

TECHNICAL DOCUMENT



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Canon LBP-PX Toner Cartridges

DOC-0207

OVERVIEW



These instructions cover the recharging of the Canon EP-P toner cartridge used in the HP-4L,4ML, 4P, 4MP, and other printers using the Canon LBP-PX Laser Engine. The HP part number for this cartridge is 92274A. The Canon FX2 fax cartridge uses the identical supplies and remanufacturing methods. The FX2 can be tested in a PX machine but a PX cartridge will not work in a fax machine.

The EP-P toner cartridge takes a new direction for Canon. The toner supply and waste chambers are not separated as in other cartridges, and the cartridge just snaps together. Because of this, great care must be taken in separating the halves so that the plastic tabs are not broken.

The HP-4L, and 4P printers are also different in the fact that they have an energy saving "Sleep Mode" in which the printer powers down to a low power usage level. It should be noted that the 4L,4ML printers do not have a power on/off switch, and that the page count is a "power on" page count only. Every time the printer is unplugged, or power is lost, the page count is reset to Zero!

The other major difference in the 4L,4ML, is that there is no display panel, and there is only one switch to control functions,(the intensity and other functions are controlled through software only). The HP-4P printers have a fully functional display panel, and the page count is permanent as in other printers.

The purpose of this disassembly procedure is to vacuum out toner that will have spilled inside the toner cartridge during shipping and/or rough handling, to clean the debris cavity, and to clean and fill the supply chamber with new toner. This disassembly procedure should also be used to examine the internal parts of the cartridge for possible damage, or wear should the printing of the cartridge be poor and not correctable by any other means.

REQUIRED TOOLS



- Phillips head screw driver.
- Razor Blade
- Small Common screw driver
- Safety goggles and breathing mask.
- Needle Nose Pliers
- Vacuum approved for toner

WARNING: Always wear safety goggles and breathing mask when working with or around toner. Do not disperse the toner into the air. Use approved toner vacuums and filters at all times.

Approved Vacuum systems:

Toner approved vacuum. The ATRIX HCTV shop vac style toner vac, or the ATRIX AAA portable toner. Some type of approved toner vacuuming system is important because toner consists of very fine particles that will pass right through a normal vacuum filter, and blow out the exhaust, creating a real mess.

If you do not have a toner approved vacuum, do not use any vacuum at all, just carefully dump the old toner into an empty, lined garbage pail.

REQUIRED SUPPLIES



- 99% Isopropyl Alcohol
- Sealing Strip
- Cotton Swabs
- Padding powder (DPP-K)
- Lint Free Cotton Pads
- 1 Self tapping screw #4 x 1/4"
- PX Toner 160 Grams
- Nu-Finish Car Polish
- Toner Cloths
- Can clean compressed air
- Wiper Blade
- New OPC Drum
- Doctor Blade
- Recovery Blade [Optional]
- Drum Cover DC-PX [Optional]

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. A 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. TM-1 Toner Magnets are ideal for wiping up toner dust.
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. If the circulation of air in the workplace is combined with other rooms in the building, toner dust may be carried into the other rooms. A separate and isolated HVAC system is recommended for the work area.
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DISASSEMBLY



1. Place the cartridge so that the HP label is facing you. Remove the Phillips head screw from the top right hand side.
2. Turn the cartridge over so that the gear is to your right. Locate the four small clips. Note: they are located just above four large notches and are in line with the ends of the drum cover bar.
3. Using a small common screw driver, pry open the clips. Work each clip out a little at a time until the top section is loose. (It will not separate yet).
4. Turn the cartridge around so that the drum gear is on the left side and the debris cavity is facing you.

5. There are four hidden clips along the seam of the debris cavity. With a small common screw driver, pry up along the seam until the entire section is loose.
6. On either side of the OPC Drum is a small clip, black on the left, and white on the right. Pry these clips loose.
7. Fully open the OPC Drum cover, and separate the two halves. Be prepared, toner will spill every where! None of this toner can be re-used because the toner will spill from both the supply section, and the debris cavity. They two halves should separate easily. If they don't, go back and release the clips that are still attached.

NOTE: If any of the plastic clips broke during the disassembly, see section 6.2 on how to repair them.

REMOVE THE OPC DRUM



1. Turn the section with the OPC drum over so that the drum is facing away from you.
2. On the side opposite the Drum gear, there is a large white plastic piece held in by a small plastic clip. Pry the clip loose, lift up on the two metal tabs with a small common screwdriver, and remove the entire piece. The two metal tabs are electrical contacts, be very careful not to bend them when removing.
3. Turn the cartridge back over so that the gear is to the left, and locate the wiping blade.
4. Remove the two screws, carefully pry up the blade, and remove.

NOTE: In some older cartridges that have not been recycled before, there is a piece of tape on the right side of the blade. Carefully cut this tape with a sharp razor knife. All of the newer cartridges do not use any tape.

5. Clean the Wiping blade, and lightly coat with (DPP-K) Kynar drum padding powder.
 6. Turn the cartridge so that the gear is facing you. In the center of the gear is a metal axle pin, with a threaded hole.
 7. Take the self tapping screw #4 x 1/4" and screw it in a few turns. With a pair of needle nose pliers, slowly and carefully pry out the axle pin. Be very careful with this and take your time. The pin has a very tight fit, and the cartridge can be easily damaged if too much force is used.
 8. Carefully remove the OPC drum, being very careful not to scratch it. Vacuum any remaining toner and debris from the drum, being very careful not to come into contact with the drum surface. Do not polish or wipe the drum with a dry cloth, since this may scratch the drum. Blow off any remaining dust using a can of compressed clean air. Never use un-filtered compressed air for this as un-filtered air will have small dirt particles which blown at high speeds, will damage the drum
- CAUTION:** Be very careful not to tilt or shake the can while spraying, as the propellant may spray out of the can and possibly ruin the drum.
9. Place the OPC Drum in a soft lint free cloth and then into a dark colored bag, or cover from bright light by some other suitable means. Again, do not rub or wipe the OPC Drum with a dry cloth as this may scratch its surface. Always handle the OPC drum with the utmost caution, since if damaged, it is costly to replace.
 10. Carefully vacuum the Magnetic roller clean.
 11. Replace the Wiper Blade.

CLEANING THE DEBRIS/SUPPLY CAVITY



1. Carefully remove the Primary Charge Roller (PCR) located next to the Wiper Blade. This is a small rubber roller with metal contacts on both ends.

WARNING: Do not clean this roller with alcohol, as this will remove the conductive coating on the roller. This roller takes the place of the corona wire assembly and it is recommended that it be cleaned with Nu-Finish car polish.

2. To clean the roller with the Nu-Finish car polish, apply a small amount, and buff with a clean lint free cloth until the roller is clean and shines. After the roller has been cleaned, clean the metal ends with alcohol. be careful not to get any of the alcohol on the rubber surface. For best results, we recommend that the roller be allowed to dry overnight before using. Place the PCR in a holder to dry. (A piece of wood with a hole drilled in it works fine).
3. Take the debris/supply section, place it so that the White gear is on the left, and vacuum clean. Be careful not to vacuum the gear up when vacuuming. Clean the U-Shaped PCR holders with a cotton swab, and alcohol.

NOTE: Be very careful not to bend or otherwise damage the small thin recovery blade located next to the Wiper Blade when vacuuming. If this blade is bent down lower than the height of the wiper blade, toner will accumulate on top of the blade and spill into the printer. If the blade does get bent, it may be possible to carefully bend the blade up equal to or slightly higher than the Wiper Blade. If the blade cannot be repaired, it should be replaced with a new Recovery Blade (RB-EX).

4. Clean off the remainder of the old sealing strip. The easiest way to scrape the remainder of the seal off is with a razor blade. Keep the edge of the blade at 90 degrees to the seal rail, and scrape clean. Vacuum the seal scrapings, and remove any remaining glue with alcohol and a cotton swab.
5. Push the fill plug out from the inside of the cartridge.
6. Place a small amount of rubber cement on both ends of the toner hopper. This will help ensure a good seal. Peel off the new seal's adhesive backing and place the sealing strip over the toner supply section. Make sure that the pull tab end of the seal will end up on the right side of the cartridge. This is the same side as the fill plug.
7. Fill with the correct toner. Replace the fill plug, and check for leaks.

RE-ASSEMBLE THE CARTRIDGE



1. The cartridge should be re-assembled by reversing section 4 and item 5.1, but basically it just snaps back together. Keep in mind the following when re-assembling:
 - A. Insert the large white plastic piece before replacing the OPC Drum. This will make it easier to line up the magnetic roller assembly. The end of the magnet inside the magnetic roller sleeve, has a keyed end that fits into a keyed slot in the large white plastic piece.
 - B. Make sure to coat the OPC drum with the Kynar (DPP-K) before installing.
 - C. Re-clean the PCR contacts with a cotton swab and alcohol, before re-installing the PCR.
 - D. The two halves should snap together easily. If they don't, part of the cartridge is out of place, and should be fixed before proceeding.
 - E. In most other cartridges that use a PCR, you must install the Kynar (DPP-K) coated OPC Drum before installing the PCR. Since the OPC Drum and PCR are mounted in different halves, all that needs to be done is to manually spin the drum so that the Wiper blade cleans off the Kynar (DPP-K). This way the PCR will not become contaminated with the (DPP-K) when the two halves are assembled.
2. If some of the plastic tabs were broken during the disassembly, we recommend using small, self-tapping screws (#4 x 1/4") to hold the cartridge together. If any of the 4 visible clips were broken on the supply chamber, you can insert a screw in the hole next to each clip. If any of the 4 hidden clips from the debris cavity are broken, 1 screw can be inserted through the flat area on each corner. If any of the two center hidden clips are broken, Black electrical tape can be used along the seam to hold the cartridge together. If screws or tape are necessary to repair the cartridge, we recommend that they be black in color so that they blend in with the cartridge.
3. Once the cartridge is fully assembled, it is a good idea to either place a label over the HP label, or remove it so that there can be no mistake that the cartridge has been re-manufactured. By doing this you will avoid any misinterpretation that this is a new OEM cartridge. This is also a perfect place for your company name and phone number.

TEST PRINTS AND PRINTER MAINTENANCE



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

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, paper dust, and/or toner dust, can contaminate the roller, causing light print and/or small white voids in the text. This roller should have no cuts, or areas of missing foam, and should be a medium gray color. If the roller appears dirty, it should be vacuumed clean. If the roller is damaged it should be replaced.

Anti Static Teeth; The anti-Static teeth are located just next to the Transfer Charge Roller. These teeth dissipate the static charge applied by the transfer charge roller to the paper. This helps prevent the paper from sticking to any of the rollers and causing a paper jam. If these teeth are dirty they should be vacuumed clean, or carefully blown out with a can of clean compressed air. Unlike most other printers, these printers do not come equipped with a brush to clean the teeth.

Laser Mirror; Underneath the front of the top lid is the laser mirror. The laser beam reflects off this mirror before striking the OPC drum surface. If this mirror becomes dirty, it will result in light print corresponding to the dirty areas on the mirror. If the mirror does become dirty, be very careful when cleaning it! The mirrored coating is on the outside of the surface, and not on the back as in most mirrors. HP recommends that to clean the mirror, the printer must be disassembled, and the mirror cleaned with compressed clean air. Never clean the mirror with a cloth, as it will scratch the mirror's surface.

Since the most important part of the toner cartridge is the OPC drum, special attention should be taken with this part. To help determine the condition of the OPC Drum, a test print should be taken with the printer's intensity set to the darkest setting. Having the intensity set to the darkest setting will help show up any possible flaws in the OPC drum that may not show up with the intensity set to the normal mid scale

In the HP 4L printer, there is not a physical intensity control, it has to be changed with the software that came with the printer and your computer. In the HP-4P the intensity can be changed by either the software, or by using the front panel controls and the following procedure.

Press the On-Line button Press the MENU button until CONFIG appears on the display Press the ITEM button until DENSITY= appears Press the + button until the display shows DENSITY=5 (The density has a range of 1-5, with 5 being the darkest) Press the enter button to save the selection

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.

To run a test print on the 4L, press the main button on the left side once. If the ready light is out, you will have to press the button twice. A test print of both text and graphics will now print. This print will also tell you what the intensity is set to.

To run a test print on the 4P, use the following procedure:

- Press the On-Line button so that the ready light goes out Press the MENU button until TEST appears on the display Press the ITEM button until PCL Demo appears Press enter, and a single page will print
- There are multiple different test prints that can be run from this printer, but we recommend the Demo page, because of it's combination of text and graphics.

Once you have the print out's, they need to be examined to determine possible cartridge defects. In general, any marks on the paper that shouldn't be there indicate a problem. We will also examine print areas for abnormalities such as light print, poor black fills and print inconsistencies.

Some of the more common toner cartridge problems and associated test prints are:

- A Dirty Primary Charge Roller (PCR); The primary charge roller is located Inside the cartridge, and if dirty will show on the test print as vertical gray streaks down the page, or as a gray background throughout the page.
- A Dirty PCR Connection will result in dark black horizontal bars across the page, or as shading throughout the page.
- A Scratched drum will show up as a very thin, perfectly straight line that runs from the top to the bottom of the test page.
- A Chipped drum will result in a dot or series of dots that repeat 4 times per page. Any drum defects will repeat 4 times per page based on the drum circumference of 2.95".
- A Light damaged drum will show up as a shaded area on the test print that should be white. Again this will repeat 4 times per page.
- A Bad wiper blade will result in vertical gray lines down the page, or as shading across the entire page. In either case there will be a film of toner on the drum surface.

CARTRIDGE PRINTING THEORY



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

In the first stage, the Primary Charge roller (PCR) places a uniform negative DC voltage on the OPC drum surface. This process is called conditioning.

In the second stage, (also called the imaging section), the laser beam will reflect off the mirror, and discharge this DC voltage to ground. The areas that are discharged, will leave a latent electrostatic image on the drum. The OPC drum's circumference is 2.95" or approximately 1/4 of a page and therefore makes four revolutions for each 11" printed page.

The third 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 variable DC bias voltage supplied by the high voltage power supply. This variable DC bias voltage is controlled by the printer's intensity setting, which in the 4L is controlled by the software only. 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 were not exposed to the laser beam. This AC potential improves the density, and contrast of the toner on the printed page.

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.

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. Any residual static charges on the paper are removed by the static charge eliminator. 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 fuser roller is a rubber roller that presses the page up into the upper fuser roller which then melts the toner into the paper. The Upper roller is

comprised of an instant on ceramic heating element, and a thin Teflon film. This roller when printing maintains a temperature of approximately 180 degrees C.

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.

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 and start the print cycle again.

The three advantages of the Primary Charge Roller are that it operates at a lower voltage than the old style corona wire, does not generate ozone, and it replaces the erase lamps that were present in the older style laser printers. The draw back to this technology is that if this roller becomes dirty, or contaminated in any way, the printed pages will have the problems as previously shown on the test pages. Since the Primary Charge Roller is not accessible from the outside of the cartridge, it cannot be cleaned by the user as the Primary Corona Wires can in older style cartridges.

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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 0x3464 Thread 0x21dc DBC 0x8437024 Jet'.

/script/catSearch.asp, line 58