

# BROTHER® HL-3040 • TN210

## TONER CARTRIDGE REMANUFACTURING INSTRUCTIONS



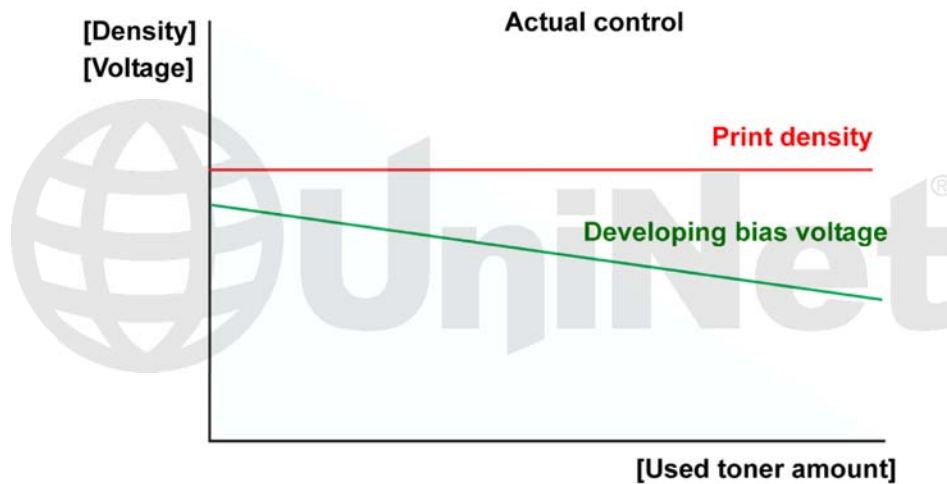
BROTHER TN210 TONER CARTRIDGE

# REMANUFACTURING THE BROTHER HL-3040 SERIES/TN210 COLOR TONER CARTRIDGES

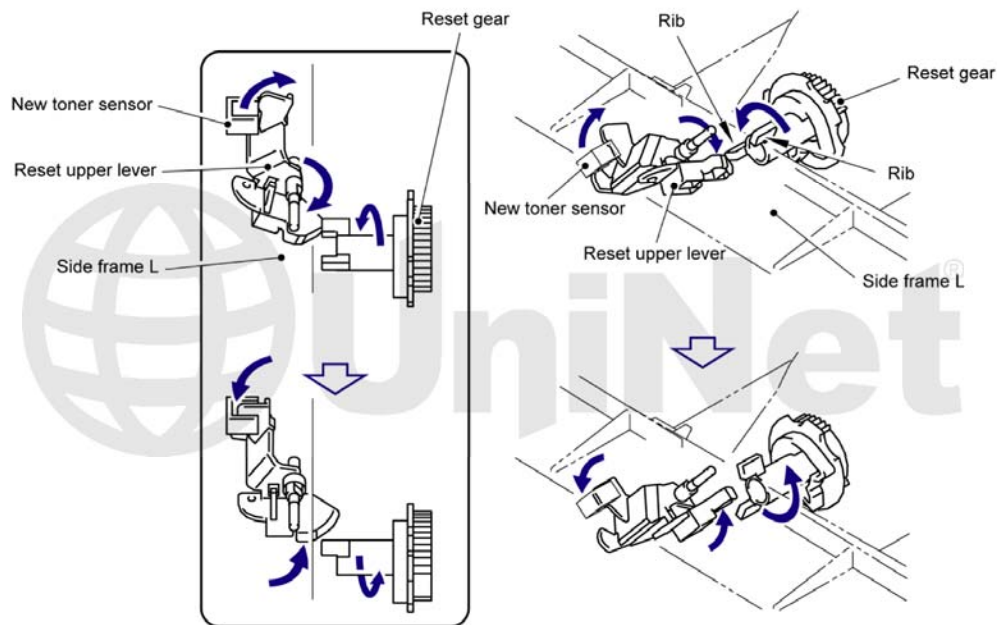
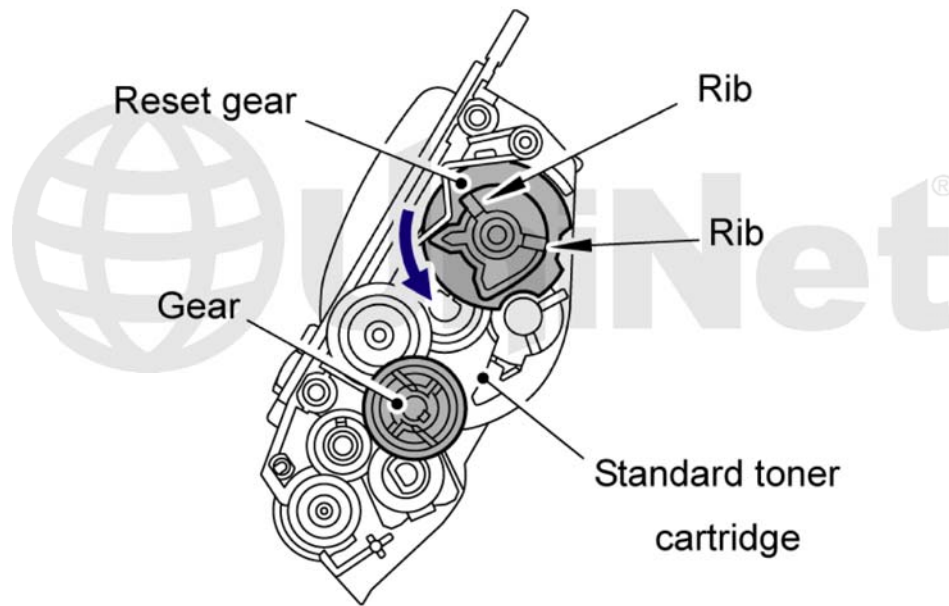
By Mike Josiah and the Technical Staff at UniNet

The Brother HL-3040 printer engine is based on a new 17ppm black and color, 2400 x 600 DPI color LED engine. The machines come standard with 32MB (expandable to 512MB) of memory. All run off a 300 MHz processor. With print speeds of 17ppm and a list price starting at \$299.00, these machines are becoming very popular. LED printers use an LED Array instead of a laser/scanner unit to print. This will be explained in the theory section below.

The toner cartridges do not have a reset chip on them, but do have a reset gear that must be positioned properly for the machine to accept it as a new cartridge. The starter cartridges that initially came with new printers do not come with a rest gear. A new gear can be added and the starter cartridge made into a full TN210 cartridge. The proper reset positions of the gear will be covered later in this instruction.



This section covers the new toner detection system and developer bias voltages when a new cartridge is installed. When the printer senses a new toner cartridge, the bias voltage is set to a high voltage. As the cartridge is used, the bias voltage is reduced gradually down to a lower voltage. This process is necessary because according to Brother, a new toner cartridge has a tendency to print light. As the cartridge is used, the density increases (lower voltage = higher density). To keep the density level even throughout its life, the density bias voltage is reduced accordingly.



Each time a new cartridge is installed, the reset gear engages the gear train. The rib on the reset gear pushes down on the new toner sensor. The bias voltage is then reset, and the cartridge page count is reset to zero. While the cartridge yield is stated in pages printed, it actually is based on the revolutions of the developer roller. The larger the run: the better the yield. There are roller cycles for every print job. There is the warm up cycle, color registration cycle, developer bias cycle, etc. As these cycles are only run once per job, the bigger the print job: the better the yield.

When the printer is in a monochrome print mode (versus a color print mode) the cyan, magenta and yellow cartridge developer rollers are disengaged so that only the black developer roller has any revolutions.

**CURRENT MACHINES RELEASED SO FAR:**

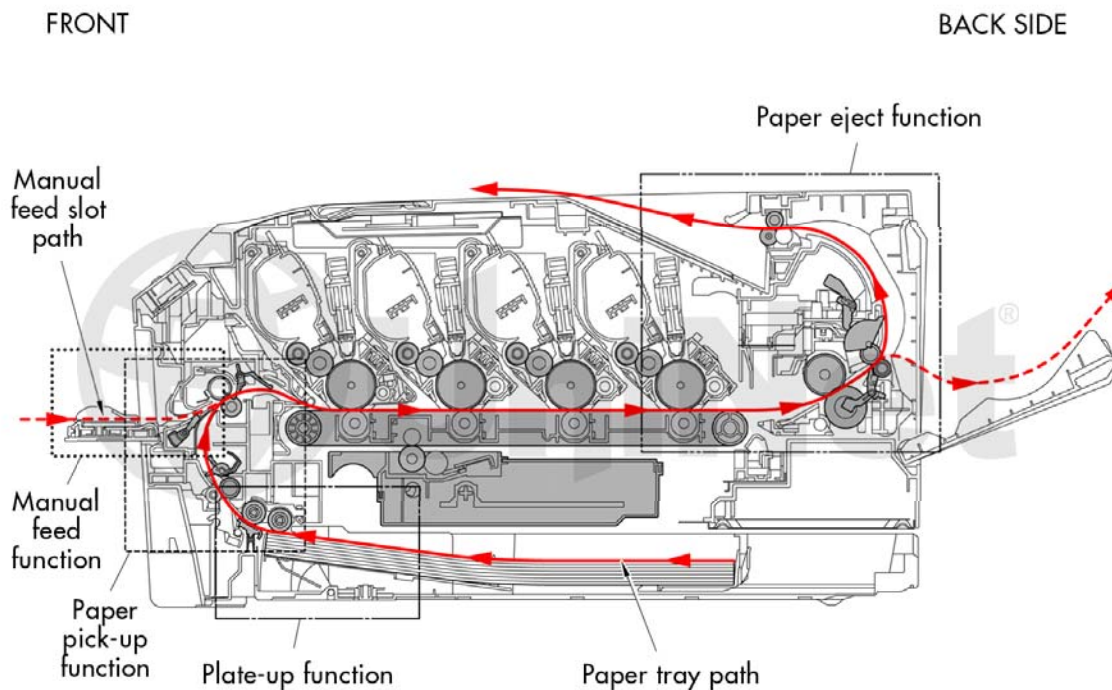
- HL-3040CN**
- HL-3050CN**
- HL-3070CW**

**TONER CARTRIDGES:**

- TN210BK**            **2,200 pages**
- TN210C**            **1,400 pages**
- TN210M**            **1,400 pages**
- TN210Y**            **1,400 pages**

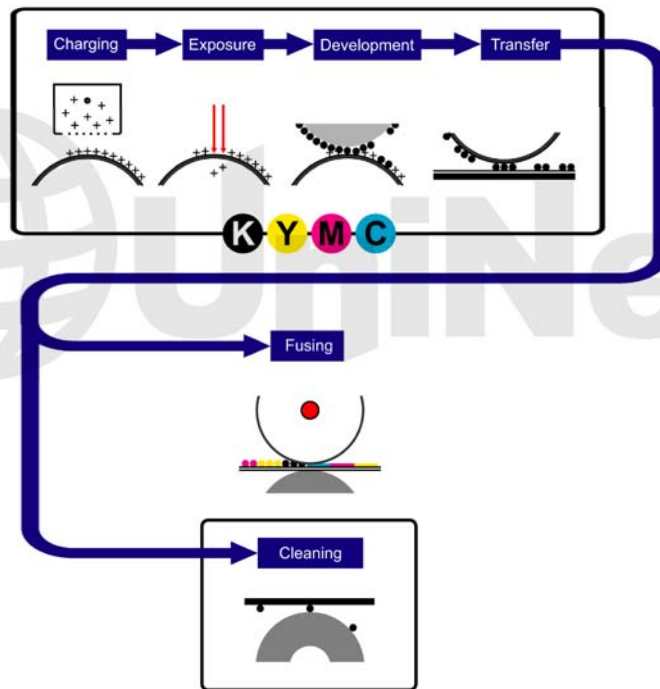
The **drum unit** (part # DR-210CL) is new as well and rated for 15,000 pages. It has four separate drums laid out in line, which will be covered in a future article.

If you are familiar with Brother-type cartridges you know they do not work like other manufacturers cartridges. This series of printers is no exception. Because of that, we will cover the printing theory here:

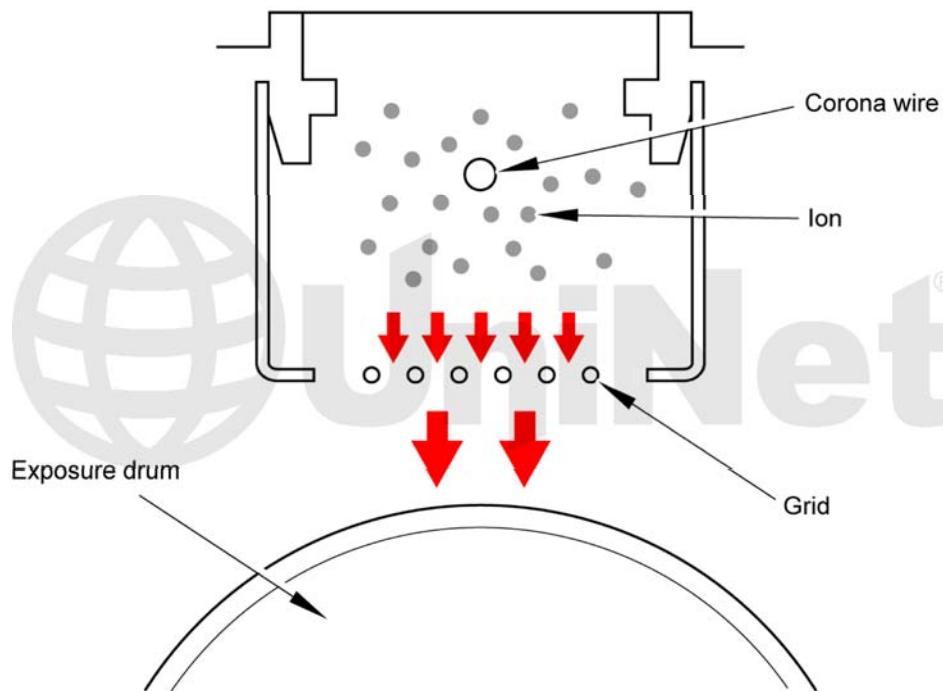


Shown is a broad overview of the printing process with component locations.

As you can see these machines use a single pass type system.

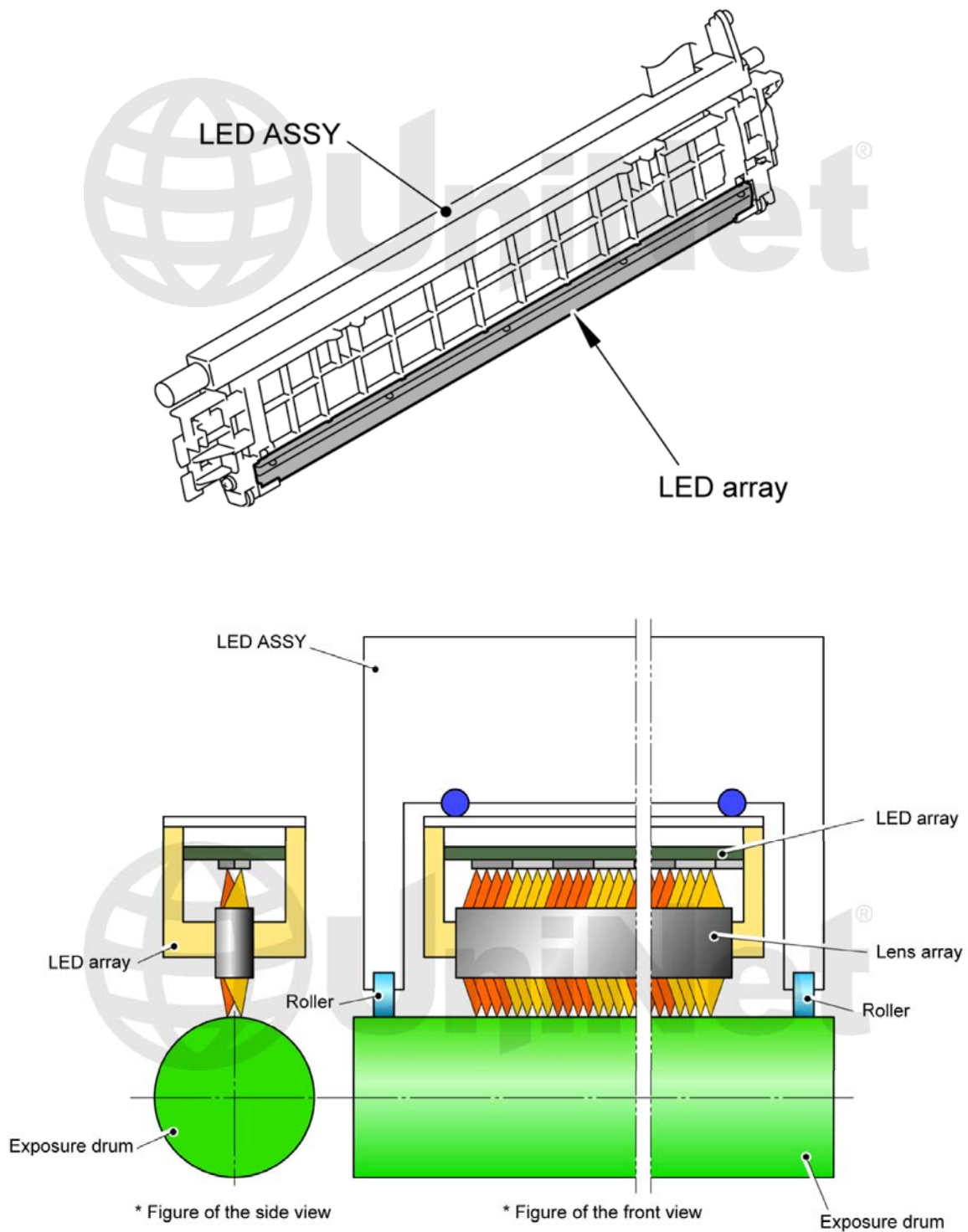


This simple diagram shows the **six** basic steps of the printing process.



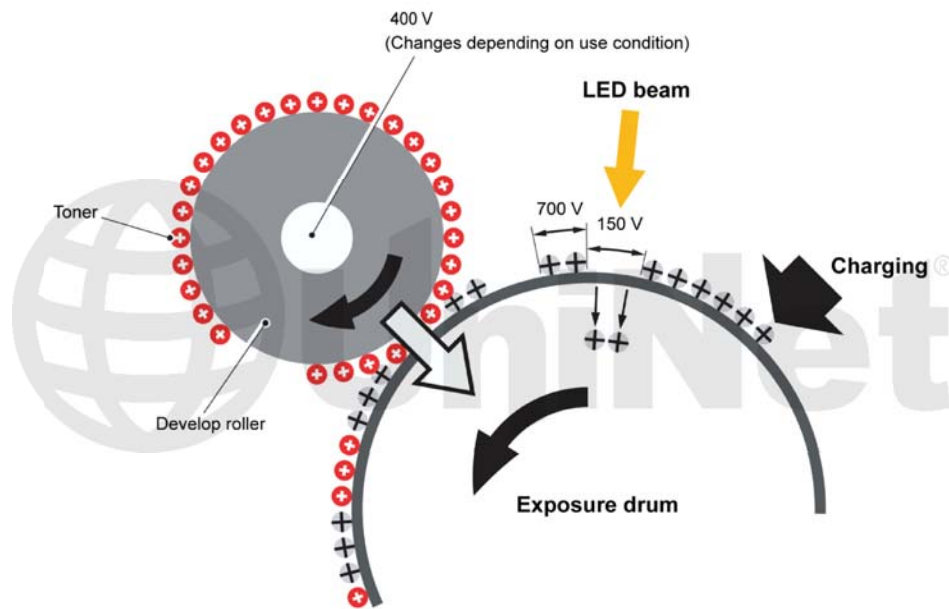
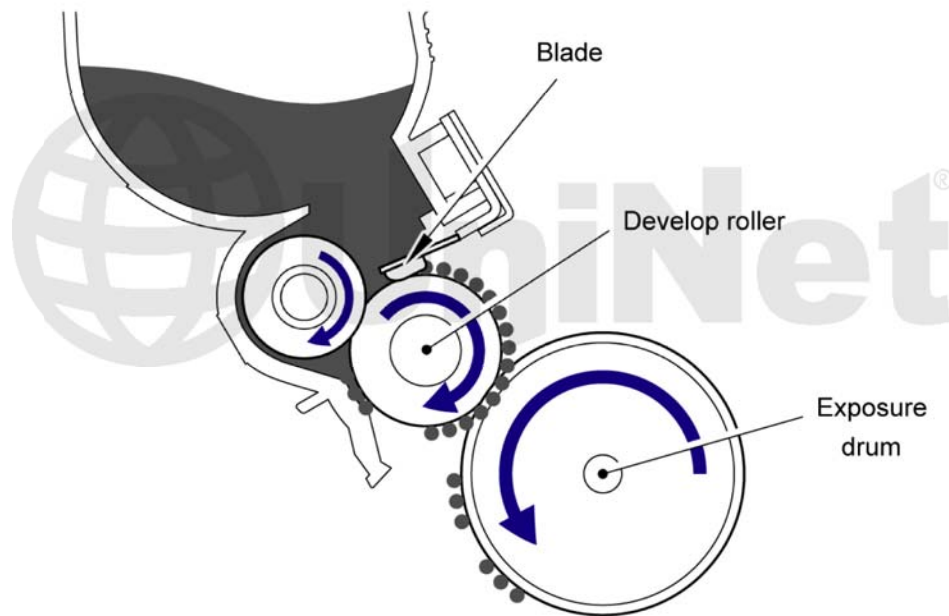
In the **first** stage, the primary corona wire places a uniform negative 700V DC voltage on the corona wire grid which then charges the OPC drum surface. The amount of the negative DC voltage placed on the drum is controlled by the printer's intensity setting.

While most manufactures have switched over their production to primary charge rollers (PCR's) to eliminate ozone health issues, Brother states that the amount of ozone expelled from the printer is less than 3.0 mg/h, therefore not harmful to the human body, and that applicable safety standards have been complied with.



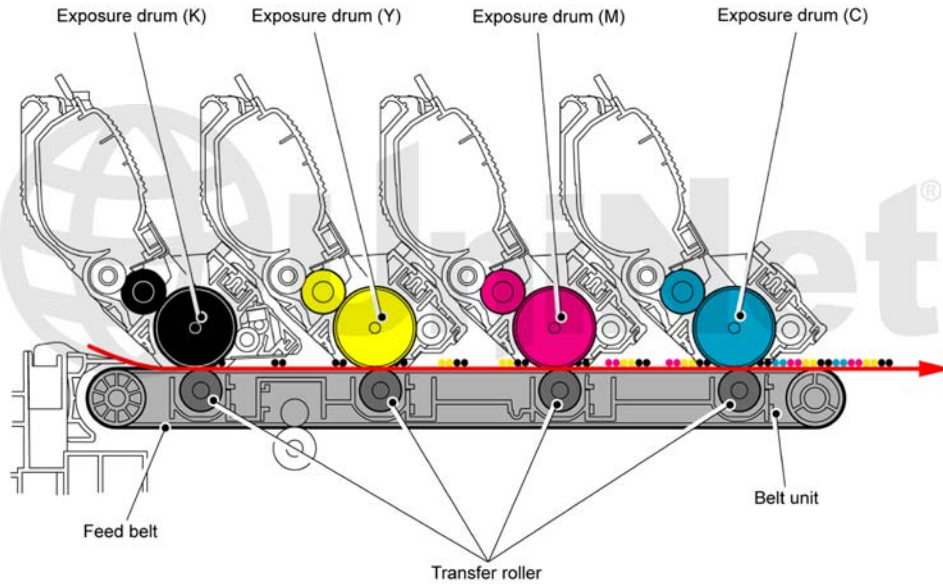
In the **second** stage, each of the four color LED arrays (4992 LED's) fire into a focusing lens (called the lens array). The beam then strikes the drums surface, reducing the negative charge and leaving a latent electrostatic image on the drum. The areas where the LED light did not strike the drum will retain the higher negative charge. Shown here is an LED assembly and how LED's work.



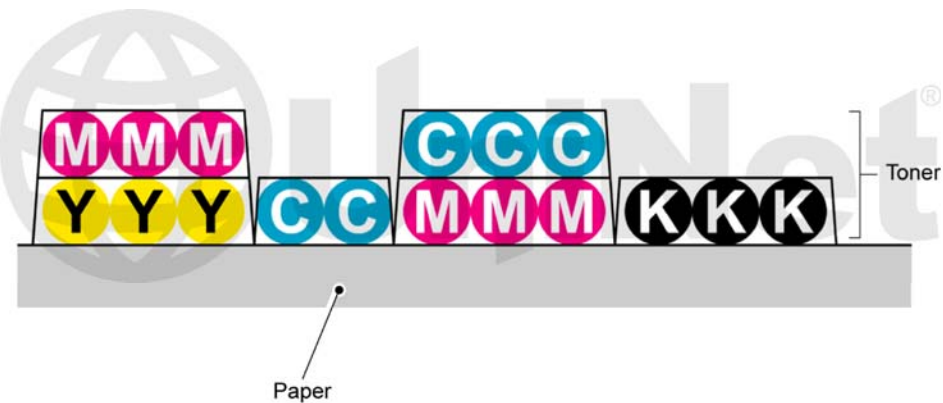


The **third** or developing stage is where the toner is developed on the drum by the developing section (or supply chamber), which contains the toner particles. The development stage is actually made up of two steps: toner charging, and the actual development. In the toner charging stage, the foam feed roller brings the toner to the developer roller. The developer roller has a charge placed on it based on the density setting and the amount of pages printed as set by the reset gear. The doctor blade controls the amount of toner on the roller.

As the LED light 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.



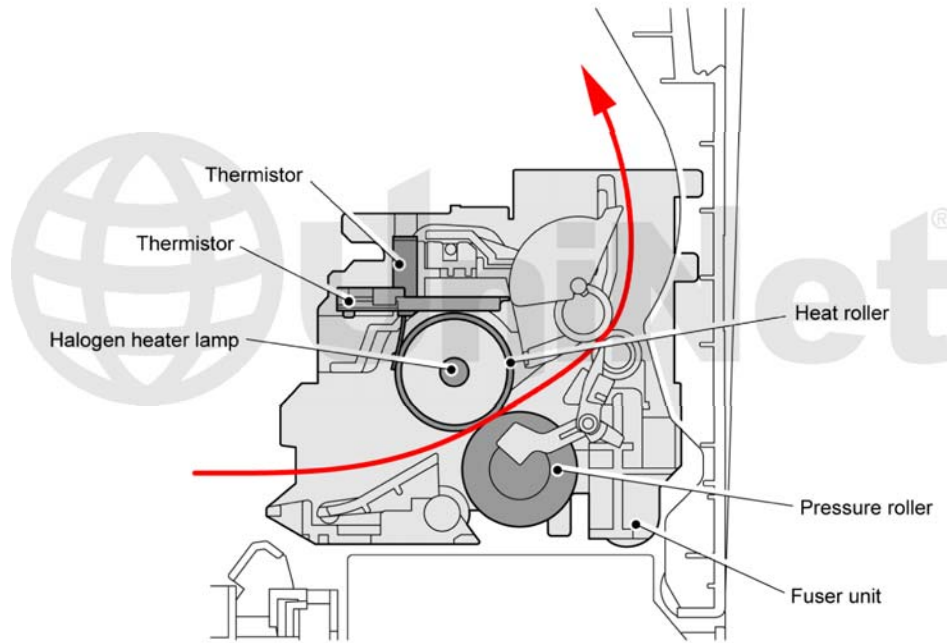
The **fourth** stage is the transfer stage. In the transfer stage the transfer roller, which is located directly opposite each OPC drum, places a positive DC bias charge on the back of the image transfer belt. Each toner cartridge has a separate transfer charge roller. The image is transferred from the drum directly to the paper. This process is repeated for each color cartridge in the following order: black, yellow, magenta, and cyan.



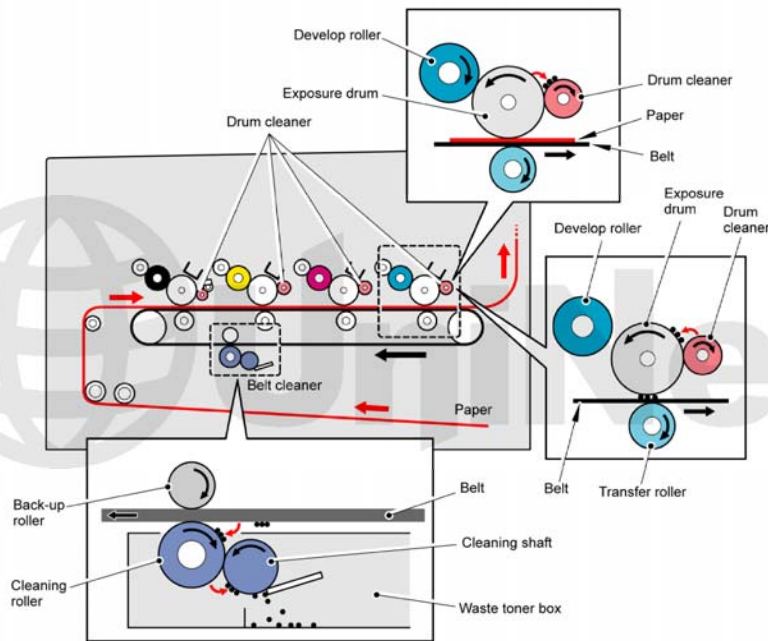
This is how the different basic colors are stacked to get different colors.

After the transfer takes place, the printer turns on a set of LED lamps that irradiate the drums surface to keep the surface potential constant. This step helps eliminate ghost images.





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 roller and lower pressure roller. The lower pressure roller presses the page up into the upper heating roller which then melts the toner into the paper. This heating assembly consists of a hard metal coated roller with a halogen lamp inside.



The **sixth** stage is where the drum is cleaned. The drum is cleaned after the image is transferred to the paper by a cleaning roller. This roller uses a DC voltage to attract the residual toner off the drum. After the cleaning roller has cleaned the drum, the DC potential is raised and the toner is then transferred back to the drum, where it is then transferred to the image transfer belt. The waste toner is then cleaned off the belt by the belt cleaning roller, and stored in the belt waste chamber.

While this is taking place, the developer roller is moved away from the drum so that it is not contaminated by the waste toner. This cleaning system, while somewhat similar to other Brother systems, is different in that none of the waste toner is recycled back into the new toner supply.

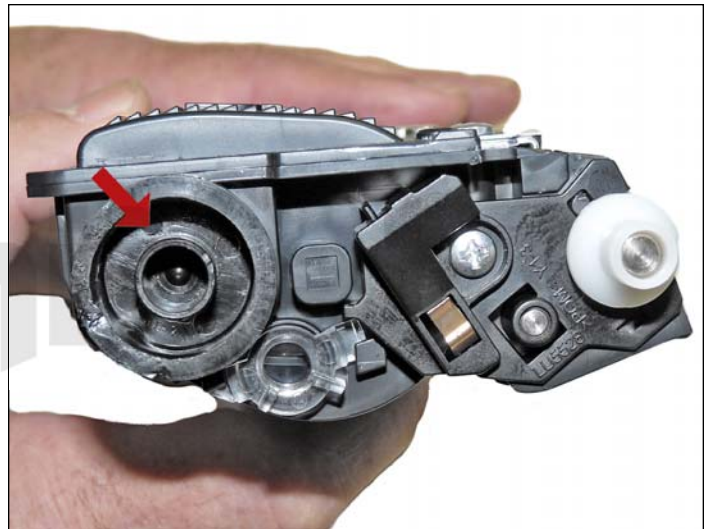
How to run test pages, printer troubleshooting, as well as common cartridge problems will be covered at the end of this article.

#### REQUIRED TOOLS:

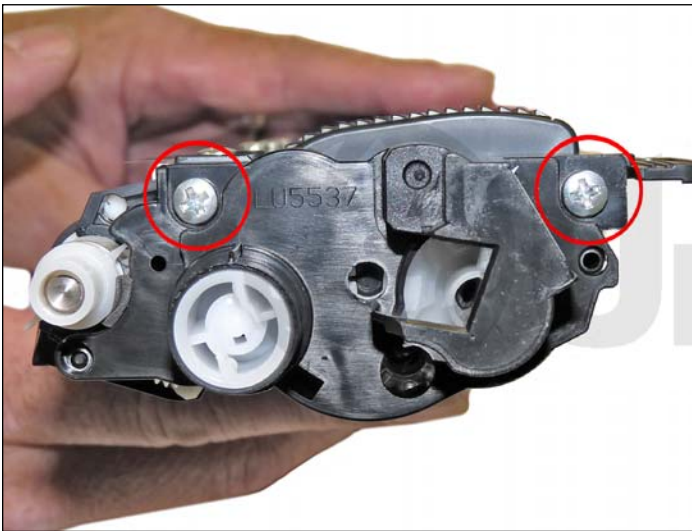
1. Toner approved vacuum
2. Phillips head screwdriver
3. Small common screwdriver
4. Needle nose pliers

#### REQUIRED SUPPLIES:

1. Toner for use in Brother HL-3040/TN210 (choose the correct color and gram weight for your cartridge)
2. Reset gear for the starter cartridge (see text)
3. UniNet dedicated developer roller cleaner Part # 11879
4. Lint free cotton cloths
5. Toner magnet cloths



1. Vacuum the exterior of the cartridge. Be careful not to damage the developer roller as it is exposed. Remove the fill plug from the toner cartridge. Dump the remaining toner and vacuum/blow out the cartridge. There will probably be a label over the fill plug. It comes off with a little alcohol and a lint free cloth or cotton swab.

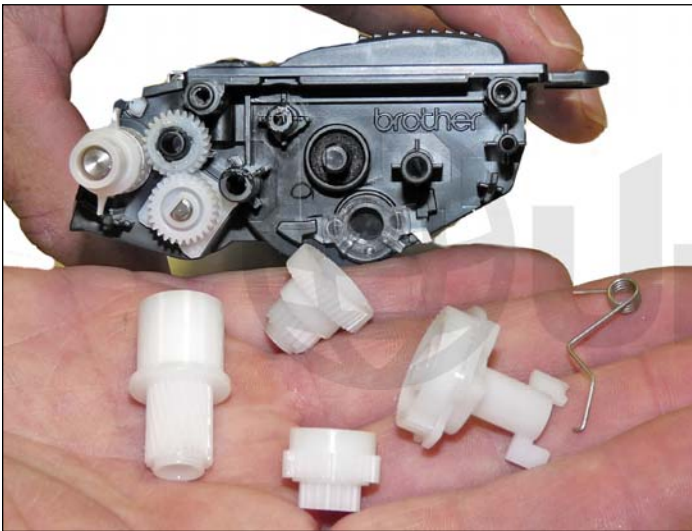


2. With the handle facing you, remove the two screws on the left end cap.

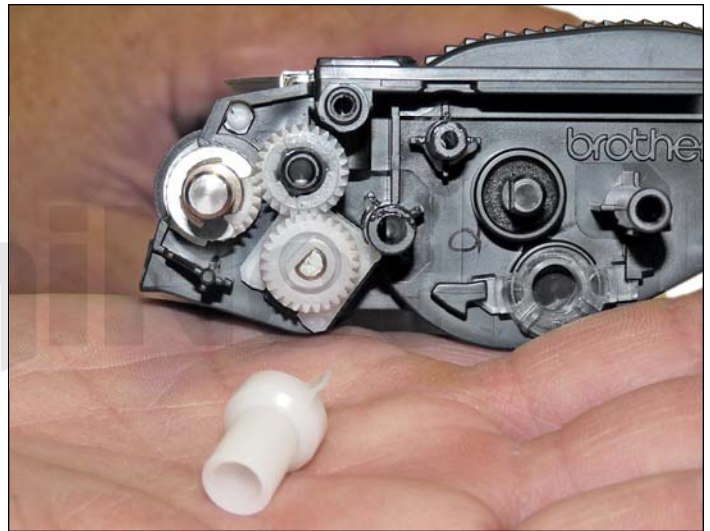


3. Press in on the tab shown and carefully pry up and remove the end cap.





4. Remove the four gears and the reset spring shown.



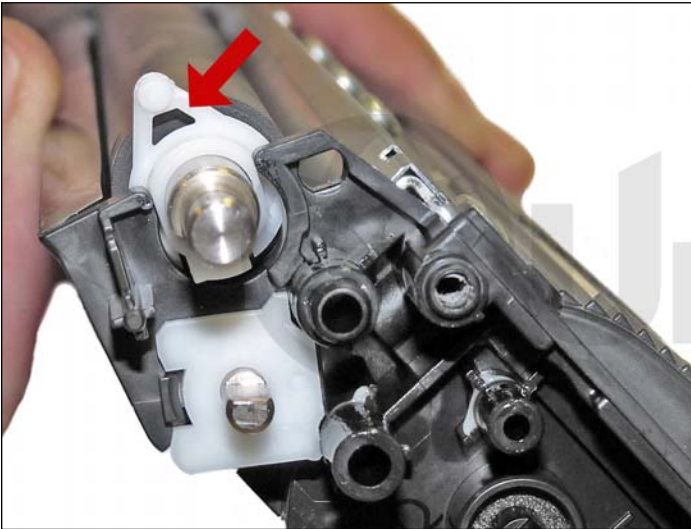
5. Pry off the developer roller bushing.



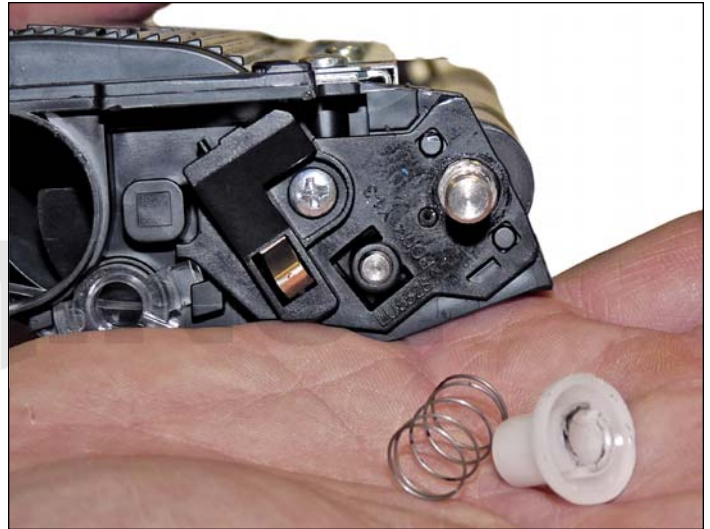
6. Remove the E-ring and developer roller gear.



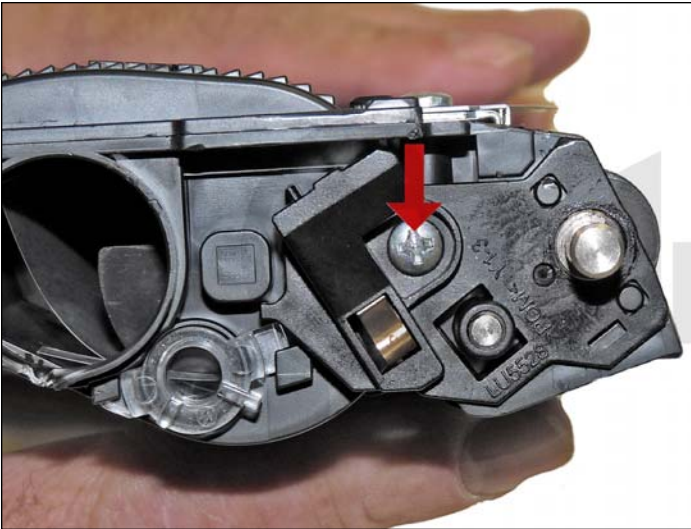
7. Remove the two remaining small white gears.



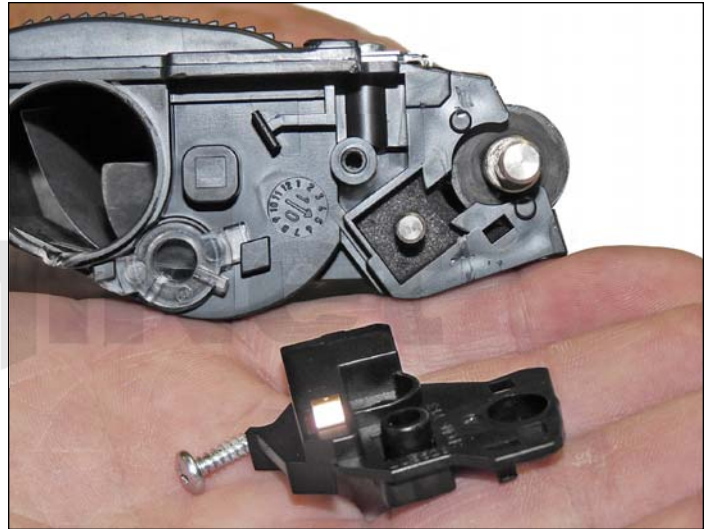
8. Move the white plastic locking tab on the right side of the developer roller to the up position.



9. Gently pry off the white bushing on the opposite side of the developer roller. Be careful not to lose the spring!



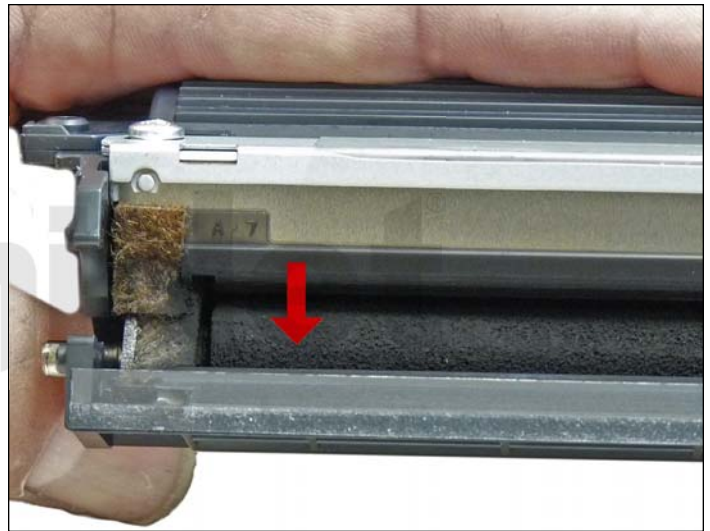
10. Remove the screw and end cap for the developer roller.



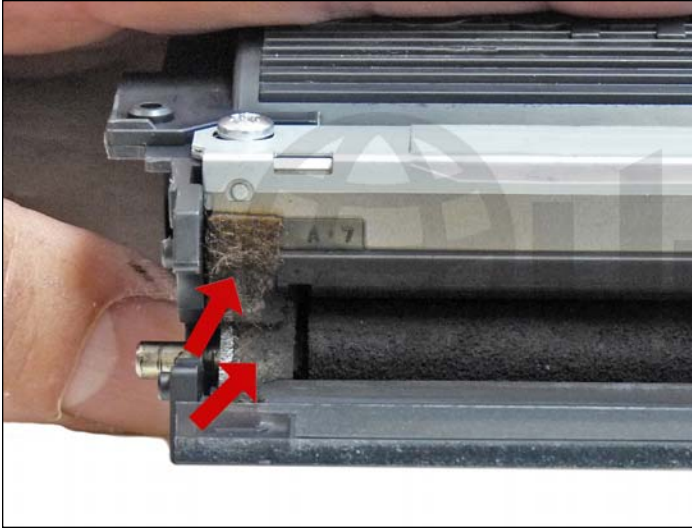




11. Remove the developer roller.



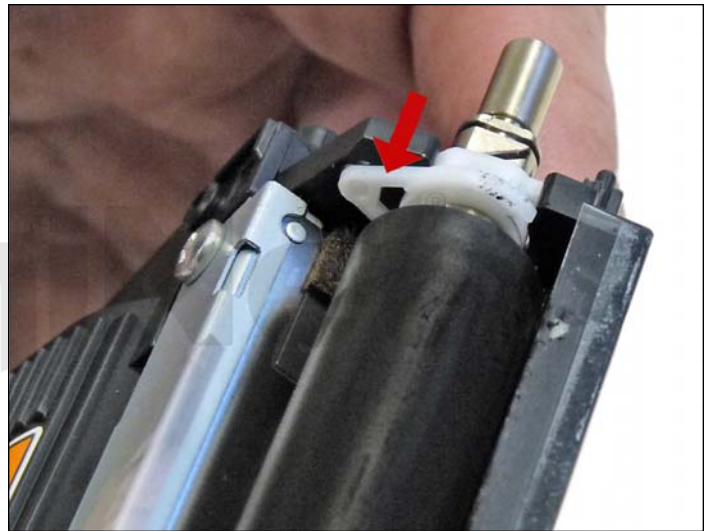
12. Carefully vacuum/blow the cartridge clean. Use only low pressure air! High pressure air can cause leaks in the seals. Be sure to rotate the foam feed roller so it is fully cleaned. Vacuum/blow the doctor blade. We do not recommend that the doctor blade be removed as the developer roller felt seals will be disturbed. Once a new blade is available, great care will have to be taken not to tear the seals causing a leak. The doctor blade can be easily cleaned by blowing the excess toner off, and wiping down with a lint free cloth. Be very careful not to leave any lint behind and do not use any chemicals to clean it!



13. Inspect the magnetic roller felts. If they are compressed (shiny), gently roughen them up with a small screwdriver. Clean the developer roller with UniNet dedicated developer roller cleaner Part # 11879.

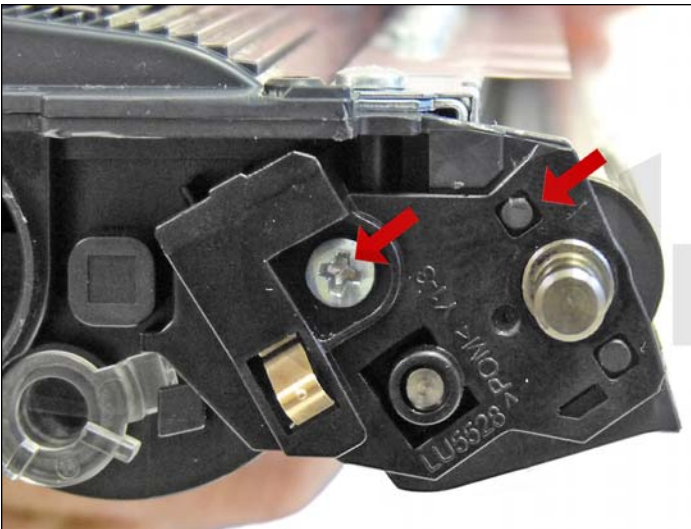
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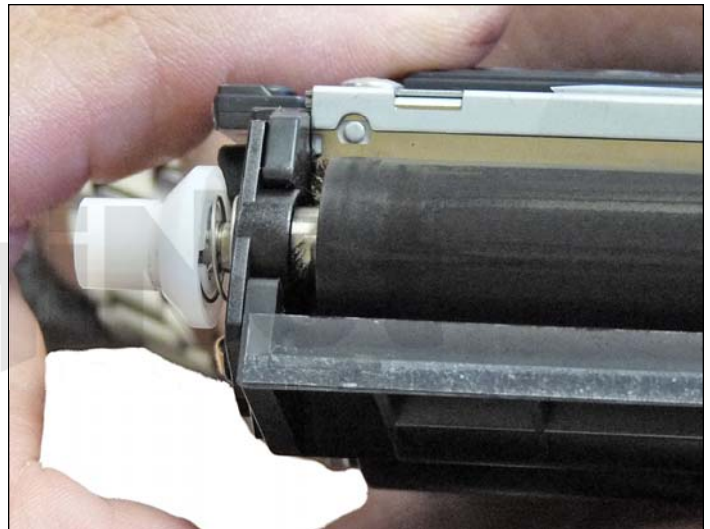


14. Install the developer roller, long shaft side to the gear side, with the white lock pointing up.

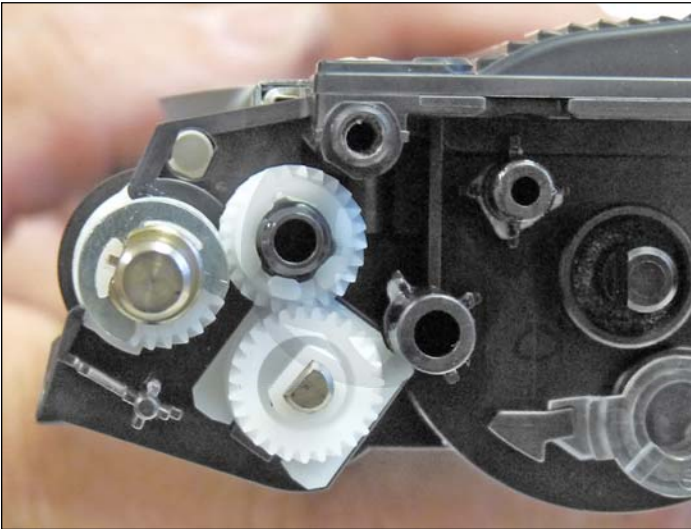
Turn the lock towards the doctor blade until it locks in place.



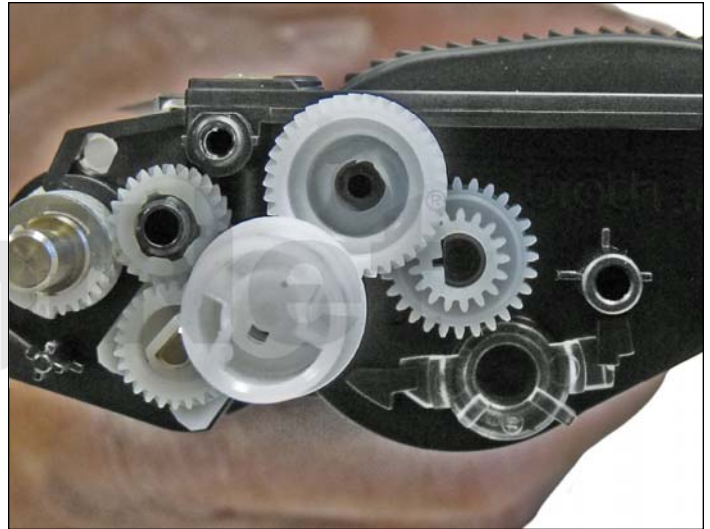
15. Install the opposite side end cap and screw.



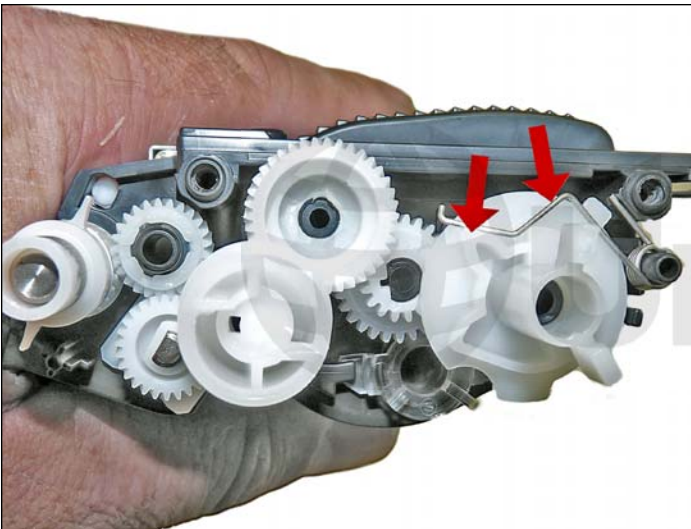
16. Install the spring and bushing on the non gear side of the roller. Make sure the bushing moves freely.



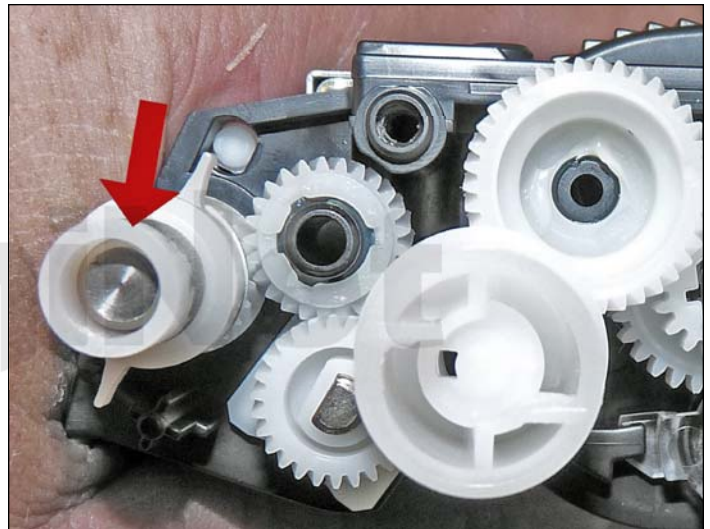
17. Install the developer roller gear and two small gears located next to it in the order shown. Install the E-ring.



18. Clean the gears, making sure that they have no toner on them. This is a good time to also check the gear shafts to make sure there is enough grease. If the shafts appear dry, or the grease is contaminated with toner, clean the shaft and inside of the gear. Replace the grease with white lithium grease. Install the three mid gears.

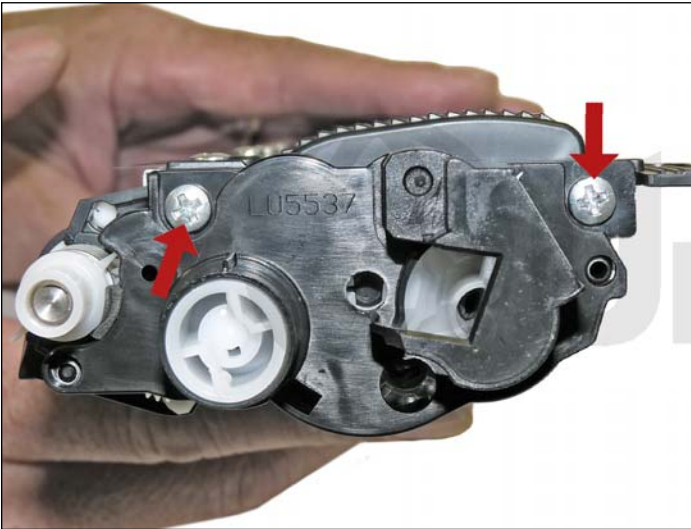


19. Set the reset gear and spring as shown. The tail of the spring fits into a notch at the base of the gear. Starter cartridges do not come with this gear, but it can be added and the starter cartridge can use as a full TN210.



20. Install the developer roller bushing.

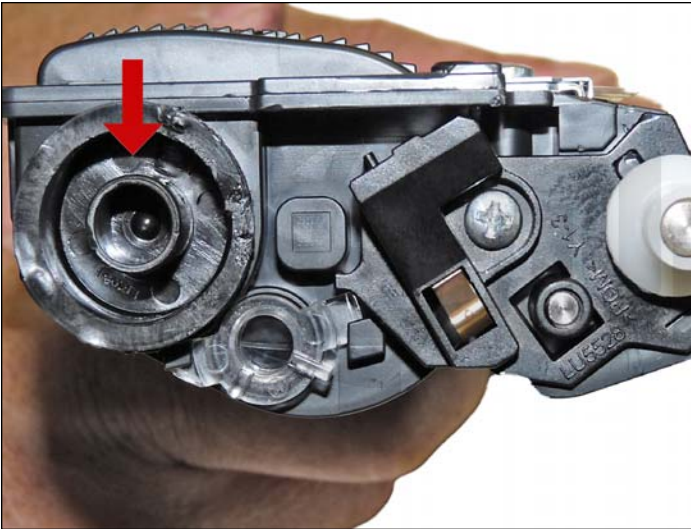




21. Install the gear cover plate and two screws.



22. Fill the cartridge with the appropriate color and amount of toner for Brother HL-3040/TN210.



23. Replace the fill plug. Wipe the cartridge down to remove any remaining toner dust.



24. Install the developer roller cover. This is important as the developer roller is exposed and is easily damaged or contaminated.

**PRINTER SETTING PAGES:**

1. Press the OK button three times while the printer is in the READY state.
2. The printer will show "Print Settings/Printing" on the LCD.
3. The HL-3040 will run three to four pages depending on the configuration.

**MACHINE TROUBLESHOOTING:**

All the machine error codes are in plain English so there is no need to go into them here.

**REPETITIVE DEFECT CHART:**

<b>Developer roller</b>	<b>31.0 mm</b>
<b>OPC drum</b>	<b>94.0 mm</b>
<b>Upper fuser roller</b>	<b>78.0 mm</b>
<b>Lower pressure roller</b>	<b>78.0 mm</b>