

TECHNICAL DOCUMENT

Disassembly Instructions

EPL (LX Style), and FX-1 (Fax) Toner Cartridges

These instructions cover the disassembly of the EPL (LX style), and FX-1 toner cartridges. FX-1 cartridges can be tested in LX printers, but printer cartridges cannot be used in fax machines. The FX-1 cartridge has a set of "windows" in the toner supply section that serve as a separate Toner low test. The fax machine shines a light into one of the windows, if the light is picked up by the sensor on the other side, the fax machine will not print until a new cartridge is inserted. Received faxes will be held in memory. The Cannon part number for the FX-1 cartridge is FX-1 or H11-6221-220, the HP part # for the laser printer cartridge is 92275A.

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.

This procedure should be read in its entirety before proceeding with the actual recycling process.

Required Tools

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

- 1) Toner approved vacuum. The Atrix HCTV canister type toner vac, OR the Atrix AAA portable style vacuum.

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.

- 2) A small screw driver (Common Style)
- 3) A Phillips head screwdriver with removable tips
- 4) Small flush cutting electronic type wire cutters

Supplies Required

LX Black Toner
Sealing strip
Black Poly Bag
Long Life Drum
Wiper Blade (WB-LX) [Optional]
99% Isopropyl alcohol
Cotton Swabs (CT-100)
Lint free cotton pads (PW-96)
Nu-Finish car polish
Toner Cloths (TM-40)
Kynar Drum Padding Powder (DPP-K)

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Recovery Blade (RB-LX) [Optional]

New replacement pins with mushroom type heads (PIN-LX) [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 magnet cloths are ideal 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.

If the circulation of air in the work area room 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 room.

Disassembly

- 1) Vacuum the exterior of the cartridge.
- 2) Place the cartridge upside down with the pull-tab towards you, and remove the spring on the right hand side.
- 3) On each side of the of the cartridge there is a small metal pin that has a 1/16" Diameter and protrudes from the side of the cartridge approximately. 1/16". These pins serve as hinges for the Toner supply chamber.
- 4) Carefully pry these pins out using a small pair of sharp, flush-cutting electronic type wire cutters. Make sure you pry these pins out. If you try pull them out, you will strip the ends of the pins and they will never come out.
- 5) Remove the supply Chamber and put aside.

Separate Debris Cavity, and Drum

- 1) Remove the Two Phillips Head screws, and the white plastic pin with the metal in the center.
- 2) Remove the Photo conductive Drum being extremely careful not to scratch it. If the drum is going to be replaced with a new long life drum, skip to section 5. If it is going to be re-used, vacuum any toner and debris from drum being careful not to let the vacuum hose come in 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 from the Drum using compressed clean air. If there is any matter on the drum that must be cleaned off, use 99% pure Isopropyl alcohol (FR-8 Film Remover) and a soft lint free cotton pad (PW-96) to lightly wipe the drum surface, then blow off the Drum using compressed clean air.

CAUTION: Be very careful not to tilt or shake the can while spraying, as the propellant may spray out and possibly ruin the drum.

Always handle the Photo conductive Drum with the utmost caution, since if damaged it is costly to replace.

- 3) Place the Photo conductive 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 Photo conductive Drum with a dry cloth as this may scratch its surface.

Cleaning the Debris Cavity

The storage area of the debris cavity is the entire area under the label.

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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) Gently shake the toner out of the debris cavity through the opening at the Wiping blade. When most of the used toner has been removed vacuum the rest out using either the 38 or 43m/m funnel on the end of the vacuum hose to get into the tight spots. If necessary, you can remove the recovery blade by taking out the 2 screws on either end of the blade.

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-LX).

4) Clean the rubber Wiping blade using a lint free cloth (PW-96) or a TM-1 Toner Magnet This blade removes excess toner from the drum and must be free of any foreign matter. Be careful not to damage this blade. Lightly coat this blade with Kynar Drum Padding Powder model DPP-K. Do not use plain DPP as this will stick to the charge roller and cause print defects, (Small white voids in printed areas)

It is possible to replace the Wiper Blade if it wears out or becomes damaged. To do this the entire flat section under the label must be removed. This is easiest done with a Dremel Saw (Hobby saw). Using the small circular blade, cut around the entire cover. Keep the blade at a 45 degree angle so the cover will have a lip to sit on when replaced. Once the cover is removed, you have clear access to the two screws that hold the wiper blade on. When replacing the cover, use a good silicon sealer around the edge to both seal, and glue the cover on.

Cleaning the Toner Supply Housing

The toner supply housing consists of the toner supply, magnetic roller and doctor blade which mounts directly next to the magnetic roller. The doctor blade consists of a metal bar that sits next to the Magnetic roller, with a rubber blade attached to it that rides under the roller. It is the pressure of this rubber blade against the magnetic roller that controls the amount of toner on the magnetic roller.

Before cleaning the toner supply, first rotate the magnetic roller by hand and observe the layer of toner applied to the magnetic roller. The toner should form an even consistent layer of toner with no clumps or lumps showing. Should the layer of toner be thicker in some areas the magnetic roller should be cleaned using 99% pure Isopropyl alcohol (FR-8 Film Remover). Always remove the roller for cleaning and make sure it is completely dry before re-installing it. If there are small lines of no toner on the magnetic roller sleeve, the Doctor Blade must be either cleaned, or replaced.

NOTE: The magnetic roller is keyed on both sides, not just one as in all the other cartridges.

1) Remove the 1 1/4" fill plug on the end of the Toner Supply Housing. This housing contains the magnetic metal roller and the toner supply area. Dump the toner out of this housing and save or discard as desired. Vacuum the outside of the housing and the magnetic roller. Turn the metal roller a few times to vacuum all sides of the roller. Inserting the vacuum end up to the 1 1/4" fill hole while turning the magnetic roller aids in complete toner removal.

At this point, if you are going to ship the cartridge, the sealing strip must be inserted. The only seal available for this cartridge is the OEM type SS-LXO seal. For proper installation, please refer to the individual SS-LXO seal instructions.

2) Fill the supply with new toner and replace the fill cap

Reassemble Toner Supply Housing, Photo conductive Drum and Debris Cavity

- 1) Replace the drum into the debris cavity being extremely careful not to scratch or damage the drum. Insert the drum axle pin and Phillips head screws. Be certain the gears between the drum and cavity are meshed properly.
- 2) Re-assemble the Cartridge by replacing the toner supply housing, inserting the small metal pins, and replacing the spring.

NOTE: When replacing the small metal pins, be careful not to push them in too far, or you won't be able to remove them again. Approximately 1/16" should be left exposed. Replacement pins (PIN-LX) are available which have a mushroom type head and are much easier to remove.

Printer maintenance and Test Prints

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 are not maintained, they could cause print defects that may be incorrectly blamed on the toner cartridge.

Located in the base of the front lid, 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.

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 off with a can of clean compressed air. Unlike most other printers, these printers do not come equipped with a brush to clean the teeth.

The separation pad should be checked periodically to see if it is worn. The separation pad makes sure that only one page at a time is fed into the printer. To remove the pad, first remove the toner cartridge, and pull straight up on the clear plastic tab. A worn pad will have a shiny, glazed, or grooved surface. If the pad is OK, clean it with a dry lint free cloth, and replace. If the printer is feeding more than one page at a time, this pad should be changed.

The Canon LBP-LX engine is unique in that most of the mechanical parts are located in the front lid of the printer. The Fuser Assembly, transfer charge roller, two paper pick-up rollers, and the four output rollers are all located here. In fact the paper path of this printer is from the paper tray, through the front lid, and out the top. The paper never enters the main body of the printer at all! This is also the first Canon laser engine designed to have a self cleaning fuser assembly, and does not use a felt wand to keep the fuser rollers clean.

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. This is with the slide control towards the right side of the scale, or set towards the thick end of the wedge shaped scale. Having the intensity set to the darkest setting will help to show up any OPC drum flaws that may not show up with the intensity set to the normal mid scale.

To run a test print, turn the printer Off-Line, and momentarily press the ALT, and TEST buttons. The display will show 05 Self Test, then 06 Print Test, and the machine will print two pages. The first will be a status page that combines both text and graphics, the second is a "Cleaning page". The cleaning page has a black bar that runs diagonally across the page. Each time a cartridge is changed, these pages should be printed.

The purpose of the cleaning page is to help keep the paper path of the printer clean. After it has been printed, it should be placed back into the paper tray face up, and the test prints run again. The toner on this page will become slightly sticky as it runs through the fuser assembly, and help remove any paper dust and /or dirt that may have been accumulating there. << (Show paper coming out) This process should be performed every time the cartridge is changed, or if you are experiencing paper jams at the fuser section.

The technology for self cleaning fuser sections was improved in later engines, making the cleaning paper process unnecessary.

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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. You should also examine print areas for abnormalities such as light print, poor black fills and print inconsistencies.

Some of the more common toner cartridge problems 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 3 times per page. Any drum defects will repeat 3 times per page based on the drum circumference of 3.66".

A Light Damaged Drum will show up as a shaded area on the test print that should be white. Again this will repeat 3 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.

A Bad Drum Axle Pin will show up as a solid or almost solid black page. The metal pin inside the plastic axle pin has shifted, and the drum has lost it's ground connection

Cartridge Printing Theory

The toner cartridge printing process is best explained as a series of steps, or stages. (See the following diagram)

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 discharge this DC voltage to ground wherever it strikes the OPC's surface, leaving a latent electrostatic image on the drum. The OPC drum's circumference is 3.66" or 1/3 of a page and therefore makes three 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. 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 then removed by the static charge eliminator, located in the fuser assembly. 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 fuser roller presses the page up into the upper fuser roller which then melts the toner into the paper. The upper roller is a hard Teflon coated, heated roller.

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.

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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 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.