

HP® LASERJET PRO 200 M251 • 276 TONER CARTRIDGE REMANUFACTURING INSTRUCTIONS



HP PRO 200 M251 TONER CARTRIDGE

REMANUFACTURING THE HP LASERJET PRO 200 M251/276 BLACK & COLOR TONER CARTRIDGES

By Mike Josiah and the Technical Staff at UniNet



First released in August 2012, the HP LaserJet Pro 200 M251/M276 (131 Series) color laser printers are based on a 14-ppm black, 14-ppm color, 600-DPI engine. The 131 series of cartridges are an all-in-one type that consists of the toner supply, drum, and waste chamber. These machines use an in-line, or single-pass system. It's basically a rectangular-shaped cartridge that comes with a toner seal and a snap-on drum cover across the bottom to protect the drum (see photo above).

The Pro 200 M276 is a multifunction machine that can print, copy, scan and fax. The first page out is under 18.5 seconds (black), and under 19 seconds (color).

SO FAR THERE ARE JUST A FEW MACHINES BASED ON THIS ENGINE

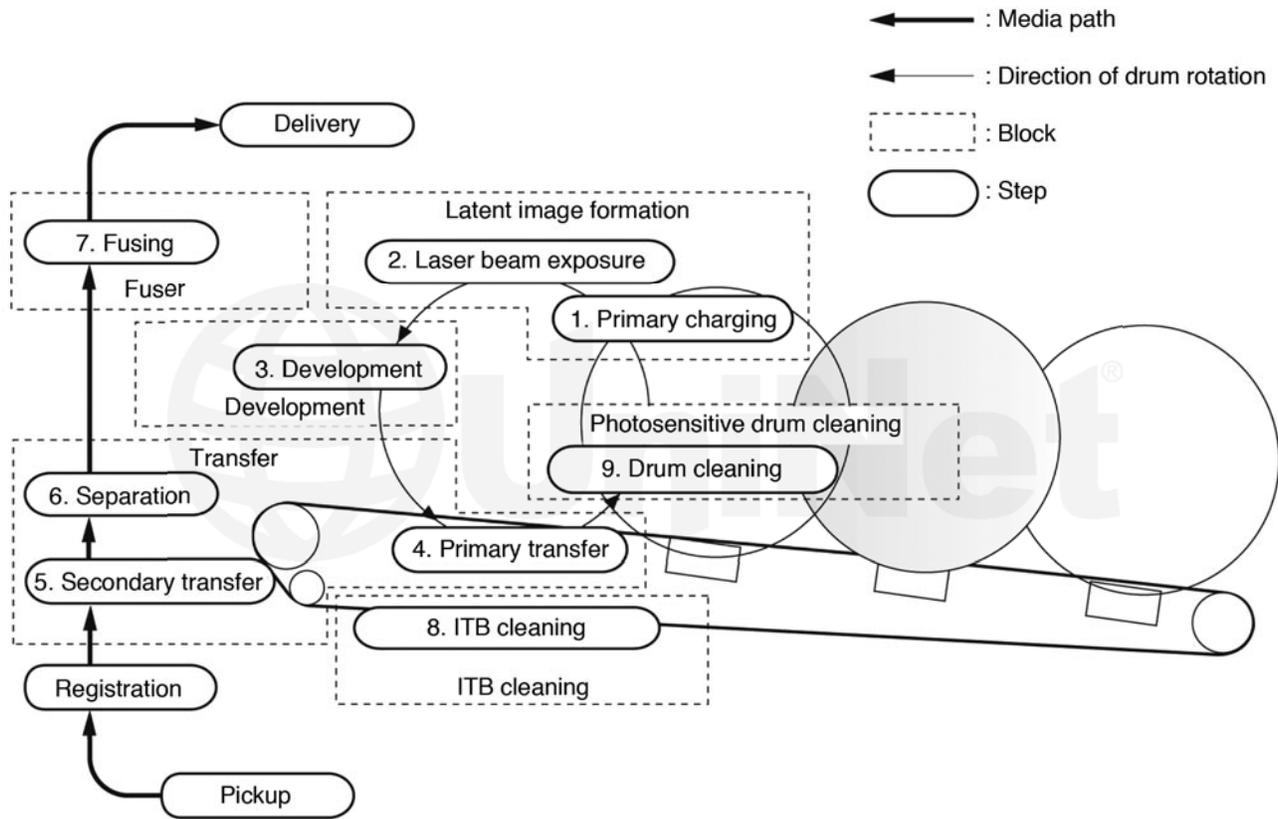
LaserJet Pro 200 M251nw
 LaserJet Pro 200 MFP M276n
 LaserJet Pro 200 MFP M276nw

CARTRIDGES USED IN THESE MACHINES ARE THE 131A/X SERIES

CF210A (Black)	1,600 pages	\$66.99 list*
CF210X (Black High Yield)	2,400 pages	\$85.99 list*
CF211A (Cyan)	1,800 page	\$84.99 list*
CF213A (Magenta)	1,800 pages	84.99 list*
CF212A (Yellow)	1,800 pages	\$84.99 list*

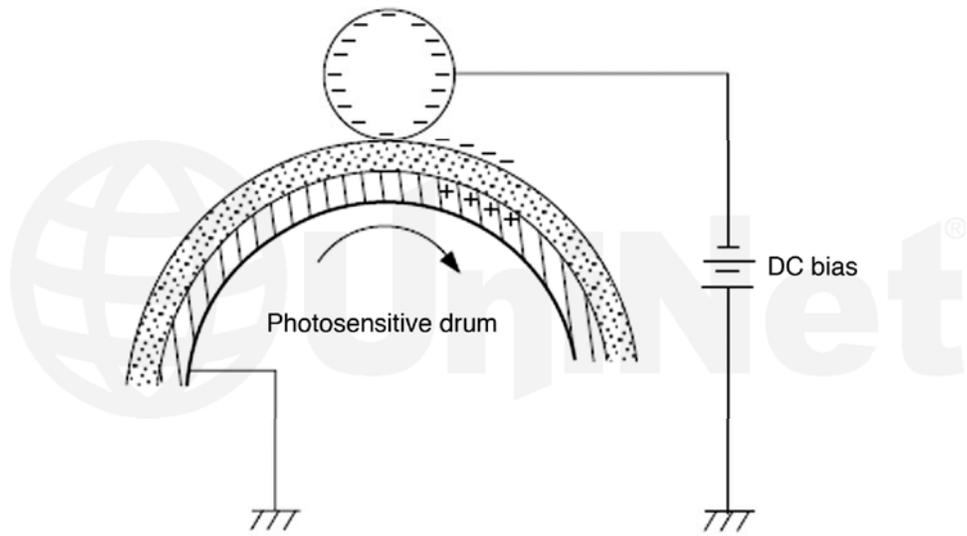
*List pricing (in U.S. American Dollars) current as of November 2012.

New machines ship with black and color starter cartridges rated for 700 pages, so users will run out of toner fairly quickly, and there is sure to be a fast growing demand for remanufactured cartridges!



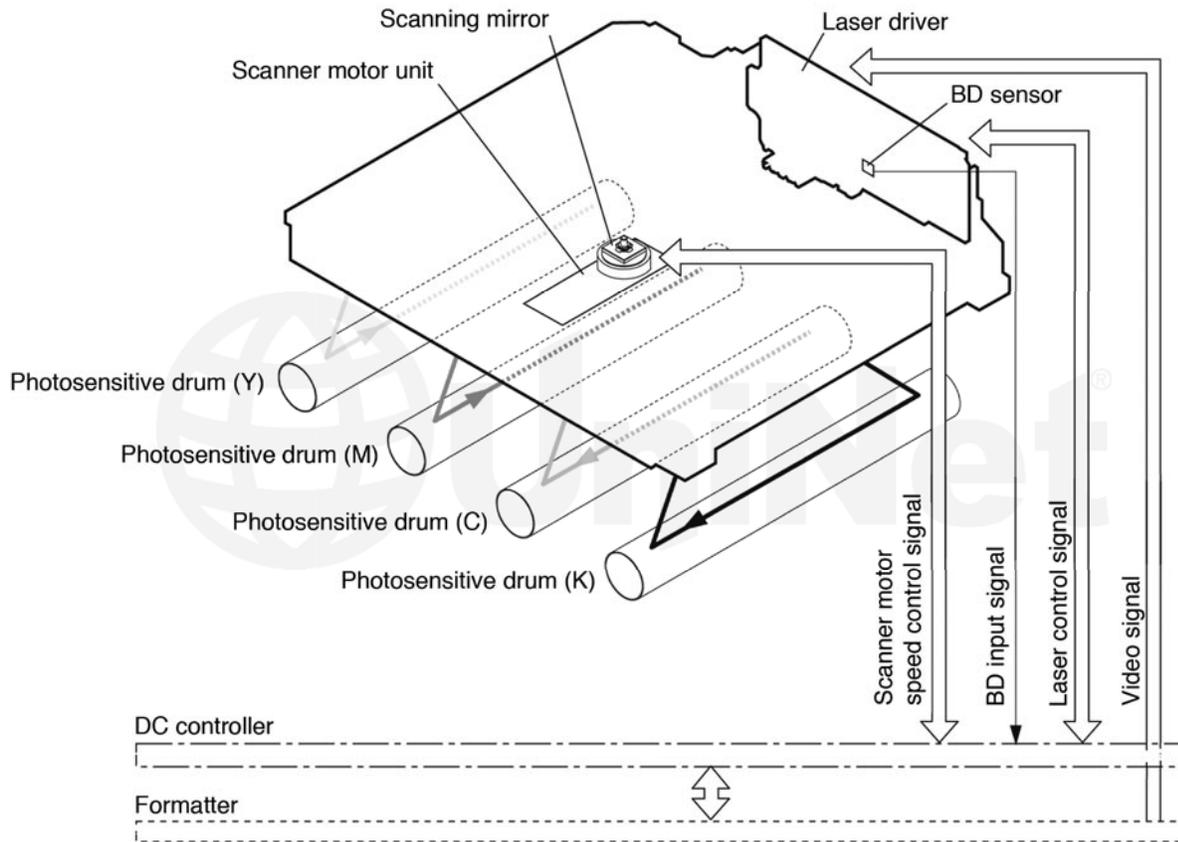
HP PRO 200 COLOR PRINTING THEORY

The color toner cartridge printing process happens in a series of stages or steps. For the purpose of this article, we will refer to them as stages. Shown above is the complete image formation process.



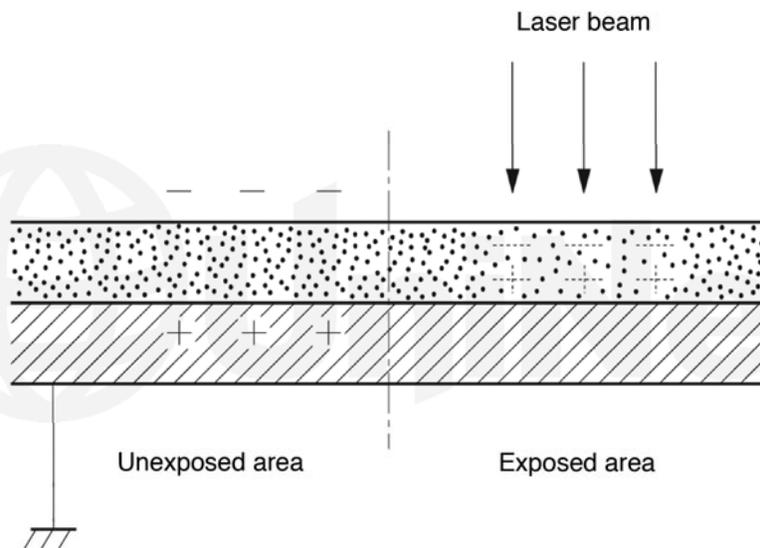
In the **first** stage, the Primary Charge Roller (PCR) places a uniform negative DC voltage on the OPC drum surface.

The amount of the negative DC voltage placed on the drum is controlled by the printer's intensity setting.



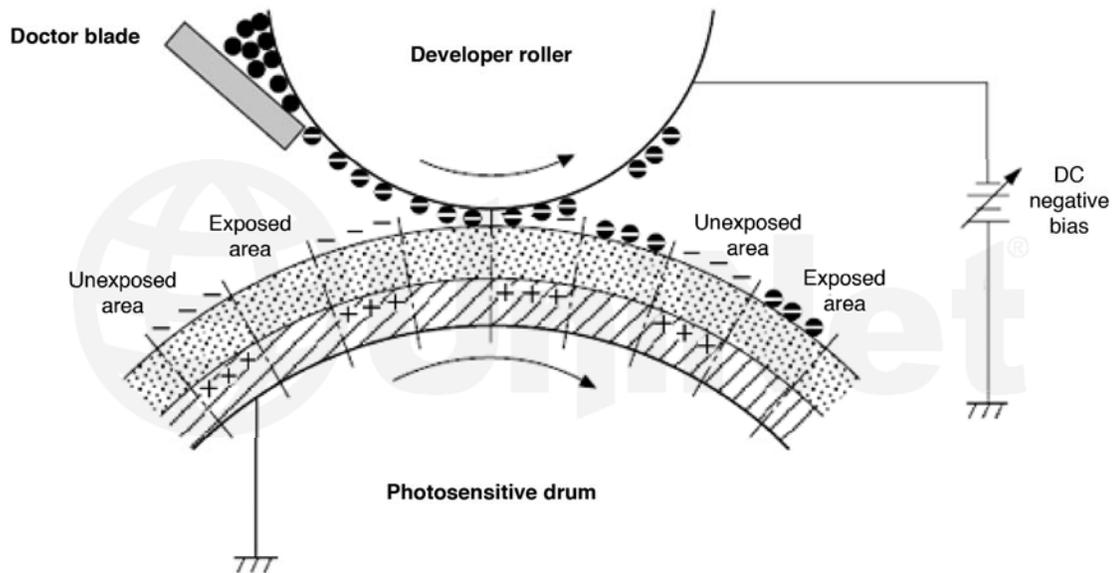
In the **second** stage, the laser beam is fired onto a rotating mirror (called the scanner).

As the mirror rotates, the beam is reflected into a set of focusing lenses.



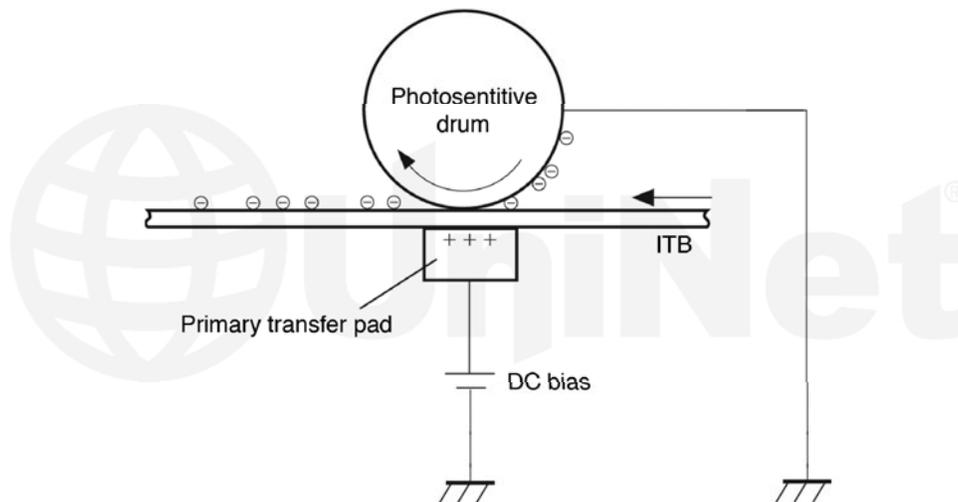
The beam then strikes the drums surface, reducing the negative charge and leaving a latent electrostatic image on the drum.

The areas where the laser did not strike the drum will retain the higher negative charge.

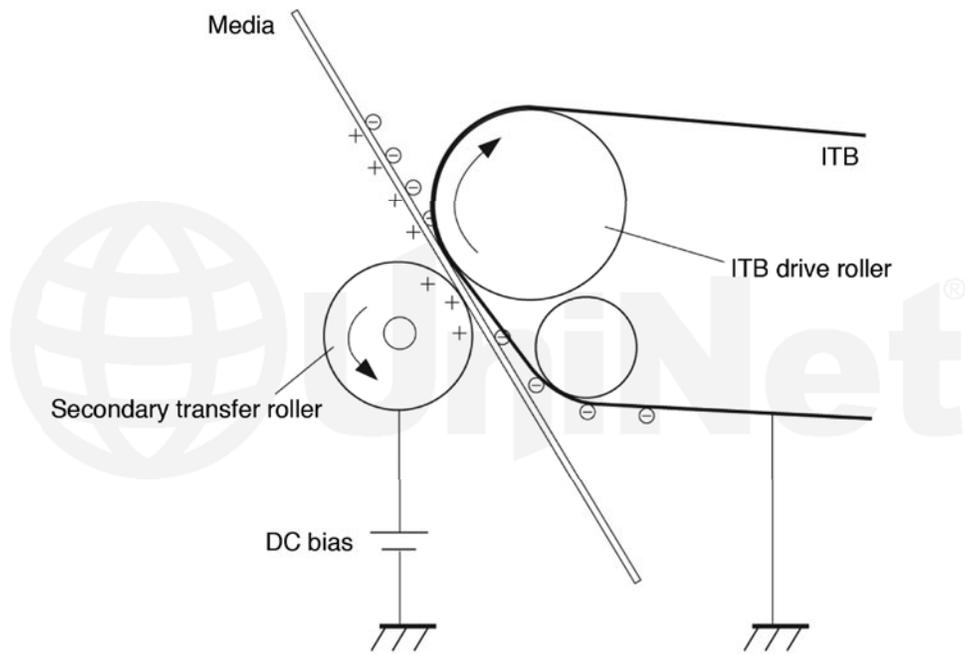


The **third** or developing stage is where the toner is developed on the drum by the developing section (or supply chamber), which contains the toner particles. The development stage is actually made up of two steps: toner charging, and the actual development. In the toner charging stage, the toner-stirring blade turns inside the hopper. As it turns, friction causes a negative potential to develop on the toner. In addition, a foam feed-roller brings the toner to the developer roller and also places a negative charge on the toner. These two charges help ensure a uniform charge on the toner. Once the toner is properly charged, the toner will coat the developer roller. The toner is also held onto and attracted to the developer roller by another negative DC bias voltage. This voltage is controlled by the printer's intensity setting and causes either more or less toner to be attracted by the developer roller. This in turn will either increase or decrease the print density. The amount of toner on the developer roller is controlled by the doctor blade, which uses pressure to keep the amount of toner on the roller constant.

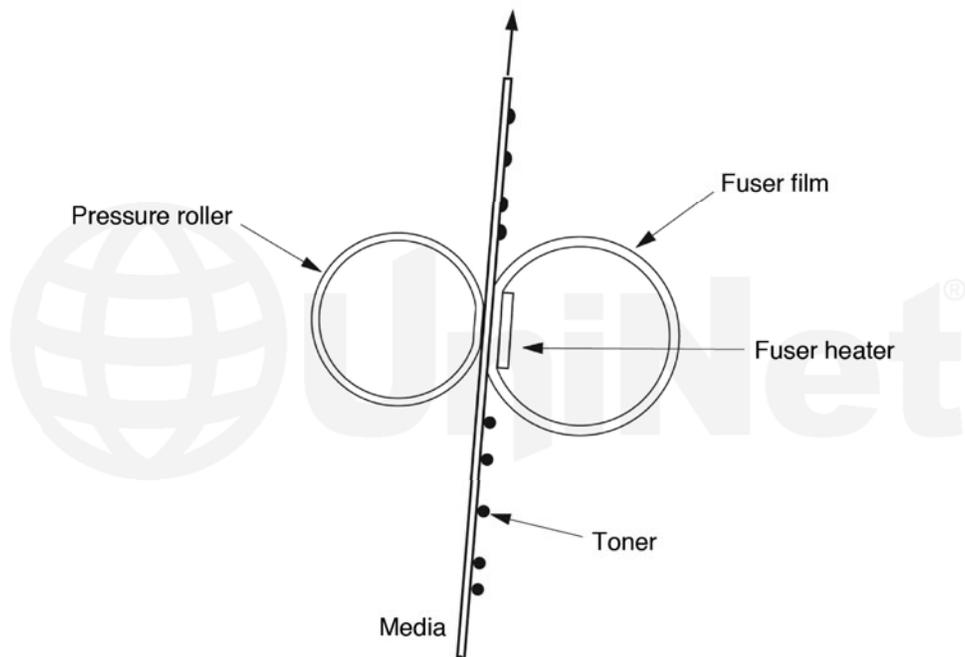
As the laser-exposed areas of the OPC drum approach the developer roller, the toner particles are attracted to the drum's surface due to the opposite voltage potentials of the toner, and laser-exposed areas of the OPC drum.



The **fourth** stage is the transfer stage. This is where there are some large differences from monochrome printers and also from other color lasers. In the primary transfer stage, the transfer pad (not a roller in this case), which is located directly opposite each OPC drum, places a positive DC bias charge on the back of the ITB or Image Transfer Belt. Each toner cartridge has a separate transfer charge pad. The image is transferred from the drum directly to the ITB. This process is repeated for each color cartridge in the following order: Yellow, Magenta, Cyan, and Black. At the same time, the paper is moving between the secondary transfer roller and the ITB. As the ITB passes the secondary transfer roller, the positive charge is picked up, and draws the negatively charged toner off the belt and onto the paper.

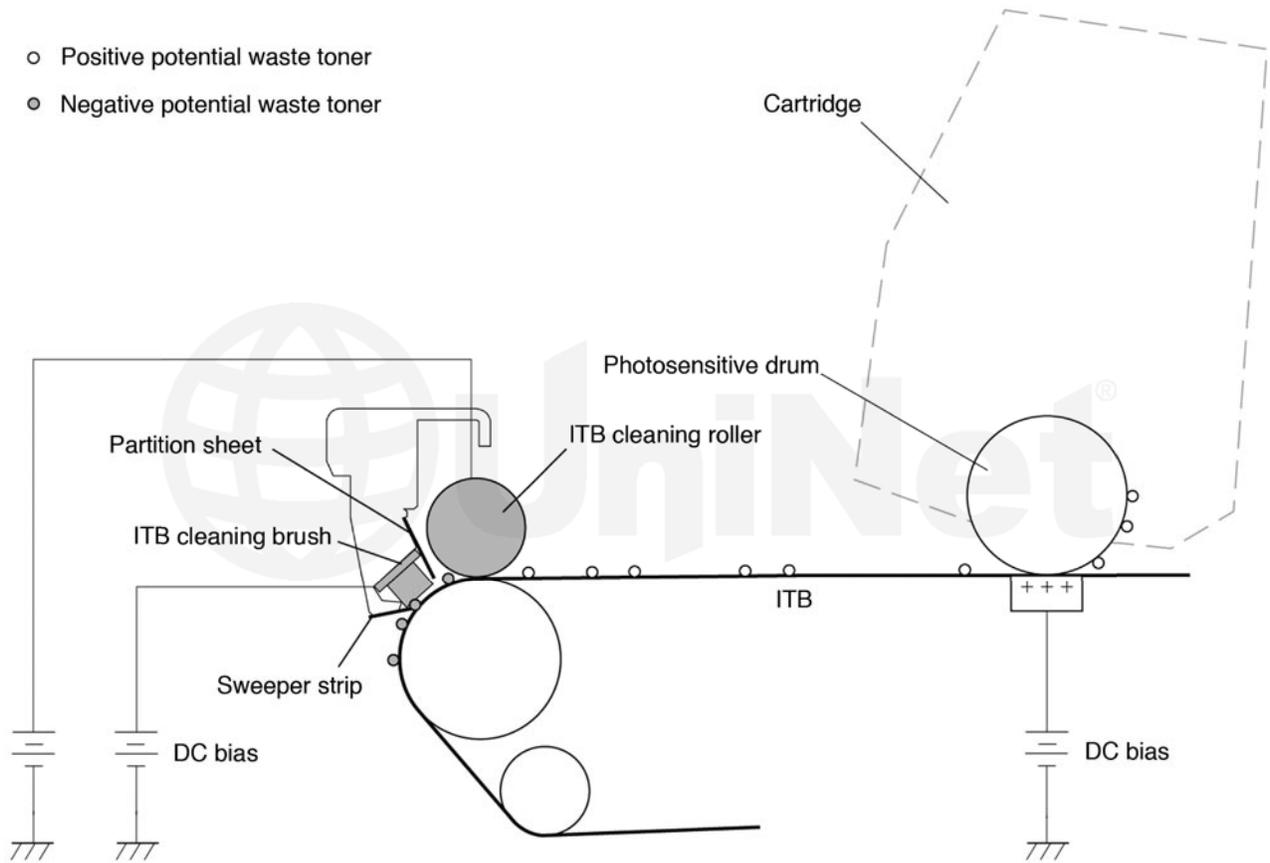


The paper separates from the ITB, as the belt reaches the top of its path, and turns back down to start the process again. The static charge on the back of the paper is decreased with static charge eliminator. This helps stabilize the paper feed, and also prevents toner flares (spots), under low temperature and low humidity conditions.



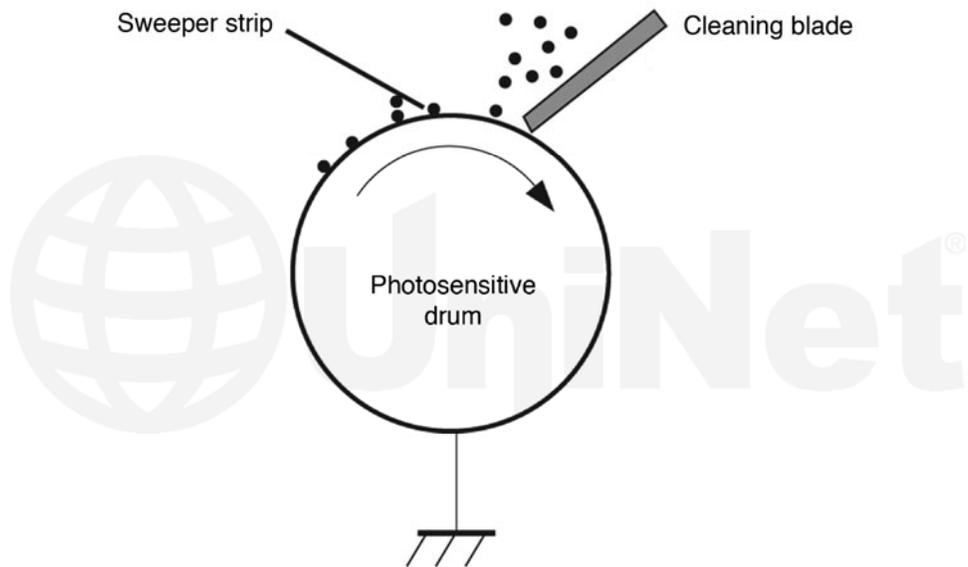
In the **fifth** stage, the image is then fused onto the paper by the fuser assembly. The fuser assembly is comprised of the upper heating assembly and lower pressure roller. The lower pressure roller presses the page up into the upper heating assembly, which then melts the toner into the paper. This heating assembly consists of a flexible sleeve with a ceramic heating coil inside. This type of fuser affords “instant-on” fusing with little to no wait time, and low power consumption.

- Positive potential waste toner
- Negative potential waste toner



ITB CLEANING

The ITB is cleaned by both the ITB cleaning roller, and the ITB cleaning brush. Both the roller and brush have a DC positive bias placed on them, which in turn places a positive DC bias on the residual toner. The residual toner is then picked up by the OPC drum (due the positive bias) and then cleaned off the drum by the wiper blade.



OPC DRUM CLEANING

The drum is cleaned after the image is transferred to the paper by the wiper blade. This part is fairly standard; the wiper blade scrapes the toner off the drum, and the recovery blade guides it into the waste chamber.

PRINTER CALIBRATION

At the start of all this is the cartridge detection process, toner level detection, and then the calibration cycle. The printer will calibrate itself: (A) whenever the printer is turned on (within 15 minutes), (B) when a new toner cartridge is installed, and (C) after 48 hours of run time. Calibration consists of a solid block and halftone of each color being printed to the ITB. As the printed areas get to the top of the belt, a sensor will detect them, measure the density, and adjust the printer accordingly. All of the calibration time settings are user-controllable.

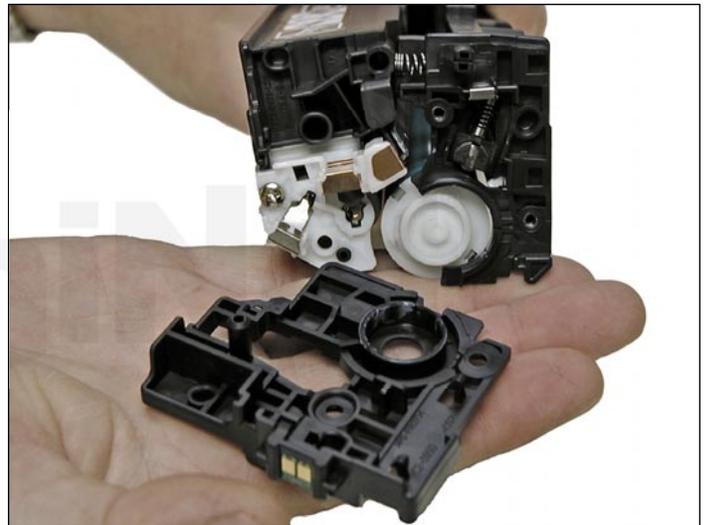
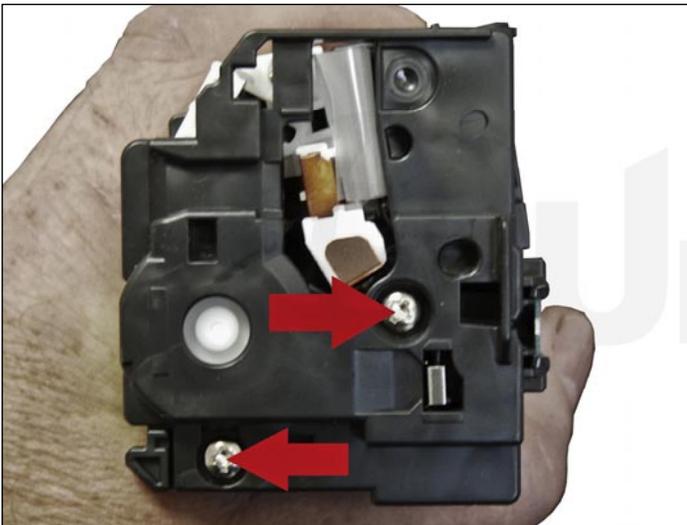
Taking test prints, cartridge troubleshooting, as well as minor printer troubleshooting will be covered at the end of this article.

REQUIRED TOOLS

1. Toner approved vacuum
2. A small screwdriver (common style)
3. A Phillips head screwdriver
4. Needle-nose pliers

SUPPLIES REQUIRED

1. New replacement toner for use in the Pro 200 series
2. New replacement chip
3. New drum
4. New wiper blade
5. New toner feed roller (optional)
6. New PCR (optional)
7. New doctor blade (optional)
8. Drum cover
9. Lint-free cloths
10. Conductive grease



1. With the label on top and facing you, remove the two screws from the left side end cap.

Remove the end cap.



2. On the right side, remove the two screws and end cap.

Be-careful! The two halves will start to separate, and the drum will come loose!



3. Flip the waste chamber upside down, and remove the drum.



4. Remove the PCR.

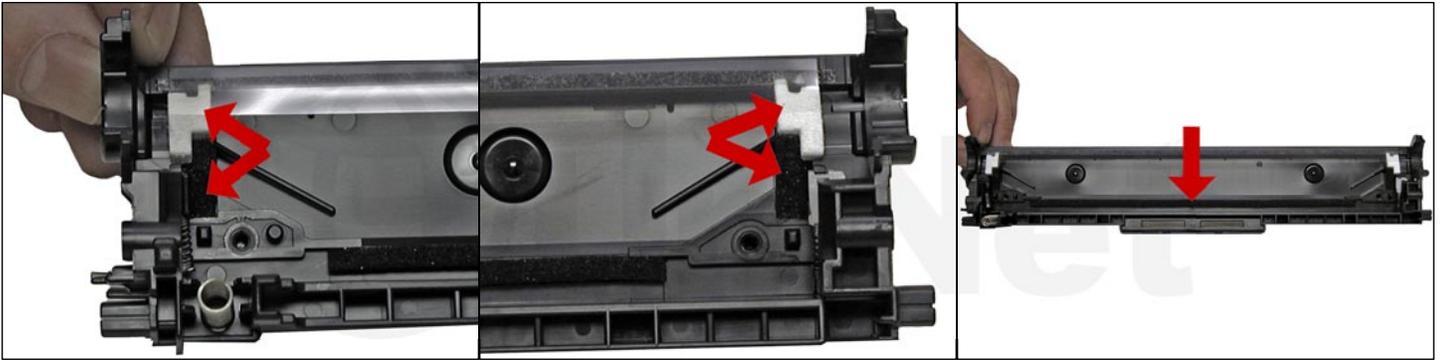
Clean with your preferred PCR cleaner, and place aside.



5. Remove the two screws and wiper blade shown.



Wiper blade and screws removed.



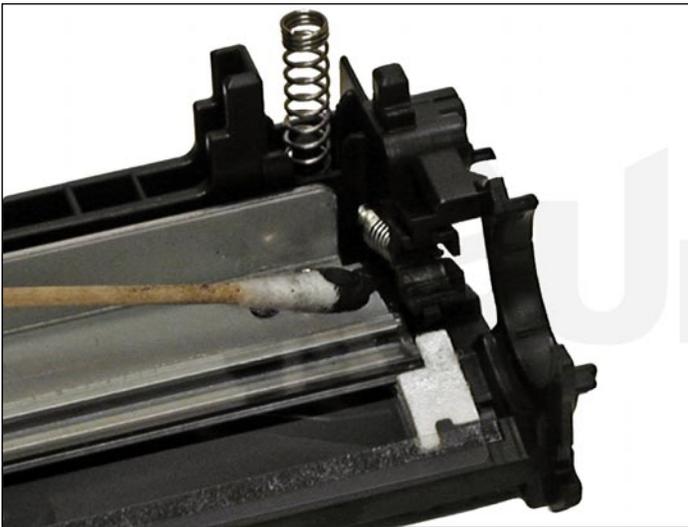
6. Clean out all the waste toner from the chamber.

Make sure all the wiper blade seals are clean.



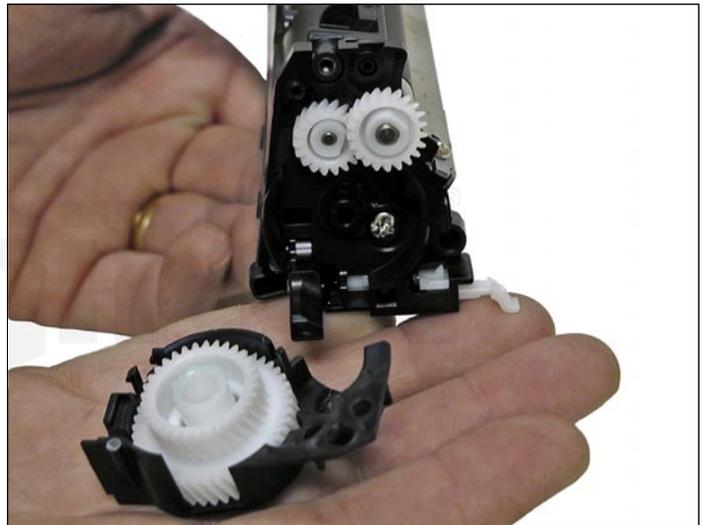
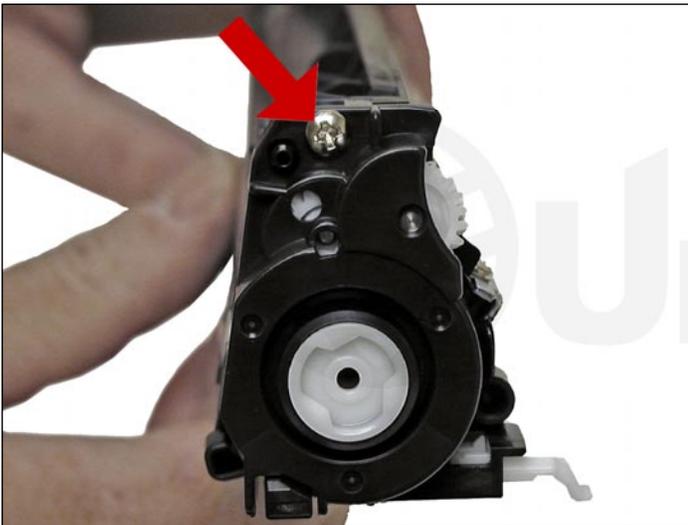
7. Coat the new wiper blade with your preferred lubricant and install.

Install the two screws.



8. Install the cleaned PCR.

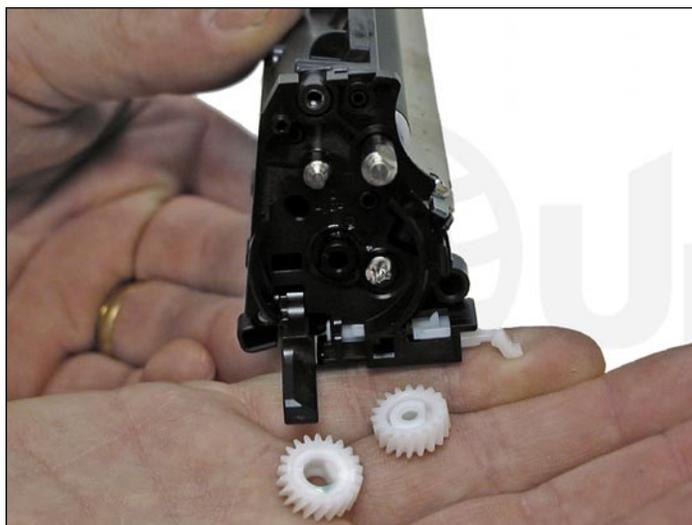
Make sure to place a small amount of conductive grease on the black PCR holder.



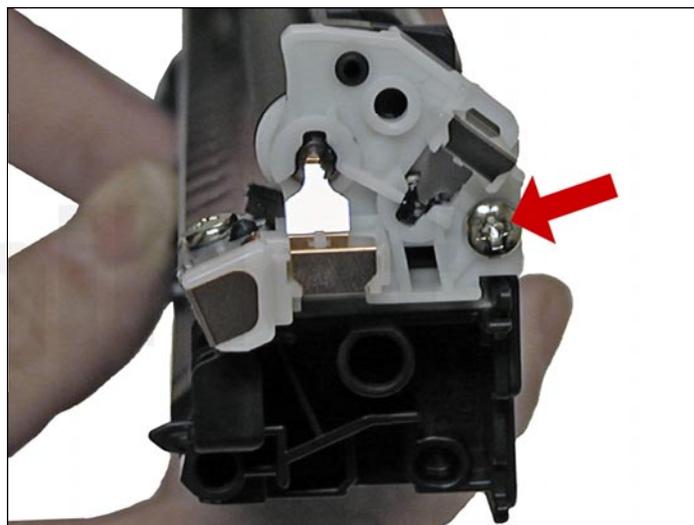
9. On the supply chamber, remove the screw from the gear/non-contact side end cap.

Carefully and gently work the end cap off the hopper.

There is a small plastic pin that will break off.



10. Remove the two gears.



11. Remove the screw on the contact side end cap.



12. Slide the developer roller over and remove.



13. Remove the two screws and doctor blade.

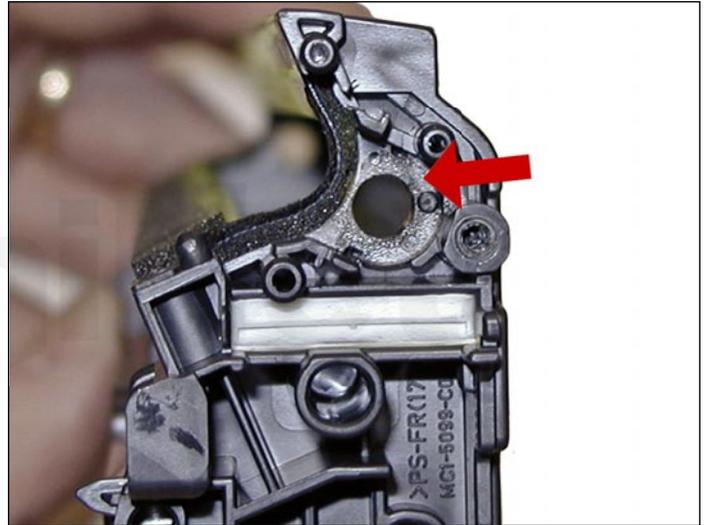


14. On the gear side of the hopper, remove the screw and inner end cap. Carefully work this end cap free. Use a small screwdriver if necessary to free the end cap from the plastic pin that broke earlier.

Note the spring-loaded arm assembly. We believe this arm is part of the cartridge detection system but nothing is mentioned about it in the service manual. The sensors for this are hidden by the transfer belt in the machine. We will figure out their purpose, but for now, it's just a guess.



15. At this point, while tight, you can clean and fill the hopper with toner for use in the HP 131 Series.



NOTE: HP/Canon created a bit of a block for us here. The clear bushing located on the right side of the hopper is glued in.



The opposite side bushing is integral to the hopper. If you wish to install a seal, change the feed roller, or just have better access to the hopper, the feed roller must be pulled over to one side compressing the foam. First remove the two white felt seals.



At this point we do not know if this will damage the roller or affect the printing at all...



...So far in our tests it has not, but it's too early to say for sure.



16. If you have not already done so, fill the hopper with new replacement toner for use in the HP 131 series, and install the feed roller.



17. Install the two white felt seals on the feed roller shaft.



18. Clean the doctor blade foam seal.

Install the doctor blade and two screws.

Gap the doctor blade using a gapping tool or plastic shims as shown.



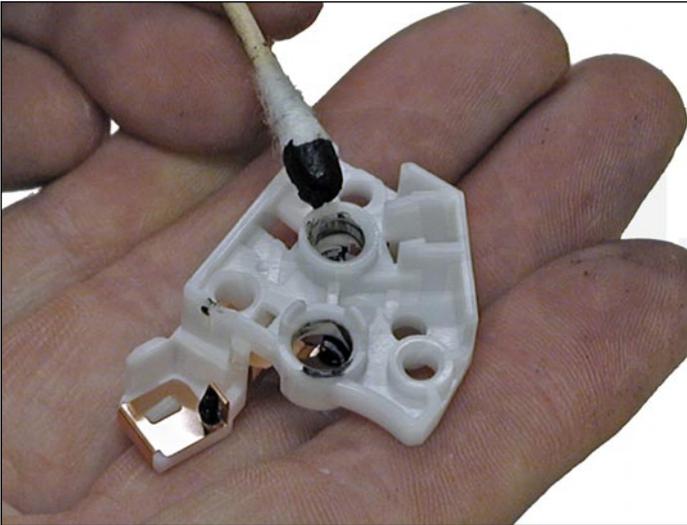
19. Install the developer roller.



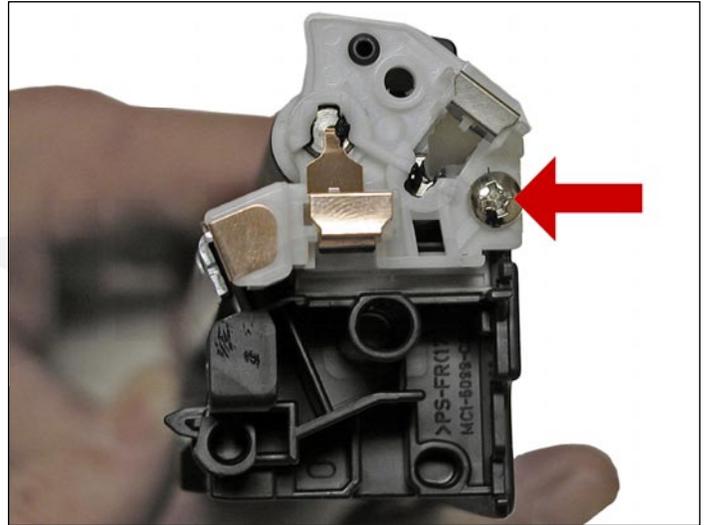
20. Install the inner end cap and screw.

This end cap has a tight fit and snaps in place.

Be careful here, as the screw hole can strip out easily.



21. Clean the contact (on the contact end cap) with a cotton swab and alcohol. Replace the conductive grease with fresh grease. Remember, more is not better with this grease.



22. Replace the contact end cap and screw.



23. Replace the two gears on the feed and developer roller shafts.



24. Install the gear end cap and screw.

Make sure the spring arm works!

DRUM GEAR CHANGE

UPDATE: If you are replacing the drum, the gears will need to be changed over from the OEM to the new. There are two methods of removing the gears from OPC drums: The first and easiest method is to place the drum in a metal vice approximately 2" back from the gear, and slowly tighten the vice. The gear should pop out easily. This is the only method you can use on the OPC drums, which have a weighted slug in the center. If you use this method go on to step #3. The other method is as follows.

REQUIRED TOOLS & MATERIALS

1. A 1/4" x 15" metal rod
2. A 1" x 15" wooden dowel
3. A tube of super glue
4. A small piece of emery-cloth or sand paper

Step #1: Remove the drive gear:

The drive gear is the gear that has no metal electrical contacts in it. These gears are usually larger than the contact gear.

- A. Carefully insert the 1/4" metal rod into the center of the gear that has the contacts, or the contact gear.
 - B. Angle the rod so that the rod presses against the edge of the opposite gear. The rod should be touching both the inside of the OPC drum and the edge of the gear.
 - C. Tap the end of the rod with a hammer, working the rod around the entire edge of the gear, until the gear comes loose.
- NOTE:** Gently heating the ends of the drum with a hair dryer or heat gun on low may cause the glue to soften and ease in the removal process. Just be careful not to use too much heat and melt the gear!

Step #2: Remove the "contact" gear:

- A. Insert the 1" wooden dowel into the gearless end of the drum.
- B. Tap the dowel with a hammer until the gear comes loose.

Step #3: Remove any old adhesive from the gears; straighten out any damage done to the contact gears' metal contacts:

A. Removing the adhesive can be done with a small sharp common screwdriver. The glue comes off easily.

Step #4: Install the gears on the new replacement drum:

A. Inspect the metal contacts on the contact gear. Make sure that the contacts will make proper contact with the inside of the OPC drum.

B. Locate the side of the drum on which you are going to place the contact gear. On some OPC drums, this is critical. See individual instructions for more information.

C. Lightly sand the INSIDE of the OPC where the metal parts of the contact gear will meet. This will insure a good electrical contact.

D. Dry-fit the contact gear in the OPC drum and check for a good contact with an Ohmmeter. The reading should be a direct short, or no more than 1 or 2 Ohms. **NOTE:** When checking the contact, place one lead on the drum axle contact and the other on the edge of the drum. This way, you will not have to pierce the coating that is on the OPC surface. A retail electronics store, such as Radio Shack, carries cheap Ohmmeters for less than \$10.00 USD, and a sales person would normally be glad to show you how to use it.

E. Using the super glue, place a few (3-4) small drops of glue strategically around the inside edge of the OPC drum. Make sure you leave a blank area for the metal contacts!

F. Insert the contact gear.

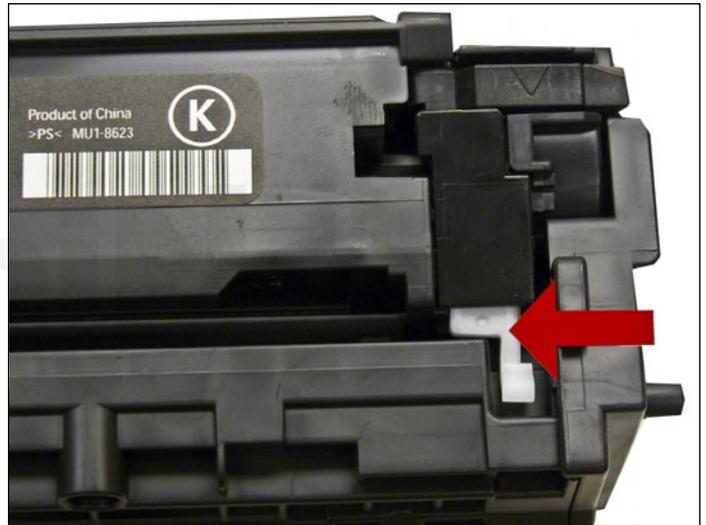
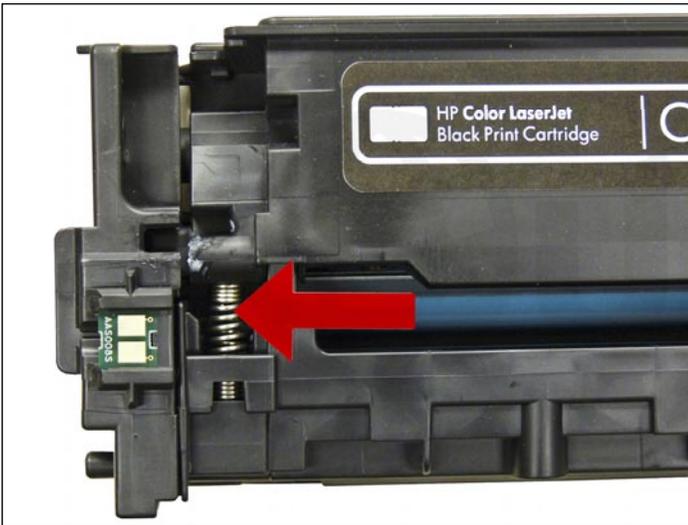
G. Check for continuity again with the Ohmmeter.

H. Repeat steps E and F for the drive gear.

NOTE: Be very careful not to place the metal contacts in direct contact with the glue, as this will interfere with the proper grounding of the drum, and the cartridge will not print properly, (solid black pages). It is also very important to NOT put any glue on the gear, as the chances of it dripping out onto the drum surface and ruining it are high. Placing the glue inside the drum tube works much better.

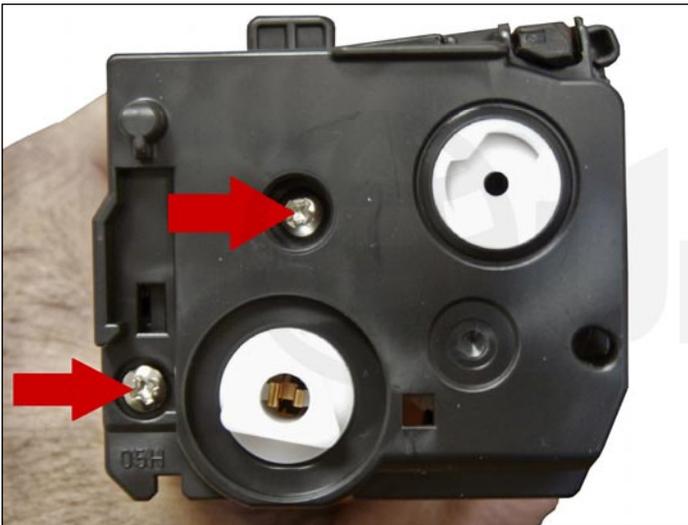


25. Coat the drum with your preferred lubricant, and install the drum in the waste hopper.

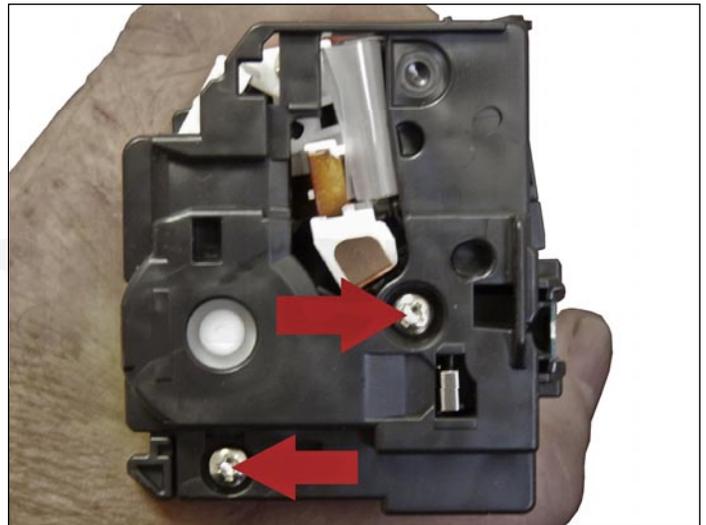


26. Hold the two halves together.

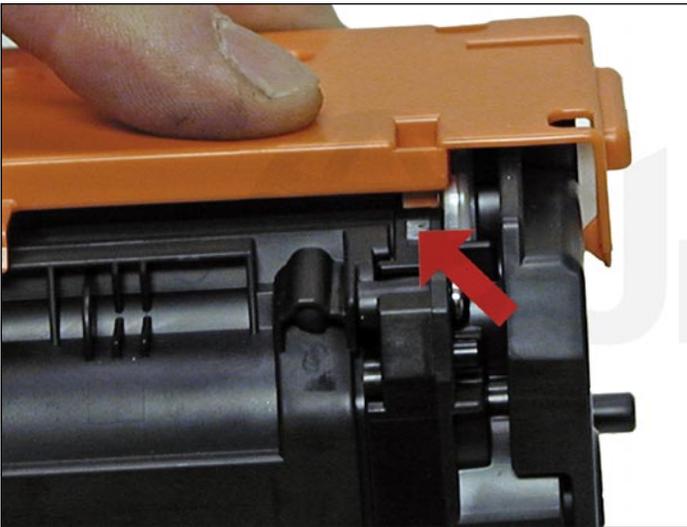
Align the spring on one side and the spring-loaded arm on the other.



27. Install the outer gear-side and cap and two screws.

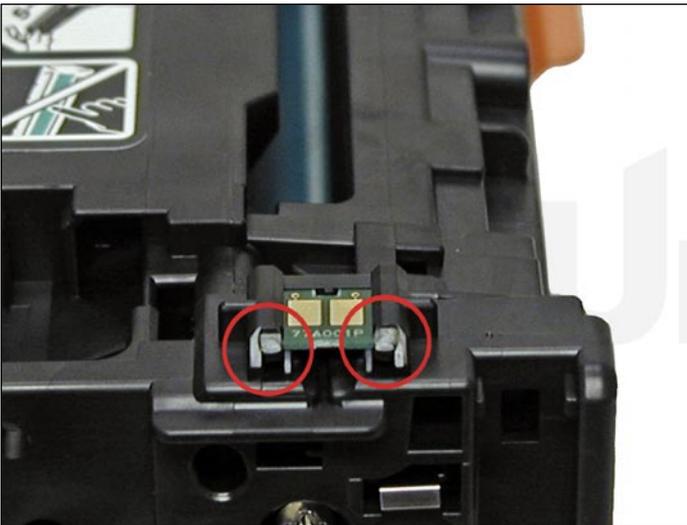


28. Install the remaining outer end cap (on the contact side of the cartridge) and two screws.

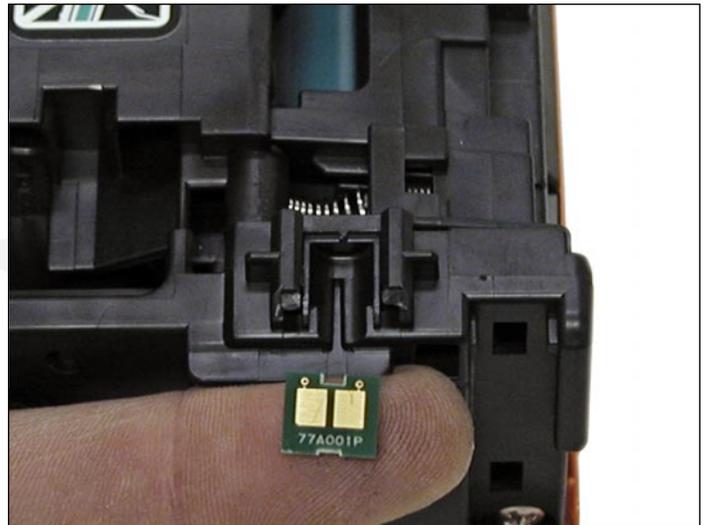


29. Install the drum cover on to the cartridge.

Spread the two halves apart slightly so it fits properly.



30. Remove the chip by cutting the plastic off the edges on both sides of the chip.



31. Remove and replace the chip. If the new replacement chip is loose in the slot, close off the top edges with small amounts of hot glue.

Taking Test Prints**Configuration report:**

1. Press the INFORMATION ("i") button from the Status Summary Screen.
2. The test page can be printed.

Supplies status page:

1. Press the SUPPLIES button.
2. From the Supplies Summary Screen, the test page can be printed.
3. You can also run the above pages, plus many more from the REPORTS menu (fonts, usage, menu, diagnostics etc.).

Repetitive Defect Chart

OPC drum:	75.8 mm
Transfer rollers:	57.0 mm
Fuser pressure roller:	56.8 mm
Fuser sleeve:	56.5 mm
Registration roller:	44.0 mm
RS roller (feed roller):	28.5 mm
Primary charge roller:	26.7 mm
Developer roller sleeve:	22.3 mm