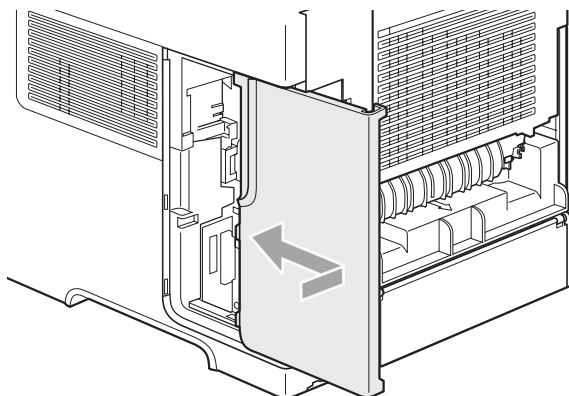
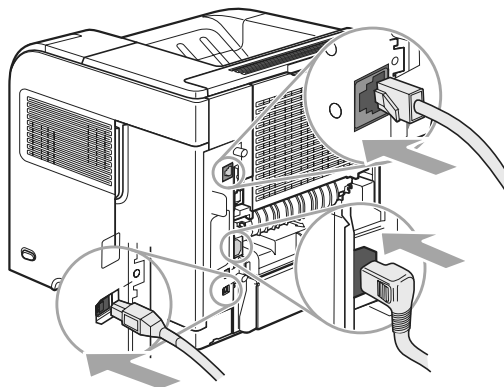


7. Reinstall the right-side panel. Align the tabs on the panel with the slots in the product, and push the panel toward the front of the product until it latches into place.



8. Reconnect the interface cables and the power cord.



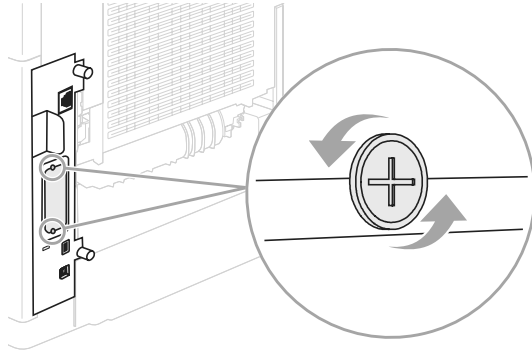
9. Turn the product on.


Install HP Jetdirect print server cards

Follow these procedures to install or remove an EIO card.

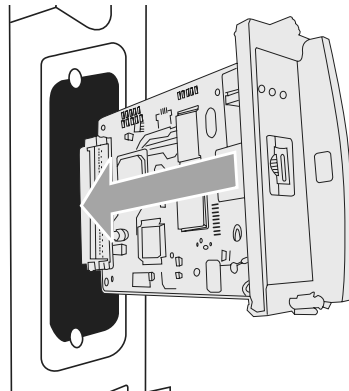
Install an HP Jetdirect print server card

1. Turn off the product.
2. Remove the two screws and cover plate from the EIO slot on the back of the product.

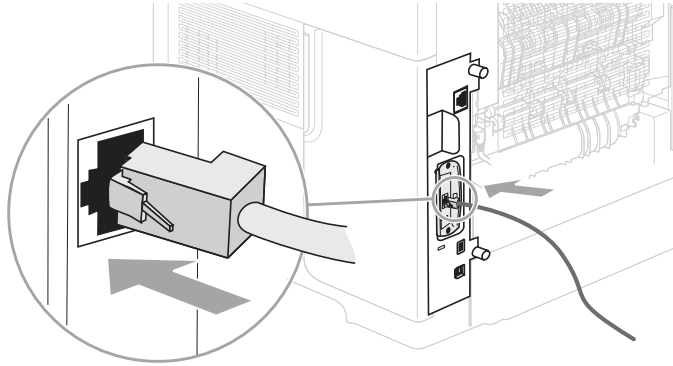


 **NOTE:** Do not discard the screws or the cover plate. Save them for future use if you remove the EIO card.

3. Install the EIO card in the EIO slot and tighten the screws.



4. Connect the network cable to the EIO card.



5. Turn on the product, and then print a configuration page to verify that the new EIO device is recognized. See [Print the information and show-me-how pages on page 66](#).



NOTE: When you print a configuration page, an HP Jetdirect configuration page that contains network configuration and status information also prints.

Remove an HP Jetdirect print server card

1. Turn off the product.
2. Disconnect the network cable from the EIO card.
3. Loosen the two screws from the EIO card, and then remove the EIO card from the EIO slot.
4. Place the cover plate from the EIO slot onto the back of the product. Insert and tighten the two screws.
5. Turn on the product.


Clean the product


During the printing process, paper, toner, and dust particles can accumulate inside the product. Over time, this buildup can cause print-quality problems, such as toner specks or smearing.

Clean the exterior


Use a soft, damp, lint-free cloth to wipe dust, smudges, and stains off of the exterior of the device.

Clean the paper path

1. Press Menu .
2. Press the down arrow ▼ to highlight **CONFIGURE DEVICE**, and then press **OK**.
3. Press the down arrow ▼ to highlight **PRINT QUALITY**, and then press **OK**.

 **NOTE:** If your product has an automatic duplexer, go to step 7.


4. Press the down arrow ▼ to highlight **CREATE CLEANING PAGE**, and then press **OK**.
5. Remove all paper from Tray 1.
6. Remove the cleaning page from the output bin, and load it face-down in Tray 1.


 **NOTE:** If you are not in the menus, navigate to **PRINT QUALITY** by using the previous instructions.

7. At the product control panel, press the down arrow ▼ to highlight **PROCESS CLEANING PAGE**, and then press **OK**.

Clean the paper path automatically

You can set the product to clean the paper path automatically after the product has printed a certain number of pages. Products in dirtier environments can be cleaned more frequently by choosing one of the lower page count settings.

1. Press Menu .
2. Press the down arrow ▼ to highlight **CONFIGURE DEVICE**, and then press **OK**.
3. Press the down arrow ▼ to highlight **PRINT QUALITY**, and then press **OK**.
4. Press the down arrow ▼ to highlight **AUTO CLEANING**, and then press **OK**.
5. Press the down arrow ▼ to highlight **ON**, and then press **OK**.
6. Press the down arrow ▼ to highlight **CLEANING INTERVAL**, and then press **OK**.

 **NOTE:** If you are not in the menus, navigate to **PRINT QUALITY** by using the previous instructions.

7. Press the down arrow ▼ to highlight the correct page count interval, and then press **OK**.

Upgrade the firmware

This product has remote firmware update (RFU) capability. Use this information to upgrade the product firmware.

Determine the current firmware version

1. Press Menu .
2. Press the down arrow ▼ to highlight **INFORMATION**, and then press **OK**.
3. Press the down arrow ▼ to highlight **PRINT CONFIGURATION**, and then press **OK** to print.

The firmware datecode is listed on the Configuration page in the section called **Device Information**. The firmware datecode has this format: YYYYMMDD XX.XXX.X. The first string of numbers is the date, where YYYY represents the year, MM represents the month, and DD represents the date. For example, a firmware datecode of that begins with 20061125 represents November 25, 2006.

Download new firmware from the HP Web site


To find the most recent firmware upgrade for the product, go to www.hp.com/go/ljp4010series_software or www.hp.com/go/ljp4510series_software. This page provides instructions for downloading the new firmware version.

Transfer the new firmware to the product

 **NOTE:** The product can receive an .RFU file update when it is in a "ready" state.


The elapsed time for an update depends on the I/O transfer time, as well as the time that it takes for the product to re-initialize. The I/O transfer time depends on a number of things, including the speed of the host computer that is sending the update. If the remote firmware update process is interrupted before the firmware is downloaded (while **Receiving upgrade** appears on the control-panel display), the firmware file must be sent again. If power is lost during the flash DIMM update (while the **Performing upgrade** message appears on the control-panel display), the update is interrupted and the message **Resend upgrade** appears (in English only) on the control-panel display. In this case, you must send the upgrade by using the parallel port. Finally, any jobs that are ahead of the RFU job in the queue are completed before the update is processed.

Use FTP to upload the firmware through a browser


 **NOTE:** The firmware update involves a change in the format of nonvolatile random-access memory (NVRAM). Any menu settings that are changed from the default settings might return to default settings and must be changed again if you want settings that are different from the defaults.

1. Make sure the Internet browser you are using is configured for viewing folders from FTP sites. These instructions are for Microsoft Internet Explorer.
 - a. Open the browser and click **Tools**, and then click **Internet Options**.
 - b. Click the **Advanced** tab.
 - c. Select the box labeled **Enable folder view for FTP sites**.
 - d. Click **OK**.
2. Print a configuration page and note the TCP/IP address shown on the EIO Jetdirect page.


3. Open a browser window.
4. In the address line of the browser, type `ftp://<ADDRESS>`, where `<ADDRESS>` is the address of the product. For example, if the TCP/IP address is 192.168.0.90, type `ftp://192.168.0.90`.
5. Locate the downloaded .RFU file for the product.
6. Drag and drop the .RFU file onto the **PORT1** icon in the browser window.

 **NOTE:** The product turns off and then on automatically to activate the update. When the update process is complete, a **Ready** message displays on the product control panel.


Use FTP to upgrade the firmware on a network connection

 **NOTE:** The firmware update involves a change in the format of nonvolatile random-access memory (NVRAM). Any menu settings that are changed from the default settings might return to default settings and must be changed again if you want settings that are different from the defaults.

1. Take note of the IP address on the HP Jetdirect page. The HP Jetdirect page is the second page that prints when you print the configuration page.

 **NOTE:** Before upgrading the firmware, make sure that the product is not in Sleep mode. Also make sure that any error messages are cleared from the control-panel display.

2. Open an MS-DOS command prompt on your computer.
3. Type: `ftp TCP/IP ADDRESS>`. For example, if the TCP/IP address is 192.168.0.90, type `ftp 192.168.0.90`.
4. Go to the folder where the firmware file is stored.
5. Press **Enter** on the keyboard.
6. When prompted for the user name, press **Enter**.
7. When prompted for the password, press **Enter**.
8. Type `bin` at the command prompt.
9. Press **Enter**. The message **200 Types set to I, Using binary mode to transfer files** appears in the command window.
10. Type `put` and then the file name. For example, if the file name is LJP4015.RFU, type `put LJP4015.RFU`.
11. The download process begins and the firmware is updated on the product. This can take approximately five minutes. Let the process finish without further interaction with the product or computer.

 **NOTE:** The product automatically turns off and then on again after processing the upgrade.

12. At the command prompt, type: `bye` to exit the ftp command.
13. At the command prompt, type: `exit` to return to the Windows interface.

Use HP Web Jetadmin to upgrade the firmware

This procedure requires that you install HP Web Jetadmin Version 7.0 or later on your computer. See [Use HP Web Jetadmin software on page 74](#). Complete the following steps to update a single product through HP Web Jetadmin after downloading the .RFU file from the HP Web site.


1. Start HP Web Jetadmin.
2. Open the **Device Management** folder in the drop-down list in the **Navigation** panel. Navigate to the **Device Lists** folder.
3. Expand the **Device Lists** folder and select **All Devices**. Locate the product in the list of devices, and then click to select it.

If you need to upgrade the firmware for products, select all of them by pressing the **Ctrl** key as you click the name of each product.
4. Locate the drop-down box for **Device Tools** in the upper-right corner of the window. Select **Update Printer Firmware** from the action list.
5. If the name of the .RFU file is not listed in the **All Available Images** box, click **Browse** in the **Upload New Firmware Image** dialog box and navigate to the location of the .RFU file that you downloaded from the Web at the start of this procedure. If the filename is listed, select it.
6. Click **Upload** to move the .RFU file from your hard drive to the HP Web Jetadmin server. After the upload is complete, the browser window refreshes.
7. Select the .RFU file from the **Printer Firmware Update** drop-down menu.
8. Click **Update Firmware**. HP Web Jetadmin sends the selected .RFU file to the product. The control panel shows messages that indicate the progress of the upgrade. At the end of the upgrade process, the control panel shows the **Ready** message.

Use Microsoft Windows commands to upgrade the firmware

To update the firmware by using a network connection, follow these instructions.

1. Click **Start**, click **Run**, and then type `cmd` to open the command window.
2. Type the following: `copy /B FILENAME> \\COMPUTERNAME>\SHARENAME>`, where `<FILENAME>` is the name of the .RFU file (including the path), `<COMPUTERNAME>` is the name of the computer from which the product is being shared, and `<SHARENAME>` is the product share name. For example: `C:\>copy /b C:\LJP4015.RFU \\YOUR_SERVER\YOUR_COMPUTER.`

 **NOTE:** If the file name or path includes a space, you must enclose the file name or path in quotation marks. For example, type: `C:\>copy /b "C:\MY DOCUMENTS\LJP4015.RFU" \\YOUR_SERVER\YOUR_COMPUTER.`

3. Press **Enter** on the keyboard. The control panel shows a message that indicates the progress of the firmware upgrade. At the end of the upgrade process, the control panel shows the **Ready** message. The message **One File Copied** appears on the computer screen.

Upgrade the HP Jetdirect firmware

The HP Jetdirect network interface in the product has firmware that can be upgraded separately from the product firmware. This procedure requires that you install HP Web Jetadmin Version 7.0 or later on

your computer. See [Use HP Web Jetadmin software on page 74](#). Complete the following steps to update the HP Jetdirect firmware by using HP Web Jetadmin.

1. Open the HP Web Jetadmin program.
2. Open the **Device Management** folder in the drop-down list in the **Navigation** panel. Navigate to the **Device Lists** folder.
3. Select the product that you want to update.
4. In the **Device Tools** drop-down list, select **Jetdirect Firmware Update**.
5. Under **Jetdirect firmware version** the HP Jetdirect model number and current firmware version are listed. Make a note of these.
6. Go to http://www.hp.com/go/wja_firmware.
7. Scroll down to the list of HP Jetdirect model numbers and find the model number you wrote down.
8. Look at the current firmware version for the model, and see if it is later than the version you wrote down. If it is, right-click on the firmware link, and follow the instructions on the Web page to download the new firmware file. The file must be saved into the <drive>:\PROGRAM FILES\HP WEB JETADMIN\DOC\PLUGINS\HPWJA\FIRMWARE\JETDIRECT folder on the computer that is running the HP Web Jetadmin software.
9. In HP Web Jetadmin, return to the main product list and select the digital sender again.
10. In the **Device Tools** drop-down list, select **Jetdirect Firmware Update** again.
11. On the HP Jetdirect firmware page, the new firmware version is listed under **Jetdirect Firmware Available on HP Web Jetadmin**. Click the **Update Firmware Now** button to update the Jetdirect firmware.

5 Theory of operation

- Basic operation
- Engine-control system
- Laser/scanner system
- Image-formation system
- Pickup, feed, and delivery system

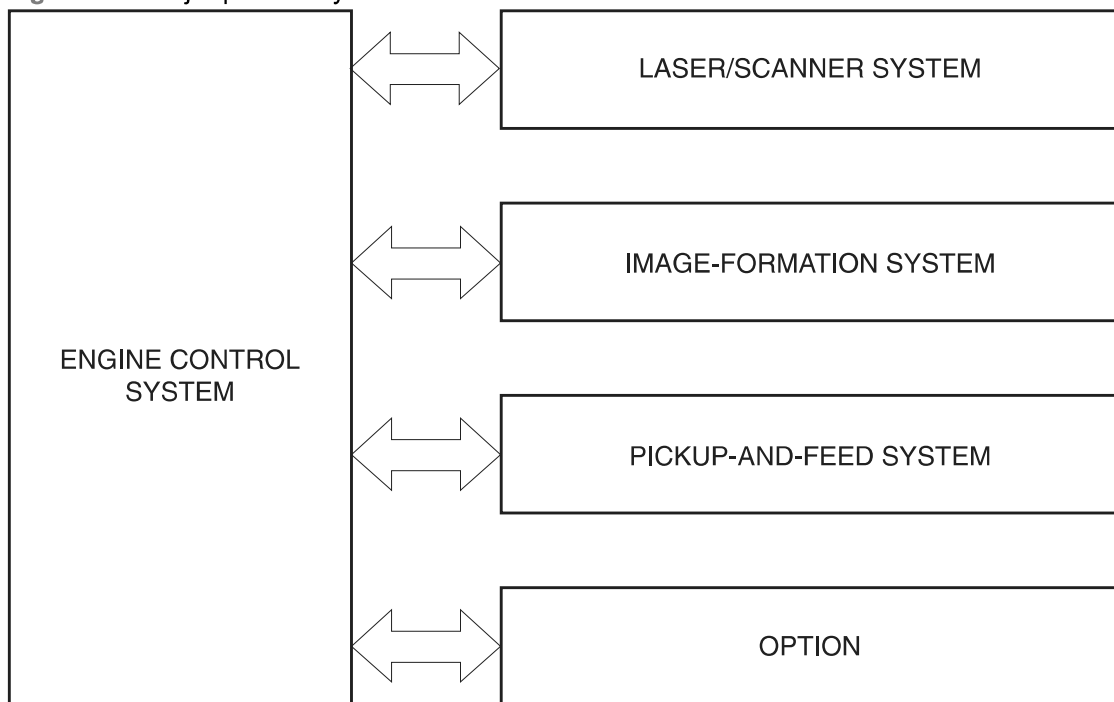
Basic operation

Major print systems

Operation can be divided into the following systems:

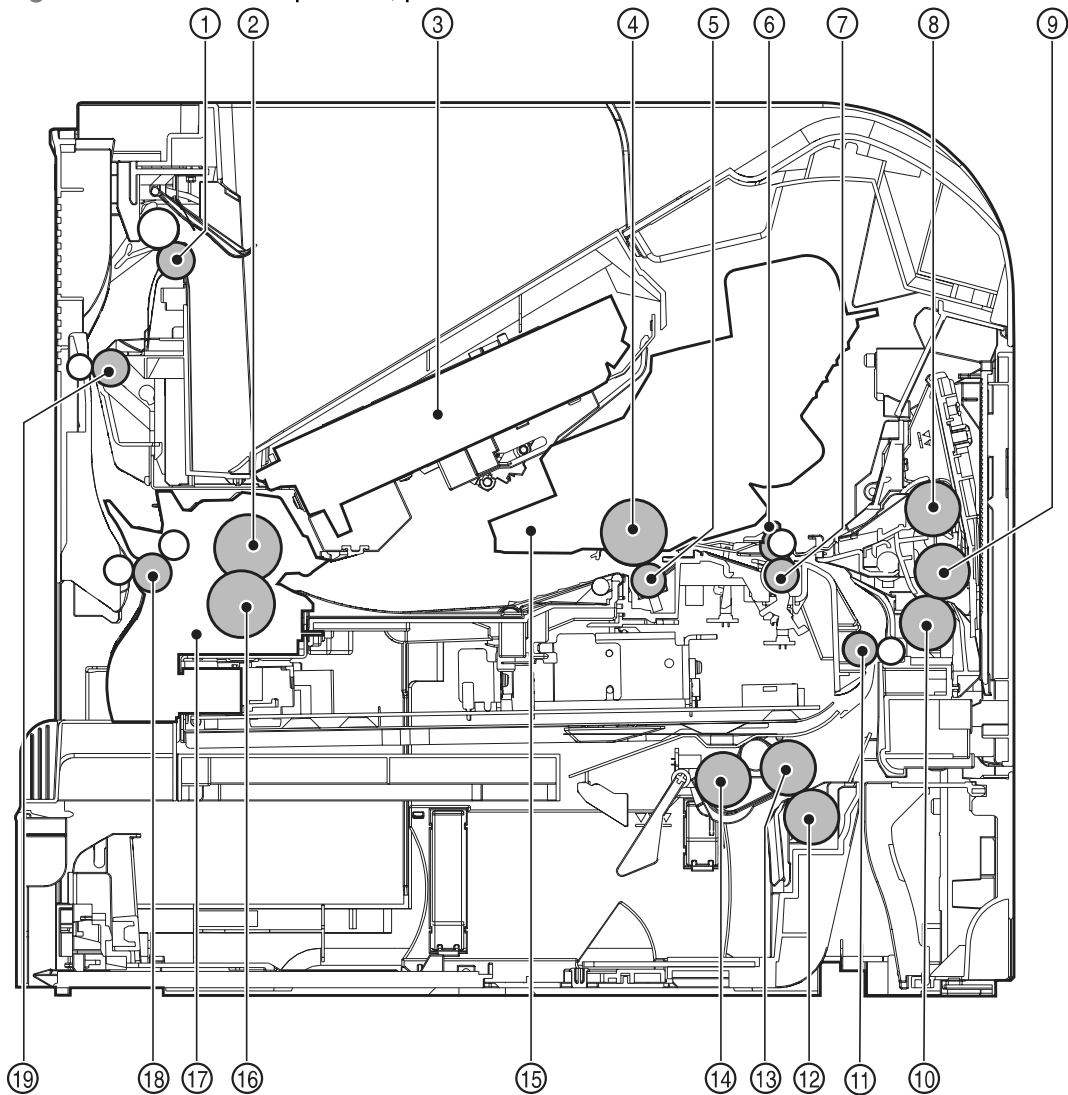
- Engine-control system (which includes the power supply and DC controller PCA)
- Laser/scanner system (which forms the latent image on a photosensitive drum)
- Image-formation system (which transfers a toner image onto the print media)
- Pickup, feed, and delivery system (which consists of various rollers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

Figure 5-1 Major product systems



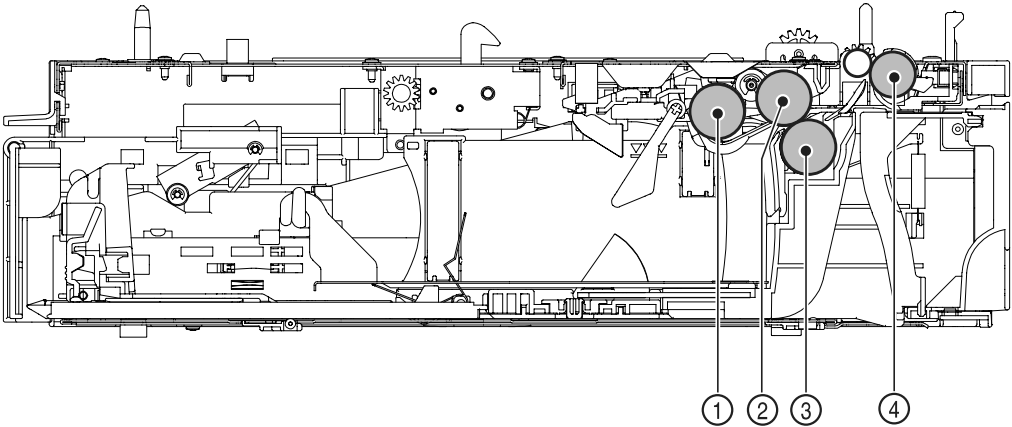
Internal components

Figure 5-2 Internal components, product base



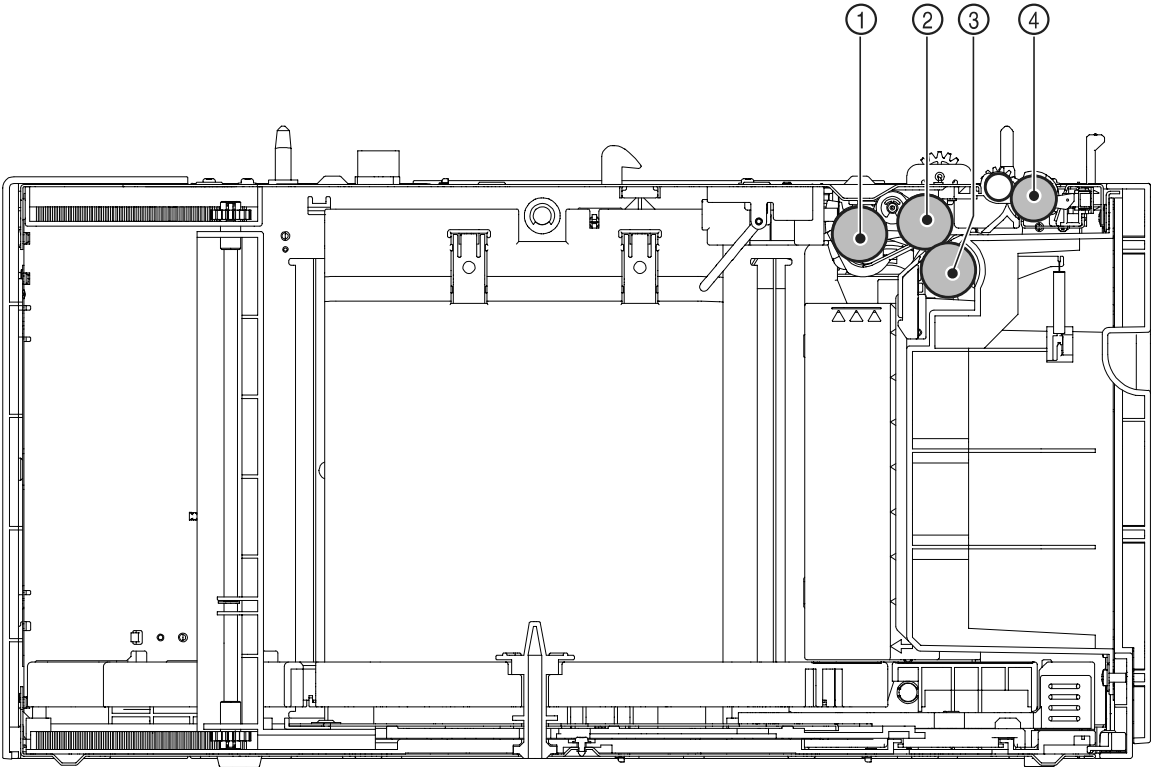
1	Face-down delivery roller	11	Feed roller
2	Fuser sleeve unit	12	Tray 2 separation roller
3	Laser/scanner unit	13	Tray 2 feed roller
4	Photosensitive drum	14	Tray 2 pickup roller
5	Transfer roller	15	Print cartridge
6	Registration shutter	16	Pressure roller
7	Pre-transfer roller	17	Fuser
8	Tray 1 pickup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

Figure 5-3 Internal components, 500-sheet paper tray



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

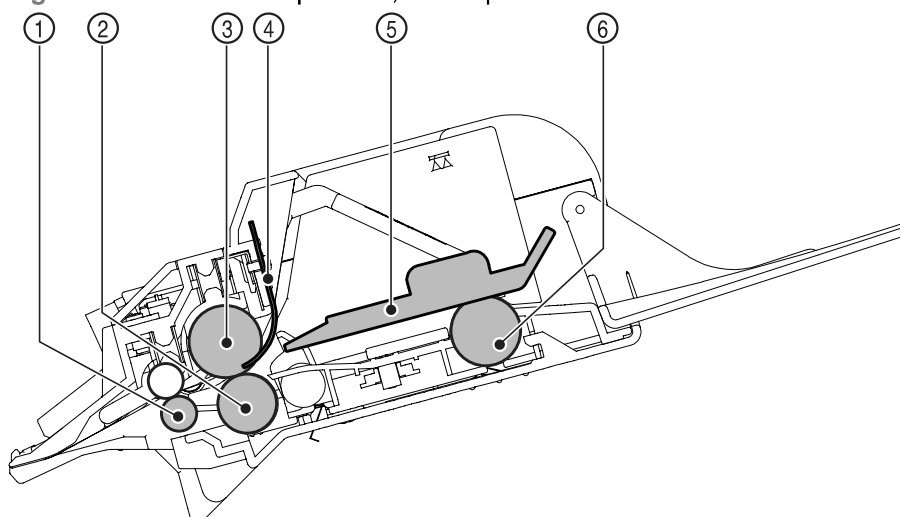
Figure 5-4 Internal components, 1,500-sheet paper tray



1	Pickup roller
2	Feed roller

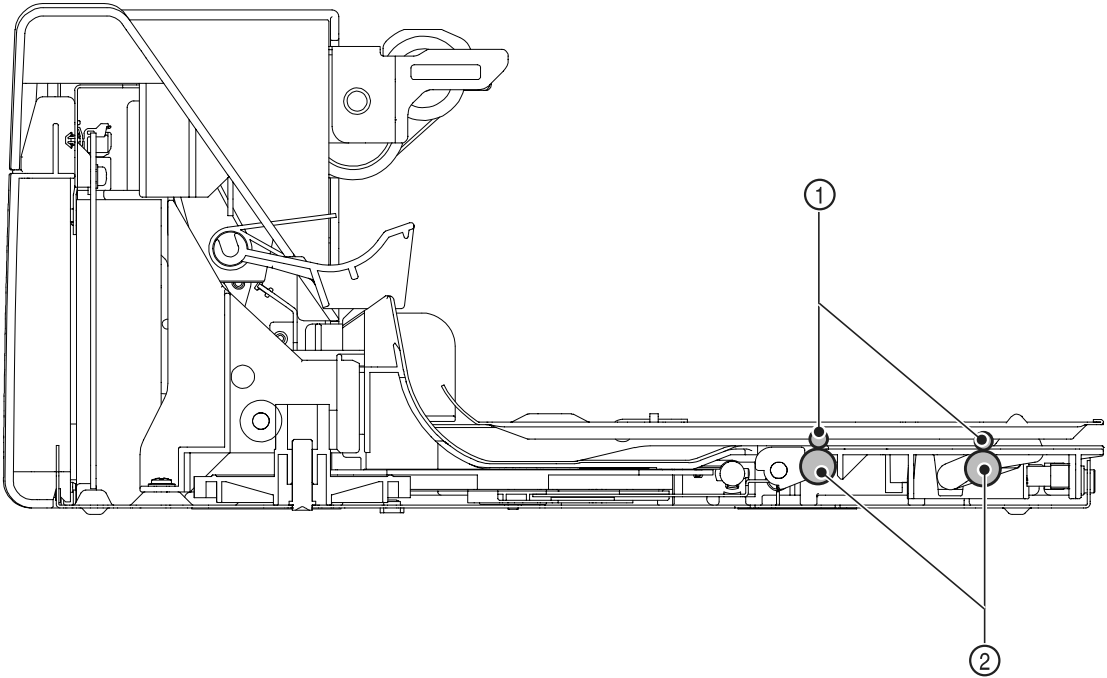
3	Separation roller
4	Feed roller

Figure 5-5 Internal components, envelope feeder



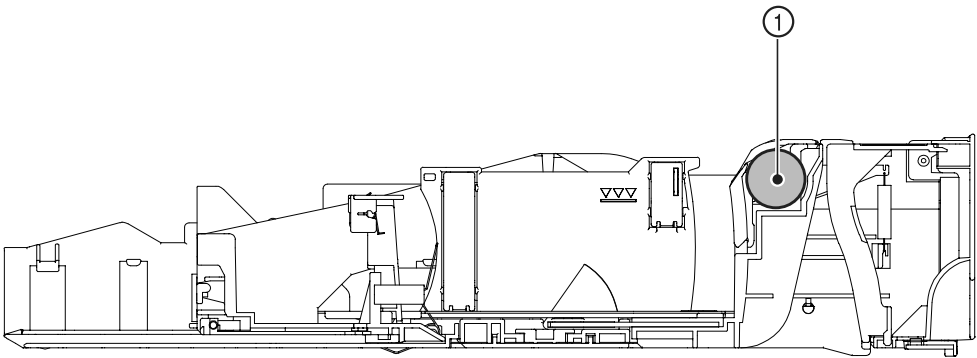
1	Feed roller
2	Upper separation roller
3	Lower separation roller
4	Separation guide
5	Weight
6	Pickup roller

Figure 5-6 Internal components, duplexer



1	Oblique rollers
2	Re-pickup rollers

Figure 5-7 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.

Table 5-1 Product operating sequence

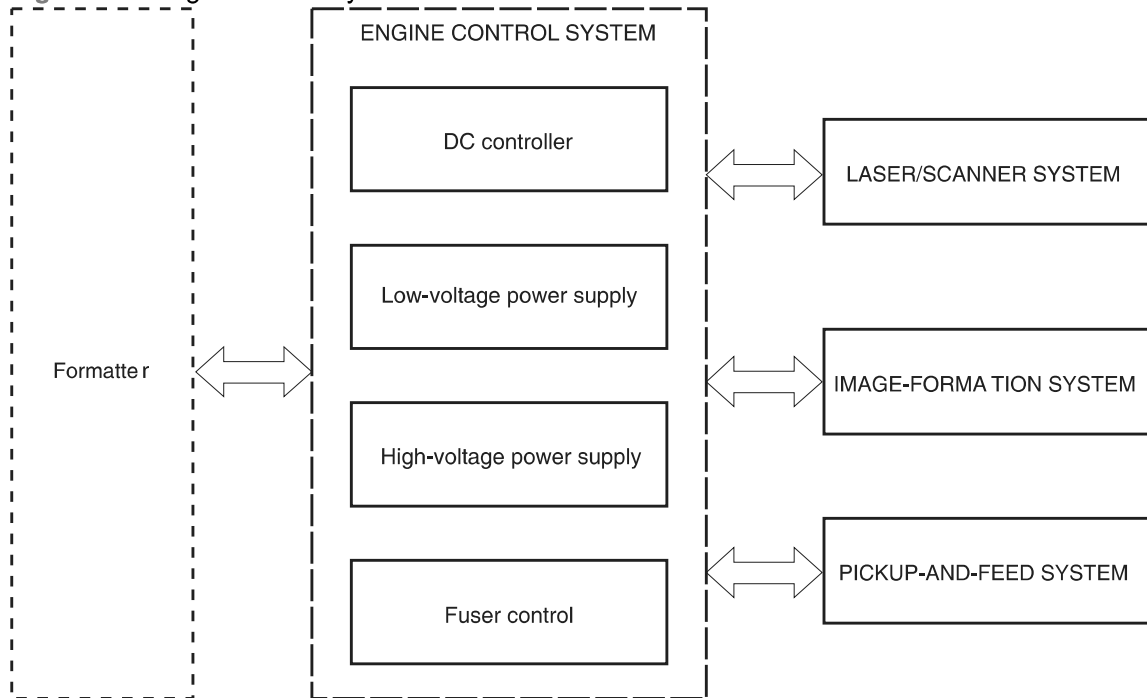
Period	Duration	Operation
WAIT	From the time the power is turned on, the door is closed or Sleep mode is released until the product gets ready for a print operation.	<ul style="list-style-type: none"> • Brings the product to standby condition. • Pressurizes the fuser pressure roller. • Detects the print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

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 5-8 Engine-control system

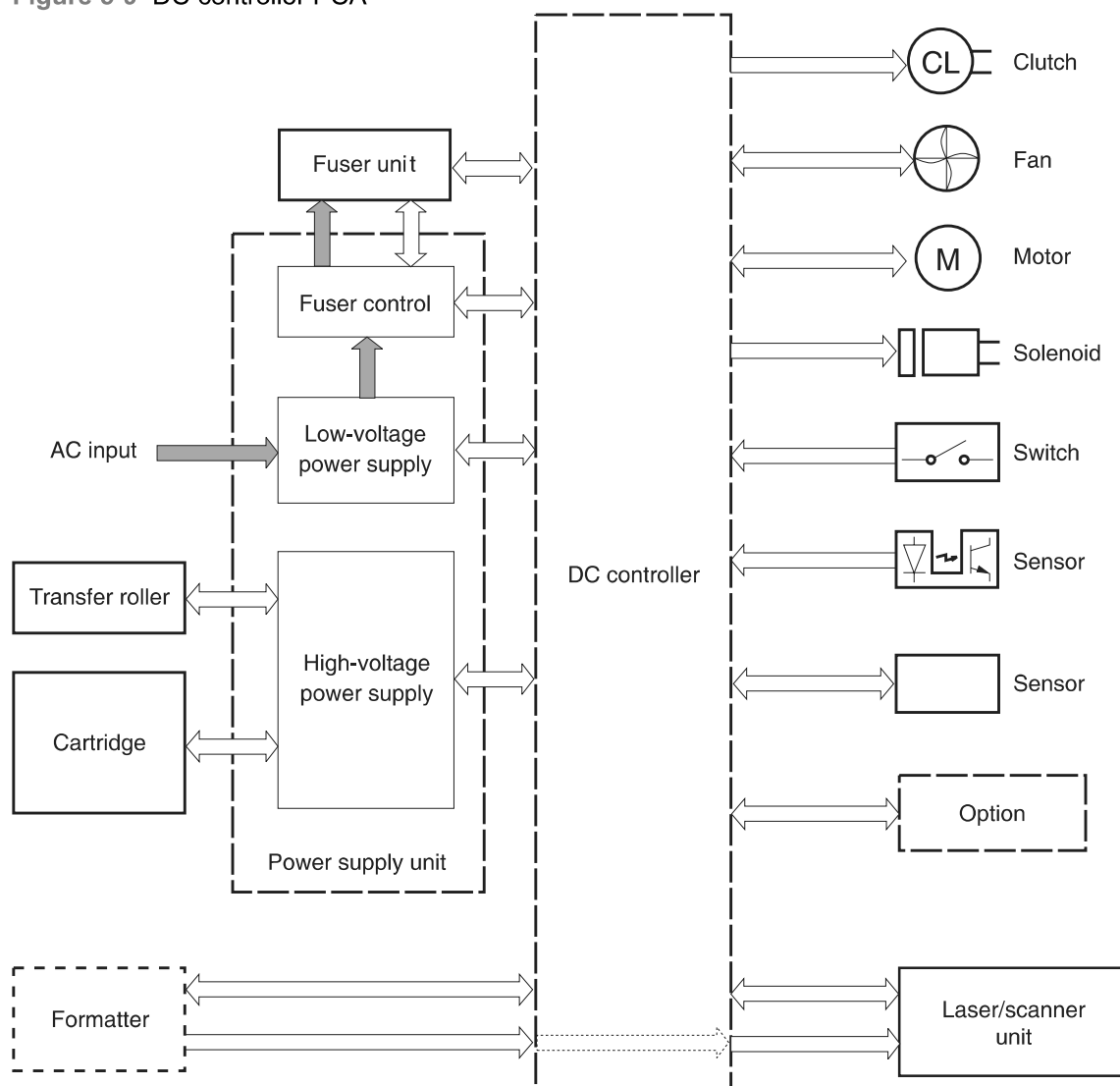


DC controller PCA

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 5-9 DC controller PCA



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 5-2 Fans

Description	Cooling area	Type	Speed
Cooling fan FN101	Cartridge area and power supply area	Intake	Full/Half ¹
Cooling fan FN102	Cartridge area	Intake	Full ²
Cooling fan FN103	Cartridge area	Intake	Full ²

Table 5-2 Fans (continued)

Description	Cooling area	Type	Speed
Cooling fan FN301	Cartridge area and laser/scanner	Intake	Full ²

¹ 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.

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

Table 5-3 Motors

Description	Driving parts	Type	Failure detection
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 (M103)	Drives the pressure roller and feed roller—when rotated counterclockwise it releases the fusing pressure for easier jam removal	DC	Yes
Lifter motor (M299)	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

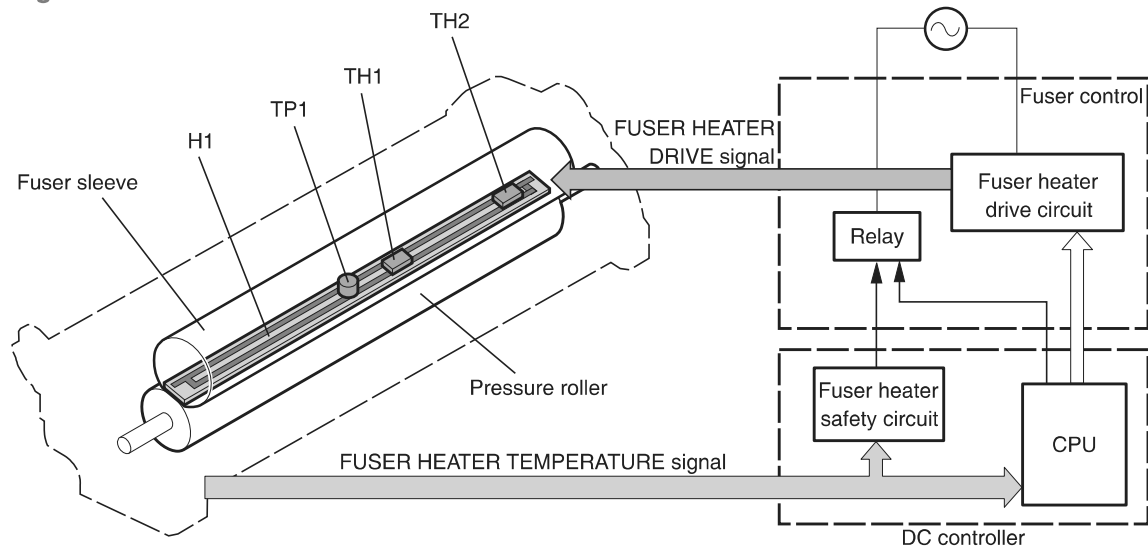
The power supply consists of the fuser-control circuit, the high-voltage circuit, and the low-voltage circuit. The fuser-control and high-voltage circuits control the temperature of the fuser and generate high-voltage according to signals from the DC controller PCA. The low-voltage circuit generates 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.

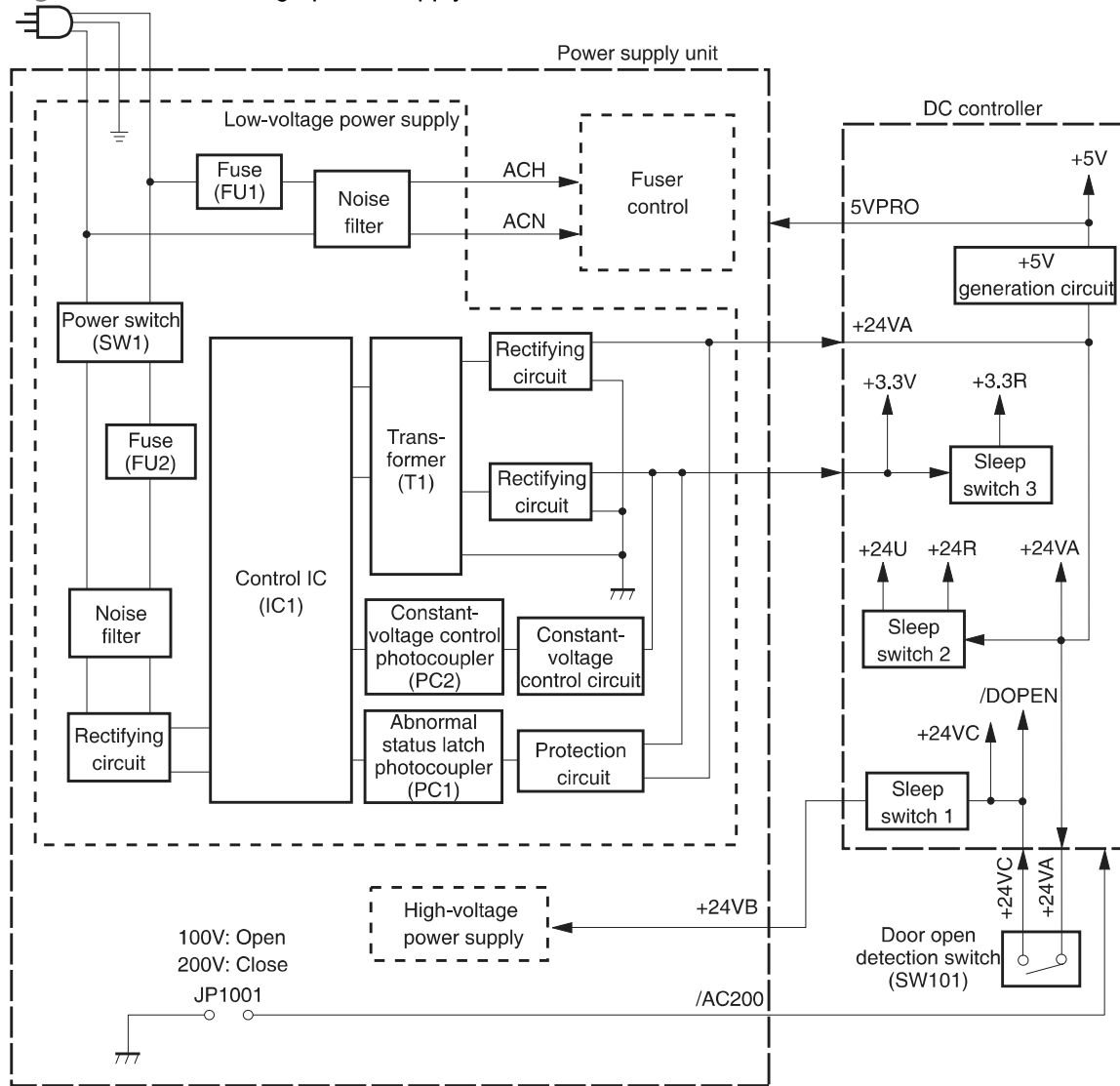
Figure 5-10 Fuser control



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 5-11 Low-voltage power supply



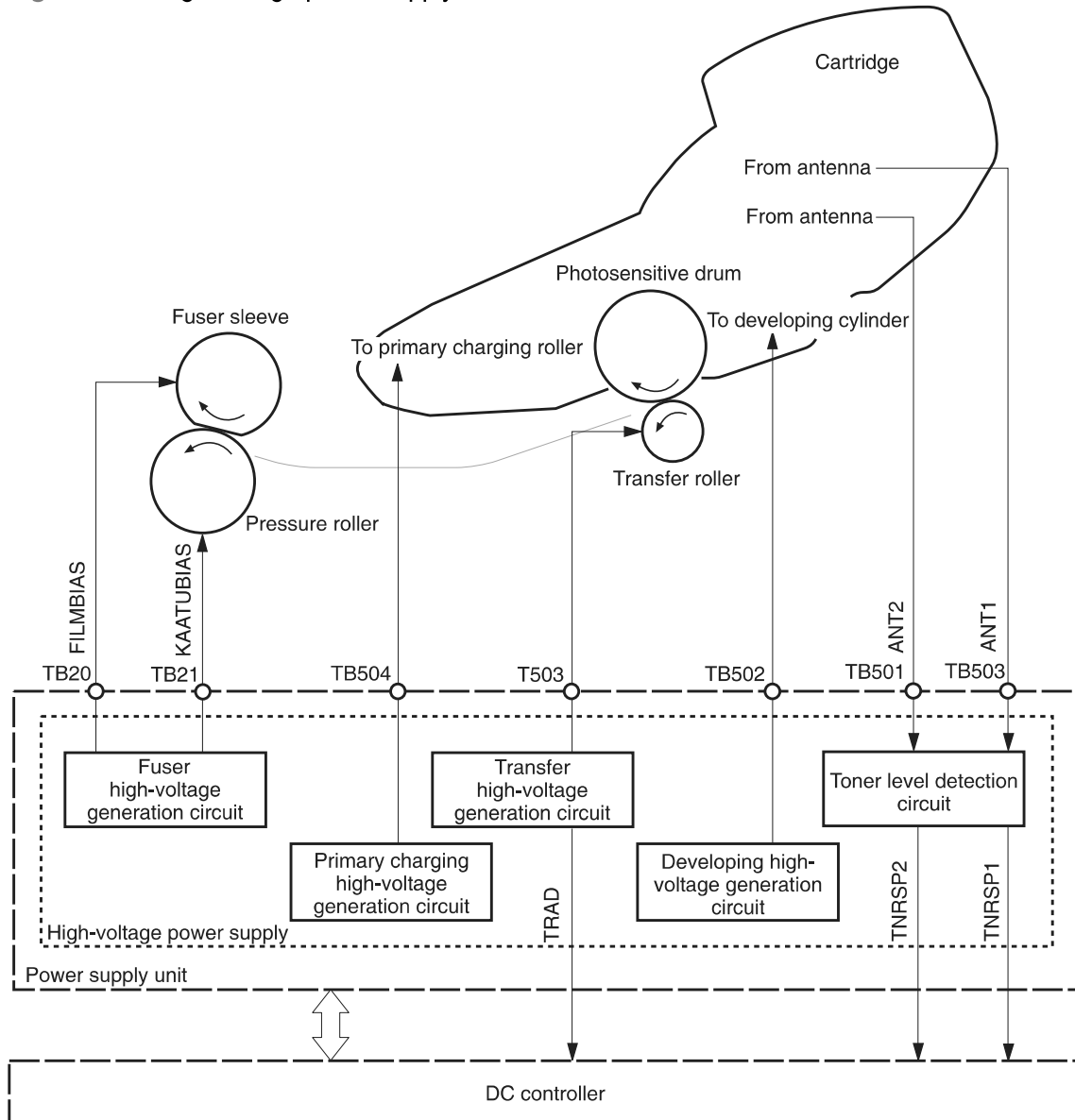
High-voltage power supply

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 5-12 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.

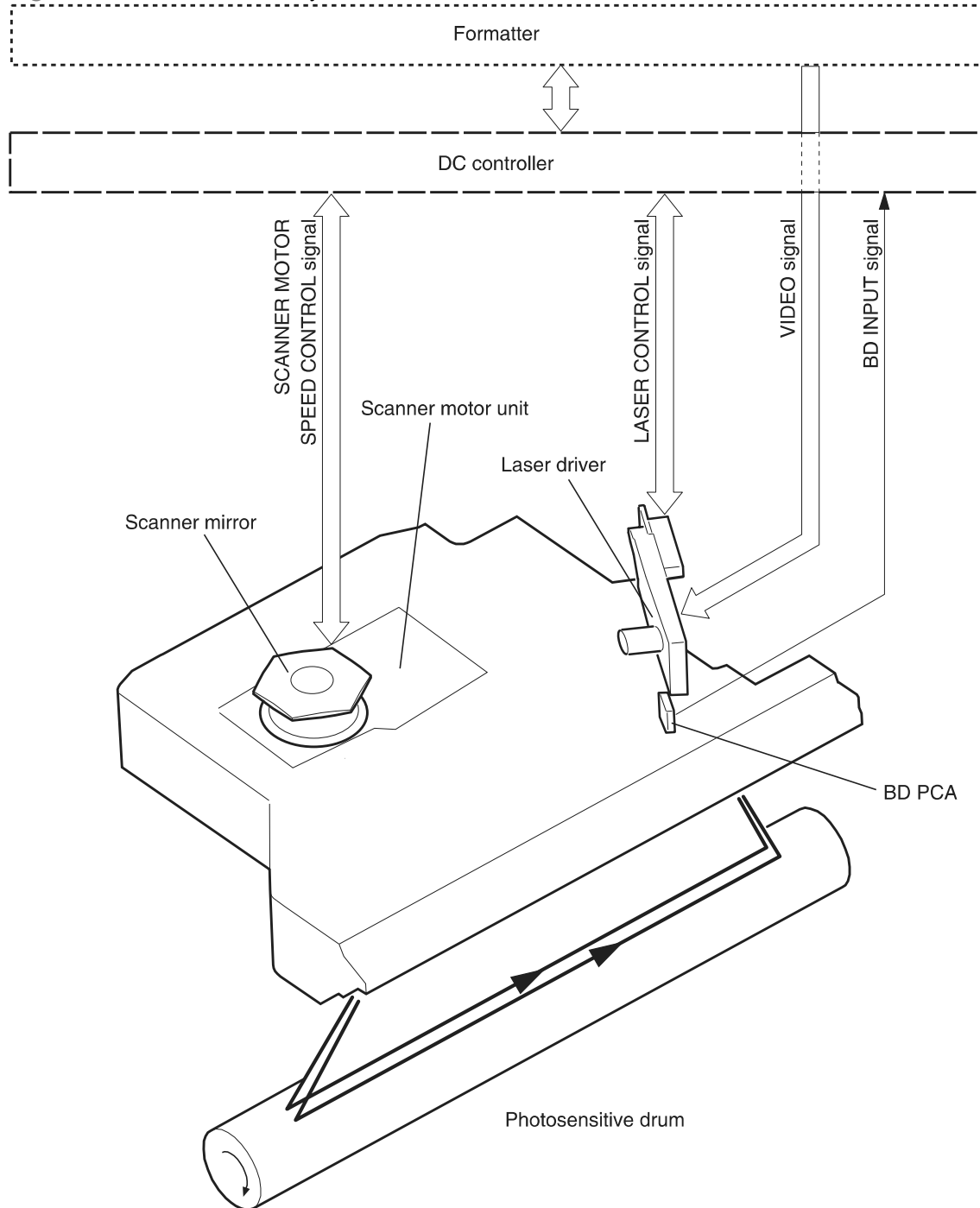
If the overcurrent or overvoltage protection system are activated and the power-supply circuit does not generate DC voltage, turn the power off, correct the problem, and then turn the product on again.

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

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 5-13 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.

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:

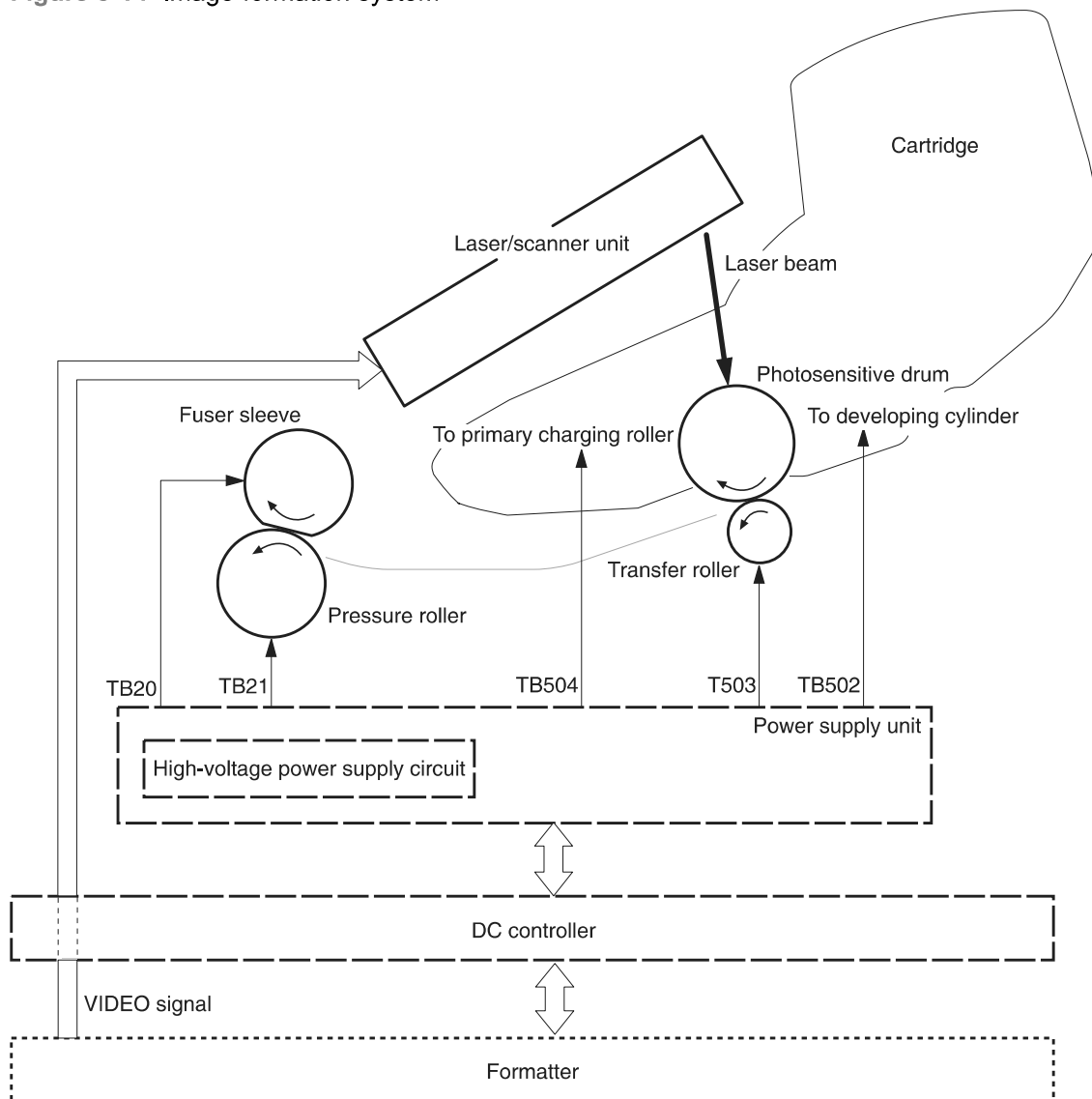
- Cartridge
- Transfer roller
- Fuser

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.

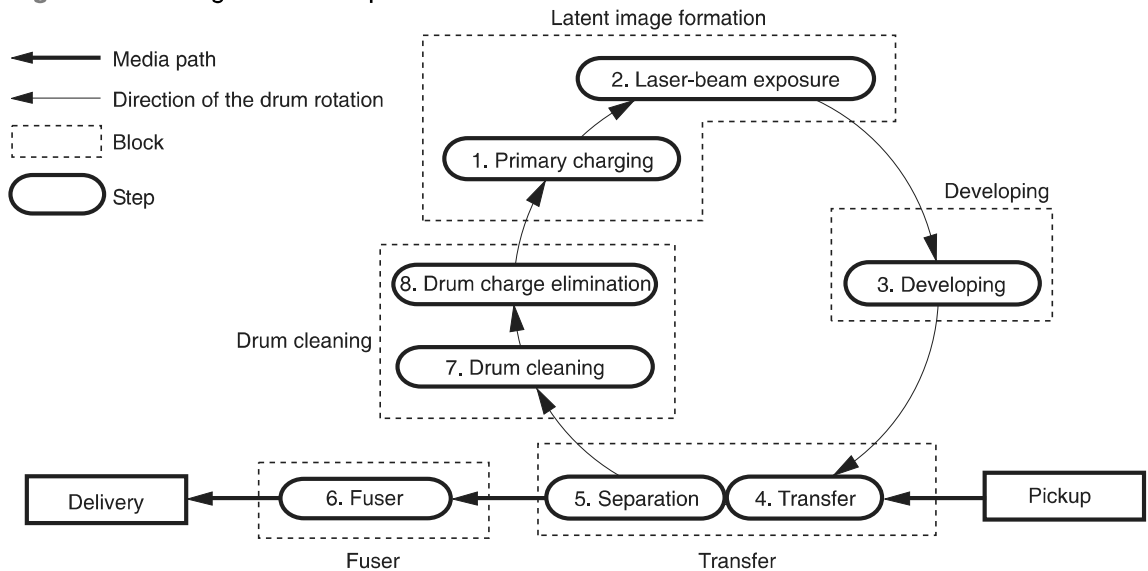
Figure 5-14 Image-formation system



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 5-15 Image-formation process



Block 1: Latent image formation

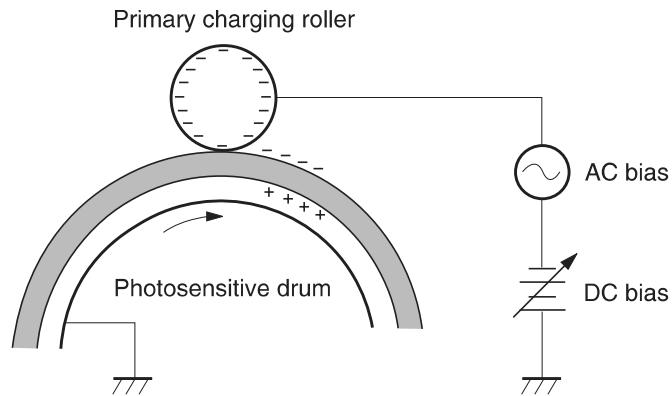
During the two steps that comprise this block, an invisible latent image is formed on the photosensitive drum.

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.

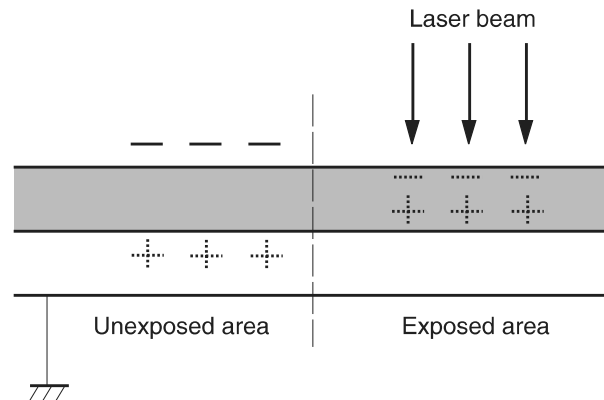
Figure 5-16 Primary charging



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 5-17 Laser-beam exposure



Block 2: Developing

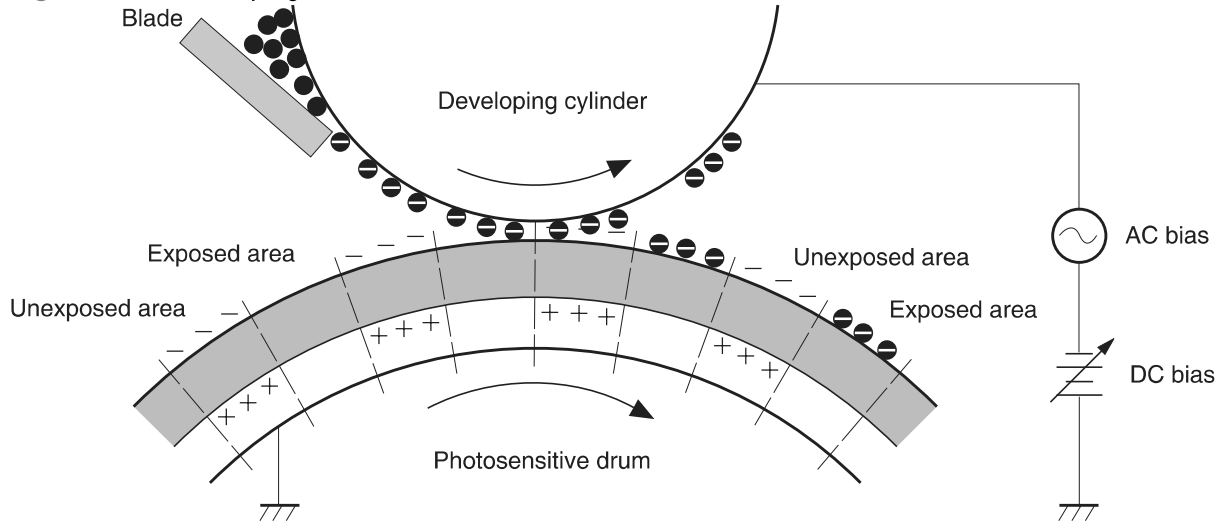
Toner adheres to the electrostatic latent image on the photosensitive drum.

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 5-18 Developing



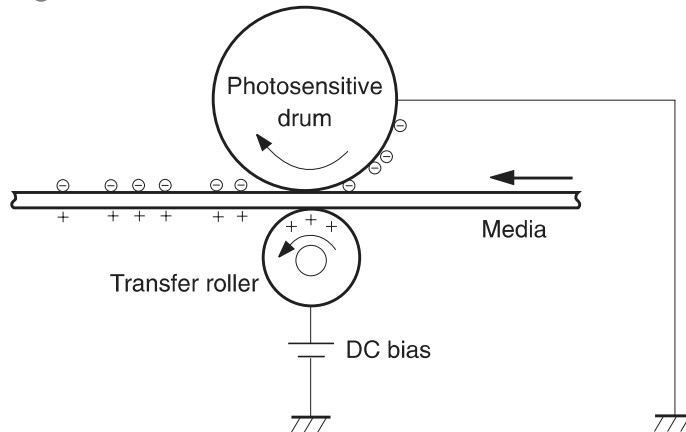
Block 3: Transfer

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.

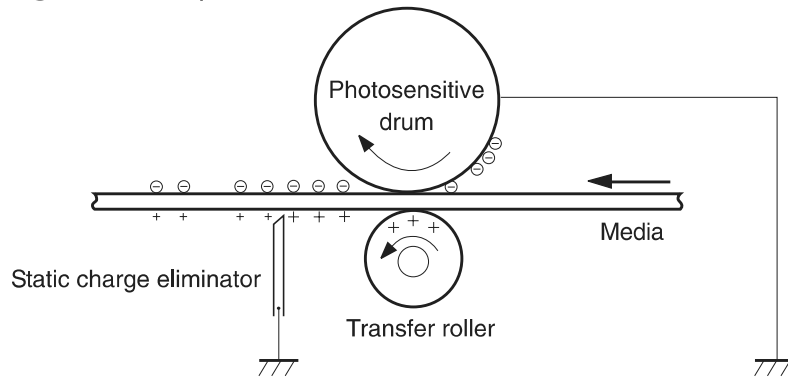
Figure 5-19 Transfer



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 5-20 Separation



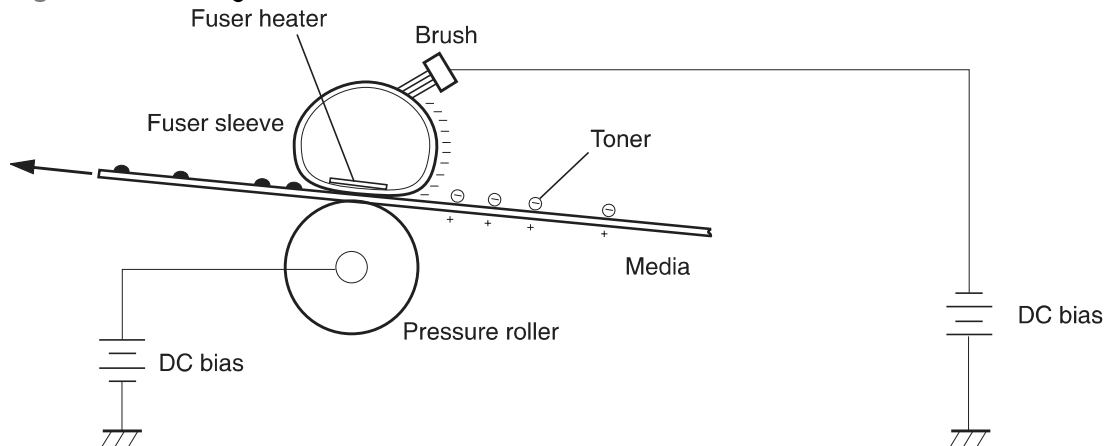
Block 4: Fusing

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 5-21 Fusing



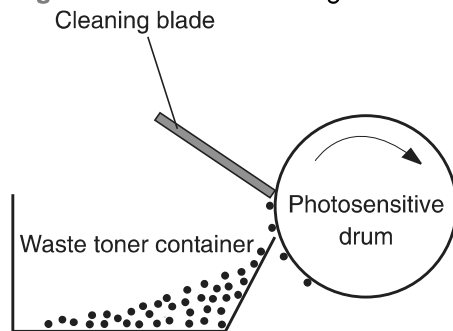
Block 5: Drum cleaning

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.

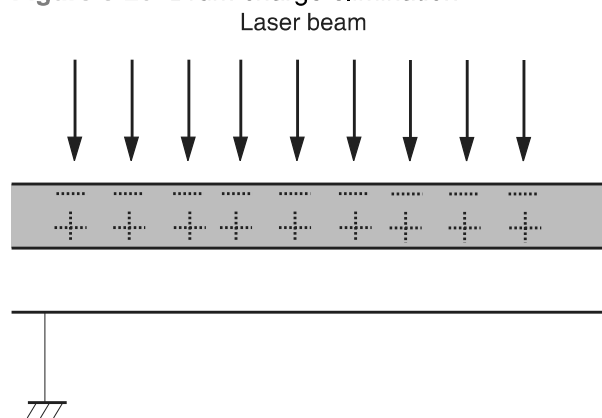
Figure 5-22 Drum cleaning



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 5-23 Drum charge elimination



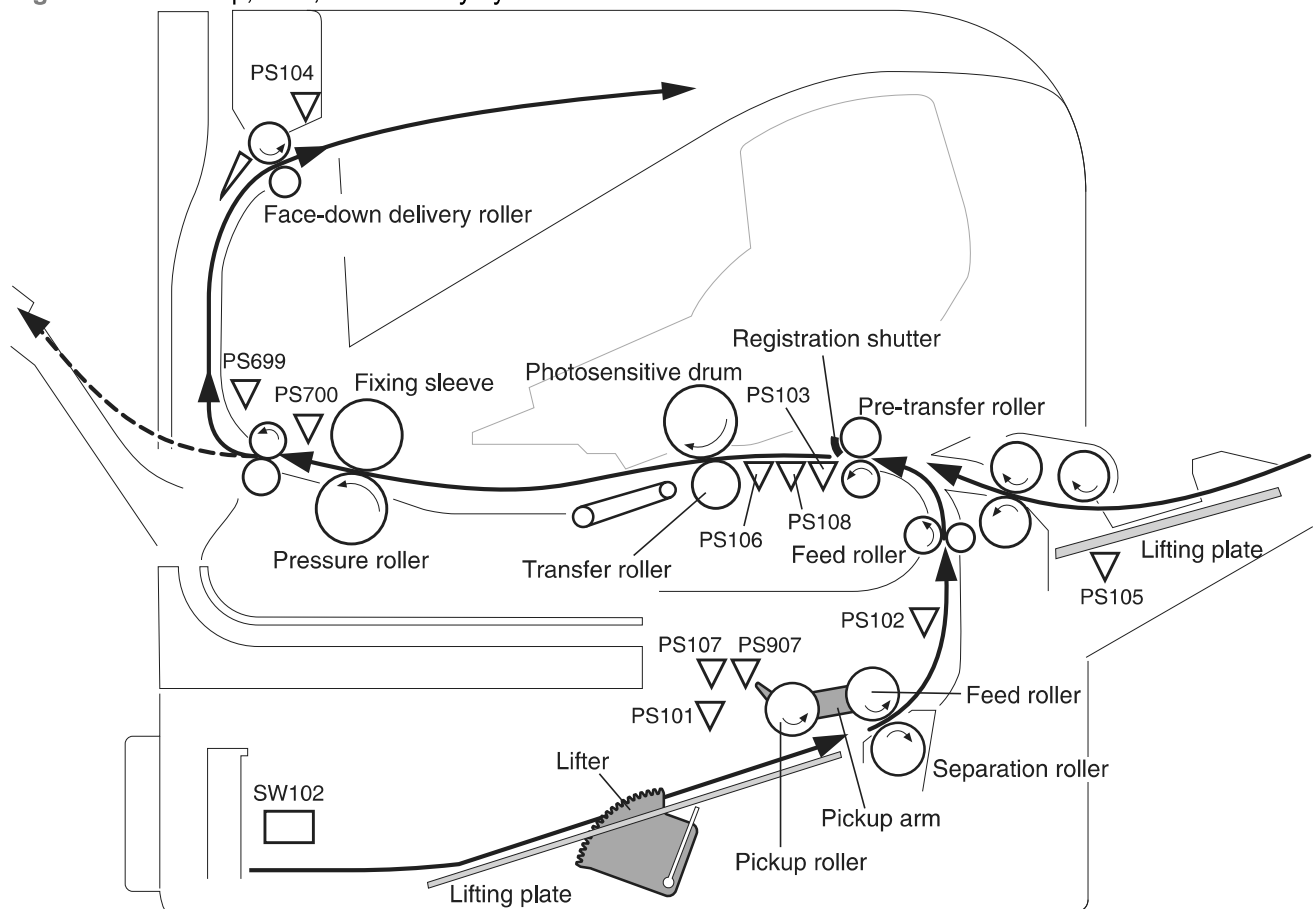
Pickup, feed, and delivery system

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 500-sheet feeders and one 1,500-sheet feeder 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.

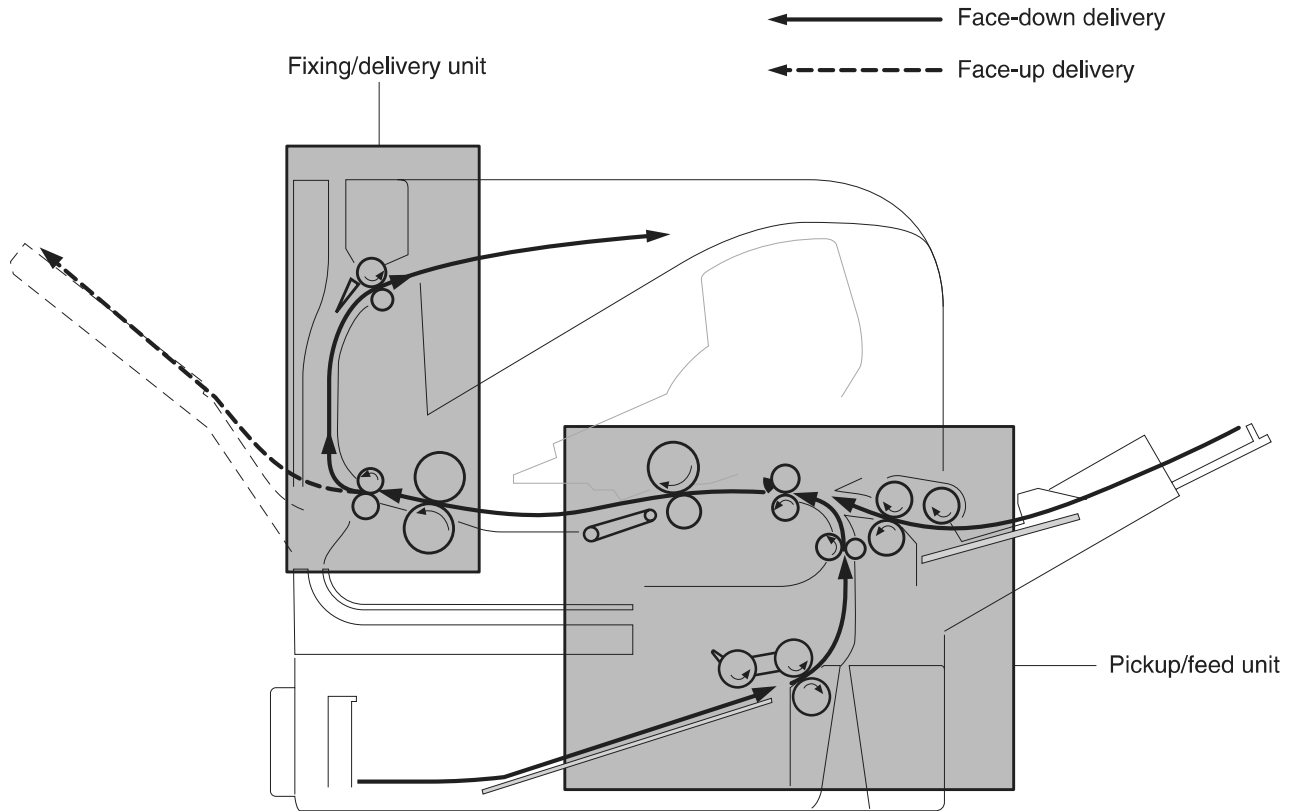
The pre-feed, top-of-page, and fuser-assembly delivery sensors (PS102, PS103, PS700) detect media arriving and passing along the paper path. If the media does not reach or pass these sensors within a specific amount of time, the microprocessor on the DC controller PCA halts the product functions and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

Figure 5-24 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 5-25 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.

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.



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.

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.

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 an EIO card, additional memory DIMMs, and the hard-disk accessory.

Sleep mode

period of time. When the product is in Sleep mode, the control-panel backlight is turned off, but the product retains all product settings, downloaded fonts, and macros. The default setting is **SLEEP MODE=ON**, with a 30-minute idle time. Sleep mode also can be turned off from the **RESETS** 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 PjL command is received at the serial port or EIO card.
- A control panel key is pressed.
- The top cover is opened.
- A tray 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.

Resolution Enhancement technology


The formatter contains circuitry for Resolution Enhancement technology (REt), which modifies the standard video dot data on its way to the dc controller PCA to produce "smoothed" line edges. The REt can be turned on or off from the control panel or from some software programs. The default setting is medium.

 **NOTE:** The REt settings that are sent from software programs or printer drivers override the control-panel settings.

EconoMode

The EconoMode setting uses up to 50% less toner than standard mode printing by reducing the dot density. However, EconoMode does not extend the life of print-cartridge components. EconoMode, which can be thought of as "draft mode," can be selected from the control panel (**PRINT QUALITY** menu) and through some software programs and printer drivers. The default setting is **OFF**.

△ **CAUTION:** HP does not recommend full-time use of EconoMode. If EconoMode is used full-time, it is possible that the toner supply will outlast the mechanical parts in the print cartridge.

 **NOTE:** EconoMode does not affect print speed or memory usage, or extend the life of the print cartridge.

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.

Expanded I/O

An optional expanded I/O (EIO) card can be installed in the designated slot on the formatter. It provides automatic I/O switching between multiple computers or networks that are connected to the product.

Hard-disk accessory

The optional hard-disk accessory can be mounted in one of the EIO slots on the rear of the formatter. The optional EIO-based hard disk is used for creating multiple original prints (mopies) and storing forms, fonts, and signatures.

CPU

The product formatter incorporates a 400 MHz RISC processor.

Product memory

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

Some product messages are affected by the auto-continue and clearable warning settings on the control-panel **SYSTEM SETUP** menu. If **CLEARABLE WARNING=JOB** is set on the control panel, warning messages appear on the control panel until the end of the job from which they were generated. If **CLEARABLE WARNING=ON** is set, warning messages appear on the control panel until **OK** is pressed. If an error occurs that prevents printing and **AUTO CONTINUE=ON** is set, the product goes offline for 10 seconds before it returns online. If **AUTO CONTINUE=OFF** is set, the message appears until **OK** is pressed.

Read-only memory

Besides storing microprocessor control programs, the read-only memory (ROM) stores dot patterns of internal character sets (fonts).

Random-access memory

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.

DIMM slot


The DIMM slot can be used to add product memory.

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.

Memory Enhancement technology

The HP Memory Enhancement technology (MEt) effectively doubles the standard memory through a variety of font- and data-compression methods.

 **NOTE:** The MEt is available only in PCL mode; it is not functional when printing in PS mode.

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.

6 Removal and replacement

- [Removal and replacement strategy](#)
- [Service approach](#)
- [User-replaceable parts](#)
- [Service replaceable parts](#)
- [1,500-sheet feeder assembly](#)

Removal and replacement strategy

This chapter documents 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 problem-solving at 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 locate. When replacing wire harnesses, always use the provided wire loops, lance points, or wire-harness guides.

Warnings, cautions, notes, and tips

⚠ **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, as well as damage to the product. The power must be on for certain functional checks during problem solving. However, the power supply should be disconnected 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* make sure that all FFCs are fully seated 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.

Electrostatic discharge

⚠



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. If an ESD workstation or mat 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.

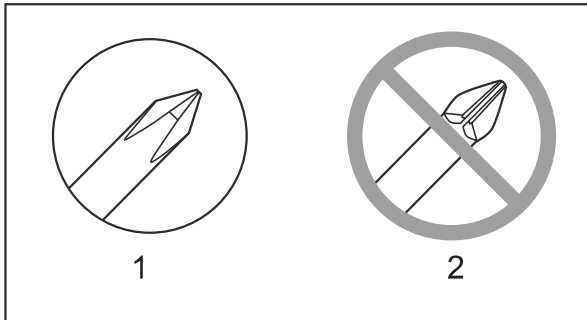
Required tools

- #2 Phillips screwdriver with a magnetic tip and a 152-mm (6-inch) shaft length
- Small flatblade screwdriver
- Needle-nose pliers
- ESD mat (if one is available)
- Penlight
- Tape (optional)
- Transfer-roller removal hook

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

CAUTION: Do *not* pull directly on the wires to disconnect them. *Always* pull on the plastic body of a connector to avoid damaging the connector wires.

Figure 6-1 Phillips and pozidrive screwdriver comparison



Service approach

Before performing service

- Remove all media from the product.
- Turn off the power using the power switch.
- Unplug the power cable and interface cable(s).
- Place the product on an ESD mat (if one is available). If an ESD workstation or mat 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 139](#).
- Remove the trays and output bins.

After performing service

- Return media to the input tray.
- Plug in the power cable.
- Reinstall the print cartridge.
- Reinstall the trays and output bins.
- Perform printer tests.

Post-service tests

After service has been completed, the following tests can be used to verify that the repair or replacement was successful.

Test 1 (print-quality test)

1. Verify that you have completed the necessary reassembly steps.
2. Ensure that the input tray contains clean, unmarked paper.
3. Attach the power cord, and then turn on the product.
4. Verify that the expected start-up sounds occur.
5. Print a configuration page (see [Print the information and show-me-how pages on page 66](#)), and then verify that the expected printing sounds occur.
6. If necessary, restore any customer-specified settings.
7. Clean the outside of the product with a damp cloth.

Types of screws

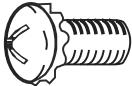
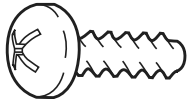


This table describes the screws that are used in the product and provides guidelines to help determine where each type of screw is used. The screws can vary in length depending on the thickness of the material that is being fastened.

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.

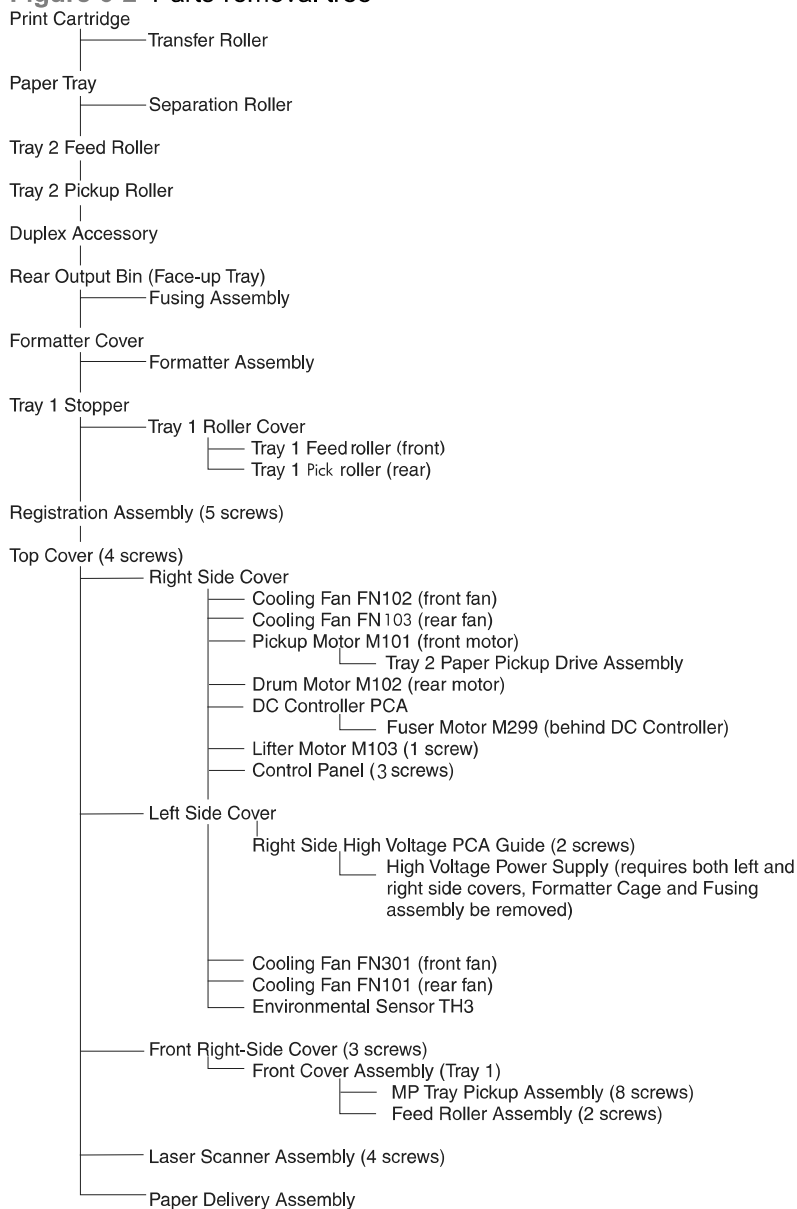
Table 6-1 Common fasteners used in this product

Screw type	Purpose
 <p>Phillips-head machine screw with captive star washer</p>	<p>This screw is used to fasten metal to metal when good electrical contact is needed. This screw also provides high resistance to loosening.</p>
 <p>Phillips-head screw with self-tapping threads</p>	<p>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).</p>
<p>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.</p>	
 <p>Phillips washer-head machine screw with a broad, flat washer attached to the screw head</p>	<p>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.</p>
<p> 6 mm 8 mm 10 mm 12 mm M 3 M 4  Screw measurement guide </p>	

Parts removal order

Use the following diagrams to determine the order in which parts must be removed.

Figure 6-2 Parts-removal tree

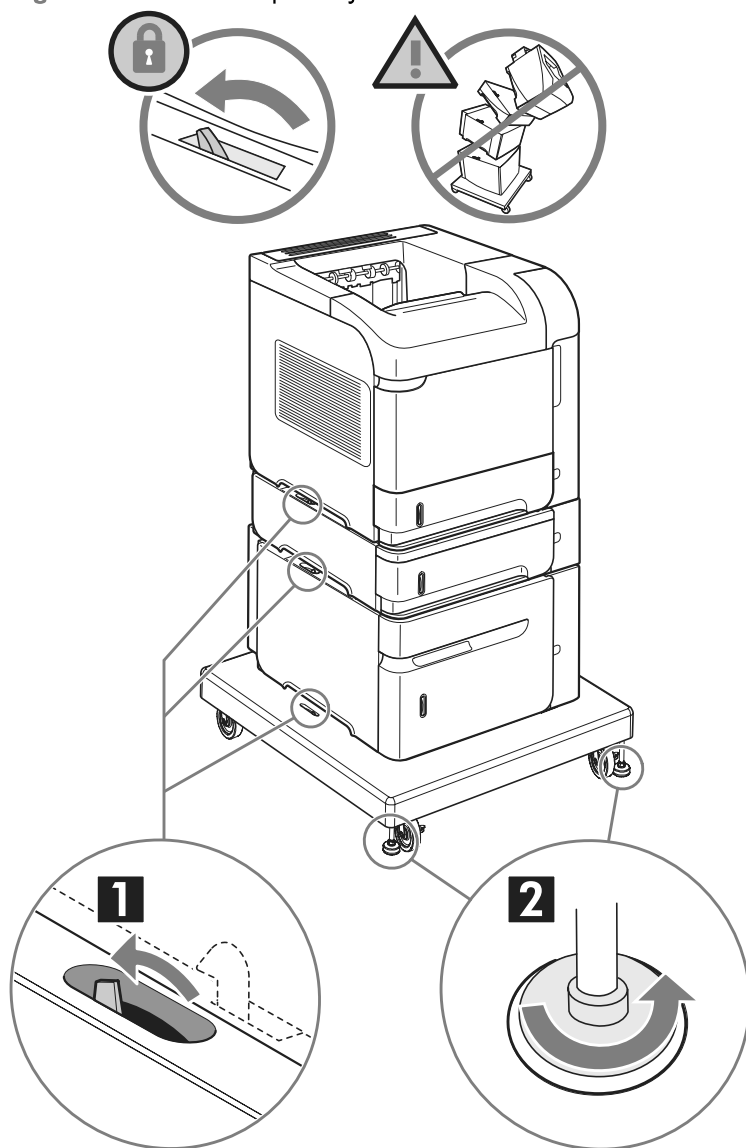


Product input trays and cabinet wheel locks

When the product and input trays are placed on the cabinet stand, the product and trays must be locked together to prevent them from tipping over. This is not necessary (but it is recommended) if the product and trays are placed on a level work surface. When servicing the product and accessories, unlatch the locking mechanism and separate the product and its accessory components.

The cabinet stand includes locks for the wheels at its base. Make sure that the wheels are locked when the product is in place. The wheels should be unlocked only when the product is being moved.

Figure 6-3 Product input trays and cabinet wheel locks



DC controller diagram

You must disconnect wires harnesses or cables from the DC controller PCA before you can remove or replace many of the product components. Use the following diagram to assist with disconnecting the cables and wire harnesses from the DC controller PCA.

Figure 6-4 DC controller diagram

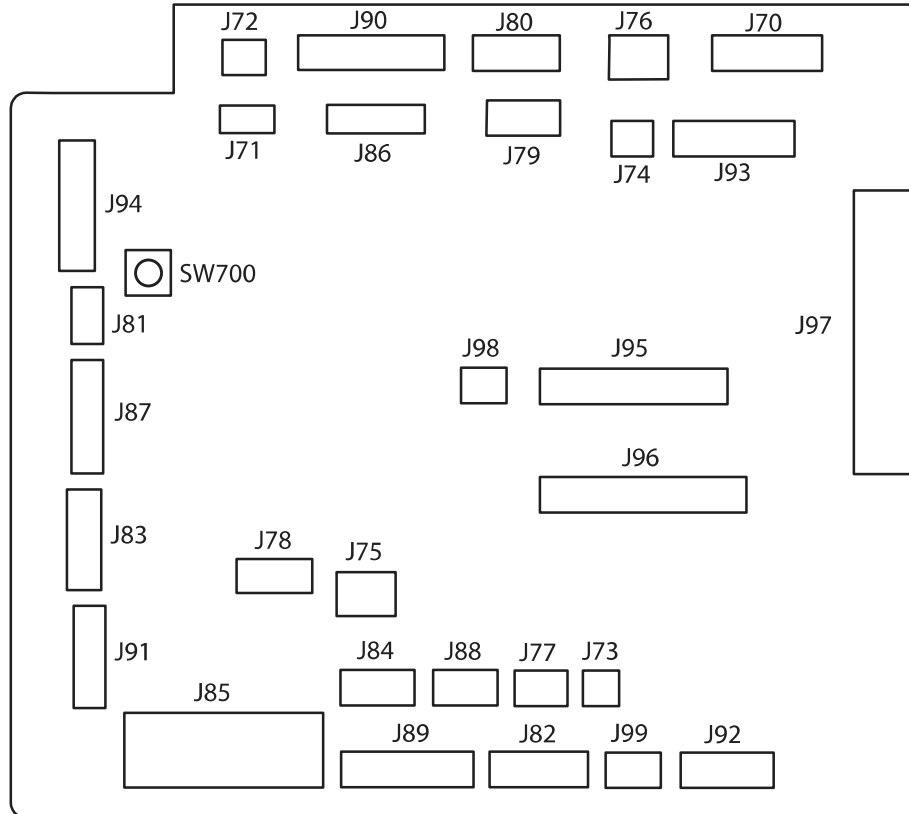



Table 6-2 DC controller connectors

Connector	Functionality	Pin Configuration
J70	Control Panel connector	8-pin
J71	SL102 Tray 1 Pickup Solenoid	2-pin
J72	SL101 Tray 2 Pickup Solenoid	2-pin
J73	M103 Tray 2 Lift Motor	2-pin
J74	TG101 Memory Tag I/O	2-pin
J75	FN102 Cooling Fan	3-wire
J76	PS104 Face Down Output Full Sensor	3-pin
J77	CL101 Feed Clutch	3-pin (2-wire)
J78	SW101 Door Open Switch	3-pin
J79	FN103 Cooling Fan	4-pin (3-wire)
J80	Not used	6-pin
J81	PS105 Tray 1 Media Present Sensor	3-pin

Table 6-2 DC controller connectors (continued)

Connector	Functionality	Pin Configuration
J82	Fusing Assembly	7-wire
J83	Envelope Feeder Accessory	5-pin
J84	Duplex Accessory	6-pin
J85	Power Supply PCA (+24Vdc/3.3Vdc)	6-wire
J86	Scanner Motor/Beam Detect	7-pin
J87	M102 Drum Motor	8-pin (7-wire)
J88	Paper Deck Accessory	5-pin
J89	M299 Fusing Motor	10-pin
J90	Stacker/Stacker-Stapler/Mailbox	8-pin
J91	M101 Feed Motor	7-pin
J92	PS101 Tray 2 Media present PS107 Tray 2 Media Stack Sensor #1 PS907 Tray 2 Media Stack Sensor #2	8-pin
J93	Laser/Driver PCA	11-pin
J94	PS102 Pre-feed Sensor PS108 Media Width Sensor #2 PS103 Top of Page Sensor PS106 Media Width Sensor #1	12-pin
J95	Power Supply PCA	18-pin
J96	Power Supply PCA	20-pin
J97	Intermediate PCA to Formatter PCA	32-pin Ribbon
J98	Not used	
J99	SW102 Tray 2 Media Size Switches	4-pin
TB700	3.3 volts dc	
TB701	GRN	

User-replaceable parts

 **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.

Print cartridge

1. Open the print-cartridge door.

Figure 6-5 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 6-6 Remove the print cartridge (2 of 2)



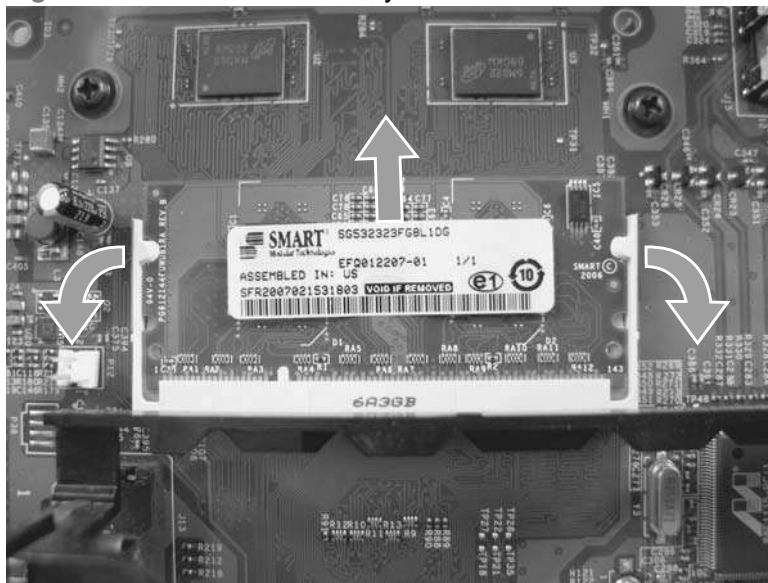
Memory DIMM



CAUTION: The product contains components that are sensitive to electrostatic discharge (ESD). Always perform service work at an ESD-protected workstation. If an ESD-protected workstation is not available, discharge body static by grasping the product chassis before touching an ESD-sensitive component. Ground the product chassis before servicing the product.

1. Remove the formatter cover. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
2. Open the formatter cage door.
3. Push the DIMM-locking arms away from the DIMM to release it, and then pull the DIMM out of the DIMM slot.

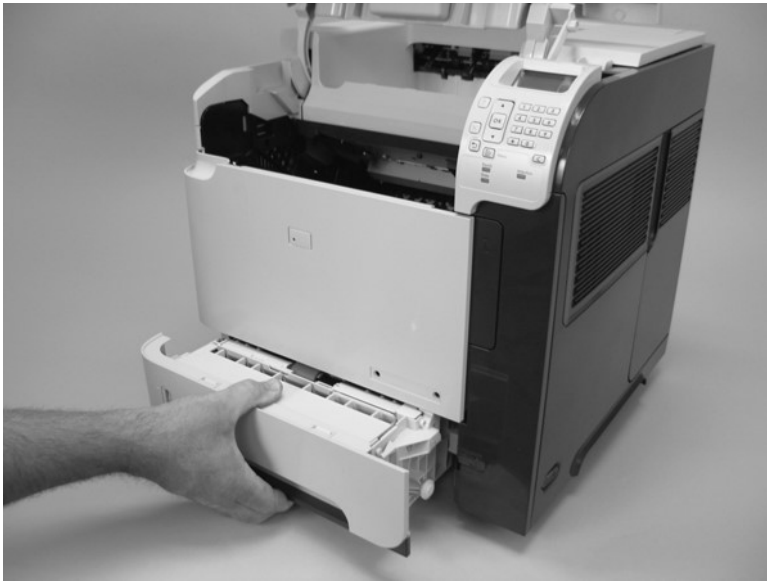
Figure 6-7 Remove the memory DIMM



Tray 2

Pull the tray out of the product to remove it.

Figure 6-8 Remove Tray 2



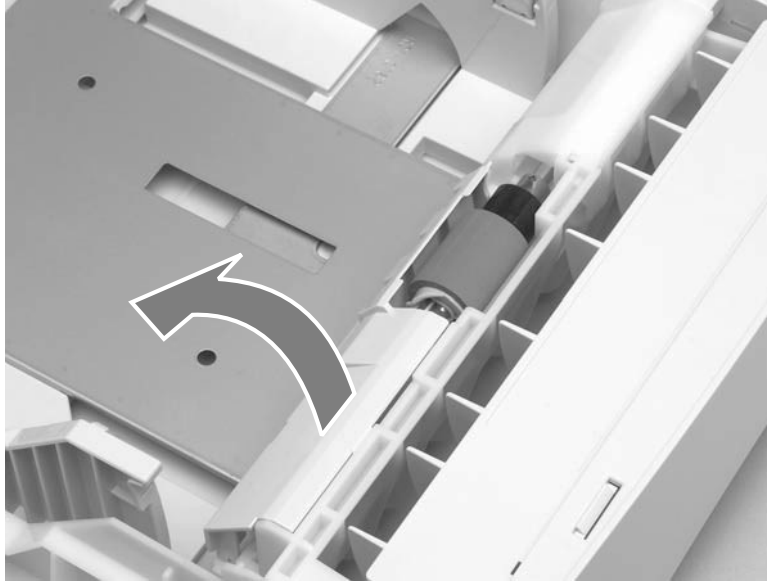
Tray 2 separation, pickup, and feed rollers

△ **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.

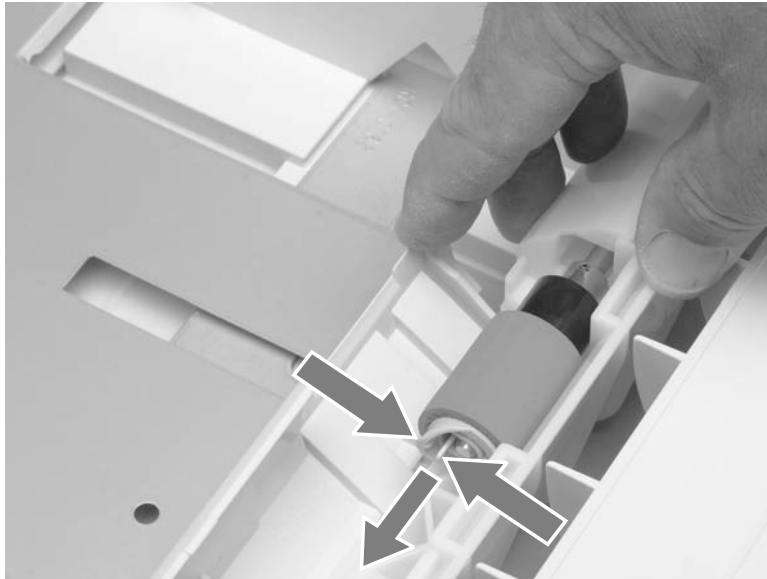
△ **CAUTION:** When you install this roller, make sure that it locks into place. Verify that the roller is correctly oriented, and that the torque limiter next to the roller is correctly positioned against the locking pin on the shaft.

Figure 6-9 Remove the Tray 2 separation, pickup, and feed rollers (1 of 4)



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

Figure 6-10 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 6-11 Remove the Tray 2 separation, pickup, and feed rollers (3 of 4)

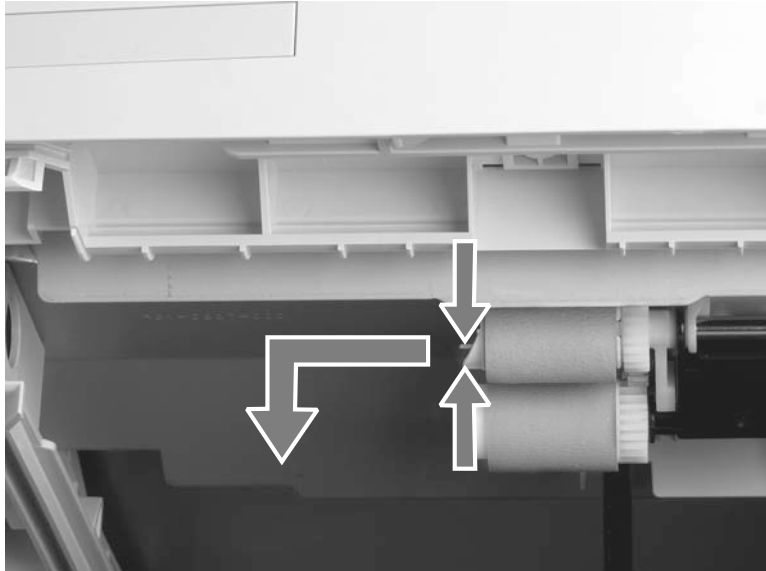


4. Pinch the locking lever on the left side of the feed roller (the front top roller below). Slide the roller off the shaft. Repeat this step for the pickup roller (the bottom roller below).

💡 Reinstallation tip You might have to rotate the roller to gain access to the locking lever.

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

Figure 6-12 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.
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 6-13 Remove the transfer roller

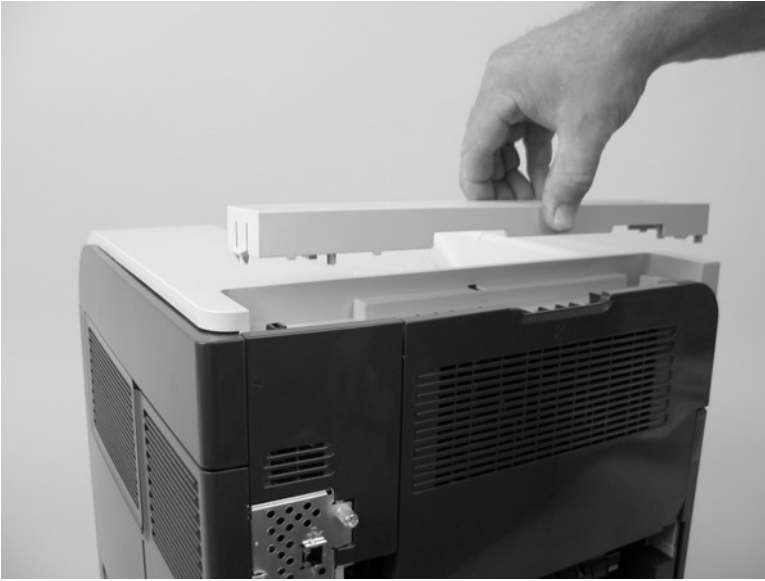


💡 **Reinstallation tip** When you install the transfer roller, make sure that the black collar on the left side is oriented correctly, with the open end face-down (the solid end is face-up).

Top-accessory cover

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

Figure 6-14 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 6-15 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 6-16 Remove the front accessory covers (2 of 2)



Duplex accessory or cover

Pull the duplex accessory or cover out of the product to remove it.

Figure 6-17 Remove the duplex accessory cover

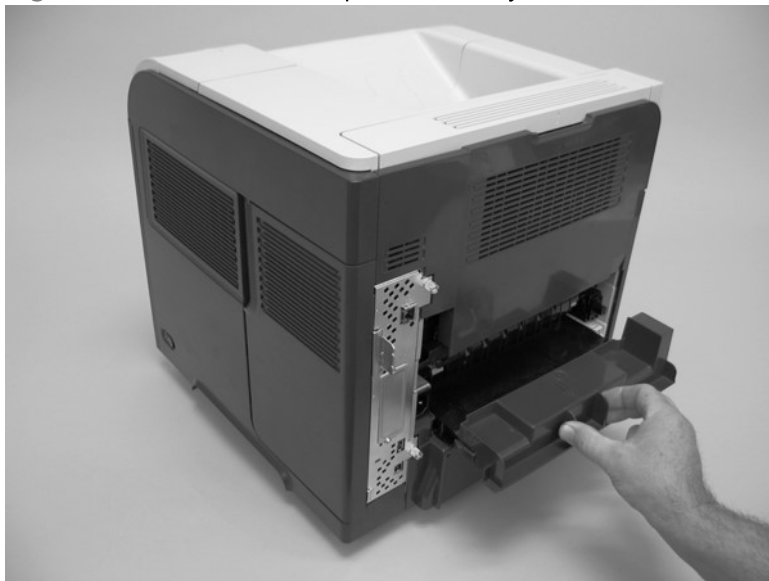


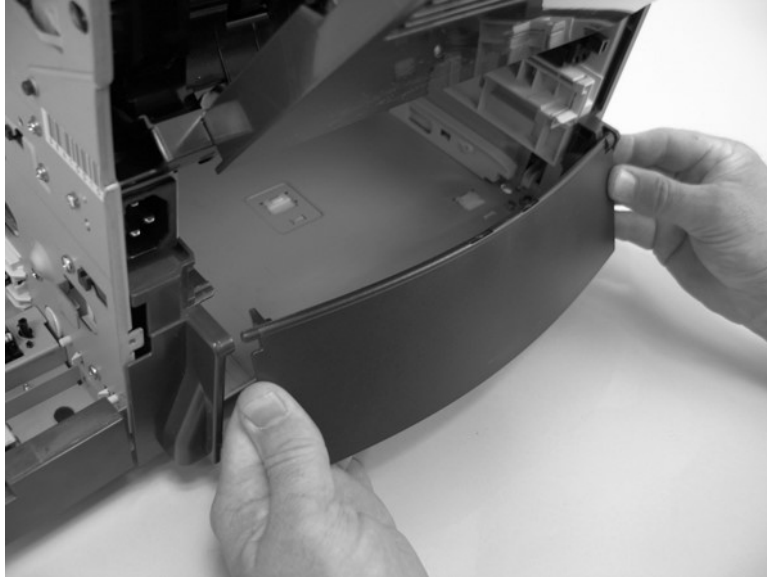
Figure 6-18 Remove the duplex accessory



Tray 2 extension door

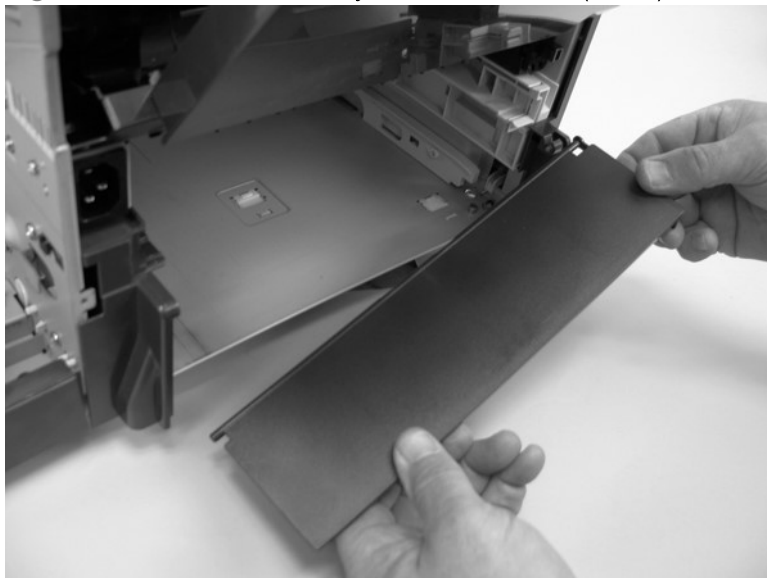
1. Remove the duplex accessory, or the duplex accessory cover. See [Duplex accessory or cover on page 148](#).
2. Carefully flex the Tray 2 extension door to release the hinge pin near the power cord side of the product.

Figure 6-19 Remove the Tray 2 extension door (1 of 2)



3. 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 6-20 Remove the Tray 2 extension door (2 of 2)

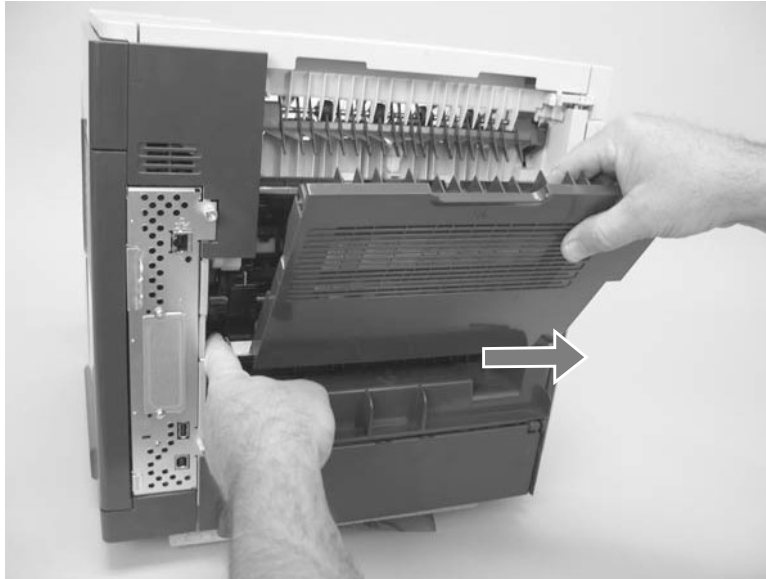


Rear output bin

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

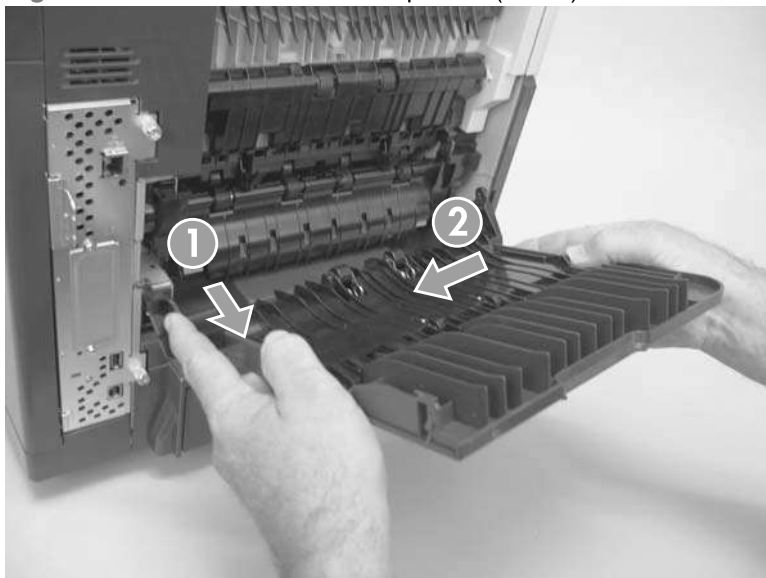
1. Open the rear output bin.
2. Squeeze the hinge pin out of its mounting hole.

Figure 6-21 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 6-22 Remove the rear output bin (2 of 2)



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.

1. Remove the rear output bin. See [Rear output bin on page 150](#).
2. Squeeze the blue fuser-release tabs (callout 1).

Figure 6-23 Remove the fuser (1 of 2)



3. 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 6-24 Remove the fuser (2 of 2)



Formatter cover, formatter cage, and formatter PCA

1. Grasp the formatter cover.
2. Pull the cover straight back and away from the product, and then remove two thumb screws (callout 1).

Figure 6-25 Remove the formatter cover and formatter cage (1 of 2)



3. Grasp the formatter cage by the finger holes, and then slide it away from the product to remove it.


 **NOTE:** When you reinstall the formatter cage, open the formatter-cage door before you fully seat the formatter cage, and verify that the formatter PCA connector is aligned with the connector on the product chassis.

Figure 6-26 Remove the formatter cover and formatter cage (2 of 2)



Reinstallation notes, formatter

If you install a *replacement* formatter, complete the following steps:

1. Use the control-panel display to open the service menu and specify the total page count, the maintenance count, the service ID, the cold reset paper size, and the serial number.
2. Reset the product display language to the customer's choice (see the Operation chapter).

After installing a *new* formatter, complete the following steps:

1. Remove the memory DIMM from the discarded formatter , and then install the DIMM 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 again, and then wait five minutes after the product reaches the **Ready** state.
5. Print a configuration page to verify against original settings.

Installing a new formatter and a new DC controller

△ **CAUTION:** If you are installing a *new formatter and a new DC controller*, follow the instructions in this section.


1. Turn the product off.
2. Remove the formatter and cage, and then replace it with the replacement formatter and cage.
3. 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. The same five-minute wait is required several times during this procedure.

4. Turn the product off.
5. Turn the product on again, and then wait five minutes after the product reaches the Ready state.
6. Turn the product off.
7. Remove the DC controller (see [DC controller PCA on page 188](#)) and replace it with the new DC controller.
8. Turn the product on and wait for five minutes after the product reaches the **Ready** state.
9. Turn the product off.
10. Turn the product on again, and then wait five minutes after the product reaches the Ready state.
11. Print a configuration page to verify against original settings.

Service replaceable parts

 **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.

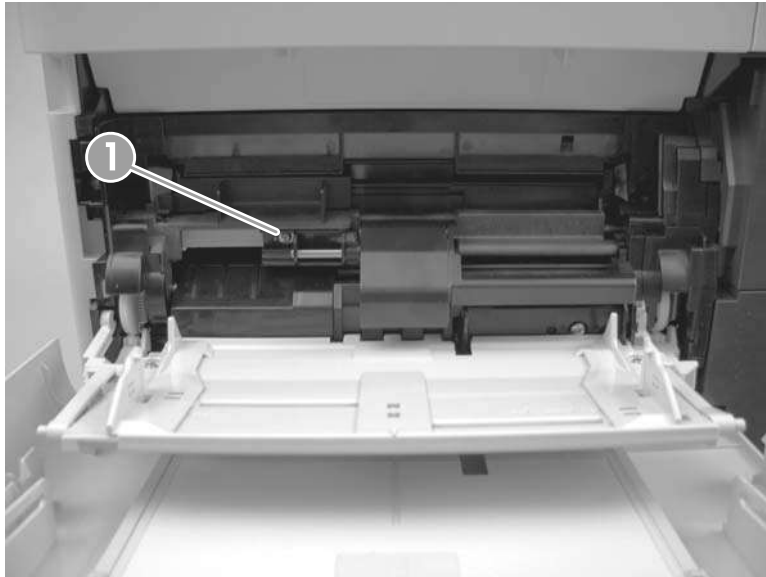
Tray 1 pickup and feed rollers

 **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.

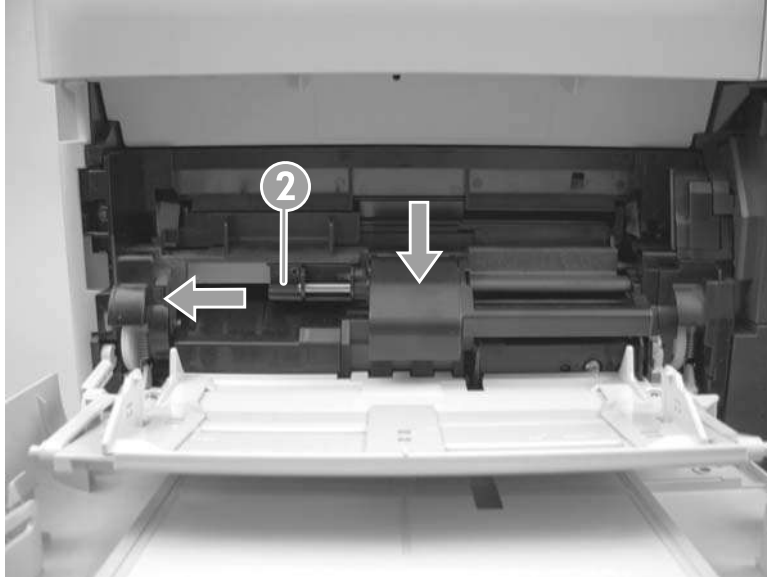
1. Open the front cover.
2. Remove one screw (callout 1) with a short screwdriver.

Figure 6-27 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 6-28 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 6-29 Remove the Tray 1 pickup and feed rollers (3 of 4)

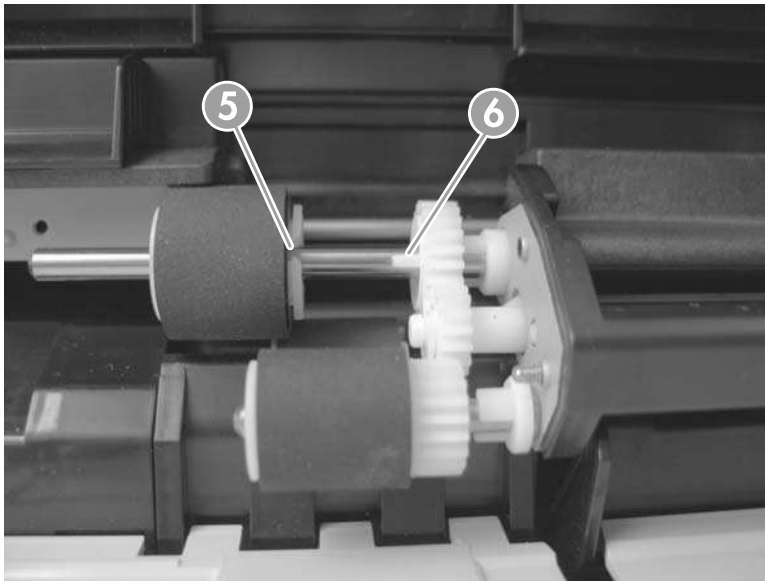


5. Slide the Tray 1 pickup roller (callout 3) and the feed roller (callout 4) to the left and off of the shafts to remove them.

Figure 6-30 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.

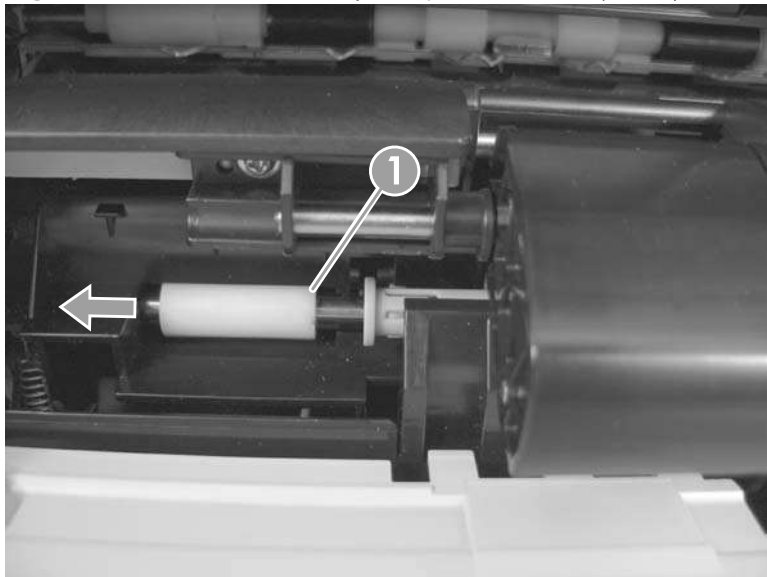
1. Open the front cover.
2. Rotate the spring-loaded cover downward to gain access to the roller.

Figure 6-31 Remove the Tray 1 separation roller (1 of 3)



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

Figure 6-32 Remove the Tray 1 separation roller (2 of 3)



4. Remove the roller.

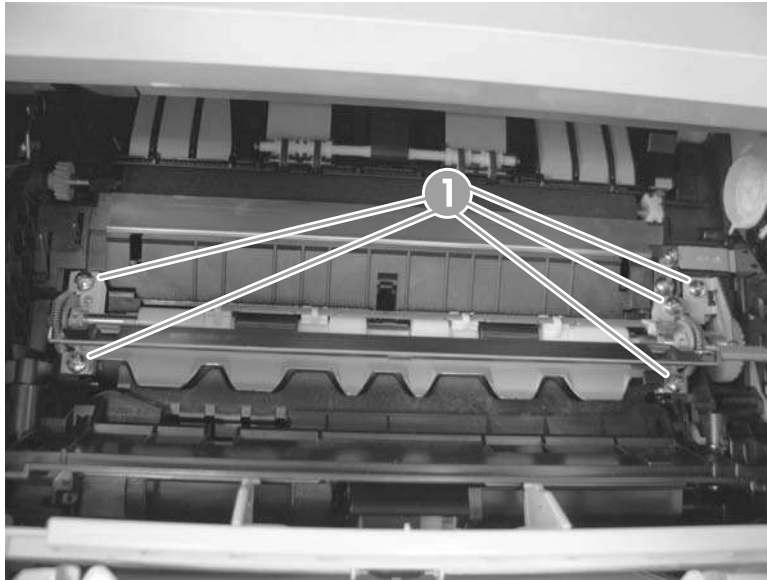
Figure 6-33 Remove the Tray 1 separation roller (3 of 3)



Registration assembly

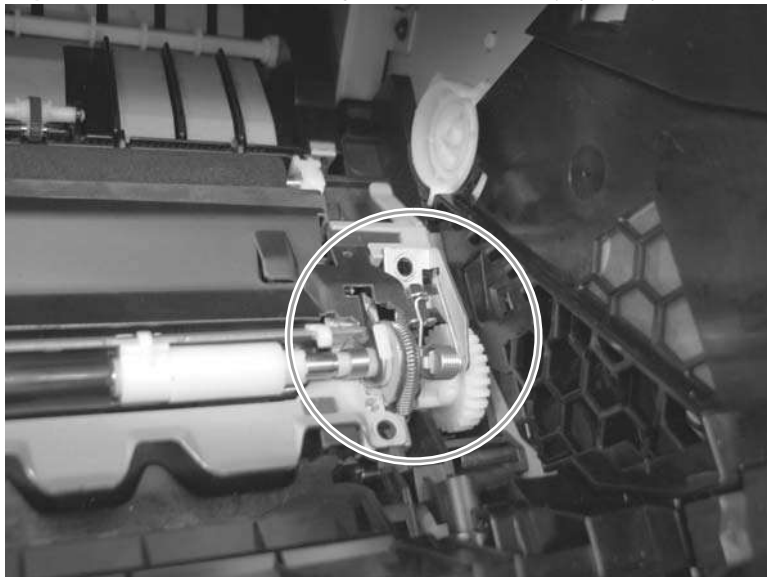
1. Open the print-cartridge door, and then remove the print cartridge.
2. Use the green handle (located at the right edge of the registration plate) to raise the registration-roller plate, and then remove five screws (callout 1).

Figure 6-34 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 6-35 Remove the registration assembly (2 of 4)



4. Lift the registration assembly out of the product.

Figure 6-36 Remove the registration assembly (3 of 4)




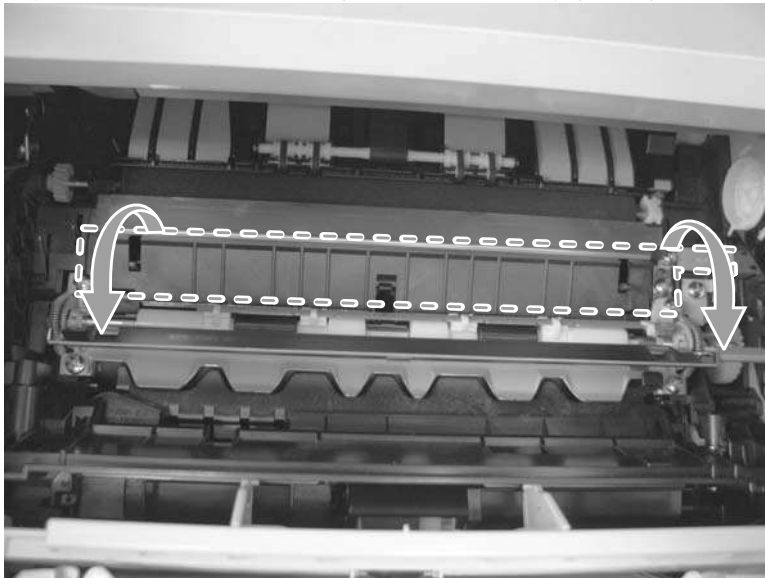

 **TIP:** To reinstall the registration assembly, you must open the registration-roller plate to gain access to the mounting holes.

Figure 6-37 Remove the registration assembly (4 of 4)



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. Remove the top accessory cover. See [Top-accessory cover on page 146](#).
2. Open the rear-output bin, the print-cartridge door, and the front cover.
3. Use needle-nose pliers to release the print-cartridge drive-arm tab (callout 1).


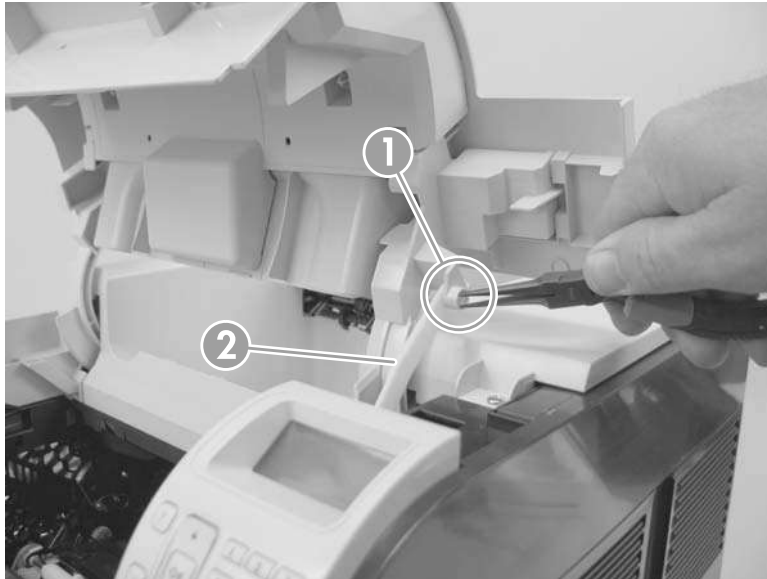
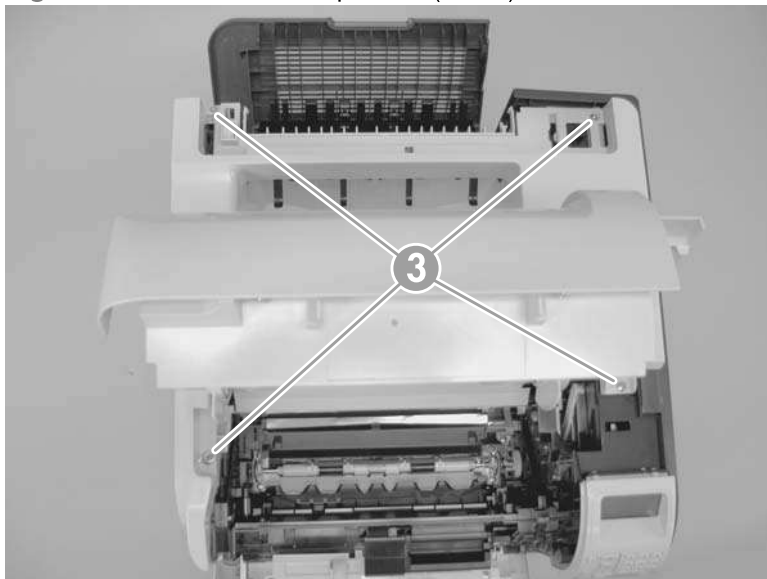
 **TIP:** Push the print-cartridge drive-arm (callout 2) back into the product to avoid damaging it when you remove the top cover.

Figure 6-38 Remove the top cover (1 of 4)



4. Remove four screws (callout 3).

Figure 6-39 Remove the top cover (2 of 4)



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


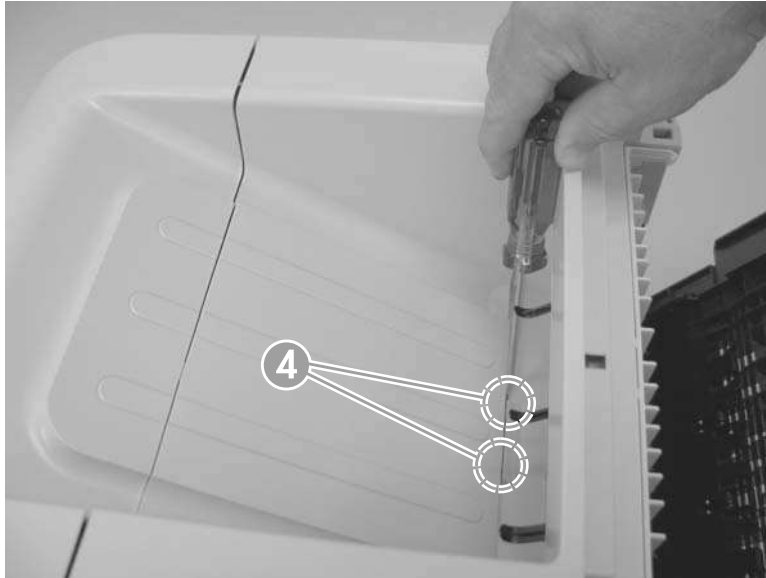
 **NOTE:** Make sure that these tabs are fully seated when the top cover is reinstalled.

Figure 6-40 Remove the top cover (3 of 4)



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


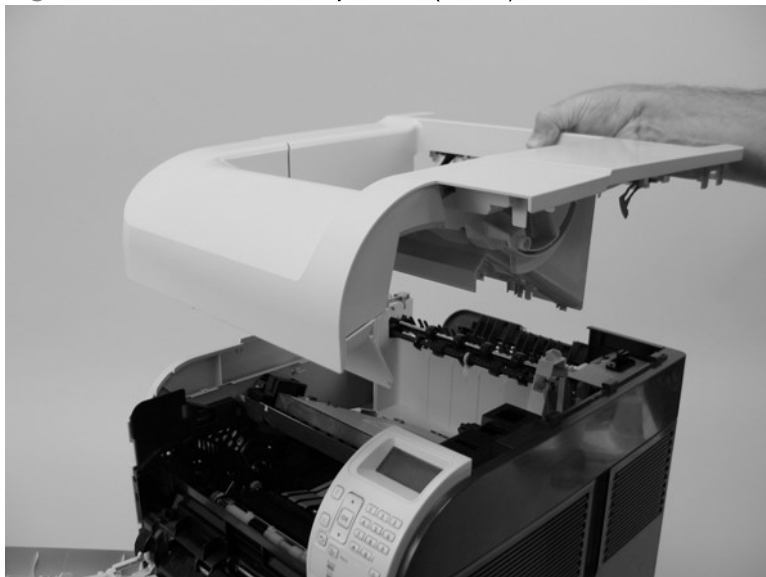
 **CAUTION:** The accessory pin (located in the left-rear corner of the cover) is not captive. Do not lose the pin.

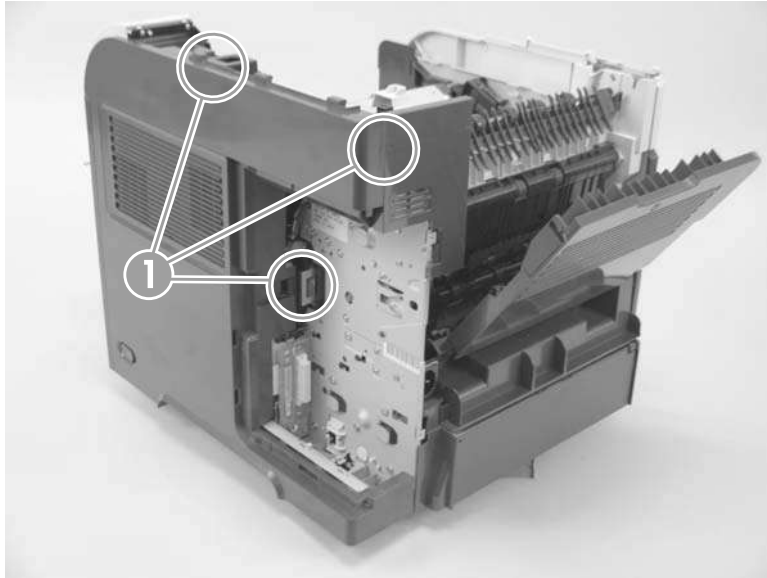
Figure 6-41 Remove the top cover (4 of 4)



Right-side cover

1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
2. Release three tabs (callout 1).

Figure 6-42 Remove the right-side cover (1 of 3)



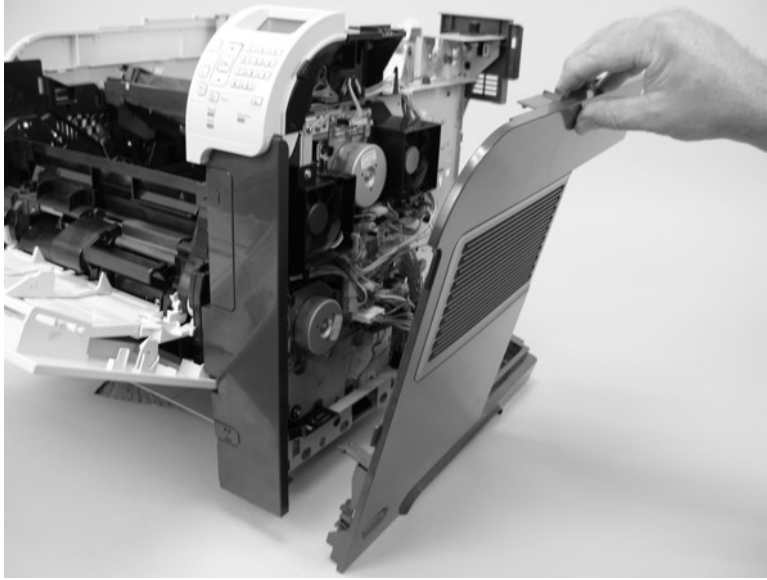
3. Carefully separate the cover from the product near the control panel.

Figure 6-43 Remove the right-side cover (2 of 3)



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

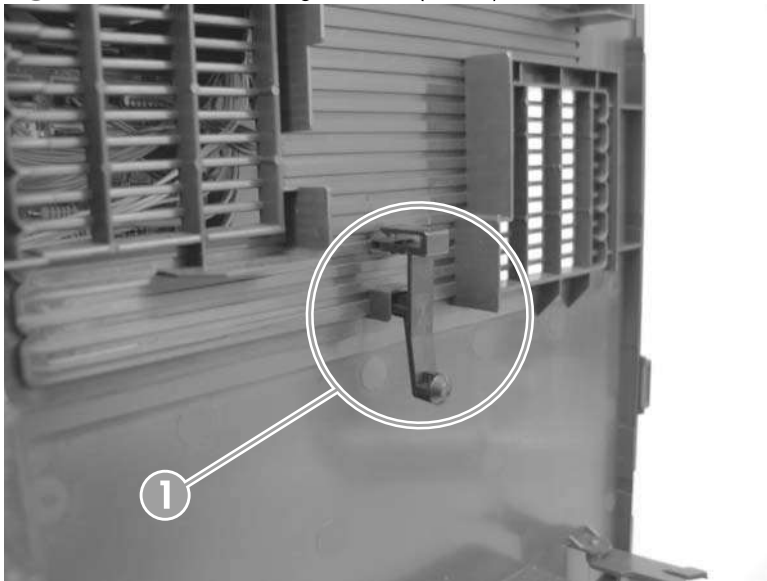
Figure 6-44 Remove the right-side cover (3 of 3)



Reinstall the right cover

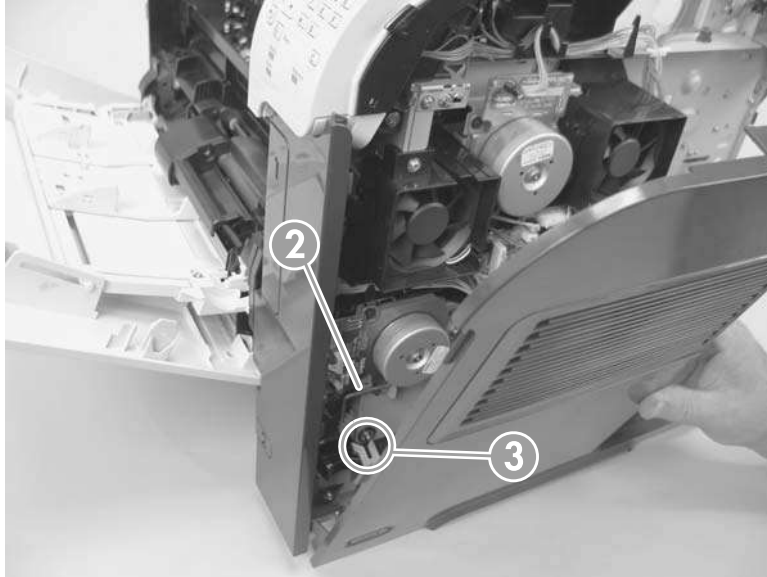
1. If you are installing a replacement cover, remove the engine-test button (callout 1) from the discarded cover and then install it on the replacement cover.

Figure 6-45 Install the right cover (1 of 2)



2. When the cover is installed, make sure that the switch-connecting rod (callout 2) snaps into the power-switch arm (callout 3).

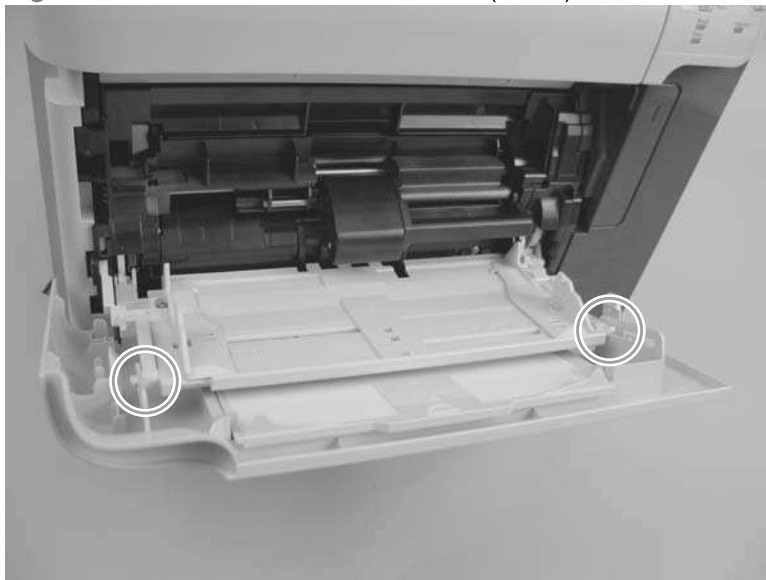
Figure 6-46 Install the right cover (2 of 2)



Left-side cover

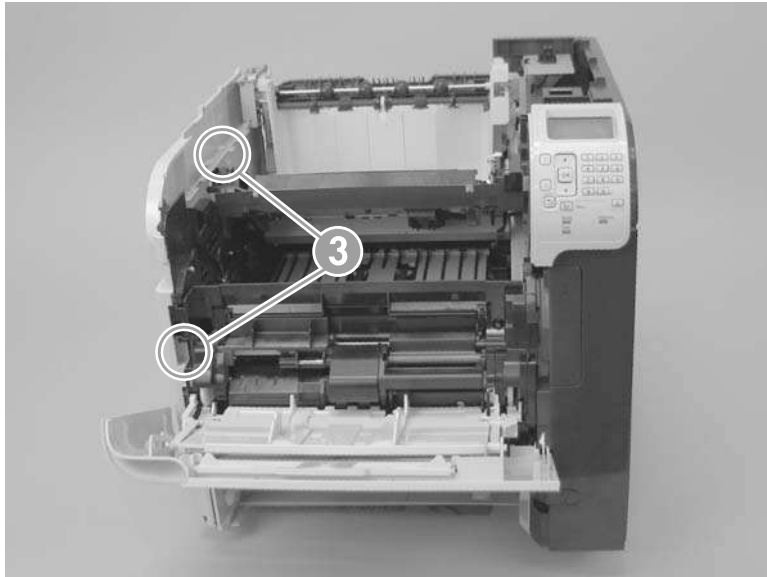
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Duplex accessory cover and Tray 2 extension door. See [Envelope feed accessory covers on page 147](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
2. Gently pry the front-cover retainers off of the Tray 1 arms.

Figure 6-47 Remove the left-side cover (1 of 3)



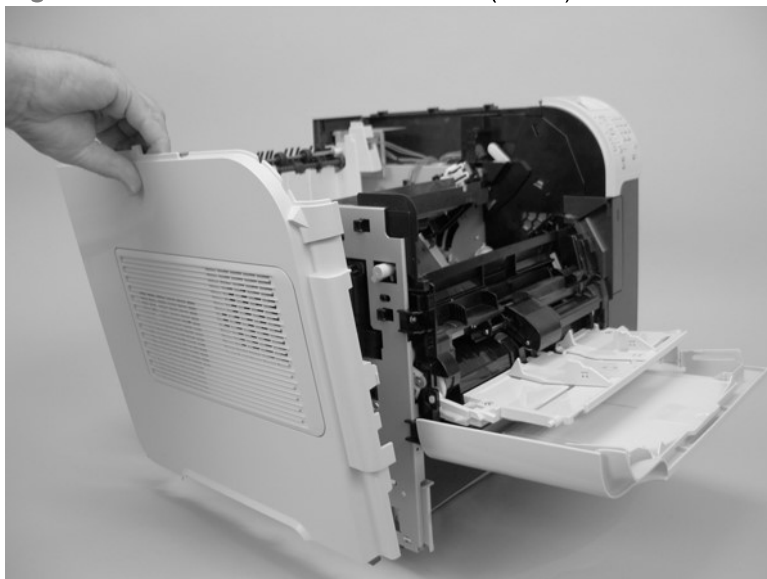
3. Release two tabs (callout 3), and then rotate the top of the cover away from the product and lift the cover up to remove it.

Figure 6-48 Remove the left-side cover (2 of 3)



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

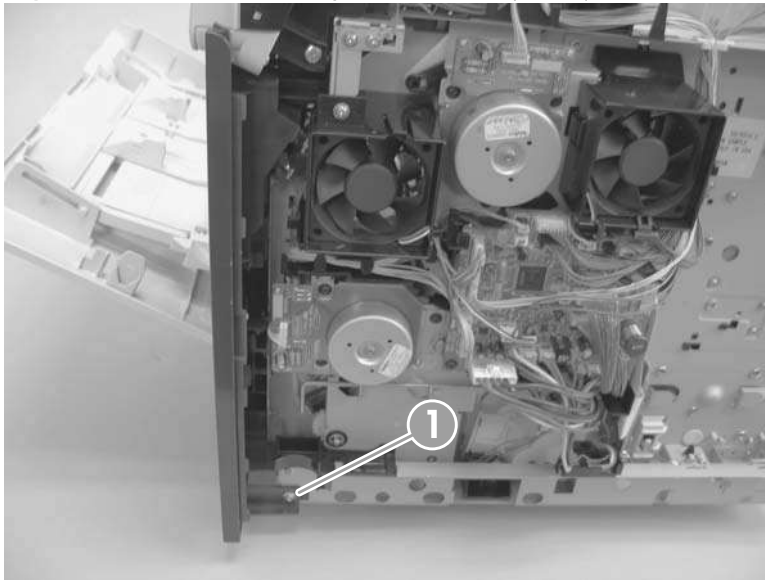
Figure 6-49 Remove the left-side cover (3 of 3)



Right-front cover

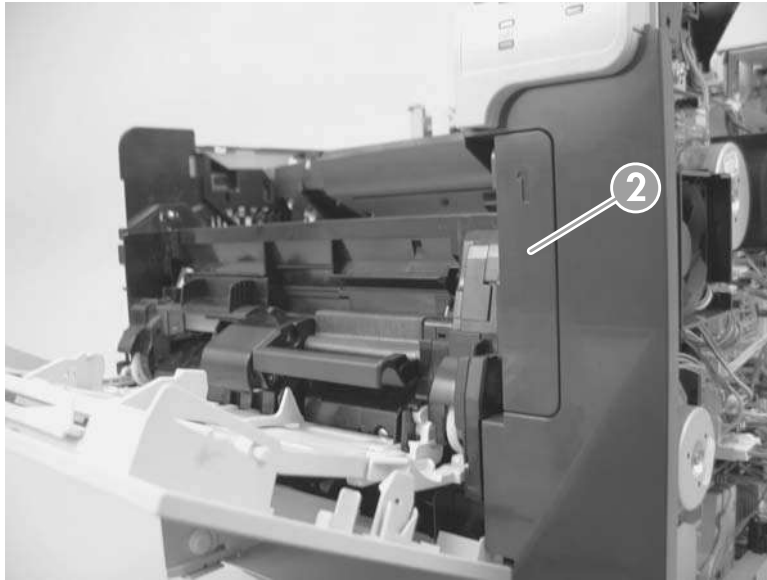
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Open the front cover.
3. Remove one screw (callout 1).

Figure 6-50 Remove the right-front cover (1 of 4)



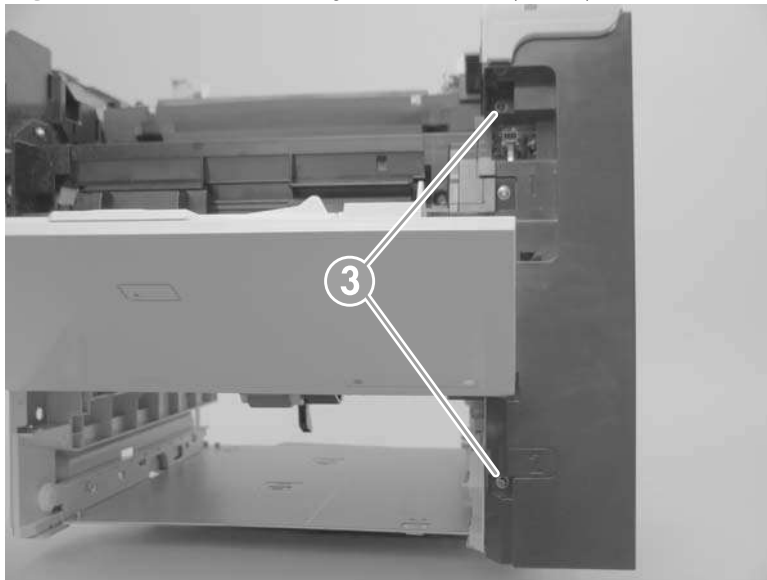
4. Gently pull the envelope-feeder connector cover (callout 2) off of the product to remove it.

Figure 6-51 Remove the right-front cover (2 of 4)



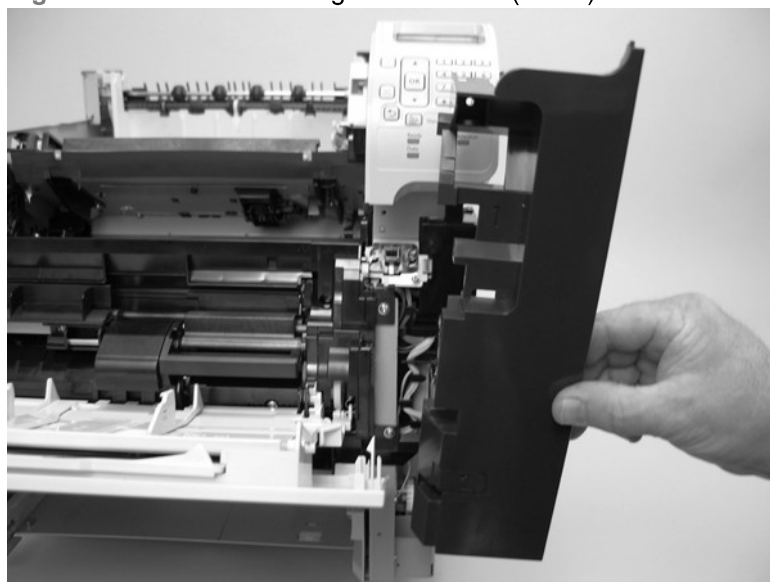
5. Remove two screws (callout 3).

Figure 6-52 Remove the right-front cover (3 of 4)



6. Remove the right front cover.

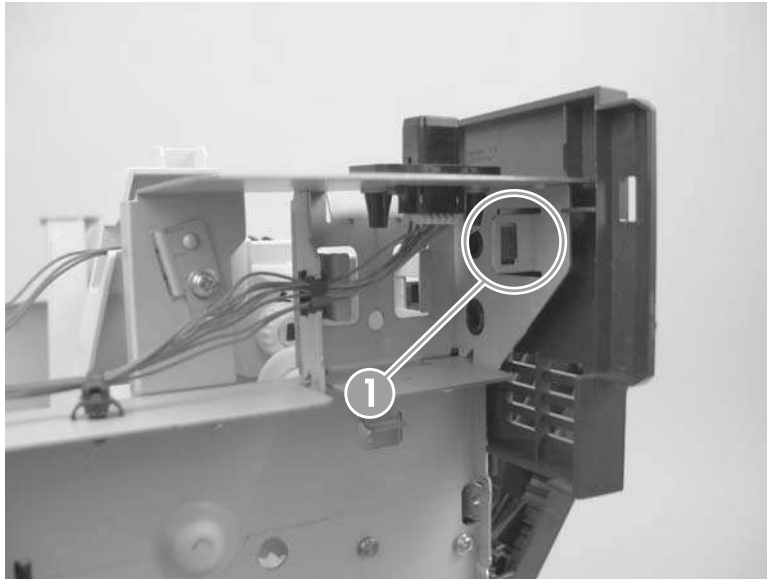
Figure 6-53 Remove the right-front cover (4 of 4)



Rear-upper cover

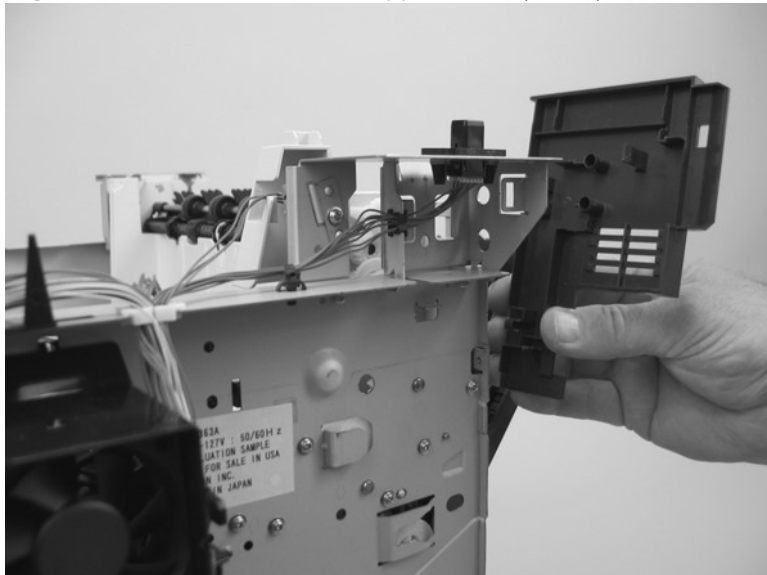
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Release one tab (callout 1).

Figure 6-54 Remove the rear-upper cover (1 of 2)



3. Remove the rear-upper cover

Figure 6-55 Remove the rear-upper cover (2 of 2)



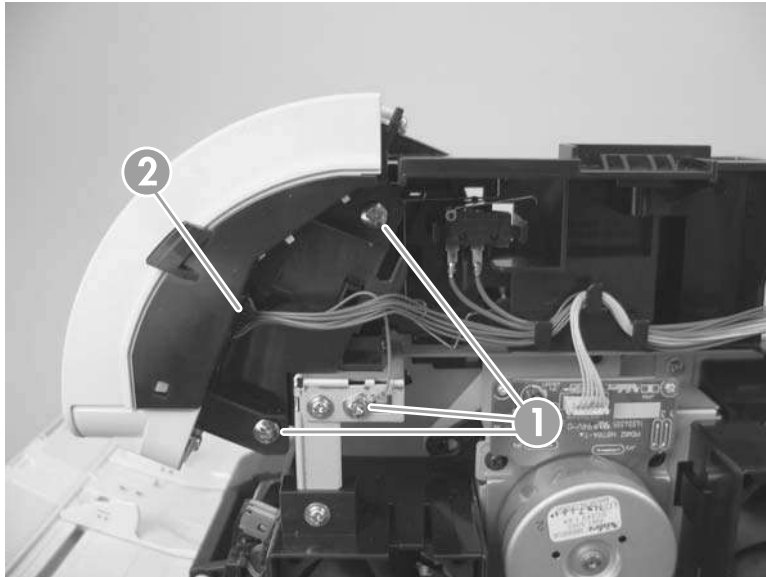
Control-panel assembly



CAUTION: The product contains components that are sensitive to electrostatic discharge (ESD). Always perform service work at an ESD-protected workstation. If an ESD-protected workstation is not available, discharge body static by grasping the product chassis before touching an ESD-sensitive component. Ground the product chassis before servicing the product.

1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Remove three screws (callout 1), and then disconnect one wire-harness connector (callout 2).

Figure 6-56 Remove the control-panel assembly (1 of 2)



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

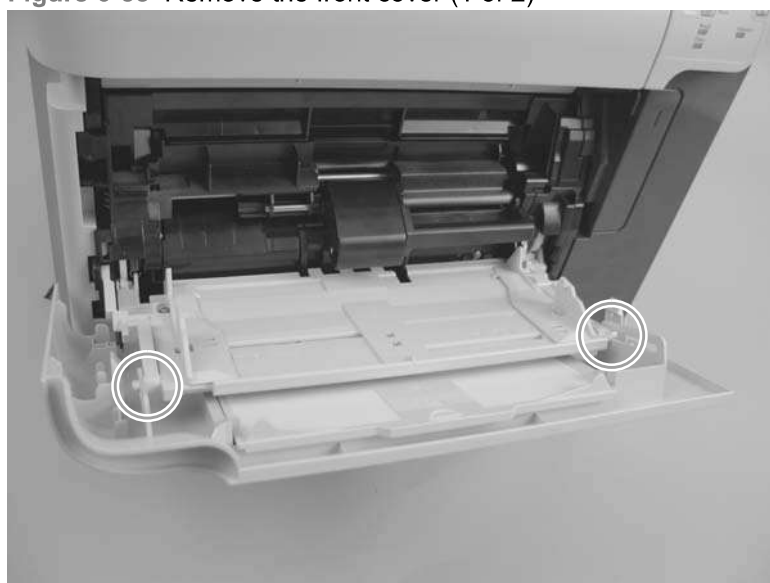
Figure 6-57 Remove the control-panel assembly (2 of 2)



Front cover

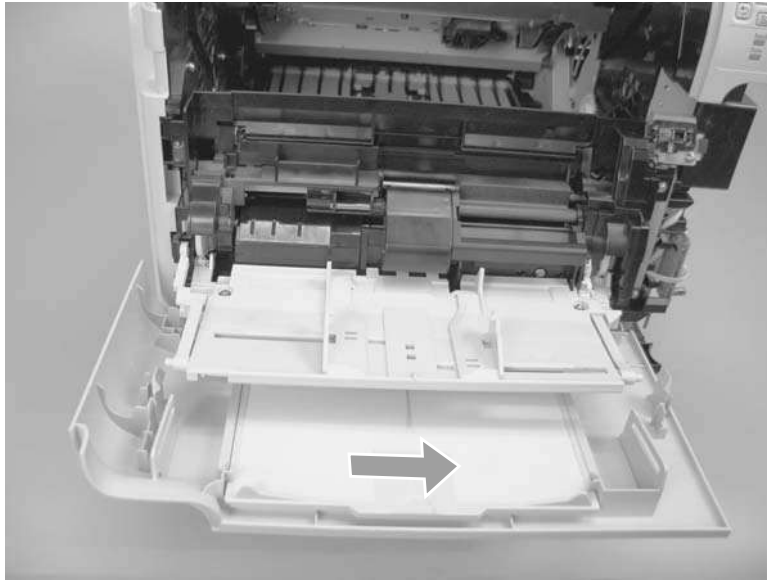
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and formatter cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
 - Right-front cover. See [Right-front cover on page 168](#).
2. Gently pry the front-cover retainers off of the Tray 1 arms.

Figure 6-58 Remove the front cover (1 of 2)




3. Slide the front cover toward the right side of the product to remove it.

Figure 6-59 Remove the front cover (2 of 2)

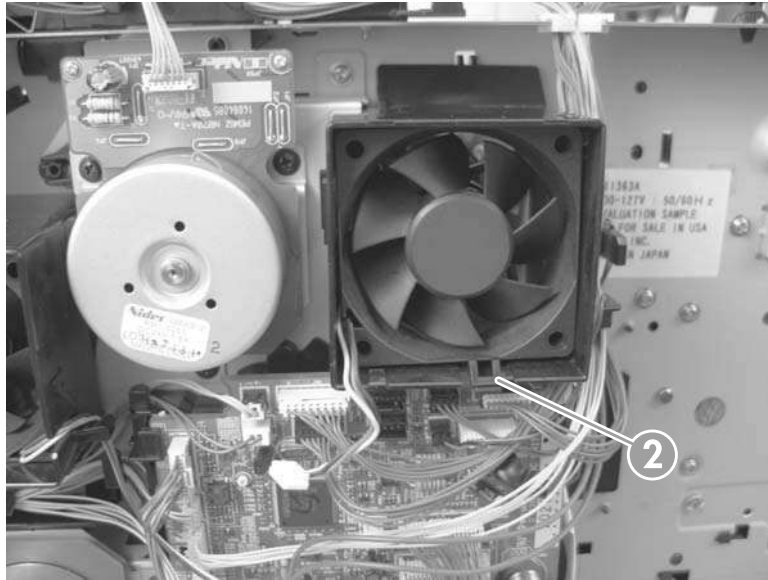


3. Release one tab (callout 2), and then remove the fan.

 **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.

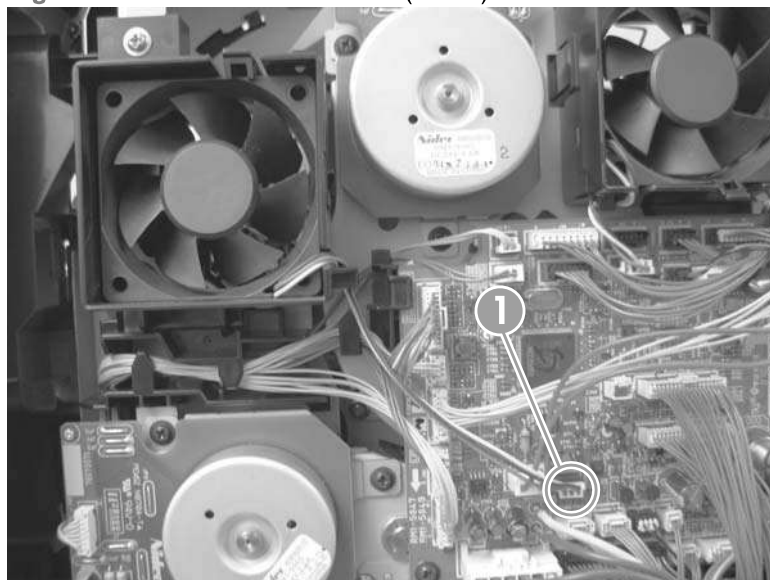
Figure 6-61 Remove fan FN102 (2 of 2)



Fan FN103

1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Disconnect one connector (callout 1; J75), and then release the wire harness from the retainer on the fan duct.

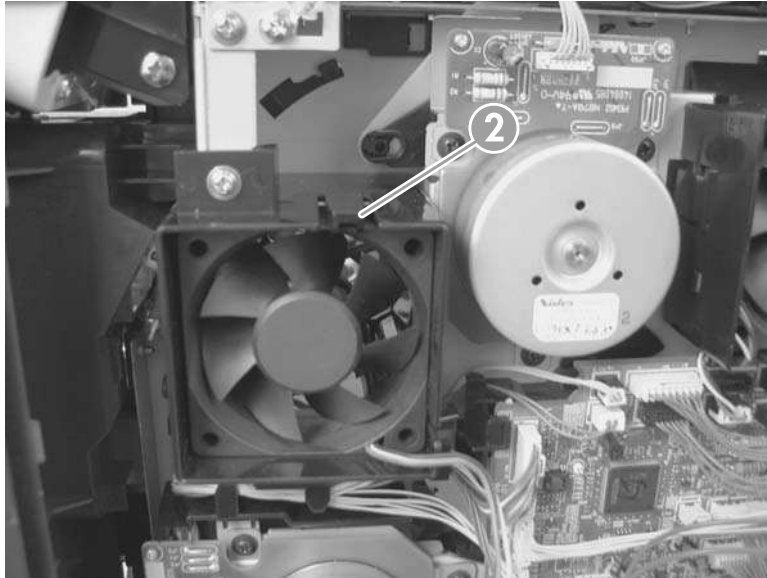
Figure 6-62 Remove fan FN103 (1 of 2)



3. 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.

Figure 6-63 Remove fan FN103 (2 of 2)

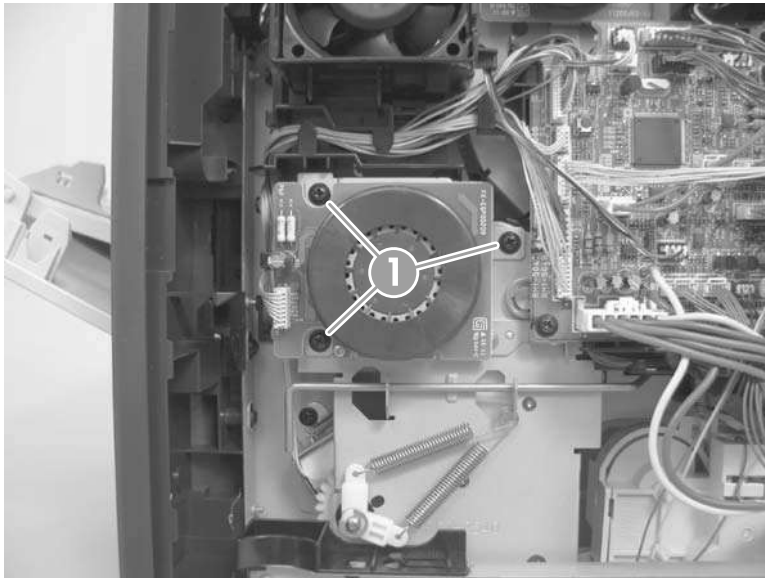


Pickup-motor assembly (M101)

1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Remove three screws (callout 1), and then separate the pickup motor from the chassis.

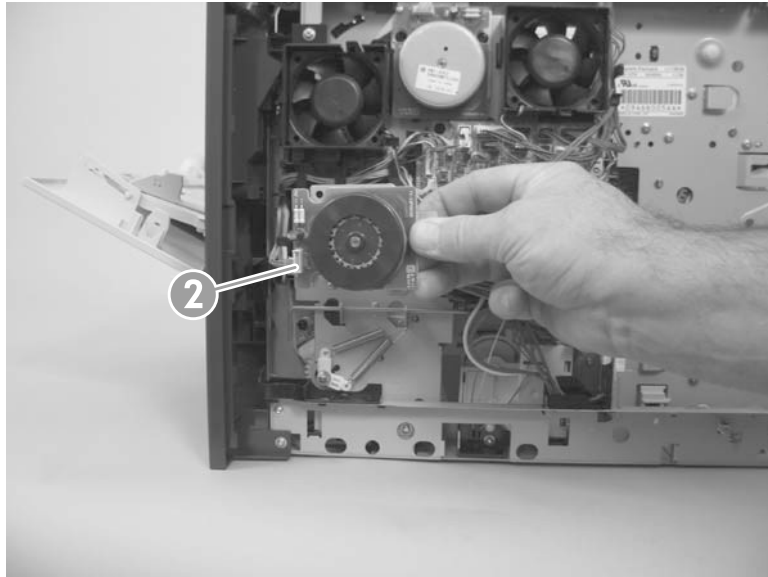
△ **CAUTION:** The pickup-motor assembly is still attached to the product by the wire harness. Do not drop the motor assembly.

Figure 6-64 Remove the pickup-motor assembly (1 of 2)



3. Support the pickup-motor assembly, and disconnect one wire-harness connector (callout 2). Remove the pickup-motor assembly.

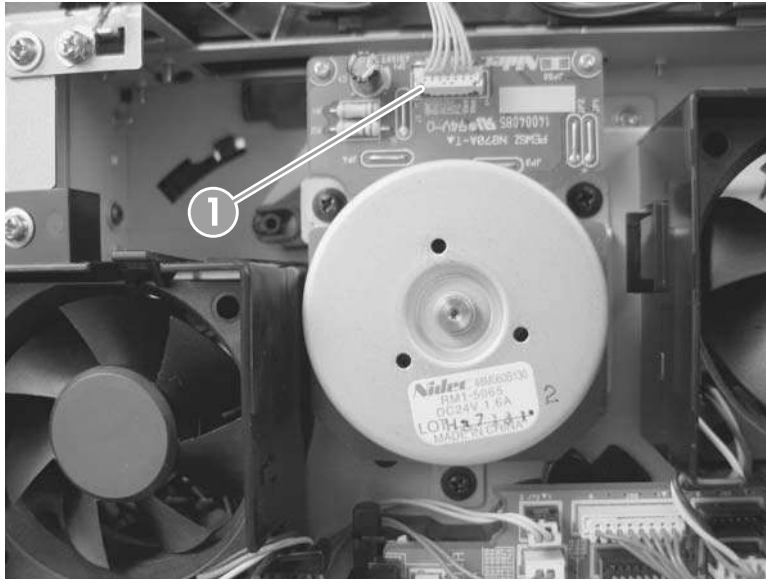
Figure 6-65 Remove the pickup-motor assembly (2 of 2)



Drum-motor assembly (M102)

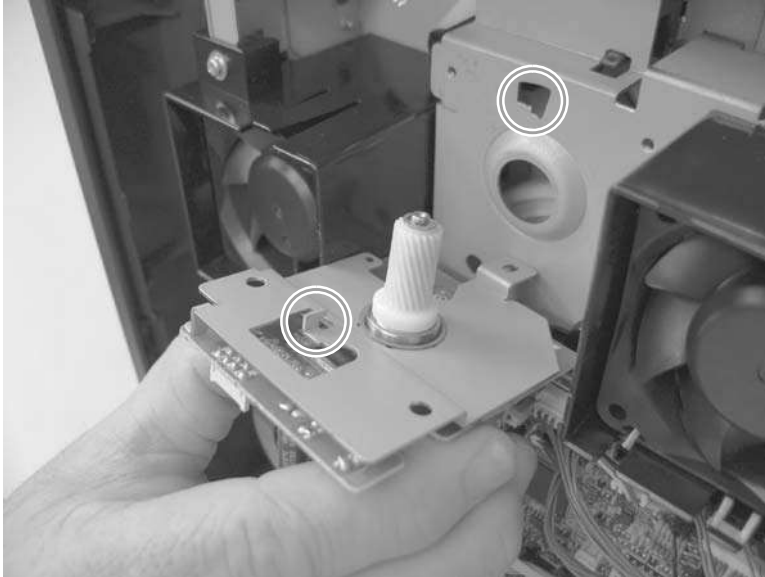
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Disconnect one wire-harness connector (callout 1).

Figure 6-66 Remove the drum motor (1 of 4)



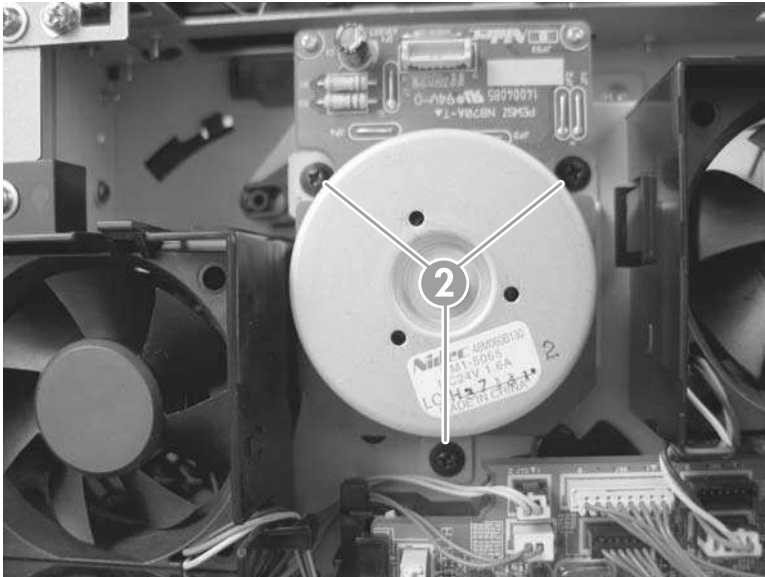
3. Before proceeding, take note of the mounting tab on the back side of the motor assembly and the slot in the chassis.

Figure 6-67 Remove the drum motor (2 of 4)



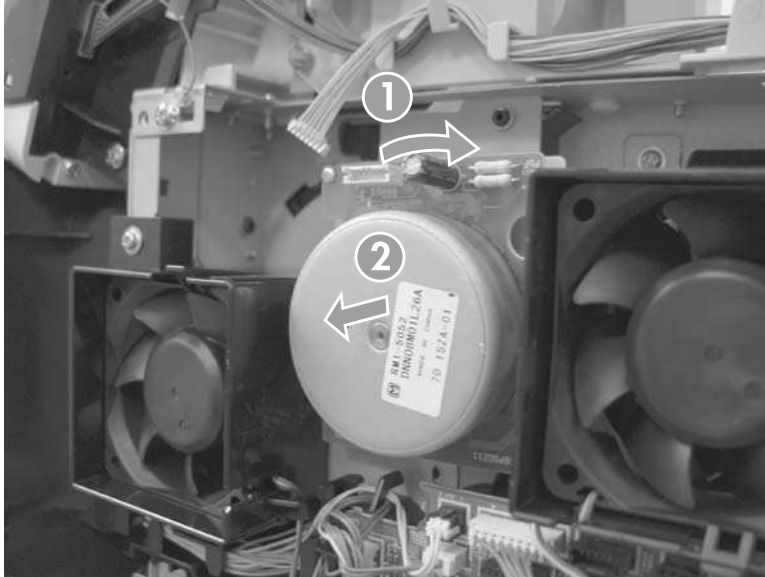
4. Remove three screws (callout 2).

Figure 6-68 Remove the drum motor (3 of 4)



5. Rotate the motor assembly to release the mounting tab on the back side of the assembly, and then pull the assembly straight away from the product to remove it.

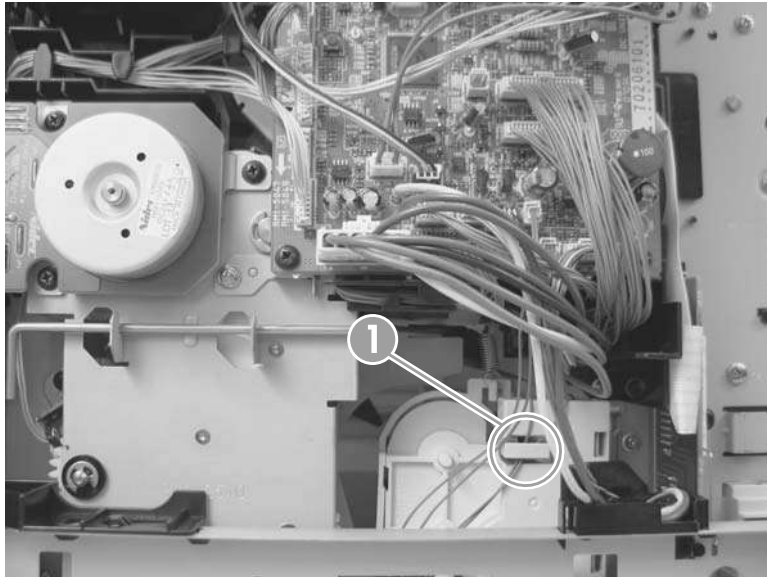
Figure 6-69 Remove the drum motor (4 of 4)



Lifter-motor assembly (M103)

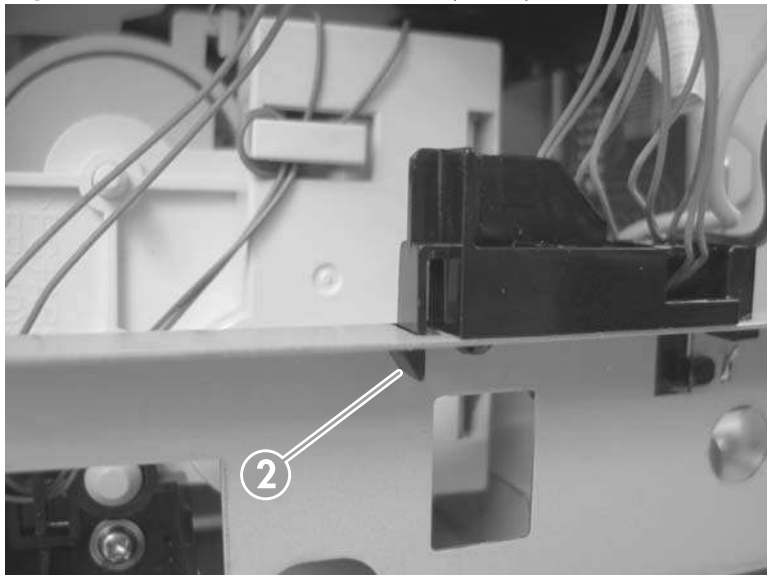
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Formatter cover and cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
2. Release the wire harness from the retainer (callout 1).

Figure 6-70 Remove the lifter motor (1 of 6)



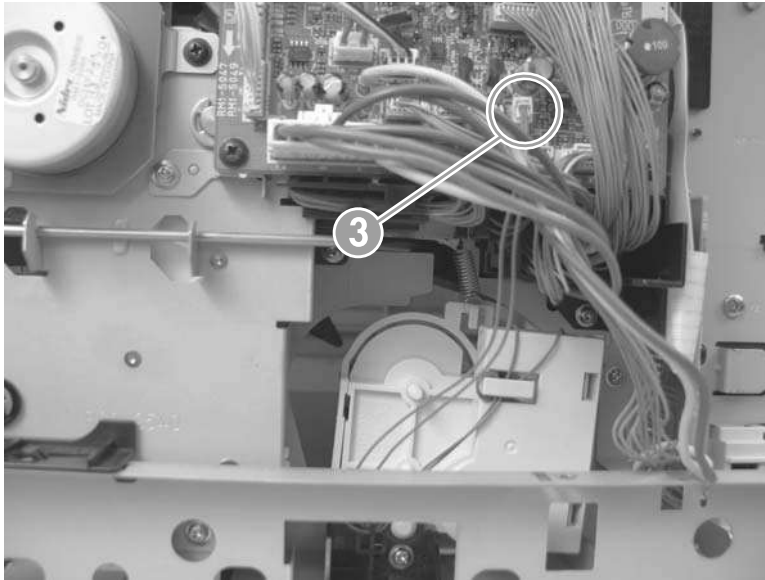
3. Release one tab (callout 2), and then remove the guide.

Figure 6-71 Remove the lifter motor (2 of 6)



4. Disconnect one wire-harness connector (callout 3; J73).

Figure 6-72 Remove the lifter motor (3 of 6)



5. Release one spring (callout 4).


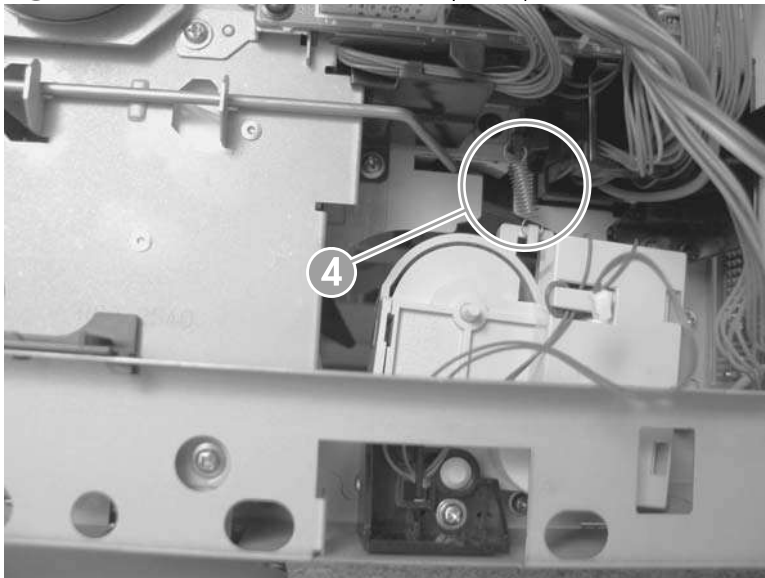
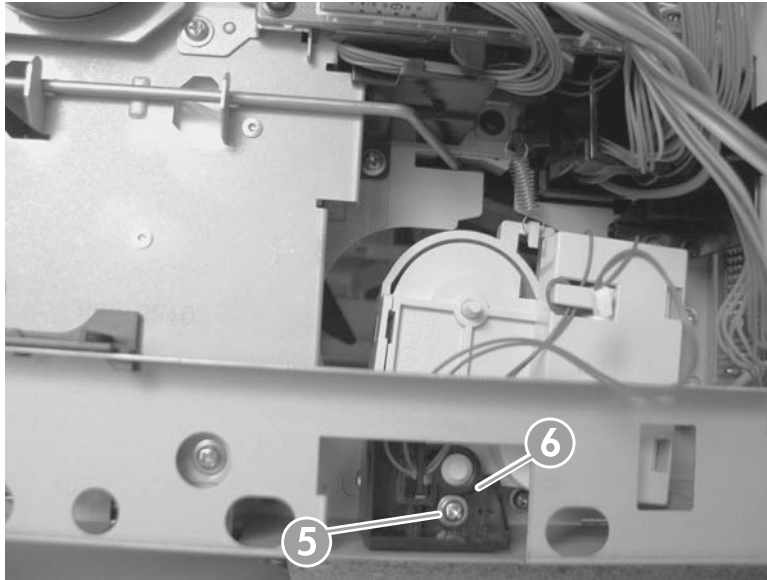
 **NOTE:** The spring is not captive. Do not lose the spring.

Figure 6-73 Remove the lifter motor (4 of 6)



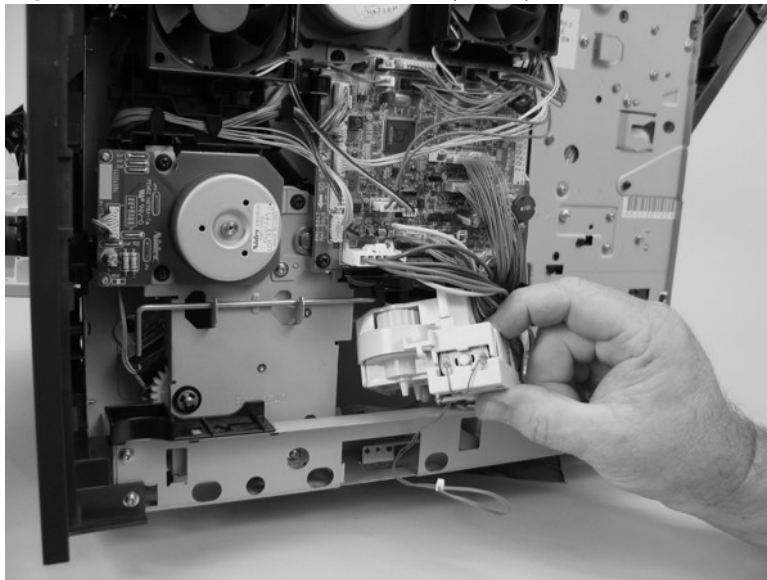
6. Remove one screw (callout 5), and then remove the lifter-motor retainer.

Figure 6-74 Remove the lifter motor (5 of 6)



7. Remove the lifter-motor assembly.

Figure 6-75 Remove the lifter motor (6 of 6)



DC controller PCA

1. Remove the following components

- Top accessory cover. See [Top-accessory cover on page 146](#).
- Formatter cover and cage. See [Formatter cover, formatter cage, and formatter PCA on page 152](#).
- Top cover. See [Top cover on page 161](#).
- Right-side cover. See [Right-side cover on page 163](#).



CAUTION: The product contains components that are sensitive to electrostatic discharge (ESD). Always perform service work at an ESD-protected workstation. If an ESD-protected workstation is not available, discharge body static by grasping the product chassis before touching an ESD-sensitive component. Ground the product chassis before servicing the product.

CAUTION: The yellow and blue heavy-gauge wires that are connected to DC controller PCA locations TB700 and TB701 are *not* terminal lug connectors. These terminals are soldered to the DC controller PCA. Do *not* attempt to unplug these connectors.

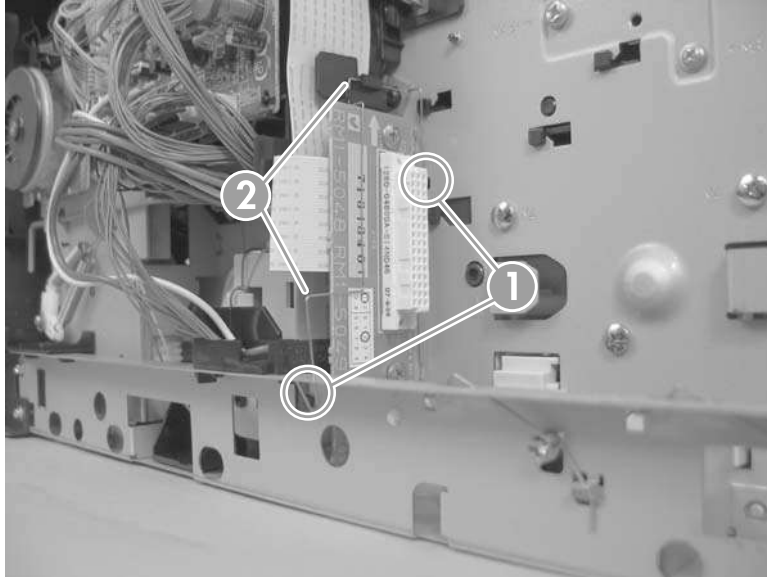
2. Unplug all of the wire and cable connectors from the DC controller PCA. Refer to [DC controller diagram on page 137](#) for details on the DC controller PCA.

Figure 6-76 Remove the DC controller PCA (1 of 4)



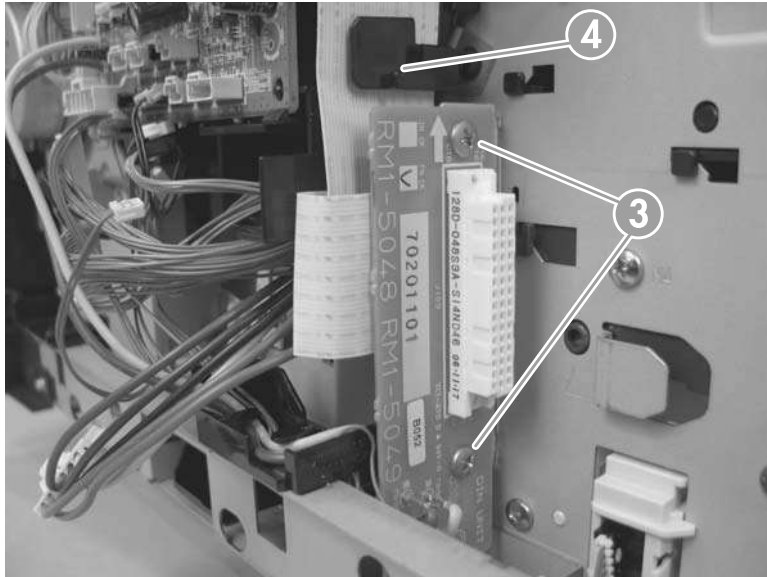
3. Release both ends (callout 1) of the formatted-connector ground clip, and then remove the clip (callout 2).

Figure 6-77 Remove the DC controller PCA (2 of 4)



4. Remove two screws (callout 3) and release the FFC from the retainer (callout 4).

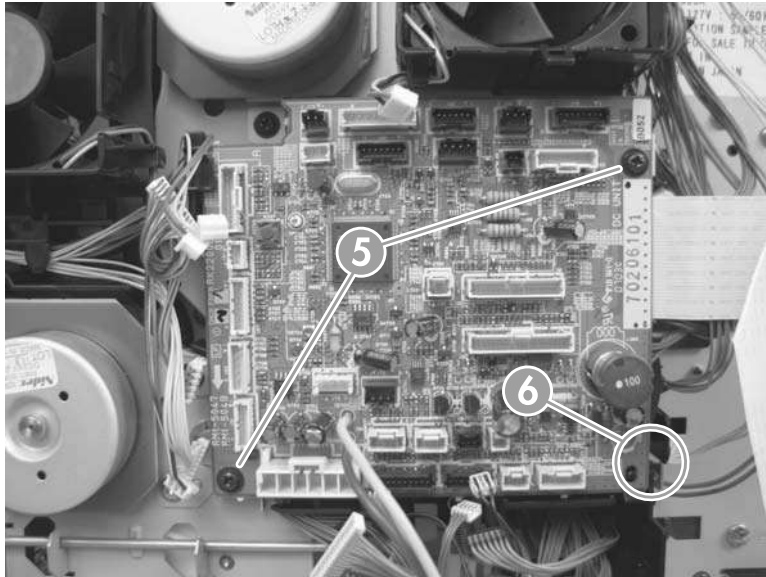
Figure 6-78 Remove the DC controller PCA (3 of 4)




5. Remove two screws (callout 5) and release one tab (callout 6). Carefully remove the DC controller PCA.

△ **CAUTION:** Correct reinstallation of the DC controller is critical to correct operation of the product. If you are installing a *new* DC controller, follow the instructions in the reinstallation tips. If you are installing a *new formatter and a new DC controller*, see the special section that follows this DC controller section—Installing a new formatter and a new DC controller on page 191.


Figure 6-79 Remove the DC controller PCA (4 of 4)



Reinstallation tip

 **TIP:** DC controller PCA connector locations J80 and J98 are not used. There will not be connectors for these locations when the DC controller PCA is reinstalled.


1. After installing a *new* DC controller, turn the product on and wait for five minutes after the product reaches the **Ready** state.

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

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

Installing a new formatter and a new DC controller

1. Turn the product off.
2. Remove the formatter (see [Formatter cover, formatter cage, and formatter PCA on page 152](#)) and replace it with the new formatter.
3. Turn the product on and then wait for five minutes after the product reaches the **Ready** state.

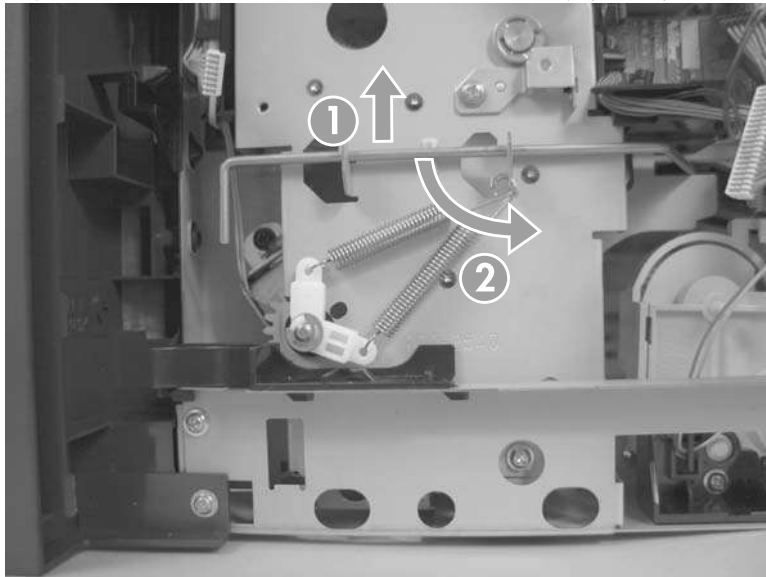
 **NOTE:** Five minutes is required to allow for NVRAM settings to be written. The same five-minute wait is required several times during this procedure.

4. Turn the product off.
5. Turn the product on again, and then wait five minutes after the product reaches the Ready state.
6. Turn the product off.
7. Remove the DC controller (see [DC controller PCA on page 188](#)) and replace it with the new DC controller.
8. Turn the product on and wait for five minutes after the product reaches the **Ready** state.
9. Turn the product off.
10. Turn the product on again, and then wait five minutes after the product reaches the Ready state.
11. Print a configuration page to verify against original settings.

Pickup-drive assembly

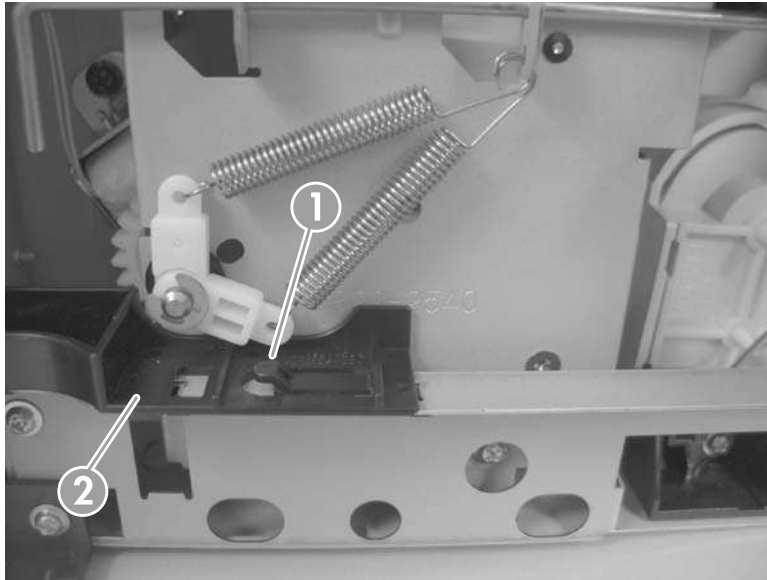
1. Remove the following components:
 - Top accessory cover. See [Top-accessory cover on page 146](#).
 - Top cover. See [Top cover on page 161](#).
 - Right-side cover. See [Right-side cover on page 163](#).
 - Pickup-motor assembly. See [Pickup-motor assembly \(M101\) on page 180](#).
 - DC controller PCA. See [DC controller PCA on page 188](#).
2. Lift up on the power-switch rod, and move it out and away from the pickup-drive assembly.

Figure 6-80 Remove the pickup-drive assembly (1 of 7)



3. Release one tab (callout 1) and remove the guide (callout 2).

Figure 6-81 Remove the pickup-drive assembly (2 of 7)



4. Remove the wire harnesses from the guide (callout 3 and callout 4).


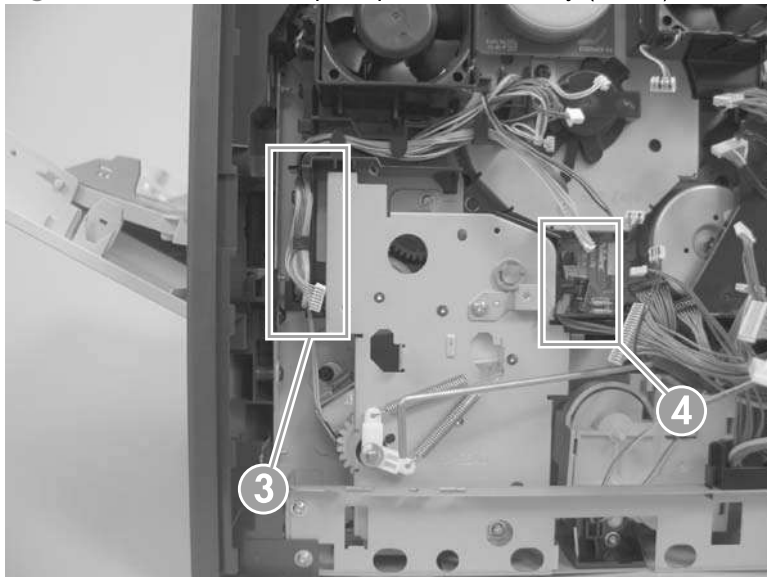
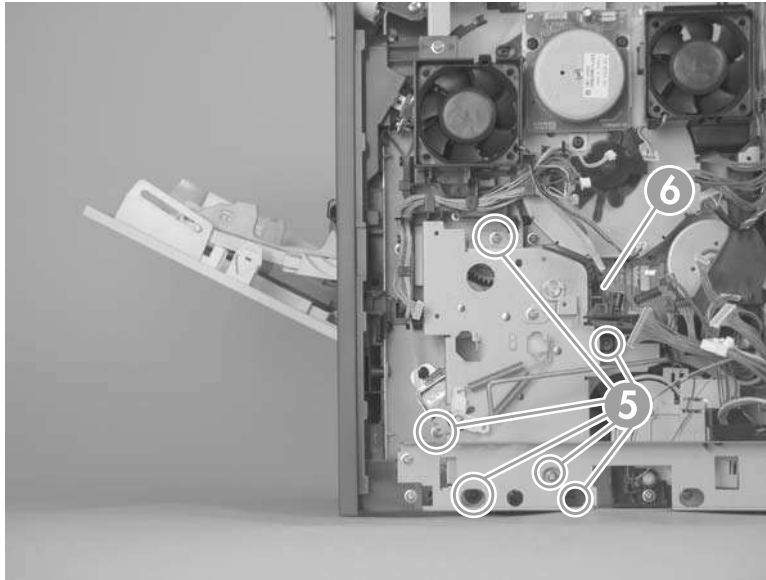
 **NOTE:** In this step, the wire harness for the pickup motor has been disconnected at the motor assembly and the DC controller. Connect the wire harness to the removed motor assembly so you do not lose it.

Figure 6-82 Remove the pickup-drive assembly (3 of 7)



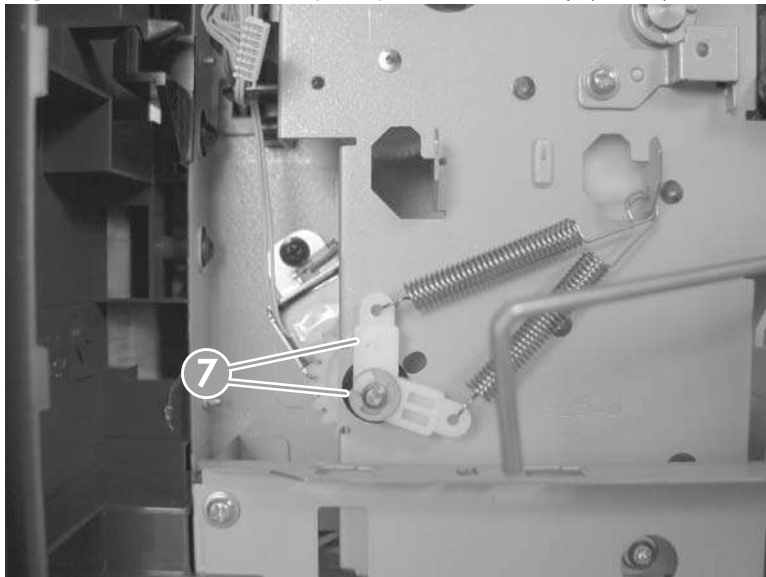
5. Remove six screws (callout 5) and the wire guide (callout 6).

Figure 6-83 Remove the pickup-drive assembly (4 of 7)



6. Remove one e-clip, the spring arm clip, and the shaft collar (callout 7; behind the spring arm clip), and then push the tray drive-gear/shaft into the Tray 2 cavity.

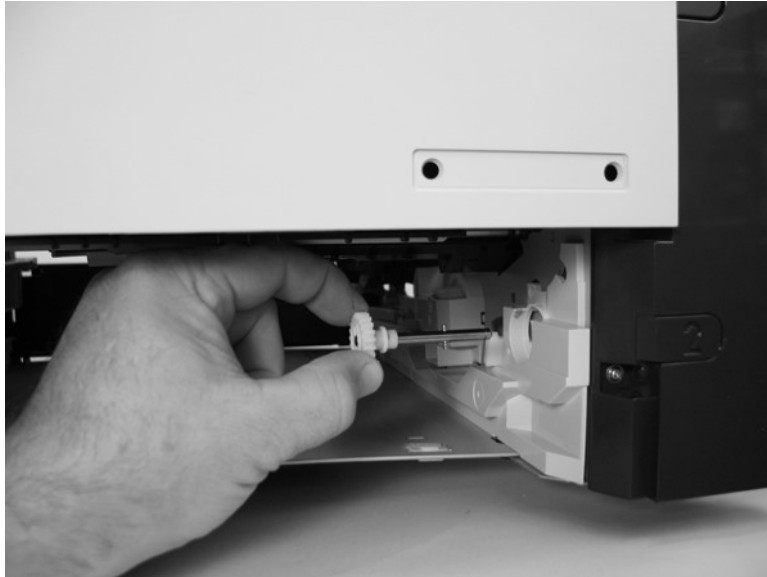
Figure 6-84 Remove the pickup-drive assembly (5 of 7)



7. Push the tray drive-gear/shaft into the Tray 2 cavity.

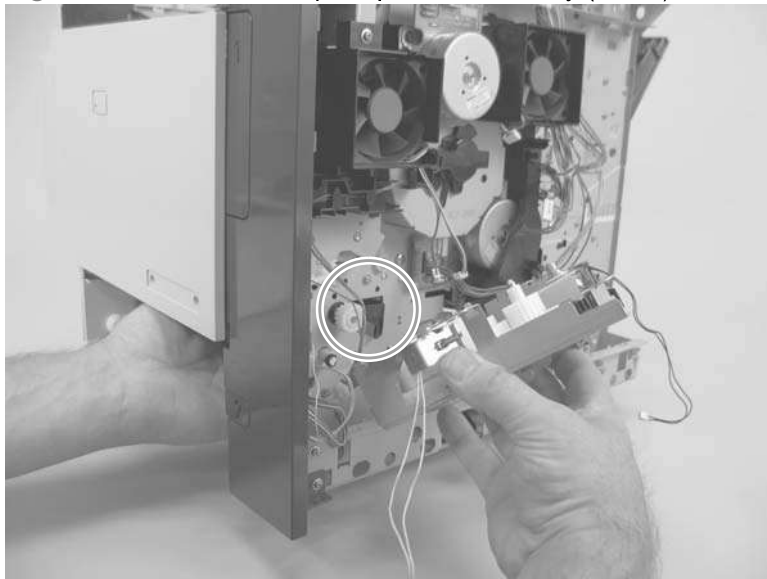
 **NOTE:** The large gear inside of the paper-delivery drive assembly is not captive and will slide off of the shaft and be loose inside the paper-delivery drive assembly (see [Reinstall the pickup-drive assembly on page 196](#)).

Figure 6-85 Remove the pickup-drive assembly (6 of 7)



8. Reach inside the product and push the rear Tray 2 feed roller up into its raised position (This disengages the roller-lifting arm from the clutch gear), and then remove the pickup-drive assembly.

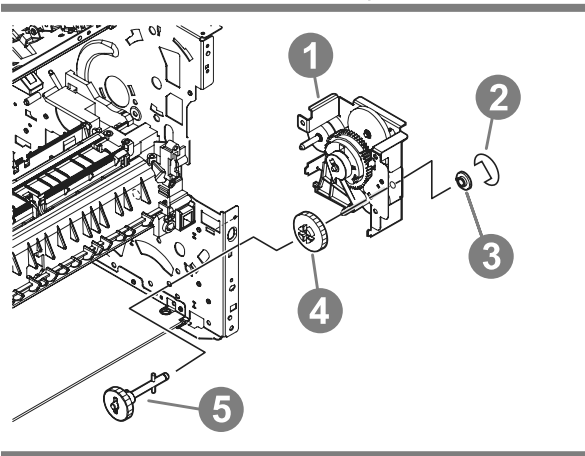
Figure 6-86 Remove the pickup-drive assembly (7 of 7)



Reinstall the pickup-drive assembly

When you reinstall the paper-delivery drive assembly gears and shaft, verify that the gears are seated on the shaft-locking bars and that the shaft collars are correctly positioned in the paper-pickup drive-gear assembly mounting bracket and product chassis.

Table 6-3 Pickup-drive assembly

	1	Pickup drive unit
	2	E-ring
	3	Bushing
	4	23T gear
	5	Retard roller drive shaft