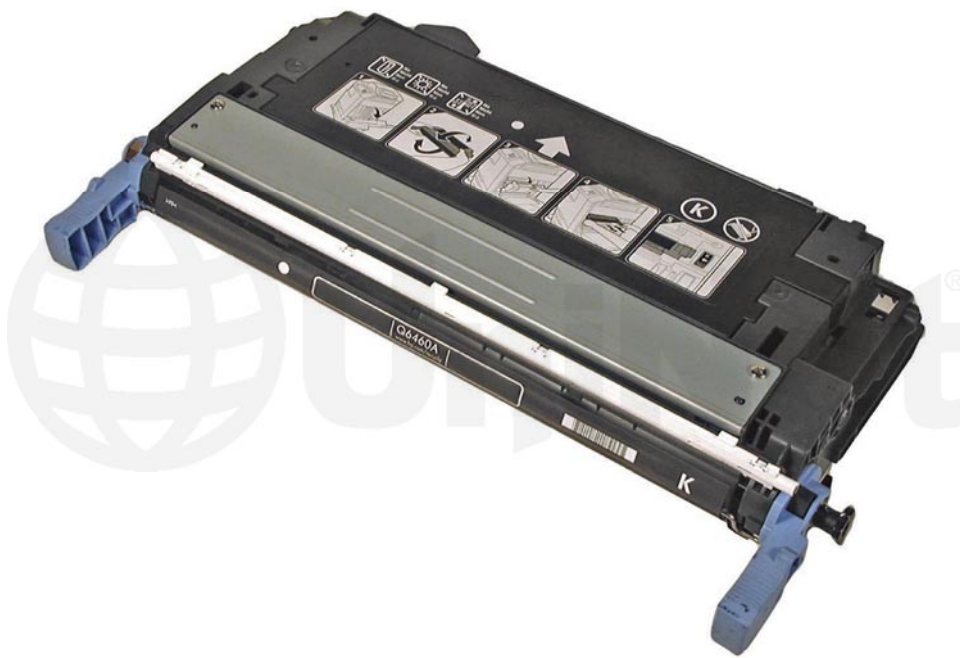


HP® COLOR LASERJET 4700 • 4730 MFP

TONER CARTRIDGE REMANUFACTURING INSTRUCTIONS



HP® 4730 TONER CARTRIDGE

REMANUFACTURING THE HP 4700/4730 MFP BLACK & COLOR TONER CARTRIDGES

By Mike Josiah and the Technical Staff at UniNet

First released in October 2005, the HP 4700 series of color laser printers are based on a 31 ppm, 600 dpi engine (3600 dpi with Resolution Enhancement Technology or RET). A short time later, the 4730 MFP machines were released with basically the same specifications, but now as a multifunction machine.

The differences between both cartridges are the chips and the amount of toner (yield) inside. The 4700 cartridges consist of the toner supply, drum, and waste chamber. Like the HP Color Laserjet 3600, these machines use an in-line, or single-pass system. All four cartridges are stacked on top of each other and each color develops its own image, which is transferred to the paper by the transfer belt. This type of system is faster, and allows for a higher quality print.

These cartridges have some interesting features. Instead of shipping locks that are removed and thrown away by the user, they have two small white plastic clips that are automatically disengaged when the cartridge is installed. These cartridges also have a self-removing seal system, in which the seal winds itself up on a small roller inside the cartridge. These items will be shown later in this article.

PRINTERS BASED ON THE 4700 ENGINE

HP Color LaserJet 4700n
HP Color LaserJet 4700dn
HP Color LaserJet 4700dtn
HP Color LaserJet 4700ph+

HP Color LaserJet 4730 MFP
HP Color LaserJet 4730x MFP
HP Color LaserJet 4730xs MFP
HP Color LaserJet 4730xm MFP

CARTRIDGES USED IN THE 4700 MACHINES

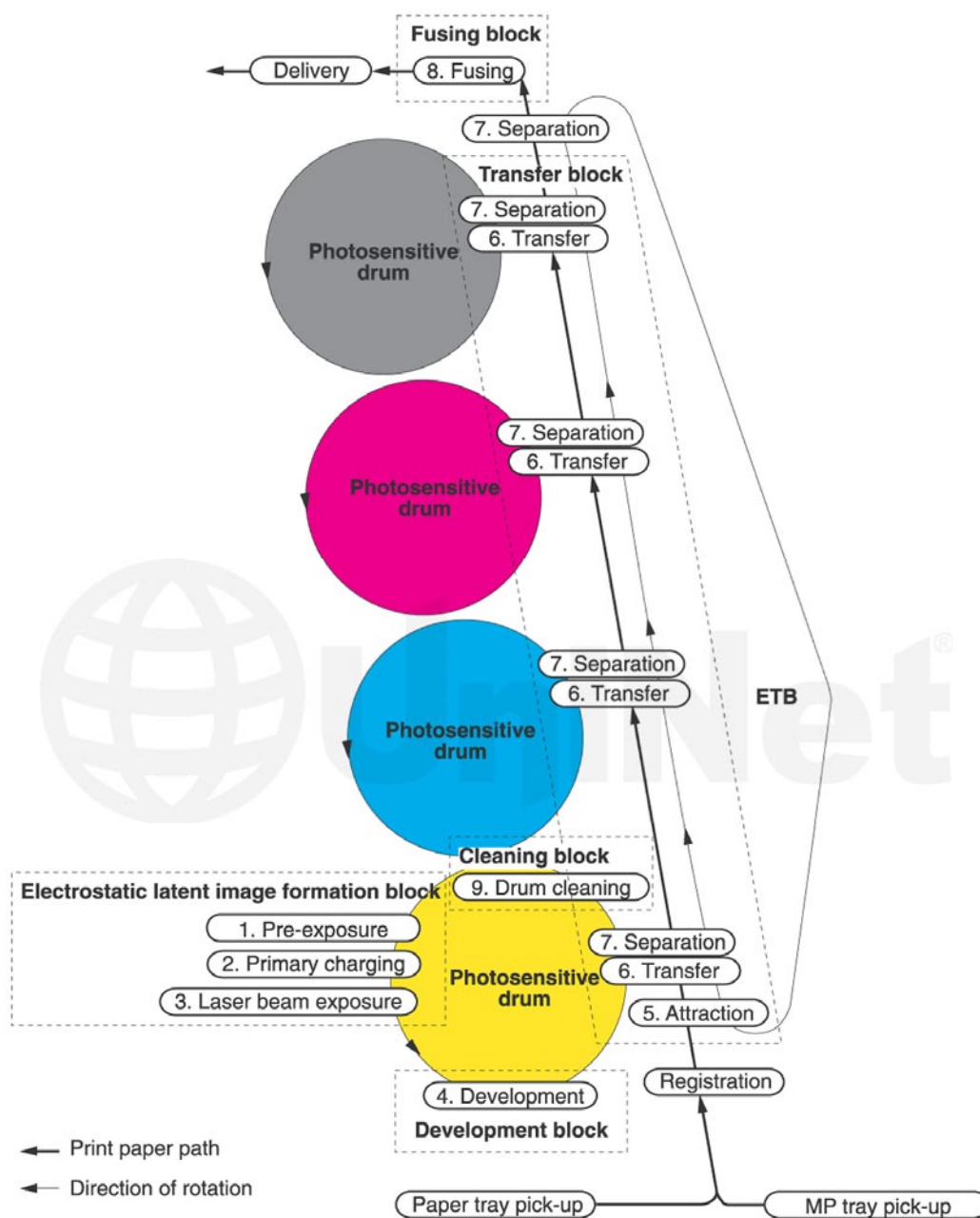
Q5950A (black)	11,000 pages at 5%	\$258.43 USD list*
Q5951A (cyan)	10,000 pages at 5%	\$367.47 USD list*
Q5953A (magenta)	10,000 pages at 5%	\$367.47 USD list*
Q5952A (yellow)	10,000 pages at 5%	\$367.47 USD list*

CARTRIDGES USED IN THE 4730 MACHINES

Q6460A (black)	12,000 pages at 5%	\$203.95 USD list*
Q6461A (cyan)	12,000 pages at 5%	\$465.90 USD list*
Q6463A (magenta)	12,000 pages at 5%	\$465.90 USD list*
Q6462A (yellow)	12,000 pages at 5%	\$465.90 USD list*

*Prices, current as of November 2011, in U.S. American Dollars.

As you can see from these prices, these are very profitable cartridges to remanufacture. The basic workings of these cartridges are similar to the HP 3600 series, but some advances have been made. Because of that, we are including the cartridge theory here...

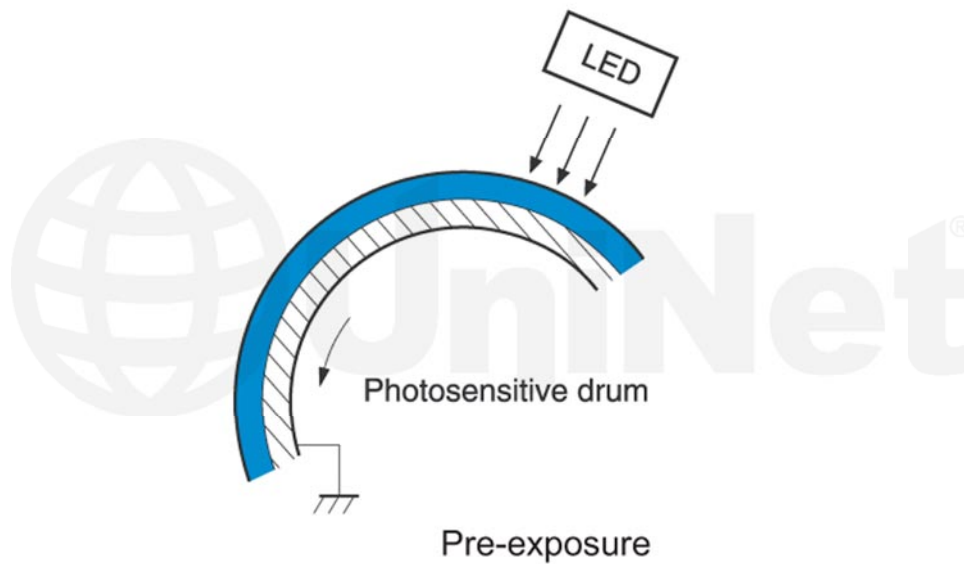


HP-4700 COLOR PRINTING THEORY

The color toner cartridge printing process happens in a series of stages or steps.

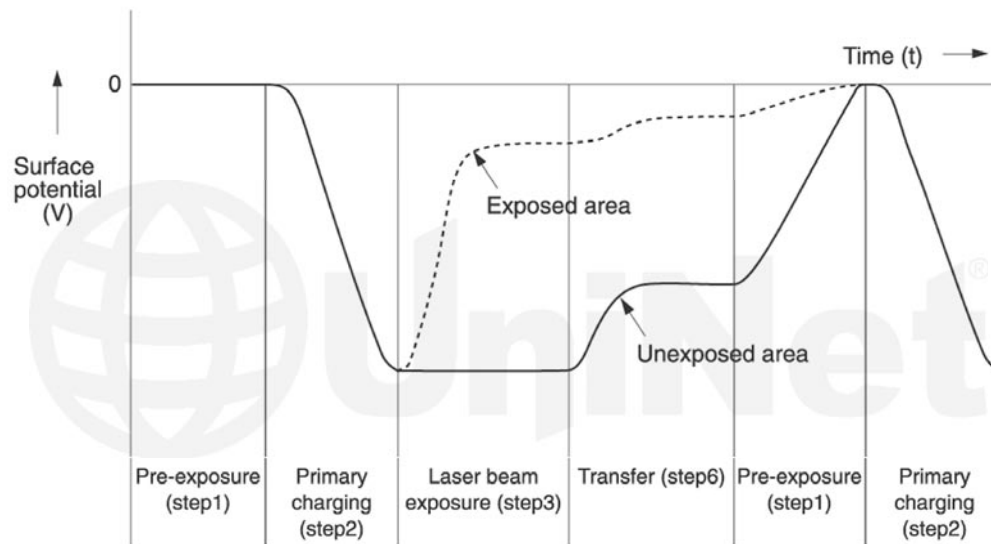
For the purpose of this article, we will call them stages.

Shown here is the basic layout of the cartridges and how they relate to each other and the printer.



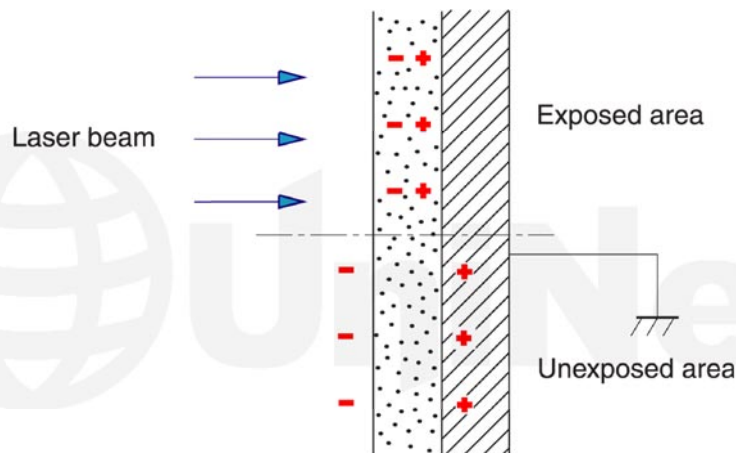
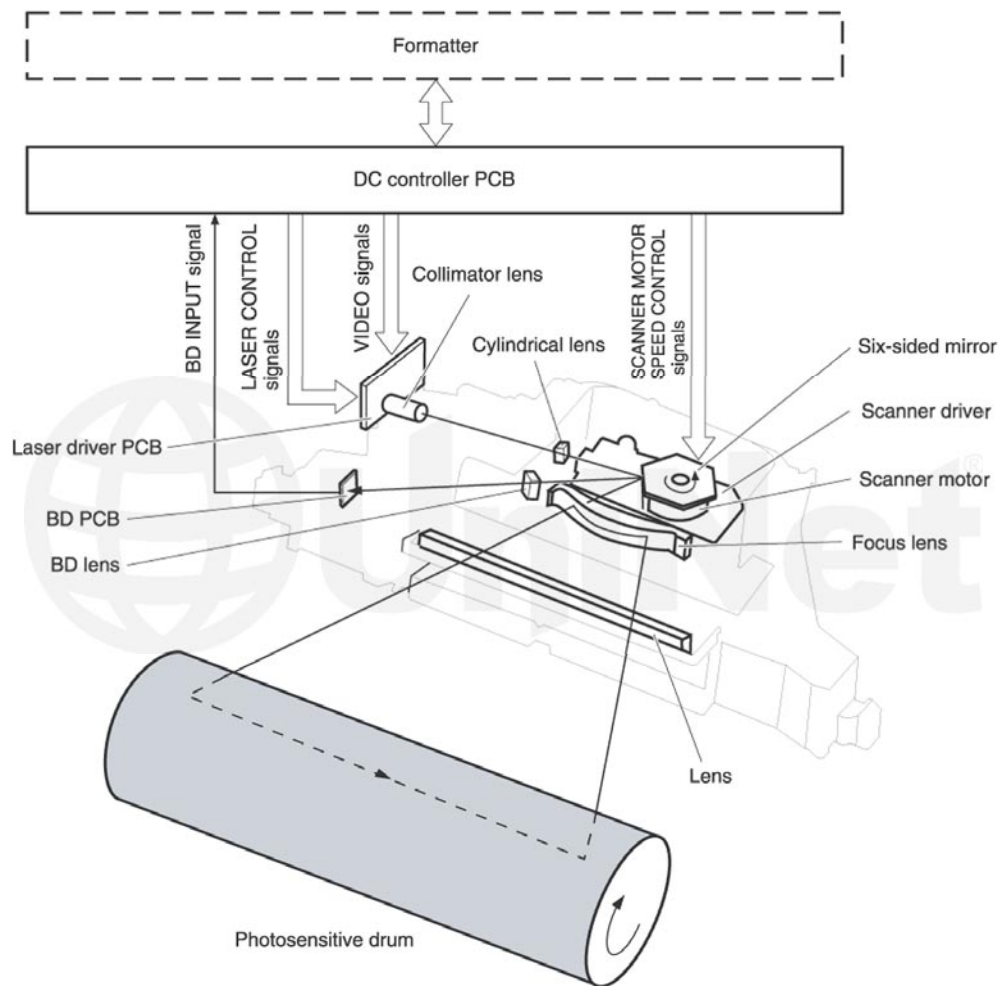
In the **first** stage, a pre-exposure LED turns on and wipes any residual charges from the drum surface.

This brings the drum surface potential to 0 (zero) volts and helps prevent backgrounding.

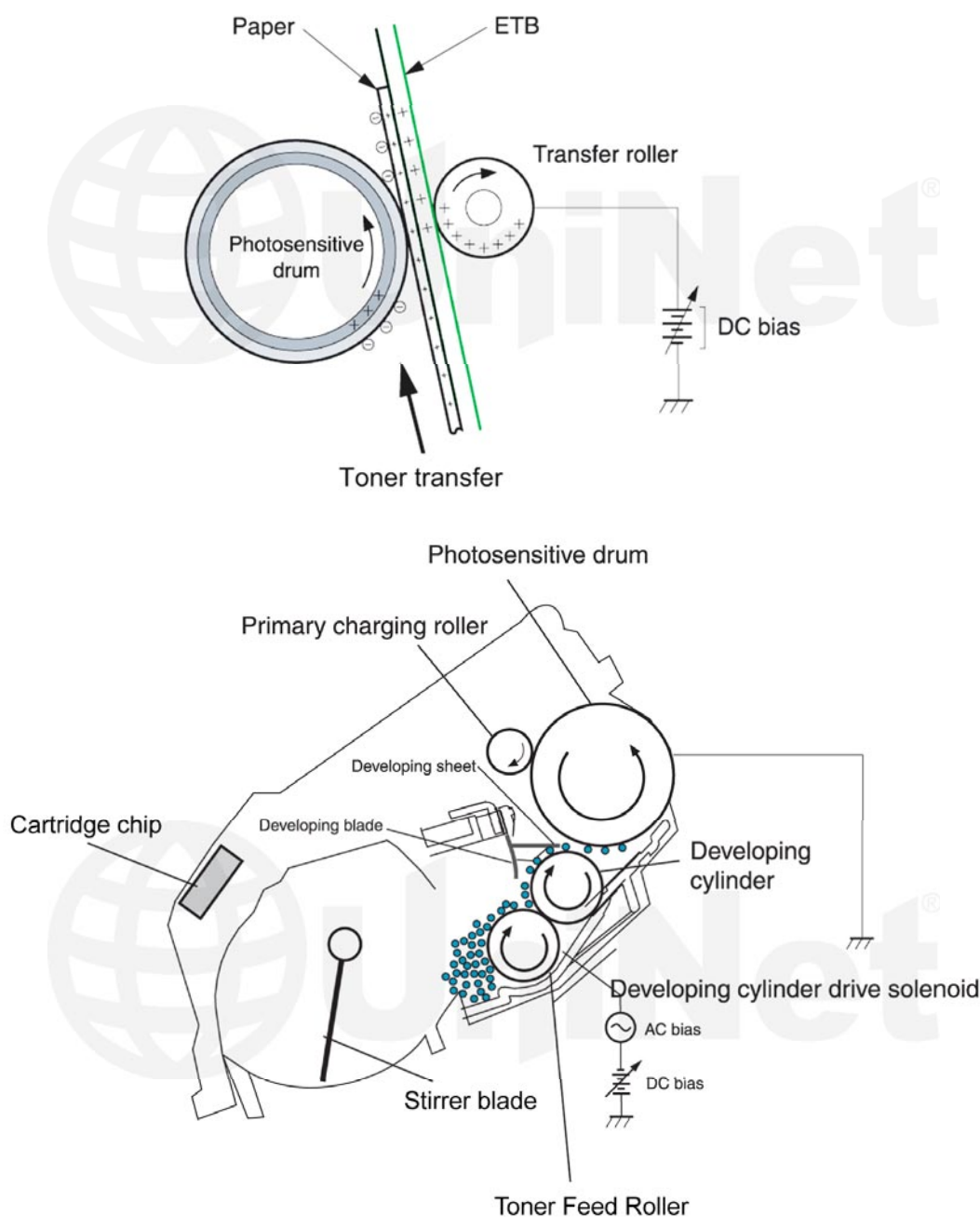


In the **second** stage, the Primary Charge Roller (PCR) places a uniform negative DC voltage on the OPC drum surface.

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

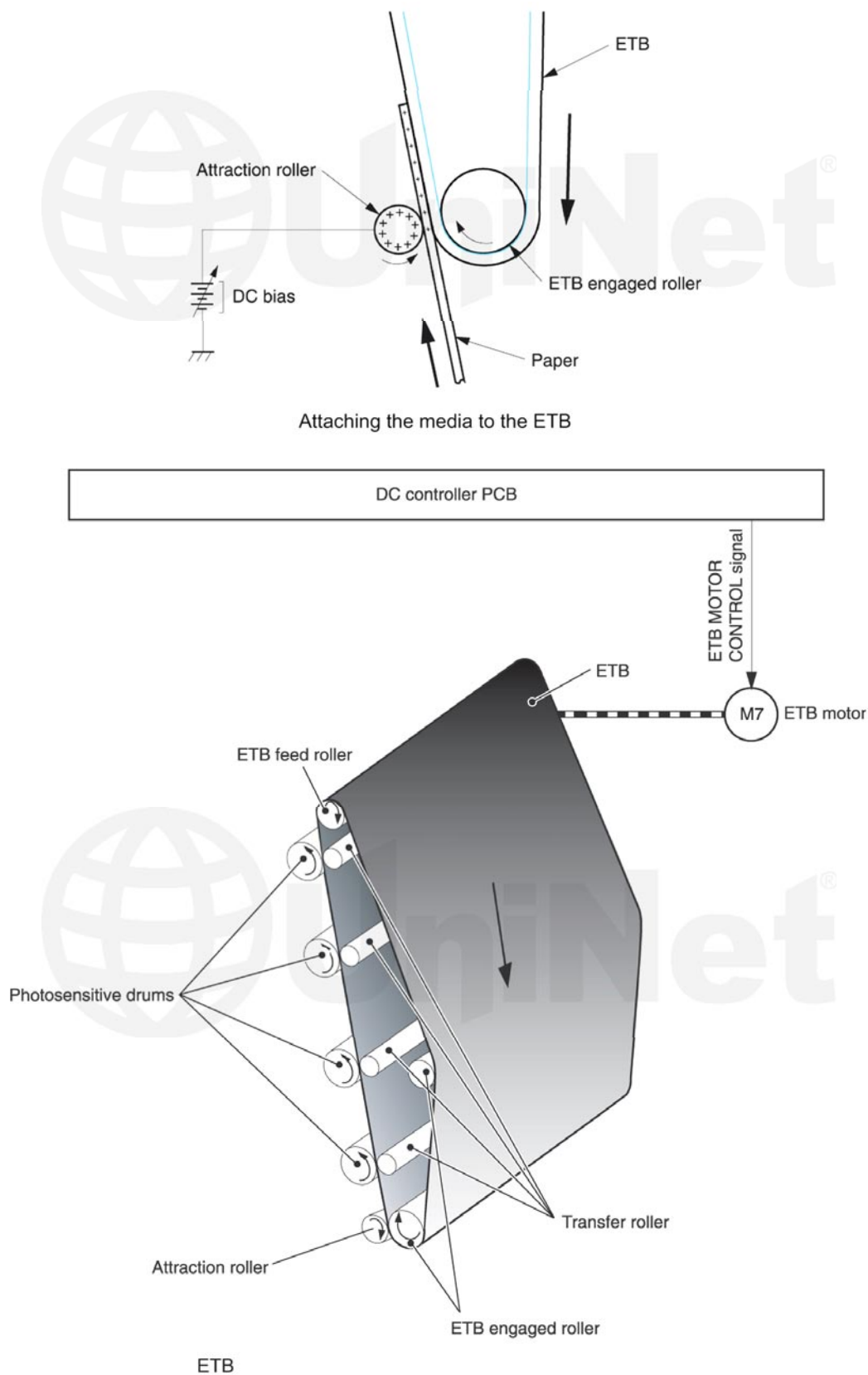


In the **third** stage, the laser beam is fired onto a rotating mirror (called the scanner). As the mirror rotates, the beam is reflected into a set of focusing lenses. The beam then strikes the drums surface, reducing the negative charge and leaving a latent electrostatic image on the drum. The areas where the laser did not strike the drum will retain the higher negative charge. Each color cartridge has its own laser and scanner units.

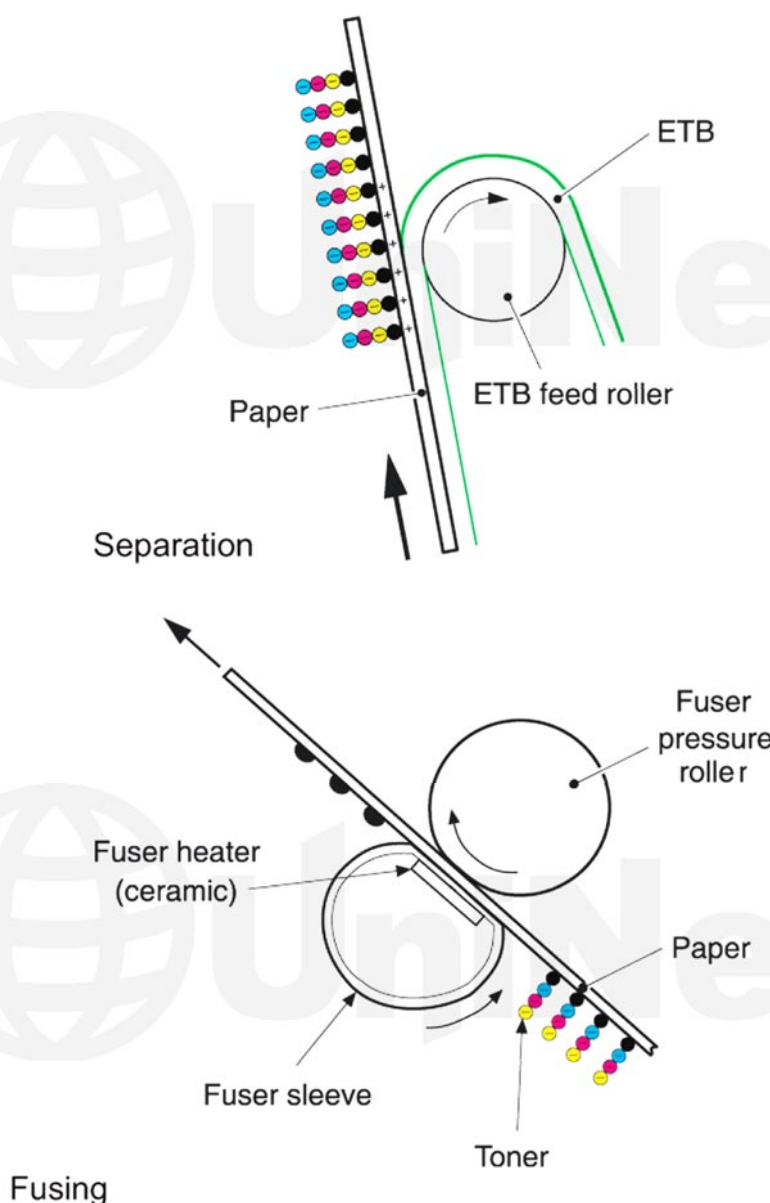


The **fourth** or developing stage is where the toner is developed on the drum by the developing section (or supply chamber), which contains the toner particles. The development stage is actually made up of two steps: toner charging, and the actual development. In the toner charging stage, the toner 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 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 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. Attached to the doctor blade is an orange mylar-type film called the "developing sheet." This sheet improves the print quality, and helps prevent toner from scattering.

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.



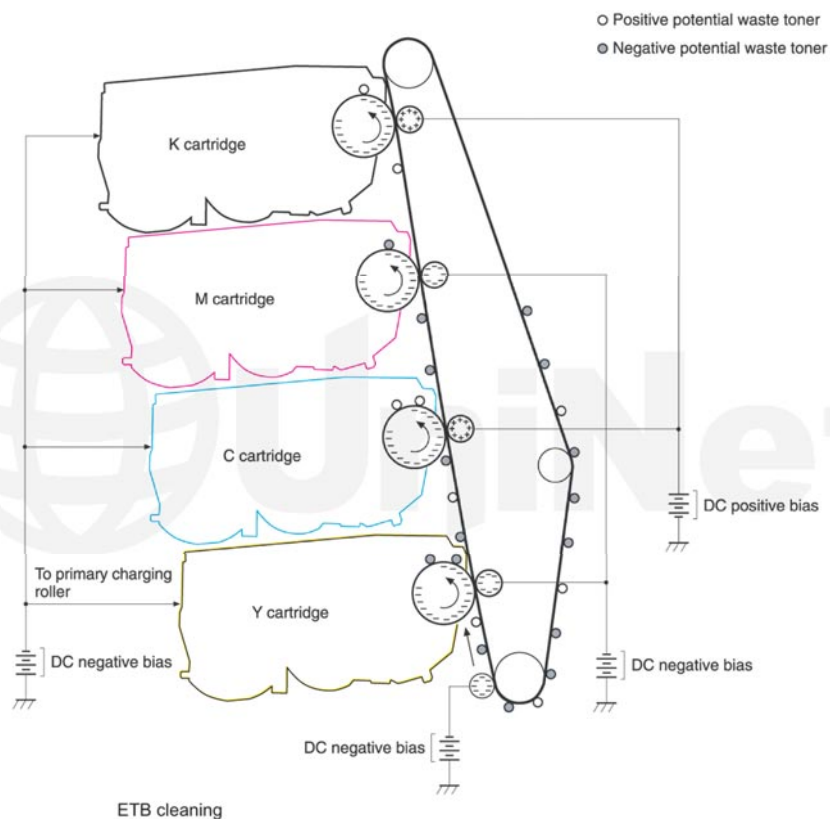
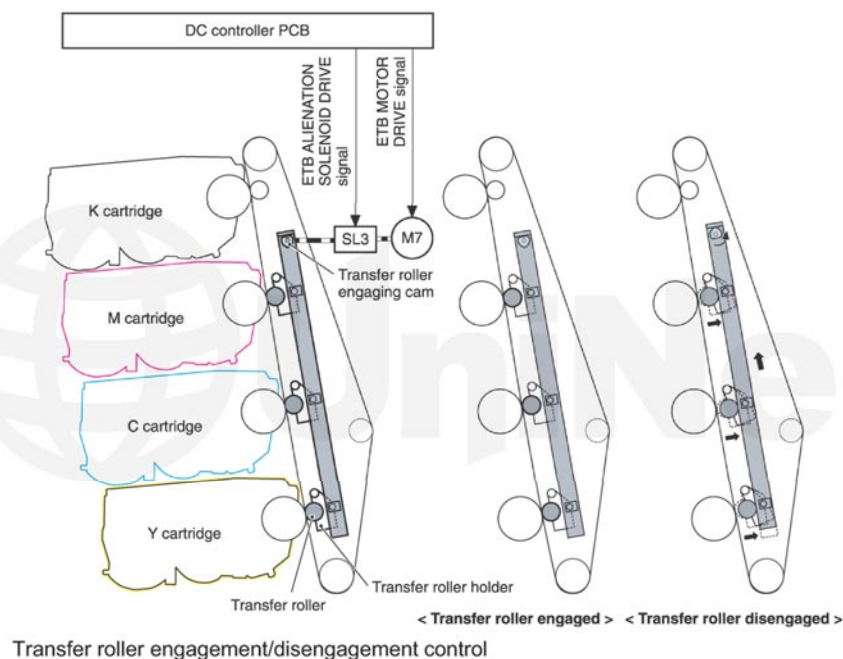
The **fifth** stage is the transfer stage. This is where there are some large differences from monochrome printers. The first step in the transfer stage is where the attraction roller places a positive DC bias which charges the paper positively to make the negatively charged toner easier to transfer onto the paper during the transfer operation.



The transfer roller (which is located directly opposite each OPC drum), then places a positive DC bias charge on the back of the ETB or transfer belt. Each toner cartridge has a separate transfer charge roller. At the same time, the paper is moving between the OPC drum and the ETB. As the ETB passes the transfer charging roller, the positive charge is picked up, and draws the negatively charged toner off the drum onto the paper. This process is repeated for each color cartridge. As the toner piles onto the paper, the positive charge on the paper weakens as the paper runs through each cartridge. For this reason, the charge is increased on the transfer charging roller for each successive color.

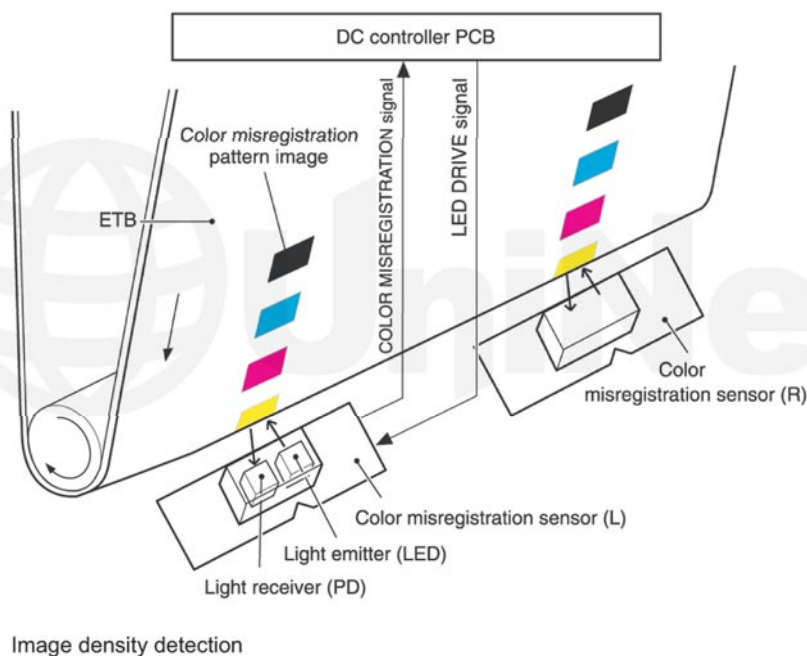
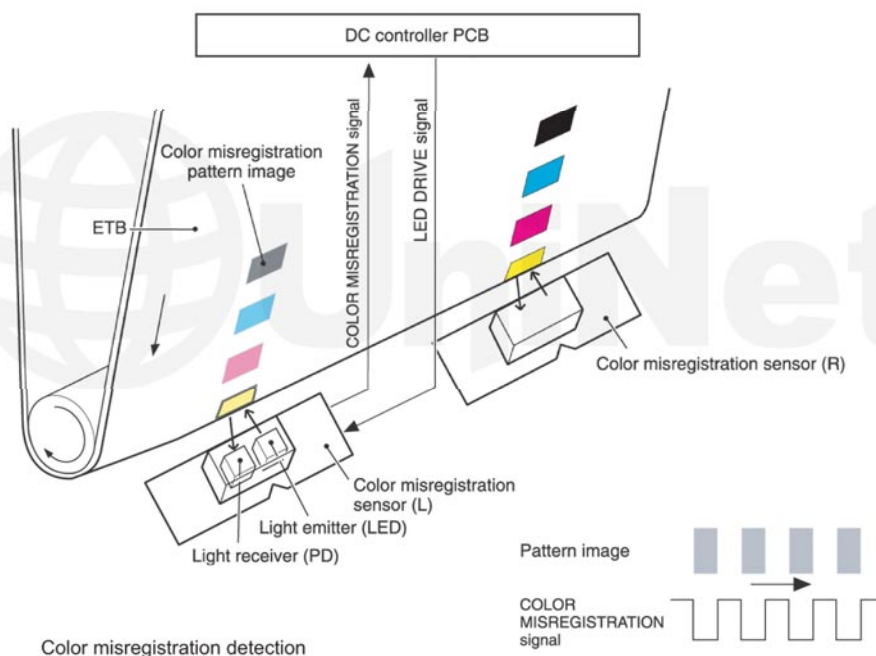
The paper separates from the ETB belt as the belt reaches the top of its path and turns back down to start the process again. The static charge on the back of the paper is decreased with static charge eliminator. This helps stabilize the paper feed, and also prevents toner flares (spots) under low temperature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

In the **sixth** stage, the image is then fused onto the paper by the fuser assembly. The fuser assembly is comprised of the heating assembly and pressure roller. The pressure roller presses the page up into the heating assembly which then melts the toner into the paper. The 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.



OPC DRUM/ETB CLEANING

The drum and ETB are both cleaned after the image is transferred to the paper. A DC negative bias voltage applied to the drum and both a negative and a positive voltage applied to each of the four color transfer rollers. This brings a potential difference between the drum and ETB so that both the positive and negatively charged residual toner is repelled from the ETB and returned to the OPC drum. The developer roller is disengaged from the OPC drum during cleaning to prevent contamination. The drum is then cleaned off 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 calibration cycle. The printer will calibrate itself whenever the printer is turned on, when a new toner cartridge is installed, after 48 hours of run time, and at 150 page intervals. Calibration consists of a solid block and halftone of each color being printed to the ETB. 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.

There is also what HP calls the color “misregistration” detection. This is where pattern images are printed to the AETB and detected by various sensors. This is done to correct for any registration problems that may be occurring.

In addition these machines also monitor temperature and humidity. The DC Controller will adjust the print voltages depending on the environment.

CARTRIDGE PRESENCE DETECTION

These printers use two types of cartridge detection: **chip detection** and **drum detection**...

For the **chip detection**, the printer reads the data stored on the chip and detects the presence of the cartridge. If the data is correct, the cartridge is recognized. If for some reason this check fails, the printer will move to the drum detection.

For the **drum detection**, the printer measures the timed torque of the drum drive. The DC controller stops the drum motor after a specific time period, if the motor stops within a prescribed period of time, the cartridge is detected. If the motor keeps turning longer than that specified time (no load), the absence of a cartridge is reported to the formatter, and all printing functions stop.

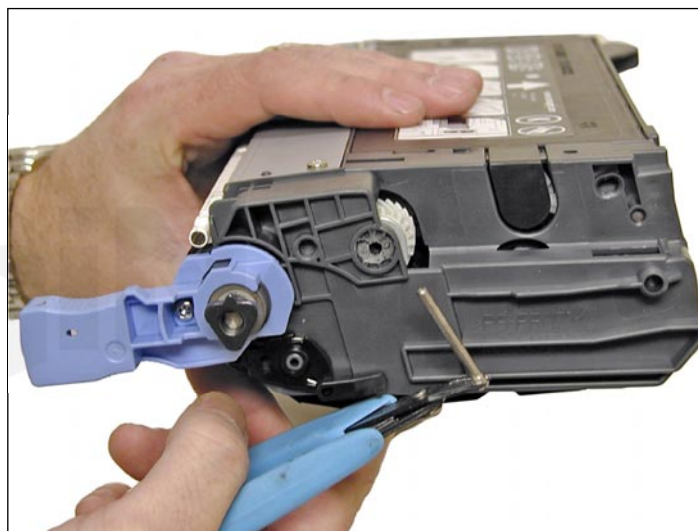
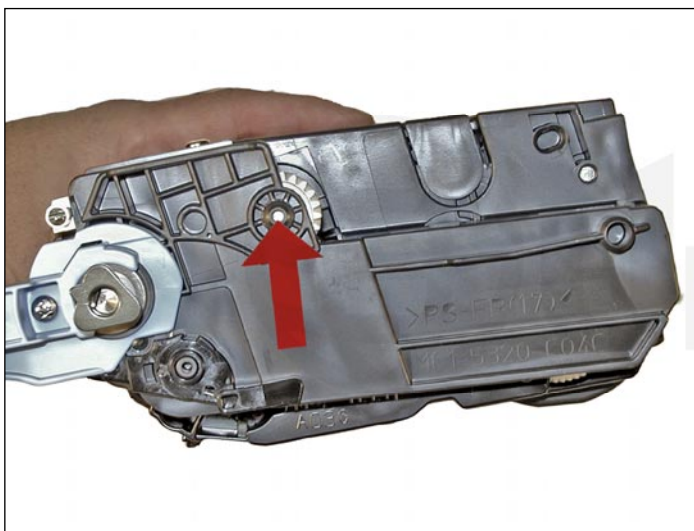
Taking test prints, cartridge troubleshooting as well as minor printer troubleshooting will be covered at the end of this article.

TOOLS REQUIRED

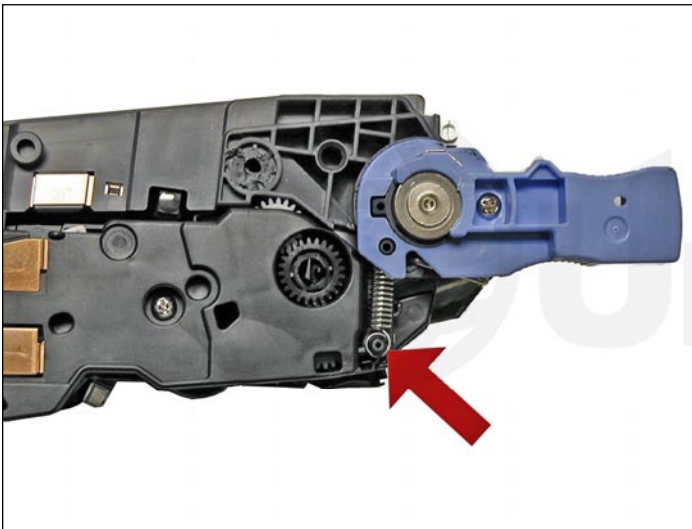
1. Toner approved vacuum
2. A small screwdriver (common style)
3. A phillips head screwdriver
4. Flush cutting wire cutters
5. Needle nose pliers
6. Spring hook
7. Hot glue gun (for chip installation)

SUPPLIES REQUIRED

1. Dedicated color toner for use in HP 4700/4730
2. New replacement chip (dedicated to each cartridge type)
3. New long life drum for HP 4700
4. New wiper blade
5. New toner feed roller (optional)
6. New PCR (optional)
7. New doctor blade (optional)
8. New replacement adhesive seal
9. Silicon caulk (Phenoseal/GE 100% silicon caulk works best)
10. Lint free cloths
11. Conductive grease



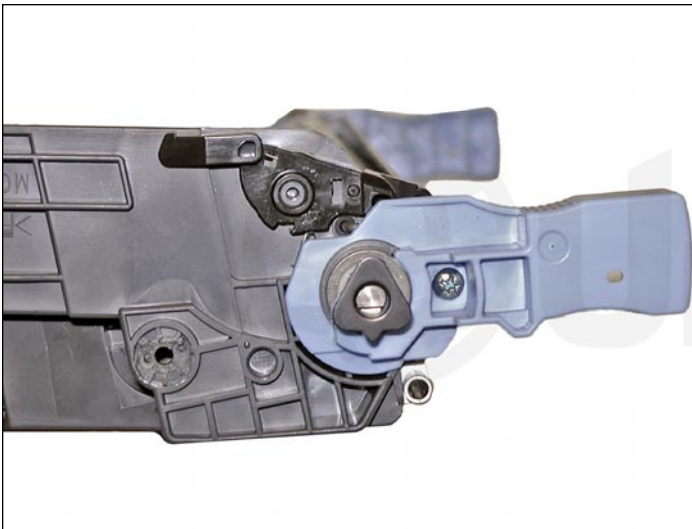
1. Shave away the plastic lip that surrounds the hinge pins, using a sharp sturdy razor knife. Dig around the pin until you can grasp it with your flush cutting wire cutters. Only cut deep enough so that you can remove the pin. If too deep of a hole is made, the hinge pin may not fit properly, and allow the two halves to move away from each other. Note that there is a long pin on the gear side, and a short on the contact side.



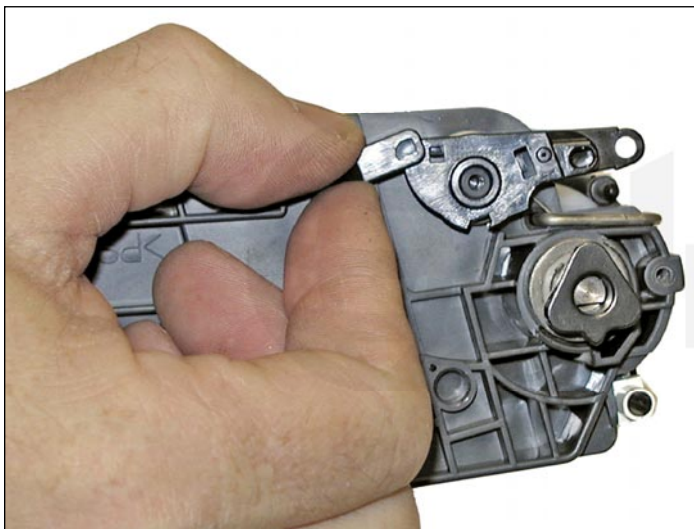
2. Unhook the spring from the bottom left on the contact side of the cartridge. The top half will stay under the blue handle.



3. Separate the two halves.

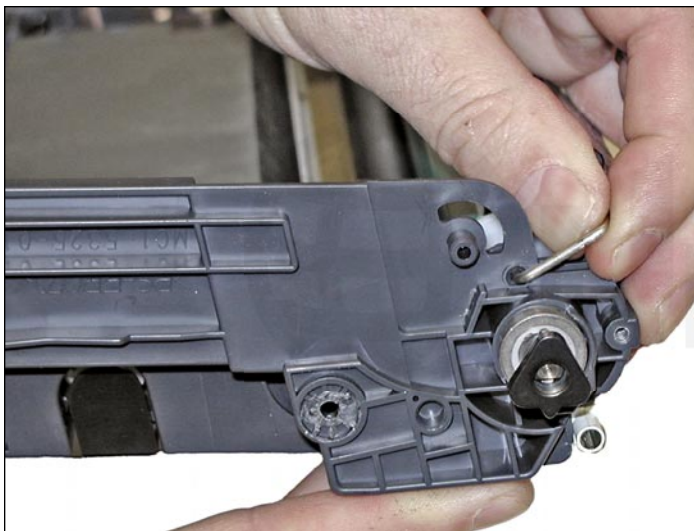


4. On the waste chamber (drive gear side), remove the Phillips head screw and blue handle.

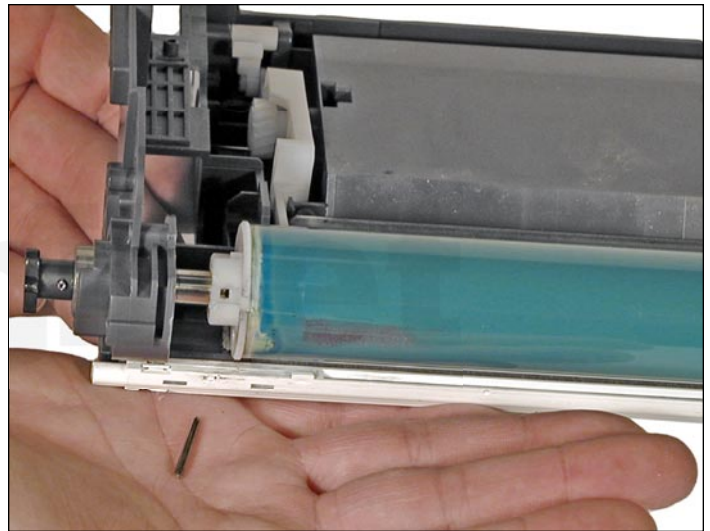
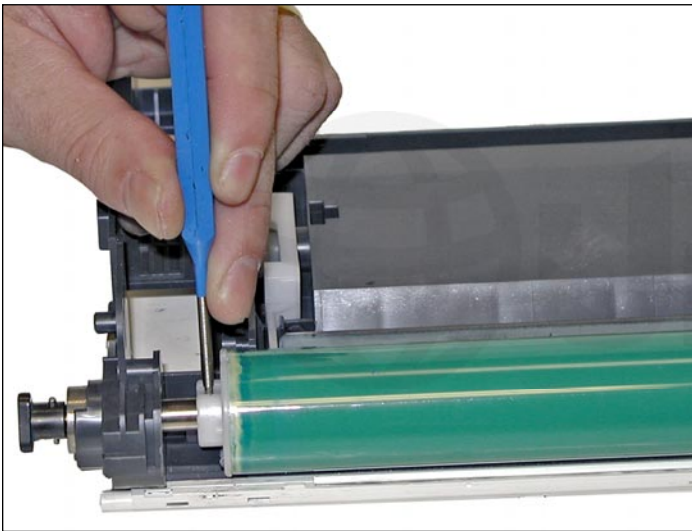


5. Remove the spring-loaded drum cover arm.

Do not lose the spring!

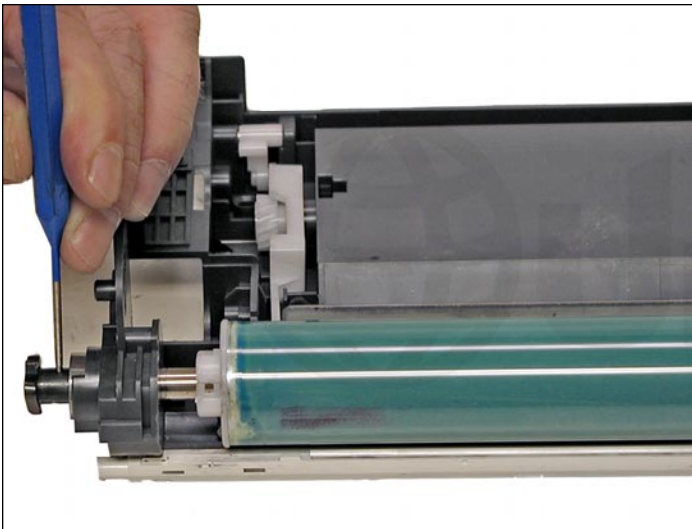


6. Remove the drum cover by pulling the metal bars out from their slots

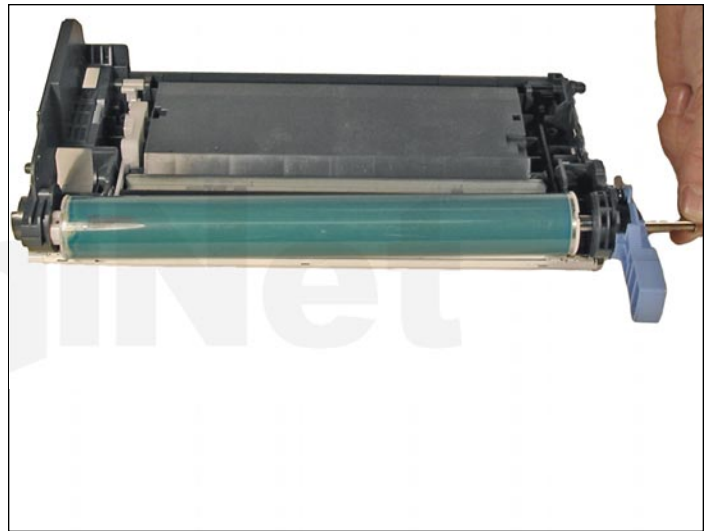
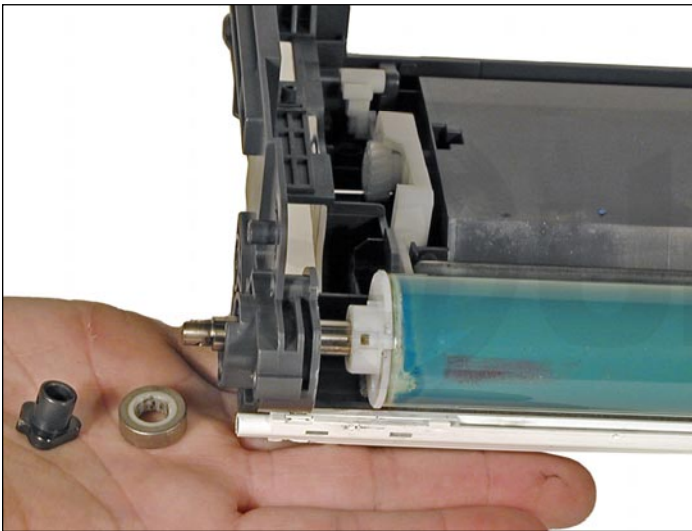


7. With the pin punch, carefully tap the pin out from the internal drum hub, and from the external drive gear.

These pins are in tight and are hard to remove.



NOTE: We have found a pin punch to be the best tool as these pins are in much tighter than in previous cartridges, and wire cutters will distort the pins.



8. Remove the drive gear and metal bearing from the drum axle.

Pull the drum axle out from the cartridge.

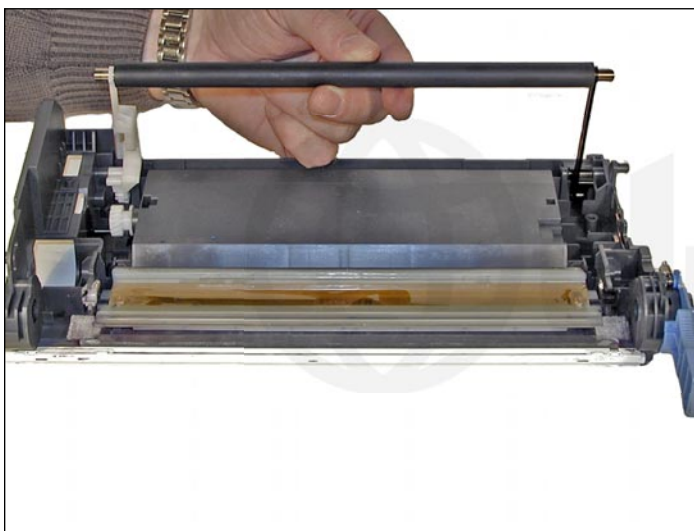
Be careful of the drum as it will come loose



9. Remove the drum.



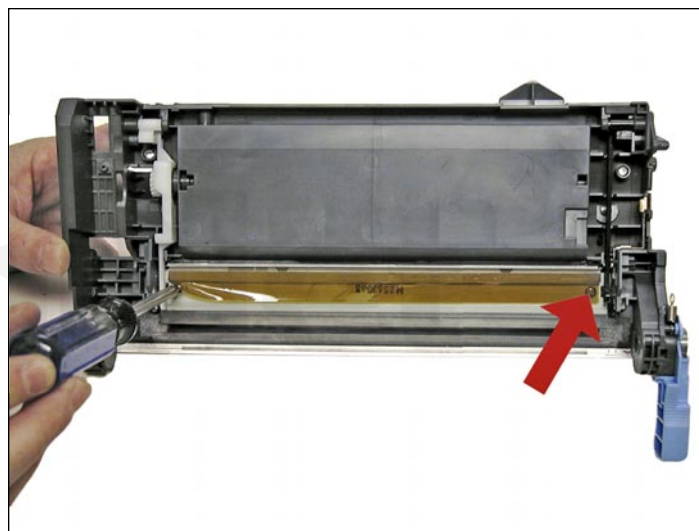
10. On the PCR, note the coating of conductive grease on **both** sides of the roller. Normally this is only on one side. For these cartridges it needs to be on both.



11. Lift up both sides of the PCR from the holders. Remove the PCR stabilizers from the PCR. The stabilizers are pinned in the cartridge and cannot be unclipped as in previous cartridges. Remove the PCR.



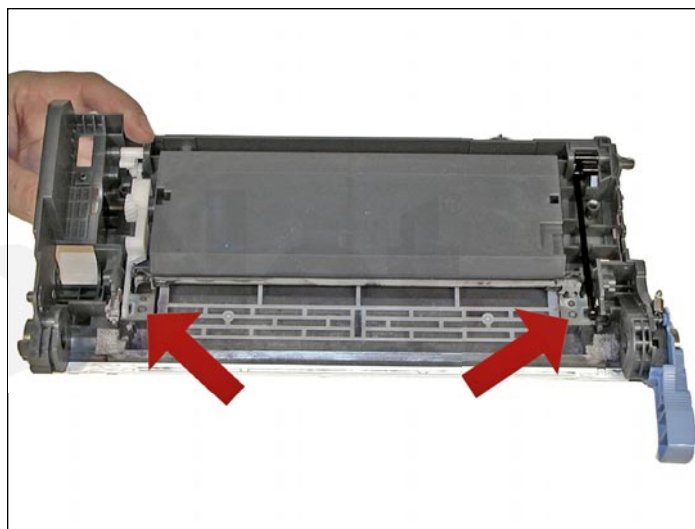
12. Take the razor knife again and slide the blade along the back edge of the wiper blade. Keep the blade along the metal so the gray sealing material is separated from the blade.



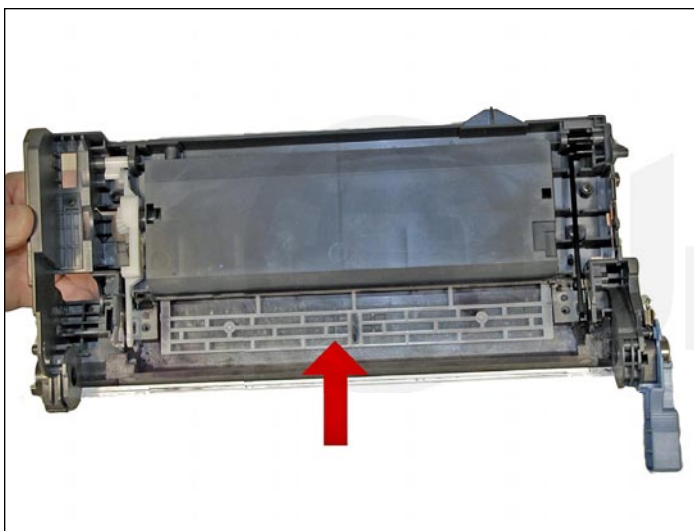
13. Remove both screws from the wiper blade. Be careful not to damage the orange mylar-type film on the blade. According to HP, this film assembly helps prevent toner from scattering.



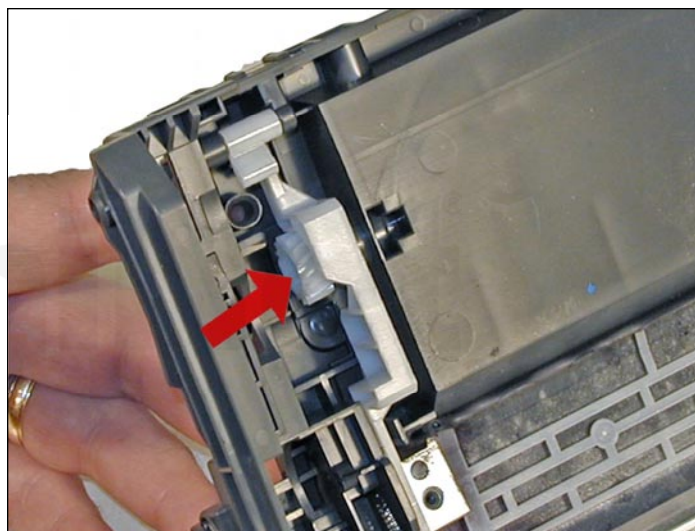
14. Remove the wiper blade.



15. Dump out and vacuum any remaining toner from the hopper. The waste toner must be removed from the wiper blade opening. Try to keep the toner from getting on the gray wiper blade seal. Do not lose the wiper blade shims!

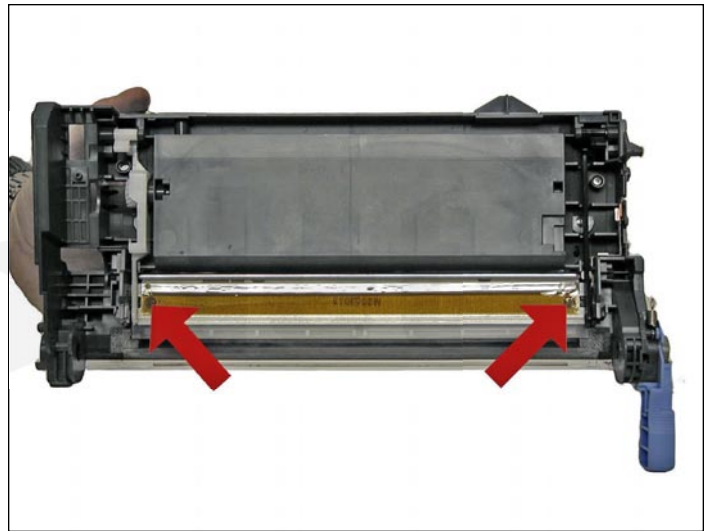


16. These cartridges have a simple auger/plate system that moves the waste toner from behind the wiper blade to the waste chamber. Make sure that the drive gear is driving the plate.





17. Check the gray wiper blade seal, if it is sticky, it can be reused. If it is not, and you cleaned it with alcohol, it must be removed and replaced with a good silicon sealer (see supplies needed at start of article).



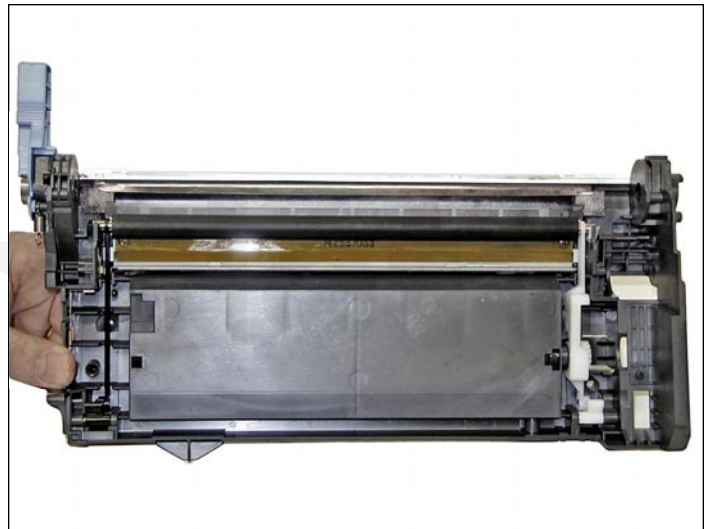
18. Lubricate the new wiper blade with your preferred lubricant. Install the blade and two screws. Make sure the wiper blade seal (whichever type you are using) seals along the back edge of the blade.

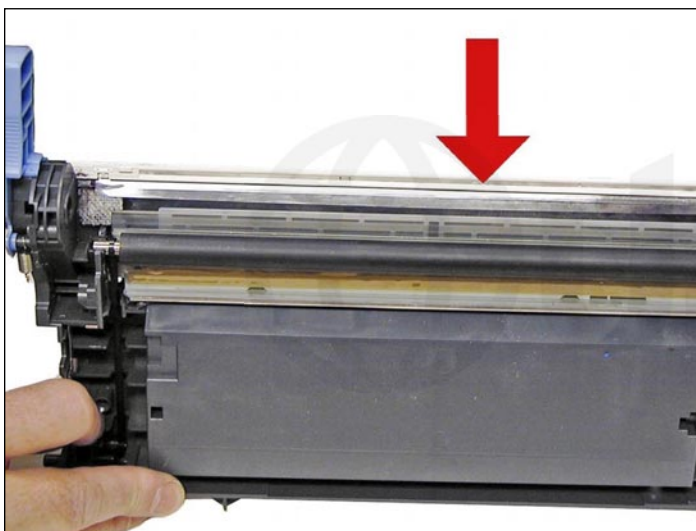


19. Clean off the old conductive grease from the PCR ends, and clean the PCR.

Coat both ends of the PCR with a small amount of new conductive grease.

Place the plastic stabilizers on the shaft, and install the assembly in the cartridge.





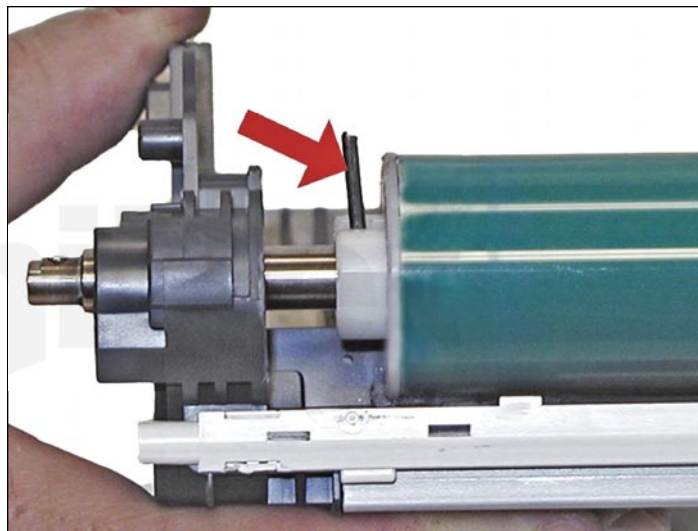
20. Clean the white and clear plastic bar that sits on the edge of the waste chamber. This part is where the pre-exposure light gets to the drum and must be clean.



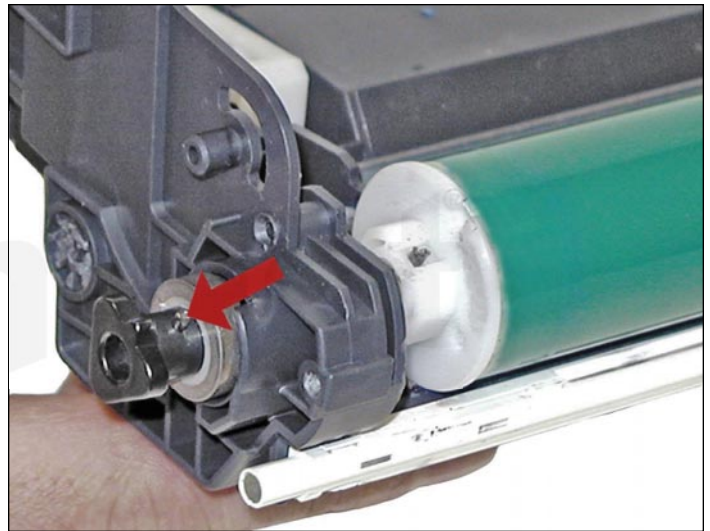
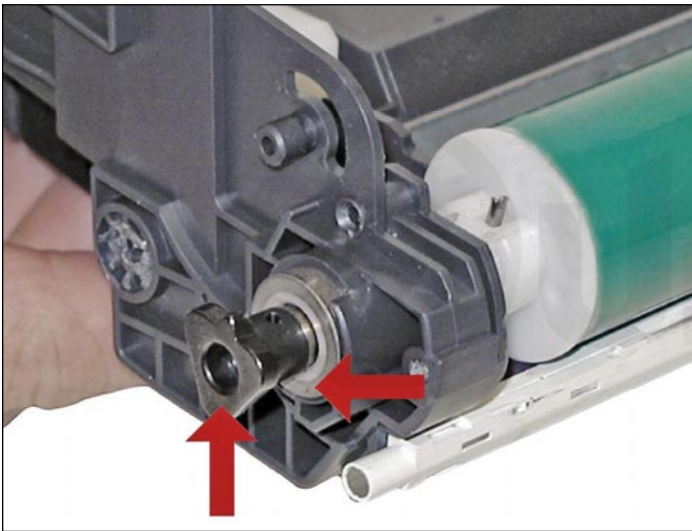
21. Install the drum in the cartridge (large hub side to the non-contact side first).



22. Slide the drum axle in from the contact side. Make sure you do not damage the copper drum contacts. Both tabs must be in contact with the axle.



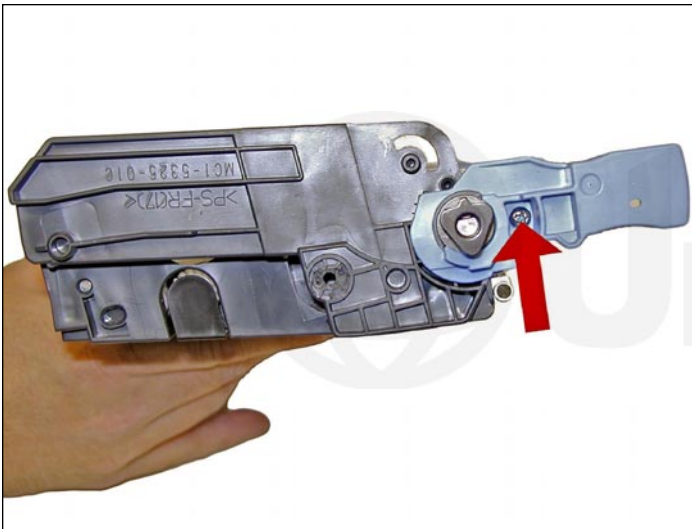
23. Align the drum hub and axle so that the holes line up. Insert the larger of the two metal pins and tap into place with the pin punch. Make sure the pin is centered on the axle.



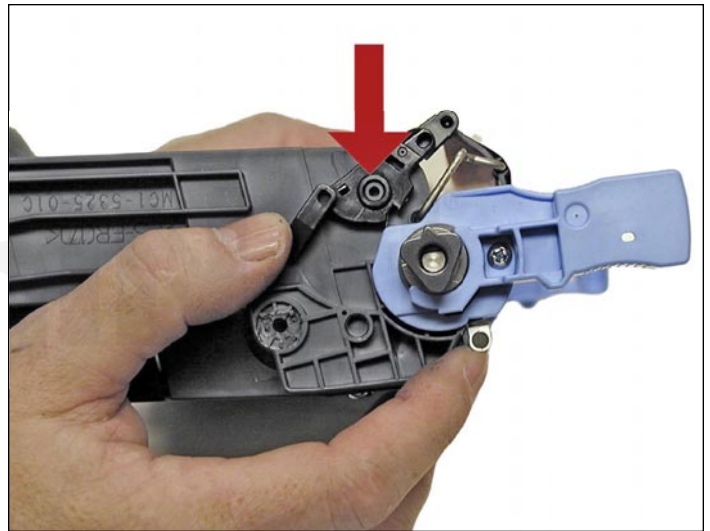
24. Install the metal bearing, drive gear, and pin onto the drum axle.

Tap the pin into place with the pin punch.

Using a small block of wood as a brace under the drive gear will make installing the pin easier.



25. On the non-gear side, install the blue handle and screw.

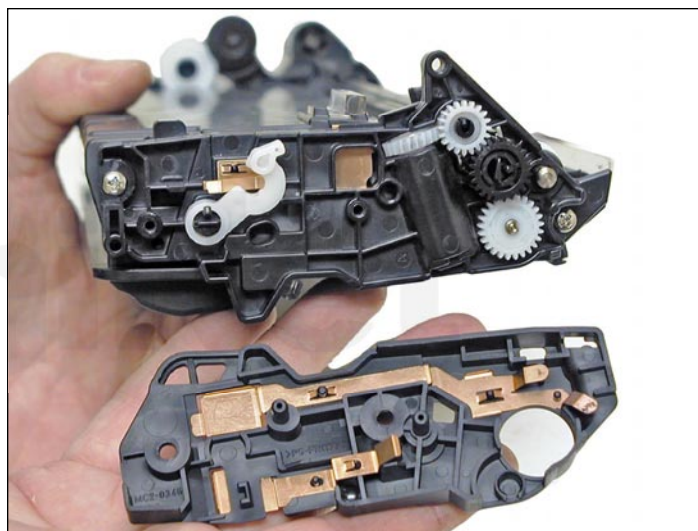
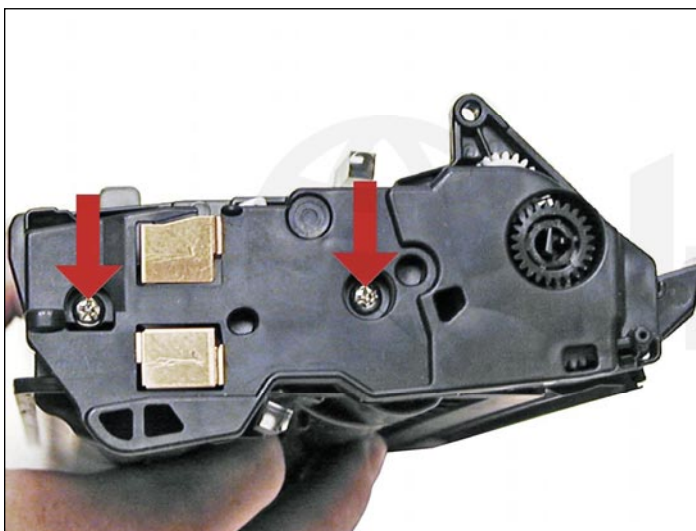


26. Install the drum cover bars, plastic arm, and spring onto the cartridge.

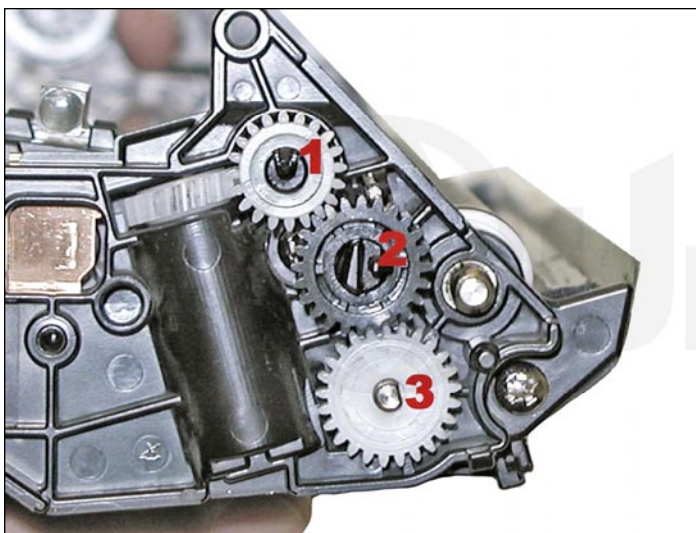
The arm does not have a typical notch to hold the spring when installing.



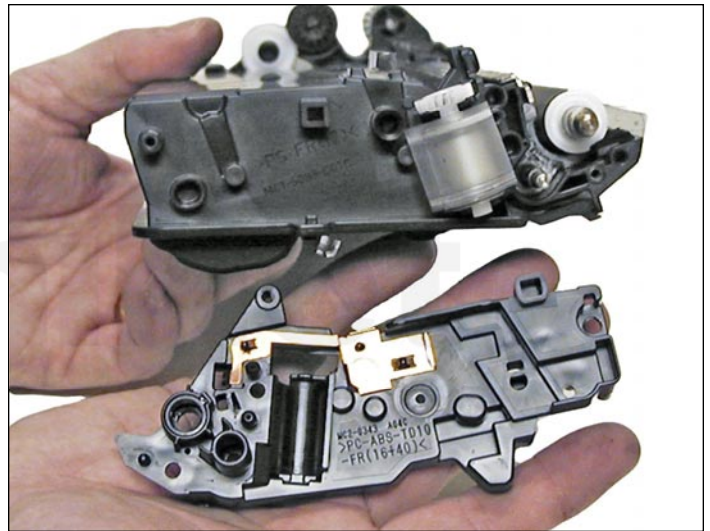
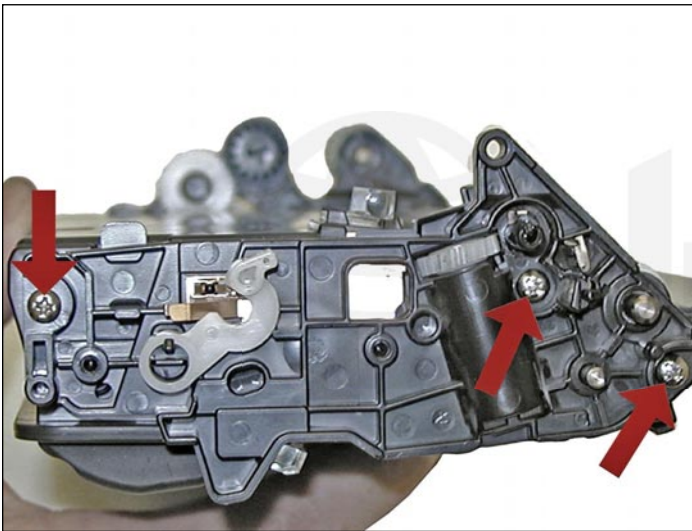
27. The larger tail part of the spring sits against the plastic, just behind the blue handle. Place the waste chamber aside.



28. On the contact side of the toner supply, remove the two screws and end cap.



29. Remove the three gears.



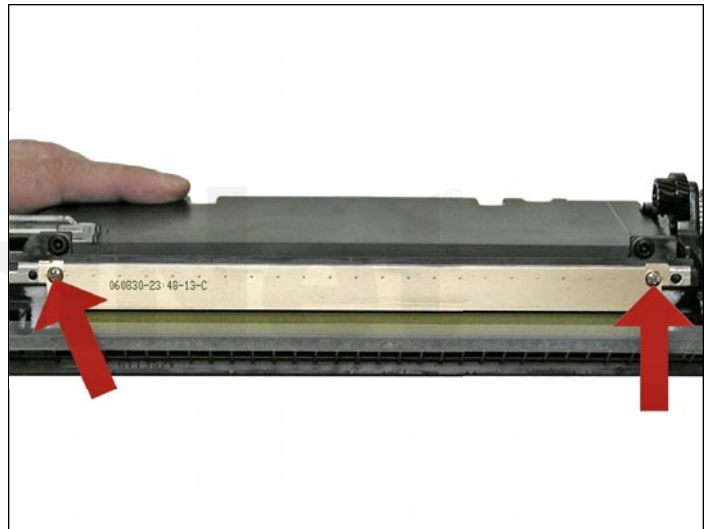
30. Remove the three screws from the inner end cap/bearing plate.

Remove the inner end cap.



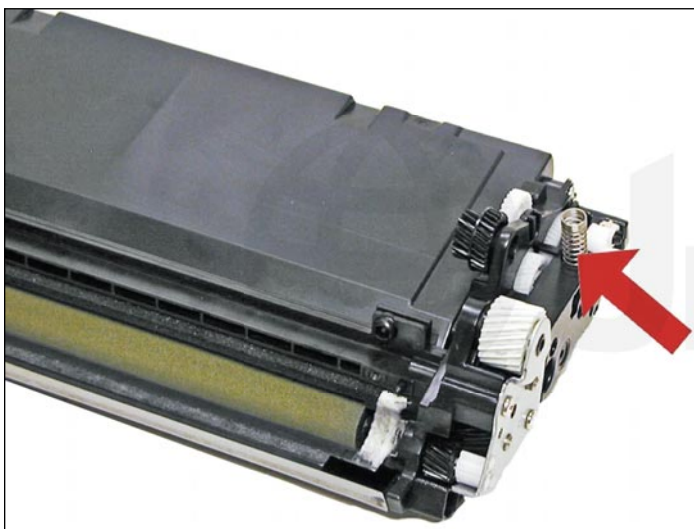
31. Slide the developer roller out from the cartridge.

There is no need to remove the gear side end cap or gears.

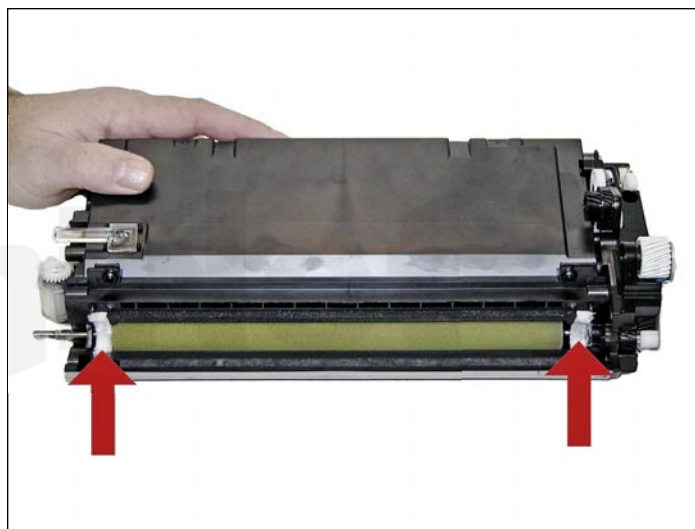


32. Remove the two screws on the doctor blade.

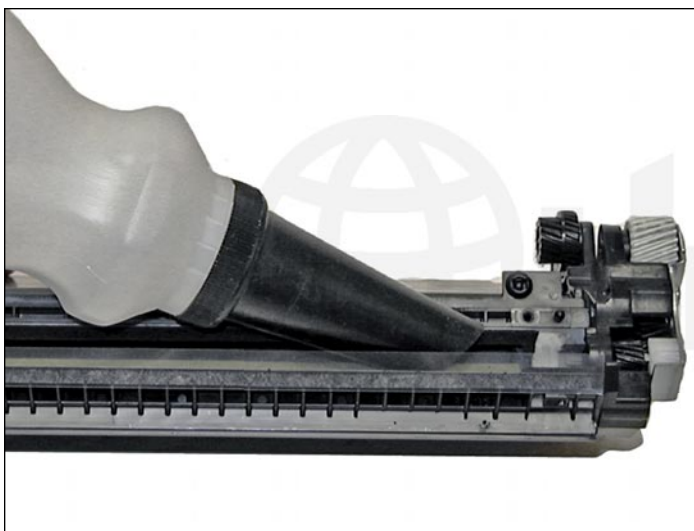
Remove the blade.



33. Vacuum out any remaining toner from the hopper. We don't recommend dumping it out, as the toner will get all over the hopper, and is hard to clean off. Remove the coil spring from the hopper by the gears so it does not get lost.



34. Vacuum the feed roller clean. Until new felt seals are available for the developer roller, we do not recommend that the feed rollers be removed. Re-using old seals that have been removed may cause leaks.



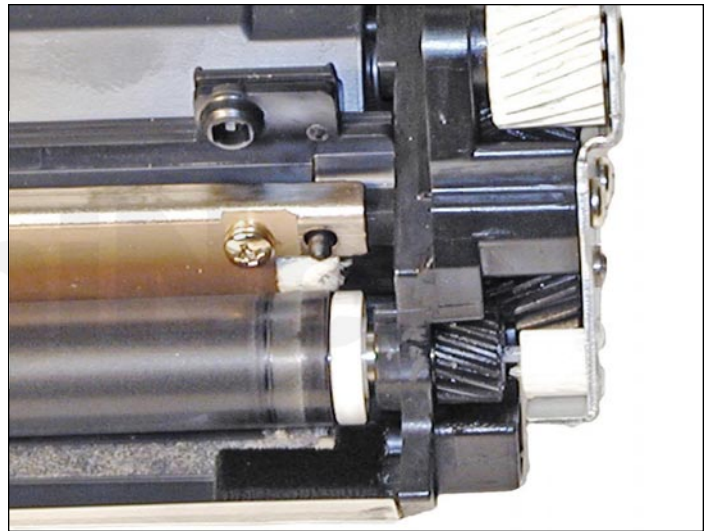
35. These cartridges do not have a fill plug and must be filled through the developer roller opening. Fill the hopper with the correct amount of dedicated toner for HP 4700/4730.



36. Note the seal take up reel. This reel automatically turns and removes the seal from the toner hopper. The old seal would have to be removed, and the new one attached to the reel.



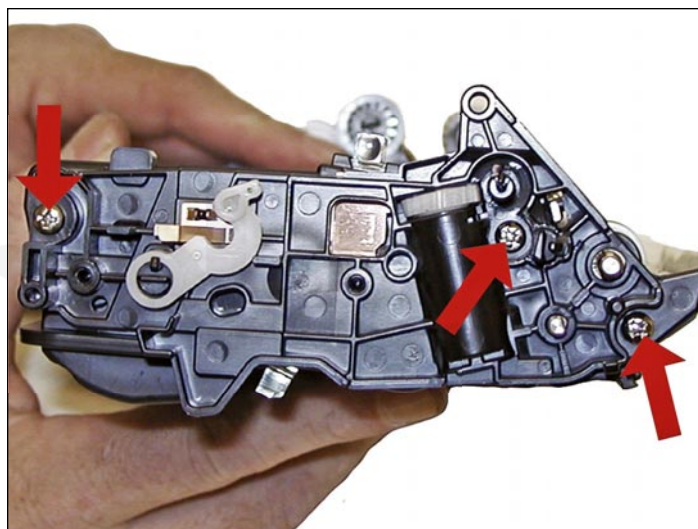
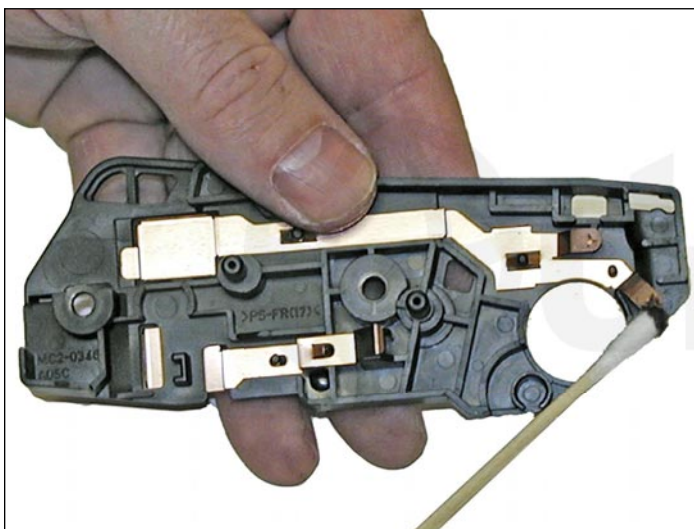
37. Install the doctor blade and two screws.



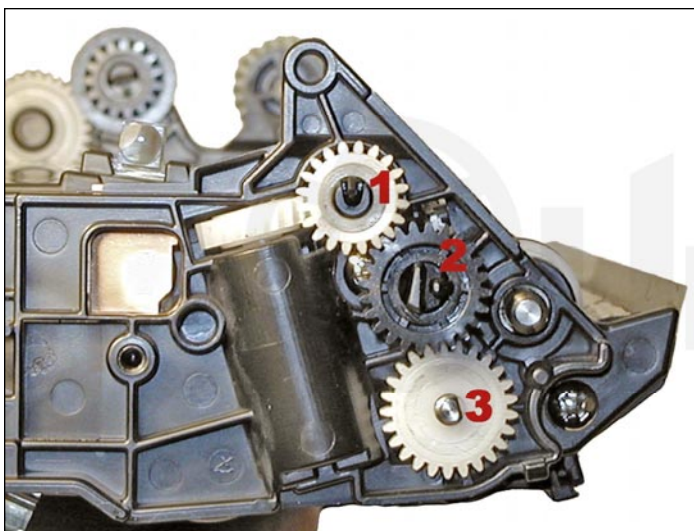
38. Wipe the developer roller down with a clean lint-free cloth. We do not recommend that any chemicals be used at this time.

Install the cleaned developer roller in the hopper (keyed end first).

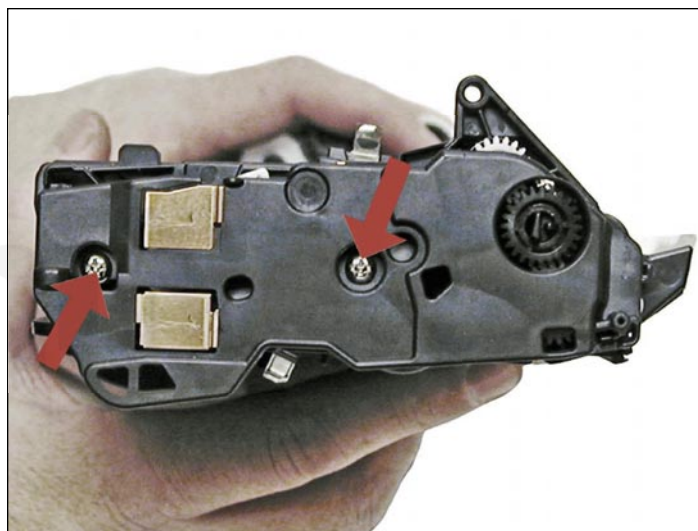
Spin it until it is fully seated in the drive gear.



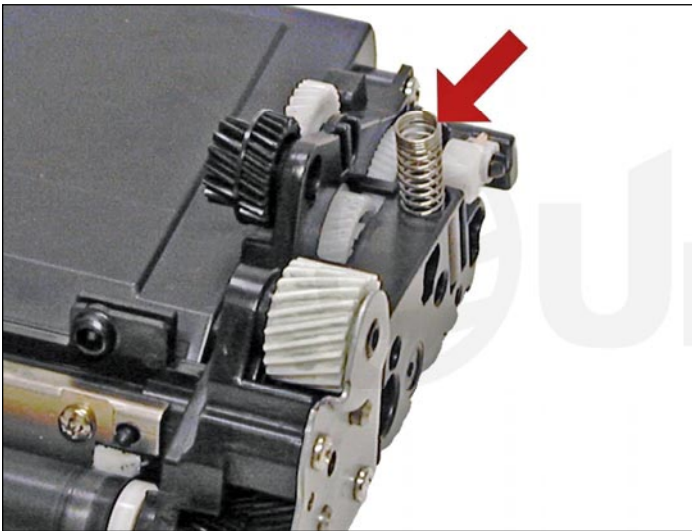
39. Clean the old conductive grease from the contacts on the inner end cap, and replace with new. Use the same amount of grease that you removed. If too much is used, it can attract toner dust and actually insulate the contact instead of enhance it. Install the inner end cap and three screws.



40. Install the three gears as shown. Clean the old conductive grease from the contacts on the outer end cap, and replace with new. The same rules as stated above on this grease apply here.



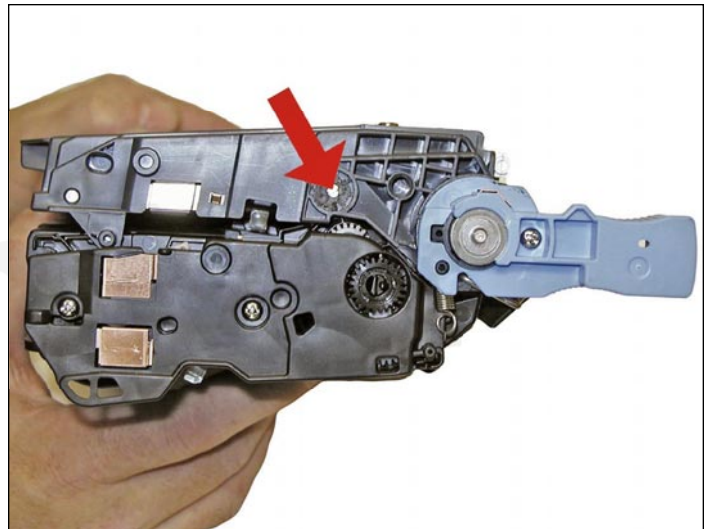
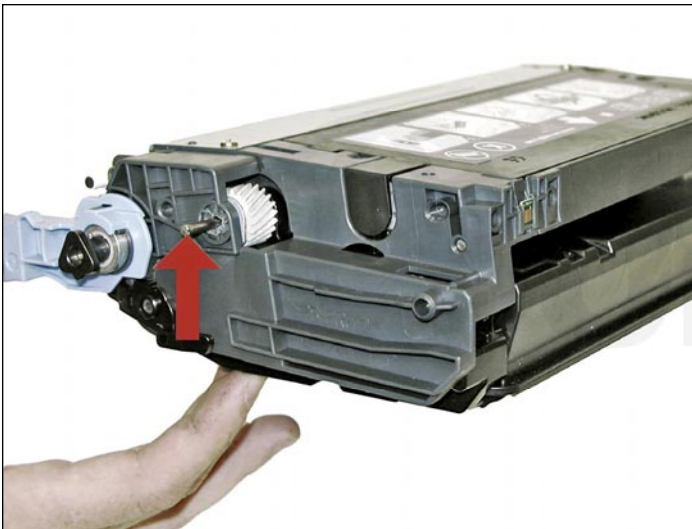
41. Install the outer end cap and two screws.



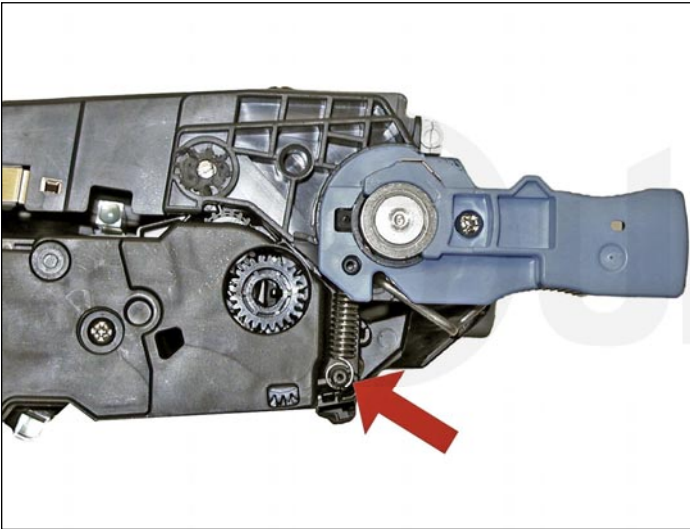
42. Install the coil spring.



43. Place the supply chamber onto the waste chamber.



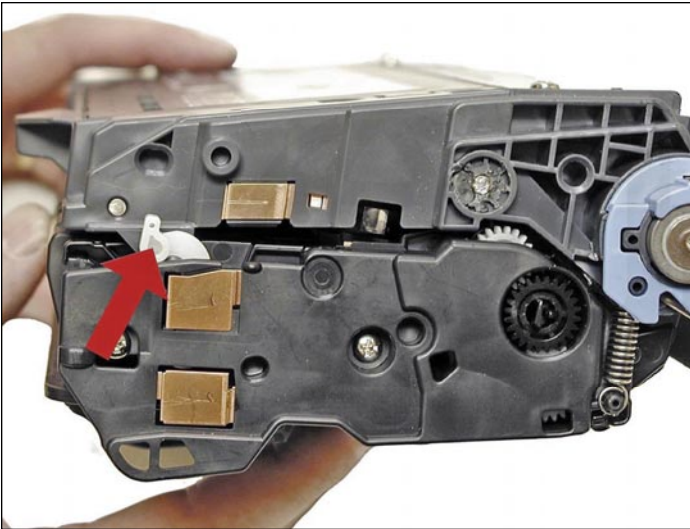
44. Align the two halves and install the hinge pins (short pin to the non-gear side, and then long pin to the gear side).



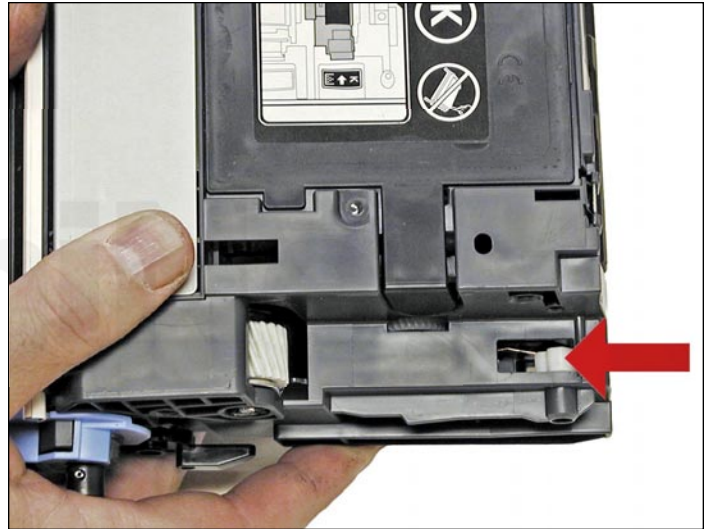
45. Install the spring from under the blue handle on the contact side of the cartridge.

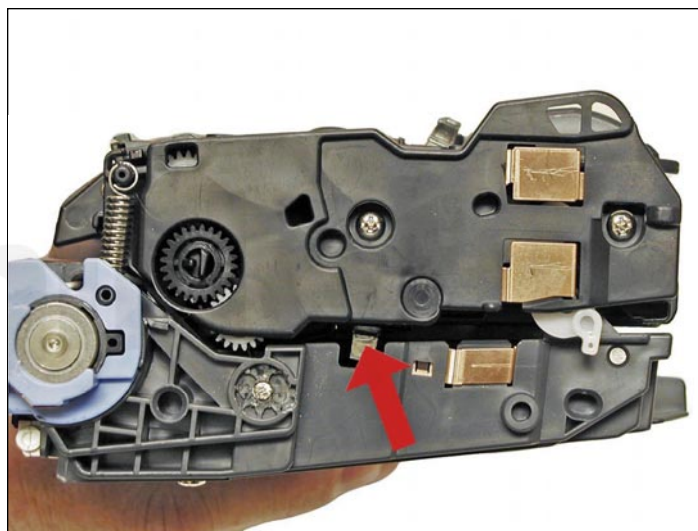
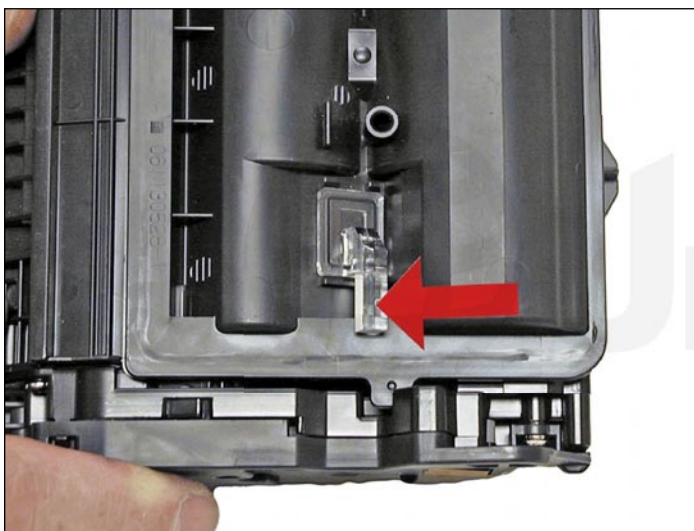


46. Check to make sure the drum cover closes properly.

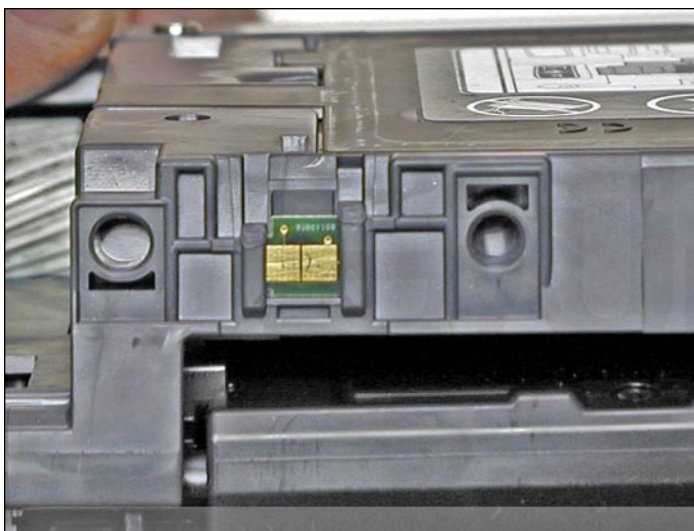


47. Set the two shipping locks on each side of the cartridge. The shipping locks are built in on these cartridges. When the cartridge is installed, the locks will open. Make sure you reset them after the cartridge has been tested. The shipping locks help keep the developer roller from getting a flat spot, which will cause horizontal voids in the print.



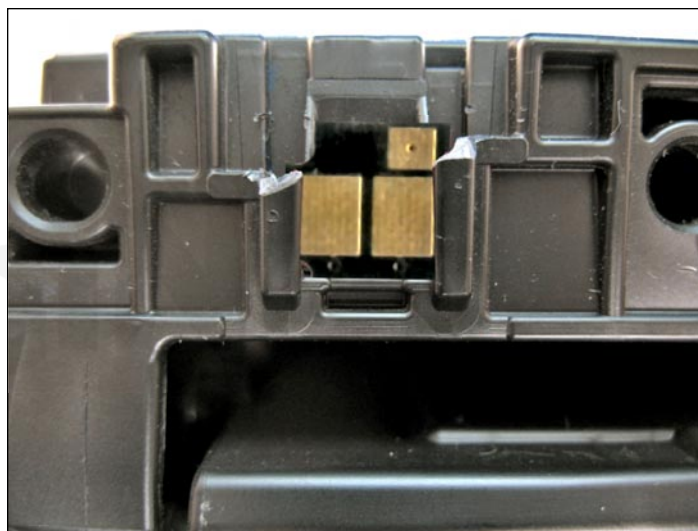


48. Clean the two clear plastic “toner low” lenses on the supply chamber.



REPLACING THE CHIP

49. Locate the OEM chip at the rear of the hopper. Using an X-Acto knife, carefully cut away the melted tabs shown that anchor the chip into place. Remove the chip.



50. Install the chip into its slot as shown. If the chip is loose in the slot, or if you would like to make sure it cannot come out, take a hot glue gun and place a small dab of glue on the top of each corner in the same place where you cut the melted plastic off.

By using hot glue, you can easily replace the chip on the next cycle by using a small screwdriver to pop the old glue off. It comes off easily and does not leave any residue.

TAKING TEST PRINTS**Configuration Page:**

1. Press the MENU button.
2. Press the down arrow until "INFORMATION" appears on the display.
3. Press SELECT.
4. Press the "down" arrow until "CONFIGURATION" appears on the display.
5. Press SELECT.

Supplies Status Page:

1. Press the MENU button.
2. Press the down arrow until "INFORMATION" appears on the display.
3. Press SELECT.
4. Press the down arrow until "SUPPLIES STATUS" appears on the display.
5. Press SELECT.

REPETITIVE DEFECT CHART

Face down delivery roller:	25.0 mm	back of page
Black developer roller:	34.3 mm	front of page
Fuser delivery roller:	37.0 mm	back of page
Primary charge roller:	37.7 mm	front of page
ETB transfer rollers:	37.7 mm	front of page

***If the defect is one color only, check the PCR. If it is in all colors, check the ETB rollers.**

Color developer roller:	38.5 mm	front of page
Toner feed rollers:	42.7 mm	front of page
Registration sub roller:	47.0 mm	back of page
Registration roller:	55.0 mm	back of page
Media attaching roller:	75.0 mm	front of page
Fuser sleeve:	76.0 mm	front of page
Paper tray feed roller:	77.0 mm	back of page
Paper tray separation roller:	77.0 mm	back of page
Paper tray pickup roller:	77.0 mm	front of page
Fuser pressure roller:	81.0 mm	front of page
OPC drum:	94.2 mm	front of page

MOST COMMON PRINTER ERROR MESSAGES

10.000x: Supply Error. Chip cannot be read or cartridge is not properly installed.

10.00.00: Black cartridge

10.00.01: Cyan cartridge

10.00.02: Magenta cartridge

10.00.03: Yellow cartridge

10.XX.YY: Cartridges NOT engaged

10.92.00: Black cartridge

10.92.01: Cyan cartridge

10.92.02: Magenta cartridge

10.92.03: Yellow cartridge

50.X: Fuser Error

50.1 Low Fuser Temp.

50.2 Slow Fuser

50.3 High Fuser Temp.

50.6 Open Fuser

50.7 Fuser pressure Release Failure

50.8 Low Fuser sub-thermistor temperature

50.9 High Fuser sub-thermistor temperature

51.2X: Printer Error

51.0 Black Scanner error

51.1 Cyan Scanner error

51.2 Magenta Scanner error

51.3 Yellow Scanner error

CALIBRATE NOW

If you are experiencing problems with color in the printouts, the “Calibrate Now” feature can be run. This “quick” calibration takes about 1 minute. This procedure does not always fix the issue, but it can. There is also a full calibration, but that should only be run when major parts have been replaced, such as the ETB or scanner.

1. Press the MENU button.
2. Press the down arrow until “CONFIGURE DEVICE” appears on the display.
3. Press SELECT.
4. Press the down arrow until “PRINT QUALITY” appears on the display.
5. Press SELECT.
6. Press the down arrow until “QUICK CALIBRATE NOW” appears on the display.
7. Press the “SELECT” to start the calibration.