

TECHNICAL DOCUMENT



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IBM 4059 Style (Optra S) Toner Cartridges

DOC-0242

OVERVIEW



These instructions cover the disassembly of the IBM 4059, style toner cartridges. The purpose of this disassembly is to vacuum out toner that will have spilled inside the cartridge during shipping and/or rough handling, to clean the debris cavity and to fill the toner supply housing with new toner. The disassembly can also be used to examine the internal parts of the cartridge for possible damage should the printing of the cartridge be poor and not correctable by other means.

The IBM/Lexmark 4059 laser engine can use two different cartridges, a high yield (17.6K yield*), and a standard yield (7.5K yield*). Both of these cartridges are available in what is called a "Prebate" version and the regular version. The Prebate cartridges are sold by Lexmark for approximately \$30.00 less than the regular cartridges. When the customer purchases and uses a Prebate cartridge, they agree to return the empty shell to Lexmark, and NOT to recycle it. Lexmark has threatened to fight legally any customer that has one of these cartridges recycled, and the recycler who recycles it. The regular cartridges can be recycled as much as you want. The legality of this program is currently being challenged in court in NY State, and possibly also in the Federal Courts. We will keep you posted on any future changes/updates. Other than the label, there is no difference between the Prebate cartridges, and the regular ones.

The Lexmark Part #'s for these cartridges are as follows:

- Prebate 7.5K* cartridge: 1382920 list \$183.00**
- Regular 7.5K* cartridge: 1382620, List \$213.00**
- Prebate 17.6K* cartridge: 1382925, List \$258.00**
- Regular 17.6K* cartridge: 1382625, List \$288.00**
* Yield based on 5% coverage
** List prices current as of June 1st 2000

The cartridge itself is similar in function to the older 4019-4049 cartridges. They have a similar Doctor Blade, Static Roller, and sealing blades.

Some of the major differences are that the PCR is not in the cartridge, it's in the printer, and is rated for 250,000 pages. The Wiper Blade inside the cartridge has an external felt brush that keeps the PCR clean. Another major difference in this cartridge is the design of the toner hopper. Although the technology used in printing is similar to the other Lexmark cartridges, The design of these toner hoppers is completely different. To start with, each cartridge has an "Encoder Wheel" that tells the printer not only what cartridge is installed (17.6k or 7.5K), it is also used to tell the printer how much toner is left. This wheel is located on the mixing blade shaft in the toner hopper, a full hopper will have a certain amount of drag on it, this will tell the printer the cartridge is full. A 1/2 full cartridge will have less drag and so on. The printer knows how fast the Encoder Wheel will turn at all toner levels. All it has to do is compare the actual speed or lag time to its memory, and it knows how much toner is left. Although the toner hopper is massive, you should not fill it with more than 500g of toner (this is the full load for the 17.6K cartridge). Physically 500g of toner will only fill the hopper 1/2 way, but this is the maximum that can be used. The hopper uses a unique toner feed system where it actually pushes a controlled amount of toner over a "wall" inside the hopper where the Feed Roller can control the amount fed to the static roller. If too much toner is present, it will flow over the wall and saturate the development section, causing print defects.

One nice difference between this cartridge and the older 4019-4049 cartridges is that you no longer have to cut rivets and worry about keeping the gear plate alignment straight. The 4059 cartridges come apart easily in comparison. 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. All of the above points will be gone into further in the instruction manual itself.

REQUIRED TOOLS



The tools needed to successfully and safely recharge toner cartridges are as follows:

- Toner approved vacuum. The Atrix HCTV canister type toner Vac, OR the Atrix AAA toner vacuum. Some type of approved toner vacuuming system is important. Toner consists of very fine particles that will pass right through a normal vacuum filter and blow out the exhaust.
- A small screw driver (Common Style)
- A Phillips head screwdriver (#1)
- Needle-nose pliers

REQUIRED SUPPLIES



- 1 Bottle 4059 500g replacement toner for 17.6 k cartridge, use 1/2 bottle or 250g for 7.5k cartridge
- DPP-K Drum padding powder (Kynar) Do NOT use Zinc Sterate on these cartridges!
- CT-100 Cotton Swabs
- FR-8 Isopropyl Alcohol
- PW-96 Poly Wipes Cotton Pads
- Long life OPC Drum (Optional)
- Wiper Blade (Optional)
- Shipping Lock
- Felt Wand
- Recovery Blade
- Conductive Grease

PREPARE WORK AREA



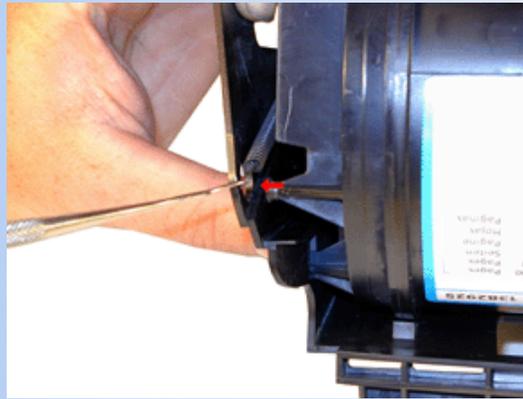
1. Before proceeding with the following procedure you should have a work area available with approximately 4' x 3' clear space. It should be covered with some disposable paper since toner will spill on this area. It is recommended that brown craft paper be used and taped to the work area. This will hold the paper in place when trying to vacuum toner from the paper.
2. An empty garbage can with a strong plastic liner should be adjacent to the work area to empty used toner. It should be at least 2' deep to prevent toner from clouding up and over the top of the bag during disposal.
3. Have a few rags available and some disposable paper towels in case of toner spillage. Toner Magnet cloths are perfect for this.

4. The work area should be capable of being ventilated, if by accident toner becomes dispersed into the air. An exhaust fan in one window is recommended for ventilation.

DISASSEMBLY



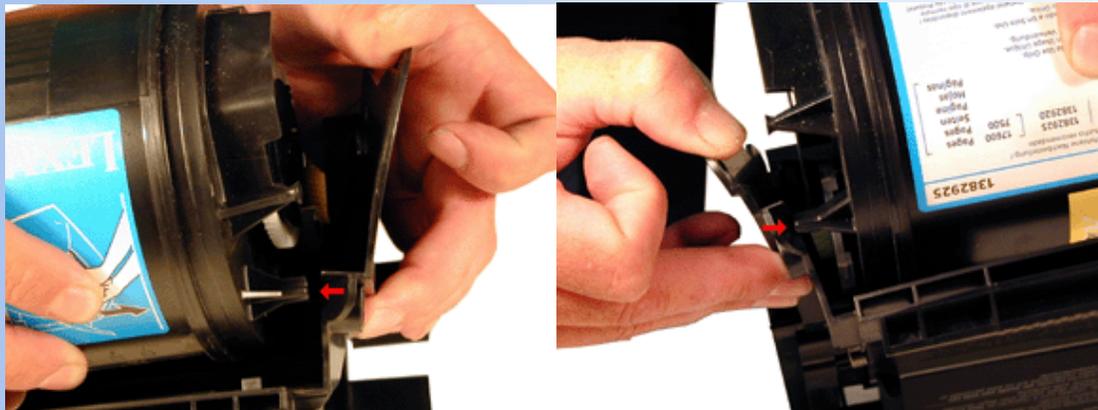
1. Vacuum the exterior of the toner cartridge.
2. Place the cartridge on the bench drum side up (Label face down), and the toner supply towards you.
3. With the needle nose pliers or a spring hook, remove the two springs from each end of the cartridge.



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.



5. Note that there are two posts from the hopper that fit into the cartridge shell. Pull the shell out to release the posts, and lift up the hopper so that the posts are free.



6. Slide the hopper to the right, and remove from the cartridge. Place the hopper aside.



REMOVE THE OPC DRUM



1. Turn the waste bin section of the cartridge so that the drum cover is facing you. Pull the drum cover open and press the front of the cartridge flat on the table. The weight of the cartridge will keep the cover open.



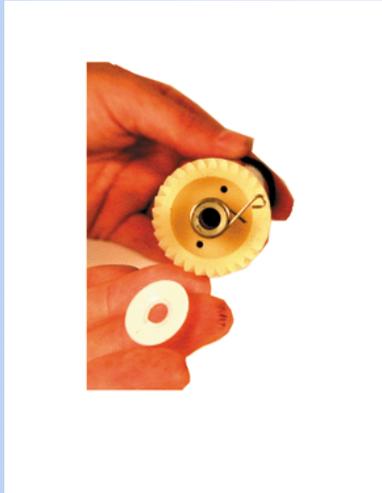
2. Remove the E-Ring from the small helical gear end of the drum axle. There is no need to remove the other E-ring.



3. Slide the Drum Axle out of the cartridge. Hold the small helical gear while pulling it out so that the drum is not damaged in the process.



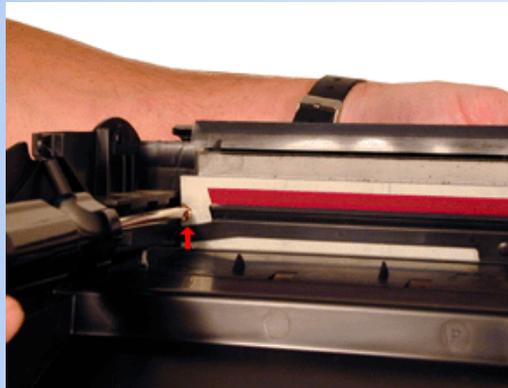
4. Gently lift the Drum and Drum washer up and out of the cartridge, and place in a light protected area. Be careful not to lose the spring and two washers from the large drum gear if present. Not all cartridges have this spring, if it was present, make sure you replace it, if not don't worry about it. It's purpose is to keep the drum from rotating backwards.



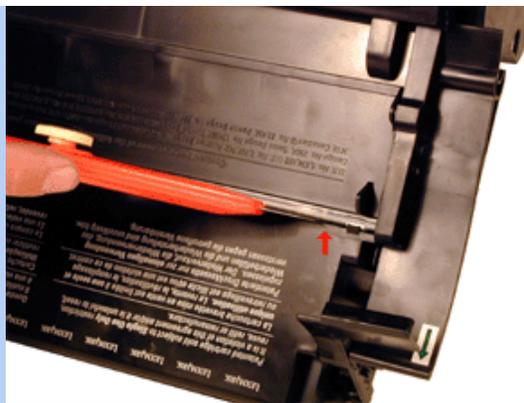
CLEANING THE DEBRIS CAVITY



1. 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.
2. To remove the Wiper Blade, start by removing the two screws from the Wiper Blade.



3. Turn the cartridge so that the waste bin is face-up. Take a razor blade and cut the tape that runs on top of the blade so that it is separated from the cartridge.



4. Remove the tape from the cartridge. Be careful not to damage the foam seals on either end of the cartridge.



5. 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.

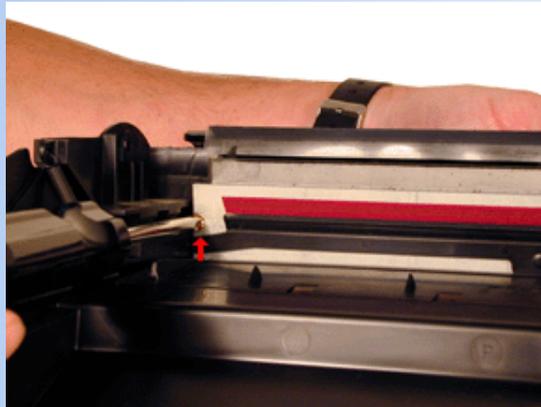


NOTE 1: The OEM Wiper Blade has the PCR cleaning assembly attached to it. It cannot be removed from the Blade without damaging it. Our new replacement Wiper Blades come complete with this assembly attached. The first after market Wiper Blades released did not have this cleaner attached. This is OK to use for one cycle, but they should be replaced with a blade that has the cleaning assembly attached.



NOTE 2: The "Starter cartridges" that came with a new printer do not have the PCR Cleaning Assembly on the Wiper Blade. They also come with approximately 250g of toner, for a 7.5k yield.

6. Pad the Wiper Blade with Kynar padding powder, replace the blade and two screws into the cartridge.



7. Place a piece of tape along the edge of the Wiper Blade. If the tape does not stick well, the area should be cleaned with alcohol. It is very important to get a good seal with the tape, otherwise the cartridge will leak.



NOTE: Be careful not to allow any tape into the laser port opening!





1. With a small common screwdriver, gently pry off the Yield Wheel. Pry it off from the center shaft so that the wheel does not become damaged. Place the wheel in a safe place. Remember, this wheel tells the cartridge what type of cartridge it is, and also how much toner is left. If this wheel becomes damaged, it must be replaced with a wheel from another cartridge. The wheels are stamped either 7k for the standard cartridge and either 15k or 17.6k for the high yield cartridge. The 15k stamp was used only in the earlier cartridges. See diagram #1 for pictures of the two wheels.

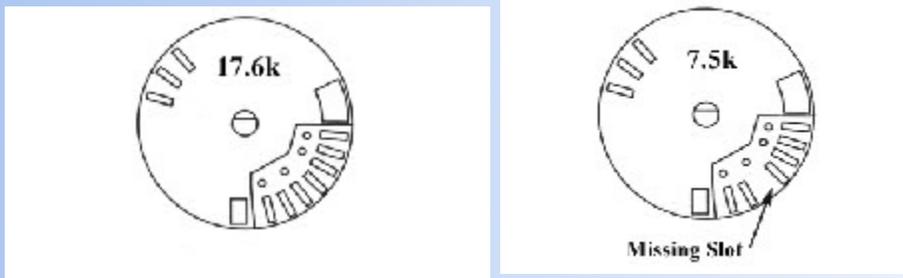
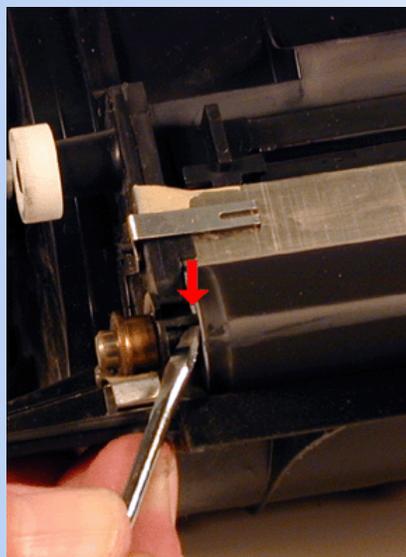


Diagram #1

2. Remove the Doctor Blade Spring by pressing down on the center of the spring.



3. On the left side of the Static Roller there is a small bushing, take a small screwdriver, and turn the bushing up so that the notch on the bushing is facing up. This will release the bushing, and Static Roller.



4. Remove the Static Roller, and bushing.

NOTE 1: 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.

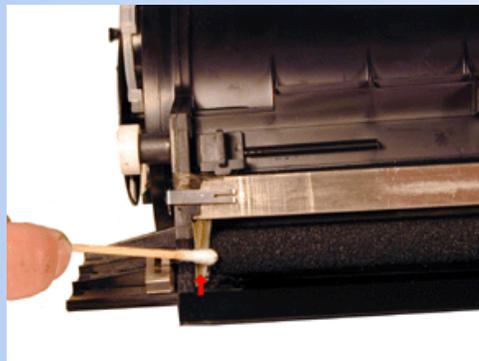
NOTE 2: If you are using compressed air to clean the supply chamber, leave the static roller in the chamber. This will ensure that the retaining blades inside the hopper will not be torn loose by the air. After the supply chamber has been blown clean, remove the Static roller, and carefully vacuum the area behind it clean.



5. Remove the fill plug from the hopper. Pry the plug out from the base next to the hopper. This fill plug is also unique to this cartridge, the 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.



6. Vacuum the Toner Hopper clean.
7. 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 clean the electrical contact that touches the Static Roller shaft.



8. 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.
9. Clean the edge of the Doctor Blade with a piece of Scotch Brite pad. This is an important step in obtaining even blacks and gray scales.



10. Install the white washers on the static roller, and on the NON-Keyed end of the Static roller, install the brushing.



11. Place the keyed end of the Static Roller into the cartridge, and install the roller. Turn the bushing so that the notch is facing down. This will lock the roller in place.



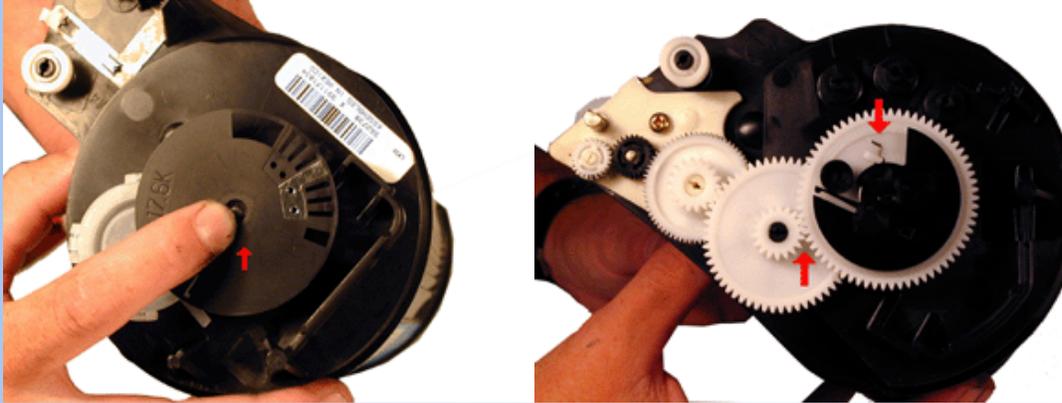
12. Install the Doctor Blade Spring.



13. Fill the hopper with the appropriate amount of toner. Remember, the amount of toner that can be placed in the cartridge is controlled by the Encoder Wheel. Use 480G for the 17.6k cartridge, and 250g for the 7.5k cartridge. Install the Fill Plug.



14. Install the Yield Wheel. Be very careful not to press in the wheel too far. The shaft will move out and you will get an ERROR 31 or 32. If this happens, push in the shaft from the opposite side and reset the spring loaded gear.

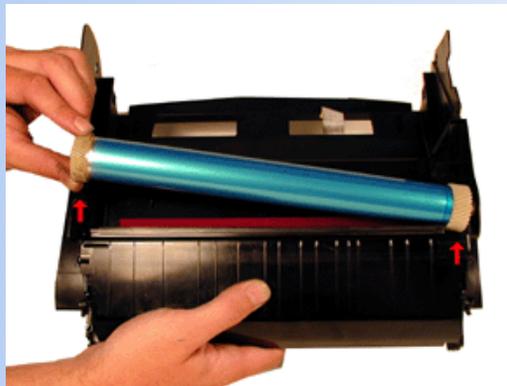


15. Place a small amount of conductive grease on the metal Static Roller Contact.

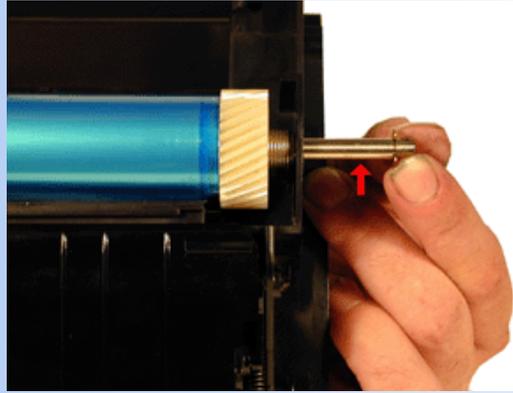
REPLACE TONER SUPPLY CHAMBER AND OPC DRUM



1. Place the Chassis on the bench Label side down with the Debris Cavity toward you, and the drum cover open.
2. Install a new recovery Blade with the Recovery Blade insertion tool.
3. Remove the drum from the light protected area, and blow off any remaining toner with the canned compressed air, and lightly coat with the DPP-K Drum Padding Powder, (Kynar). Do NOT use DPP (Zinc Sterate), this powder will ruin the wiper blade.
CAUTION: Be very careful not to tilt or shake the can while cleaning as the propellant may spray out of the can and possibly ruin the drum.
4. Place the OPC Drum into the cartridge with the small helical gear on the NON-Contact side of the cartridge.



5. 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.

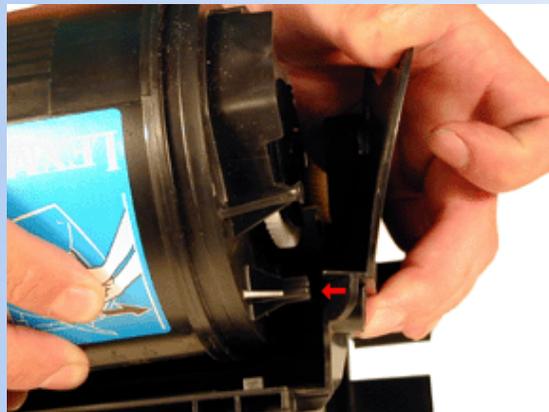


6. Install the E-Ring on the end of the axle.



7. Spin the drum for a few revolutions towards the drum cover to ensure the drum and wiper blade are properly lubricated.

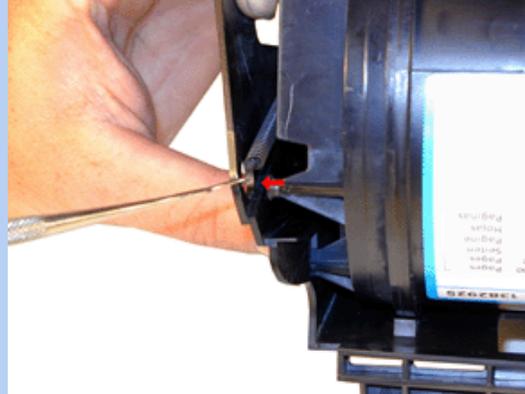
8. Take the Toner Hopper and install it left side first. Make sure the left side post is in its proper slot.



9. On the right side of the cartridge, pull the cartridge shell out so that the right side post falls into its slot.



10. With either the small flat head screwdriver or the needle nose pliers, replace both springs on to the Toner Supply Chamber.



11. Re-install the Static Roller drive gear.



12. 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 in the picture supplied with the lock. When packaging the cartridge, make sure you include a new Felt Wand.



13. Replace the wand in the machine by lifting up the external plastic cover located over the fuser assembly. Unlike most other printers, this area cannot be reached from the inside of the machine!



TROUBLE SHOOTING



A common problem is ERROR 31 or 32. This is usually caused when the Yield wheel is pressed in too hard and the shaft that it rides on moves out. To reset this press the shaft in from the opposite side of the wheel, and reset the spring loaded gear

Before taking any test prints, there are a few items in the printer that should be maintained to ensure optimum print quality. If these items are not maintained, they could cause print defects that may be incorrectly blamed on the cartridge. 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.

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.

All of these items just covered, as well as the condition of the toner cartridge effect the print quality and should be checked before taking test prints.

Some of the more common toner cartridge problems are:

- **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.
- **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 2 times per page. Any drum defects will repeat 3 times per page based on the drum circumference of 5.2".
- **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.



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 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 drums circumference is 5.2" and therefore makes approximately two 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 0x8585024 Jet'.

/script/catSearch.asp, line 58