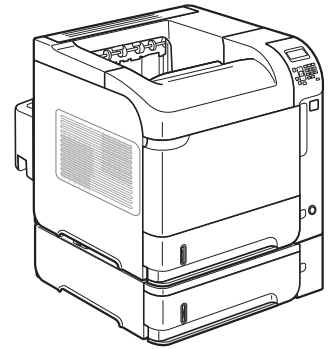
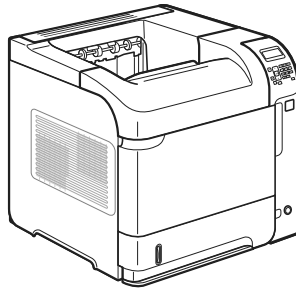
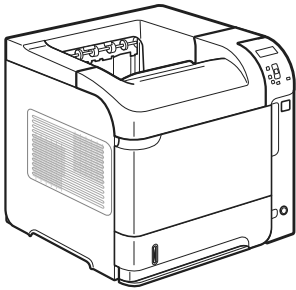




# LASERJET ENTERPRISE 600 M601, M602, AND M603 SERIES PRINTER

## Service Manual







# HP LaserJet Enterprise 600 M601, M602, and M603 Series Printer

Service Manual

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## Conventions used in this guide

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 **TIP:** Tips provide helpful hints or shortcuts.

 **NOTE:** Notes provide important information to explain a concept or to complete a task.

 **CAUTION:** Cautions indicate procedures that you should follow to avoid losing data or damaging the product.

 **WARNING!** Warnings alert you to specific procedures that you should follow to avoid personal injury, catastrophic loss of data, or extensive damage to the product.

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# 1 Theory of operation

- Basic operation
- Formatter system
- Engine-control system
- Image-formation system
- Laser/scanner system
- Pickup, feed, and delivery system
- 1x500-sheet paper feeder
- 1x1500-sheet paper deck
- Envelope feeder
- Duplexer

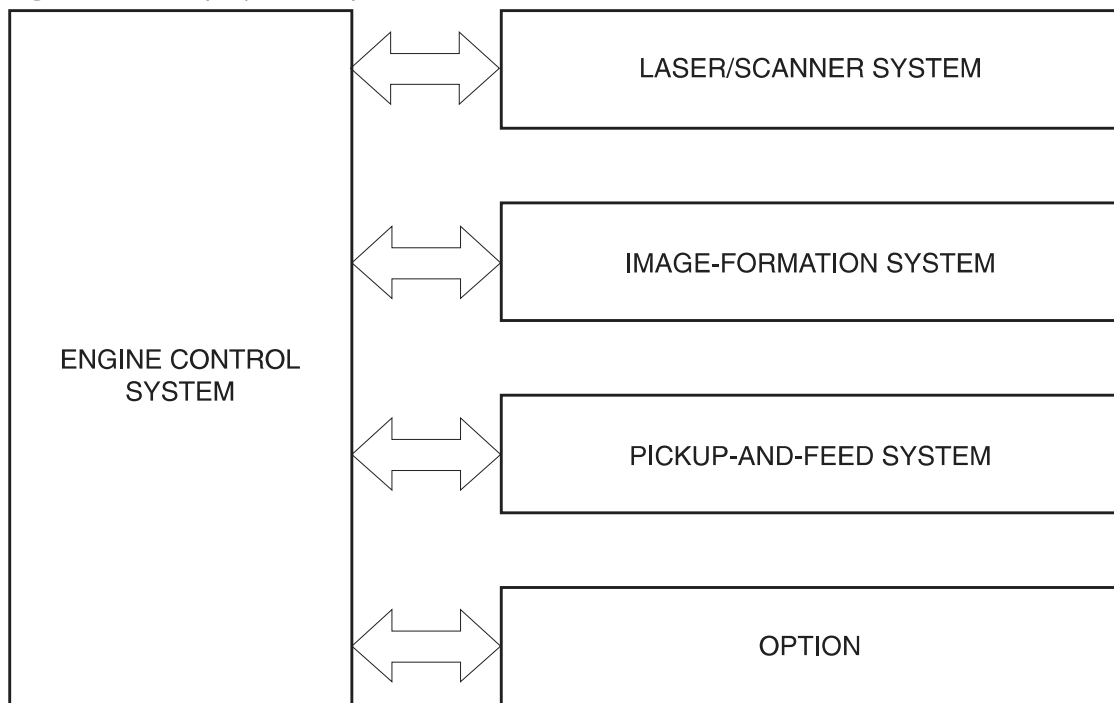
# Basic operation

## Major print systems

Operation can be divided into the following systems:

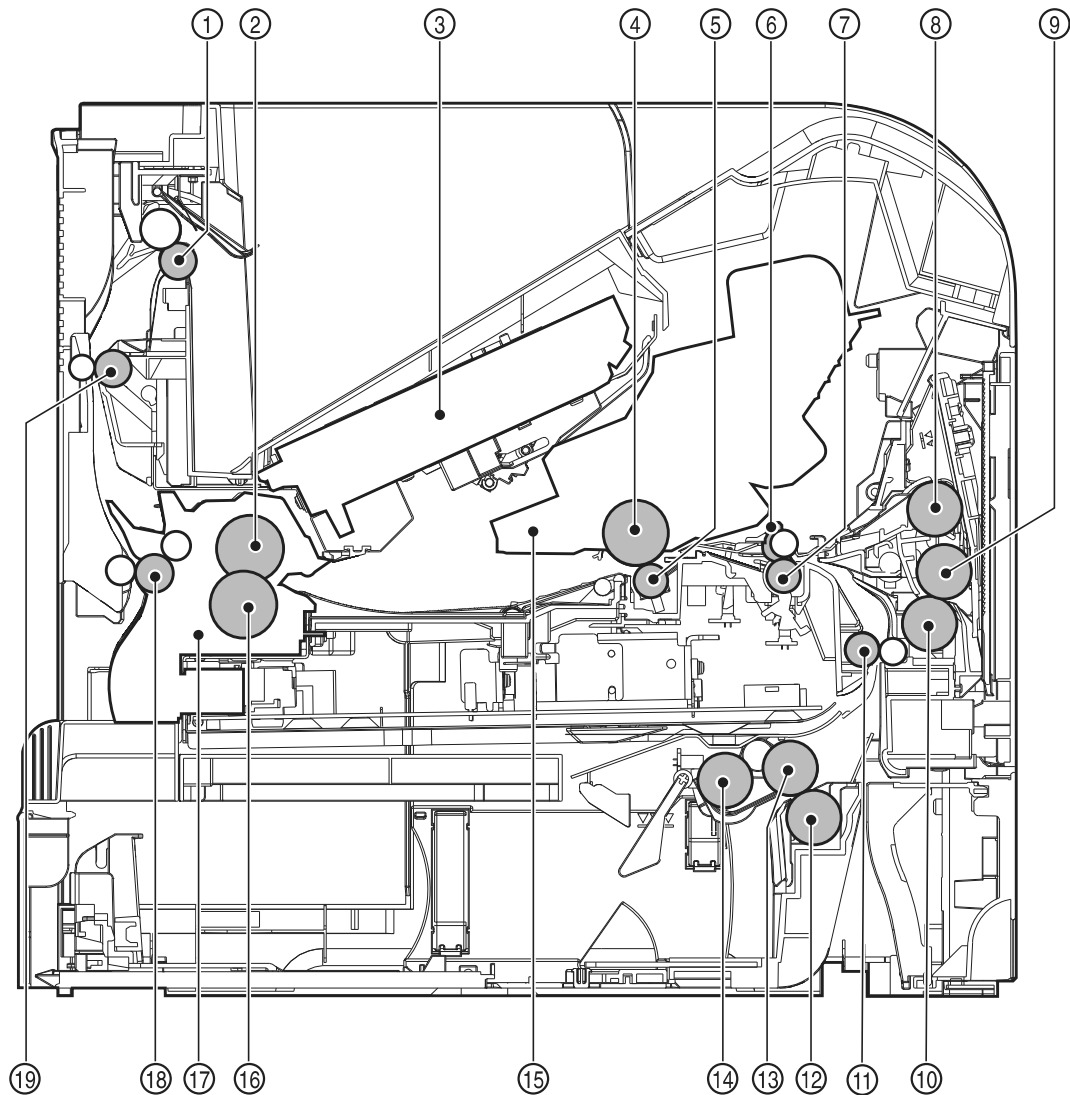
- Engine-control system (which includes the power supply and DC controller PCA)
- Laser/scanner system (which forms the latent image on a photosensitive drum)
- Image-formation system (which transfers a toner image onto the print media)
- Pickup, feed, and delivery system (which consists of various rollers and transports the media through the product)
- Options

**Figure 1-1** Major product systems



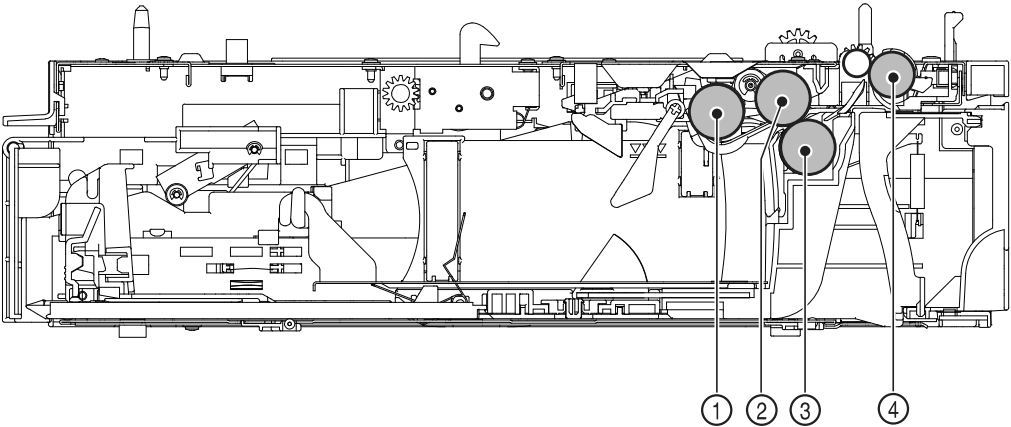
## Internal components

**Figure 1-2** Internal components, product base



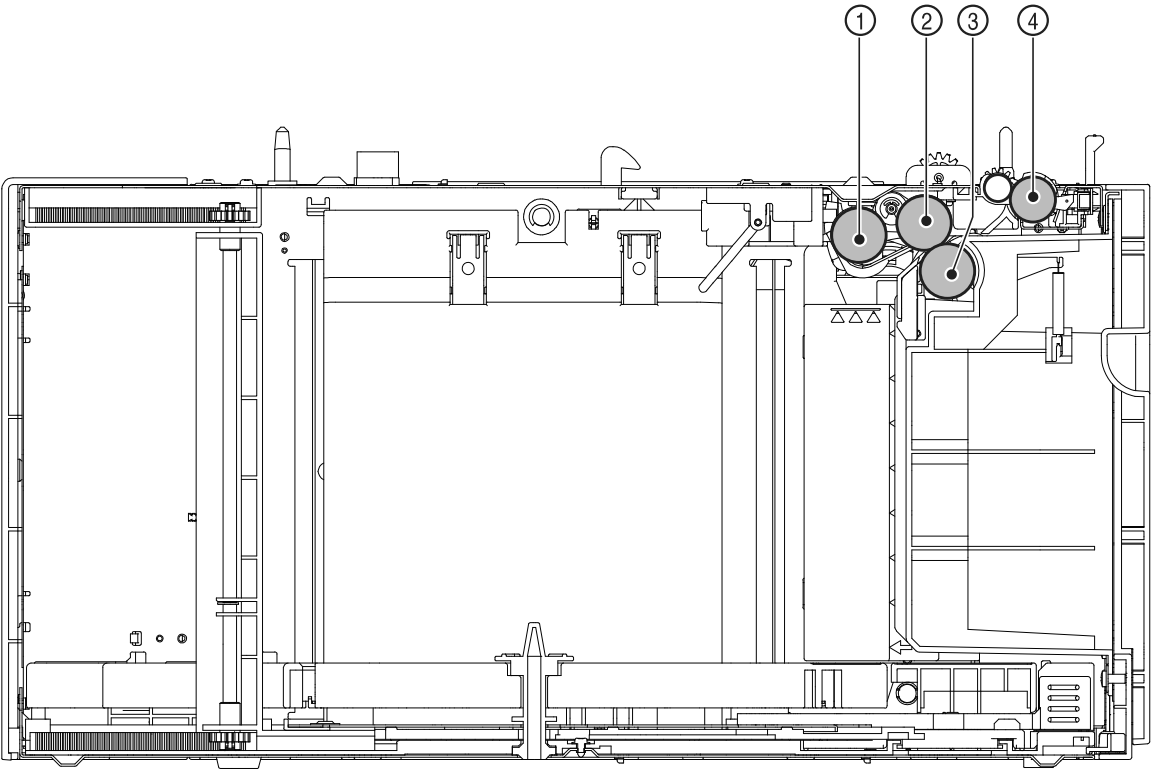
<b>1</b>	Face-down delivery roller	<b>11</b>	Feed roller
<b>2</b>	Fuser sleeve unit	<b>12</b>	Tray 2 separation roller
<b>3</b>	Laser/scanner unit	<b>13</b>	Tray 2 feed roller
<b>4</b>	Photosensitive drum	<b>14</b>	Tray 2 pickup roller
<b>5</b>	Transfer roller	<b>15</b>	Print cartridge
<b>6</b>	Registration shutter	<b>16</b>	Pressure roller
<b>7</b>	Pre-transfer roller	<b>17</b>	Fuser
<b>8</b>	Tray 1 pickup roller	<b>18</b>	Fuser delivery roller
<b>9</b>	Tray 1 feed roller	<b>19</b>	Intermediate delivery roller
<b>10</b>	Tray 1 separation roller		

**Figure 1-3** Internal components, 1x500-sheet feeder



1	Pickup roller
2	Feed roller
3	Separation roller
4	Feed roller

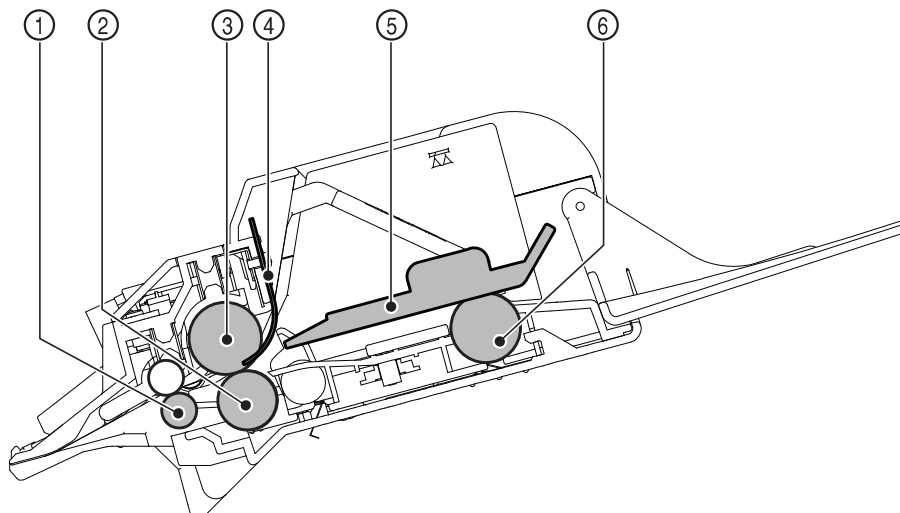
**Figure 1-4** Internal components, 1,500-sheet paper deck



1	Pickup roller
2	Feed roller

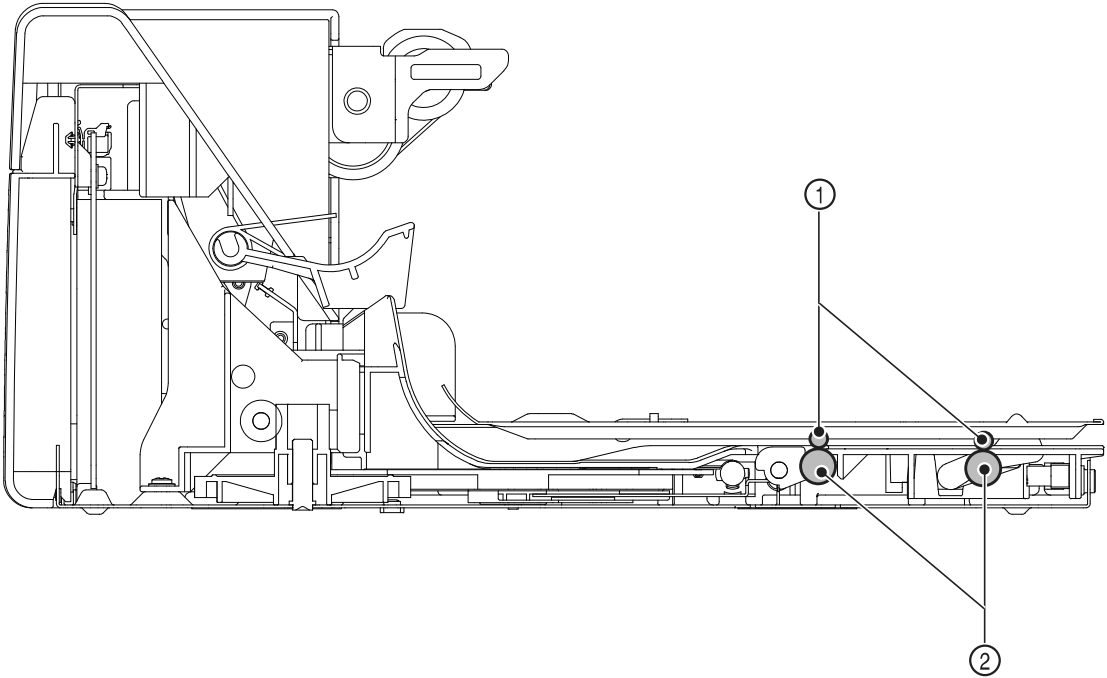
3	Separation roller
4	Feed roller

**Figure 1-5** Internal components, envelope feeder



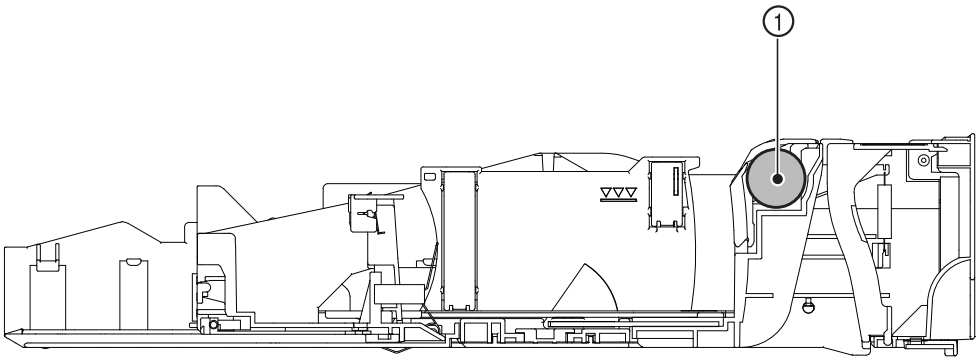
1	Feed roller
2	Upper separation roller
3	Lower separation roller
4	Separation guide
5	Weight
6	Pickup roller

**Figure 1-6** Internal components, duplexer



1	Oblique rollers
2	Re-pickup rollers


**Figure 1-7** Internal components, custom media cassette



1	Separation roller
---	-------------------

## Operating sequence

A microprocessor on the DC controller PCA controls the product operating sequence. The following table describes the basic operating sequence from when the product power is turned on until the final printed page is delivered to an output bin.

 **NOTE:** The product takes about two minutes and twenty seconds to initialize.

**Table 1-1 Product operating sequence**

Period	Duration	Operation
WAIT	From the time the power is turned on, the door is closed or Sleep mode is released until the product gets ready for a print operation.	<ul style="list-style-type: none"><li>• Brings the product to standby condition.</li><li>• Pressurizes the fuser pressure roller.</li><li>• Detects the print cartridge.</li></ul>
STBY (Standby)	From the end of WAIT or LSTR period until either the print command is received from the formatter or the power button is turned off.	<ul style="list-style-type: none"><li>• Maintains the product in printable condition.</li><li>• Puts the product in Sleep mode when the formatter sends a sleep command.</li></ul>
INTR (Initial rotation period)	From the time the print command is received from the formatter until the media is picked up.	Starts up each high-voltage bias, laser/scanner unit, and fuser for printing.
PRINT	From the end of INTR period until the last paper completes the fixing operation.	<ul style="list-style-type: none"><li>• Forms the image on the photosensitive drum based on the signals from the formatter.</li><li>• Transfers and fuses the toner image to the print media.</li></ul>
LSTR (Last rotation period)	From the end of PRINT period until the motors stop rotating.	<ul style="list-style-type: none"><li>• Moves the last printed sheet out of the product.</li><li>• Stops the laser/scanner unit operation and high-voltage biases.</li></ul> <p>The product enters the INTR period as soon as the LSTR period is completed, if the formatter sends another print command.</p>

# Formatter system

The formatter is involved in the following procedures.

- Controlling the Sleep mode
- Receiving and processing print data from the various product inputs
- Monitoring control-panel functions and relaying product status information (through the control panel and the bidirectional input/output)
- Developing and coordinating data placement and timing with the DC controller PCA
- Storing font information
- Communicating with the host computer through the bidirectional interface

The formatter receives a print job from the bidirectional interface and separates it into image information and instructions that control the printing process. The dc controller PCA synchronizes the image-formation system with the paper-input and -output systems, and then signals the formatter to send the print-image data.

The formatter also provides the electrical interface and mounting locations for the memory DIMM and the hard-disk (hard disk drive or solid state drive).

## Sleep mode

When the product is in Sleep mode, the control-panel backlight is dimmed, but the product retains all product settings, downloaded fonts, and macros. The default setting is a 30-minute idle time. Sleep mode also can be turned off from the **Administration** menu on the control panel.

The product exits Sleep mode and enters the warm-up cycle when any of the following occurs.

- A print job, valid data, or a PML or PJI command is received at the serial port.
- A control panel key is pressed.
- The top cover is opened.
- The engine-test button is pressed.



---

**NOTE:** Error messages override the Sleep message. The product enters Sleep mode at the appropriate time, but the error message continues to appear.

---

## Input/output

The following sections discuss the input and output features of the product.

### USB

The product includes a universal serial bus (USB) 2.0 connection.


## Embedded print server

For all models except the HP LaserJet 4014 base model, the product includes an HP Jetdirect embedded print server for connecting to a 10/100Base-TX network.

## Hard-disk

The hard-disk is mounted on the formatter cage door. The hard disk is used for creating multiple original prints (copies) and storing forms, fonts, and signatures.

---

 **NOTE:** All models have a solid state module (SSM) installed except the HP LaserJet Enterprise 600 M603xh.

---

## CPU

The product formatter incorporates a 800 MHz RISC processor.

## Memory

If the product encounters a problem when managing available memory, a clearable warning message appears on the control panel.

## Random-access memory

The formatter has one DIMM slot. All models come with 512MB of memory installed. Additional memory can be added up to a maximum of 1GB.

The random-access memory (RAM) contains the page, I/O buffers, and the font storage area. It stores printing and font information received from the host system, and can also serve to temporarily store a full page of print-image data before the data is sent to the print engine. Memory capacity can be increased by adding DIMMs to the formatter. Note that adding memory (DIMMs) might also increase the print speed for complex graphics.

## Nonvolatile memory

The product uses nonvolatile memory (NVRAM) to store I/O and information about the print environment configuration. The contents of NVRAM are retained when the product is turned off or disconnected.

## DIMM slot

The DIMM slot can be used to add product memory.

## PJL overview

Printer job language (PJL) is an integral part of configuration, in addition to the standard printer command language (PCL). With standard cabling, use PJL to perform a variety of functions.

- Two-way communication with the host computer through a bidirectional parallel connection. The product can send the host computer information about such things as the control panel settings, and the control panel settings can be changed from the host through two-way communication.
- Dynamic I/O switching. The product can be configured with a host on each I/O by using dynamic I/O switching. Even when the product is offline, it can receive data from more than one I/O simultaneously, until the I/O buffer is full.
- Context-sensitive switching. The product can automatically recognize the personality (PS or PCL) of each job and configure itself in that personality.
- Isolation of print environment settings from one print job to the next. For example, if a print job is sent to the product in landscape mode, the subsequent print jobs are printed in landscape mode only if they are formatted for it.

## PML

The printer management language (PML) allows remote configuration and status monitoring through the I/O ports.

## Control panel

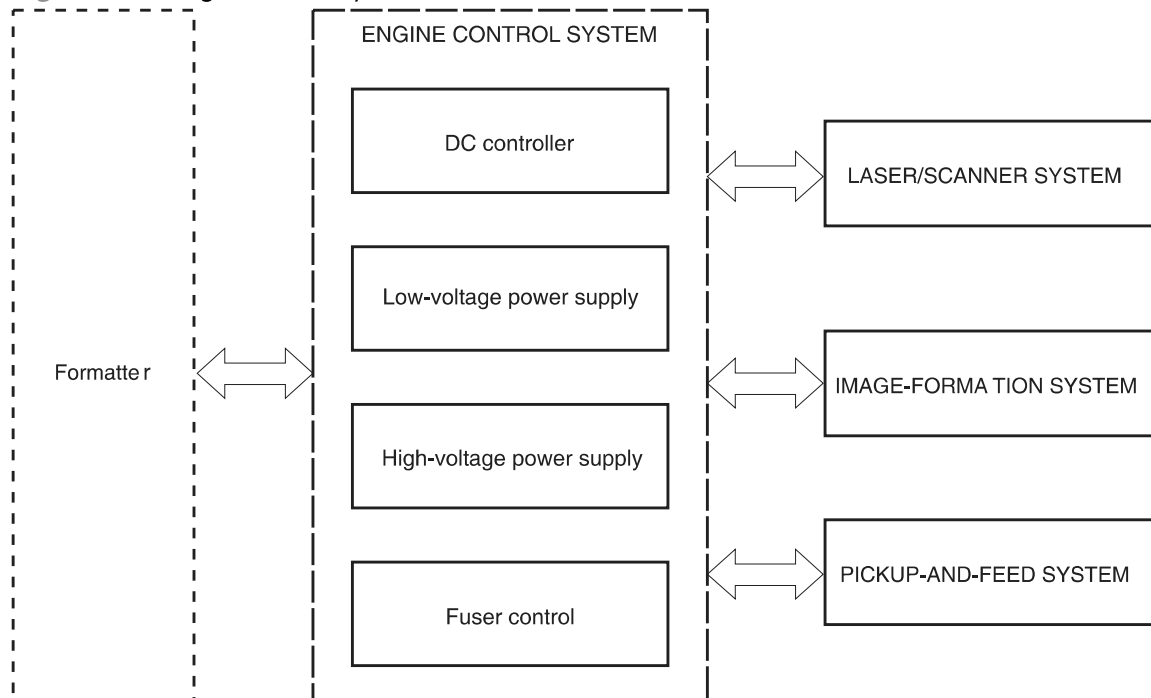
The formatter sends and receives product status and command data to and from a control-panel PCA.

# Engine-control system

The engine control system coordinates all product functions and controls all the other systems according to commands from the formatter. The engine control system contains the following components:

- DC controller
- Low-voltage power supply
- High-voltage power supply
- Fuser control

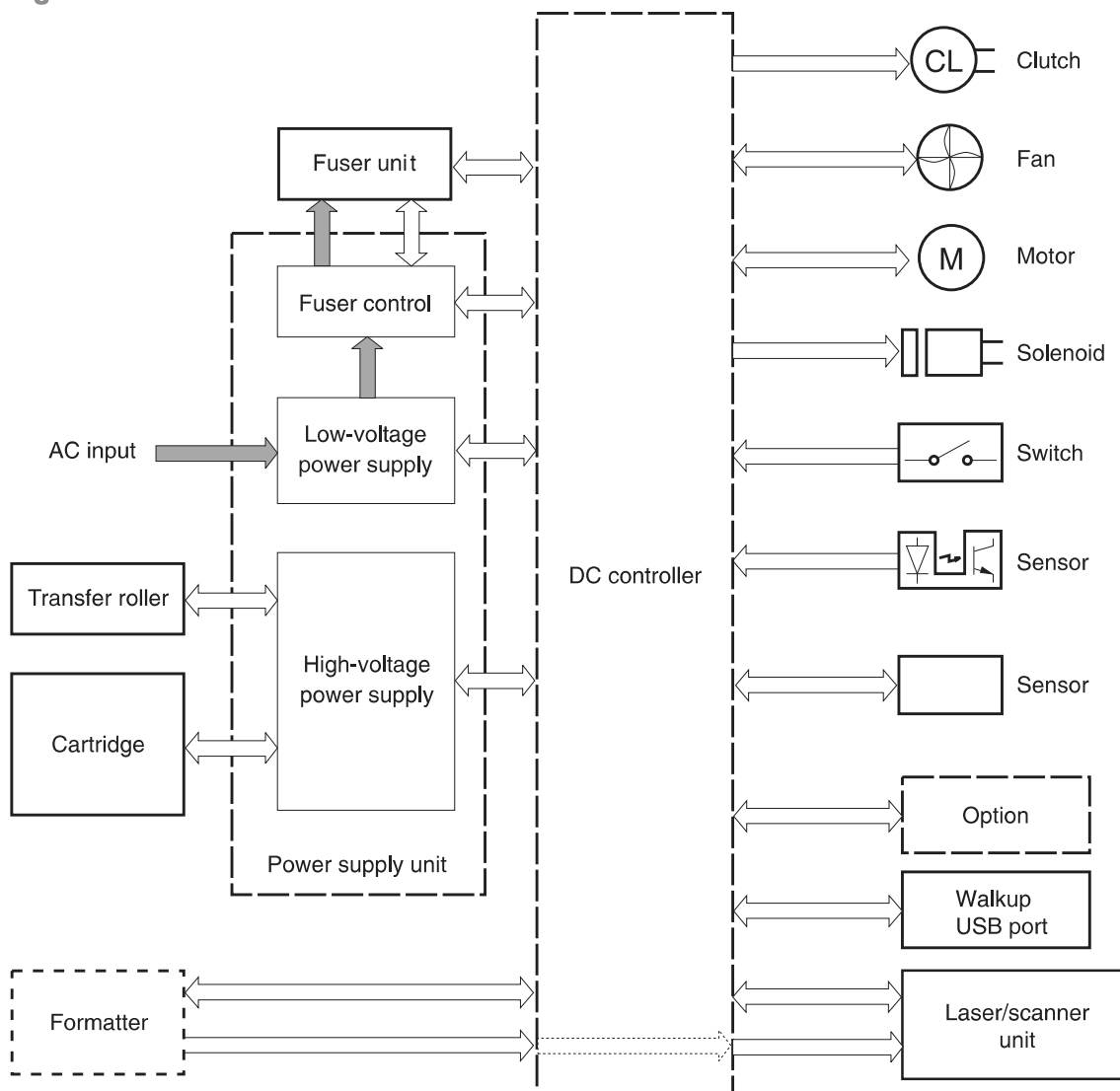
**Figure 1-8** Engine-control system



## DC controller PCA

The DC controller PCA controls the operation of the product and its components. The DC controller PCA starts product operation when the power is turned on and the power supply sends DC voltage to the DC controller PCA. After the product enters the standby sequence, the DC controller PCA sends out various signals to operate motors, solenoids, and other components based on the print command and image data that the host computer sends.

**Figure 1-9** DC controller PCA



## Sensors, solenoids, and switches

The product has twelve sensors, two solenoids, and three switches. Sensors are used for remote detection of various functions during product operation. Solenoid and switches are used for product operation control.

**Table 1-2 Sensors, solenoids, and switches**

Description	Item	Component
Sensors	PS101	Cassette media presence sensor
	PS102	Pre-feed sensor
	PS103	Top-of-page sensor
	PS104	Face-down tray media full sensor
	PS105	MP tray (Tray 1) media presence sensor
	PS106	Media width sensor 1
	PS107	Media stack surface sensor 1
	PS108	Media width sensor 2
	PS699	Fixing (fuser) pressure release sensor
	PS700	Fixing (fuser) delivery sensor
	PS907	Media stack surface sensor 2
	TH3	Environmental sensor
Solenoids	SL101	Cassette pickup solenoid
	SL102	MP tray (Tray 1) pickup solenoid
Switches	SW101	Door open detection switch
	SW102	Cassette media size switch
	SW800	Test print switch

## Motors and fans

The product has four motors and four fan motors. The motors are used for the media feeding and image formation. The fan motors are used for preventing a temperature rise inside the product.

**Table 1-3 Fans**

Description	Cooling area	Type	Speed
Cooling fan FN101	Cartridge area and power supply area	Intake	Full/Half <sup>1</sup>
Cooling fan FN102	Cartridge area	Intake	Full <sup>2</sup>
Cooling fan FN103	Cartridge area	Intake	Full <sup>2</sup>
Cooling fan FN301	Cartridge area and laser/scanner	Intake	Full <sup>2</sup>

<sup>1</sup> Cooling fan FN101 rotates at full speed for eight seconds when the product is turned on, and then decreases to half-speed for approximately 10 minutes. After that time period, if there is no print job in the print queue, the fan will stop completely. The fan rotates at full speed during a print job.

<sup>2</sup> This fan operates at full speed only during a print job. Otherwise, it does not rotate.

**Table 1-4 Motors**

Description	Driving parts	Type	Failure detection
Paper feed motor (M101)	Drives the Tray 1 pickup roller, Tray 2 pickup roller, and feed roller	DC	Yes
Drum motor (M102)	Drives the photosensitive drum, primary charging roller, and transfer roller	DC	Yes
Fuser motor (M299)	Drives the pressure roller and feed roller—when rotated counterclockwise it releases the fusing pressure for easier jam removal	DC	Yes
Lifter motor (M103)	Drives the lifting plate of the tray	DC	No

## Failure detection

### Motor failure

The DC controller determines a motor failure and notifies the formatter when it encounters the following conditions:

- **Motor start-up failure:** The motor does not reach a specified speed within a specified period from when each motor starts up.
- **Motor rotational failure:** The rotational speed of the motor is out of a specified range for a specified period from when it once reaches a specified speed.

### Fan motor failure

The DC controller determines a fan motor failure and notifies the formatter when the fan locks for a specified period from when each fan starts up.

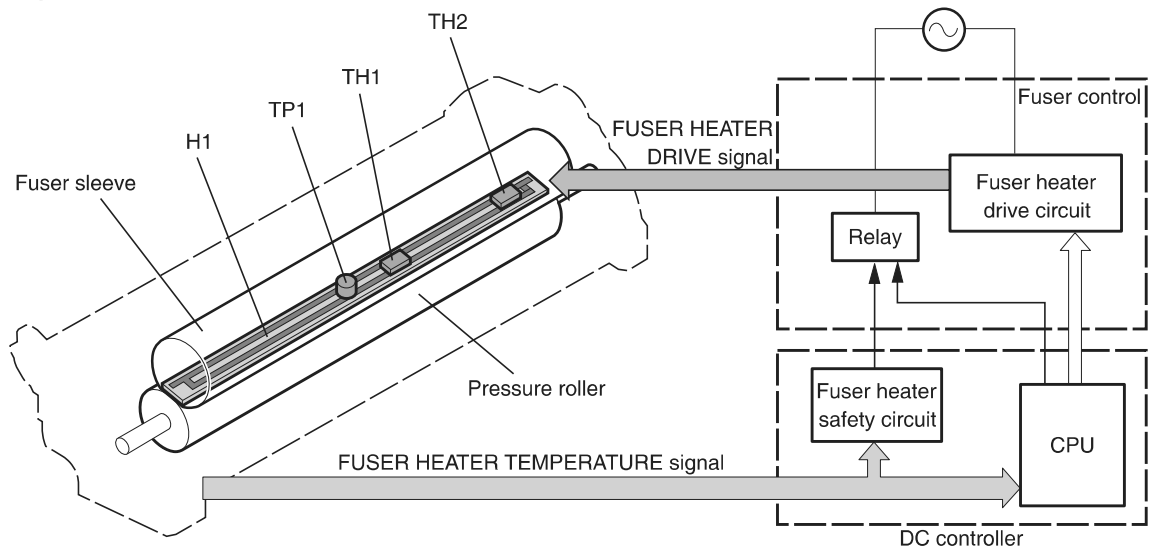
## Engine power supply

The power supply consists of the fuser-control circuit, the high-voltage circuit, and the low-voltage circuit. The fuser-control and high-voltage circuits control the temperature of the fuser and generate high-voltage according to signals from the DC controller PCA. The low-voltage circuit generates the DC voltages that other components in the product use (for example the DC controller PCA, the motors, and fans).

### Fuser-control circuit

The fuser-control circuit controls the fuser components. The two fuser heaters provide the high temperatures that cause the toner to permanently bond to the media. The fuser thermistor monitors the fuser temperatures. The thermal switch detects abnormally high fuser temperatures and interrupts the supply of voltage to the fuser if the temperature is too high.

**Figure 1-10** Fuser control

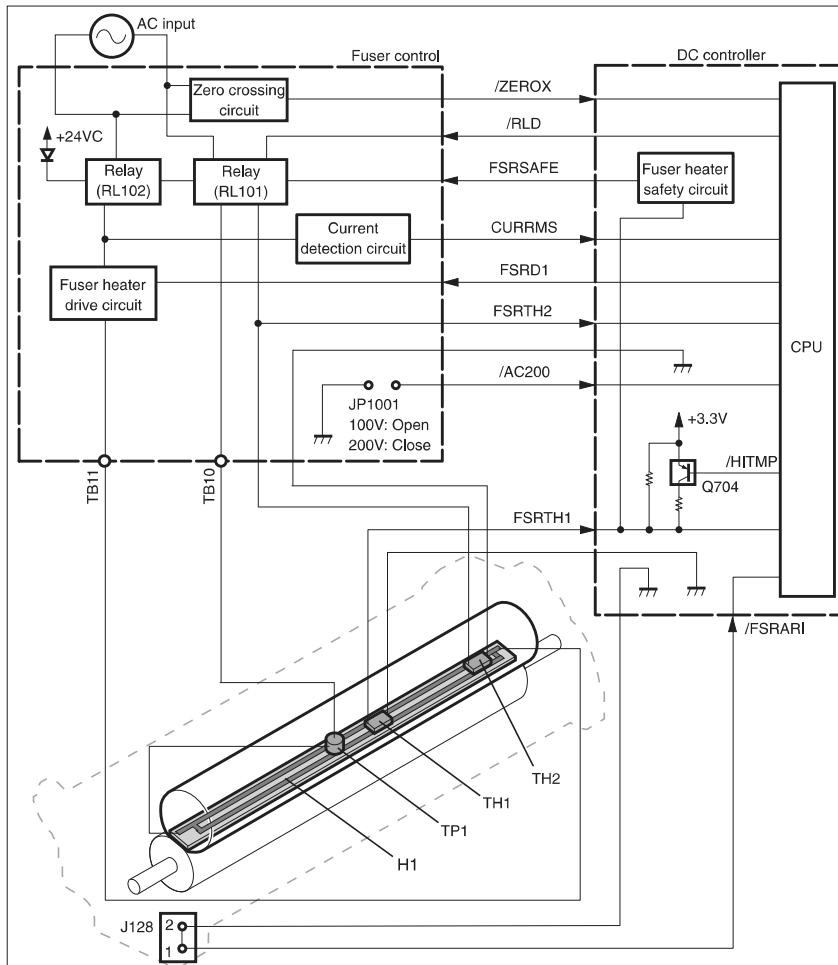


## Fuser temperature control

The fuser temperature control detects the temperature of the fuser heater surface, and then controls the FUSER HEATER DRIVE (FSRD1) signal to the fuser heater until the fuser heater temperature reaches the target temperature.

The DC controller controls the FSRD1 signal by monitoring the detected fuser heater temperature—using the thermistor (TH3)—and then holds the heater at the target temperature.

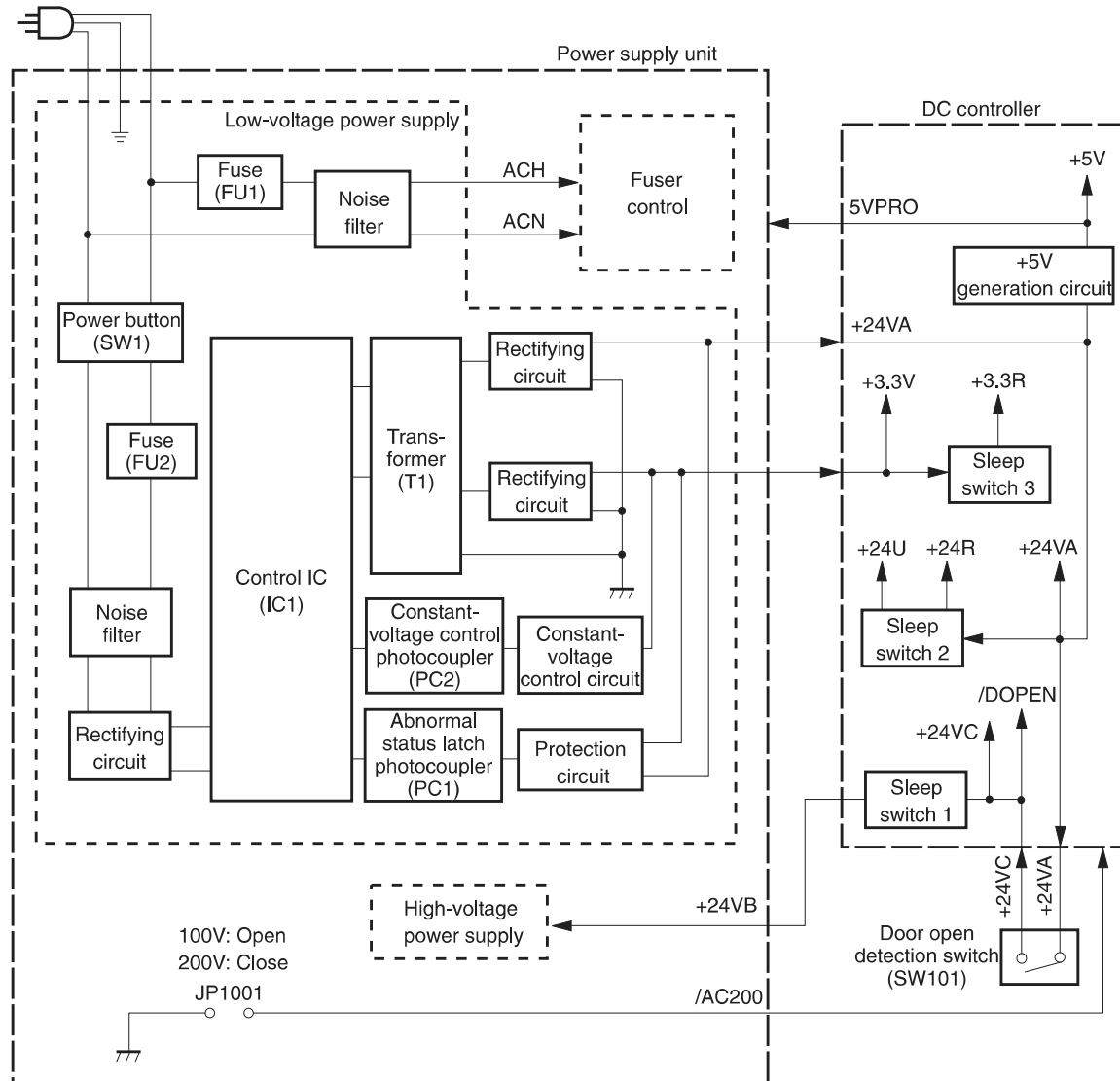
**Figure 1-11** Fuser temperature control



## Low-voltage power supply

The low-voltage power supply converts AC power from the power receptacle into DC power to cover the DC loads.

**Figure 1-12** Low-voltage power supply

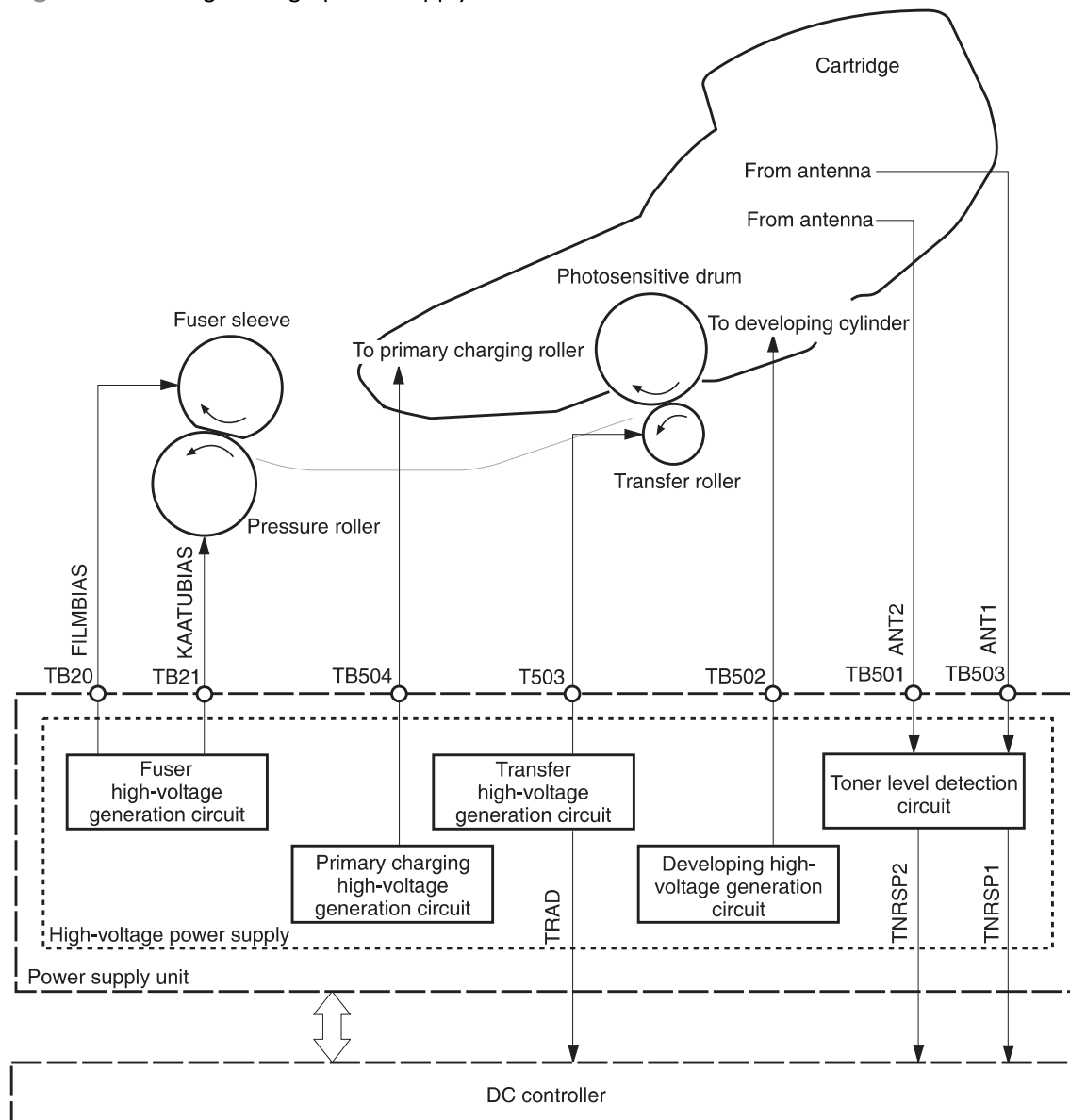


## High-voltage power supply

The high-voltage power supply applies the high-voltage biases to the following components:

- Primary charging roller
- Developing roller
- Transfer roller
- Fuser sleeve
- Pressure roller

**Figure 1-13** High-voltage power supply



## **Overcurrent/overvoltage protection**

If a short-circuit or other problem on the load side causes an excessive current flow or generates abnormal voltage, the overcurrent/overvoltage protection systems automatically cut off the output voltage to protect the power-supply circuit.

If the overcurrent or overvoltage protection system are activated and the power-supply circuit does not generate DC voltage, turn the power off, correct the problem, and then turn the product on again.

The circuit has two fuses (FU1, FU2), which break and cut off the output voltage if overcurrent flows through the alternating current (AC) line.

# Image-formation system

The image-formation system is the central hub of the product. It forms the toner image on the media. The following are the main components of the image-formation system:

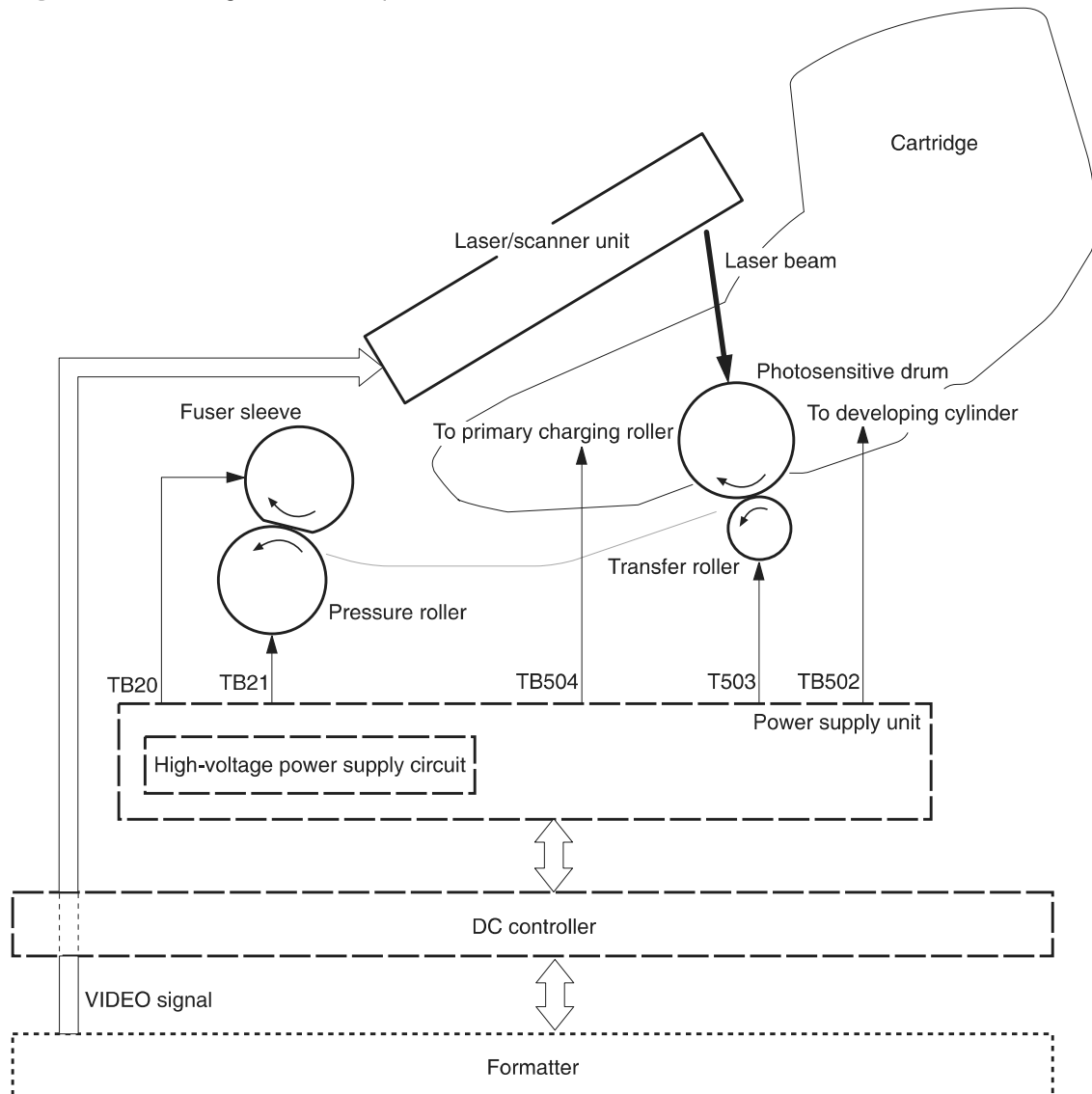
- Cartridge
- Transfer roller
- Fuser

The DC controller controls the laser/scanner unit and high-voltage power supply to form an image on the media according to the VIDEO signals.

## Image-formation process

The image formation system is the central hub of the product. It also forms the toner image on the media.

**Figure 1-14** Image-formation system



The image-formation process contains eight steps divided among five functional blocks:

- Block 1: Latent image formation
  - Step 1: Primary charging
  - Step 2: Laser-beam exposure
- Block 2: Developing
  - Step 3: Developing
- Block 3: Transfer

Step 4: Transfer

Step 5: Separation

- Block 4: Fusing

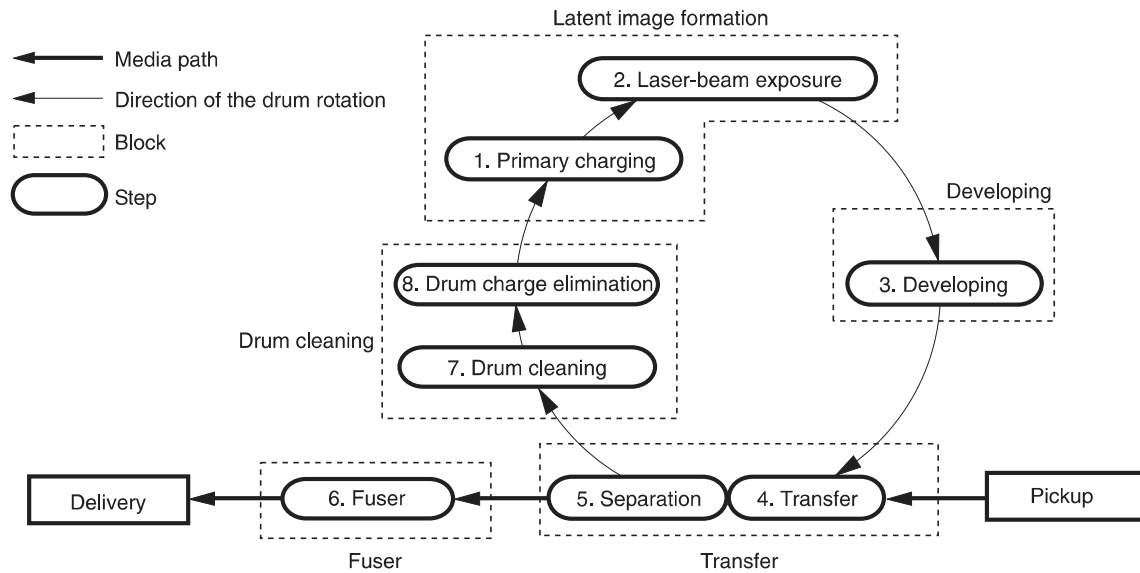
Step 6: Fusing

- Block 5: Drum cleaning

Step 7: Drum cleaning

Step 8: Drum charge elimination

**Figure 1-15** Image-formation process



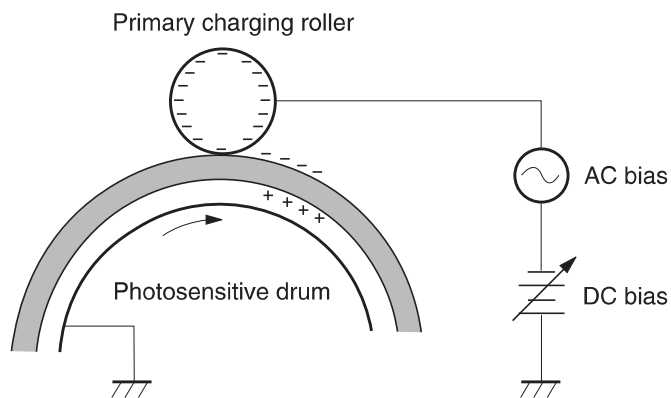
## Block 1: Latent image formation

During the two steps that comprise this block, an invisible latent image is formed on the photosensitive drum.

### Step 1: Primary charging

To prepare for latent image formation, the surface of the photosensitive drum is charged with a uniform negative potential. The product charges the photosensitive drum surface directly from the primary charging roller. The DC bias and AC bias are applied to the primary charging roller to maintain a constant charge on the drum surface.

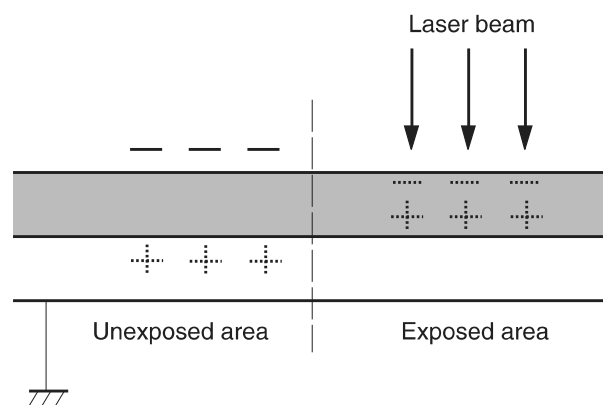
**Figure 1-16** Primary charging



### Step 2: Laser-beam exposure

The laser beam scans the photosensitive drum to neutralize the negative charge on portions of the drum surface. An electrostatic latent image forms where the negative charge was neutralized.

**Figure 1-17** Laser-beam exposure



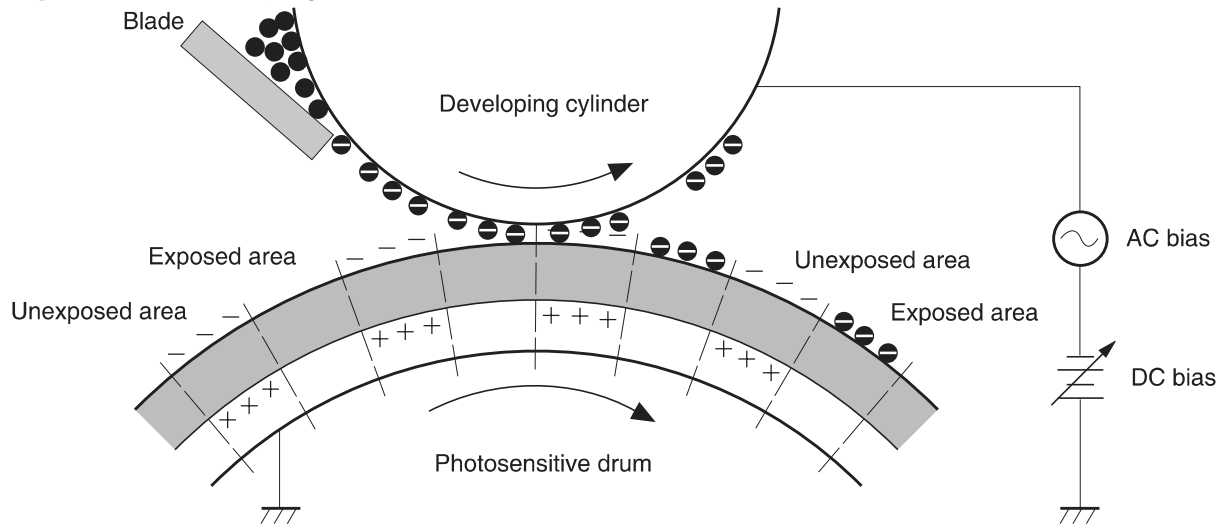
## Block 2: Developing

Toner adheres to the electrostatic latent image on the photosensitive drum.

### Step 3: Developing

Toner acquires a negative charge from the friction that occurs when the developing cylinder rotates against the developing blade. The negatively charged toner is attracted to the latent image on the photosensitive drum surface because the drum surface has a higher potential. The AC bias that is superimposed with the developing negative DC bias is applied to the developing cylinder.

**Figure 1-18** Developing



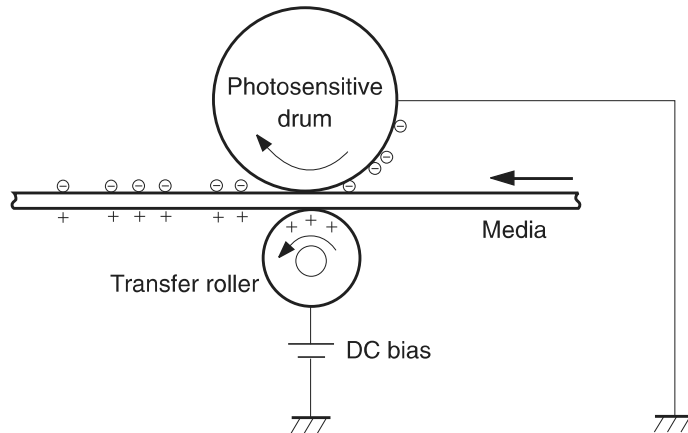
### Block 3: Transfer

During the steps that comprise this block, a toner image on the photosensitive drum is transferred to the print media.

#### Step 4: Transfer

The positive DC bias is applied to the transfer roller to charge the media positive. The positively charged media attracts the negatively charged toner from the photosensitive drum surface.

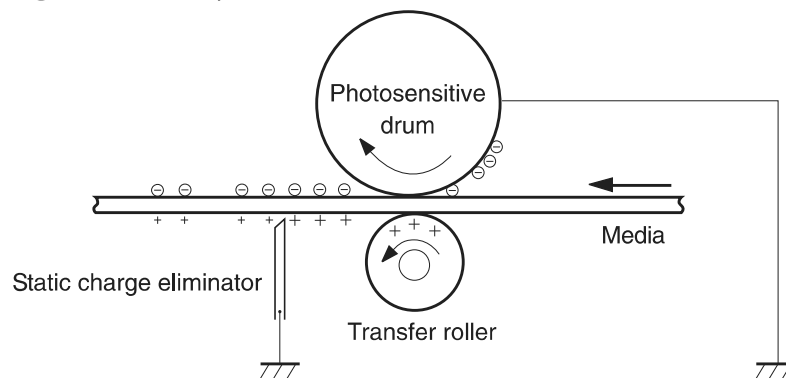
**Figure 1-19** Transfer



#### Step 5: Separation

The curvature elasticity of the print media causes it to separate from the photosensitive drum surface. The static charge eliminator reduces back side static discharge of the media for stable media feed and image quality.

**Figure 1-20** Separation



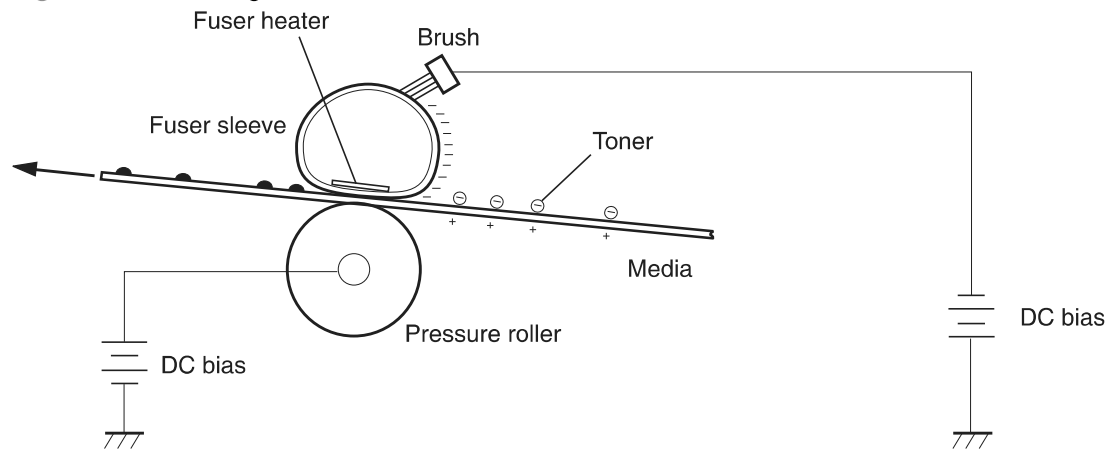
## Block 4: Fusing

The toner image is fixed onto the print media.

### Step 6: Fusing

The product uses the on-demand fixing method to fix the toner image onto the media. The image is permanently affixed to the print media by the heat and pressure.

**Figure 1-21** Fusing



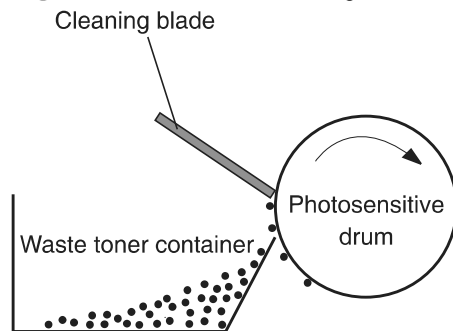
## Block 5: Drum cleaning

The residual (waste) toner is cleared from the photosensitive drum surface to prepare for the next latent image formation.

### Step 7: Drum cleaning

The cleaning blade scrapes the residual toner off the surface of the photosensitive drum and deposits it in the waste toner container.

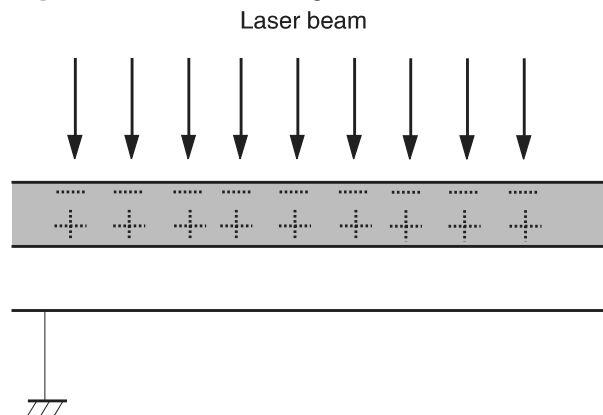
**Figure 1-22** Drum cleaning



### Step 8: Drum charge elimination

The residual charge on the photosensitive drum surface is eliminated to avoid uneven image. The residual charge of the previous image is left on the drum surface after the transfer operation and this affects the following image formation. The product eliminates this residual charge by emitting a laser beam to the drum surface. The drum charge elimination is operated only during the last rotation period.

**Figure 1-23** Drum charge elimination

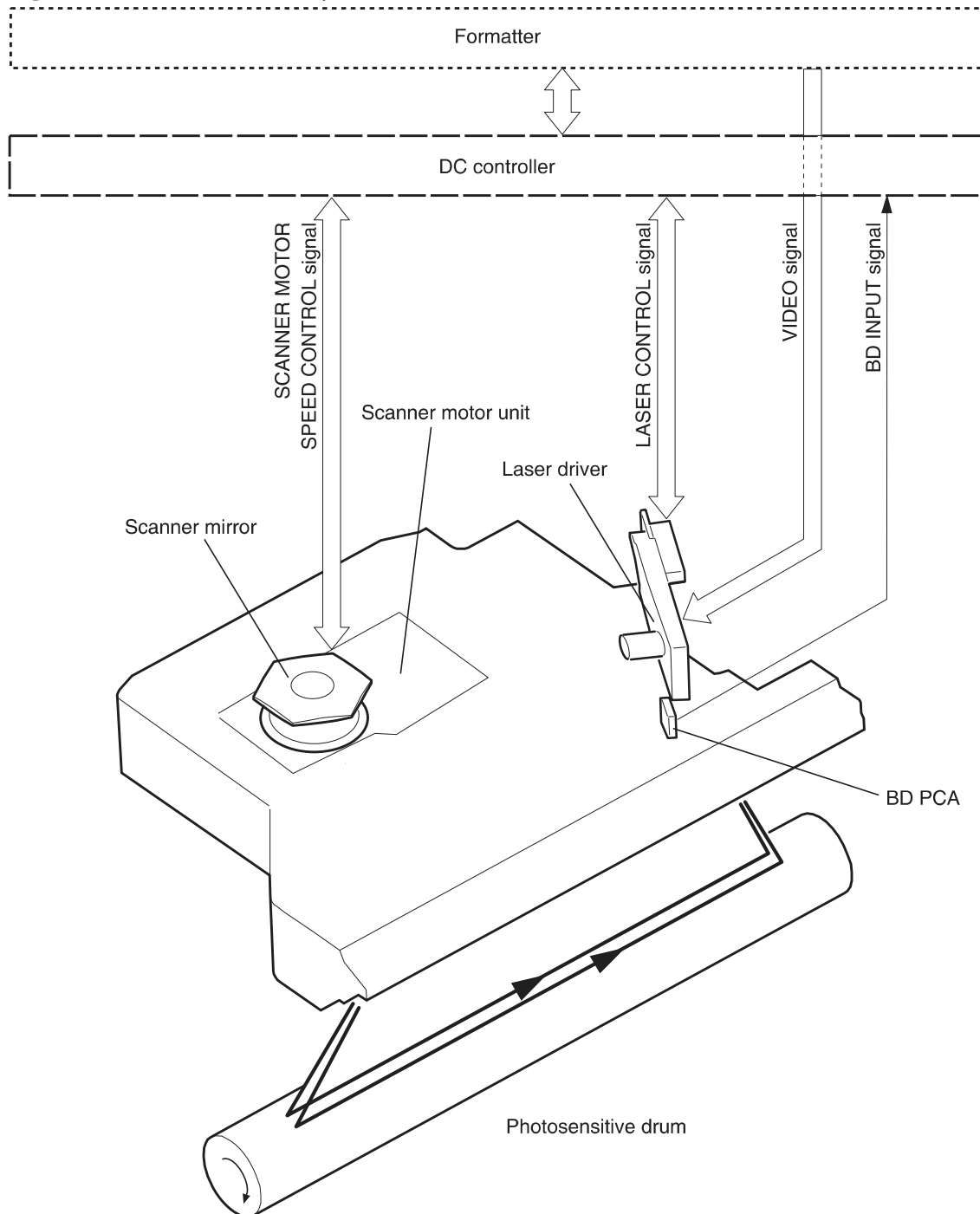


## Laser/scanner system

The laser/scanner system forms a latent image on the photosensitive drum according to the VIDEO signals sent from the formatter. The main components, such as the laser driver and scanner motor, are assembled as a laser/scanner unit and controlled by the DC controller. The DC controller allows the laser to emit light according to the VIDEO signals. The laser beam passes through the lenses and enters

the scanner mirror that is rotating at constant speed. The laser beam is reflected by the scanner mirror, passes through the lenses, and scans on the photosensitive drum.

**Figure 1-24** Laser/scanner system



The laser scanner uses two laser diodes to scan two lines simultaneously, producing high-speed laser scanning. After receiving the print command from the host computer, the DC controller PCA activates the scanner motor, which rotates the six-sided scanner mirror. The laser-driver PCA emits light from the two laser diodes according to signals from the DC controller PCA. The two laser beams strike the six-sided scanning mirror and are directed through the focusing lenses and onto the photosensitive drum.

The modulated laser beams generate the latent electrostatic image on the photosensitive drum according to the image data signals that the DC controller PCA sends.

1. As it receives a print command from the formatter, the dc controller outputs the SCANNER MOTOR SPEED CONTROL signal (/ACC) and rotates the scanner motor in order to rotate the six-sided mirror.
2. As the scanner motor starts rotating, the dc controller uses a LASER CONTROL signal (CNT0, CNT1, CNT2) to receive the /BD INPUT signal (/BDI) and force the laser to emit light . The dc controller detects the rotational speed of the scanner motor based on the timing the /BD1 signal is input and controls the speed to keep it constant.
3. While the scanner motor rotates at a constant speed, the dc controller passes the VIDEO signals from the formatter on to the laser driver PCA. The laser driver PCA emits light from the two laser diodes according to these signals: VDO1, /VDO1, VDO2, /VDO2.
4. The two laser beams pass through the collimator lens and cylindrical lens and strike the six-sided mirror that is rotating at a constant speed.
5. The laser beams, that are reflected off of the six-sided mirror pass through the focus lens and reflective mirror and focus on the photosensitive drum. The laser beams scan the drum surface at a constant speed.
6. As the six-sided mirror rotates and the laser beam scans the drum surface at a constant speed, a latent image forms on the drum surface.

## Laser failure detection

The DC controller determines a laser/scanner unit failure and notifies the formatter, if the laser/scanner unit encounters the following conditions:

- **Laser failure:** The laser intensity is not detected for a specified value when the laser is turned on for a specified period during the scanner unit start-up period.
- **BD failure:** The BD interval is out of a specified value during a print operation.
- **Scanner motor start-up failure:** The scanner motor does not reach a specified rotation within a specified period from when the scanner motor starts rotation.

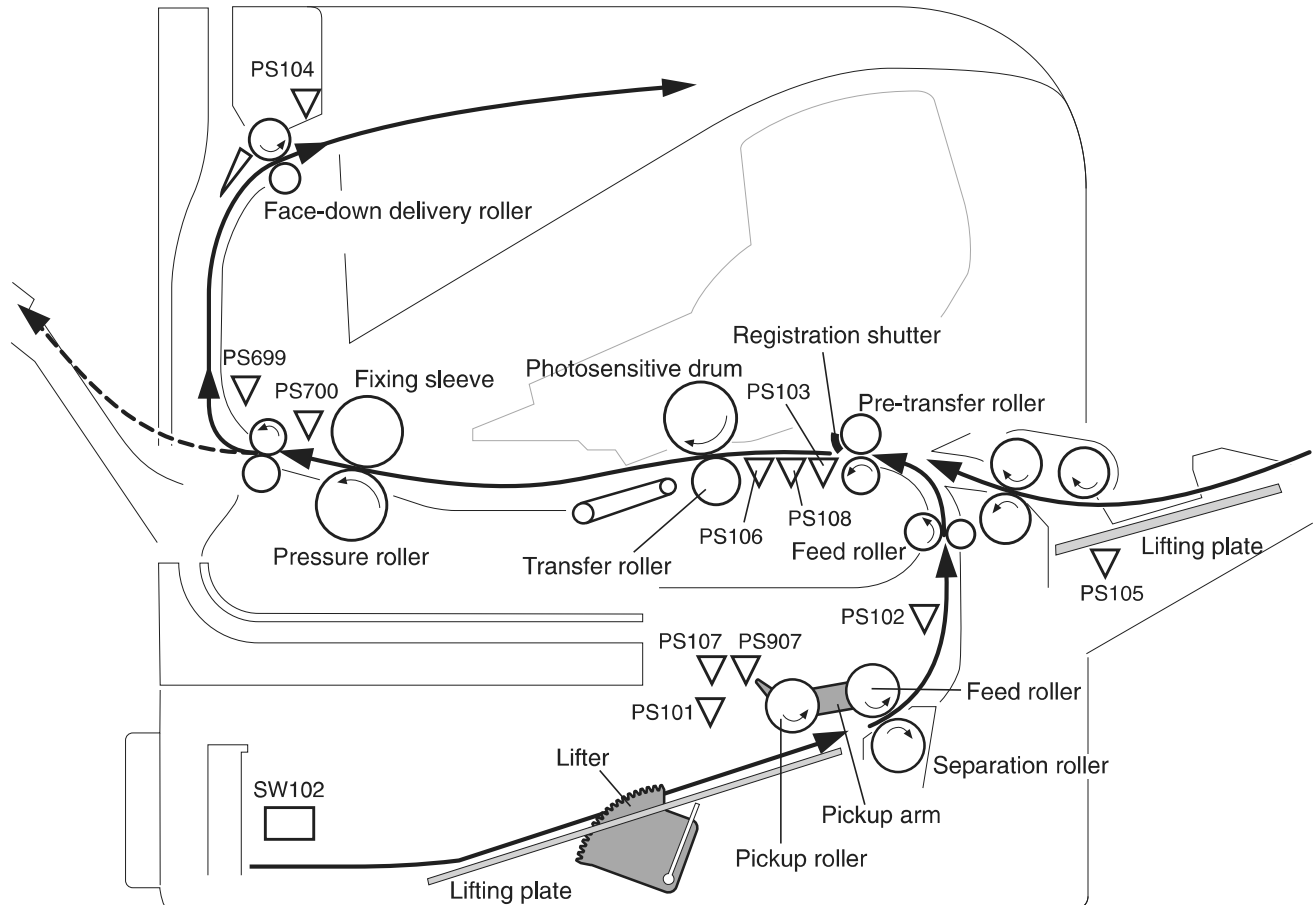
# Pickup, feed, and delivery system

The pickup, feed, and delivery system consists of various rollers that the product motors drive. The product uses Tray 1 (the manual feeding tray) and a cassette in Tray 2 as media sources. The printed media is delivered to either the rear output bin (straight-through printing) or the top output bin (the default destination). A number of 1x500-sheet feeders and one 1,500-sheet paper deck can be added to certain models. These accessories are discussed later in this chapter. The Tray 1 paper sensor (on the Tray 1 pickup assembly; PS105) detects media in Tray 1. The Tray 2 paper sensor (PS101) detects media in Tray 2. The paper-size switch (SW102) detects the media size that is loaded in Tray 2.

Two motors, a clutch, and a solenoid that are controlled by the DC controller PCA drive all of the rollers in the product.

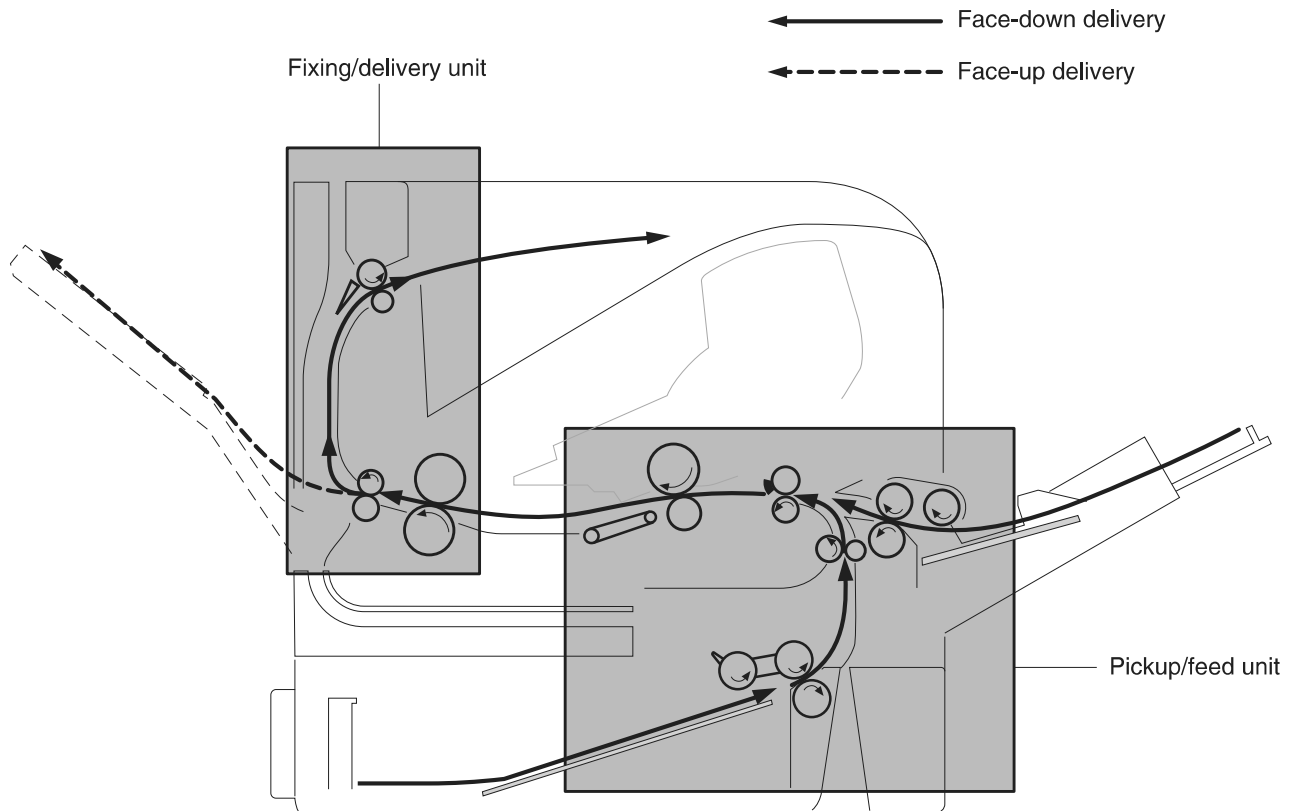
The pre-feed, top-of-page, and fuser-assembly delivery sensors (PS102, PS103, PS700) detect media arriving and passing along the paper path. If the media does not reach or pass these sensors within a specific amount of time, the microprocessor on the DC controller PCA halts the product functions and a jam error message appears on the control-panel display.

**Figure 1-25** Pickup, feed, and delivery system



The pickup-and-feed system is divided into two blocks: The pickup-and-feed block and the fuser/delivery block.

**Figure 1-26** Pickup, feed, and delivery blocks



## Pickup-and-feed block

The following functions take place in the pickup-and-feed block:

- Detection of media
- Detection of media-size
- Detection of media entering the paper path from Tray 1 or Tray 2
- Lifting of the Tray 2 paper plate
- Prevention of multiple-feeds
- Correction of page skew

When it receives a print command from the host computer, the DC controller PCA turns on the feed motor (M101) power. The motor drives the Tray 2 pickup, feed, and separation rollers. The drum motor power also turns on. The laser/ scanner motor power turns on.

The DC controller PCA then activates the feed clutch (CL101) to rotate the feed roller. The Tray 2 pickup solenoid is activated (SL101) and the pickup arm descends. The pickup roller touches the media and a sheet is fed into the product. The separation roller prevents multiple sheets of media from being fed at one time.

As the pre-feed sensor (PS102) detects the media, the dc controller PCA turns off the clutch, which stops the media. When the DC controller PCA detects that the laser/scanner is ready it activates the feed

clutch again. The feed roller moves the media farther into the product. The registration shutter corrects page skew and the media is transported to the fuser/delivery block.

## Fuser/delivery block

The fuser/delivery block consists of rollers, sensors, the fuser, and the output delivery assembly. The rollers transport the media through the fuser/delivery block paper path. The fuser applies heat and pressure to the media to permanently bond the toner image to the media. The output delivery assembly sends the printed media either to the rear output bin (if the rear output door is open) or to the top output bin (the default output delivery bin). Sensors along the paper path detect media movement, jams, and the top output-bin capacity.

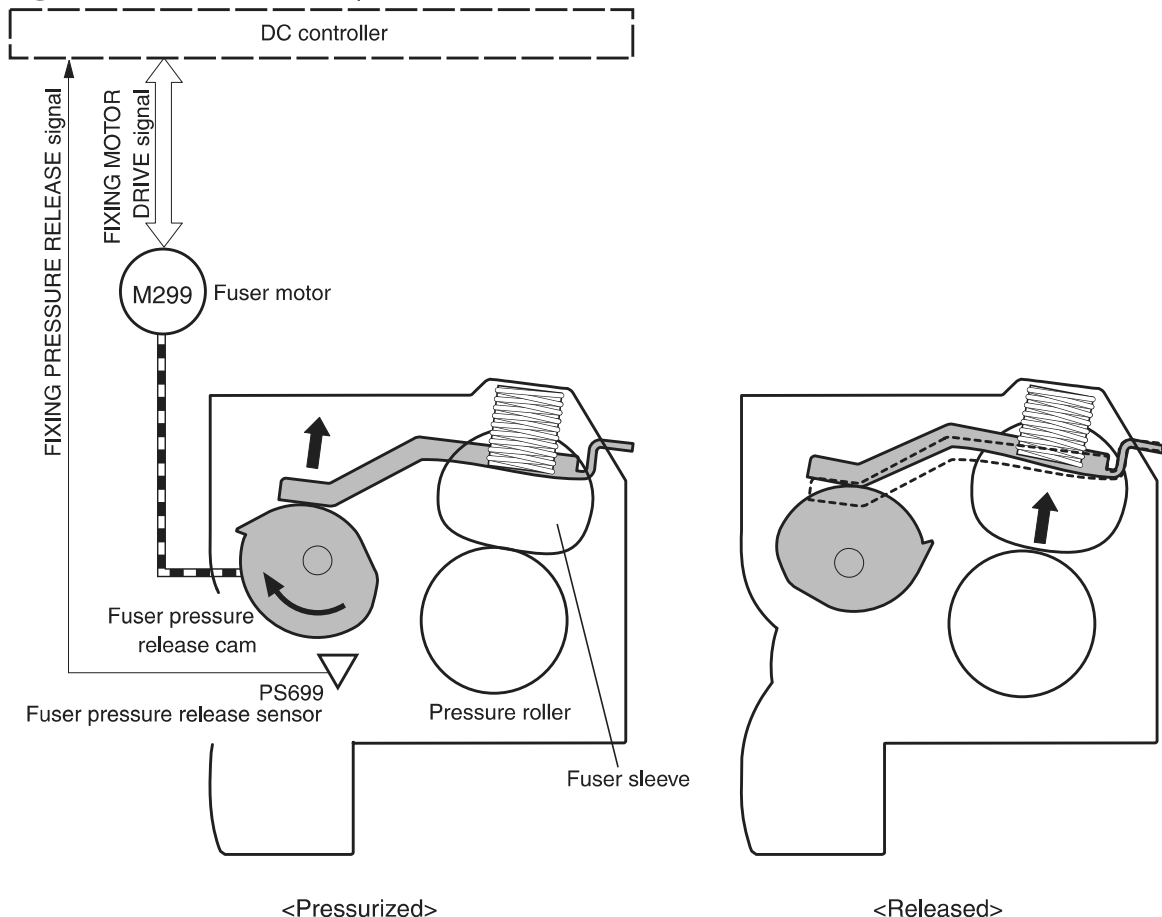
## Pressure roller pressure release control

The product releases the pressure roller except during a print operation to improve usability for jammed paper removal.

The DC controller reverses the fuser motor (M299) to rotate the fuser pressure release cam. The pressure roller is pressurized or depressurized due to the shape of the cam.

The DC controller reverses the fuser motor to control the pressure roller pressurize or depressurize state according to the signal sent from the fuser pressure release sensor (PS699).

**Figure 1-27** Pressure roller pressure release control



The pressure roller pressure is released under the following conditions:

- A paper jam is detected
- Factory shipment

The DC controller determines a fuser pressure release mechanism failure and notifies the formatter if the fuser roller release control is not completed within a specified period when it reverses the fuser motor.

## Paper trays


### Printing from Tray 1

The Tray 1 paper sensor (PS105) detects the presence of media in Tray 1. When the DC controller PCA receives the print command, the product starts the initial rotation phase, which consists of feed motor warm-up, scanner motor warm-up, high-voltage control sequence, and fuser warm-up. When the initial rotation phase ends, the Tray 1 pickup solenoid (SL102) is activated.

The cam rotates, the paper-tray lifter rises, and the media comes in contact with the Tray 1 pickup roller. At the same time, the Tray 1 pickup roller rotates twice and picks up a sheet of media from Tray 1. The separation pad prevents additional sheets from feeding with the first sheet.

The sheet then reaches the registration assembly, where its skew is corrected. The sheet then passes through the transfer, separation, and fusing stages; through the delivery unit; and is to the output bin.

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 **NOTE:** If media is removed from Tray 1 after the initial rotation phase, but before the pickup roller pulls the media from the tray, the Tray 1 pickup roller might continue to rotate up to six times, after which a jam detected.

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### Printing from Tray 2

When the DC controller PCA receives the print command, the feed motor (M101) and scanner motor start their rotation. When the feed motor reaches its prescribed speed, the feed roller clutch (CL101) and Tray 2 pickup solenoid (SL101) are activated. (The feed motor rotation drives the Tray 2 pickup roller, Tray 2 feed roller, Tray 2 separation roller, and paper-feed rollers.)

The Tray 2 pickup roller, which the pickup solenoid activates, rotates once and picks up the media in the tray. The separation roller prevents additional sheets from feeding with the first sheet, and the media is fed to the pre-feed sensor (PS102).

The sheet then reaches the registration assembly, where its skew is corrected. The sheet then passes through the transfer, separation, and fusing stages; through the delivery unit; and to the output bin.

### Cassette media size detection and cassette presence detection

The media size detection switch (SW102) detects the size of media loaded in the cassette and the presence of the cassette.

The media size detection switch—comprised of three switches: upper, center, and lower—is active when the cassette media size plate is correctly positioned to the loaded paper size and the cassette is installed in the product. The DC controller determines the paper size by monitoring the switch conditions.

the DC controller determines a size mismatch and sends a signal to the formatter if the switches detect a paper size that is different from the size specified by the formatter.

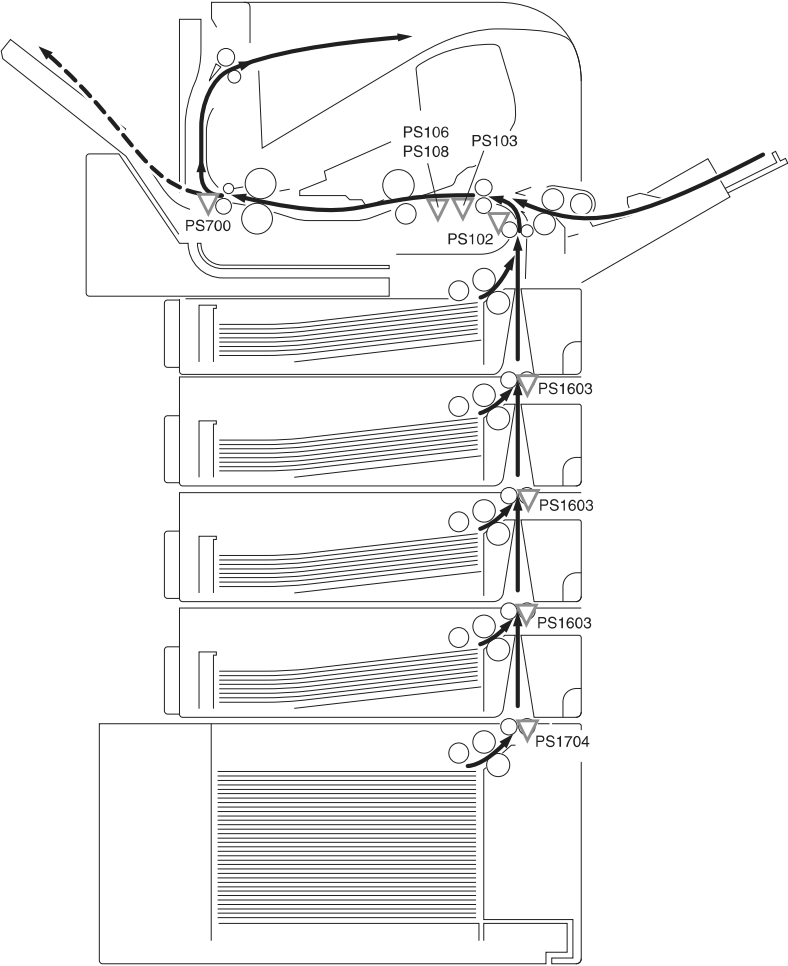
**Table 1-5 Cassette media size detection and cassette presence detection (Tray 2 and 1x500-sheet feeder)**

Media size	Media size switch settings		
	Upper	Center	Lower
No cassette	Off	Off	Off
A4	Off	Off	On
B5	Off	On	On
A5	On	Off	Off
Legal	On	On	Off
Letter	Off	On	Off
Executive	On	Off	On
Universal	On	On	On

# Jam detection

The product uses the following sensors to detect the presence of media and to check whether media is being fed correctly or has jammed

**Figure 1-28** Jam detection sensors



PS102: Pre-feed sensor	PS108: Media width sensor 2	PS1704: Media path sensor (paper deck)
PS103: Top of page sensor	PS700: Fuser delivery sensor	
PS106: Media width sensor 1	PS1603: Media path sensor (paper feeder)	

The product determines a jam if the sensor detects paper presence at a specified timing stored in the DC controller.

The DC controller stops a print operation and notifies the formatter when it determines a jam occurrence.

The product detects the following jams.

### Pickup delay jam 1

**a.** Standard equipped cassette

The top of page sensor (PS103) does not detect the leading edge of media within a specified period from when the pre-feed sensor (PS102) detects the leading edge.

**b.** Pickup option

The top of page sensor (PS103) does not detect the leading edge of media within a specified period from when the feed clutch (CL101) is turned on.

**c.** MP tray (Tray 1)

The top of page sensor (PS103) does not detect the leading edge of media within a specified period from when the MP tray pickup solenoid (SL102) is turned on.

### Pickup delay jam 2

**a.** Standard equipped cassette

The pre-feed sensor (PS102) does not detect the leading edge of media within a specified period from when a pickup operation starts.

**b.** Top pickup source of pickup option

The PF media path sensor (PS1603) for the top PF cassette or the PD media path sensor (PS1704) does not detect the leading edge of media within a specified period from when a pickup operation starts.

**c.** Lower pickup sources of pickup option

The PF media path sensor (PS1603) for the top PF cassette does not detect the leading edge of media within a specified period from when the PF media path sensor (PS1603) or the PD media path sensor (PS1704), either one of that equipped to the pickup source that picks up the media, detects the leading edge of media.

### Pickup delay jam 3

The PF media path sensor (PS1603) or PD media path sensor (PS1704), either one of that equipped to the pickup source that picks up the media, does not detect the leading edge of media within a specified period from when a pickup operation from the lower pickup sources of the pickup option.

### Pickup stationary jam

**a.** Top of page sensor detection

The top of page sensor (PS103) does not detect the trailing edge of media within a specified period from when it detects the leading edge.

**b.** Media width sensors detection

Both of the media width sensors (PS106, PS108) do not detect the trailing edge of media within as pecified period from when the top of page sensor (PS103) detects the trailing edge.

## Delivery delay jam

The fuser delivery sensor (PS700) does not detect the leading edge of media within a specified period from when the top of page sensor (PS103) detects the leading edge.

## Delivery stationary jam

The fuser delivery sensor (PS700) does not detect the trailing edge of media within a specified period from when the top of page sensor (PS103) detects the trailing edge.

## Residual media jam 1

- a. Either one of the following sensors detects media presence when the wait sequence starts:
  - Top of page sensor (PS103)
  - Media width sensors (PS106, PS108)
  - Fixing delivery sensor (PS700)
- b. The fuser delivery sensor (PS700) detects media presence before the top of page sensor (PS103) or the media width sensor (PS106, PS108) detects leading edge of media during an automatic delivery operation.



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**NOTE:** The automatic delivery delivers the deliverable residual media automatically during the initial rotation period when the power is turned on or when the door is closed. The DC controller sends an automatic delivery request to the formatter and stops a print operation when it determines that there is deliverable residual media. Then the formatter sends an automatic delivery command and the DC controller drives media feed system to deliver the residual media out of the product.

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- c. Either one of the following sensors detects media presence during an automatic delivery operation:
  - Pre-feed sensor (PS102)
  - Top of page sensor (PS103)
  - Media width sensors (PS106, PS108)
  - Fuser delivery sensor (PS700)
  - PF media path sensor (PS1603)
  - PD media path sensor (PS1704)

- d. The door open is detected when either one of the following sensors detects media presence during an automatic delivery operation:
  - Top of page sensor (PS103)
  - Media width sensors (PS106, PS108)
  - Fuser delivery sensor (PS700)
- e. A stop control command is received when either one of the following sensors detects media presence during an automatic delivery operation:
  - Pre-feed sensor (PS102)
  - Top of page sensor (PS103)
  - Media width sensors (PS106, PS108)
  - Fuser delivery sensor (PS700)
  - PF media path sensor (PS1603)
  - PD media path sensor (PS1704)

### **Residual media jam 2**

- a. Either one of the following sensors detects media presence when a print operation completes:
  - Pre-feed sensor (PS102)
  - Top of page sensor (PS103)
  - Media width sensors (PS106, PS108)
  - Fuser delivery sensor (PS700)
  - PF media path sensor (PS1603)
  - PD media path sensor (PS1704)
- b. A stop control command is received from the formatter after a pickup operation has started.

### **Door open jam**

The door open is detected after a pickup operation has started.

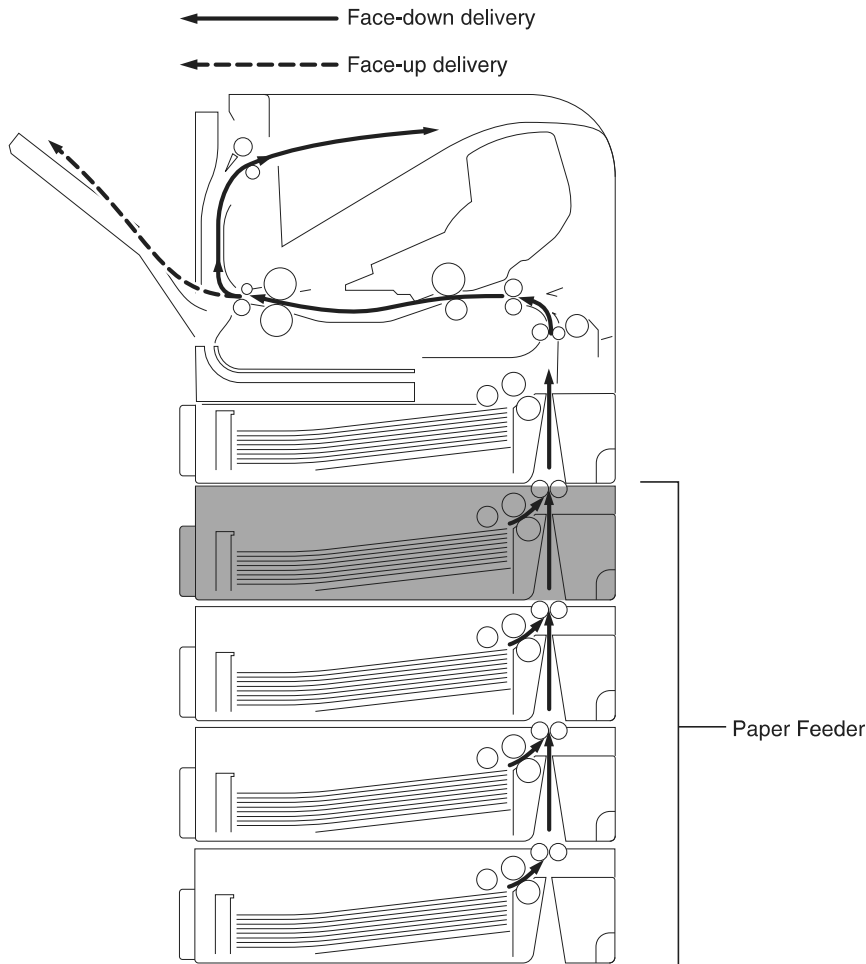
### **Wrapping jam**

The fuser delivery sensor (PS700) detects media absence before it detects the trailing edge of media after a specified period from when it detects the leading edge.

# 1x500-sheet paper feeder

The 1x500-sheet paper feeder (PF) is optionally installed at the bottom of the product. It features paper pickup and paper feeding to the product. The product supports up to four optional paper feeders.

**Figure 1-29** 1x500-sheet paper feeder



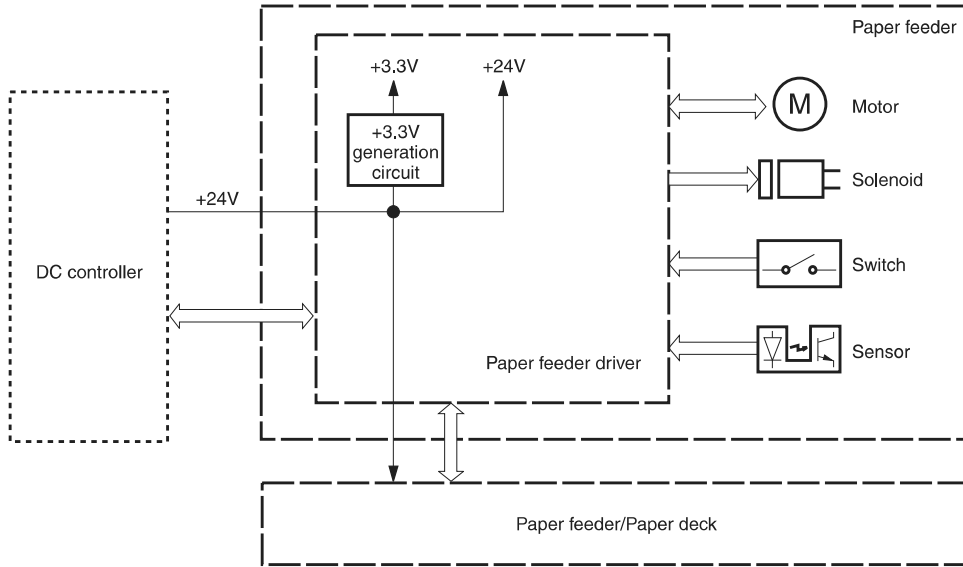
The paper feeder driver controls the operational sequence of the paper feeder and the serial communication with the DC controller of the product.

The DC controller sends several commands to the paper feeder driver at necessary timing. The paper feeder driver drives each load, such as motor and solenoid, according to the commands. The paper feeder driver responds the status information of the paper feeder to the DC controller.

The DC controller determines a paper feeder illegal connection and notifies the formatter if it does not make the serial communication with the paper feeder driver during the pre-rotation period when the product is turned on, when recovering from the Sleep mode or when the door is closed.

The product supplies DC24V to the paper feeder. The DC3.3V for sensors and ICs is generated from the DC24V in the paper feeder driver.

**Figure 1-30** 1x500-sheet paper feeder circuit diagram



Component		Description
Motor	M1600	Paper feeder lift motor
Sensor	PS1600	Paper feeder media presence sensor
	PS1601	Paper feeder media stack surface sensor 1
	PS1602	Paper feeder media stack surface sensor 2
	PS1603	Paper feeder media path sensor
Solenoid	SL1600	Paper feeder pickup solenoid
Switch	SW1600	Paper feeder media size switch

## Pickup-and-feed operation (PF)

The paper feeder uses same mechanism of the product for the pickup-and-feed operation. The rollers used in the paper feeder are driven by the feed motor (M101) of the product through the gears.

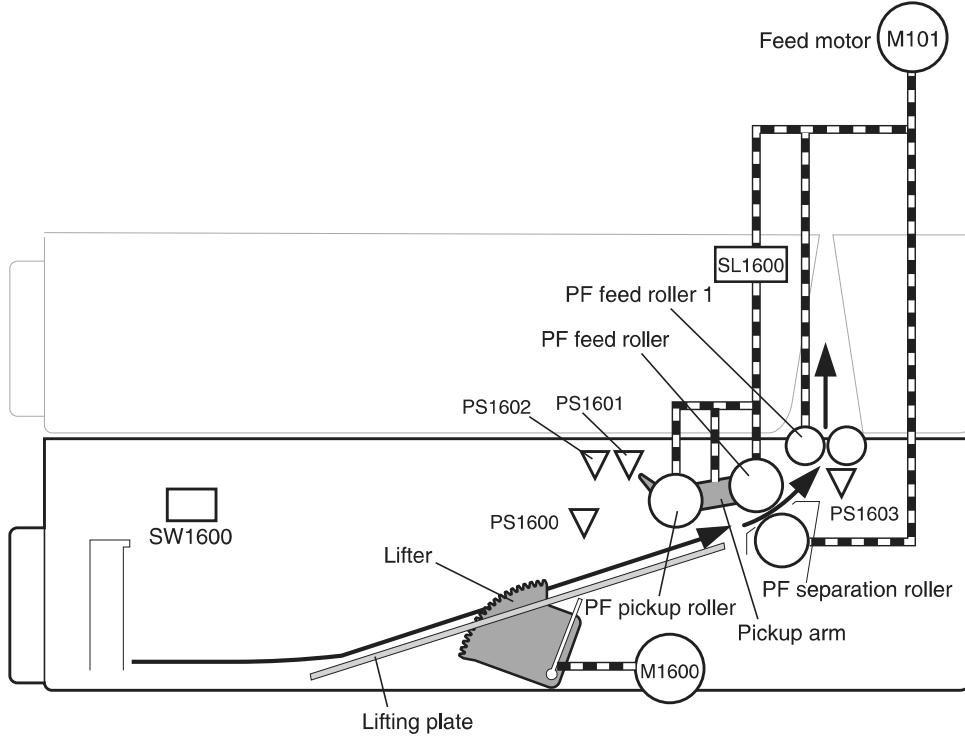
### Pickup and feed sequence of operation (PF)

1. The lifting plate moves up to the position where the paper can be picked up after the product is turned on or the paper feeder cassette is installed.
2. The DC controller drives the feed motor (M101) when it receives a print command from the formatter.
3. The DC controller outputs a pickup command to the paper feeder driver.
4. The paper feeder driver turns on the PF pickup solenoid (SL1600) when it receives a pickup command. Accordingly the PF pickup roller, PF feed roller and PF feed roller 1 rotate to pick up

media in the PF cassette. (PF cassette pickup mechanism and PF lift-up operation are the same way as that of the product).

5. The PF separation roller holds back any multiple-fed sheets and one sheet of media is fed into the product. (PF multiple-feed prevention mechanism is the same way as that of the product).

**Figure 1-31** 1x500-sheet paper feeder block diagram



Description		Signal	Driver
PF lifter motor	M1600	PF LIFTER MOTOR DRIVE signal	PF driver
PF media presence sensor	PS1600	PF MEDIA PRESENCE signal	PF driver
Paper feeder media stack surface sensor 1	PS1601	PF MEDIA STACK SENSOR 1 signal	PF driver
Paper feeder media stack surface sensor 2	PS1602	PF MEDIA STACK SENSOR 2 signal	PF driver
Paper feeder media path sensor	PS1603	PF MEDIA PATH signal	PF driver
Paper feeder pickup solenoid	SL1600	PF PICKUP SOLENOID signal	PF driver
Paper feeder media size switch	SW1600	PF MEDIA SIZE signal	PF driver

## Cassette lift operation (PF)

The lift-up operation keeps the stack surface of media in the paper feeder cassette at a specified position to perform stable pickup operation.

The paper feeder driver drives the PF lifter motor (M1600) to move up the lifter plate in which media is stacked. The cassette lift-up operation for the paper feeder is operated in the same way as that of the product base.

The paper feeder driver monitors the PF media stack surface sensors (PS1601, PS1602) when the product is turned on, when the PF cassette is installed or during a print operation to perform the lift-up operation.

### Cassette lift operation (PF)

#### 1. Initial lift-up operation

The initial lift-up operation is performed if either one of the PF media stack surface sensors (PS1601, PS1602) does not detect the media surface when the power is turned on or when the PF cassette is installed. The paper feeder driver drives the PF lifter motor for a specified period after both of the PF stack surface sensors detect media and lifts the stack surface to the pickup position.

The paper feeder driver determines a PF lifter motor failure and notifies the DC controller if both of the PF media stack surface sensors do not detect media within a specified period from when a lift-up operation is started.

#### 2. During print lift-up operation

The during print lift-up operation is performed when the media surface is lowered for a specified level due to a pickup operation. The paper feeder driver drives the PF lifter motor for a specified period and lifts the stack surface to the pickup position when the PF media stack surface 1 (PS1601) detects media absence during a print operation.

## Cassette media size detection and cassette presence detection (PF)

The cassette media size and cassette presence for the paper feeder are detected in the same way as that of the product base.

## Cassette multiple-feed prevention (PF)

The cassette multiple-feed prevention for the paper feeder is operated in the same way as that of the product base.

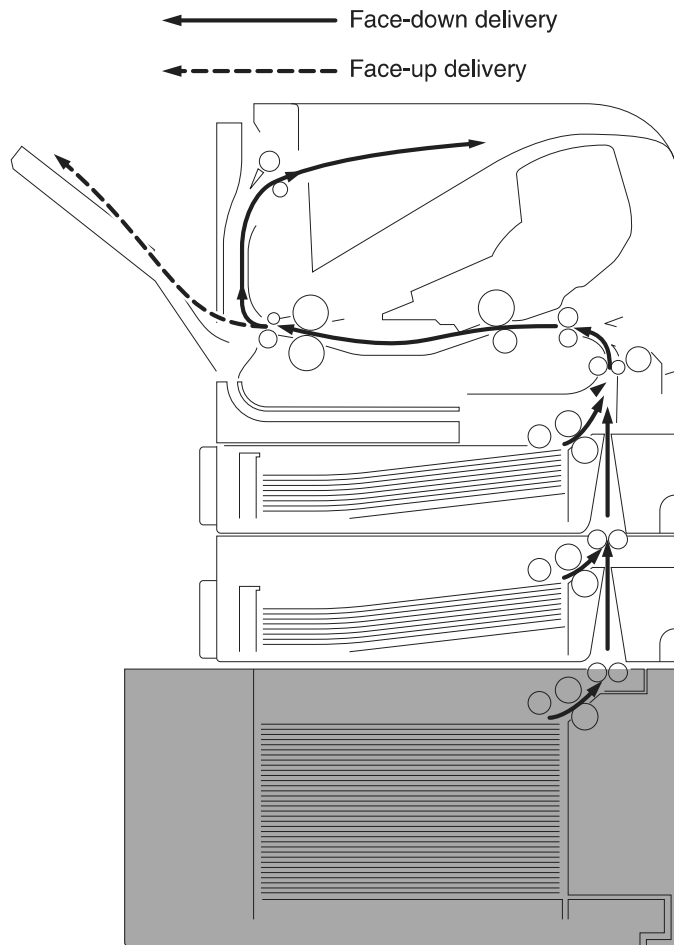
## Jam detection (PF)

The paper jam for the paper feeder is detected by the DC controller of the product base.

## 1x1500-sheet paper deck

The 1x1500-sheet paper feeder (PD) is optionally installed at the bottom of the product. It features paper pickup and paper feeding to the product. The product supports one paper deck and up to three paper feeders between the product and the paper deck.

**Figure 1-32** 1x1500-sheet paper feeder



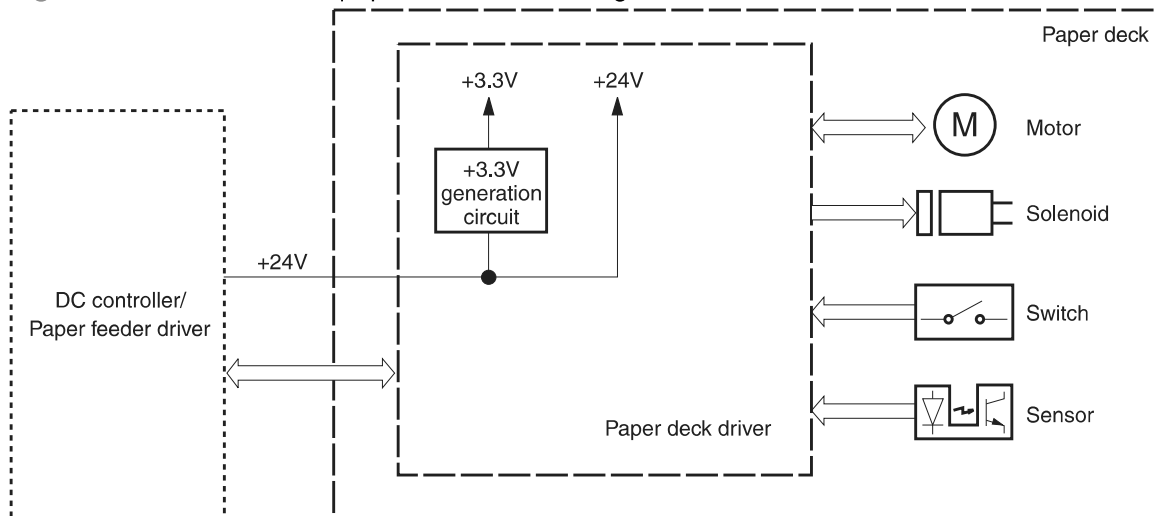
The paper deck driver controls the operational sequence of the paper deck and the serial communication with the DC controller of the product.

The DC controller sends several commands to the paper deck driver at necessary timing. The paper deck driver drives each load, such as motor and solenoid, according to the commands. The paper deck driver responds the status information of the paper deck to the DC controller.

The DC controller determines a paper deck illegal connection and notifies the formatter if it does not make the serial communication with the paper deck driver during the pre-rotation period when the product is turned on, when recovering from the sleep mode or when the door is closed.

The product supplies DC24V to the paper deck. The DC3.3V for sensors and ICs is generated from the DC24V in the paper deck driver.

**Figure 1-33** 1x500-sheet paper feeder circuit diagram



Component		Description
Motor	M1700	Paper deck lift motor
Sensor	PS1700	Paper deck media presence sensor
	PS1701	Paper deck media stack surface sensor 1
	PS1702	Paper deck media stack surface sensor 2
	PS1703	Door open detection sensor
	PS1704	Paper deck media path sensor
Solenoid	SL1700	Paper deck pickup solenoid
Switch	SW1700	Paper deck media size switch


## Pickup-and-feed operation (PD)

The paper deck uses same mechanism of the product for the pickup-and-feed operation. The rollers used in the paper feeder are driven by the feed motor (M101) of the product through the gears.

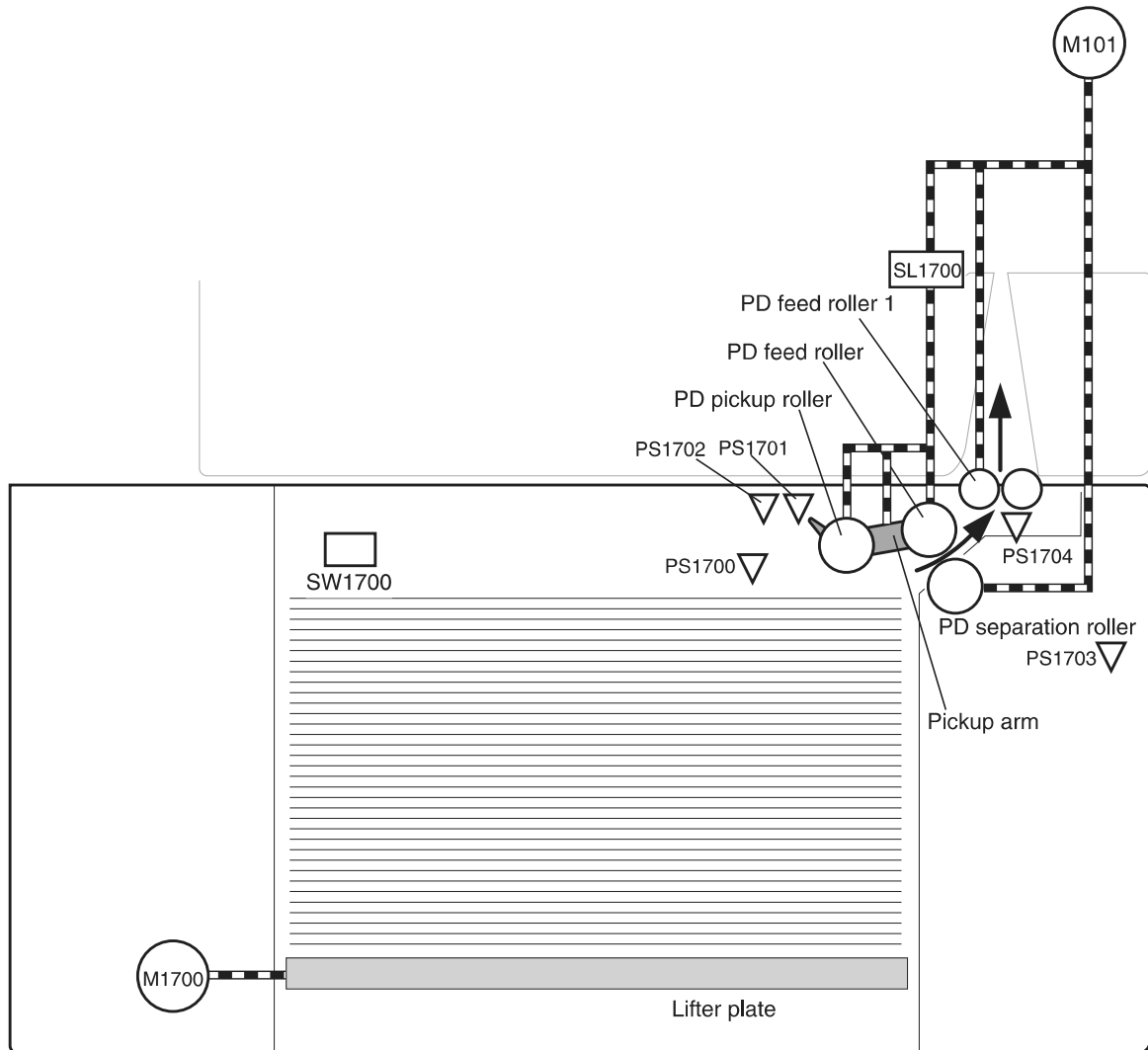
### Pickup and feed sequence of operation (PD)

1. The lifter plate moves up to the position where the paper can be picked up after the product is turned on or the PD front door is closed.
2. The DC controller drives the feed motor (M101) when it receives a print command from the formatter.
3. The DC controller outputs a pickup command to the paper deck driver.

4. The paper deck driver turns on the PD pickup solenoid (SL1700) when it receives a pickup command. Accordingly the PD pickup roller, PD feed roller and PD feed roller 1 rotate to pick up media in the paper deck. (PD pickup mechanism is the same way as that of the product).
5. The PD separation roller holds back any multiple-fed sheets and one sheet of media is fed in to the product. (PD multiple-feed prevention mechanism is the same way as that of the product).

 **NOTE:** The paper deck media size switch (SW1700) detects a media size in the paper deck.

**Figure 1-34** 1x1500-sheet paper deck block diagram



Description		Signal	Driver
PD lifter motor	M1700	PD LIFTER MOTOR DRIVE signal	PD driver
PD media presence sensor	PS1700	PD MEDIA PRESENCE signal	PD driver
PD media stack surface sensor 1	PS1701	PD MEDIA STACK SENSOR 1 signal	PD driver

Description		Signal	Driver
PD media stack surface sensor 2	PS1702	PD MEDIA STACK SENSOR 2 signal	PD driver
PD door open detection sensor	PS1703	PD DOOR OPEN DETECTION signal	PD driver
PD media path sensor	PS1704	PF MEDIA PATH signal	PD driver
PD pickup solenoid	SL1700	PF PICKUP SOLENOID signal	PD driver
PD media size switch	SW1700	PF MEDIA SIZE signal	PD driver

## Cassette lift operation (PD)

The lift-up operation keeps the stack surface of media in the paper deck at a specified position to perform stable pickup operation.

The paper deck driver drives the PD lifter motor (M1700) to move up the lifter plate in which media is stacked. The PD lifter motor uses four pulleys to wind the wire cables and two wire cables lift the lifter plate. When the PD front door is opened, the pulley gears and the motor gear are disengaged and the lifter plate lowers under its own weight.

The paper deck driver monitors the PD media stack surface sensors (PS1701, PS1702) when the product is turned on, when the PD front door is closed or during a print operation to perform the lift-up operation.

### Lift operation (PD)

#### 1. Initial lift-up operation

The initial lift-up operation is performed if either one of the PD media stack surface sensors (PS1701, PS1702) does not detect the media surface when the power is turned on or when the PD front door is closed. The paper deck driver drives the PD lifter motor for a specified period after both of the PD media stack surface sensors detect media and lifts the stack surface to the pickup position.

The paper deck driver determines a paper deck lifter motor failure and notifies the DC controller if both of the PD media stack surface sensors do not detect media within a specified period from when a lift-up operation is started.

#### 2. During print lift-up operation

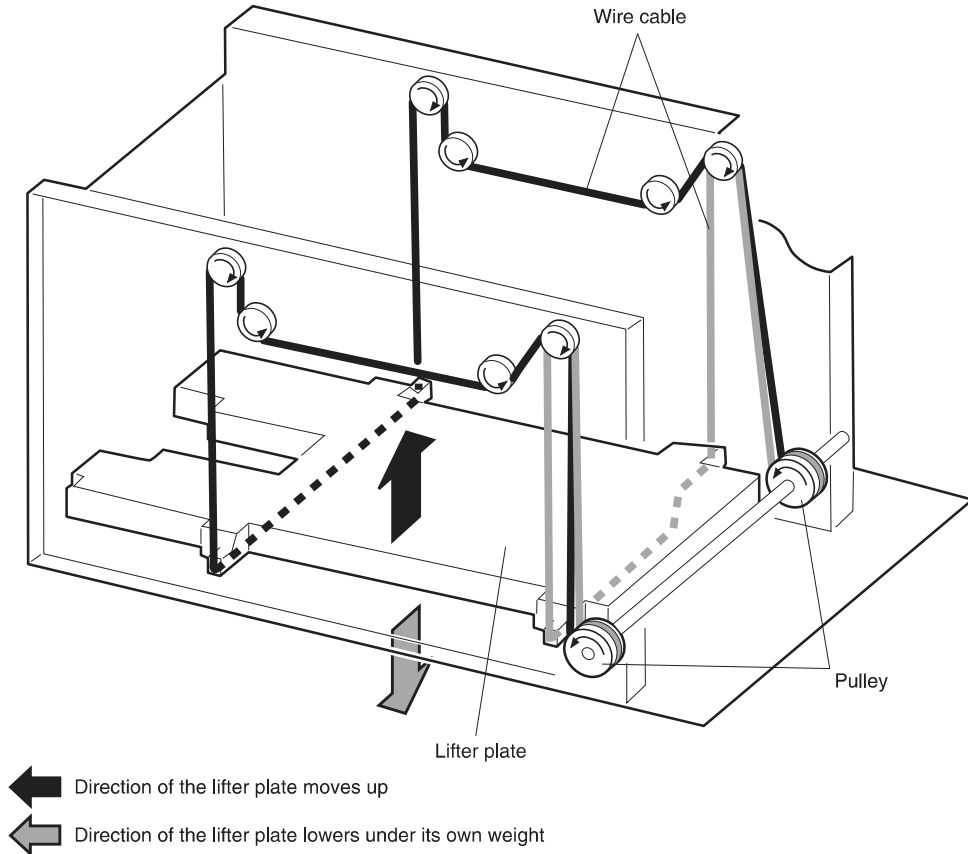
The during print lift-up operation is performed when the media surface is lowered for a specified level due to a pickup operation. The paper deck driver drives the PD lifter motor for

a specified period and lifts the stack surface to the pickup position when the PD media stack surface sensor 1 (PS1701) detects media absence during a print operation.

### 3. Pickup retry lift-up operation

The pickup retry lift-up operation is performed when the first pickup retry is failed to pick up media. The paper deck driver drives the PD lifter motor for a specified period to lift the stack surface and performs second pickup retry.

**Figure 1-35** 1x1500-sheet paper deck lift



## Media size detection (PD)

The combination of the switches for the paper deck media size detection differs from the product cassette.

## Multiple-feed prevention (PD)

The multiple-feed prevention for the paper deck is operated in the same way as that of the product.

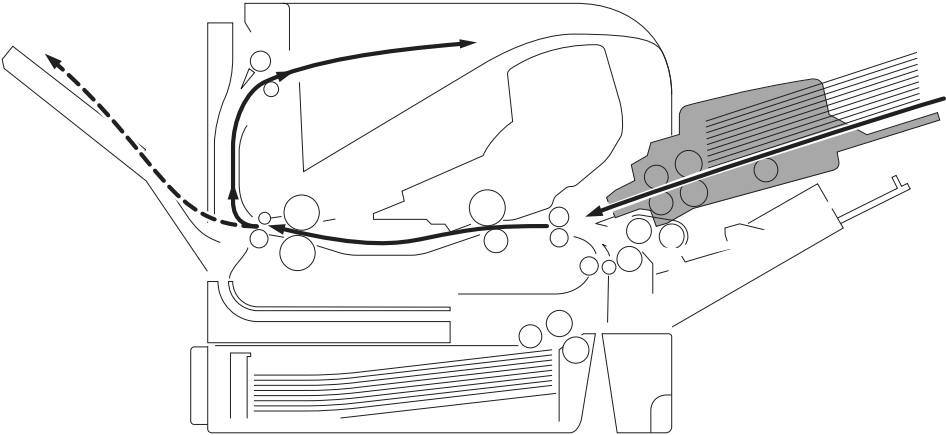
## Jam detection (PF)

The paper jam for the paper deck is detected by the DC controller of the product.

# Envelope feeder

The envelope feeder (EF) is optionally installed on Tray 1, front side of the product. It features envelope pickup and envelope feed to the product.

**Figure 1-36** Envelope feeder

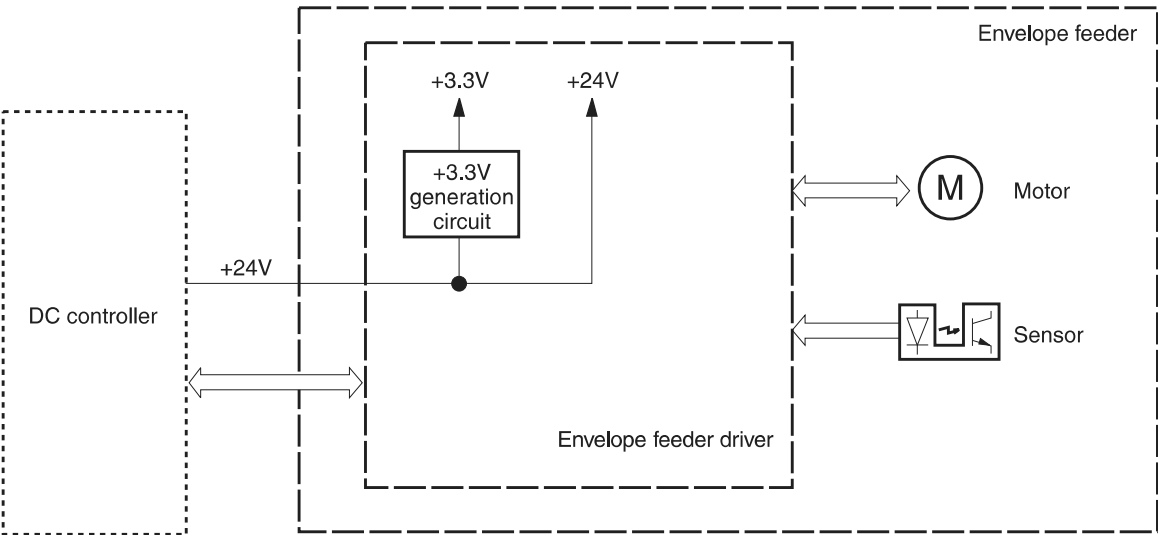


The envelope feeder driver controls the operational sequence of the envelope feeder and the serial communication with the DC controller of the product.

The DC controller sends several commands to the envelope feeder driver at necessary timing. The envelope feeder driver drives the motor according to the commands. The envelope feeder driver responds the status information of the envelope feeder to the DC controller.

The product supplies DC24V to the envelope feeder. The DC3.3V for sensors and ICs is generated from the DC24V in the envelope feeder driver.

**Figure 1-37** Envelope feeder circuit diagram



Component		Description
Motor	M1800	Envelope pickup motor

Component		Description
Sensor	PS1800	Envelope presence sensor
	PS1802	Envelope multiple feed sensor

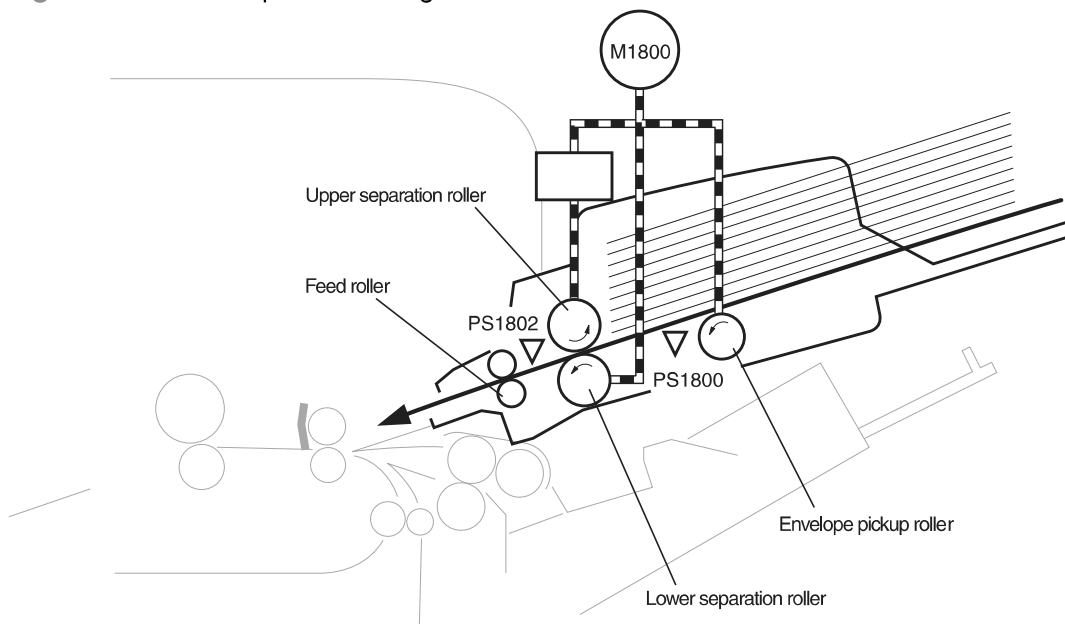
## Pickup-and-feed operation (EF)

The envelope in the envelope feeder is fed into the product individually.

### Pickup and feed sequence of operation (EF)

1. The envelope feeder driver drives the envelope pickup motor (M1800) when it receives a pickup command from the DC controller. Accordingly the envelope pickup roller, upper separation roller and lower separation roller rotate to pick up envelope.
2. The upper separation roller and lower separation roller remove any multiple-fed envelopes and one envelope is fed into the product.

**Figure 1-38** Envelope feeder diagram



Description		Signal	Driver
EF pickup motor	M1800	ENVELOPE PICKUP MOTOR DRIVE signal	EF driver
EF media presence sensor	PS1800	ENVELOPE PRESENCE signal	EF driver
EF multi feed sensor	PS1802	ENVELOPE MULTI FEED signal	EF driver

## Multiple-feed prevention (EF)


The multiple-feed prevention for the envelope feeder is operated in the same way as that of the product.

## Multiple-feed detection (EF)

The envelope feeder detects the multiple-feed of the envelopes to prevent the product damage from massive multiple-feed.

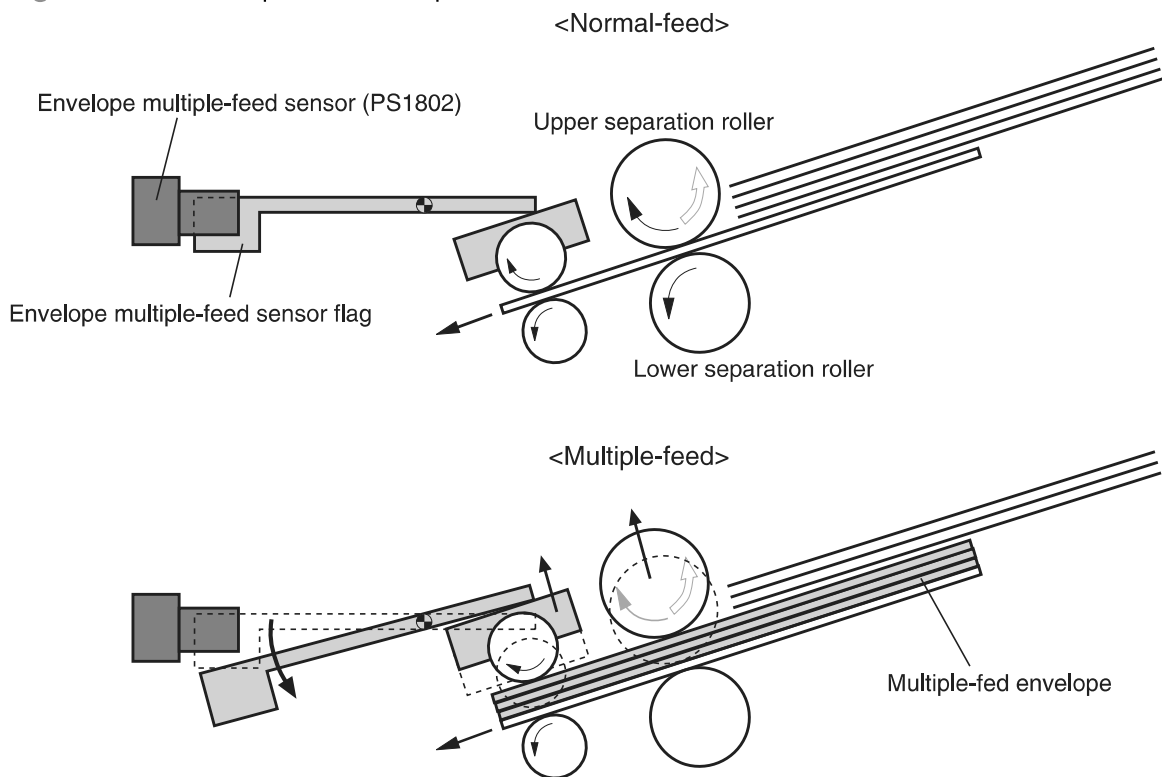
The envelope feeder driver monitors the envelope multiple-feed sensor (PS1802) to detect up and down motion of the upper separation roller.

During a normal-feed operation, the envelope multiple-feed sensor flag interrupts the multiple-feed sensor. If more than four multiple-fed envelopes are placed between the upper separation roller and the lower separation roller, the upper separation roller rises approximately 0.7mm (almost equivalent to the thickness of four envelopes). This causes the multiple-feed sensor flag not interrupting the sensor and the envelope feeder driver detects the multiple-feed of envelopes.

 **NOTE:** The multiple-feed detection mechanism is not able to detect less than four multiple-fed envelopes (approximately 0.7 mm), however, it does not affect the product damage.

The envelope feeder driver notifies the pickup jam to the DC controller when it determines a multiple feed.

**Figure 1-39** Envelope feeder multiple-feed detection



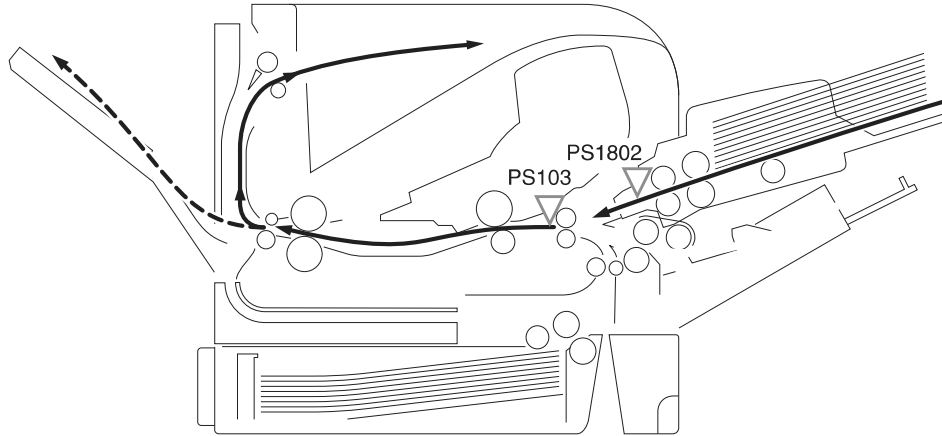
## Jam detection (EF)

The envelope feeder uses the following sensors to detect the presence of media and to check whether media is being fed correctly or has jammed

jam detection sensors (EF)

- PS1802: Envelope multiple-feed sensor
- PS103: Top of page sensor (in the product)

**Figure 1-40** Envelope feeder jam detection



The envelope feeder driver determines a jam if the sensor detects envelope presence at a specified timing stored in the envelope feeder driver. The envelope feeder driver stops a print operation and notifies the DC controller when it determines a jam has occurred.

#### **Envelope feeder pickup delay jam**

- The top of page sensor (PS103) does not detect the leading edge of envelope within a specified period from when a envelope pickup operation starts.

#### **Envelope feeder multiple-feed jam**

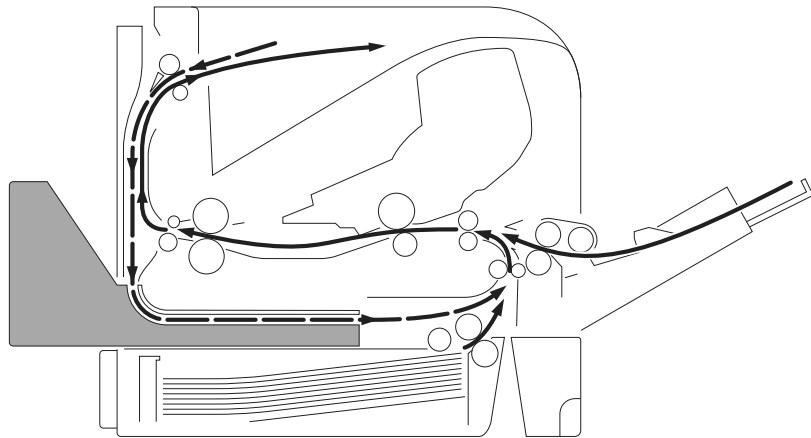
- The envelope multiple-feed sensor (PS1802) detects the multiple-fed envelopes after a pickup operation has started.

# Duplexer

The duplexer (DP) is installed at the back of the product. It features media reverse and media feed to the product to print two sides of media.

**Figure 1-41** Duplexer

← Face-down delivery  
← Duplex print

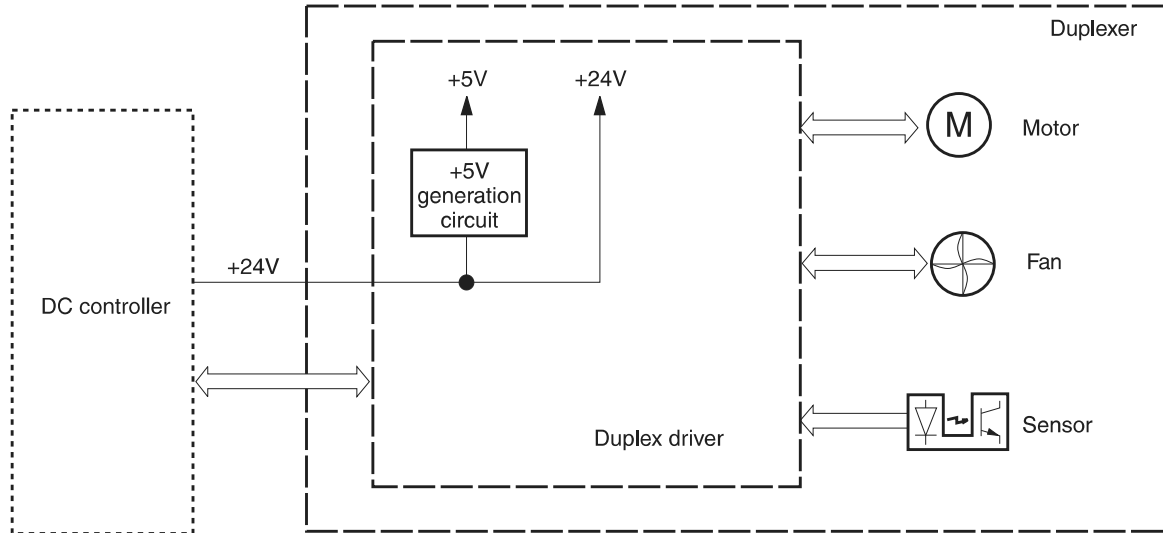


The duplex driver controls the operational sequence of the duplexer and the serial communication with the DC controller of the product.

The DC controller sends several commands to the duplex driver at necessary timing. The duplex driver drives the duplex reverse motor and the duplex re-pickup motor according to the commands. The duplex driver monitors the sensors and responds the status information of the duplexer to the DC controller.

The printer supplies DC24V to the duplexer. The DC5V for sensors and ICs is generated from the DC24V in the duplex driver.


**Figure 1-42** Duplexer circuit diagram



Component		Description
Fan	FM1501	Duplex cooling fan
Motor	M1501	Duplex reverse motor
	M1502	Duplex re-pick motor
Sensor	PS1501	Face up sensor
	PS1502	Duplex re-pick sensor
	PS1503	Side registration home-position sensor

## Motor and fan control (DP)

The duplexer has two motors and a fan. The motors are used for the media feeding and the fan is used for preventing a temperature rising inside the duplex unit.

 **NOTE:** The paper deck media size switch (SW1700) detects a media size in the paper deck.

**Table 1-6 Fan (DP)**

Description	Cooling area	Type	Speed
Duplex cooling fan      FM1501	Inside of the duplexer	Intake	Full

**Table 1-7 Motors (DP)**

Description	Component driven	Type	Failure detection
Duplex reverse motor      M1501	Face-down delivery roller (in the product)	Stepping motor	No
Duplex re-pick motor      M1502	Side registration guide, duplex feed roller	Stepping motor	No

## Failure detection (DP)

The duplex driver determines a fan failure and notifies the DC controller when the fan locks for a specified period after the fan starts up.

## Reverse-and-re-pickup operation (DP)

The duplexer has two motors: the duplex reverse motor (M1501) and the duplex re-pickup motor (M1502). The duplex driver controls forward and reverse the duplex re-pickup motor rotations. When the duplex re-pickup motor rotates, the rollers in the duplexer rotate and when it reverses, the side registration guide moves.

The duplex reverse motor rotates or reverses the face-down delivery roller of the product.

In addition, the duplexer has three photo interrupters: the face-up sensor (PS1501), duplex media re-pickup sensor (PS1502), and the side registration guide home-position sensor (PS1503). The face-up sensor is used for face-up tray open detection, the duplex media re-pickup sensor is used for jam detection, and the side registration guide home-position sensor is used for side registration guide home-position detection.

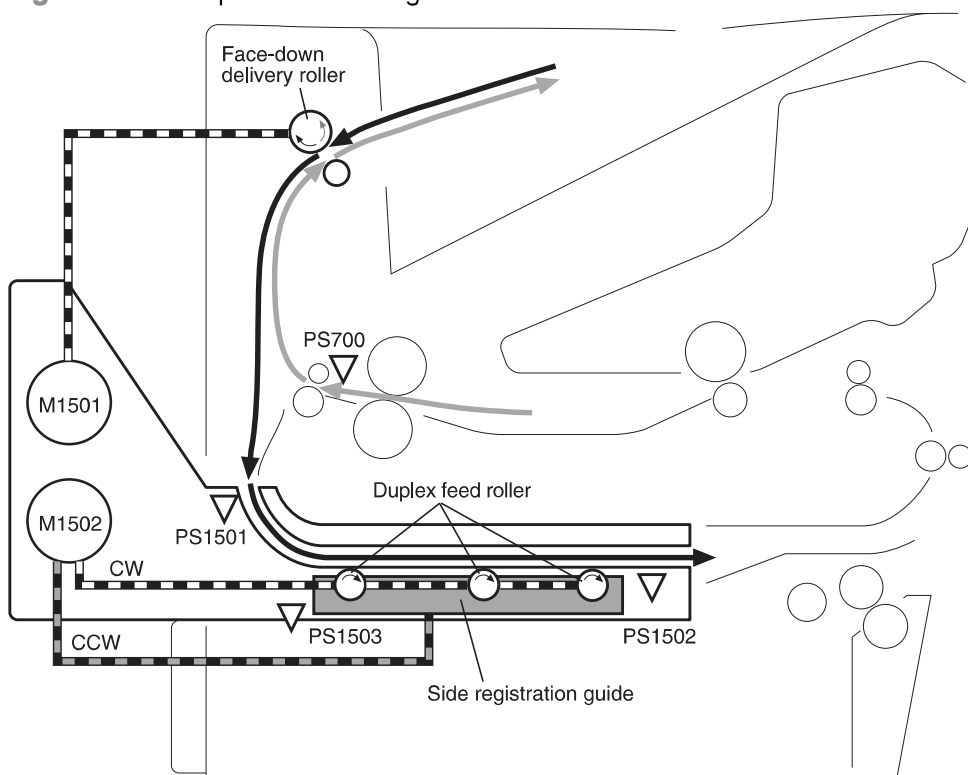
## Reverse-and-re-pickup operation (DP)

1. The duplex driver reverses the duplex re-pickup motor (M1502) when it receives a side registration adjustment command from the DC controller. See [Side registration adjustment operation \(DP\) on page 56](#).
2. The DC controller outputs a duplex reverse motor rotation command to the duplex driver after a specified period from when the fuser delivery sensor (PS700) of the product detects the leading edge of the page.
3. The duplex driver rotates the duplex reverse motor (M1501) and the page is fed to the face-down tray when the command is received.
4. The DC controller outputs a duplex reverse motor reverse command to the duplex driver after a specified period from when the fuser delivery sensor detects the trailing edge of a page.
5. The duplex driver reverses the duplex reverse motor and the page is fed to the duplexer along the side registration guide when the command is received.
6. The duplex driver rotates the duplex re-pickup motor after a specified period from when it reverses the duplex reverse motor. The media is fed by the oblique roller and the duplex feed rollers so that the edge contacts with the left plate to correct a skewed feed.
7. The duplex driver stops the duplex reverse motor after a specified period from when the DC controller reverses the duplex reverse motor.
8. The duplex driver stops the duplex re-pickup motor after a specified period from when the duplex media re-pickup sensor (PS1502) detects the leading edge of the page.

9. The duplex driver rotates the duplex re-pickup motor when it receives a duplex re-pickup command from the DC controller. The page is fed to the pre-feed sensor (PS102) of the product at the same product feed speed.
10. The duplex driver stops duplex re-pickup motor after a specified period from when the duplex media re-pickup sensor detects the trailing edge of the page.

The DC controller determines a print error and delivers media to the delivery tray without duplex printing if it encounters following conditions after the page is picked up for the first side printing.

**Figure 1-43** Duplexer block diagram



Description		Signal	Driver
DP reverse motor	M1501	DUPLEX REVERSE MOTOR DRIVE signal	DP driver
DP re-pick motor	M1502	DUPLEX RE-PICK MOTOR signal	DP driver
Face-up sensor	PS1501	FACE-UPsignal	DP driver
DP media re-pick sensor	PS1502	DUPLEX MEDIA RE-PICK signal	DP driver
Side registration guide home-position sensor	PS1503	SIDE REGISTRATION GUIDE HOMEPOSITION signal	DP driver

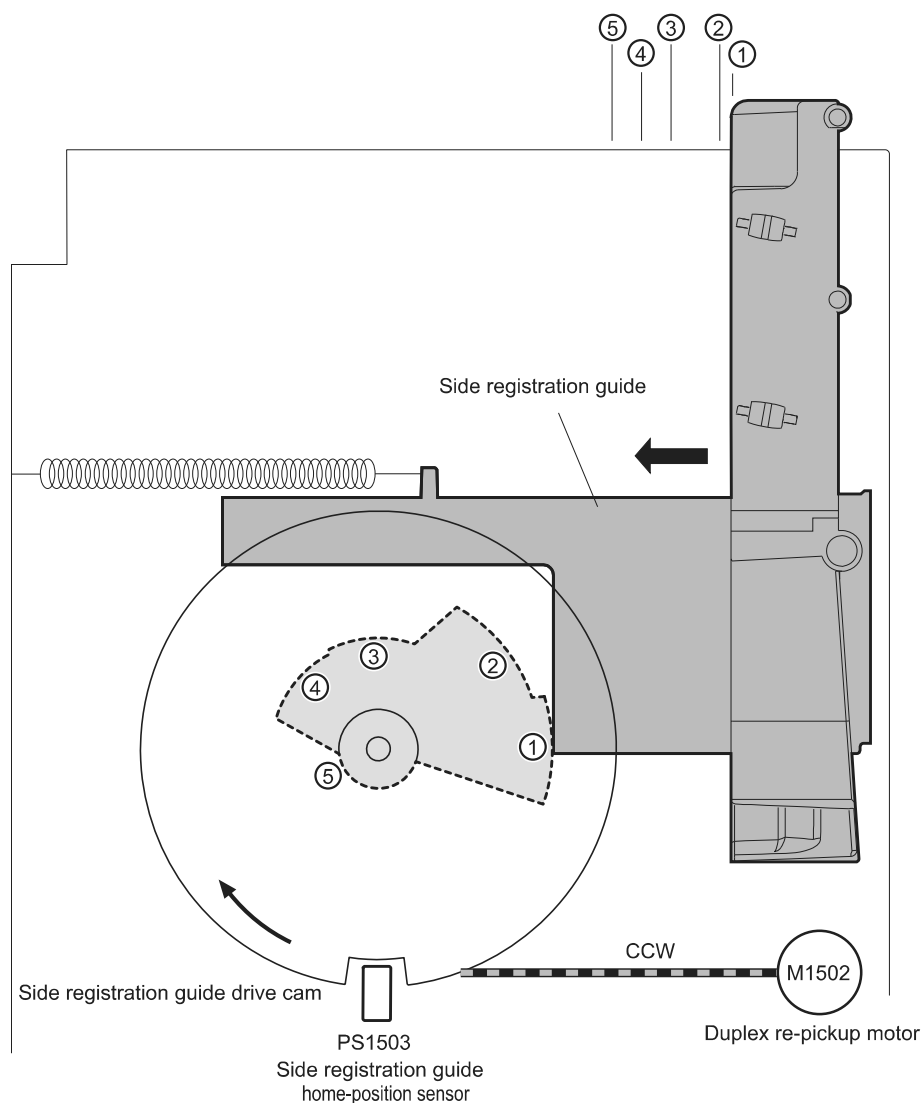
## Side registration adjustment operation (DP)

The product adjusts the side registration during a duplex print operation to align the center of the horizontal scanning on the second side with that of the print area on the photosensitive drum.

The side registration adjustment is made by moving the side registration guide to the designated page size of the side registration adjustment command. The side registration guide moves to the following five positions depending on the media size in order of numbers 1 to 5 and then back to 1.

1. Letter or Legal (home position)
2. A4
3. Executive
4. B5
5. A5

**Figure 1-44** Side registration adjustment operation (DP)



The sequence of the side registration adjustment operation is as follows:

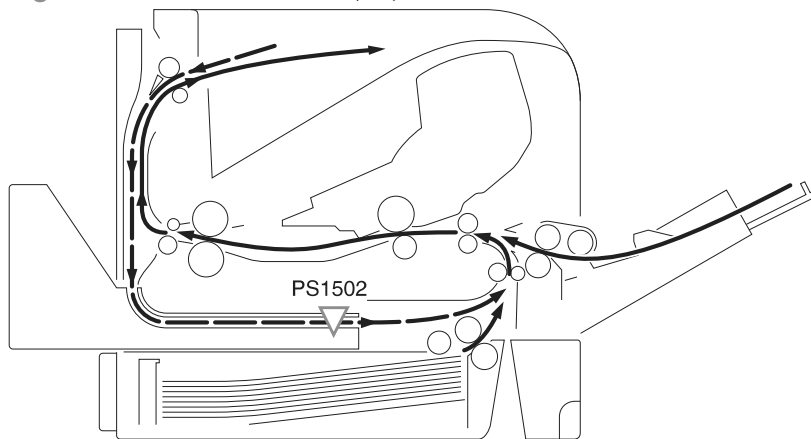
1. The duplex driver reverses the duplex re-pickup motor (M1502) when it receives a side registration adjustment command from the DC controller.
2. The side registration guide drive cam rotates and the side registration guide home-position sensor (PS1503) detects the home position of the side registration guide. Then the side registration guide moves depending on the media size.
3. The duplex driver stops the duplex re-pickup motor and completes the side registration guide movement.

The duplex driver determines a side registration guide failure and notifies the DC controller when the side registration guide home-position sensor does not detect the home position after the side registration guide drive cam rotates twice.

## Jam detection (DP)

The duplex unit uses the duplex media re-pickup sensor (PS1502) to detect the presence of media and to check whether media is being fed correctly or has jammed.

**Figure 1-45** Jam detection (DP)



The duplexer determines a jam if the sensor detects media presence at a specified timing stored in the duplex driver.

The duplex driver stops a print operation and notifies the DC controller when it determines a jam has occurred.

### Duplex media reverse delay jam

- The duplex media re-pickup sensor (PS1502) does not detect the leading edge of media within a specified period from when the duplex reverse motor starts reverse rotation.

### Duplex media re-pickup stationary jam

- The duplex media re-pickup sensor (PS1502) does not detect the trailing edge of media within a specified period from when the re-pickup operation starts.

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## 2 Removal and replacement

- [Introduction](#)
- [Removal and replacement strategy](#)
- [Electrostatic discharge](#)
- [Required tools](#)
- [Types of screws](#)
- [Service approach](#)
- [Customer replaceable units \(CRUs\)](#)
- [Covers](#)
- [Main assemblies](#)
- [1,500-sheet paper deck \(PD\)](#)



**NOTE:** Your product might not appear exactly as the one shown in the photos in this chapter. Although details such as the color of the external panels and covers might be different than your product, the procedures in this chapter are appropriate for your product.

---

# Introduction

This chapter describes the removal and replacement of field-replaceable units (FRUs) only.

Replacing FRUs is generally the reverse of removal. Occasionally, notes and tips are included to provide directions for difficult or critical replacement procedures.


HP does *not* support repairing individual subassemblies or troubleshooting to the component level.

Note the length, diameter, color, type, and location of each screw. Be sure to return each screw to its original location during reassembly.

Incorrectly routed or loose wire harnesses can interfere with other internal components and can become damaged or broken. Frayed or pinched harness wires can be difficult to find. When replacing wire harnesses, always use the provided wire loops, lance points, or wire-harness guides and retainers.


## Removal and replacement strategy


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 **WARNING!** Turn the product off, wait 5 seconds, and then remove the power cord before attempting to service the product. If this warning is not followed, severe injury can result, in addition to damage to the product. The power must be on for certain functional checks during troubleshooting. However, disconnect the power supply during parts removal.

Never operate or service the product with the protective cover removed from the laser/scanner assembly. The reflected beam, although invisible, can damage your eyes.

The sheet-metal parts can have sharp edges. Be careful when handling sheet-metal parts.

 **CAUTION:** Do not bend or fold the flat flexible cables (FFCs) during removal or installation. Also, do not straighten pre-folds in the FFCs. You *must* fully seat all FFCs in their connectors. Failure to fully seat an FFC into a connector can cause a short circuit in a PCA.



 **NOTE:** To install a self-tapping screw, first turn it counterclockwise to align it with the existing thread pattern, and then carefully turn it clockwise to tighten. Do not overtighten. If a self-tapping screw-hole becomes stripped, repair the screw-hole or replace the affected assembly.

 **TIP:** For clarity, some photos in this chapter show components removed that would not be removed to service the product. If necessary, remove the components listed at the beginning of a procedure before proceeding to service the product.

---

## Electrostatic discharge

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 **CAUTION:**  Some parts are sensitive to electrostatic discharge (ESD). Look for the ESD reminder when removing product parts. Always perform service work at an ESD-protected workstation or mat, or use an ESD strap. If an ESD workstation, mat, or strap is not available, ground yourself by touching the sheet-metal chassis *before* touching an ESD-sensitive part.

Protect the ESD-sensitive parts by placing them in ESD pouches when they are out of the product.

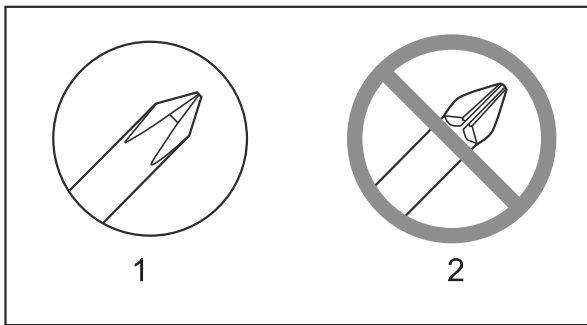
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## Required tools

- #2 Phillips screwdriver with a magnetic tip and a 152-mm (6-inch) shaft length
- Small flat blade screwdriver
- Needle-nose pliers
- ESD mat or ESD strap (if one is available)
- Penlight (optional)

**⚠ CAUTION:** Always use a Phillips screwdriver (callout 1). Do not use a Pozidriv screwdriver (callout 2) or any motorized screwdriver. These can damage screws or screw threads.

**Figure 2-1** Phillips and Pozidriv screwdriver comparison



# Types of screws

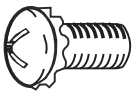
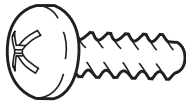
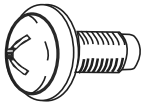

This table describes the screws that are used in the product and provides guidelines to help determine where each type of screw is used. The screws can vary in length depending on the thickness of the material that is being fastened.

Always note where each type of screw is located and replace each one in its original location.

**⚠ WARNING!** Make sure that components are replaced with the correct screw type. Using the incorrect screw (for example, substituting a long screw for the correct shorter screw) can cause damage to the product or interfere with product operation. Do not intermix screws that are removed with one component with the screws that are removed from another component.

**💡 TIP:** When you are disassembling the product, place the screws into the chassis holes from which they were removed. This prevents their loss, and ensures that the proper type and length of screw for each location is used when the product is reassembled.

**Table 2-1 Common fasteners used in this product**

Screw type	Purpose
	This screw is used to fasten metal to metal when good electrical contact is needed. This screw also provides high resistance to loosening.
Phillips-head machine screw with captive star washer	
	This screw is used to fasten sheet metal or plastic to plastic frames (the deep, coarsely spaced threads provide an increased holding capability while decreasing the possibility of stripping the target hole).
Phillips-head screw with self-tapping threads	
Reinstallation note: To install a self-tapping screw, first turn it counterclockwise to align it with the existing thread pattern, and then carefully turn it clockwise to tighten it. You will feel resistance and hear the screw click when it engages the existing threads in the hole. Do not overtighten the screw. If a self-tapping screw-hole becomes stripped, repair the screw-hole or replace the affected assembly.	
	This screw is used to fasten sheet metal parts to the sheet-metal chassis. It spans large clearance holes and distributes the load by increasing the bearing surface.
Phillips washer-head machine screw with a broad, flat washer attached to the screw head	
<div>6 mm    8 mm    10 mm    12 mm    M 3    M 4</div> <div>Screw measurement guide</div>	

# Service approach

## Before performing service

- Remove all media from the product.
- Turn off the power using the power button.
- Unplug the power cable and interface cable or cables.
- Place the product on an ESD workstation or mat, or use an ESD strap (if one is available). If an ESD workstation, mat, or strap is not available, ground yourself by touching the sheet-metal chassis *before* touching an ESD-sensitive part.
- Remove the print cartridge. See [Print cartridge on page 64](#).
- Remove the tray cassette or cassettes.

## After performing service

- Connect the interface cables, and then plug in the power cable.
- Reinstall the print cartridge.
- Reinstall the tray cassette or cassettes.
- If the 500-sheet paper feeder(s) or optional 1500-sheet paper deck was removed for service, place the product on the feeder(s) or deck. If applicable, engage the feeder or deck locks to secure the feeder(s) or deck to the product.

## Post-service test

Perform the following test to verify that the repair or replacement was successful.

### Print-quality test

1. Verify that you have completed the necessary reassembly steps.
2. Make sure that the tray or trays contains clean, unmarked paper.
3. Verify that the power cord and interface cable or interface cables are correctly connected, and then turn on the product.
4. Verify that the expected startup sounds occur.
5. Print a configuration page, and verify that the expected printing sounds occur.
6. Send a print job from the host computer, and then verify that the output meets expectations.
7. If necessary, restore any customer-specified settings.
8. Clean the outside of the product with a damp cloth.

# Customer replaceable units (CRUs)

## Print cartridge

1. Open the print-cartridge door.

**Figure 2-2** Remove the print cartridge (1 of 2)



2. Firmly grasp the print cartridge and pull it up and out of the product.

**⚠ CAUTION:** Do not expose the print cartridge to bright light or direct sunlight for long periods of time. This can damage the cartridge, which will result in print-quality defects. If the cartridge must be removed from the product for an extended amount of time, cover it and keep it out of bright light or direct sunlight.

**Figure 2-3** Remove the print cartridge (2 of 2)



## Tray 2

Pull the tray out, slightly lift up, and then pull it completely out of the product to remove it.

**Figure 2-4** Remove Tray 2



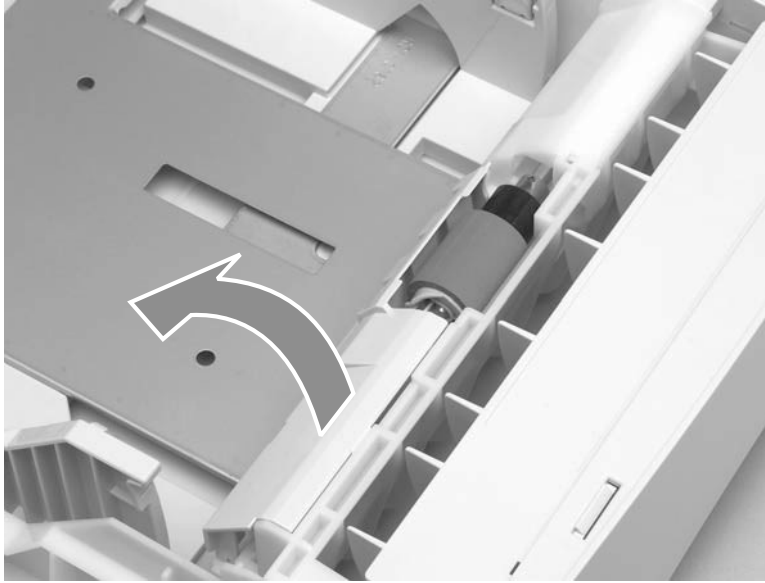
## Tray 2 separation, pickup, and feed rollers

**⚠ CAUTION:** When handling the rollers, avoid touching the roller surfaces. Skin oils and fingerprints on a roller surface can cause print-quality problems.

1. Remove Tray 2 and place it on a level work surface. Locate and open the spring-loaded cover that is next to the roller in Tray 2.

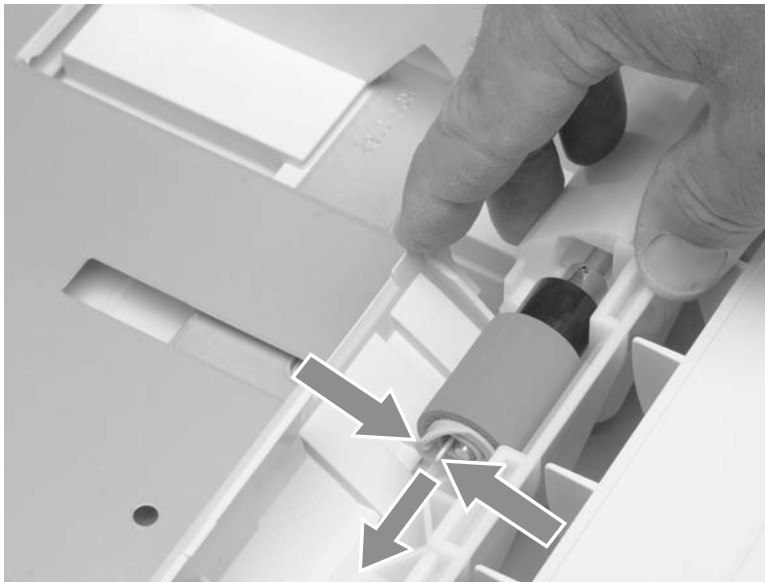
**⚠ CAUTION:** When you install this roller, make sure that it locks into place. Verify that the roller is correctly oriented, and that the torque limiter next to the roller is correctly positioned against the locking pin on the shaft.

**Figure 2-5** Remove the Tray 2 separation, pickup, and feed rollers (1 of 4)



2. Pinch the blue tab that is on the left side of the roller. Slide the roller off of the shaft.

**Figure 2-6** Remove the Tray 2 separation, pickup, and feed rollers (2 of 4)



3. Move the front of the product to the edge of the work surface for better access to the remaining pickup and feed rollers. To find the rollers, look up into the inside of the opening that was created when you removed Tray 2.

---

**⚠ WARNING!** Do not allow the front of the product to extend beyond the edge of the work surface. The product can become unbalanced and fall, which can cause damage to the product or personal injury to the service technician.


---

**Figure 2-7** Remove the Tray 2 separation, pickup, and feed rollers (3 of 4)




4. Pinch the locking tab on the left side of the feed roller (the front top roller below). Slide the roller off of the shaft. Repeat this step for the pickup roller (the bottom roller below).

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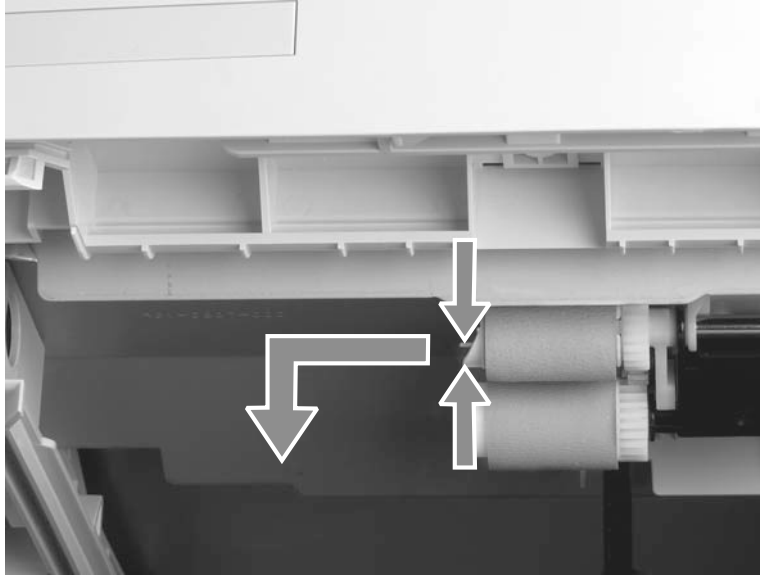
 **Reinstallation tip** You might have to rotate the roller to gain access to the locking tab.

---

 **NOTE:** When you install these rollers, make sure that the rollers lock into place on the tabs that are on the drive gears.

---

**Figure 2-8** Remove the Tray 2 separation, pickup, and feed rollers (4 of 4)



## Transfer roller

**⚠ CAUTION:** Do not touch the black rubber on the roller. Skin oils on the roller can cause print-quality problems. The use of disposable gloves is recommended when you remove the transfer roller.

1. Open the front cover.

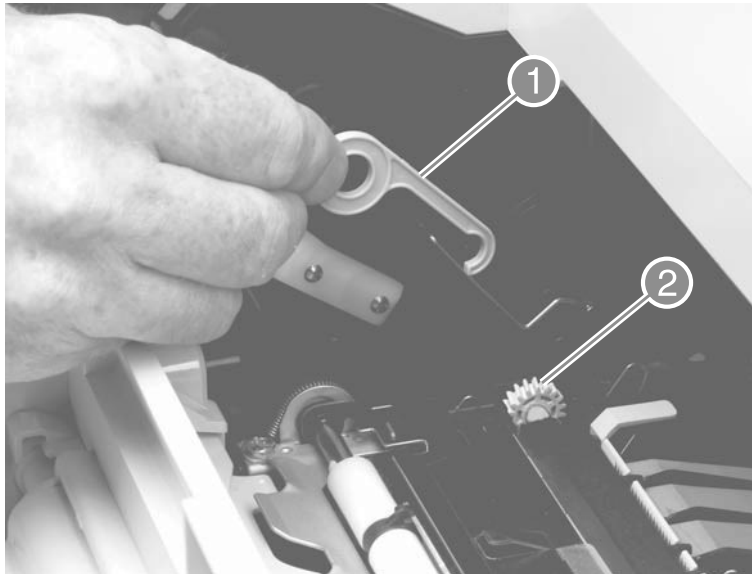
**📝 NOTE:** If the print cartridge was not removed prior to servicing the product, remove it now.

2. Use a transfer-roller removal hook (callout 1) to lift the left end of the metal shaft out of place near the blue gear (callout 2). If a removal hook is not available use a flatblade screwdriver. Slide the transfer roller to the left to remove it.

**⚠ CAUTION:** Be careful to release and lift the left side of the roller *first*, and then slide the roller out.

**📝 NOTE:** The transfer-roller removal hook is included with a transfer-roller replacement kit.

**Figure 2-9** Remove the transfer roller



**💡 Reinstallation tip** When you install the transfer roller, make sure that the black collar on the left side is oriented correctly, with the open end face-down (the solid end is face-up).

## Fuser

**⚠ WARNING!** The fuser might be very hot. After turning off the product power, allow the fuser to cool for at least 5 minutes before removing it.

**Before proceeding, remove the following components:**

- Rear output bin. See [Rear output bin on page 87](#).
- Duplex accessory or cover. See [Duplex accessory or cover on page 90](#).

### Remove the fuser

1. Squeeze the blue fuser-release tabs (callout 1).

**Figure 2-10** Remove the fuser (1 of 2)



2. Pull the fuser straight back and out of the product.

**CAUTION:** Do not drop or jar the fuser. It can easily be damaged if it is mishandled.

**TIP:** When you replace the fuser, make sure that it is fully seated into the product. You should hear both sides snap into place.

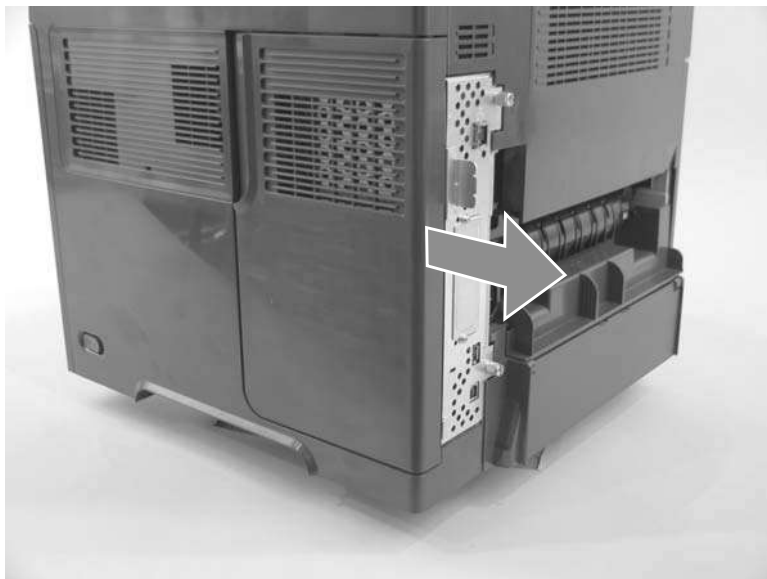
**Figure 2-11** Remove the fuser (2 of 2)



## Formatter cover and formatter cage

1. Grasp the formatter cover.
2. Pull the cover straight back and away from the product.

**Figure 2-12** Remove the formatter cover and formatter cage (1 of 3)




3. Remove two thumb screws (callout 1)

**Figure 2-13** Remove the formatter cover and formatter cage (2 of 3)



4. Carefully slide the formatter cage away from the product to remove it.

 **NOTE:** If you installing a replacement formatter, transfer the hard drive and memory DIMM (if installed) to the replacement formatter. See [Hard drive on page 74](#) and [Memory DIMM on page 80](#).

**Figure 2-14** Remove the formatter cover and formatter cage (3 of 3)



## Installing a new formatter


---

 **CAUTION:** Do not replace the DC controller and the formatter at the same time.

---

1. Install the hard drive and memory DIMM from the discard formatter on the replacement formatter.
2. Turn the product on and then wait for five minutes after the product reaches the **Ready** state.

---

 **NOTE:** Five minutes is required to allow for NVRAM settings to be written.

---

3. Turn the product off.
4. Turn the product on and then wait for five minutes after the product reaches the **Ready** state.
5. Print a configuration page to verify against original settings.

## Hard drive

A solid state module (SSM) or a crypto hard-disk drive (HDD) device is installed depending on the product model.

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**CAUTION:**  ESD sensitive component.

---

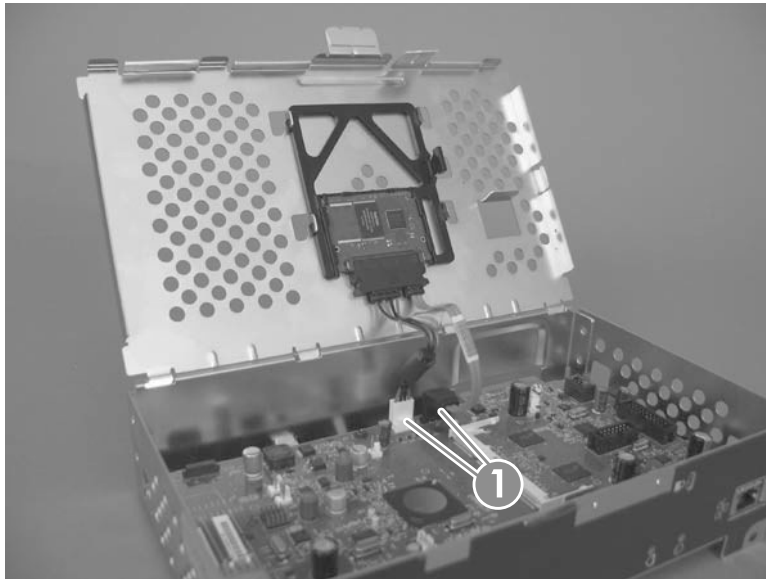
**Before proceeding, remove the following components:**

- Formatter cover, formatter cage, and formatter PCA. See [Formatter cover and formatter cage on page 71](#).


### Remove the SSM

1. Open the formatter cage door, and then disconnect two connectors (callout 1).

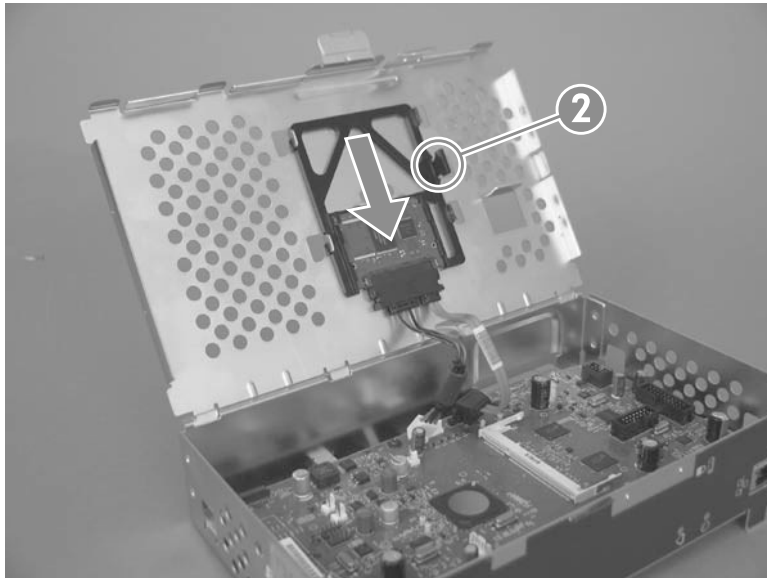
**Figure 2-15** Remove the SSM (1 of 3)




2. Release one tab (callout 2), and then slide the SSM toward the hinge side of the door.


 **TIP:** It might be easier to remove the SSM if you separate the formatter cage door from the cage. Slide the door toward the top of the cage, and then separate the components.

**Figure 2-16** Remove the SSM (2 of 3)

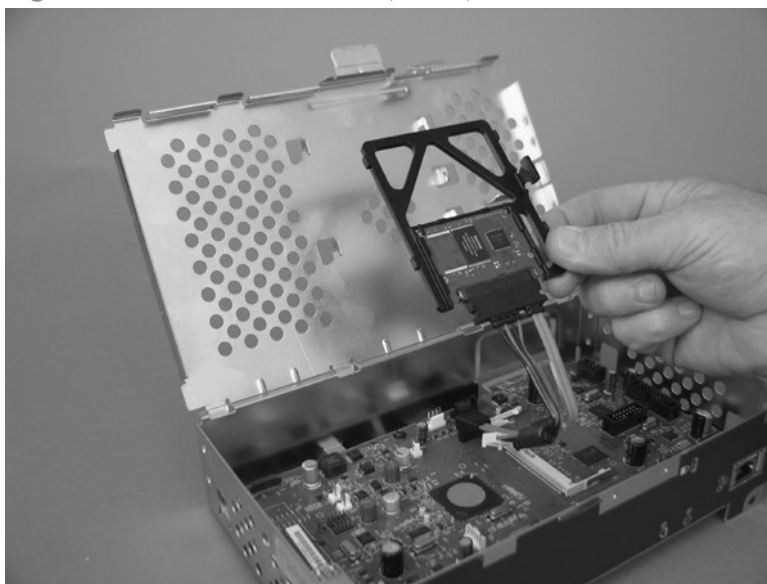


3. Remove the SSM from the cage door.

 **NOTE:** Slide the SSM out of the mounting cradle to separate the components. Do not lose the cradle while handling the SSM.

 **Reinstallation tip** Use the cradle to install a replacement SSM. After installing a replacement hard drive, you must reload the firmware by performing a firmware upgrade. See [Installing a replacement hard drive on page 78](#).

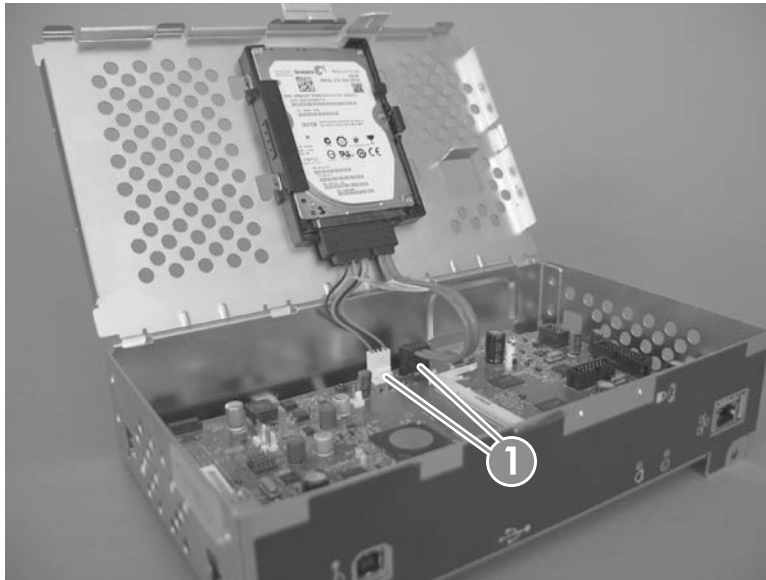
**Figure 2-17** Remove the SSM (3 of 3)




## Remove the encrypted HHD

1. Open the formatter cage door, and then disconnect two connectors (callout 1).

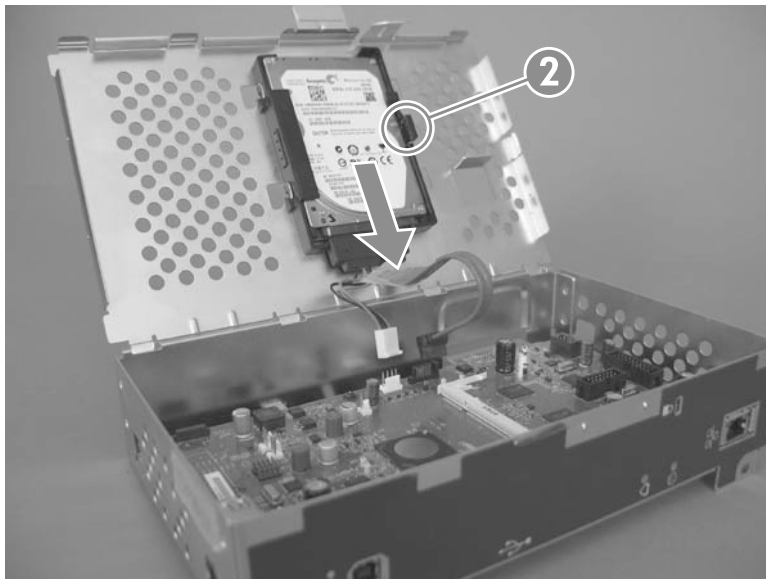
**Figure 2-18** Remove the encrypted HHD (1 of 4)




2. Release one tab (callout 2), and then slide the HHD toward the hinge side of the door.

 **TIP:** It might be easier to remove the HHD if you separate the formatter cage door from the cage. Slide the door toward the top of the cage, and then separate the components.

**Figure 2-19** Remove the encrypted HHD (2 of 4)




3. Remove the HDD from the cage door.

 **NOTE:** The HDD rails (callout 3) are not captive and can be easily separated from the component. Do not lose the rails while handling the HDD.

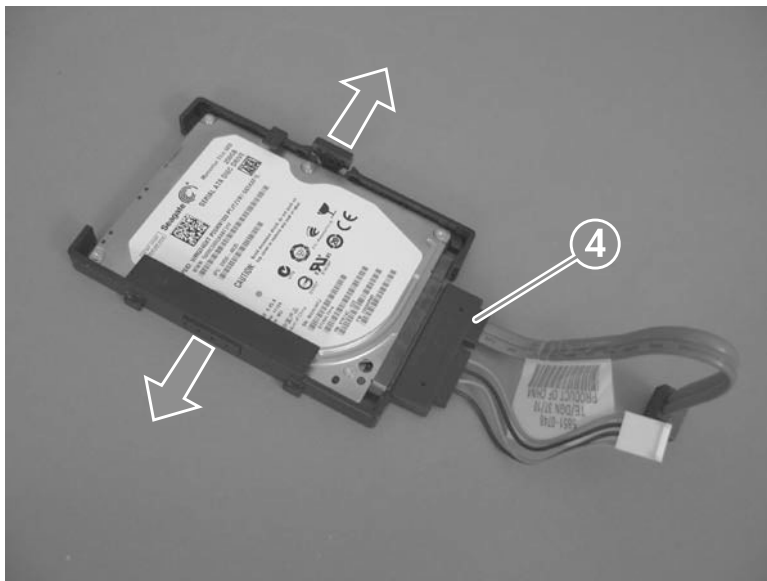
**Figure 2-20** Remove the encrypted HDD (3 of 4)



4. Disconnect one connector (callout 4), and then remove the HDD mounting rails. Do not lose the rails while handling the HDD.

 **Reinstallation tip** Use the rails to install a replacement HDD. After installing a replacement hard drive, you must reload the firmware by performing a firmware upgrade. See [Installing a replacement hard drive on page 78](#).

**Figure 2-21** Remove the encrypted HDD (4 of 4)




## Installing a replacement hard drive

After installing a replacement hard drive, you must reload the firmware by performing a firmware upgrade.

### Perform a firmware upgrade

1. Go to [www.hp.com/support/lj600Series](http://www.hp.com/support/lj600Series) and follow the on screen steps to download the most recent firmware upgrade files for this product.
2. Copy the firmware upgrade file to the root directory of a USB storage accessory. The firmware upgrade file has a .bdl extension.

---

 **NOTE:** Use a standard USB storage accessory that uses File Allocation Table (FAT) file systems and that does not have a CD-ROM partition.

---

3. Insert the USB storage accessory into the USB port on the bottom edge of the control panel.
4. SSM: see [SSM firmware upgrade on page 78](#).


**-or-**

HDD: see [HDD firmware upgrade on page 79](#).

### SSM firmware upgrade

1. Turn the product on. The message **Error 99.09.67 Disk Not Bootable** appears on the control-panel display. Press the **OK** button to continue.
2. Wait for the **Preboot** menu to appear on the control-panel display, and then press the down arrow ▼ button to scroll to **Administrator**. Press the **OK** button to select it.
3. Press the down arrow ▼ button to scroll to **Download**. Press the **OK** button to select it.
4. Press the down arrow ▼ button to scroll to **USB Thumbdrive**. Press the **OK** to select it.
5. Several .bdl files might be listed. Press the down arrow button to scroll to the firmware upgrade file that you downloaded earlier. Press the **OK** button to select it.


---

 **NOTE:** If no .bdl files are listed, try saving the file to a different USB storage accessory.

---

6. Wait while the file transfers. When the transfer is complete, the message **Complete** appears on the screen.
7. Turn the product off, remove the USB storage accessory, and then turn the product on. Wait for several minutes while the product initializes.

---

 **NOTE:** If the upgrade is unsuccessful, try sending the firmware upgrade file again.

---

## HDD firmware upgrade

1. Turn the product on. The message **Error 99.09.63 Incorrect Disk** appears on the control-panel display. Press the **OK** button to continue.
2. Wait for the **Preboot** menu to appear on the control-panel display, and then press the down arrow ▼ button to scroll to **Administrator**. Press the **OK** button to select it.
3. Press the down arrow ▼ button to scroll to **Manage Disk**. Press the **OK** button to select it.
4. Press the down arrow ▼ button to scroll to **Clear Disk Pass**. Press the **OK** button to select it.
5. The message **Proceed With Requested Action** appears. Press the **OK** button to select it.
6. Press the **#** button to return to the **Preboot** home menu screen.
7. Press the down arrow ▼ button to scroll to **Administrator**. Press the **OK** button to select it.
8. Press the down arrow ▼ button to scroll to **Download**. Press the **OK** button to select it.
9. Press the down arrow ▼ button to scroll to **USB Thumbdrive**. Press the **OK** button to select it.
10. Several .bdl files might be listed. Press the down arrow ▼ button to scroll to the firmware upgrade file that you downloaded earlier. Press the **OK** button to select it.



---

**NOTE:** If no .bdl files are listed, try saving the file to a different USB storage accessory.

---

11. Wait while the file transfers. When the transfer is complete, the message **Complete** appears on the screen.
12. Turn the product off, remove the USB storage accessory, and then turn the product on. Wait for several minutes while the product initializes.



---

**NOTE:** If the upgrade is unsuccessful, try sending the firmware upgrade file again.

---

## Memory DIMM

**CAUTION:**  ESD sensitive component.

**NOTE:** Depending on the model, a memory DIMM might not be installed. To increase the product memory, install a memory DIMM. See [Install the memory DIMM on page 81](#).

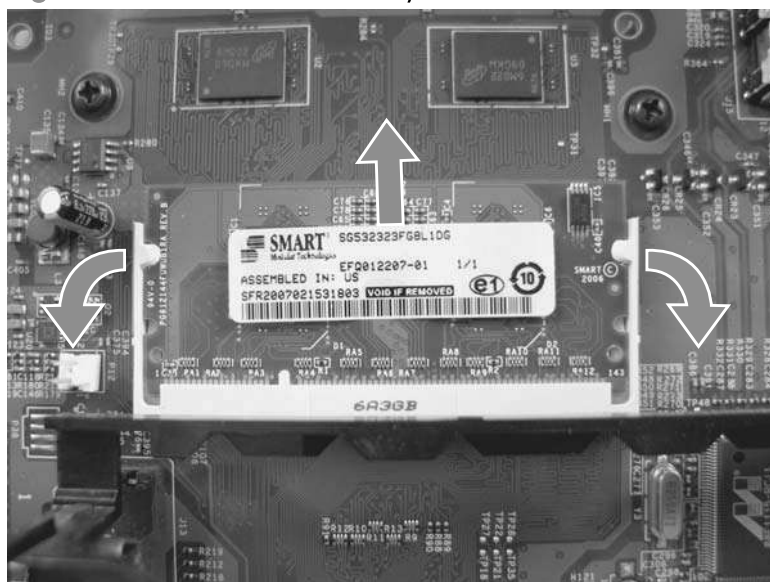
**Before proceeding, remove the following components:**

- Formatter cover. See [Formatter cover and formatter cage on page 71](#).

### Remove the memory DIMM

1. Open the formatter cage door.
2. Push the DIMM-locking arms away from the DIMM to release it, and then pull the DIMM out of the DIMM slot.

**Figure 2-22** Remove the memory DIMM



## Install the memory DIMM

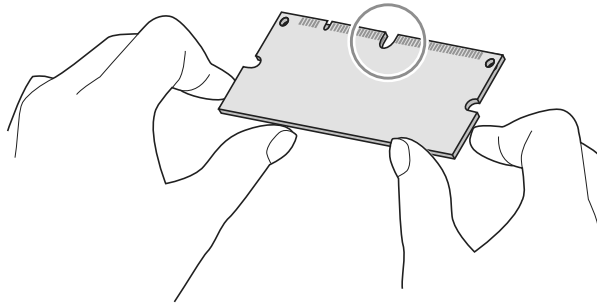
**⚠ CAUTION:**  ESD sensitive component.

Turn the product off. Disconnect the power cord and interface cables.

### Before proceeding, remove the following components:

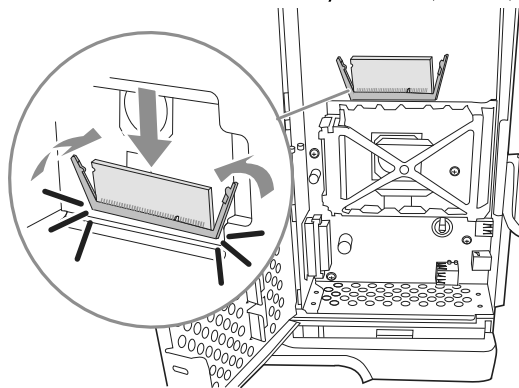
- Formatter cover. See [Formatter cover and formatter cage on page 71](#).
1. Open the formatter cage door.
  2. Remove the DIMM from the antistatic packadge.
  3. Hold the DIMM by the edges, and align the notches on the DIMM with the DIMM slot. (Check that the locks on each side of the DIMM slot are open.)

**Figure 2-23** Install the memory DIMM (1 of 2)



4. Press the DIMM straight into the slot, and press firmly. Make sure the locks on each side of the DIMM snap into place.

**Figure 2-24** Install the memory DIMM (2 of 2)



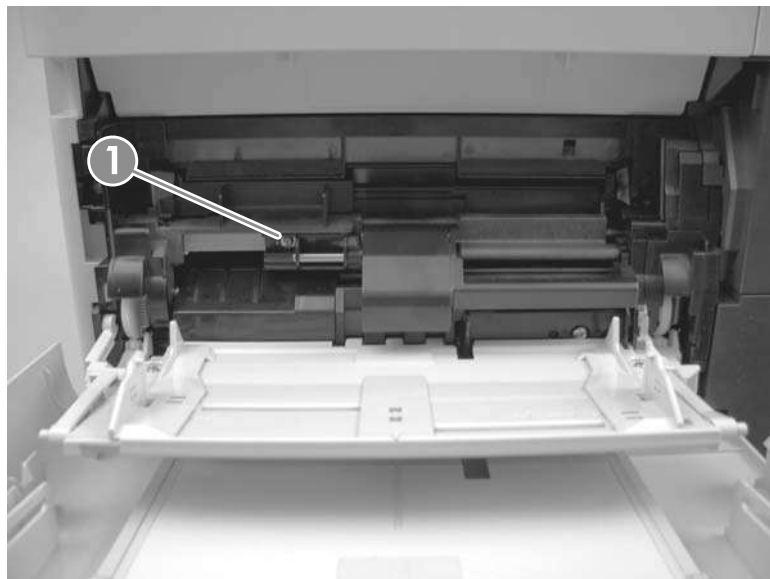
## Tray 1 pickup and feed rollers

**⚠ CAUTION:** When handling the rollers, avoid touching the roller surfaces. Skin oils and fingerprints on a roller surface can cause print-quality problems.

The Tray 1 pickup and feed rollers are also user-replaceable components.

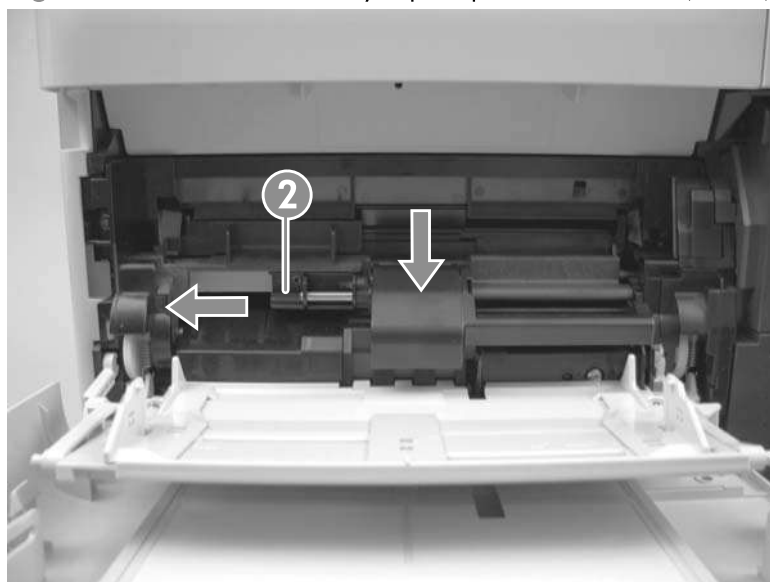
1. Open the front cover.
2. Remove one screw (callout 1) with a short screwdriver.

**Figure 2-25** Remove the Tray 1 pickup and feed rollers (1 of 4)



3. Push down on the roller-shaft bushing (callout 2) to release two alignment pins, and then slide the bushing to the left and off of the shaft to remove it.

**Figure 2-26** Remove the Tray 1 pickup and feed rollers (2 of 4)



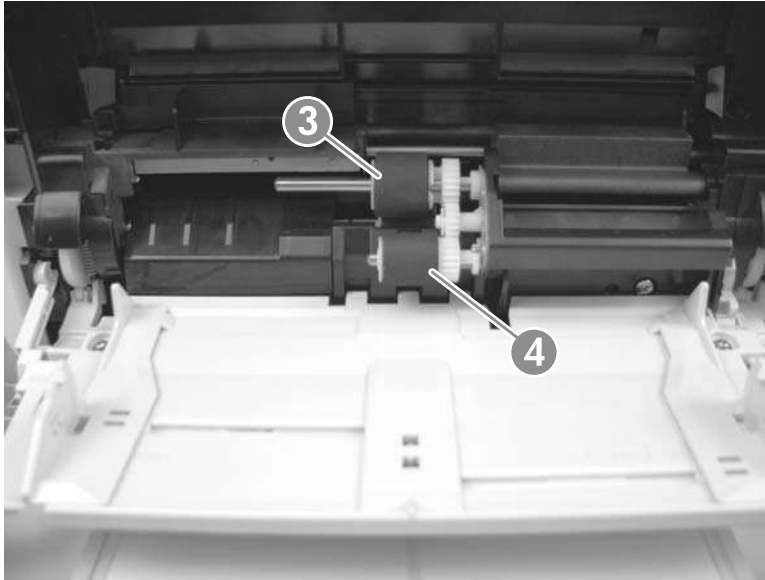
4. Slide the Tray 1 pickup and feed rollers cover slightly to the left to release it, and then lift the cover up to remove it.


**Figure 2-27** Remove the Tray 1 pickup and feed rollers (3 of 4)

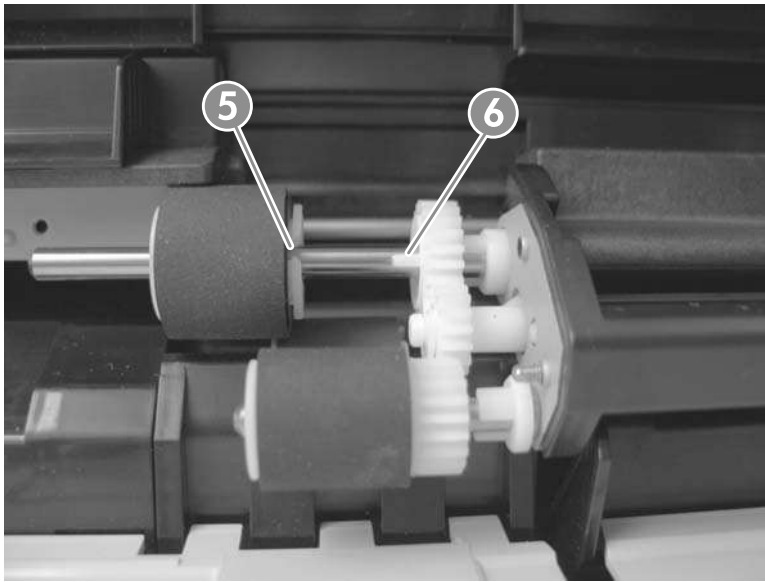


5. Slide the Tray 1 pickup roller (callout 3) and the feed roller (callout 4) to the left and off of the shafts to remove them.

**Figure 2-28** Remove the Tray 1 pickup and feed rollers (4 of 4)



 **TIP:** The pickup roller must fit over the drive tabs (callout 5) on the roller-drive gear (callout 6).



## Tray 1 separation roller

**CAUTION:** When handling the roller, avoid touching the roller surface. Skin oils and fingerprints on a roller surface can cause print-quality problems.

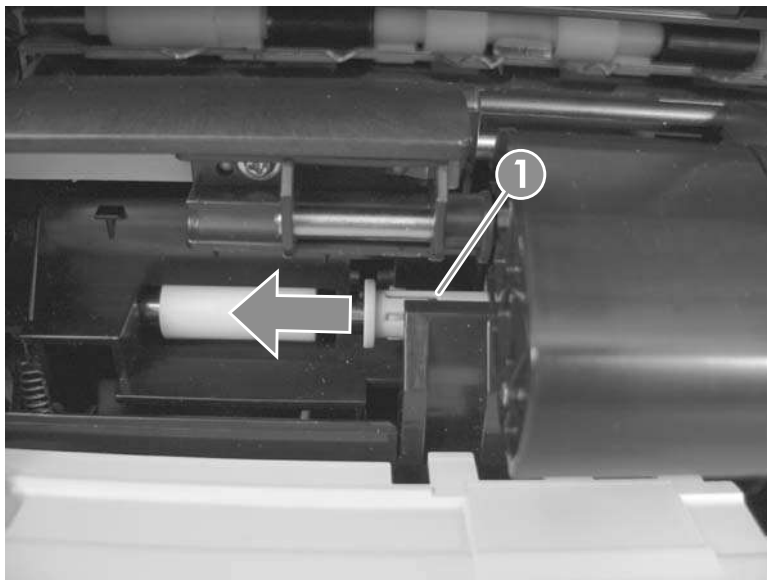
1. Open the front cover.
2. Rotate the spring-loaded cover downward to gain access to the roller.

**Figure 2-29** Remove the Tray 1 separation roller (1 of 3)



3. Slide the separation roller (callout 1) to the left to remove it.

**Figure 2-30** Remove the Tray 1 separation roller (2 of 3)



4. Remove the roller.

**Figure 2-31** Remove the Tray 1 separation roller (3 of 3)

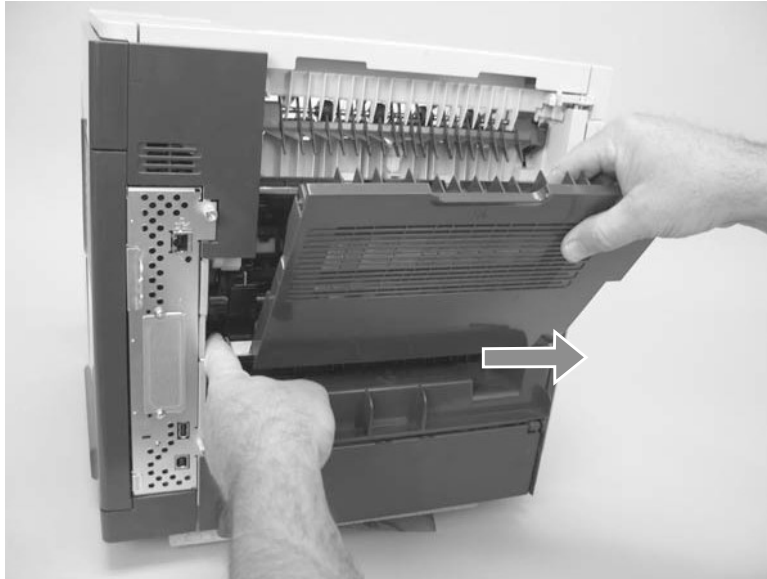


## Rear output bin

 **NOTE:** If the duplexer is installed, lift it up slightly and pull it away from the product to remove it.

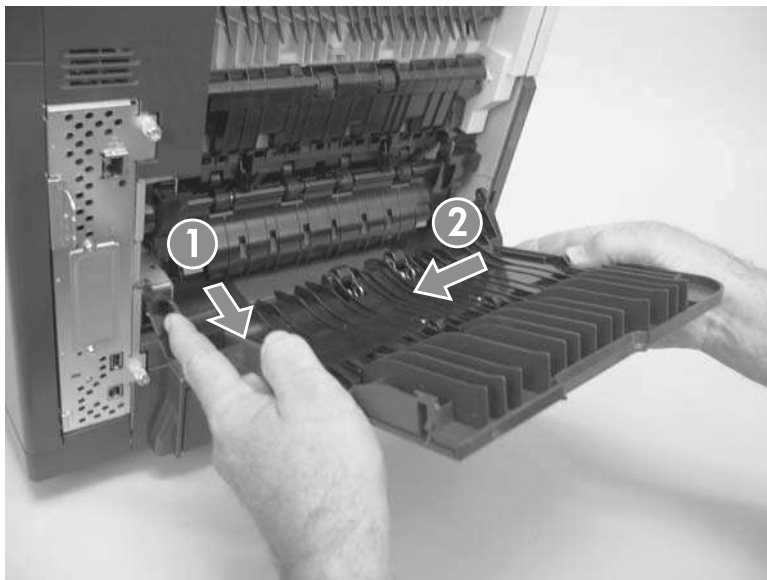
1. Open the rear output bin.
2. Squeeze the hinge pin out of its mounting hole.

**Figure 2-32** Remove the rear output bin (1 of 2)



3. Rotate the output bin away from the product until the right hinge pin is released, and then remove the output bin.

**Figure 2-33** Remove the rear output bin (2 of 2)

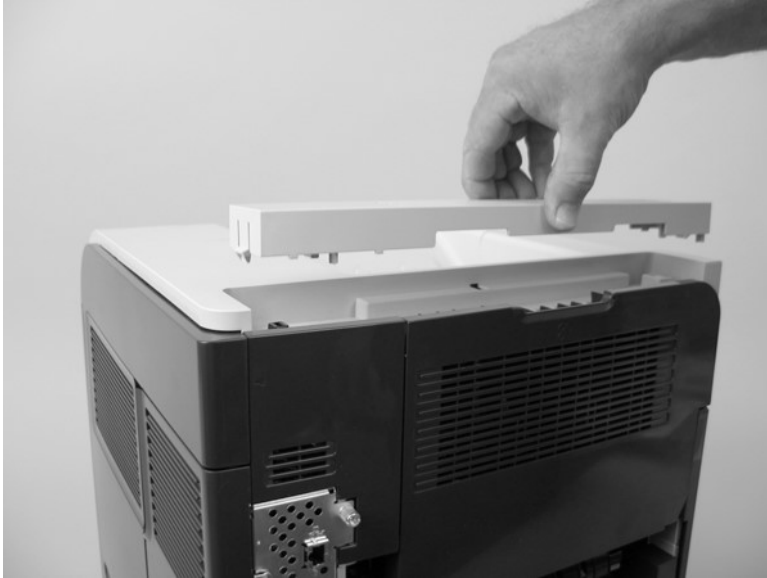


# Covers

## Top-accessory cover

Lift the top-accessory cover up and off the product.

**Figure 2-34** Remove the top-accessory cover



## Envelope feed accessory covers

1. Open the front cover. Grasp the inner front accessory cover, and then pull it straight out of the product.

**Figure 2-35** Remove the front accessory covers (1 of 2)



2. Rotate the top of the front accessory receptacle cover away from the product, and then pull it straight away from the product to remove it.

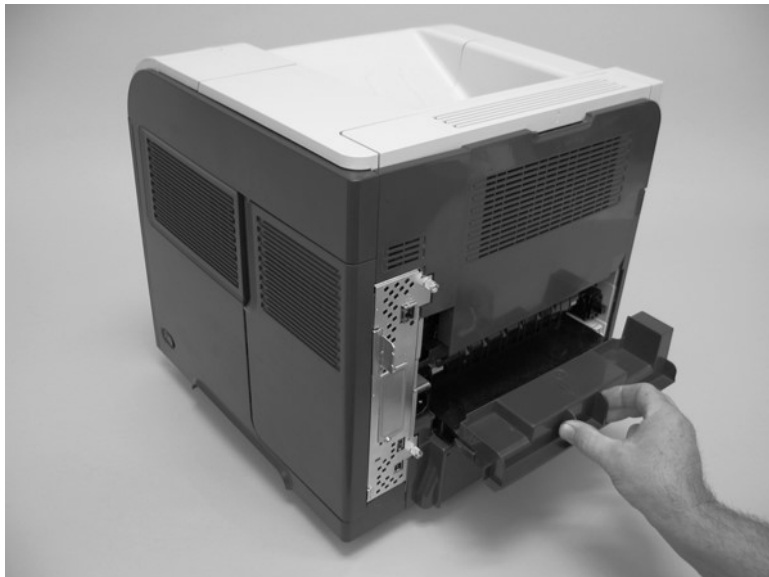
**Figure 2-36** Remove the front accessory covers (2 of 2)



## Duplex accessory or cover

Pull the duplex accessory or cover out, slightly lift up, and then pull it completely out of the product to remove it.

**Figure 2-37** Remove the duplex accessory cover



**Figure 2-38** Remove the duplex accessory



## Tray 2 extension door

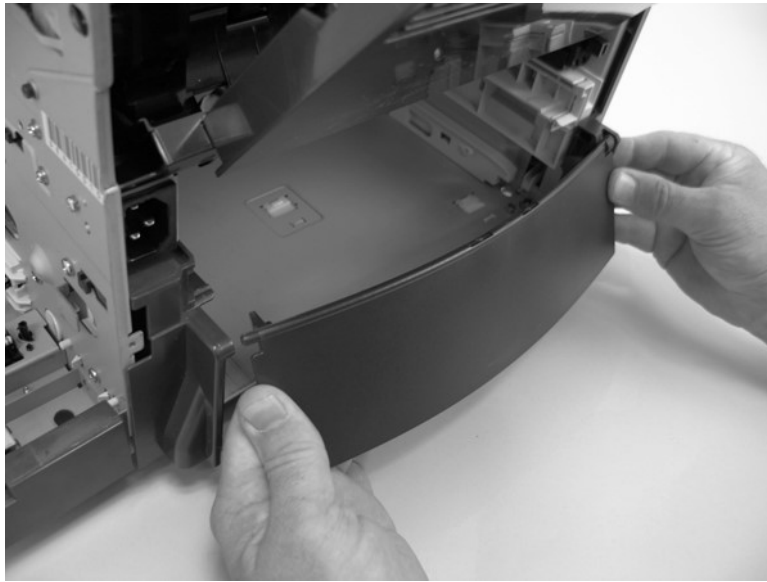
**Before proceeding, remove the following components:**

- Duplex accessory, or the duplex accessory cover. See [Duplex accessory or cover on page 90](#).

### Remove the Tray 2 extension door

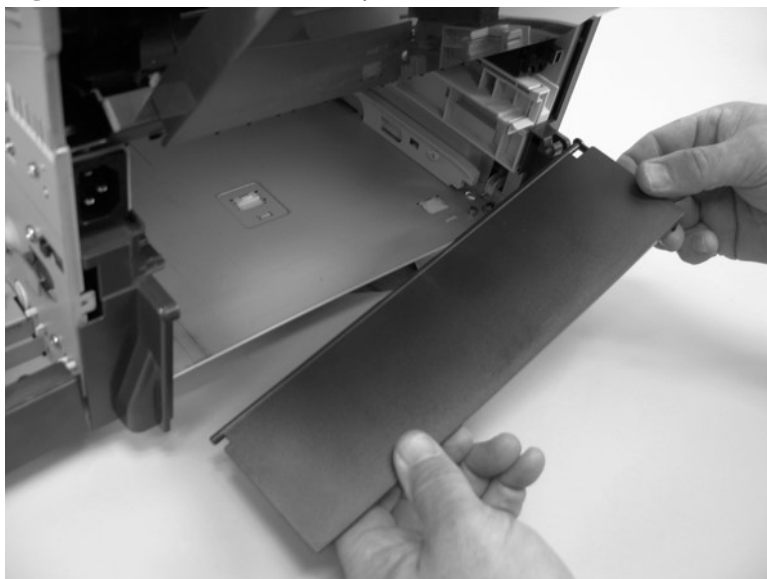
1. Carefully flex the Tray 2 extension door to release the hinge pin near the power cord side of the product.

**Figure 2-39** Remove the Tray 2 extension door (1 of 2)



2. Rotate the Tray 2 extension door to the horizontal position, and then pull up on the keyed hinge pin to release the door. Remove the Tray 2 extension door

**Figure 2-40** Remove the Tray 2 extension door (2 of 2)




## Top cover


**Before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).

### Remove the top cover

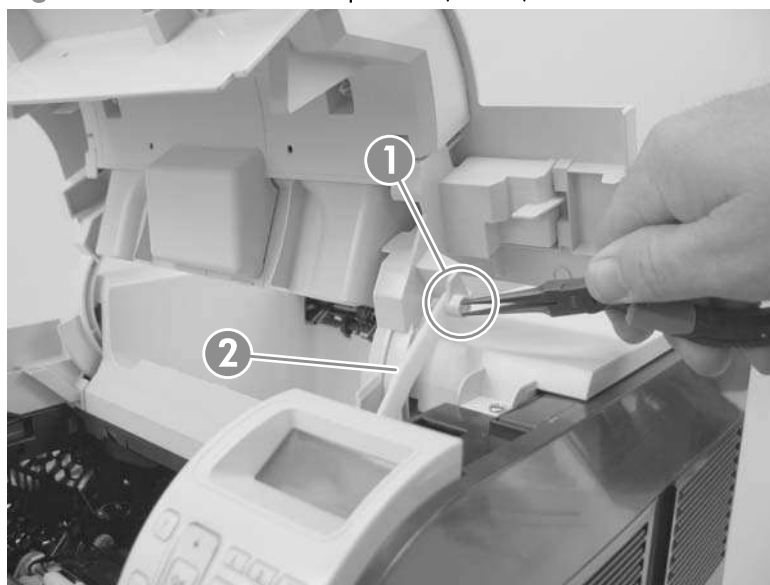
 **NOTE:** If the optional stapler/stacker or stacker accessory is installed, lift it straight up and off of the product to remove it. Then proceed to step 2.

1. Open the rear-output bin, the print-cartridge door, and the front cover.
2. Use needle-nose pliers to release the print-cartridge drive-arm tab (callout 1).

 **CAUTION:** The print-cartridge drive-arm tab is easily broken.

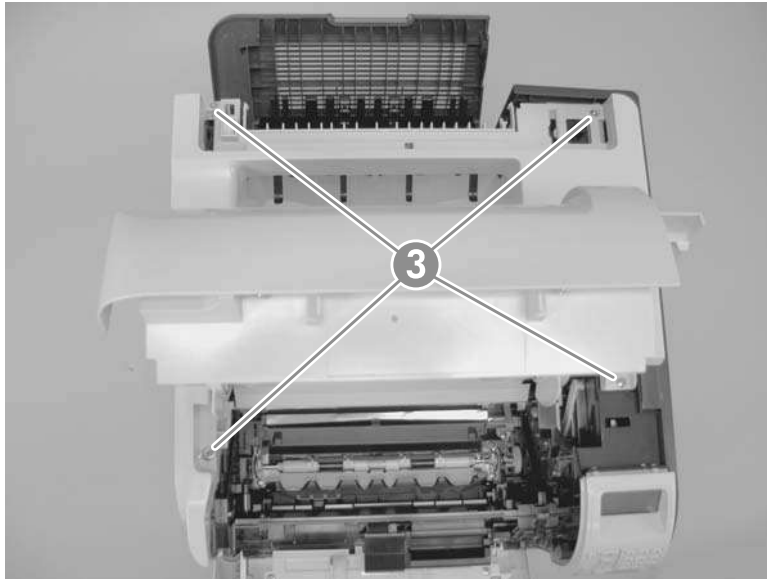
 **TIP:** Push the print-cartridge drive-arm (callout 2) back into the product to avoid damaging it when you remove the top cover.

**Figure 2-41** Remove the top cover (1 of 4)




3. Remove four screws (callout 3).

**Figure 2-42** Remove the top cover (2 of 4)



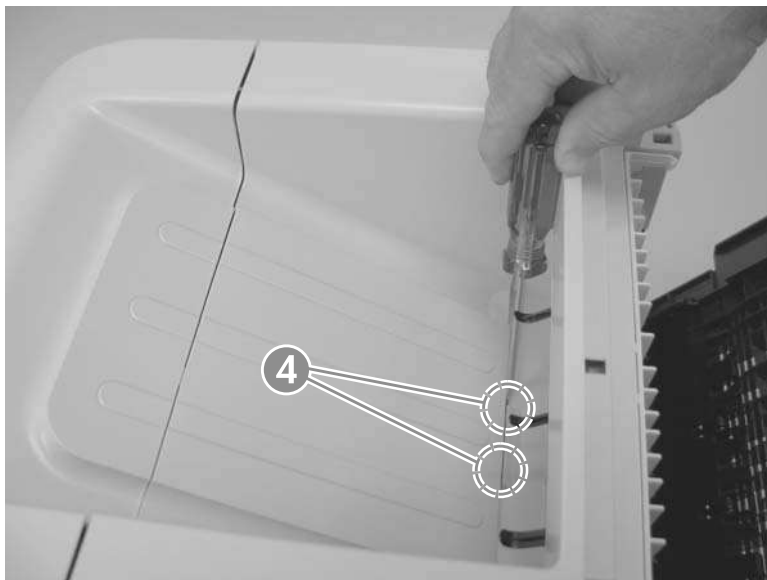
4. Partially close the print-cartridge door, and then use a small flat blade screwdriver to release two tabs (callout 4).

---

 **NOTE:** Make sure that these tabs are fully seated when the top cover is reinstalled.

---

**Figure 2-43** Remove the top cover (3 of 4)

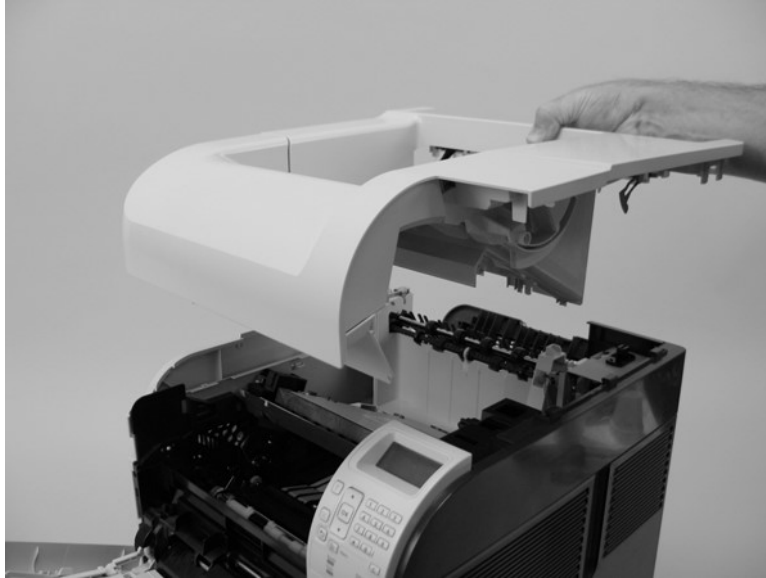


5. Lift the top cover up and off of the product to remove it.

**⚠ CAUTION:** The accessory pin (located in the left-rear corner of the cover) is not captive. Do not lose the pin.

---

**Figure 2-44** Remove the top cover (4 of 4)



## Right-side cover

**Before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).

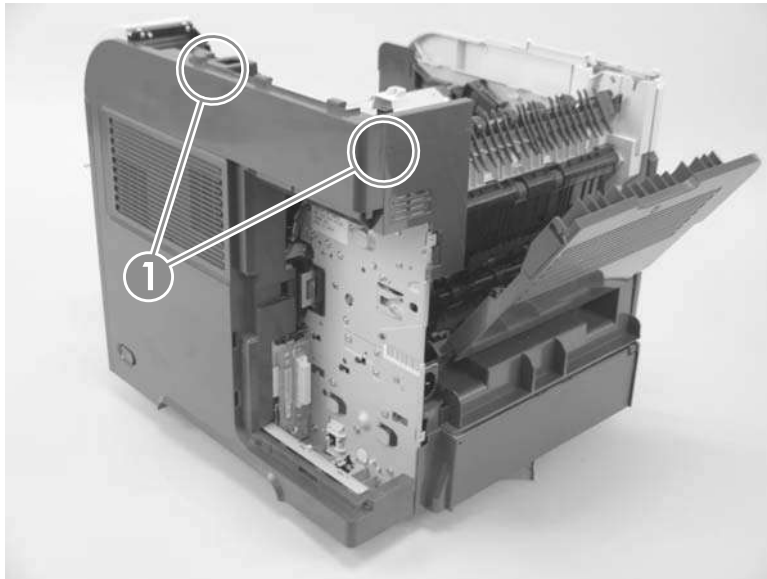
### Remove the right-side cover

1. Release two tabs (callout 1).



**TIP:** Look for the arrows embossed into the cover to locate the tab.

**Figure 2-45** Remove the right-side cover (1 of 3)



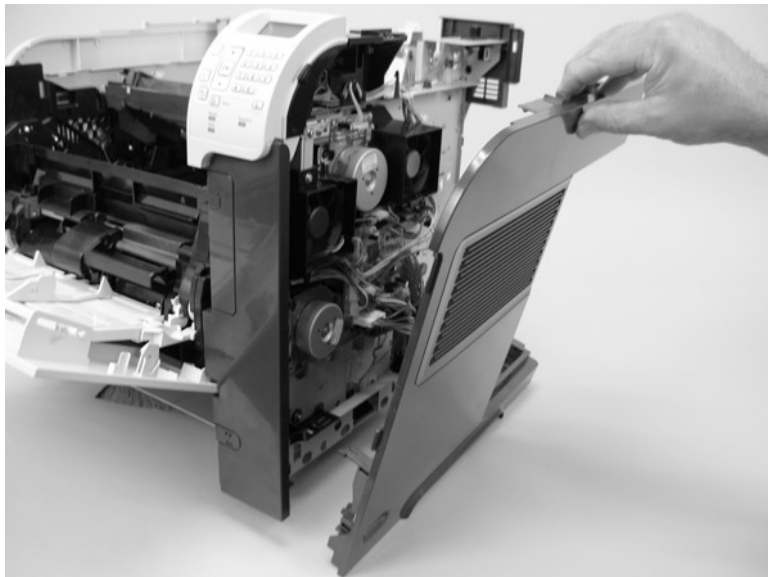
2. Carefully separate the cover from the product near the control panel.

**Figure 2-46** Remove the right-side cover (2 of 3)



3. Rotate the top of the cover away from the product, and then lift the cover up to remove it.

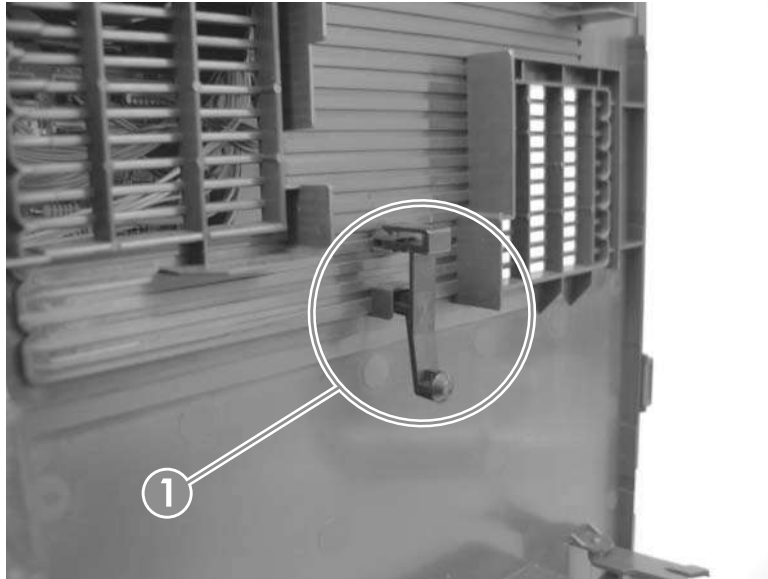
**Figure 2-47** Remove the right-side cover (3 of 3)



## Reinstall the right cover

- ▲ If you are installing a replacement cover, remove the engine-test button (callout 1) from the discarded cover and then install it on the replacement cover.

**Figure 2-48** Install the right cover




## Left-side cover

**Before proceeding, remove the following components:**

- Tray 2 extension door. See [Tray 2 extension door on page 91](#).

---

 **NOTE:** If Tray 2 was not removed prior to servicing the product, remove it now.

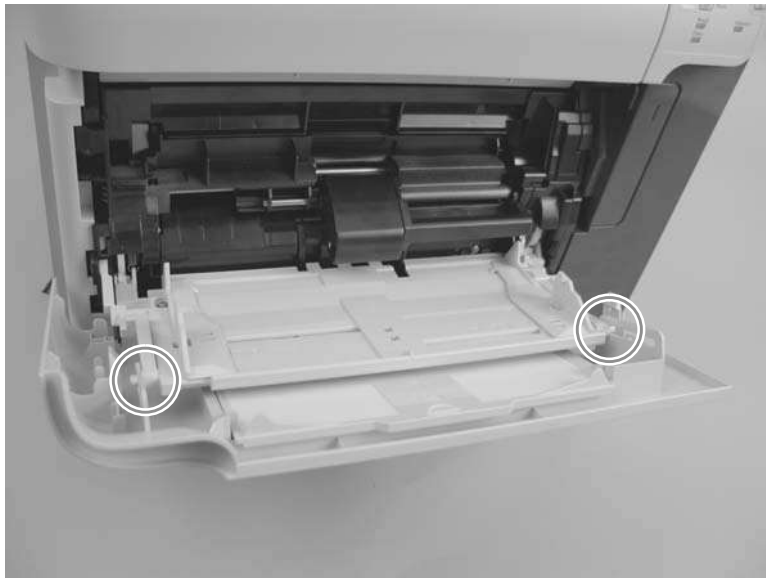
---

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Duplex accessory cover. See [Duplex accessory or cover on page 90](#).
- Top cover. See [Top cover on page 92](#).

### Remove the left-side cover

1. Gently pry the front-cover retainers off of the Tray 1 arms.

**Figure 2-49** Remove the left-side cover (1 of 3)



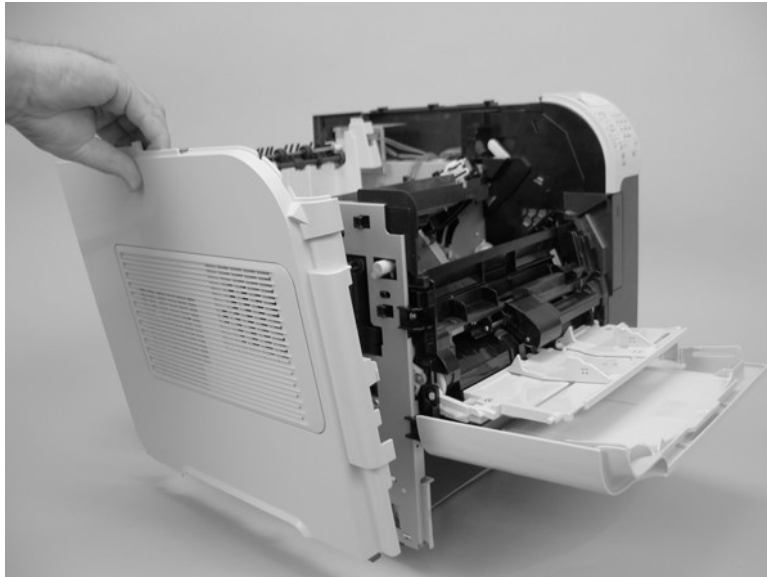
2. Release two tabs (callout 3), and then rotate the top of the cover away from the product and lift the cover up to remove it.

**Figure 2-50** Remove the left-side cover (2 of 3)



3. Rotate the top of the cover away from the product and lift the cover up to remove it.

**Figure 2-51** Remove the left-side cover (3 of 3)



## Right-front cover

Before proceeding, remove the following components:

- Walk-up USB cover, if installed.

---

 **NOTE:** This is the small dust cover that plugs into the walk-up USB port on the front of the product.

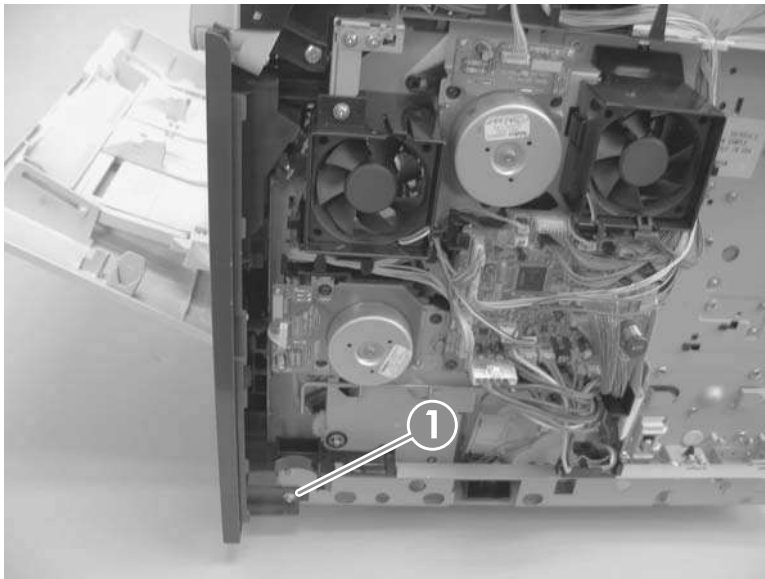
---

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove the right-front cover

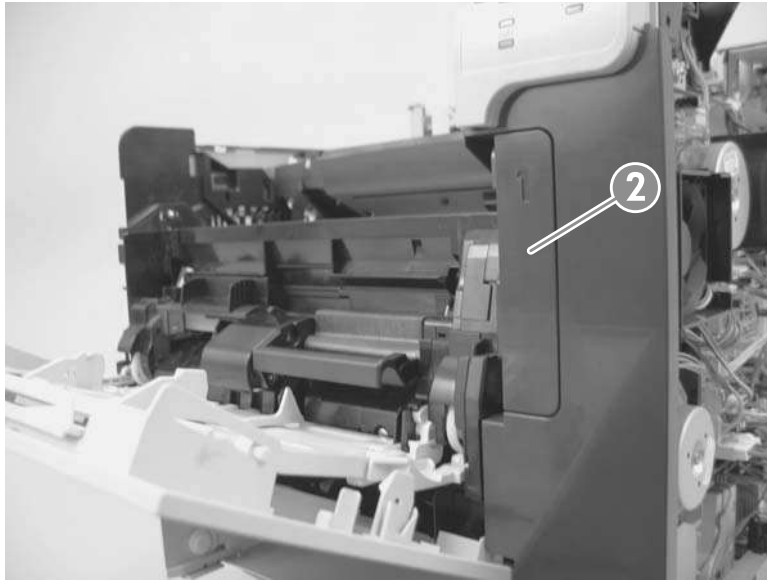
1. Open the front cover.
2. Remove one screw (callout 1).

**Figure 2-52** Remove the right-front cover (1 of 4)



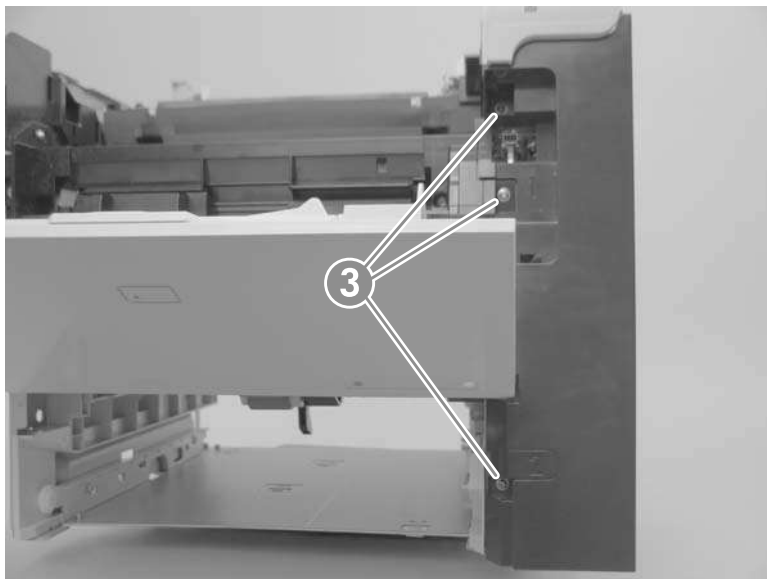
3. Gently pull the envelope-feeder connector cover (callout 2) off of the product to remove it.

**Figure 2-53** Remove the right-front cover (2 of 4)



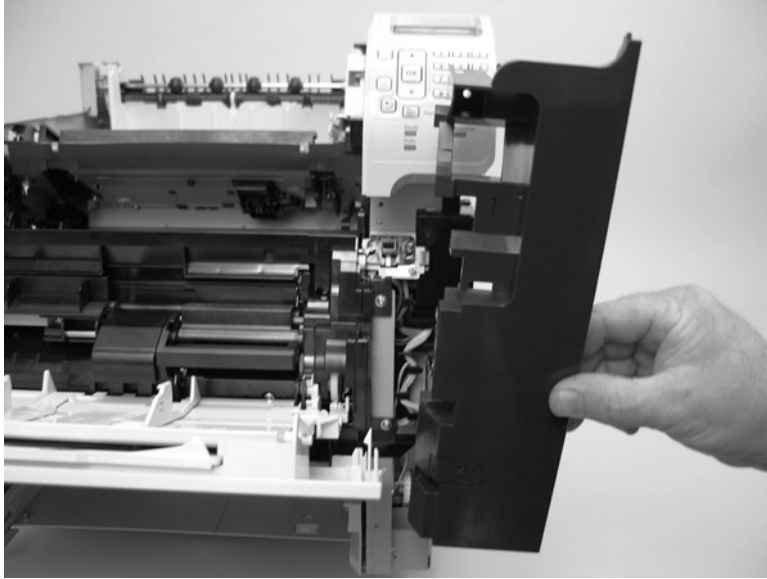
4. Remove three screws (callout 3).

**Figure 2-54** Remove the right-front cover (3 of 4)



5. Remove the right front cover.

**Figure 2-55** Remove the right-front cover (4 of 4)



## Rear-upper cover

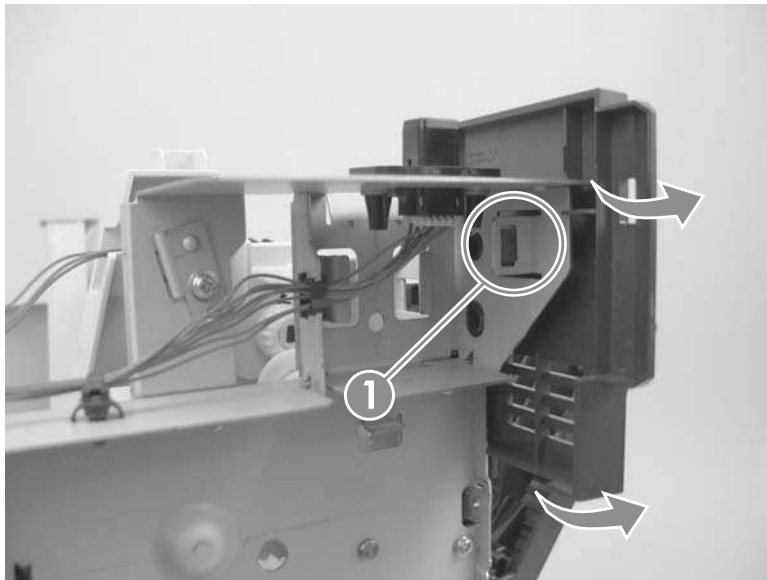
**Before proceeding, remove the following components:::**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove the rear-upper cover

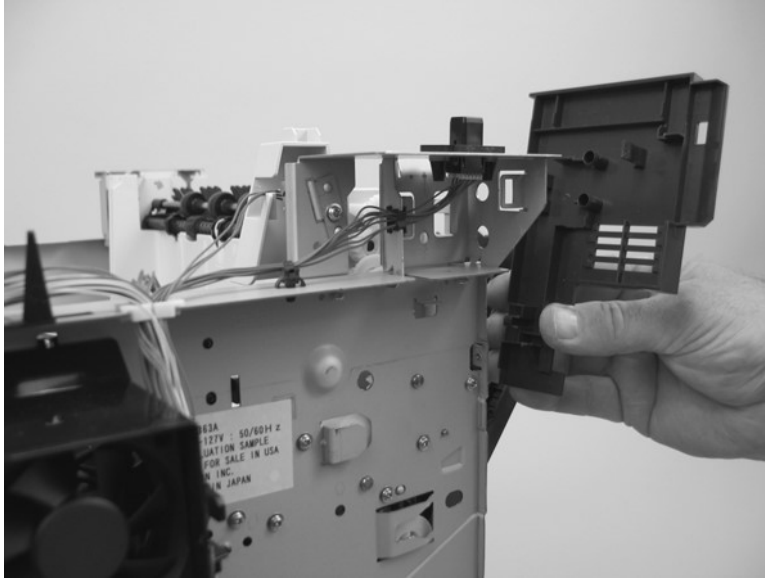
1. Release one tab (callout 1), and then rotate the cover toward the paper-delivery assembly to release it.

**Figure 2-56** Remove the rear-upper cover (1 of 2)



2. Remove the rear-upper cover

**Figure 2-57** Remove the rear-upper cover (2 of 2)



## Front cover

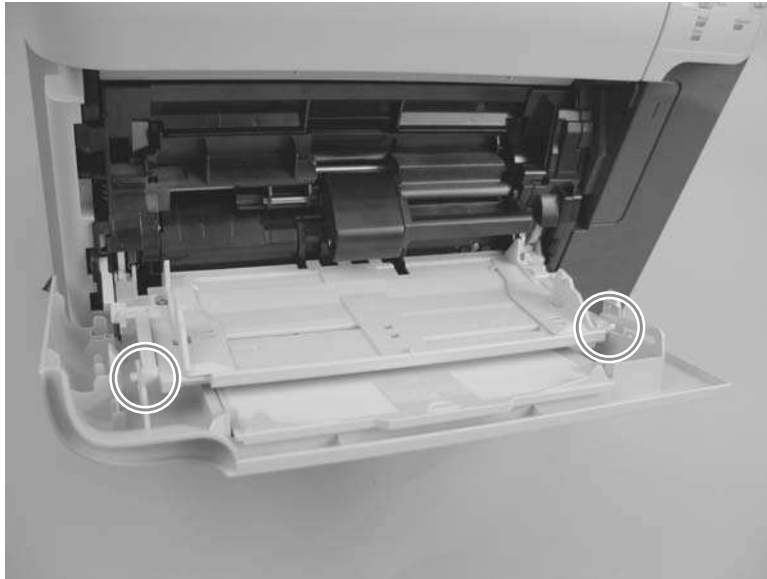
**Before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).
- Right-front cover. See [Right-front cover on page 100](#).

### Remove the front cover


1. Gently pry the front-cover retainers off of the Tray 1 arms.

**Figure 2-58** Remove the front cover (1 of 2)



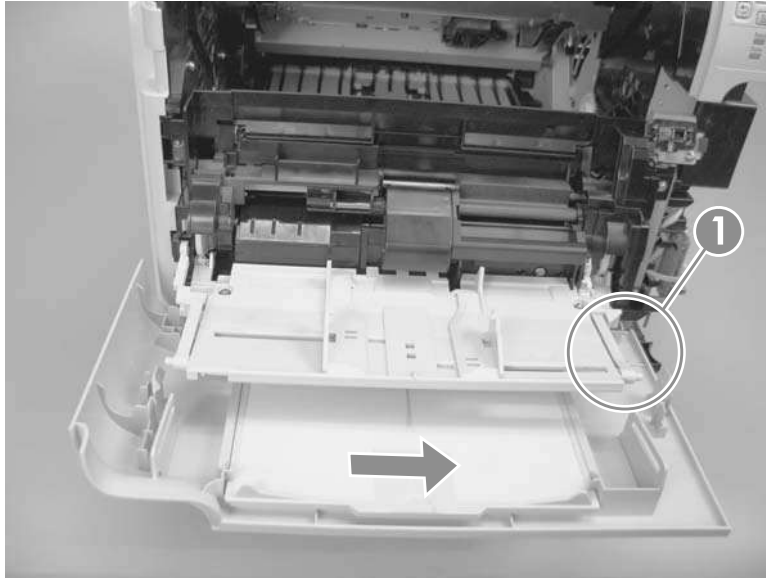
2. Release one spring (callout 1), and then slide the front cover toward the right side of the product to remove it.

---

 **Reinstallation tip** Use a pair of needle-nose pliers to reinstall this spring.

---

**Figure 2-59** Remove the front cover (2 of 2)

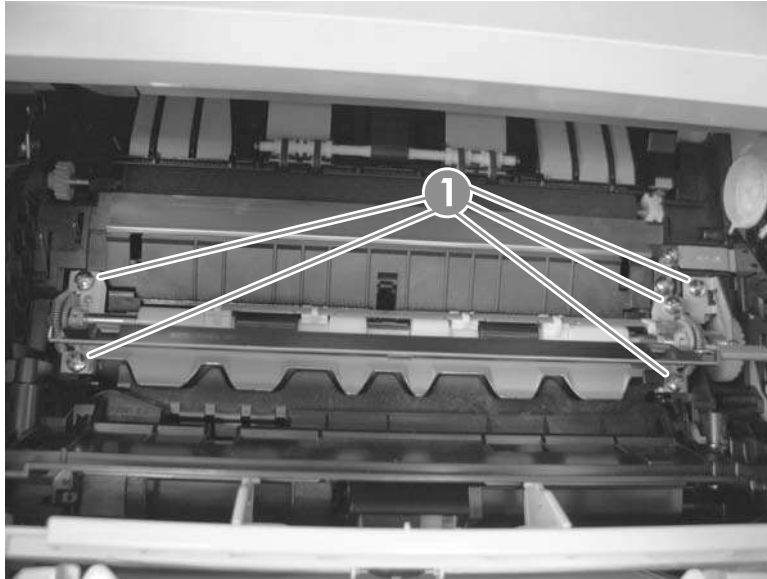


# Main assemblies

## Registration assembly

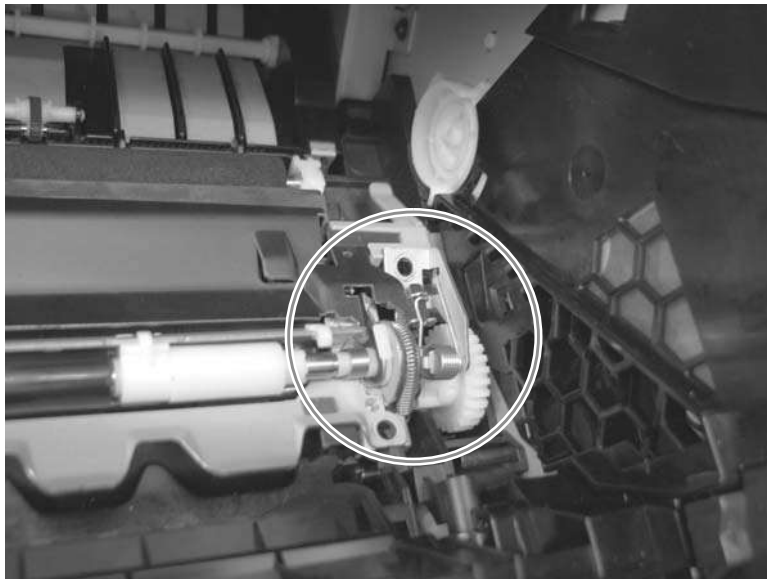
1. Open the print-cartridge door, and then remove the print cartridge.
2. Use the green handle (located at the right edge of the registration plate) to raise the registration-roller plate, and then remove five screws (callout 1).

**Figure 2-60** Remove the registration assembly (1 of 4)



3. Locate the grounding plate at the right side of the registration assembly. The plate is not captive when you remove the assembly. Do not lose the grounding plate.

**Figure 2-61** Remove the registration assembly (2 of 4)




4. Lift the registration assembly out of the product.

**Figure 2-62** Remove the registration assembly (3 of 4)

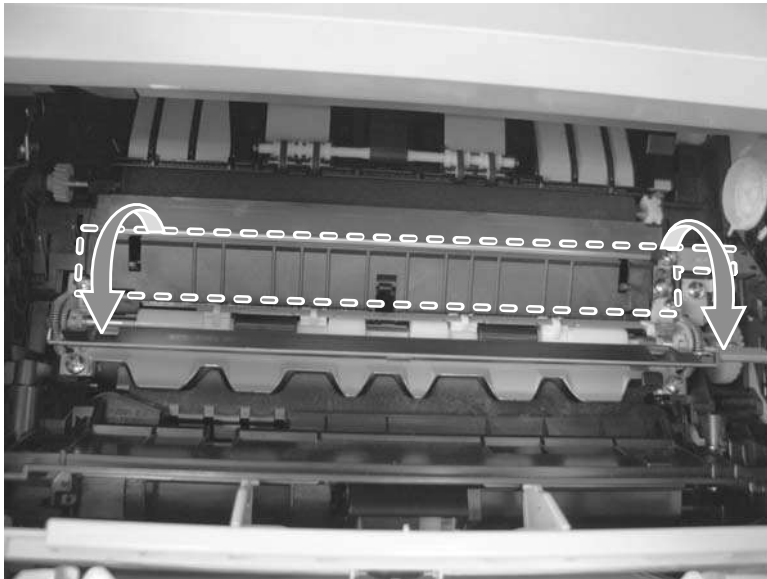


---

 **TIP:** To reinstall the registration assembly, you must open the registration-roller plate to gain access to the mounting holes.

---

**Figure 2-63** Remove the registration assembly (4 of 4)



## Control-panel assembly

**CAUTION:**  ESD sensitive component.

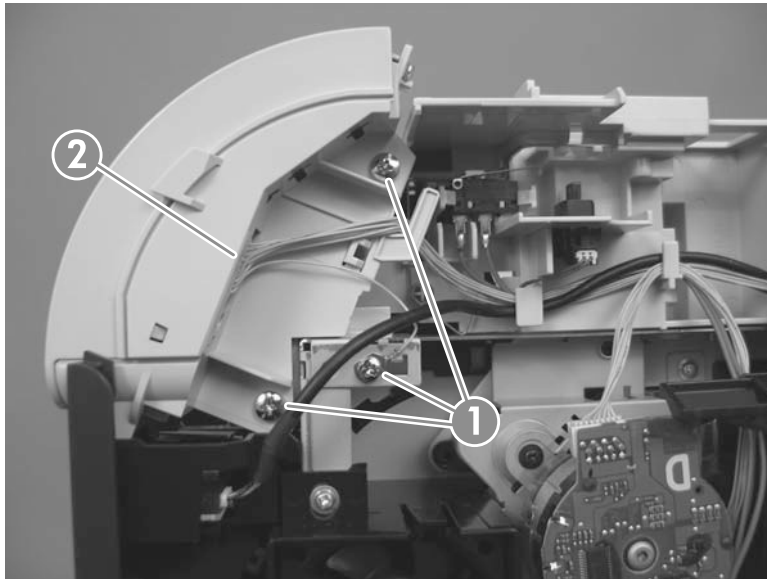
**before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove the control-panel assembly

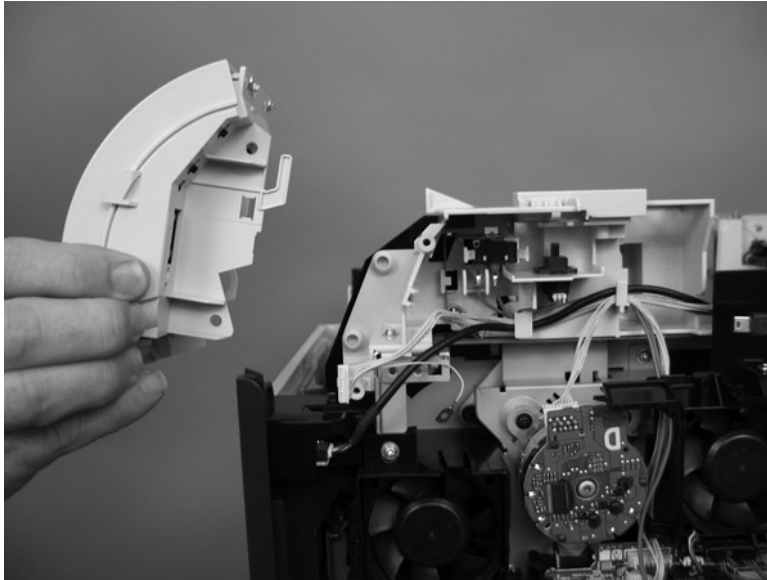
1. Remove three screws (callout 1), and then disconnect one wire-harness connector (callout 2).

**Figure 2-64** Remove the control-panel assembly (1 of 2)



2. Slightly move the control-panel assembly toward the right side of the product to release it, and then remove the assembly.

**Figure 2-65** Remove the control-panel assembly (2 of 2)



## Walk-up USB port and cable

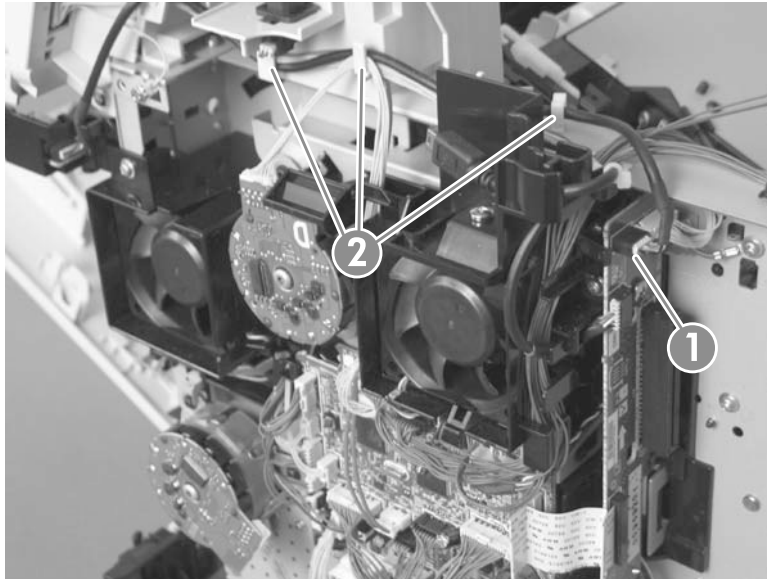
**Before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover and formatter cage. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove the walk-up USB port and cable

1. Disconnect one connector (callout 1), and then release the cable from the retainers (callout 2).

**Figure 2-66** Remove the walk-up USB port and cable (1 of 4)




2. Remove one screw (callout 3).

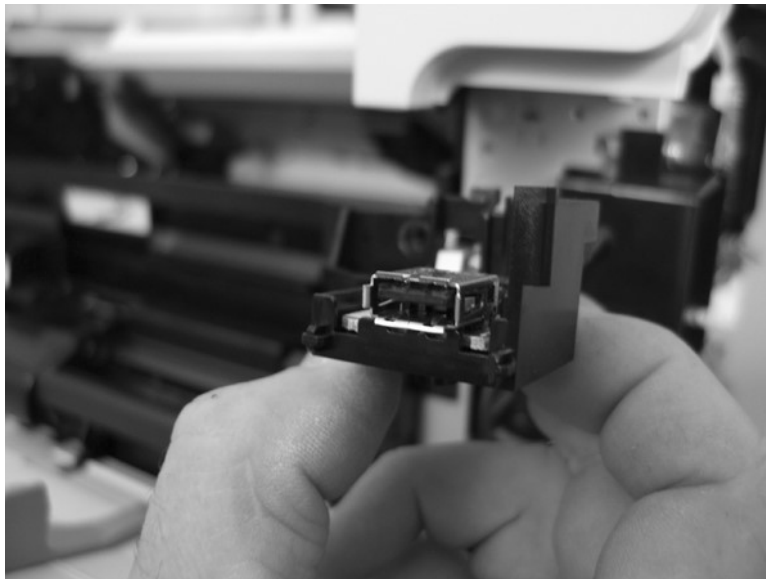
**Figure 2-67** Remove the walk-up USB port and cable (2 of 4)



3. Remove the USB port and cable assembly.

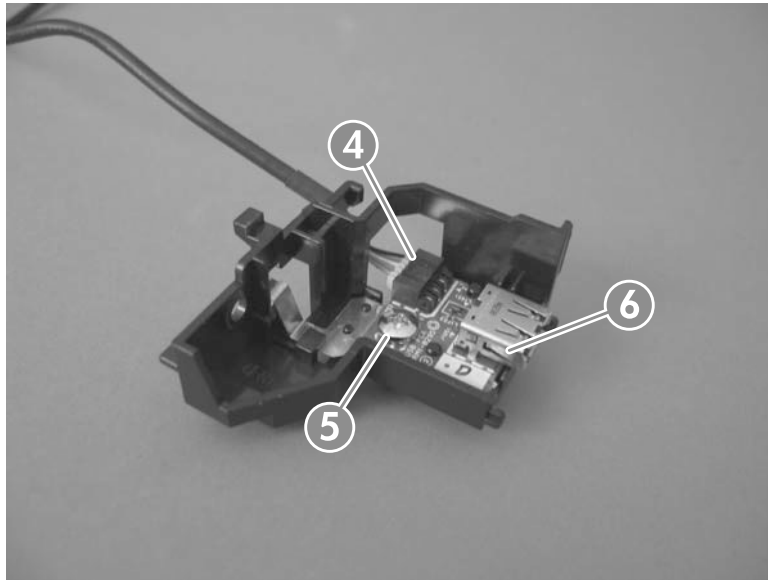
 **TIP:** You might need to push on the mounting tab that secures the USB port holder to the chassis—from the DC controller side of the product—to remove the assembly.

**Figure 2-68** Remove the walk-up USB port and cable (3 of 4)



4. If necessary, disconnect one connector (callout 4), remove one screw (callout 5), and then remove the walk-up port PCA (callout 6) from the mounting bracket.

**Figure 2-69** Remove the walk-up USB port and cable (4 of 4)



## Inner connecting PCA


**CAUTION:**  ESD sensitive component.

**Before proceeding, remove the following components:**

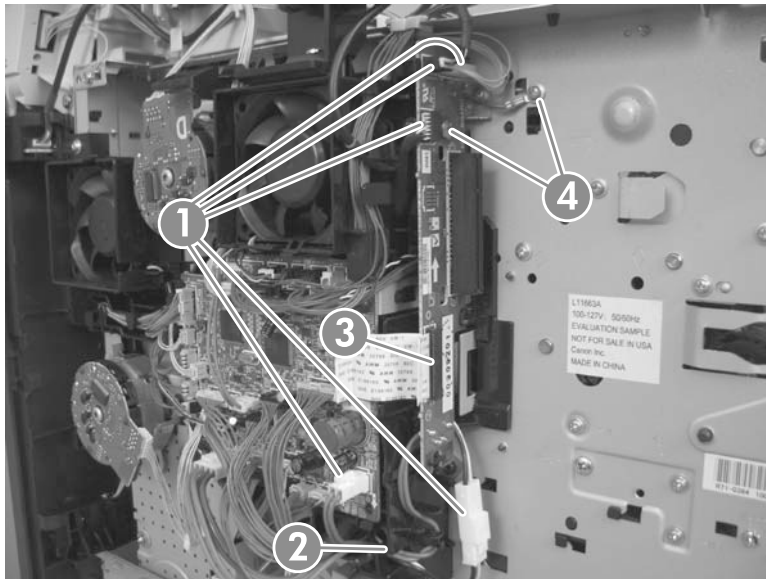
- Top accessory cover. See [Top-accessory cover on page 88](#).
- Formatter cover, formatter cage, and formatter PCA. See [Formatter cover and formatter cage on page 71](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove the inner connecting PCA

1. Disconnect five connectors (callout 1), release the wire harness from the retainers (callout 2), disconnect one FFC (callout 3), and then remove two screws (callout 4).

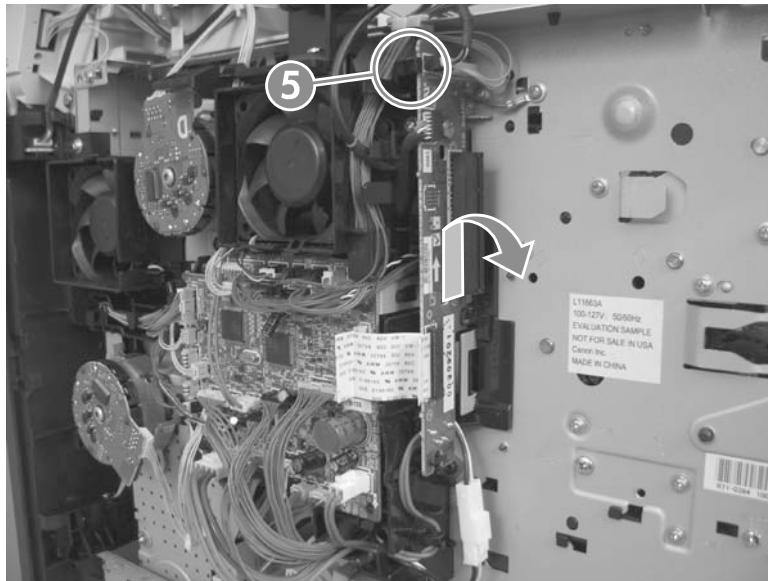
 **TIP:** The PCA mounting screw is a shoulder type fastener. When the PCA is reinstalled, make sure that you use this screw to fasten the PCA to the chassis.

**Figure 2-70** Remove the inner connecting PCA (1 of 3)



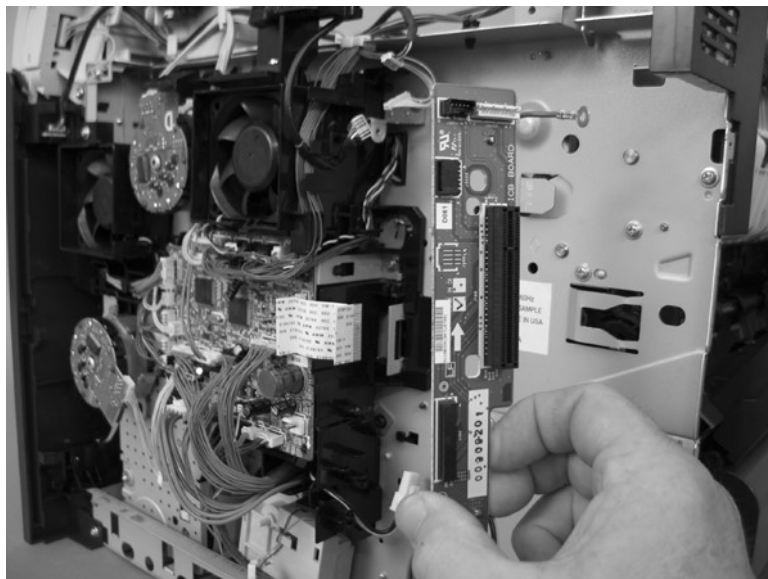
2. Release one tab (callout 5), lift up on the PCA to release it.

**Figure 2-71** Remove the inner connecting PCA (2 of 3)



3. Remove the inner connecting PCA.

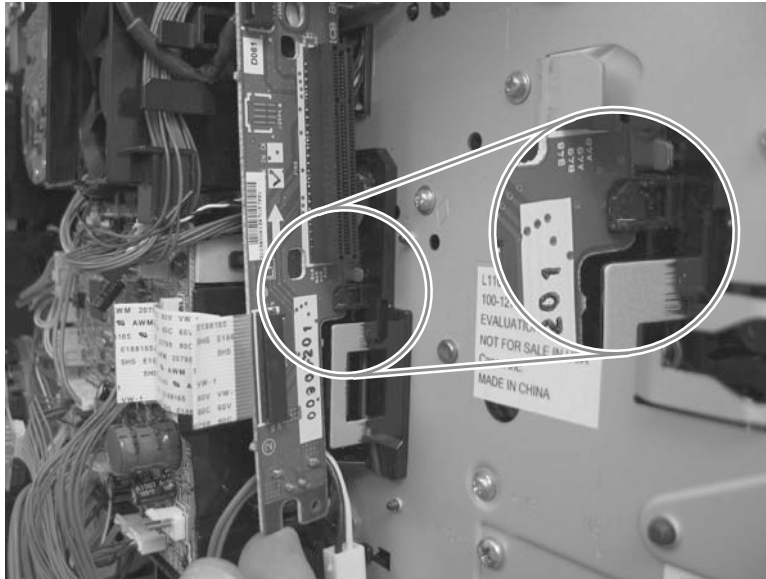
**Figure 2-72** Remove the inner connecting PCA (3 of 3)



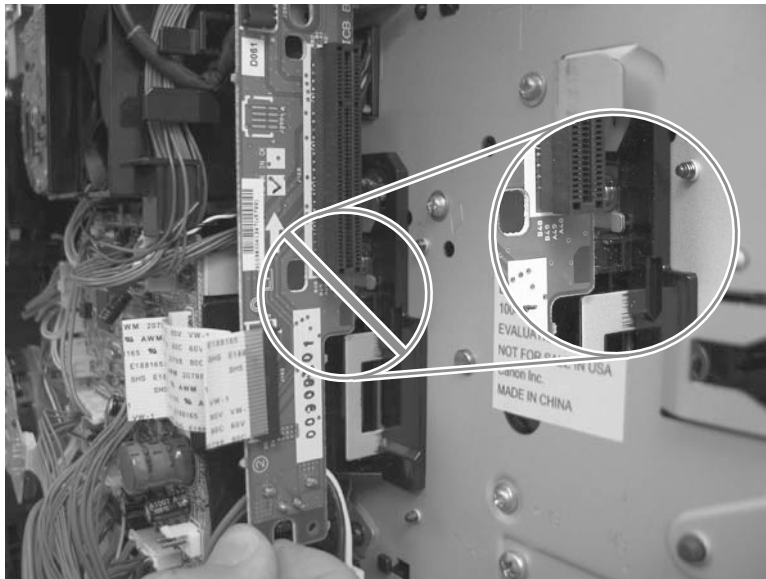
## Reinstall the inner connecting PCA

The back edge of the PCA—near the bottom of the formatter connector—must be correctly positioned in the mounting-bracket slot.

**Figure 2-73** Correctly installed inner connecting PCA



**Figure 2-74** Incorrectly installed inner connecting PCA




## Fan FN102

**Before proceeding, remove the following components:**

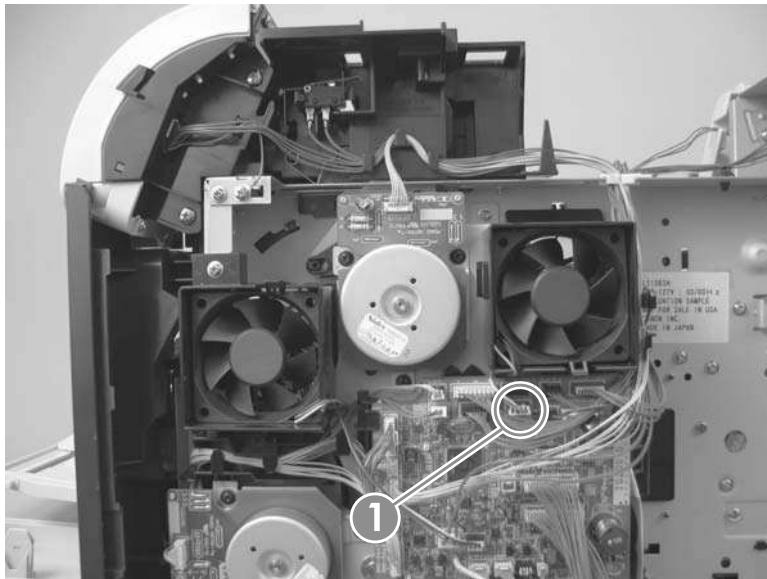
- Top accessory cover. See [Top-accessory cover on page 88](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove fan FN102


1. Disconnect one connector (callout 1; J79), and then release the wire harness from the retainer on the fan duct.

 **TIP:** It might be easier to release this wire harness if you partially release the fan duct from the chassis (release one tab near the motor).

**Figure 2-75** Remove fan FN102 (1 of 2)

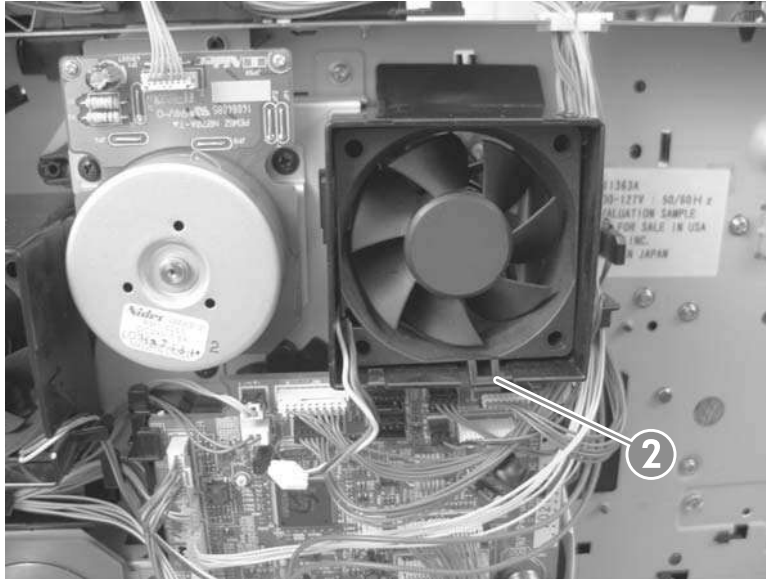


2. Release one tab (callout 2), and then remove the fan.

 **TIP:** When you reinstall the fan, the air must flow into the product. Verify that the airflow arrows that are embossed on the fan body point *into* the product.

Connect the wire-harness connector to the DC controller before reinstalling the fan into the duct.

**Figure 2-76** Remove fan FN102 (2 of 2)



## Fan FN103

**Before proceeding, remove the following components:**

- Top accessory cover. See [Top-accessory cover on page 88](#).
- Top cover. See [Top cover on page 92](#).
- Right-side cover. See [Right-side cover on page 95](#).

### Remove fan FN103

1. Disconnect one connector (callout 1; J75), and then release the wire harness from the retainer on the fan duct.

**Figure 2-77** Remove fan FN103 (1 of 2)

