**
  - After refilling the toner 3 times, the photo-conductor is getting old, so the customer must replace the AIO (this is the only PM replacement item).
- **GDI driver, with support for Windows only.**

Slide 4

**No additional notes**

# Appearance – OP-P1

**OP-P1a (M133, M162)**
**OP-P1an (M144, M145, M163)**

**OP-P1aw (M146, M164)**

- **OP-P1a: No network connectivity (Ethernet or wireless LAN). USB only**
  - OP-P1an: Ethernet and USB only
  - OP-P1aw: Ethernet, USB, and WiFi
- **M145, M146 (Europe/N. America models): In these models, the AIO cannot be refilled with toner.**
- **The OP-P1 doesn't have a full operation panel but has 2 keys and 2 LEDs. The top of the machine is covered by a plastic maintenance cover.**
- **Use Smart Organizing Monitor to make machine settings, monitor the error codes, and execute other functions.**

Slide 5

- The OP-P1 has only a printer function. It doesn't have a full operation panel but has 2 keys and 2 LEDs. The top of the machine is covered by a plastic maintenance cover.
- The functions that can be performed with Smart Organizing Monitor are explained in the service manual (Troubleshooting > Utilities).

## Appearance – OP-MF1 (3-in-1 Model)

**OP-MF1au (M134, M147, M165)**
**OP-MF1aun (M142)**

**OP-MF1a (M191)**
**OP-MF1an (M148, M166)**

- **OP-MF1a: Copier + Printer + Scanner + ADF**
  - OP-MF1au: Copier + Printer + Scanner, No ADF
  - OP-MF1aun: OP-MF1 au + Ethernet
  - OP-MF1an: OP-MF1 au + Ethernet + ADF
- **M147, M148 (Europe/N. America models): In these models, the AIO cannot be refilled with toner.**
- **The 3-in-1 model has a larger operation panel than OP-P1, with more buttons and a 2-digit display. The top of the machine is covered by a platen cover and flatbed scanner unit, except for the M148, M166, and M191, which have an ADF instead of a platen cover. The M148, M166, and M191 also have a larger operation panel, almost the same as the 4-in-1 model, but without the fax functions.**
- **Use Smart Organizing Monitor to make machine settings, monitor the error codes, and execute other functions**

Slide 6

- The functions that can be performed with Smart Organizing Monitor are explained in the service manual (Troubleshooting > Utilities).
- The ADF can hold and feed 15 originals for continuous scanning.

# Appearance – OP-MF1 (4-in-1 Model)

**OP-MF1afh (M135), OP-MF1afhn (M143)**
**OP-MF1af (M149, M167), OP-MF1afn (M150, M168)**
**OP-MF1afw (M151, M169)**

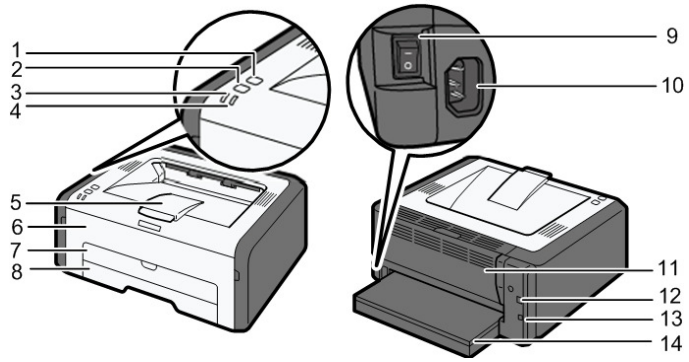
**OP-MF1afhu (M141)**

- **OP-MF1af: Copier + Printer + Scanner + Fax, With ADF**
  - OP-MF1afh: OP-MF1af + handset
  - OP-MF1afn: OP-MF1af + Ethernet
  - OP-MF1afw: OP-MF1af + WiFi
  - OP-MF1afhn: OP-MF1af + handset + Ethernet
  - OP-MF1afhu: OP-MF1af + handset, No ADF
- **The 4-in-1 model has an operation panel with a full array of keys, a 10-key pad, and a 7-digit display. The top of the machine is covered by a ADF and a flatbed scanner unit, except for the M141 which has a platen cover instead of an ADF.**
- **M149, M150, M151 (Europe/N. America models): In these models, the AIO cannot be refilled with toner.**
- **Use Smart Organizing Monitor to make machine settings, monitor the error codes, and execute other functions**

Slide 7

- The functions that can be performed with Smart Organizing Monitor are explained in the service manual (Troubleshooting > Utilities).
- The ADF can hold and feed 15 originals for continuous scanning.

# External Components – OP-P1

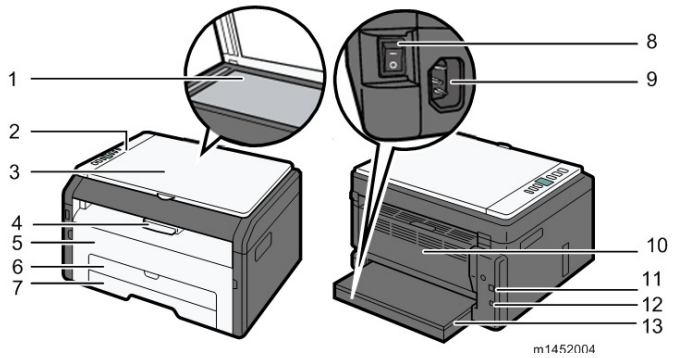



| | |
|---|---|
| 1. Job Reset key | 8. Tray 1 |
| 2. Start key | 9. Power switch |
| 3. Power indicator | 10. Power connector |
| 4. Alert indicator | 11. Rear cover |
| 5. Output tray | 12. USB port |
| 6. Front cover | 13. Ethernet Port (M144, M145, M146, M163, and M164 only) |
| 7. Bypass tray | 14. Tray cover |

Slide 8

- See the User's Guide for detailed external component descriptions.
- Tray cover: The North America model has two types: LT, and LG. Other versions have only one type (A4/LT).

# External Components – OP-MF1 (no ADF)

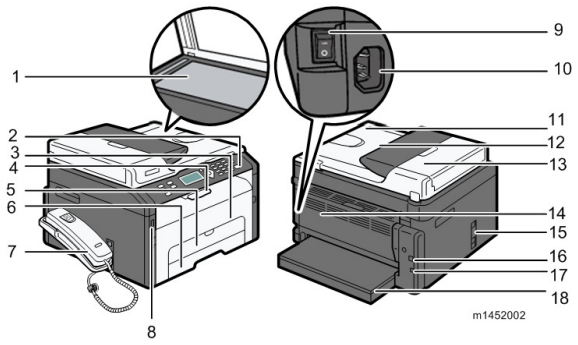



| | |
|---|---|
| 1. Exposure glass | 8. Power switch |
| 2. Operation panel | 9. Power connector |
| 3. Exposure glass cover | 10. Rear cover |
| 4. Output tray | 11. USB port (Scan to USB not available in China) |
| 5. Front cover | 12. Ethernet Port (M142 only) |
| 6. Bypass tray | 13. Tray cover |
| 7. Tray 1 | |

Slide 9

- See the User's Guide for detailed external component descriptions.
- Tray cover: The North America model has two types: LT, and LG. Other versions have only one type (A4/LT).

## External Components – OP-MF1 (with ADF and handset)




| | |
|---|---|
| 1. Exposure glass | 10. Power switch |
| 2. Operation panel | 11. Auto Document Feeder |
| 3. Front cover | 12. ADF input tray |
| 4. Output tray | 13. ADF cover |
| 5. Bypass tray | 14. Rear cover |
| 6. Tray 1 | 15. Line and TEL connectors |
| 7. Handset (M135, M143 for China only) | 16. USB port (Scan to USB not available in China) |
| 8. USB Flash Disk Port (M150, M168, M148, M166 only) | 17. Ethernet Port (M150, M168, M143, M148, M166, M151, M169 only) |
| 9. Power connector | 18. Tray cover |

Slide 10

- See the User's Guide for detailed external component descriptions.
- Tray cover: The North America model has two types: LT, and LG. Other versions have only one type (A4/LT).
- In the M141, the Auto Document Feeder (ADF) has not been installed.
- Line and TEL Connector (M135, M141, M143, M149, M150, M151, M167, M168, and M169)
  - For M135, M141, M143

    *Upper port: Port for handset connection.*

    *Middle port: Port for external telephone connection.*

    *Lower port: G3 (analog) line Interface port for telephone line connection.*
  - For M149, M150, M151, M167, M168, M169

    *Upper port: Port for external telephone connection.*

    *Lower port: G3 (analog) line Interface port for telephone line connection.*

# Operation Panel – Printer Chinese Version

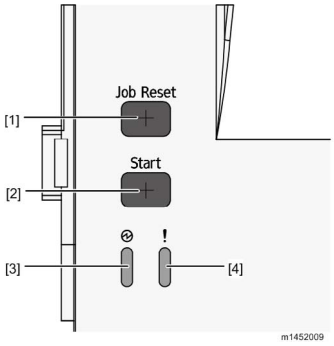
| | |
|---|---|
| 1. Job Reset key | 3. Power indicator |
| 2. Start key | 4. Alert indicator |


Slide 11

- See the User's Guide for detailed operation panel descriptions.

# Operation Panel – Printer International Version

| | |
|---|---|
| 1. Job Reset key | 3. Power indicator |
| 2. Start key | 4. Alert indicator |

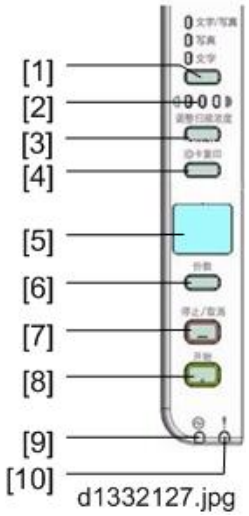



Slide 12

- See the User's Guide for detailed operation panel descriptions.

# Operation Panel – 3 in 1
# Chinese Version

| | |
|---|---|
| 1. Document Type key | 6. Copy Number key |
| 2. Density indicator | 7. Stop/Cancel key |
| 3. Density key | 8. Start key |
| 4. ID Copy key | 9. Power indicator |
| 5. Display LCD | 10. Alert indicator |



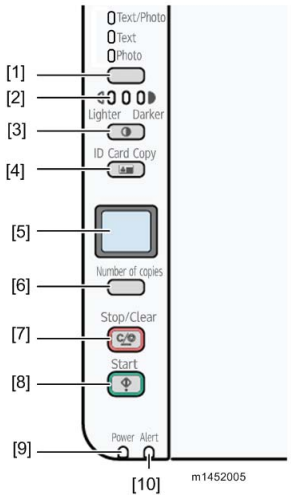

Slide 13

- See the User's Guide for detailed operation panel descriptions.

# Operation Panel – 3 in 1 International Version

| | |
|---|---|
| 1. Document Type key | 6. Copy Number key |
| 2. Density indicator | 7. Stop/Clear key |
| 3. Density key | 8. Start key |
| 4. ID Copy key | 9. Power indicator |
| 5. Display LCD | 10. Alert indicator |

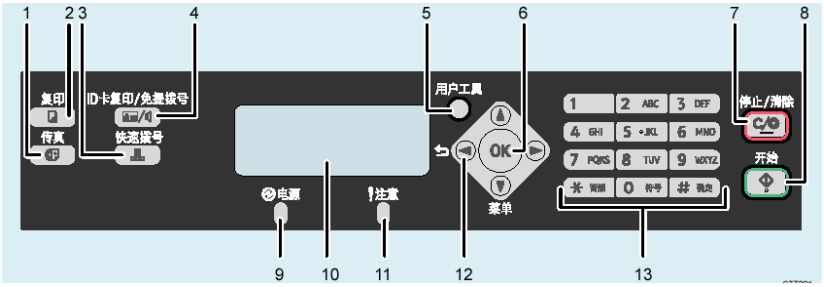
Note that for the models with ADF (M148, M166), the operation panel is the same as the 4-in-1 model, but without the keys for the fax functions.




Slide 14

- See the User's Guide for detailed operation panel descriptions.

# Operation Panel – 4 in 1
# Chinese Version

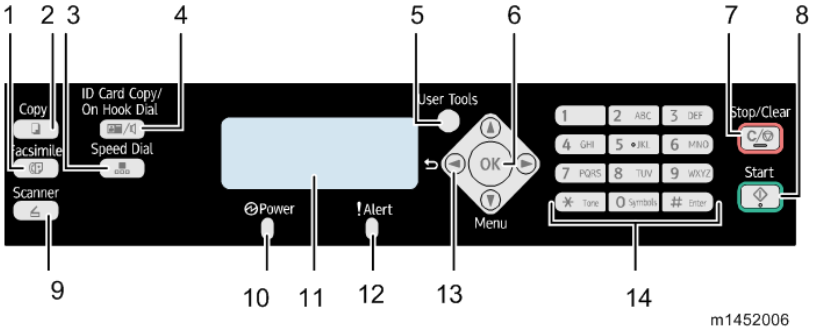



| | |
|---|---|
| 1. Fax key | 8. Start key (Fax tx/rx) |
| 2. Copy key | 9. Power indicator |
| 3. Speed dial key | 10. Display screen |
| 4. ID card copy/On hook key | 11. Alert indicator |
| 5. User Tools key | 12. Scroll keys |
| 6. OK key | 13. Number keys |
| 7. Stop/Clear key | |

Slide 15

- See the User's Guide for detailed operation panel descriptions.

# Operation Panel – 4 in 1 International Version




| | |
|---|---|
| 1. Fax key | 8. Start key (Fax tx/rx) |
| 2. Copy key | 9. Scanner key |
| 3. Speed dial key | 10. Power indicator |
| 4. ID card copy/On hook key | 11. Display screen |
| 5. User Tools key | 12. Alert indicator |
| 6. OK key | 13. Scroll keys |
| 7. Stop/Clear key | 14. Number keys |

Slide 16

- See the User's Guide for detailed operation panel descriptions.

# Market Positioning and Concepts

- **Main Objective**
  - Maintain and expand MIF in the low end market
- **Target Users**
  - Business personal and small office
  - Can double as a small office printer/copier/fax
- **Technical Enhancements (compared to some competitors/predecessors)**
  - Compact
    - » Small footprint
  - Genuine refill toner (all models except the Europe and N. America models: M145, M146, M147, M148, M149, M150, and M151)
  - Fast first print

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**No additional notes**

# Yield Targets

- **Toner yield (Starter AIO): About 1000 pages**
- **Toner yield (Replacement AIO, Supply):**
  - High yield: About 2600 pages
  - Low yield: About 1500 pages (except for the China models [M133, M134, M135, M141, M142, M143, M144, M191])
    - » Yield values are for when printing on A4 or 8½" x 11" paper (5% chart) in accordance with ISO/IEC 19752.
  - All models except the Europe and N. America models (M145, M146, M147, M148, M149, M150, and M151): Refill toner is also available. Each AIO can be refilled up to 3 times.

Slide 18

**No additional notes**

## Reliability Targets

- **Average Print Volume**
  - OP-P1a: 400 prints/month
  - OP-MF1a: 500 prints/month
  - OP-P1a/OP-MF1a (China models): 800 prints per month
- **MPBF**
  - OP-P1a: 26k prints
  - OP-MF1a: 22k prints
- **Expected product life**
  - All models: 5 years or 60,000 prints (whichever comes first)

Slide 19

**ME-MF1/P1**

- Expected life was 50k


**No additional notes**

# General Specifications - 1

- **Print/Copy speed: Up to 22 ppm (A4/LT SEF)**
- **Warm up time: Less than 25 s at 23 C**
- **First print time:**
  - Less than 6 s from the start of paper feed until paper exits.
  - Less than 10 s from the time data is received until paper exits.
- **First copy time:**
  - Less than 25 s (ADF/platen)
- **Resolution:**
  - Printing/Copying: 600 x 600 dpi, 1200 x 600 dpi
  - Scan from exposure glass: 600 x 600 dpi, 600 x 300 dpi
  - Scan from ADF: 600 x 300 dpi
- **ADF capacity: 15 sheets**
- **Input tray capacity: 150 sheets**
  - Bypass tray: 1 sheet
- **Output tray capacity: 50 sheets**
- **Duplex printing: Manual**

Slide 21

- This slide shows the basic specifications.
- For more detailed specifications, see the field service manual.

## General Specifications - 2

- **Maximum original & print size: A4, 8½" x 14"**
- **Paper size**
  - Standard Tray: A4, Letter, Half letter, B5 (ISO), A5, B6, A6, Executive, 16K, Legal
  - Bypass Tray: Width 100 mm to 216 mm (3.5" to 8.5“), Length 148 mm to 356 mm (5.8" to 14")
  - ADF: Width 105 to 216 mm (4.1" to 8.5"), Length 127 to 356 mm (5" to 14")
- **Media type (ADF, standard and bypass trays): Plain Paper, Recycled Paper**
- **Paper weight**
  - Standard Tray: 60 - 105g/$m^2$ (16 - 28lb)

Slide 22

**No additional notes**

# General Specifications - 3

- **Memory size:**
  - OP-P1a: 16 MB
  - OP-MF1au: 16 MB
  - OP-MF1afh, OP-MF1afhu: 32 MB
  - No upgrades available
- **Hard disk: None**
  - Not available as standard or as option
- **Fax**
  - Compression Methods: MH / MR / MMR
  - Modem Speed: 33.6kbps - 2400bps
  - Transmission Speed: Approx. 3 s/page
- **Power Consumption**
  - Copying: 350W or less
  - Standby: 55W or less
  - Sleep: 5W or less

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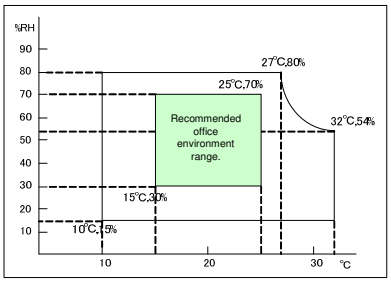
**No additional notes**


**No additional notes**

# Overview

- **Generally, the user installs this machine. However, in addition to your maintenance duties, you may also have to install the machine when you are in the field.**
- **The full installation procedure is in the *Quick Installation Guide*.**
- **Before you start installation:**
  - Check the accessories.
  - Confirm the location to install the machine (space, power source, environment). The space requirements depend on the model (see the next slide).

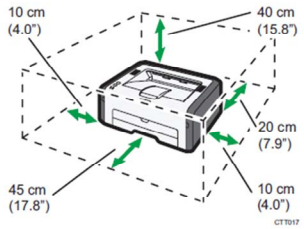



Slide 25

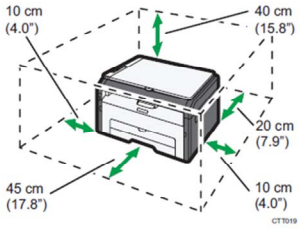
**No additional notes**

# Space Requirements

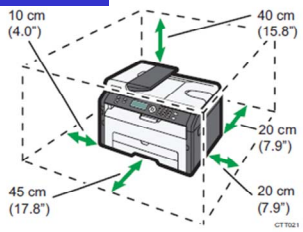
**Printer model**




**With platen cover**




**With ADF**




M1333061

Slide 26

**No additional notes**

# Install the Machine

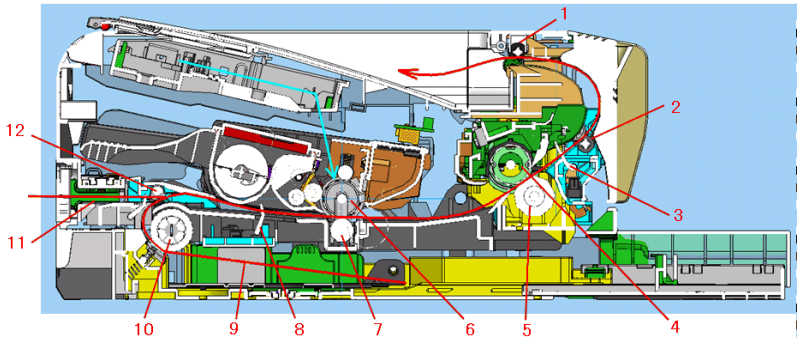
- **The following are the main steps to installation. Refer to the Quick Installation Guide (QIG) for details.**
  - Unpack the machine.
  - Take out the AIO (print cartridge), shake it 5 or 6 times, and reinstall it.
  - Connect the power cord and USB cord.
  - Install the printer software in the computer.
  - Load paper in the paper tray and open the output tray.
  - 4-in-1 models only
    - » Connect the phone line.
    - » Set up the fax functions.
  - The *User's Guide* contains more information about machine setup options. Familiarize yourself with it in case the user requests your help.

Slide 27

**No additional notes**


**No additional notes**

## Component Layout




1. Exit Rollers
2. Straight Rollers
3. Exit Sensor
4. Hot Roller
5. Pressure Roller
6. Drum
7. Transfer Roller
8. Registration Sensor
9. Paper
10. Feed Roller
11. Manual Feed Tray
12. Connecting Roller

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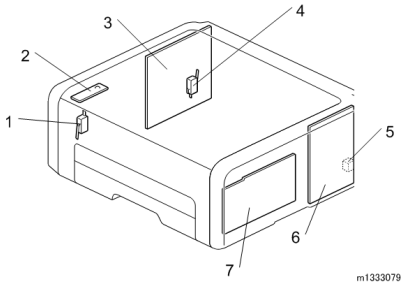
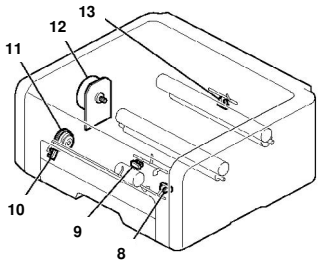
**No additional notes**

## Electrical Component Layout – 1



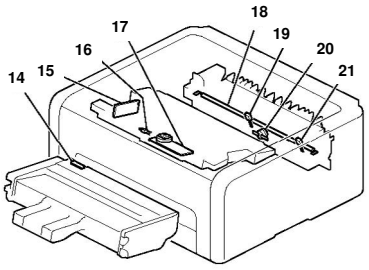



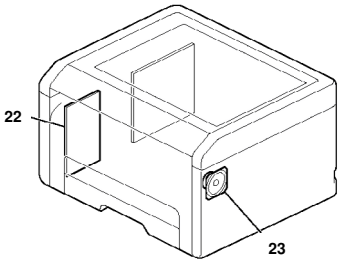

1. Front Door Switch
2. Operation Panel Unit
3. Main Board
4. Interlock Switch (Fusing Unit Cover)
5. Main Switch
6. PSU
7. HVPP (High Voltage Power Pack)
8. Paper End Sensor
9. Registration Sensor
10. By-pass Set Sensor
11. Paper Feed Clutch
12. Main Motor
13. Paper Exit Sensor

Slide 30

- Front door switch: North America models have two switches. Models for other regions have one.

## Electrical Component Layout – 2




14. ID Chip
15. LD Board
16. Thermistor
17. Polygon Mirror Motor
18. Fusing Lamp
19. Fusing Thermistor (Center)
20. Thermostat
21. Fusing Thermistor (End)
22. Fax Board (4-in-1 models)
23. Speaker (4-in-1 models)

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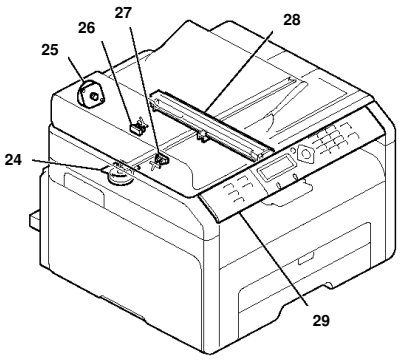
### 16. Thermistor

- This thermistor is above the laser unit. It detects the temperature inside the machine. If it becomes higher than 52 degrees C, printing stops. Then when it falls below 50 degrees C again, printing will restart. This operation is necessary because of the lack of cooling fans in this machine.

# Electrical Component Layout – 3




**24.Scanner Motor**

**25.ADF Motor**

**26.ADF Sensor 1**

**27.ADF Sensor 2**

**28.CIS**

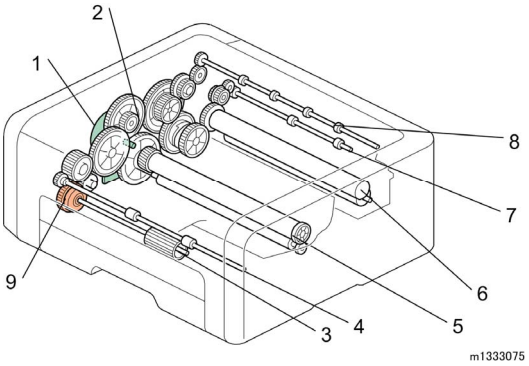
**29.Operation Panel Unit**

Items 24 to 28: 3-in-1 and 4-in-1 models only
Items 25 to 27: Only in models with ADF

Slide 32

**No additional notes**

# Main Unit Drive

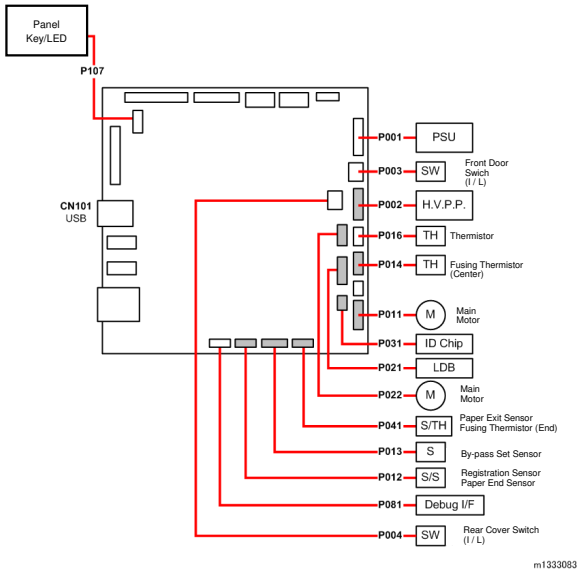



- The main motor (1) and a gear train (2) drive the feed roller (3) and transport roller (4), the drum (5, inside the AIO), the hot roller (6), the fusing exit roller (7), and the exit roller (8).
- The paper feed clutch (9) engages and disengages the rotation of the feed roller during paper feed.

Slide 33

**No additional notes**

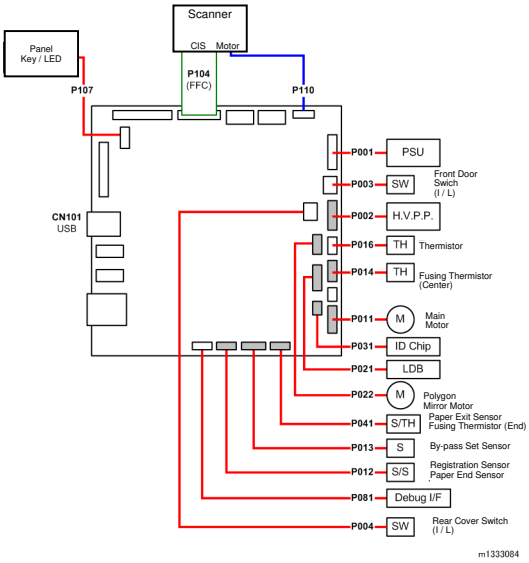
## Control Structure – Printer model




Slide 34

- LDB = Laser diode board
  I/L SW = Interlock switch

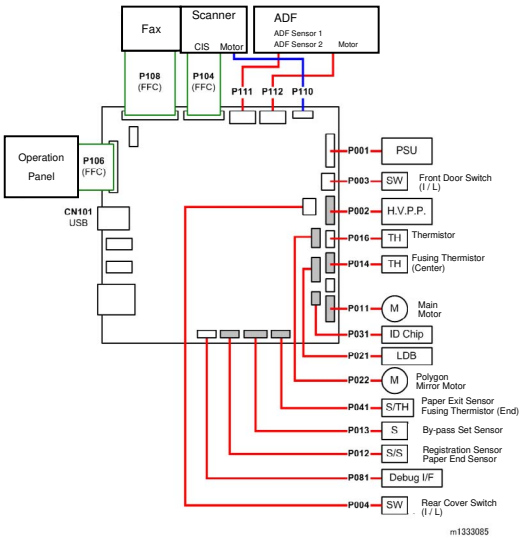
# Control Structure – 3-in-1 model




Slide 35

- LDB = Laser diode board
  I/L SW = Interlock switch

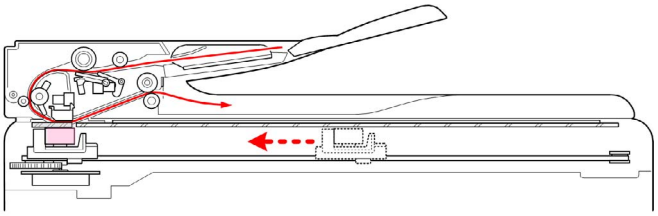
# Control Structure – 4-in-1 model




Slide 36

- LDB = Laser diode board
  I/L SW = Interlock switch

# ADF Paper Path



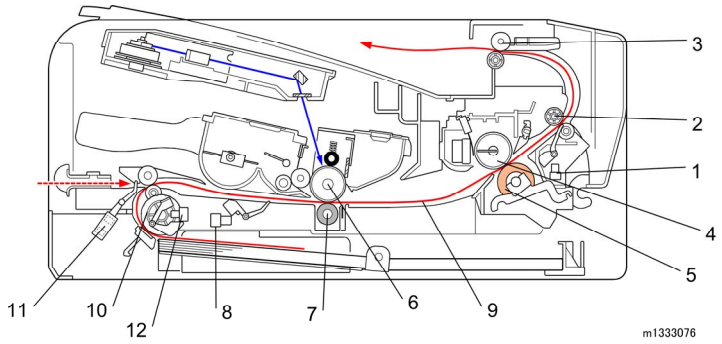
m103d101

- The solid red line shows the path that documents take through the ADF.

Slide 37

**No additional notes**

# Main Unit Paper Path




❑ **The red line shows the path that paper takes through the machine.**

Slide 38

1. Paper Exit Sensor
2. Fusing Exit Roller
3. Exit Roller
4. Hot Roller
5. Pressure Roller
6. Drum
7. Transfer Roller
8. Registration Sensor
9. Paper
10. Feed Roller
11. By-pass Set Sensor
12. Paper End Sensor

❑ The registration sensor sets registration timing. (= Laser on timing)

## Loading Paper

- Before loading paper, the paper size and paper type must be selected on the initial screen (System Settings) of the Smart Organizing Monitor.
- Also, in print mode, the user must select the correct size on the printer driver.

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**No additional notes**

## Message and Error Displays

- The 4-in-1 models have a 2-line display that can show SC codes and messages.
- The display for the 3-in-1 models is limited to two digits.
- The printer model has no display.
- The Service Mode of Smart Organizing Monitor can be used to view error messages for all machines.

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**No additional notes**


**No additional notes**

# Maintenance Procedures

- **This machine is designed for user maintenance; so, it does not have a periodic maintenance schedule.**
- **Refer to the maintenance information in the User Guide.**
  - Operating Instructions: User Guide → Maintaining the Machine
- **Also see the "Using the Service Mode" slide.**

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**No additional notes**

## Configuring the Machine

- **The 4-in-1 models can be configured/set-up from the control panel.**
  - User Guide → Configuring the Machine Using the Control Panel
- **All models can be configured/set-up using the Smart Organizing Monitor.**
  - User Guide → Configuring the Machine Using the Smart Organizing Monitor

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- Refer to "User Maintenance Mode" in the FSM for details about user access procedures.

# Using the Service Mode

- **The method for entering the service mode depends on the function item and the model.**
  - Refer to the table below.
  - The Service Mode PC utility is accessed from within the Smart Organizing Monitor.
  - For full details see the FSM.
    FSM → Troubleshooting → Utilities → Smart Organizing Monitor Service Mode

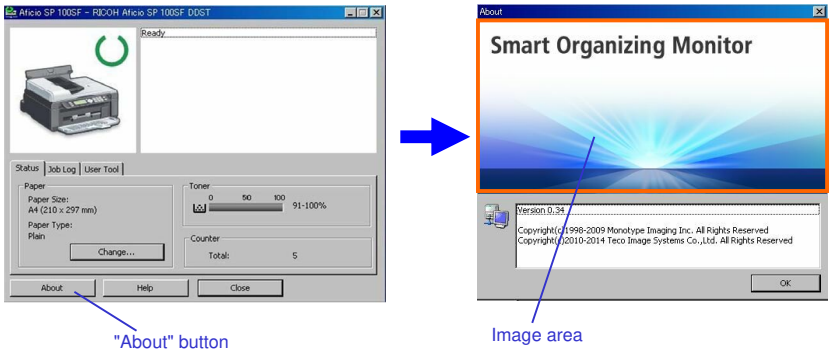
| No. | Function | To Enter Service Mode | 4-in-1 | 3-in-1 | Printer |
|---|---|---|---|---|---|
| 1 | Fax maintenance | From "Ready" state: Stop/Reset > 1 > 0 >7 > Start | Yes | No | No |
| 2 | Fax test | Power ON + Fax key | Yes | No | No |
| 3 | Engine maintenance | See the next slide. | Yes | Yes | Yes |
| 4 | Counter information | | Yes | Yes | Yes |
| 5 | Error history | | Yes | Yes | Yes |

Note: The Service Mode of the Smart Organizing Monitor is your best tool for troubleshooting problems as is a common tool available for all machines.

Slide 44

**No additional notes**

# Opening the Service Mode




"About" button

Image area

**To open the Service Mode:**

**Step 1: Click "About".**

**Step 2: Press Ctrl+Shift and double click the right mouse button in the image area of the Smart Organizing Monitor. (Orange outlined area above.)**

Slide 45

**No additional notes**

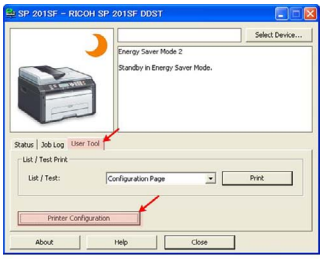
# Updating Firmware - 1

- **Always update the firmware in READY mode. If you update firmware while copying or printing or in the energy saver modes, the update will fail.**
  - Make sure that the PC is set so that it does not enter standby mode or sleep mode automatically during the firmware update.
  - The firmware update may take a while to complete, so you may need to switch off the standby or sleep mode settings in the PC operating system.
- **4-in-1 models: Unplug the fax cable before starting the update.**
- **Make sure that the machine is on and connected to the PC by its USB cable.**
- **Before you start, print the Configuration page (using Smart Organization Monitor).**

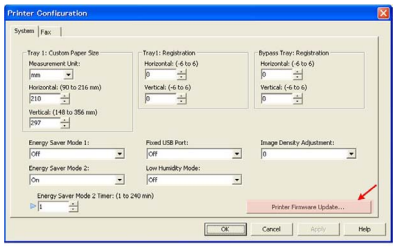
Slide 46

*Service Manual > 5. System Maintenance Reference > Firmware Update*

# Updating Firmware - 2




m1333015.png




m1333016.png

- **To begin the update, click the [User Tools] tab, and then click [Printer Configuration].**
- **Click [Printer Firmware Update].**
- **Follow the procedure in the service manual.**
  - The manual explains what the machine displays during the update and after the update has finished.
  - The manual also explains what happens if the firmware update fails.
- **Do not cut the power, unplug the USB cable, or do any other operation during the update.**
- **After the update has finished:**
  - Cycle the main power off/ on to initialize the firmware.
  - Print another Configuration Page and check it to make sure that the firmware was updated.

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*Service Manual > 5. System Maintenance Reference > Firmware Update*

## If Firmware Update Fails

- Engine firmware update: If the firmware update fails, SC871 appears (3-in-1 models show c7, and in the printer version, only the Alert LED lights). The main board must be replaced.
- Controller firmware update: If the firmware update fails, try again.

Slide 48

**No additional notes**

# Cleaning

- **This machine is designed for user maintenance; so, it does not have a periodic maintenance schedule.**
- **As a preventive maintenance measure, you may need to clean machine components during service calls.**
- **Go to the machine and practice the cleaning procedures.**
  - Refer to the User Guide for the cleaning procedures.
  - Pay particular attention to the "Cautions when Cleaning" section.
- **Never use an organic solvent like benzene, thinner, acetone, etc. to clean the machine.**

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**No additional notes**

## Print Counter

- Count-up is done at the time of image writing.
- So in this machine, count-up is done even when jam detection occurs after writing.
- This process differs from existing machines, where count-up is done after feeding out the printed paper.

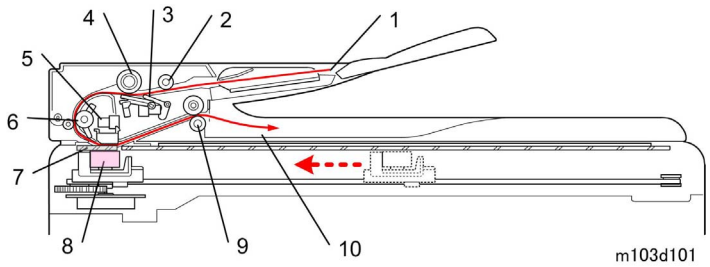
Slide 50

**No additional notes**


**No additional notes**


**No additional notes**

# ADF - Overview

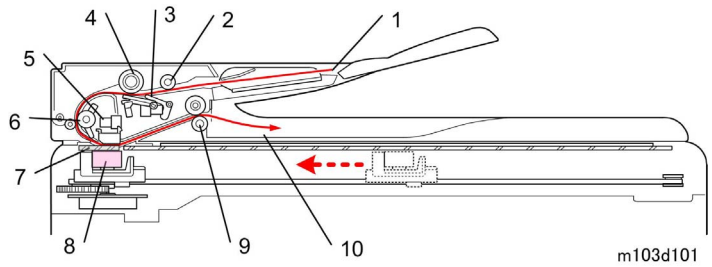



- The ADF can hold up to 15 originals for continuous scanning.
- Originals can also be scanned from the exposure glass one at a time (book mode).

Slide 53

1. Original Feed Tray
2. Pick-up Roller
3. ADF Sensor 1
4. ADF Roller
5. ADF Sensor 2
6. Feed Roller
7. Scanning Glass (ADF originals)
8. CIS
9. Original Exit Roller
10. Original Output Tray

# ADF – Operation (1)




- The originals are placed face-up.
- The original feed tray (1) can hold up to 15 originals.
- The pick-up roller (2) feeds each original into the ADF after the operator pushes [Start] on the operation panel.
- The ADF scanner motor will not turn on and rotate the entrance roller unless ADF sensor 1 (3) detects a sheet of paper ready to be fed.

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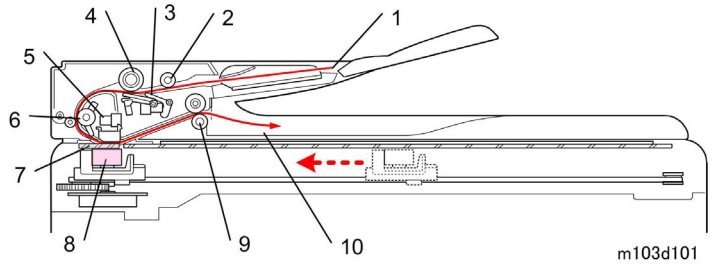
1. Original Feed Tray
2. Pick-up Roller
3. ADF Sensor 1
4. ADF Roller
5. ADF Sensor 2
6. Feed Roller
7. Scanning Glass (ADF originals)
8. CIS
9. Original Exit Roller
10. Original Output Tray

# ADF – Operation (2)




- **The ADF roller (4) feeds the original into the ADF and sends it down.**
- **ADF sensor 2 (5) detects the leading and trailing edge of each original as passes and continues to feed past the feed roller (6).**
  - If the leading and trailing edges of the paper do not pass ADF sensor 2 within the time prescribed for the paper length, this will trigger a jam.

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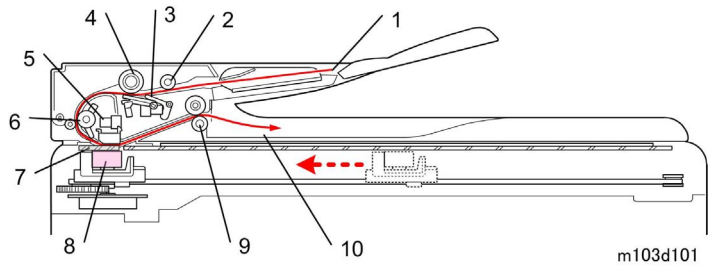
1. **Original Feed Tray**
2. **Pick-up Roller**
3. **ADF Sensor 1**
4. **ADF Roller**
5. **ADF Sensor 2**
6. **Feed Roller**
7. **Scanning Glass (ADF originals)**
8. **CIS**
9. **Original Exit Roller**
10. **Original Output Tray**

# ADF – Operation (3)




- The 2nd feed roller feeds the paper over the ADF scanning glass (7).
- The stationary CIS (8) below the ADF scanning glass scans the original as it passes overhead.
- The exit roller (9) feeds to original out of the ADF and onto the original output tray (10).

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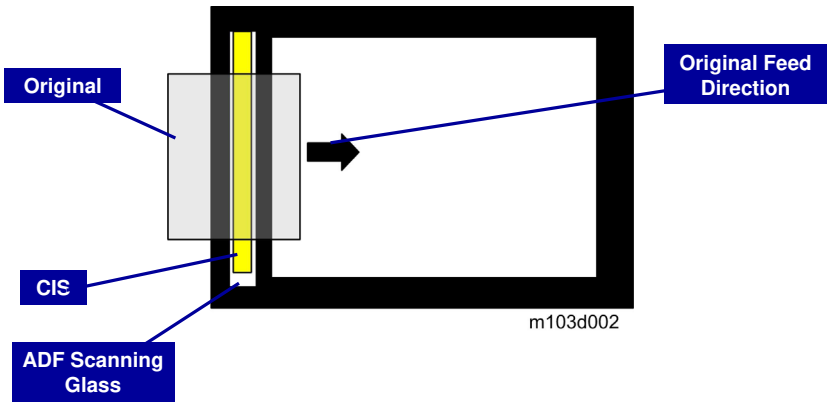
1. Original Feed Tray
2. Pick-up Roller
3. ADF Sensor 1
4. ADF Roller
5. ADF Sensor 2
6. Feed Roller
7. Scanning Glass (ADF originals)
8. CIS
9. Original Exit Roller
10. Original Output Tray

## ADF – Operation (4)

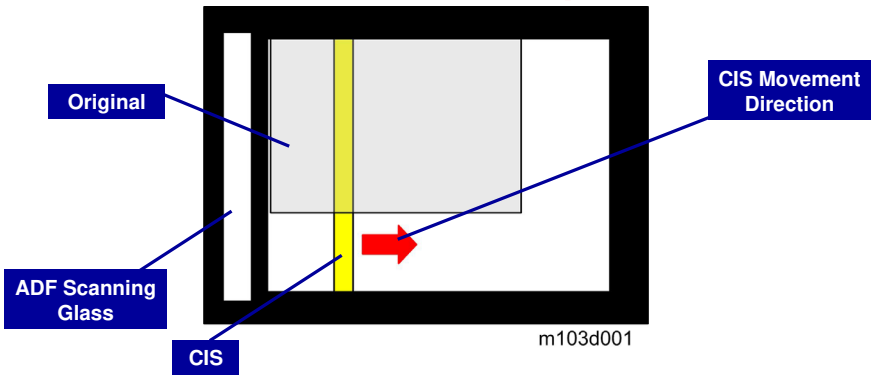



- **In ADF mode, the CIS stays below the ADF scanning glass during scanning.**

Slide 57

- The CIS is shaded in yellow in this diagram.

## Flatbed Scanner – Operation




- **To scan an original placed face down on the exposure glass, the CIS is moved from left to right by a timing belt.**
  - The timing belt does not move when scanning originals from the ADF. The CIS remains stationary on the left under the ADF scanning glass.

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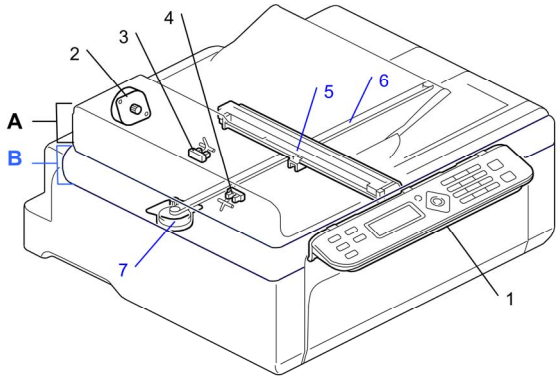
- The CIS is shaded in yellow in this diagram.

# ADF Components




- The ADF (A) is mounted on top of the flatbed scanner (B).

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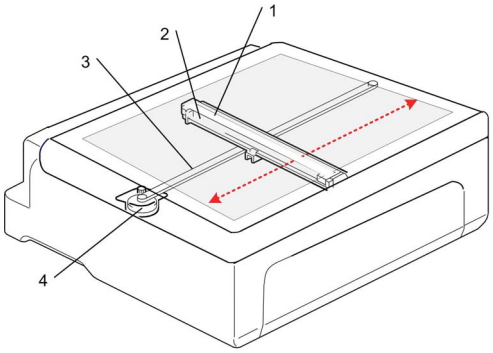
1. Operation Panel
2. ADF Motor
3. Original Set Sensor (ADF Sensor 1)
4. Original Feed Sensor (ADF Sensor 2)
5. CIS Unit
6. Timing Belt
7. Scanner Motor

## Flatbed Scanner Components




- The CIS and flatbed scanner motor are the only two electrical components in the flatbed scanner.

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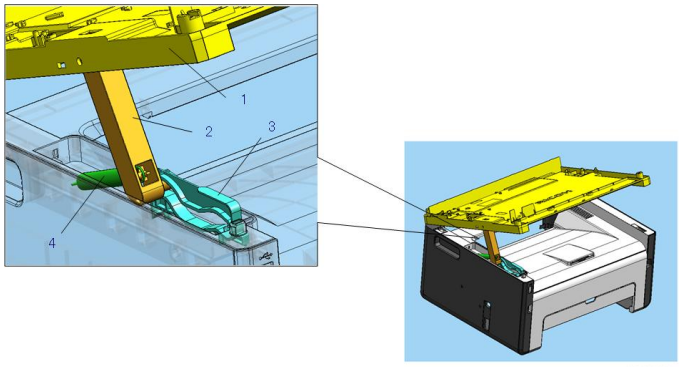
1. CIS
2. CIS Cradle
3. Timing Belt
4. Scanner Motor

## Flatbed Hinge Mechanism - 1

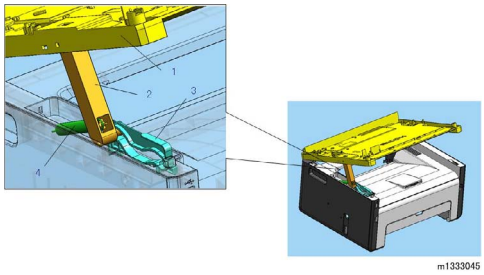



1. Flatbed Scanner Unit Base
2. Support Arm
3. Guides
4. Spring

Slide 61

**No additional notes**

## Flatbed Hinge Mechanism - 2




- The hinge is mounted on the top of the left cover and connected to the bottom of the flatbed unit.
- The hinge locks and holds when the top of the machine is raised.
- On machines with scanner and no ADF, the flatbed unit is raised.
- On machines with scanner and ADF, the ADF and flatbed unit are raised together.

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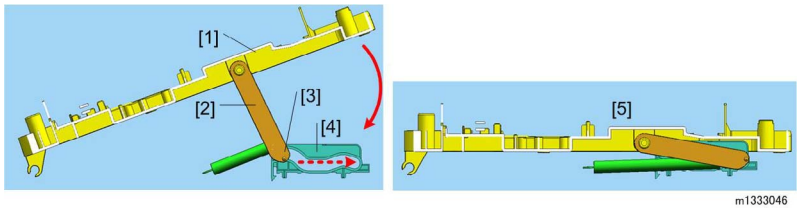
**No additional notes**

## Flatbed Hinge Mechanism - 3




- There is only one hinge, on the left.
- The top of the hinge is connected to the base of the flatbed scanner [1].
- The end (convex part) [3] of the support arm [2] is joined to the guide [4]. The end moves within this guide when the flatbed is lifted or lowered.
- The mechanism lies flat in the locked position [5].

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**No additional notes**

## Replacement of Parts

- The only serviceable part in the ADF is the original tray cover.
- If other part malfunctions occur, replace the whole ADF.

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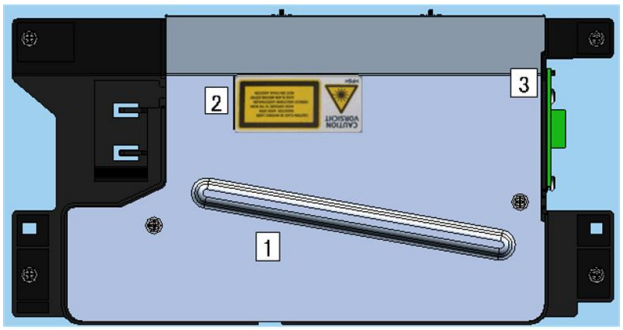
**No additional notes**


**No additional notes**

# Top View, Cover On




1. Top Cover
2. Laser Decal
3. LD Board

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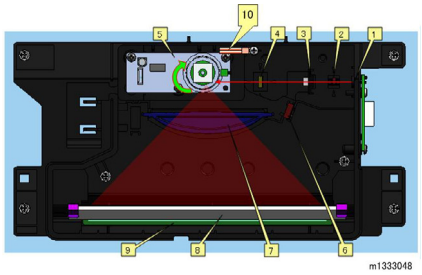
**No additional notes**

## Top View, Cover Off




1. Laser Diode
2. Collimating Lens
3. Aperture
4. Cylindrical Lens
5. Polygon Mirror
6. Laser Synchronization Detector
7. F-theta Lens
8. 1st Mirror
9. Shield Glass
10. Thermistor

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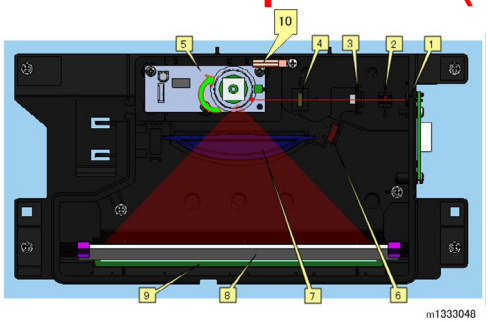
- The thermistor [10] monitors the temperature in the machine, and the print job stops when it is more than 52 degrees Celsius to let the machine cool down.
- The machine resumes automatically when the temperature goes down to 50 degrees Celsius.

# Laser Unit Operation (1)




- The laser diode [1] emits a single laser beam.
- A collimating lens [2] shapes the laser beam, which then passes through the aperture [3] and cylindrical lens [4]. The aperture and cylindrical lens focus the beam and aim it at the polygon mirror.
- The polygon mirror [5] rotates clockwise at a very high but constant speed.
- When the laser beam strikes a face of the mirror, the mirror surface reflects the beam across the photoconductor surface of the drum after passing through more lenses and mirrors.

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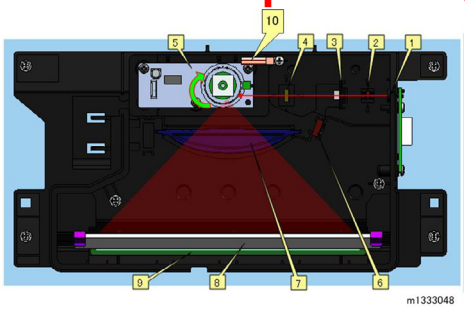
**No additional notes**

# Laser Unit Operation (2)




- **The mirror rotates clockwise to the angle of reflection of the beam.**
- **There are four steps to scanning a single line onto the drum:**
  - Laser synchronization done by the laser synchronization detector [6]
  - Main scan start position
  - Main scan intermediate position between the start and end points
  - Main scan end position
- **Each step is repeated for each beam reflected from each face of the polygon mirror.**
- **The laser synchronization detector (6) controls the timing of the laser operation.**

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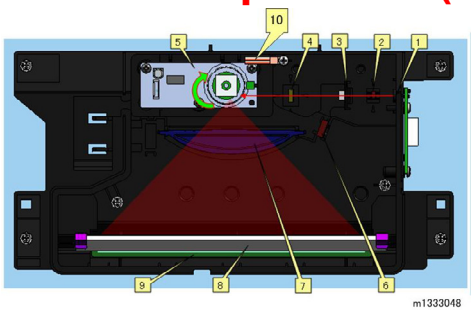
**No additional notes**

# Laser Unit Operation (3)




- **After the laser beam is reflected from the polygonal mirror, it passes through the F-theta lens [7].**
- **The first mirror [8] and shield glass [9] above the slit on the bottom of the laser unit deflect the laser beams from the F-theta lens downward onto the photoconductive surface of the drum.**

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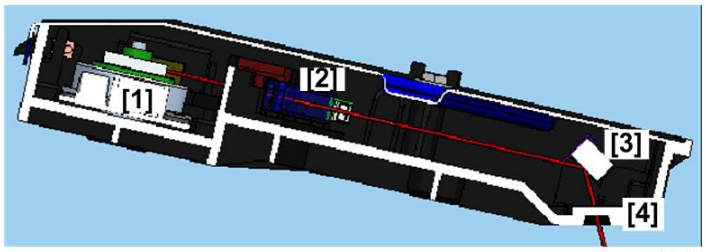
- The angles between the beams that form the image elements are equal. However, if the beams are projected without adjustment, the diameters of each element projected onto the drum surface may be different (wide at the ends and narrow at the center).
- The F-theta lens corrects each beam so that it is projected onto the drum surface at a constant speed and deflects the beam slightly inward to ensure that the diameters of each picture element are all equal.

# Laser Unit – Cross-section View




m1333049

- The polygon mirror [1] reflects the laser beam through the F-theta lens [2].
- The first mirrors [3] deflect the beam through the shield glass [4] on the front bottom edge of the laser unit and onto the photoconductor surface of the drum below the laser unit.

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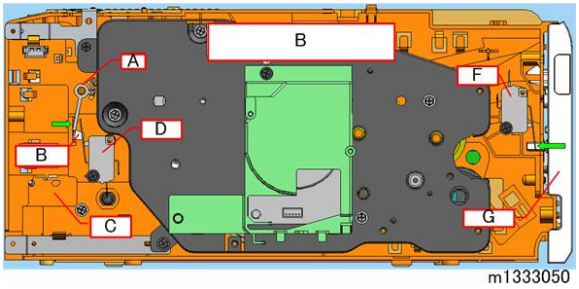
**No additional notes**

# Safety Switches




- **Safety switches are installed on the front and the rear. They are turned On/Off when each cover (front or rear) are opened or closed.**
  - Front door switch: Turned on and off when the front cover is opened or closed.
    - » North America models have two switches. Models for other regions have one.
  - Interlock switch (fusing unit cover): Turned on/off by the straight guide plate which is pushed by the arm.
- **When the cover opens, power supply to the laser unit is cut to secure safety during maintenance and jammed paper removal.**

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| | |
|---|---|
| **A** | **Arm** |
| **B** | **Straight Guide Plate** |
| **C** | **Left Side Plate** |
| **D** | **Interlock SW (Fusing Unit Cover)** |
| **F** | **Front Door SW** |
| **G** | **Front Cover** |

## Laser Unit Replacement

- **After replacing the laser unit, print the Test Page and check the position of the image area on the page, as explained in the replacement procedure in the service manual.**
  - There are no SP adjustments.
- **There are no serviceable parts inside the laser unit. Never attempt to disassemble the laser unit and then reinstall it in the machine.**

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**No additional notes**


**No additional notes**

## Introduction

- **The print cartridge is called the AIO (all-in-one) throughout this course.**
- **All models in the series use the same AIO.**
- **There are no serviceable parts inside the AIO.**
  - Disassembly of an AIO is never required.
- **When the AIO runs out of toner, the toner waste tank can be emptied and the toner supply tank can be refilled.**
  - All models except the the Europe and N. America models (M145, M146, M147, M148, M149, M150, and M151): An AIO can be refilled up to three times (this is the approximate service life of the drum). The refillings greatly extend the service life of the AIO.
- **The AIO can be easily removed and replaced by the user.**
- **The AIO has an ID chip which helps the machine to detect when an AIO is set and when a new AIO has been installed.**

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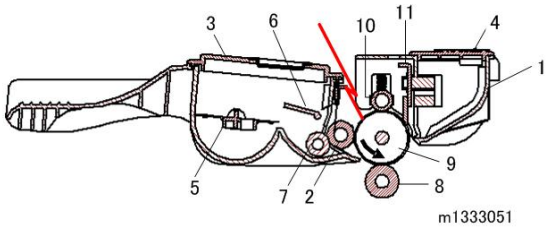
- The machine detects that an AIO has been refilled when toner end is no longer detected, but the ID chip is not for a new AIO.

# AIO (All-in-one) Unit




1. Waste Toner Tank
2. Development Roller
3. Toner Hopper
4. ID Chip
5. Agitator
6. Agitator Feeler
7. Toner Supply Roller
8. Transfer Roller
9. Drum
10. Charge Roller
11. Cleaning Blade

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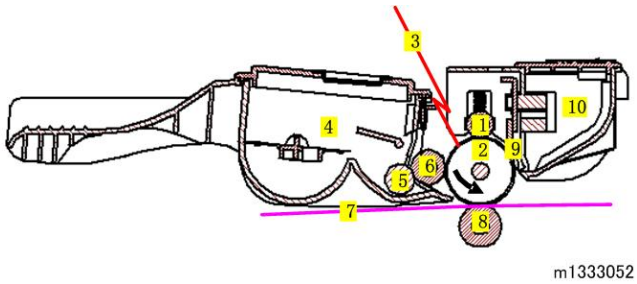
- The print cartridge is called the AIO (all-in-one) throughout this course.

# AIO Operation (1)




m1333052

- **The following steps are done for each sheet of paper:**
  - The charge roller [1] applies a charge to the photoconductive surface of the drum [2].
  - A developer/toner mixture from the toner supply unit [4] is picked up by the toner supply roller [5] and applied to the development roller [6].
  - The areas of the latent image on the drum (created by exposure to the laser beam) pick up toner from the development roller.

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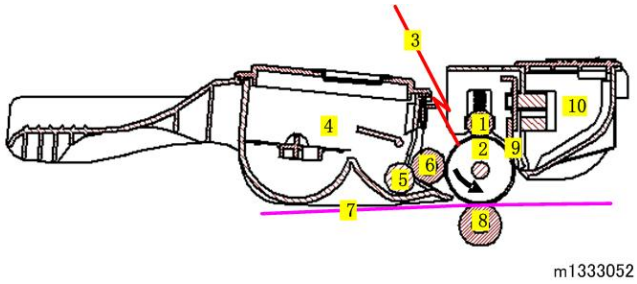
**No additional notes**

# AIO Operation (2)

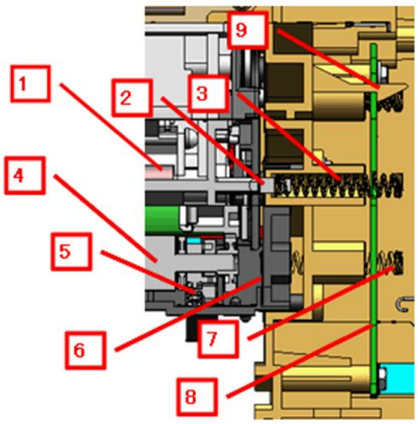



- When the paper [7] passes between the drum [2] and the transfer roller [8], the charge on the transfer roller pulls the toner off the drum onto the paper to form the image.
- The cleaning blade [9] removes unused toner from the surface of the drum. The toner removed from the drum by the cleaning blade is collected in the waste toner unit [10].
- The paper passes out between the drum and transfer roller, and goes to the fusing unit.

Slide 78

**No additional notes**

# AIO Contact Points with Main Frame




1. AIO Unit
2. AIO Contact Terminal
3. AIO Contact Spring
4. Transfer Roller
5. Transfer Roller Pressure Spring
6. Base Leaf Spring
7. Transfer Roller Contact Spring
8. Base Plate
9. Base Plate Lock Pawl

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**No additional notes**

## Toner End Detection

- **Printer models and 3-in-1 models, except for Europe and N. America models (M145, M146, M147, M148): There is no toner end detection mechanism. The operator replaces or refills the AIO when printouts become faint or blurred.**
- **4-in-1 models, and M145, M146, M147, M148, M164: These machines have a feature called "Toner End Option", which monitors toner consumption using a dot count system (this is done by the controller). However, it only works for new AIOs and not refilled AIOs.**
  - About 50 pages can be printed between the toner near end alert and the final toner end alert.
  - Normally this system is enabled, but the operator can switch Toner End Option off with the User Tools.
    - » Enabled: User tool is set to 'Stop Printing'
    - » Disabled: User tool is set to 'Continue Printing'
  - When toner end detection is switched off, there will be no warning message when the AIO is about to run out of toner. The operator refills or replaces the AIO when printed sheets become faint or blurred.
    - » Customers with the fax unit option have to be careful about this, or they might not be able to read incoming fax messages.

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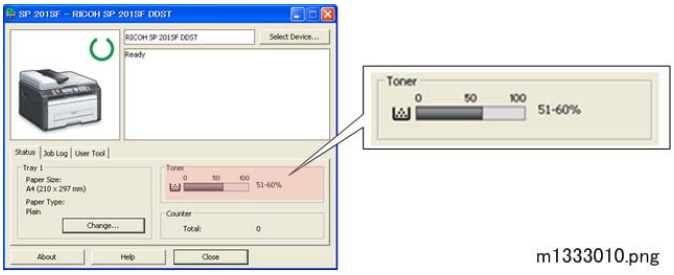
- Note that the machine does the dot count even if 'Continue Printing' is selected. This means that the user can switch between 'Stop Printing' and 'Continue Printing' at any time, and if toner end occurs when 'Stop Printing' is selected, then the toner end alert will occur.

# Toner End Option (1)

- **When the Toner End Option is set to 'Stop Printing':**
  - The toner near end and toner end alert functions are enabled.
  - The toner near end alert will appear when toner supply runs low, and then about 50 pages can be printed until toner end.
  - A toner level progress bar is displayed on the operation panel, and on the initial screen of Smart Organizing Monitor.
  - The configuration page shows a percentage for the amount of toner that has been consumed (listed under "Print Cartridge" in the "System Settings" group).



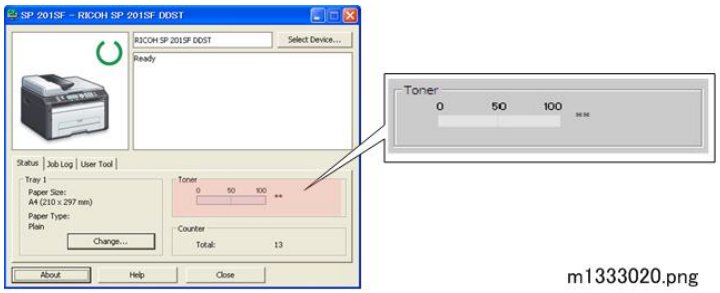

m1333010.png

Slide 81

**No additional notes**

# Toner End Option (2)

- **When the Toner End Option is set to 'Continue Printing':**
  - The toner level in the AIO is not monitored.
  - The machine will continue printing even after toner runs out because the toner near end and toner end alerts will not appear.
  - The operation panel, Configuration Page, and initial screen of the Smart Organizing Monitor will display a blank progress bar with two asterisks to the right and no information about how much toner remains.

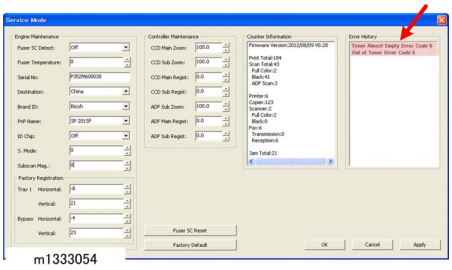



m1333020.png

Slide 82

**No additional notes**

# Toner End Option (3)



m1333054

- **When Toner End Option is on ("Stop Printing" selected), the toner near end and toner end alerts will appear in the Error history box of the Service Mode Screen of Smart Organizing Monitor.**
  - Toner Almost Empty Error Code 6
  - Out of Toner Error Code 5
- **When Toner End Option is off ("Continue Printing" selected), these messages will not appear.**

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**No additional notes**

## After Toner End

- **The operator can force print from the AIO even after the toner end message appears by switching off the Toner End Option:**
  - [User Tools] > System Settings > Toner End Option > Continue Printing
- **The machine can continue to print until printouts become faint or blurred.**

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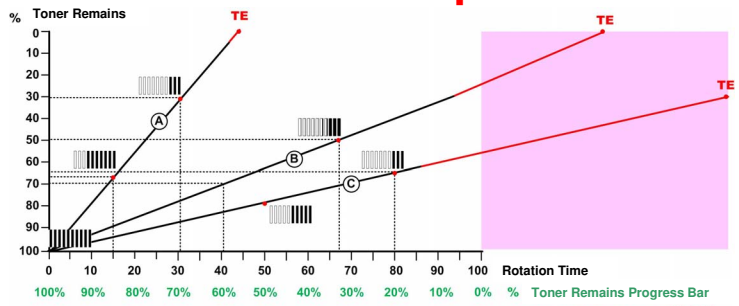
- The toner count reset can also be executed on the Service Mode screen of Smart Organizing Monitor.

# Toner Consumption




- **The rate of toner consumption depends on the type of documents that are printed.**
- **In the illustration above:**
  - Line A shows toner consumption when documents consistently contain a large number of images that require area filling (photos, bar charts, grayscale). The rate of toner consumption is much higher and the AIO will run out of toner sooner.
  - Line B shows toner consumption when documents contain pages that are mostly text and only a moderate number of pages that require large fill areas. The rate of toner consumption is slower.
  - Line C shows an extremely low rate of toner consumption. This can be achieved when printing documents that contain only text.
  - The rate of toner consumption can be further reduced by selecting "Toner Save" for the "Copy" feature on the Service Mode screen in Smart Organizing Monitor.

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**TE: Toner End**

# AIO Replacement - 1


- When toner runs out, the AIO can be refilled by the service technician or the AIO can be replaced by the operator.
- Refilling requires removal of two caps: the square cap to dump the toner and the round cap for refilling.
- Refilling can be done in all models except the the Europe and N. America models: M145, M146, M147, M148, M149, M150, and M151.

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**No additional notes**

# AIO Replacement - 2

- The ID chip on the AIO tells the machine that an AIO is installed. It is also used to detect when a new AIO is installed in the machine.
- If a new AIO is detected, the toner counter is reset automatically.
- There are no service parts for the AIO, except for toner refills.
- The AIO can be easily removed and replaced by the user. For more details, please refer to the operating instructions.

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**No additional notes**

# Refilling the AIO

## (All models except the Europe and N. America models)

- **The AIO is easy to refill. (Just remove caps to refill the toner and remove waste toner. There are no screws to remove.)**
  - Drum life is the limiting factor. The AIO can be refilled 2 or 3 times (depends on use).
  - Genuine refill toner provides cost savings with stable quality.
- **Study the refill procedure in the FSM.**
  - FSM → Replacement and Adjustment → Refilling the AIO
  - Observe all notes and cautions.
- **Note for 4-in-1 models**
  - When an AIO is refilled, the amount of toner in the AIO may not be the same as for a new AIO. Therefore, the dot count for toner end detection is not done.
  - Because of this, when using a refilled AIO, the machine cannot detect toner near-end or toner end. The machine always behaves as though 'Continue Printing' was selected, even if 'Stop Printing' was selected.

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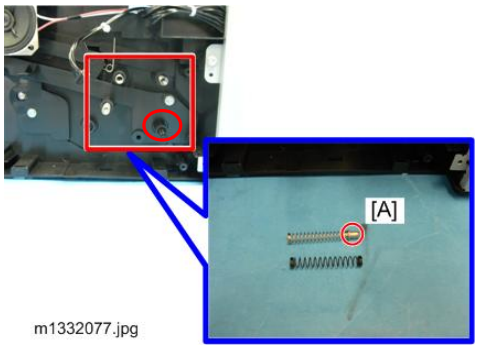
*Service Manual > Replacement and Adjustment > Refilling the AIO*

## Replacing the High-voltage Power Pack (HVPP)




m1332077.jpg

- There are four AIO springs but only three terminal nodes [A] (the black one doesn't have a terminal node.)
- Be sure to re-attach the black spring at the place marked with a red circle, and then the other springs with the terminal nodes in the other holes.

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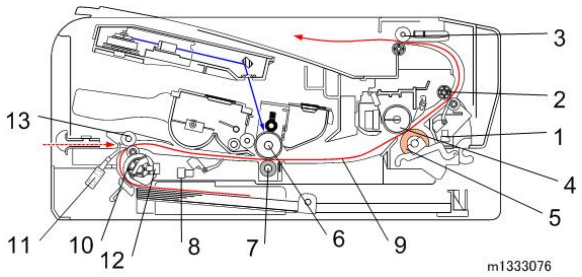
**No additional notes**


**No additional notes**

# Mechanism - 1




- **The main motor drives the feed roller (10) to feed paper from the tray.**
- **Only one sheet passes the feed roller and friction pad.**
- **The registration sensor (8) detects the leading edge of the paper. This triggers the laser unit above which writes the image onto the drum.**
  - The registration sensor will trigger an error if the leading and trailing edge of the paper do not pass within the correct time. (The timing depends on the paper length.)

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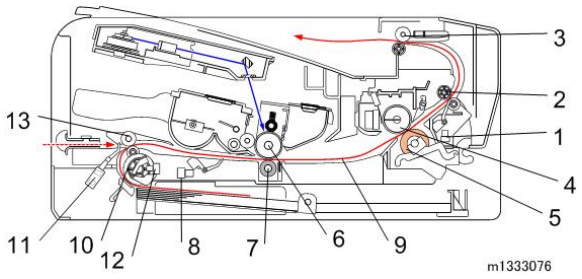
1. **Paper Exit Sensor**
2. **Fusing Exit Roller**
3. **Paper Exit Roller**
4. **Hot Roller**
5. **Pressure Roller**
6. **Drum (inside AIO)**
7. **Transfer Roller**
8. **Registration Sensor**
9. **Paper**
10. **Feed Roller**
11. **By-pass Set Sensor**
12. **Paper End Sensor**
13. **Paper Transport Roller**

## Mechanism - 2




- **The paper passes between the drum (6) and the transfer roller (7). The transfer roller pulls the toner image from the drum onto the paper.**
- **The toner image is fused onto the paper when it passes between the hot roller (4) and pressure roller (5).**
- **The paper exit sensor (1) detects the leading edge and trailing edges of the paper.**
  - The sensor will trigger a jam alert if the leading and trailing edge do not pass within the correct time for the length of the paper (determined by the selected paper size).

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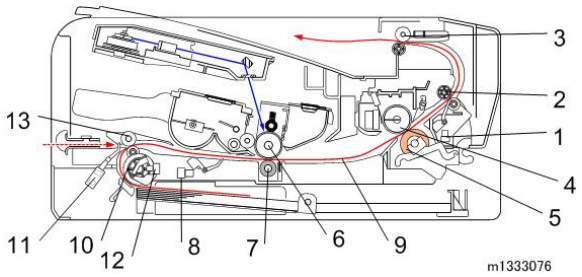
1. **Paper Exit Sensor**
2. **Fusing Exit Roller**
3. **Paper Exit Roller**
4. **Hot Roller**
5. **Pressure Roller**
6. **Drum (inside AIO)**
7. **Transfer Roller**
8. **Registration Sensor**
9. **Paper**
10. **Feed Roller**
11. **By-pass Set Sensor**
12. **Paper End Sensor**
13. **Paper Transport Roller**

## Mechanism - 3




- Finally, the paper passes through the exit roller (3) and is stacked face-down on the output tray.
- When there is no paper in the tray, a feeler falls through a cutout in the bottom plate, triggering the paper end sensor.
- The by-pass set sensor (11) detects when paper is set in the bypass tray.

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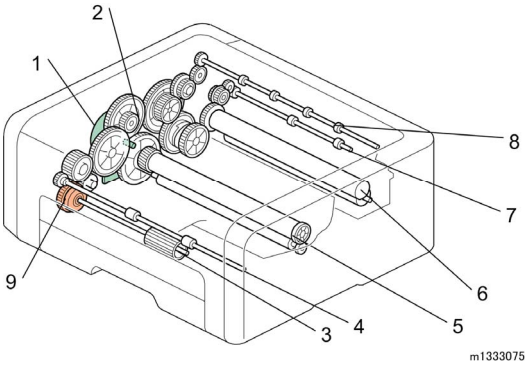
1. Paper Exit Sensor
2. Fusing Exit Roller
3. Paper Exit Roller
4. Hot Roller
5. Pressure Roller
6. Drum (inside AIO)
7. Transfer Roller
8. Registration Sensor
9. Paper
10. Feed Roller
11. By-pass Set Sensor
12. Paper End Sensor
13. Paper Transport Roller

# Drive




- The main motor (1) and a gear train (2) drive the feed roller (3) and transport roller (4), the drum (5, inside the AIO), the hot roller (6), the fusing exit roller (7), and the exit roller (8).
- The paper feed clutch (9) engages and disengages the rotation of the feed roller during paper feed.

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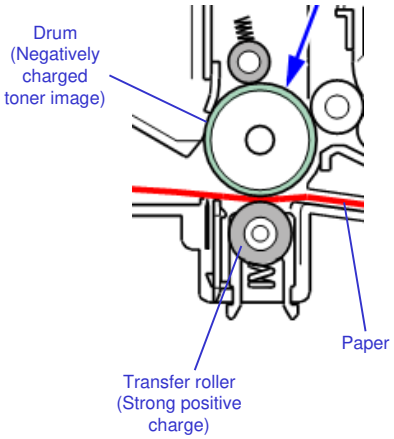
**No additional notes**


**No additional notes**

# Image Transfer

- The positively charged transfer roller attracts the negatively charged toner from the drum to the paper.

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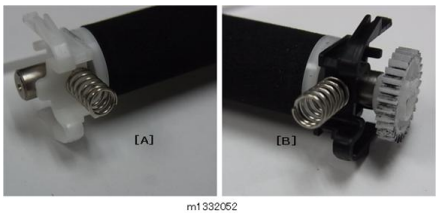
**No additional notes**

# Replacing the Transfer Roller


- **Note the correct way to install a new roller, as shown on the left:**
  - The black collar must be on the right end of the roller [A].
  - The white collar must be on the left end of the roller [B].
- **Keep springs [A] and [B] shown on the right. The new transfer roller may not have these springs.**
- **After re-installing the transfer roller, press and release the transfer roller several times to confirm that the roller bounces up and down evenly. If it does not, the springs are not set correctly.**
  - See the replacement procedure in the service manual.

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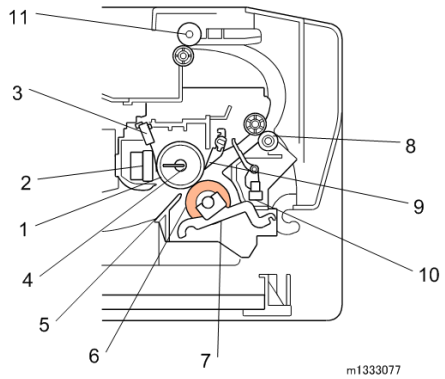
**No additional notes**


**No additional notes**

# Cross-section View




1. Hot Roller
2. Thermostat (Center)
3. Thermistor (Center, Edge)
4. Fusing Lamp
5. Entrance Guide
6. Pressure Roller
7. Pressure Arm
8. Fusing Exit Roller
9. Separation Pawls (x3)
10. Paper Exit Sensor
11. Paper Exit Roller

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**No additional notes**

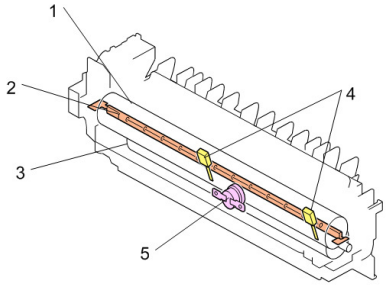
# Fusing Unit Specifications

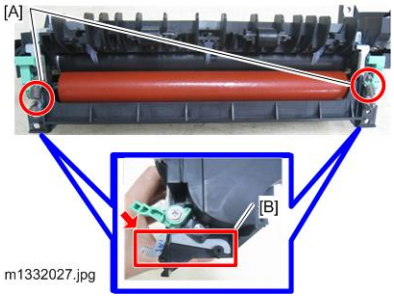
- Fusing method: Hot roller
- Fusing lamp: Halogen lamp, 700W
- Hot roller diameter: 25 mm
- Hot roller surface: 0.7mm thick
- Pressure roller diameter: 25 mm
- Fusing unit drive: Main motor
- Warm-up time: 25 sec. (from cold start or from energy saver mode)

Slide 100

**No additional notes**

# Main Components



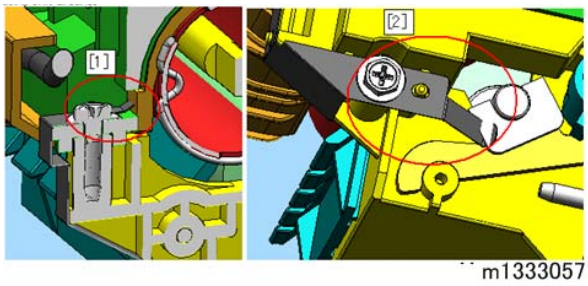




- The hot roller (1) contains the fusing lamp (2) (a halogen lamp).
- The hot roller and pressure roller (3) are pressed together by two strong springs [A] attached to arms [B] at the left and right ends of the fusing unit.
- The thermistor (4) touches the surface of the hot roller and constantly monitors the temperature of the hot roller. The machine uses this to control to on/off timing of the fusing lamp to keep the temperature of the hot roller constant and at the correct level for fusing.
- The thermostat (5) above the hot roller monitors the temperature around the hot roller and shuts down the machine if it detects that the hot roller has overheated. This is a safety feature that prevents a fire if the fusing unit malfunctions.

Slide 101

**No additional notes**

# Fusing Unit Ground Plates




- Ground plates are attached to the fusing unit at two points: One point on the hot roller at [1] and at one point on the pressure roller [2].

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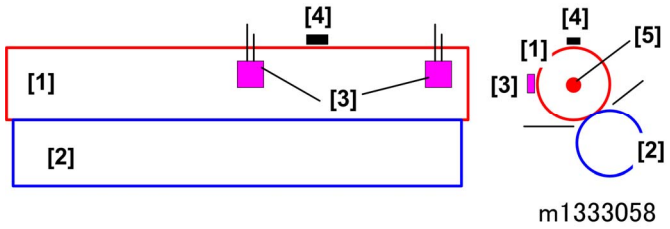
**No additional notes**

## Temperature Control (1)




- **The thermistors (center and right end) [3] touch the surface of the hot roller [1].**
  - They measure the temperature of the hot roller surface every 50 ms.
  - The center thermistor detects temperature where paper passes between the rollers, while the right end thermistor detects temperature where paper does not pass between the rollers
- **One thermostat [4] is mounted above (but does not touch) the surface of the hot roller.**
  - It constantly monitors temperature inside the fusing unit.
  - The thermostat switches the machine off when the temperature rises above 185° C (365° F).

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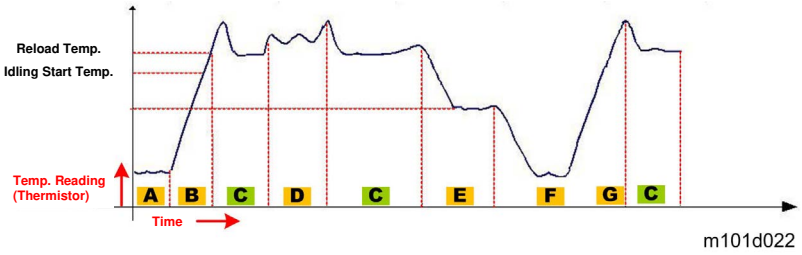
- The thermistor is a contact NTC type. This means that it has a negative temperature coefficient (NTC) so its resistance decreases as the temperature increases.

# Temperature Control (2)




- In Energy Save Mode 2 at "A" (while the machine is idle), the fusing lamp inside the hot roller switches on.
- At "B", the hot roller and pressure roller start to idle so that the heat from the fusing lamp is transferred and distributed evenly over the surfaces of these rollers. When the rollers reach the reload temperature, the machine can start printing.
- When the hot roller reaches the standby temperature at "C", the machine is ready to start printing.

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**A: Stop (machine idle)**

**B: Start up**

**C: Ready (Standby)**

**D: Printing (paper feeding)**

**C: Ready (Standby)**

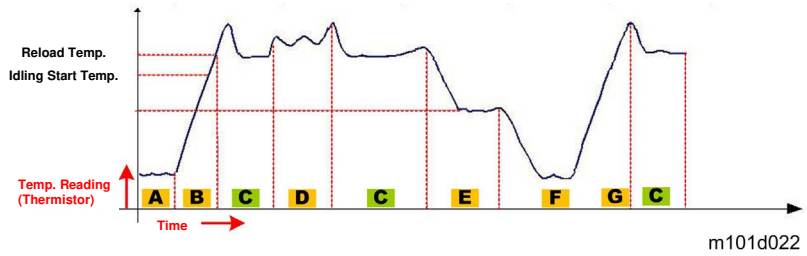
**E: Energy Save Mode 1 (Default: Machine idle 30 sec.)**

**F: Energy Save Mode 2 (Default: Machine idle for 60 sec.)**

**G: Recover from energy save mode**

**C: Ready (Standby)**

# Temperature Control (3)




- Fusing temperature control keeps the hot roller temperature constant during a print job at "D".
- When the job is finished, the machine returns to standby mode "C" and is ready to start the next job as soon as it is received.
- If a new job is received within 30 sec. the machine starts the new job immediately. If a new job is not received within 30 sec., the machine enters Energy Save Mode 1 at "E" (the default for energy save mode 1 is disabled).
- If a new job is received within 60 sec. the machine recovers rapidly and starts printing. If a new job is not received within 60 sec. while the machine is in Energy Save Mode 1, the machine enters Energy Save Mode 2. This mode conserves power while the printer remains idle.

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**A: Stop (machine idle)**

**B: Start up**

**C: Ready (Standby)**

**D: Printing (paper feeding)**

**C: Ready (Standby)**

**E: Energy Save Mode 1 (Default: Machine idle 30 sec.)**

**F: Energy Save Mode 2 (Default: Machine idle for 60 sec.)**

**G: Recover from energy save mode**

**C: Ready (Standby)**

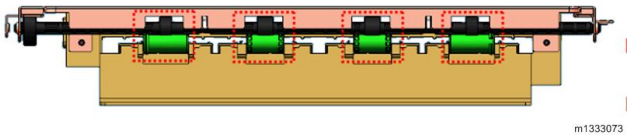
# Energy Save Modes

- **Energy Save Mode 1**
  - If enabled (the default is 'off'), the machine enters this mode if the machine remains idle for more than 30 sec.
    - » The idle time setting (30 sec.) is not adjustable.
  - The machine consumes 40W in this mode.
  - Recovery time is shorter than Energy Save Mode 2.
- **Energy Save Mode 2**
  - The machine enters this mode after the machine remains idle for 60 sec.
    - » This 60 sec. default setting can be adjusted by the operator with User Tools.
  - The machine consumes 5W in this mode.
  - Recovery time is longer than Energy Save Mode 1, but the machine consumes much less power.

Slide 106

**No additional notes**

# Paper Exit




- The paper exits the machine at the front after it passes through the fusing unit.
- The exit rollers, driven by the main motor, feed the paper out of the fusing unit and onto the output tray.
- The exit sensor detects the leading and trailing edge of each sheet of paper as it exits the machine. If the edges of the paper fail to pass the sensor at the expected time (based on the length of the paper selected for the job), the machine will issue a jam alert.

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**No additional notes**


- These are general comments about replacement and adjustment. Details for each section were discussed in the relevant part of the course.

# Before You Start

- **Safety Precautions**
  - It is important to observe the all safety precautions during maintenance work.
  - Refer to the safety precautions in the field service manual.
    - » FSM → Safety, Symbols, Trademarks
    - » FSM → Replacement and Adjustment → Before You Begin
  - Additionally, pay attention to all notes and cautions related to specific procedures elsewhere in the FSM.

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**No additional notes**

# Removing and Replacing Parts

- **Disassembly**
  - The procedures are not all the same for each model. The manual contains procedures for all models. Make sure you are looking at the correct procedure before you start.
  - Observe all notes and cautions.
  - Most of the parts of the machines in this series are identical and interchangeable. However, please note that the main boards of these machines are not the same

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**No additional notes**

## Replacing Boards

- **Before board replacement, enter the SP mode to output reports (Service Date List, Fax Dial List, and Fax Speed Dial List). Refer to these reports when making settings after replacement.**
- **After replacing the Main Board, use SOM to make settings as explained in the service manual.**
  - Replacement and Adjustment → After Replacing the Main Board

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**No additional notes**


- This section explains the basic points about machine troubleshooting. Refer to the service manual for details on how to recover from the error codes.

## What Happens when an Error Occurs? - 1

- **When an error occurs, the alert indicator on the operation panel lights and the machine stops.**
- **A buzzer will sound an alert on the 4-in-1 models. Press any key on the operation panel to turn the buzzer off.**
  - This buzzer is the fax speaker; it also functions as an error alarm.
  - There is no buzzer alert for the printer and 3-in-1 models because these machines do not have the fax speaker.

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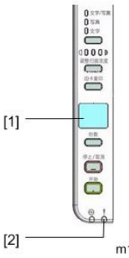
**No additional notes**

# What Happens when an Error Occurs? - 2

**Printer model**

m1332106.jpg

**3-in-1**



m1333086

**4-in-1**

m1332108.jpg

- The printer models have no panel display. When an error occurs, only the alert lamp lights [1].
- The 3-in-1 models have a 2-segment display [1]. A letter-number code is used. For example, "C6" means "SC101“ (see the SC tables in the service manual). The alert lamp [2] also lights when an error occurs.
- The 4-in-1 models have a 7-segment display (1), so the full SC number "SC101" can be shown on the display. When an error occurs, the alert lamp (2) lights and the fax speaker will sound an alert.
- For all models, the Smart Organizing Monitor can be used to display the most recent SC codes in the Error History box of the Service Mode screen.

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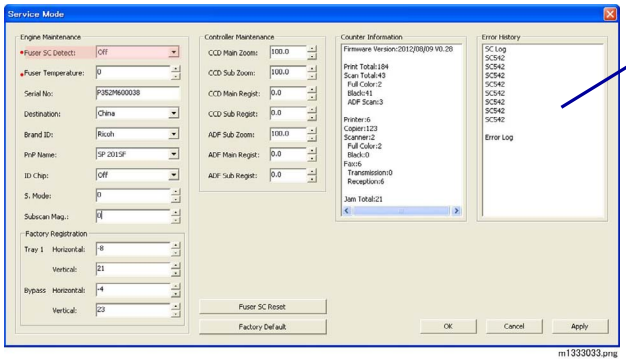
**No additional notes**

# What Happens when an Error Occurs? - 3




Error History

m1333033.png

- Error codes can be viewed in the Error History box of the Service Mode screen in Smart Organizing Monitor.
- After a fatal fusing error you must execute [Fuser SC Reset] to recover machine operation.
- When Fuser SC Detect is switched on, the machine will shut down after the third consecutive fusing jam error. This setting should remain on for safety.

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**No additional notes**


- 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 | OP-P1/MF1 |
|---|---|---|
| 1. QSU | - Reduction of warm-up time (Energy saving)<br>- 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.<br>- Improves machine productivity when printing out duplex (double-sided) images. | |
| 5. High-speed duplex output | - Improves machine productivity when printing out duplex (double-sided) images | |
| 6. Ozone reduction design | - Low ozone emissions | * |
| 7. PxP (polymerized) toner | -Energy saving<br>- 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 | | * |

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- This slide explains what technologies are used for conserving the environment in this product.

# 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.

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**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.

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**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

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**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.

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**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.

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**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.

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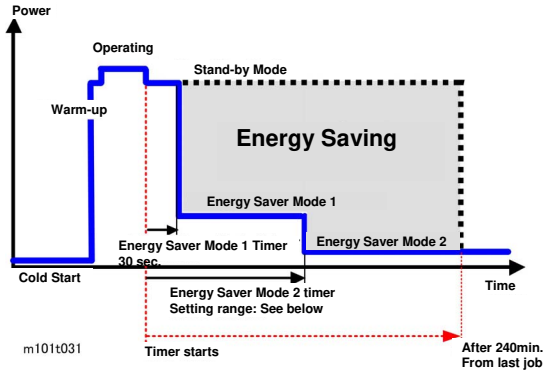
**No additional notes**

# Energy Saving
## Overview




Timer settings and recovery time (Smart Organizing Monitor → User Tool → Printer Configuration → System tab)

| Mode | Default | Setting range | Recovery time |
|---|---|---|---|
| Energy Saver Mode 1 | Off | Off or 30 s only | 10 s |
| Energy Saver Mode 2 | 1 min. | See below | 25 s |

Energy Saver Mode 2: Setting Range
For -17 (NA, Brazil) and -21 (China): 1-240 min.
For -27(Europe, Asia, part of South America): 1-30 min.

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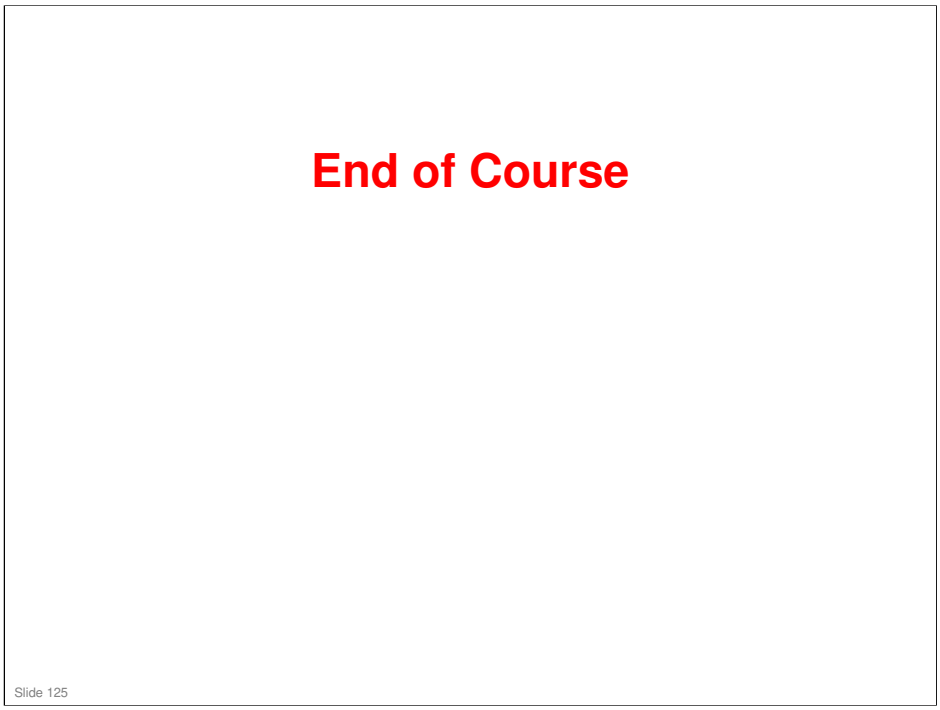
- When the machine is not being used, the machine enters energy saver mode to reduce the power consumption by turning off the LCD of the operation panel and lowering the fusing temperature.
- The area shaded grey in this diagram represents the amount of energy that is saved when the timers are at the default settings. If the timers are changed, then the energy saved will be different. For example, if the timers are all set to 240 minutes, the green area will disappear, and no energy is saved before 240 minutes expires.
- If the operator prefers that these settings be changed or switched off altogether, please explain that switching these energy saver features off could increase energy costs and waste energy.
- If the operator changes the settings please advise that setting Energy Save Mode 2 should not be too long. The longer the machine waits to enter Energy Save Mode 2, the more energy will be wasted.
- Setting Energy Save Mode 2 to the maximum value (240 min.) should be avoided. At close of business for the day, the machine will wait 4 hours before entering Energy Saver Mode 2. This is a waste of energy.
- Energy Saver Mode 1 cannot be turned off.




**No additional notes**