

THE HP LASERJET 5200 TONER CARTRIDGE



DOC# 0344

By Mike Josiah and the Technical Staff at Summit Technologies

Remanufacturing the HP LaserJet 5200 Toner Cartridge

First released in May 2006, the HP LaserJet 5200 series of printers are based on a 1200dpi, 35ppm wide format Canon engine. This series replaces the LaserJet 5000/5100 series. As with all the new HP cartridges, these cartridges use a chip to monitor toner low functions. The 5200 cartridge looks somewhat like an updated/larger version of the 2400 (Q6511A/X) cartridge. The cartridge for the 5200 is the Q7516A, and is rated for 12000 Pages at 5% coverage. No "X" cartridges have been released at this time.

The LaserJet 5200 series of printers use a 460 MHz processor and the most basic unit has 48Mb of DDR memory. The entire series has a monthly duty cycle of 65,000 pages/month. The cartridges have list prices of \$168.00 for the 16A. (Pricing as of July 2006).

So far the LaserJet 5200 series consists of the following printers:

- LaserJet 5200
- LaserJet 5200tn
- LaserJet 5200dtn.

Figure 1 shows the pull tab for the seal. Similar to the 2420, this tab prevents the cartridge from being installed

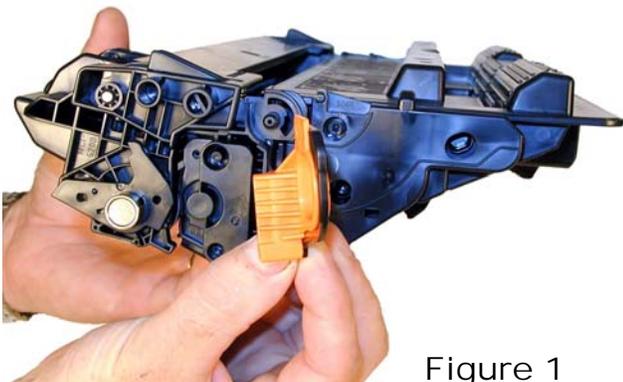


Figure 1

The HP 5200 cartridge



unless the seal has been pulled. (Unless the tab has been separated from the seal of course).

In HP's further cost cutting/remanufacture thwarting plans, they have eliminated all the screws that hold the supply hopper end caps on. They are now held on by plastic rivets. This is not too much of a problem, but it is a bit of a pain. We are working on new replacement end caps.

As with all other black HP cartridges, the chips on these cartridges do not shut down the entire cartridge, they disable the toner low features. The cartridge will run if the chip is removed, but the error message must be cleared first. As with past HP chips, the toner low function is disabled if a used chip is installed. The chips used are the new smaller type similar to the CLJ 2600 and 3600 cartridges.

Printing test pages, cartridge troubleshooting as well as some simple machine troubleshooting is covered at the end of the article.

It has been a while since the theory of a normal monochrome HP cartridge has been covered. So we have included it here. There is really nothing new here, but it can be used as a refresher course.

The toner cartridge printing process is best explained as a series of steps or stages.

Figure 2 shows the various cartridge parts as they relate to each other, and **Figure 3** shows a block diagram of the entire printing process.

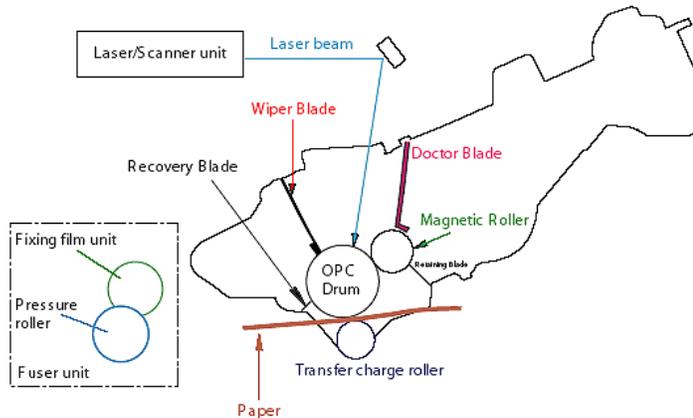


Figure 2

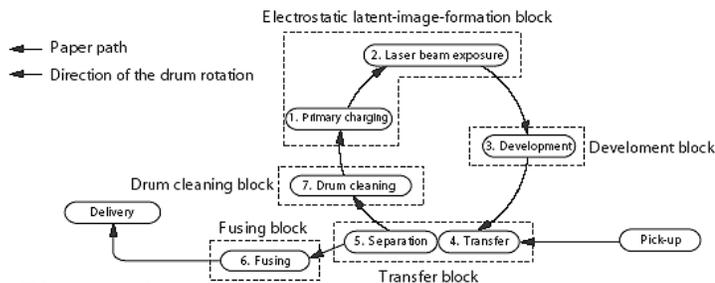


Figure 3

In the first stage, the Primary Charge roller (PCR) places a uniform negative DC Bias voltage on the OPC drum surface. The amount of the negative DC Bias placed on the drum is controlled by the printer's intensity setting. This process is called conditioning. See **Figure 4**

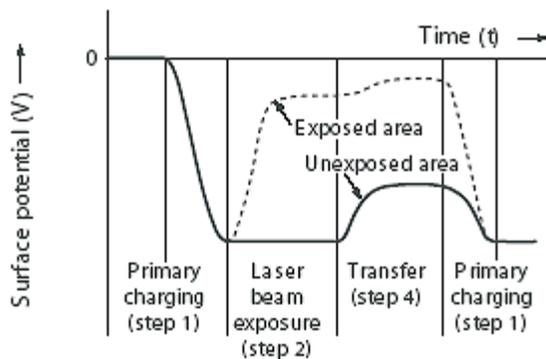


Figure 4

In the second stage, (also called the imaging section), the laser beam is fired onto a rotating mirror (called the scanner). As the mirror rotates, the beam reflects into a set of focusing lens. The beam then strikes the OPC's surface, leaving a latent electrostatic image on the drum. See **Figures 5 & 6**.

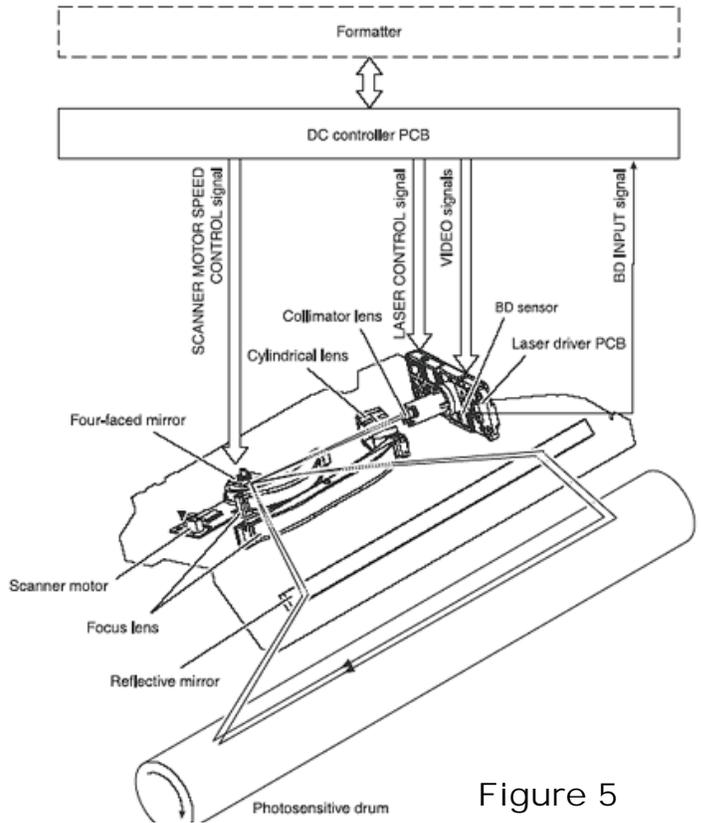


Figure 5

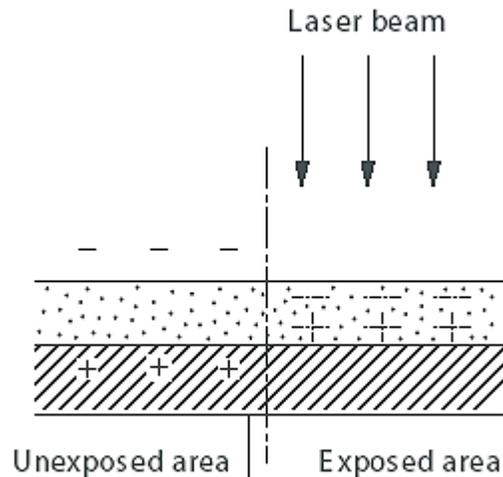


Figure 6

The third stage (developing stage) is where the toner image is developed on the drum by the developing section, (or supply chamber), which contains the toner

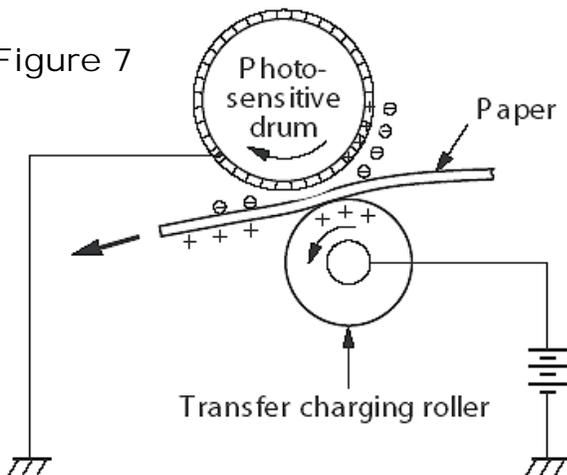
particles. The toner is held to the magnetic roller sleeve by the stationary magnet inside the sleeve, and a DC bias voltage supplied by the high voltage power supply. This DC bias voltage is controlled by the printer's intensity setting, and causes either more or less toner to be attracted to the drum. This in turn will either increase or decrease the print density. Both the Primary Charge roller and magnetic roller DC Bias voltages are controlled by the printer's intensity setting. The amount of toner on the magnetic roller sleeve is controlled by the rubber Doctor blade, which uses pressure to keep the amount of toner on the magnetic roller sleeve constant. This blade also causes a static charge to build up on the toner, which helps keep the coating of toner even, and allows easy transfer to the OPC drum.

At the same time an AC signal is also placed on the magnetic roller sleeve. This signal decreases the attraction of the toner to the Magnetic Roller sleeve, and increases the repelling action of toner against the areas of the drum that was not exposed to the laser beam. This AC potential improves the density, and contrast of the toner on the printed page. See **Figure 2**

As the laser exposed areas of the OPC drum approach the magnetic roller, the toner particles are attracted to the drums surface due to the opposite voltage potentials of the toner, and laser exposed surface of the OPC drum.

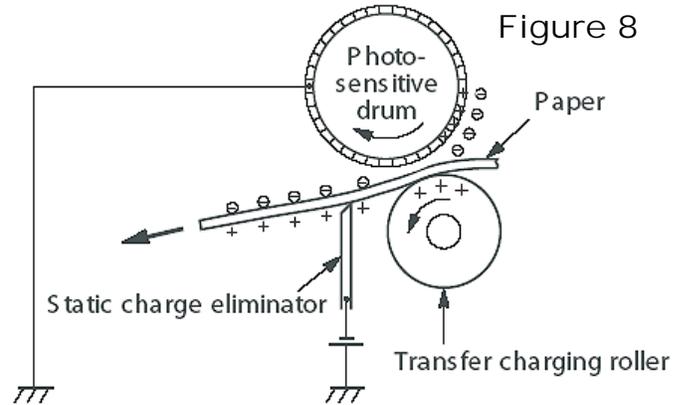
In the fourth stage (transfer stage) the toner image is then transferred to the paper as it passes below the drum by the transfer charge roller, which places a positive charge on the back of the paper. This positive charge causes the negatively charged toner on the drum's surface to be attracted to the page. The small diameter of the drum, combined with the stiffness of the paper causes the paper to peel away from the drum. See **Figure 7**

Figure 7



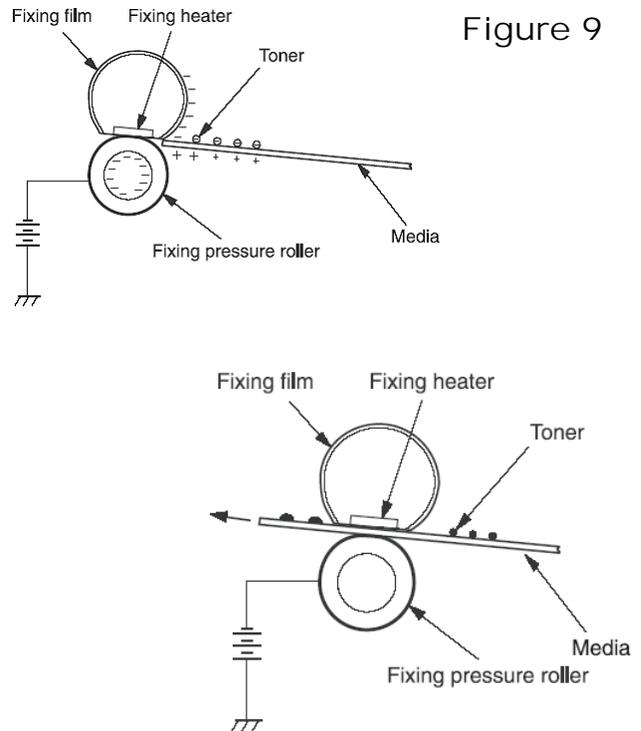
In the fifth stage (separation stage) the paper separates from the drum. The static charge eliminator weakens the attractive forces between the negatively charged drum surface, and the positively charged paper. This prevents toner dropouts onto the paper at low temperatures and humidity and also prevents paper from wrapping around the drum. See **Figure 8**.

Figure 8



In the Sixth stage (fusing stage) the image is then fused on to the paper by the fuser assembly, which is comprised of the upper and lower fuser rollers. The paper passes between a heated ceramic fusing element and a soft lower rubber roller that presses the page up into the upper heating element. The upper heated element then melts the toner into the paper. See **Fig. 9**

Figure 9



In the Seventh stage (Drum cleaning stage) the OPC drum is cleaned. On average, approximately 95% of the toner is transferred to the paper during the print cycle. As the drum rotates during printing, the remaining 5% of the toner that is on the OPC drum is cleaned off the drum by the wiper blade. It is then guided into the waste chamber by the recovery blade, and stored in the waste chamber.

Once the print cycle has been completed, the Primary Charge Roller will then place an AC voltage across the drum surface that erases any residual charges left on the drum surface. The OPC drum is now ready to be conditioned by the Primary Charge Roller using the negative DC bias voltage, and start the print cycle again.

In older systems, a primary corona wire, and a transfer corona wire are used instead of the PCR and transfer roller. These wires do the same job, but demand much more power to do it. The advantages of the Primary Charge Roller systems are that they operate at a lower voltage than the old style corona wire, do not generate ozone, and they also replace the erase lamps that were present in the older style laser printers.

Required Tools

- Toner approved vacuum.
- A small Common screwdriver
- A Phillips head screwdriver
- Needle nose pliers
- Wire Cutters
- Dremmel tool with side cutting bit. (Hobby rotary saw)-
-See **Figure 15**
- X-Acto knife with flat chisel type blade.

Required Supplies

- Toner 580g HP-5200 type (Preliminary weight)
- New OPC Drum (5200 specific)
- New Wiper Blade (HP-5000)
- New PCR [Optional]
- New mag. Roller [Optional]
- New Dr. Blade [Optional]
- 99% Isopropyl Alcohol
- Magnetic Roller Cleaner
- Drum Lubricant
- Conductive Grease
- White Lithium grease

1) Remove the drum cover by prying the spring loaded arm, and then carefully pry off the two metal bars out of their holders. The cover must be in the closed position in order to pry off the spring loaded arm. Be careful not to loose the spring! Both of the metal bars should be removed from the front not the end. See **Figures 10,11 & 12**

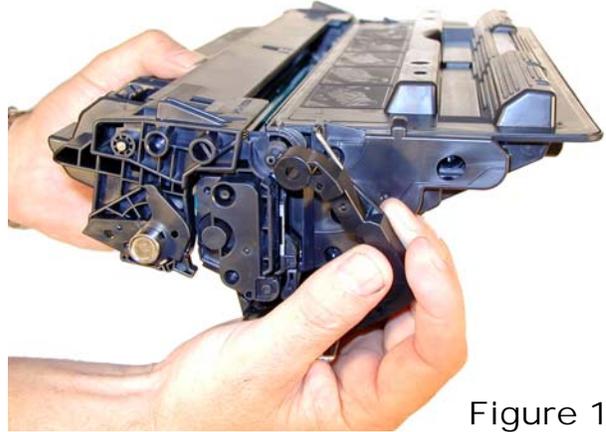


Figure 10

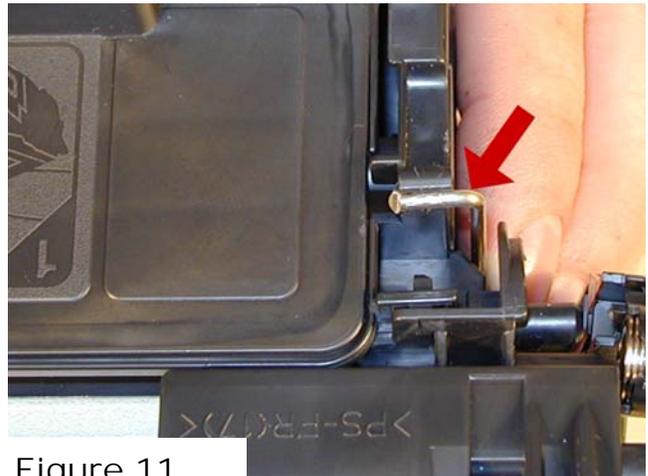


Figure 11



Figure 12

2) Note on each end of the cartridge there are small silver pins. To separate the two halves these pins must be removed. Like the 96A/10A cartridges, these pins cannot be pulled out, or pushed in from the outside of the cartridge (the pins have heads on them). The only way to disassemble the cartridge without damaging it is to push the pins out from the inside. **Figures 13 & 14**



Figure 13



Figure 14

3) To remove the pins, 2 small holes must be cut. Cut the holes with the Dremmel tool, and a side cutting bit. See **Figures 15, 16, 17, 18, & 19**



Figure 15



Figure 16

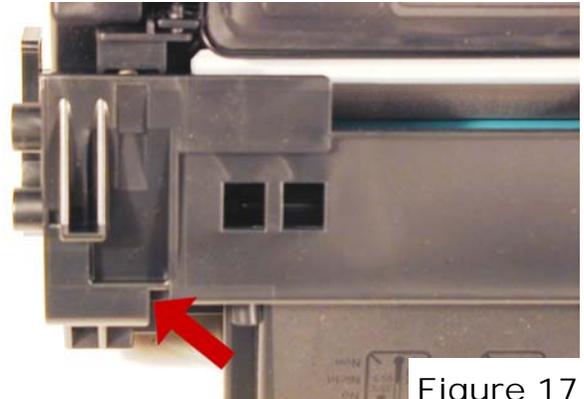


Figure 17

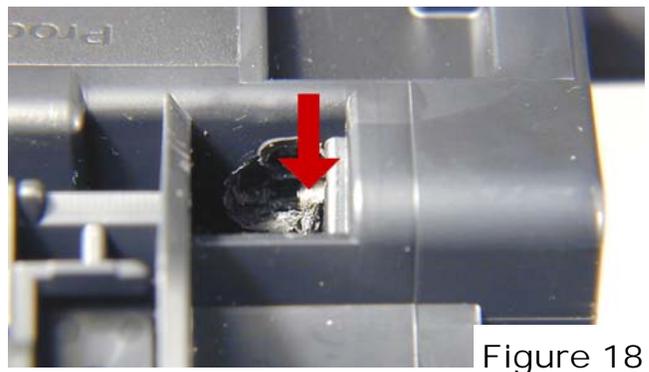


Figure 18

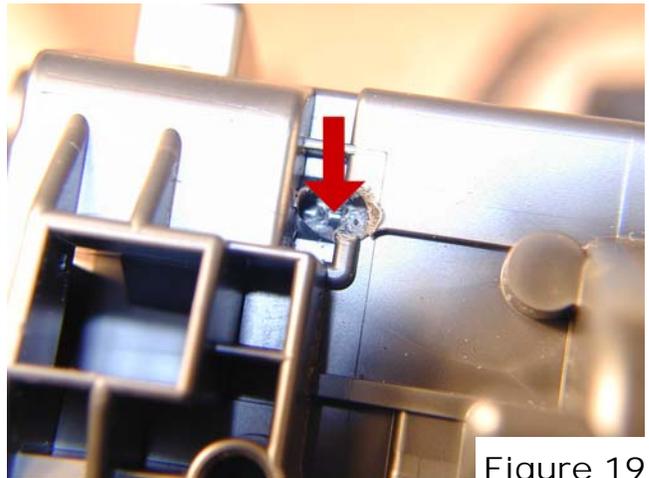


Figure 19

4) Push the pins out with either a jewelers screwdriver, or a modified spring hook. See **Figures 20, 21, & 22**



Figure 20

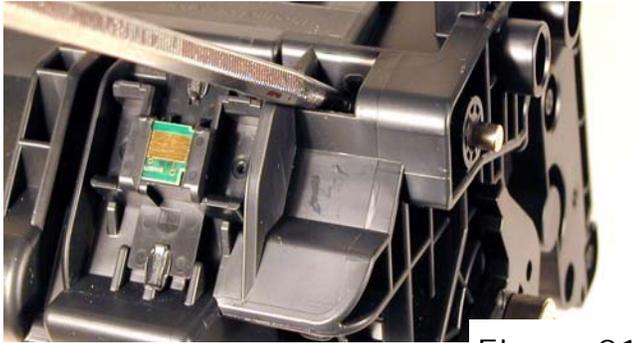


Figure 21

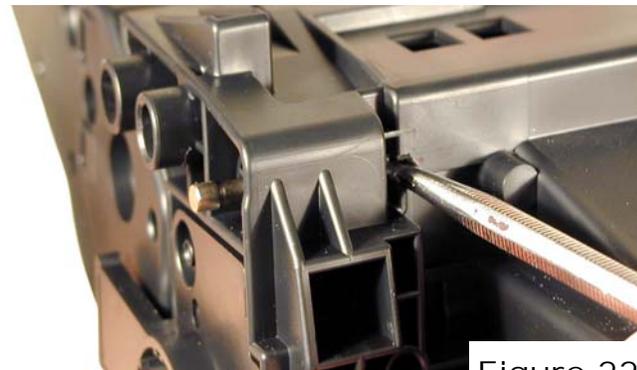


Figure 22

5) Separate the two halves See **Figure 23**



Figure 23

6) On the Waste section, take a common screwdriver and remove the Metal Axle pin/spring loaded cover located on the right side of the cartridge. This is the same type of drum axle pin that the 2400 series uses. It comes out easily enough, but be careful as it seems somewhat fragile. See **Figures 24 & 25**

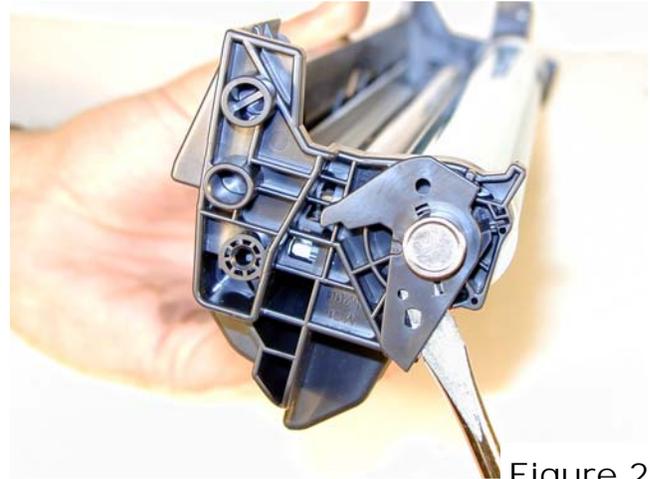


Figure 24

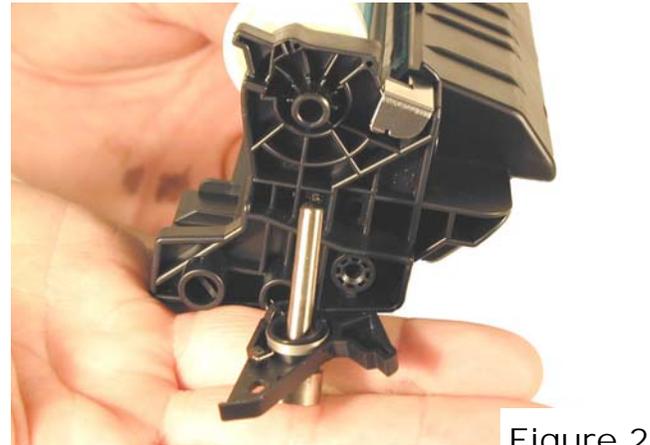


Figure 25

7) Remove the Photoconductive Drum. See **Figure 26**



Figure 26

8) Remove the Primary Charge Roller (PCR), by prying it out of the clips on either end. Clean the PCR with your preferred cleaner and place the aside. See **Figure 27**



Figure 27

9) Remove the wiper blade and 2 screws. **Figure 28**

NOTE: Be very careful not to damage or distort the thin Mylar Recovery Blade next to the wiper blade. If this blade is bent or damaged in any way, it should be replaced.



Figure 28

10) Clean out any remaining waste toner. Make sure the foam seals under the wiper blade are clean and not damaged. See **Figure 29**

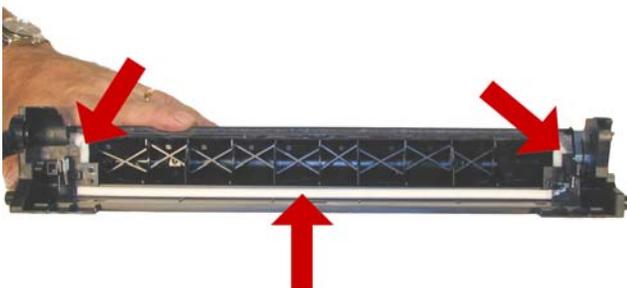


Figure 29

11) Due to the aggressive nature of the toner used in these cartridges, we recommend that the Wiper Blade

be replaced each cycle. Lightly coat the new blade with you preferred lubricant. Replace the Wiper Blade and 2 screws into the cartridge. See **Figure 30**



Figure 30

12) Clean the 2 PCR holders, and place a small amount of conductive grease on the black PCR holder, install the PCR. See **Figure 31**

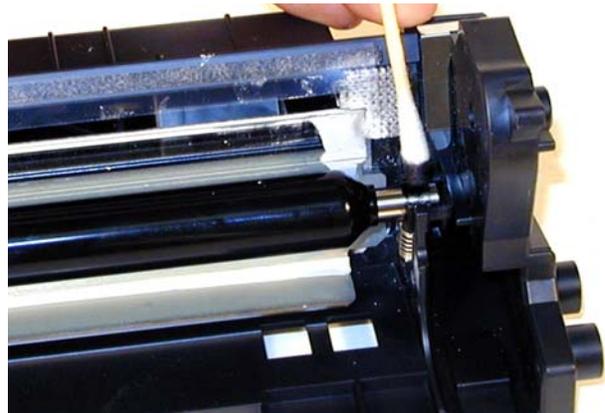


Figure 31

13) If you are re-using the drum, check to make sure the grease on the drum drive gear and hub is clean. If not remove it and replace. White Lithium grease can be used here. Install the drum. See **Figure 32**

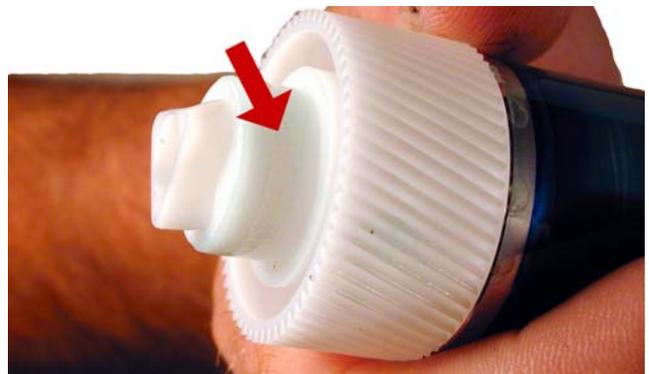


Figure 32

14) Install the spring in the holder as shown, install on the cartridge and set the tail of the spring so it drops into its slot. See **Figures 33 & 34**



Figure 33

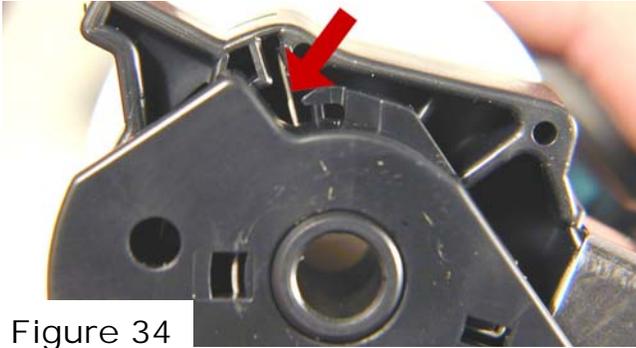


Figure 34

15) Replace the conductive grease on the end of the drum axle tip, and install on the cartridge. See **Figures 35 & 36**



Figure 35



Figure 36

16) Place the waste chamber aside.

17) On the supply section, the end caps are held in place by a series of plastic rivets. They need to be cut off in order to gain access to the hopper. Only the gear side needs to have the rivets cut. In Figure 38 you see there are more rivets that would need to be removed, and in our preliminary tests, proper re-alignment of the end caps on that side is difficult to do. **Figures 37 & 38.**

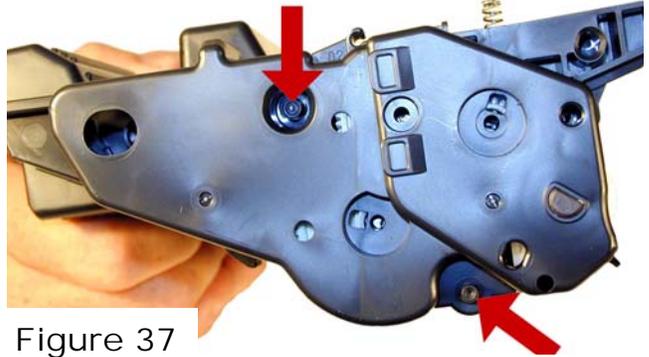


Figure 37

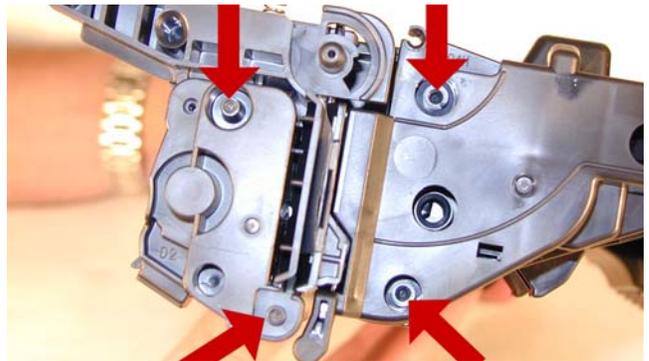


Figure 38

18) On the gear side only, take the Xacto knife with the chisel blade, and cut the small plastic rivet off. Insert a small self tapping screw to keep the end cap alignment properly set. Remove the screw. See **Figure 39**



Figure 39

19) Take the Dremmel tool again and cut away the recessed plastic rivet do not grind through the end cap! To separate the end cap from the cartridge, take a common screwdriver, pry up the end cap and slide the screwdriver against the shoulder. Press the screwdriver against the shoulder until it snaps free. Do the same for the small rivet. See **Figures 40, & 41**



Figure 40

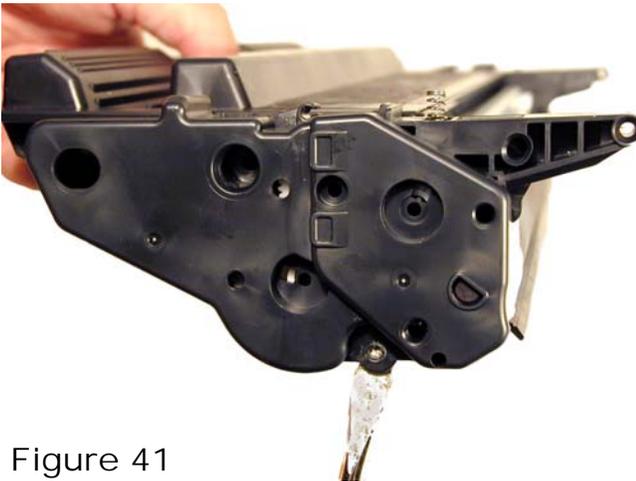


Figure 41

20) Remove the end cap. Note that the gears stay with it. See **Figure 42**.

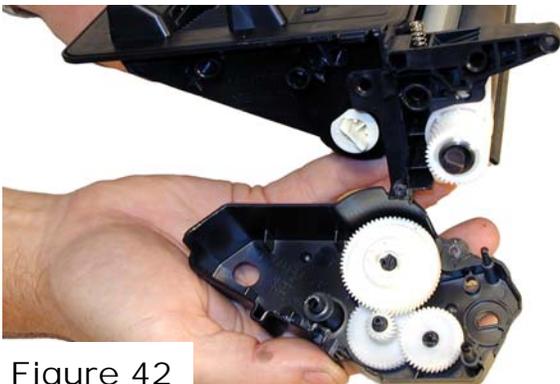


Figure 42

21) Remove the magnetic roller assembly from the cartridge.

See **Figure 43**.



Figure 43

22) Remove the 2 screws and doctor blade.

See **Figure 44**



Figure 44

23) Clean out any remaining toner.

24) There is no fill hole in these cartridges so it must be filled through the DB slot. Fill the cartridge with 580g (Preliminary weight) of 5200 toner.

See **Figure 45**



Figure 45

25) If a seal is available, install it now.

26) Make sure the doctor blade seals are clean. Install the doctor blade and 2 screws. See **Figures 46 & 47**



Figure 46



Figure 47

27) Clean the mag roller contact plate on the end cap that is still on the cartridge. Replace the conductive grease. See **Figure 48**

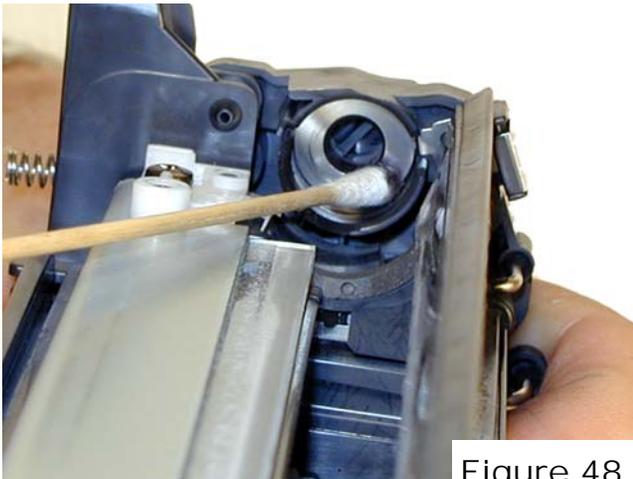


Figure 48

28) Clean the mag roller sleeve with a dedicated mag roller cleaner.

29) Install the mag roller. Turn the stationary magnet so that the keyed end will fit into the end cap. See **Figure 49**

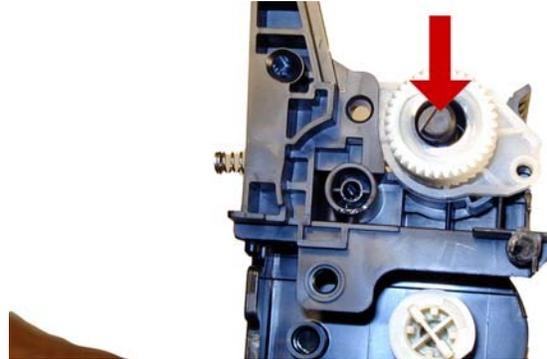


Figure 49

30) Install the end cap. Hold it in place with the small self tapping screw used earlier. Drill a hole in the recessed rivet, and install a screw that is approximately 1/2" long. Make sure the screw size matches the drill size. See **Figures 50, 51**

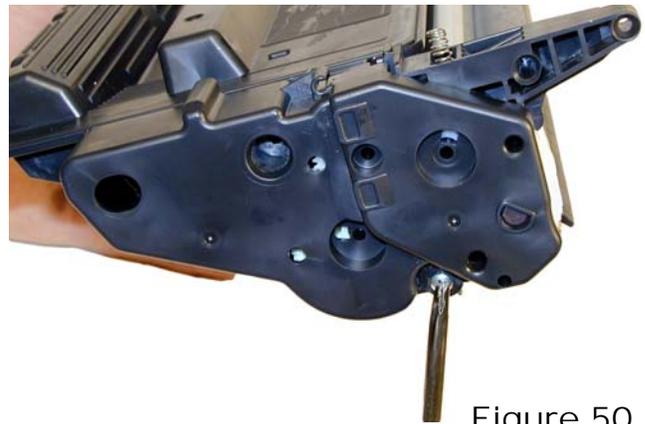


Figure 50



Figure 51

31) Place the 2 halves together. Make sure the springs are set, and install the 2 pins. See **Figures 52 & 53**

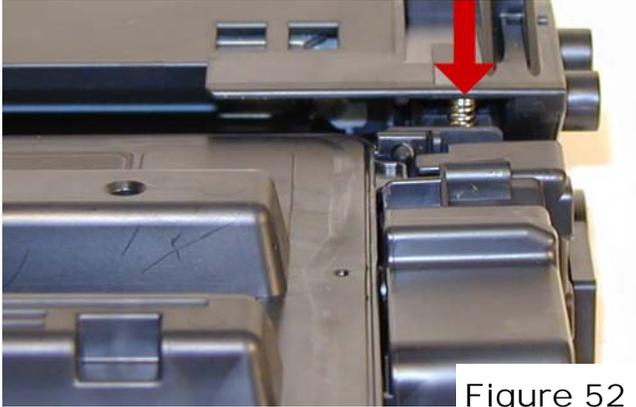


Figure 52



Figure 53

32) Install the spring in the drum cover arm as shown. Install the metal bar into the hole and slot. Install the arm. See **Figures 54 & 55**

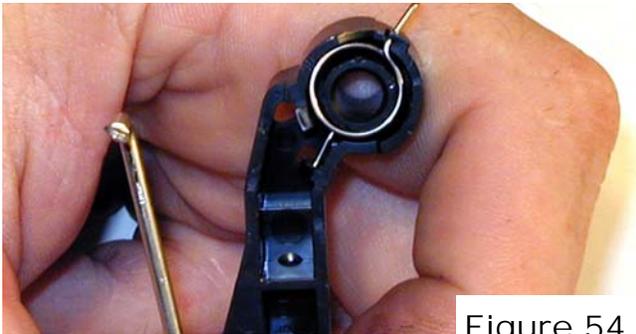


Figure 54

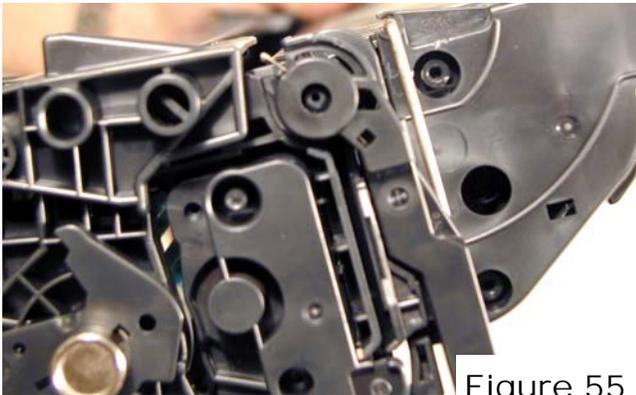


Figure 55

33) Release the tail of the spring so that the cover closes. See **Figure 56**



Figure 56

34) Replace the chip. See **Figure 57**

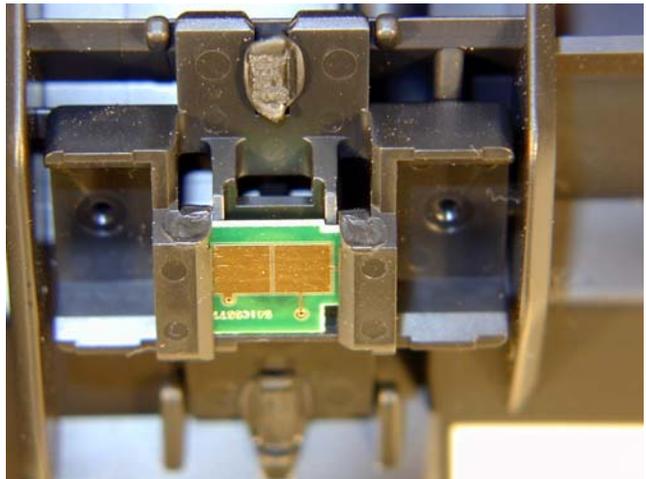


Figure 57

Running the Cleaning page.

The cleaning page helps keep the fuser free of toner particles. HP recommends that it be run every time a new cartridge is installed.

- 1) Press the MENU button to open the menus.
- 2) Press the UP or DOWN arrows until "CONFIGURE DEVICE" appears on the display.
- 3) Press the SELECT button.
- 4) Press the UP or DOWN arrows until "PRINT QUALITY" appears on the display.
- 5) Press the SELECT button.
- 6) Press the UP or DOWN arrows until "CREATE CLEANING PAGE" appears on the display.

- 7) Press the SELECT button.
- 8) Load the cleaning page face down in tray 1
- 9) Press the DOWN arrow until "PROCESS CLEANING PAGE" appears on the display
- 10) Press the SELECT button.

Changing the Printers Intensity (Density)

- 1) Press the SELECT button to open the menus.
- 2) Press the UP or DOWN arrows until "PRINT QUALITY" appears on the display.
- 3) Press the SELECT button.
- 4) Press the UP or DOWN arrows until "TONER DENSITY" appears on the display.
- 5) Press the SELECT button.
- 6) Press the UP or DOWN arrows until the desired setting (1-5) appears on the display. "3" is the default setting

Printing Test Prints

There are a number of test pages that can be run from the menu. There is a "Menu map", "Configuration Page", "Supplies Status Page", "Usage page", and the "PCL font list". The Supplies Status Page or the Configuration page are the best to use. They have Solid Black, Gray Scales, and text.

- 1) Press the SELECT button to open the menus.
- 2) Press the UP or DOWN arrows until "INFORMATION" appears on the display.
- 3) Press the SELECT button.
- 4) Press the UP or DOWN arrows until the page you wish to print appears on the display.
- 5) Press the SELECT button.

Cartridge Troubleshooting:

Repetitive defect chart:

94mm Drum
58mm Mag
44mm PCR

A dirty or Bad Primary Charge Roller (PCR): this will show on the test print as vertical gray streaks down the page, as a gray background throughout the page, or as ghosting where part of a previously printed area is repeated.

Dirty PCR Connection: This will show as horizontal dark black bars across the page, or as shading throughout the page.

Scratched Drum: This is shown by a very thin, perfectly straight line that runs from the top to the bottom of the test page.

Chipped Drum: This will show as a dot or series of dots that repeat every 94mm.

Light Damaged Drum: This will show up as a shaded area on the test print that should be white. Again this will repeat every 94mm.

Worn-Out Drum: This will usually show up as shading on the right side of the page. It will usually start right from the edge of the page, and work in towards the center. The pattern will normally look like tire tracks.

Bad Wiper Blade: This will show as either a gray line approximately 1/8" thick or as shading across the entire page. In either case there will be a film of toner on the drum surface that matches the defect.

Bad Magnetic Roller Bushing: When this round shaped bushing wears out, gray scale pages, and pages with heavy graphics will exhibit light and dark line across the page.

Printer Troubleshooting

Most of the error messages show on the display in plain English so we will not go into them here. Some of the more common numeric messages are as follows:

10.32.YY Unauthorized supply. A new non HP supply has been installed. Press the SELECT button to clear.

10.XX.YY Supply Memory Error. Bad or missing chip

13.XX.YY paper jams in printer

50.X Fuser error, where X is:

- Low fuser temperature
- Fuser warm-up service
- High fuser temperature
- Open fuser
- Fuser pressure release mechanism failure

50.1 laser beam error.

52.XX.Y Scanner error

58.XX fan Error

59.XX Printer motor error

