

## TECHNICAL DOCUMENT



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## Lexmark Optra M-410/412 Toner Cartridges

DOC-0281

### OVERVIEW



The Optra M410/412 series of printers use cartridges that look very similar to the Optra S except they are smaller. They do not use any type of chips or even yield wheels, and unlike other recent Lexmark printers, there are no Prebate cartridges! The Optra M410 was introduced in September 1999, the 412 series was introduced in May 2000.

The main difference between the two series is the print speed. The 410 runs at 12ppm, while the 412 runs at 17ppm. The maximum resolution for both series is the same at 1200 x 600 dpi. These printers are unique in their print class in that they have the ability to fax, and that as network printers, they have the ability to print a confidential job. When this feature is used, the user must go to the printer and enter their PIN # before the pages will print out.

There are actually four cartridges currently available for these machines. The original cartridges released with the 410 series are the 4K00198 (5k pages at 5%) and the 4K00199 (10k pages at 5%). With the introduction of the 412 series, two new cartridges came out the 17G0152 (5k pages at 5%) and the 17G0154 (15k pages at 5%). The 4K00198 and 199 cartridges are being discontinued as stocks run out and are being replaced with the newer 17G cartridges.

As with the Optra S cartridges, the PCR is not in the cartridge, it's in the printer. The Wiper Blade inside the cartridge has an external felt brush that keeps the PCR clean. Some of the older 410 cartridges do not have the PCR cleaner on the wiper blade but the 17G cartridges do. I have not been able to find the page count rating for the PCR. The manual only states to change it when the printed pages have a gray background or "fogging" as they put it.

It should also be noted that because of the play between the toner hopper and the OPC drum, a shipping lock should be installed in every cartridge. This holds true even if you are going to hand deliver the cartridge. The shipping lock for the Optra M cartridges looks the same as the Optra S but is different. These machines also still use felt wands to keep the fuser clean.

Running test pages and/or changing the density is not a straight forward process and will be covered at the end of this article.

### REQUIRED TOOLS



- Toner approved vacuum. The Atrix HCTV canister type toner Vac, **OR** the Atrix AAA toner vacuum.
- Small screw driver (Common Style)
- Phillips head screwdriver (#1)
- Needle-nose pliers
- Spring hook
- Recovery Blade Insertion Tool

## MATERIALS NEEDED



- 1 Bottle Optra M black toner. Use 160G for low yield cartridges, and 320g for high yield cartridges.
- Drum padding powder (Kynar) or Sure-Lube. Do NOT use Zinc Sterate on these cartridges!
- Cotton Swabs
- Isopropyl Alcohol
- Poly Wipes Cotton Pads
- Long life OPC Drum (Optional)
- Wiper Blade
- Shipping Lock
- Felt Wand
- New White Static Roller Shims

## DISASSEMBLY



1. Vacuum the exterior of the toner cartridge.
2. Place the cartridge on the bench drum side up (Label face down), and the toner supply towards you.
3. With the needle nose pliers or a spring hook, remove the two springs from each end of the cartridge. See Figure #1
4. Remove the drive gear on the Static Roller. This will allow you to remove the toner hopper from the rest of the cartridge. This gear has a tight fit, pull it straight off the shaft. See Figure #2

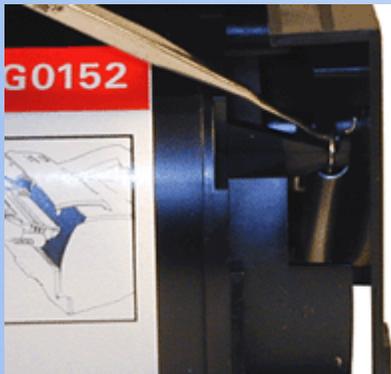


FIGURE 1



FIGURE 2

5. Lift up the 2 tabs on top of the cartridge to release the hopper. See Figure #3.
6. Remove the E-Ring from the small helical gear end of the drum axle. There is no need to remove the other E-ring. See Figure #4

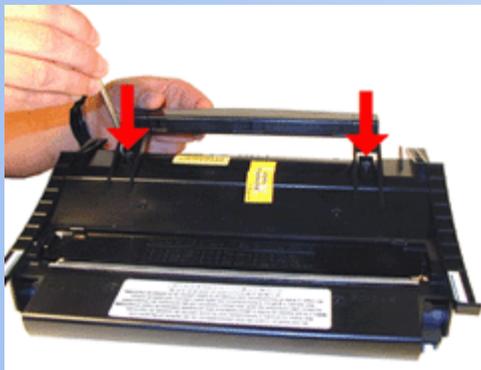


FIGURE 3

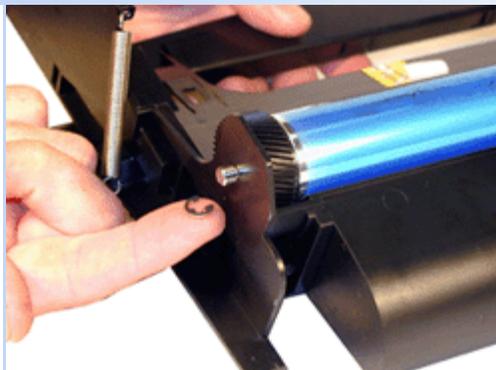
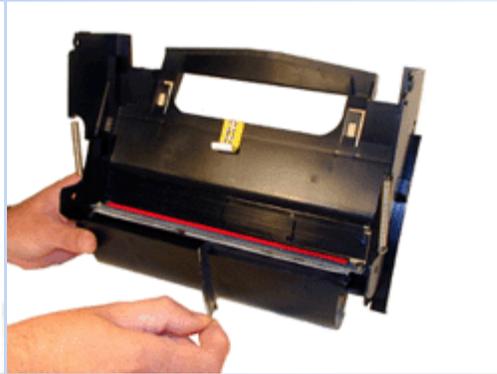


FIGURE 4

7. Slide the Drum Axle out of the cartridge. See Figure #5
8. Gently lift the Drum and Drum spring up and out of the cartridge, and place in a light protected area. Be careful not to lose the spring from the large drum. It's purpose is to keep the drum from rotating backwards.
9. Remove the Recovery Blade entirely, and shake the toner out of the debris cavity into the garbage can and vacuum clean. Removing the Recovery Blade allows greater access to the waste toner. See Figure #6



**FIGURE 5**

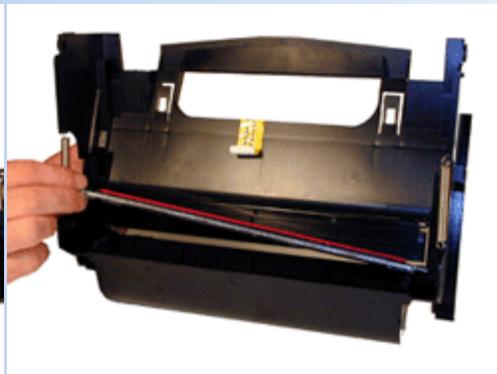


**FIGURE 6**

10. If you are replacing the OPC drum, you should also change the Wiper Blade. Remember, the Wiper Blade also has the PCR cleaner attached to it. To remove the Wiper Blade, Remove the two screws from the Wiper Blade. See Figure #7
11. Hold the cartridge so that it is up right (Standing up with the waste bin on the table). With one hand, hold the laser shutter open, and with the other hand, remove the Wiper Blade. See Figure #8



**FIGURE 7**

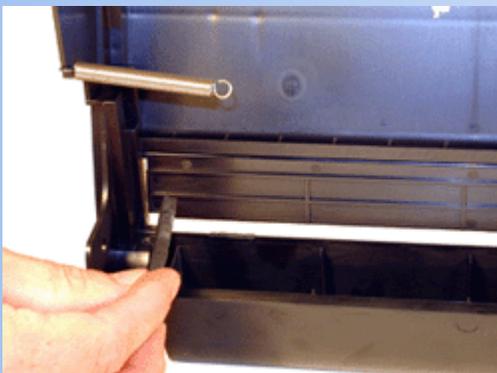


**FIGURE 8**

12. Be careful not to damage the foam seals on either side of the blade. See Figure #9

The OEM Wiper Blade has the PCR cleaning assembly attached to it. It cannot be removed from the Blade without damaging it. New replacement Wiper Blades should come complete with this assembly attached.

13. Pad the Wiper Blade with Kynar padding powder or Sure-Lube, replace the blade and two screws into the cartridge.
14. Make sure the foam seal on the bottom of the wiper blade is not torn or the cartridge will leak. See Figure #10.



**FIGURE 9**



**FIGURE 10**

15. Remove the Doctor Blade Spring by pressing down on the center of the spring. See Figure #11
16. On the left side of the Static Roller there is a small metal bushing, take a small screwdriver, and pry the bussing off the shaft. See Figure #12

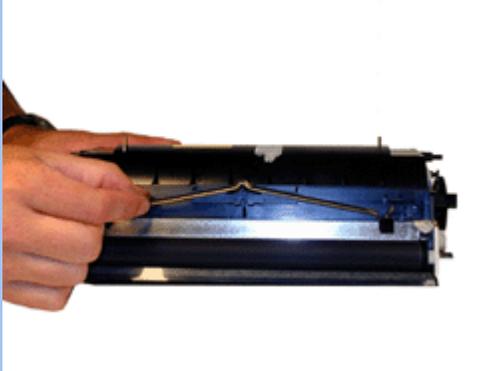


FIGURE 11

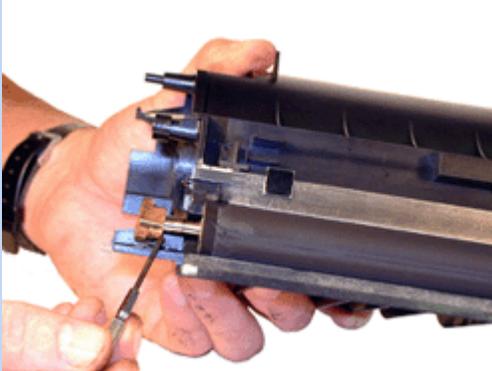


FIGURE 12

17. Remove the Static Roller. See Figure #13.

**NOTE:** Always remove the Doctor Blade Spring before removing the Static Roller, failure to do this will allow the Doctor Blade to slide down from its original position.

18. Remove the fill plug from the hopper. Pry the plug out from the base next to the hopper. This fill plug is also a breather cap. It is best to remove both sections at once and to clean them from the outside. These plugs tend to leak if they have been separated. . See Figure #14



FIGURE 13

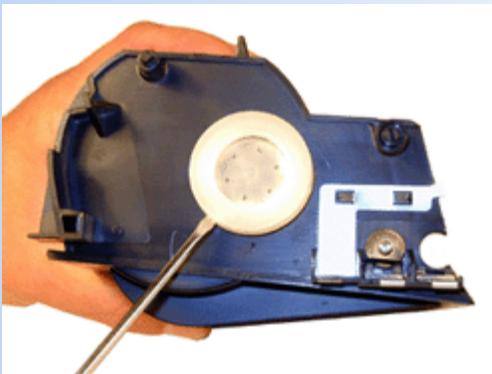


FIGURE 14

19. Vacuum the Toner Hopper clean.
20. With a cotton swab dipped in alcohol, clean the Static Roller seals located on either end of the static roller section. These seals are made of a white plastic. Also the bottom of the Dr. Blade. . See Figure's #15 & 16.



FIGURE 15

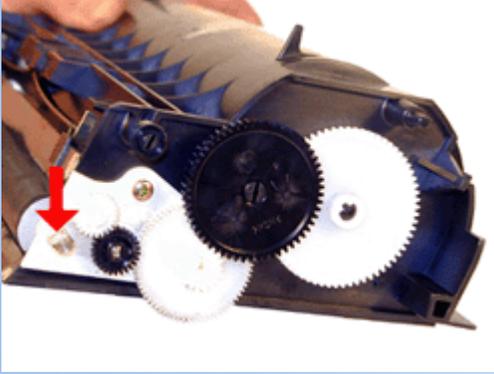


FIGURE 16

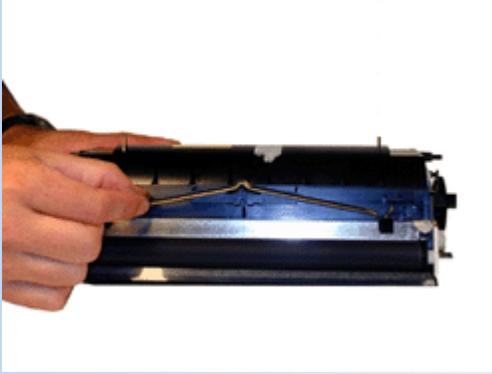
21. Carefully vacuum or blow off the Static Roller, Be careful not to touch the roller with your hands, or to damage this roller in any way.
22. Install the NEW white washers on the static roller.

23. Place the keyed end of the Static Roller into the cartridge, and install the roller. Install the metal bushing. See Figure # 17.

24. Install the Doctor Blade Spring. See Figure #18



**FIGURE 17**



**FIGURE 18**

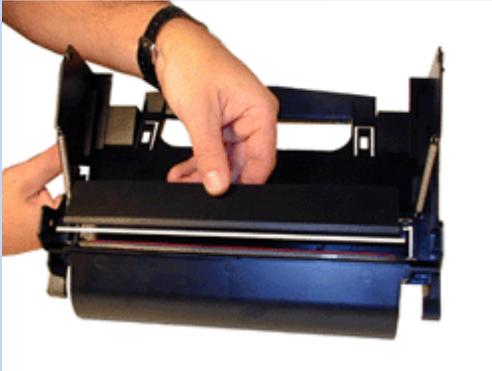
25. Fill the hopper with the appropriate amount of toner. Install the Fill Plug. See Figure #19.

26. Place the Chassis on the bench Label side down with the Debris Cavity toward you, and the drum cover open.

27. Install a new recovery Blade with the Recovery Blade insertion tool. See Figure #20



**FIGURE 19**



**FIGURE 20**

28. Lightly coat the drum with Drum Padding Powder,(Kynar). Do NOT use Zinc Sterate.

29. Place the OPC Drum into the cartridge with the gear side of the drum to the gear side of the cartridge. Make sure that the spring is facing down, and is in between the two slots. See Figure's 21 & 22.



**FIGURE 21**

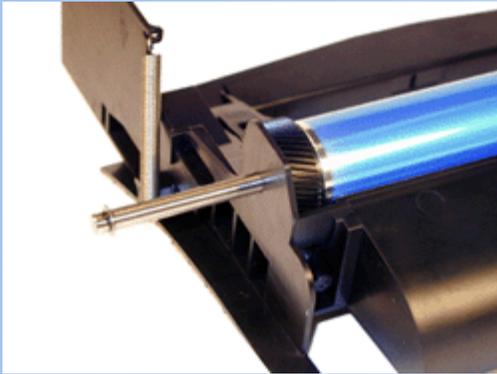


**FIGURE 22**

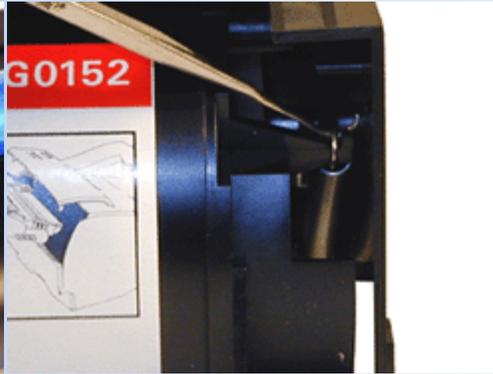
30. Install the Drum Axle pin into the large gear side of the drum. This is the opposite side from where the axle was removed. The Axle must be installed this way to prevent the axle from bending and damaging the drum ground contact located inside the drum. See Figure #23

31. Install the E-Ring on the end of the axle.

32. Spin the drum for a few revolutions towards the waste chamber to ensure the drum and wiper blade are properly lubricated.
33. Take the Toner Hopper and install it straight in. Make sure the top pins are locked in place.
34. With either the small flat head screwdriver or the needle nose pliers, replace both springs on to the Toner Supply Chamber. See Figure #24



**FIGURE 23**



**FIGURE 24**

35. Re-install the Static Roller drive gear. See Figure #25
36. A shipping lock must now be installed. This lock should be used even if you are going to hand deliver the cartridge. It will prevent the toner hopper from coming in contact with the OPC Drum, and causing damage to either the Drum or the Static Roller. Press the two red tabs into the sides of the cartridge as indicated.

When packaging the cartridge, make sure you include a new Felt Wand.



**FIGURE 25**

## TROUBLE SHOOTING



**Print Head Lens:** The print head lens should be cleaned periodically or when ever light print occurs. To clean it open the upper and lower doors, remove the cartridge. The lens is located across the frame just above where the cartridge sits. Clean the lens with a clean dry lint free cloth. Do not use any type of chemicals on the lens.

**Anti-Static Teeth:** Located next to the transfer charge roller wire are the anti static teeth. These teeth dissipate the static charge applied by the transfer corona wire to the paper. This helps prevent the paper from sticking to the OPC drum and causing a paper jam. If these teeth are dirty, they should be vacuumed clean, or carefully blown off with a can of clean compressed air.

**Transfer Charge Roller** In the base of the printer, there is the Transfer Charge Roller. This is a foam roller that must be kept clean. Be very careful not to touch this roller with any part of your skin. The oils naturally present in your skin, and/or paper dust, and toner dust will contaminate the roller causing light print and/or small white voids in the text.

**Dirty Primary Charge roller** Located inside the PRINTER, this will show on the test page as vertical gray streaks down the page, or as a gray background throughout the page.

**Fuser Assembly** Towards the back of the printer is the Fuser Assembly. This assembly has a felt wand that is used to keep the upper fuser roller clean. This wand should be replaced (or re-felted) every time the toner cartridge is replaced.

Some of the more common toner cartridge problems are:

**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 3 times per page.

Light damaged drum This will show up as a shaded area on the test print that should be white. Again this will repeat 3 times per page.

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.

Weak Dr. Blade Spring This will usually show as shaded areas on one or both sides of the page.

## TEST PRINTING



### Menu Settings Page:

1. Make sure that the ready status message appears on the display
2. Press the MENU> or <MENU to enter menus.
3. Continue to press and release MENU> or <MENU until you see UTILITIES MENU on the second line of the display.
4. Press SELECT.
5. Press MENU> until PRINT MENU SETTING appears on the second line of the display.
6. Press SELECT
7. The pages will print out.

### Font List:

1. Make sure that the ready status message appears on the display
2. Press the MENU> or <MENU to enter menus.
3. Continue to press and release MENU> or <MENU until you see UTILITIES MENU on the second line of the display.
4. Press SELECT.
5. Press MENU> until PRINT FONTS appears on the second line of the display.
6. Press SELECT.
7. Press the MENU> or <MENU until either PCL FONTS or PS FONTS appears.
8. Press SELECT.
9. The pages will print out.

### Test Pages:

1. Turn the printer off
2. Press and hold the SELECT and RETURN buttons and turn the printer power on.
3. Release the buttons when PERFORMING SELF TEST appears on the display. When the self test ends, CONFIG MENU appears on the display.
4. Press the MENU> or <MENU until PRT QUALITY PGS appears on the display.
5. Press SELECT
6. The pages will print out
7. Press SELECT again to exit the CONFIG MENU and return the printer to the ready state.

### Changing the Printers Density:

1. Press the MENU> or <MENU until QUALITY MENU appears on the display.
2. Press SELECT
3. Press the MENU> or <MENU again until TONER DARKNESS appears on the display
4. Select the setting you wish by pressing the MENU< to go lower, or MENU> to go higher.
5. Press SELECT.

These machines come set to #8 from the factory, so you only have 9 & 10 to make it darker! According to the manual, 1-5 are to be used only when there is a need to conserve toner.

## CARTRIDGE PRINTING THEORY



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

The first stage in the printing process is the conditioning stage. The Primary Charge Roller 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 printers intensity setting.

In the second stage (also called the imaging section), the laser beam is fired onto the OPC drum surface. The laser beam dissipates the OPC drum charge to ground wherever it strikes the drum, leaving a latent electrostatic image. The OPC drum makes approximately three revolutions for each printed page.

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 toner is held to the static roller by a DC voltage supplied by the high voltage power supply. This voltage is controlled by the printers intensity setting, and causes either more or less toner to be attracted by the static roller. This in turn will either increase or decrease the print density. The toner is first fed to the static roller by the feed mechanism. The amount of toner on the static roller is controlled by the metal doctor blade, which uses pressure to keep the amount of toner on the static roller constant.

As the laser exposed areas of the OPC Drum approach the static 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. This 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. The static charge eliminator weakens the attractive forces between the negatively charged drum surface, and the positively charged paper. Without this help, thin paper may wrap itself around the drum.

The image is then fused on to the paper by the fuser assembly, which is comprised of the upper and lower fuser rollers. The lower rubber roller presses the page up into the upper roller which then melts the toner into the paper. The upper roller is a hard Teflon coated, heated roller, which is kept clean by a felt wand.

The fourth stage is where the OPC drum is cleaned. On average, approximately 90% of the toner is transferred to the paper during the print cycle. The remaining 10% remains on the OPC drum and is cleaned off the Drum by the wiper blade, guided into the waste chamber by the recovery blade, and stored in the waste chamber.

The final stage is completed by the primary charge roller. This roller now places an AC signal across the OPC drum surface, which will erase any residual charges left on the OPC drum surface. The OPC drum is now ready to be conditioned by the PCR's DC signal and start the printing process all over again.

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## RECOMMENDED SUPPLIES



Microsoft OLE DB Provider for ODBC Drivers error '80004005'

[Microsoft][ODBC Microsoft Access Driver]General error Unable to open registry key 'Temporary (volatile) Jet DSN for process 0xe54 Thread 0x1d54 DBC 0x8547d64 Jet'.

/script/catSearch.asp, line 58