

LEXMARK E120: THE "DISPOSABLE" PERSONAL PRINTER

By **VLADIMIR KAMENOV**



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The goal of the article to analyze and evaluate this modest personal printer. First of all, let's clarify what I mean by "disposable". Most of you, maybe, guessed the meaning of that word related to modern office equipment. Nowadays, every manufacturer of such equipment seeks to reduce production prices and maximize profits. Logically, this leads to a change of construction and production methods, especially in low segment personal printers. Gone are the days when a printer was built to last forever, like the famous Hewlett Packard II and III series. Today everything is made of plastic and clips. The printers are assembled by robots and, therefore, are sometimes very difficult to disassemble with hands. Also many parts are designed by CAD systems, and the safety coefficients of the materials are calculated on the edge of structural integrity. In other words, modern printers are very fragile. One more aspect is the cost of service repairs and maintenance. These days printers are so cheap to buy and replaceable parts are so expensive, that it is easier to buy a new printer when a failure occurs rather than repair the existing one. One more thing: often the price for a new OEM imaging module is higher than the printer itself (thank god, the remanufacturing industry is here). But no matter how developed the remanufacturing market in certain regions like Eastern Europe is, there are still problems with non-OEM service replaceable parts.

For example, in Bulgaria companies selling non-OEM parts limit their catalogues to only Hewlett Packard parts and support very few items from other brands. That way it is quite difficult to replace even a feed tire on a non HP printer. On the other hand, local companies representing officially the major brands of office equipment are almost exclusive monopolists. That means there is no competition on the OEM parts and supplies market. Sometimes, this leads to severe consequences. Here is another one from my experience: a local official Toshiba dealer refused to sell me any parts at all just because I wasn't certified by them to repair equipment under this brand.

After all the factors I mentioned above, it's up to you, dear reader, to decide what your opinion of modern office equipment would be. Now I want to take a closer look of the presented Lexmark E120 model. In this article the construction of the printer, the procedure of disassembly and some comments on the quality of the structure will be discussed.

Before I start, I want to mention that the construction and methods of disassembly and recycling of the imaging unit of the printer will not be the subject of this article.



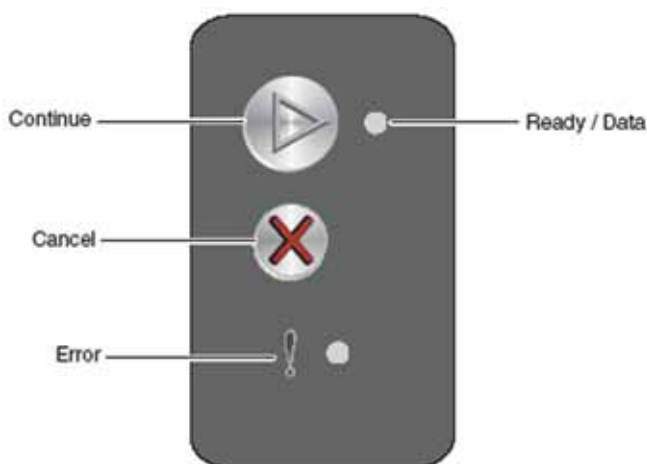
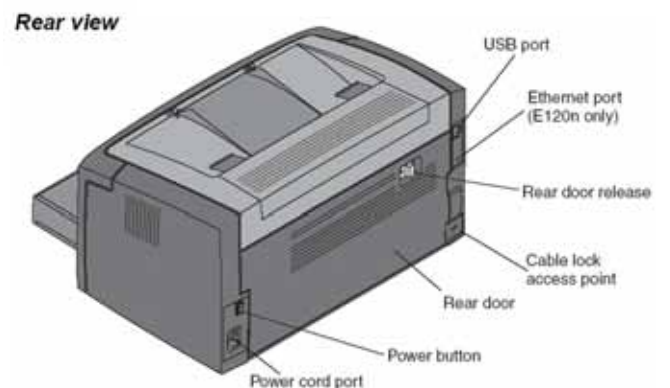
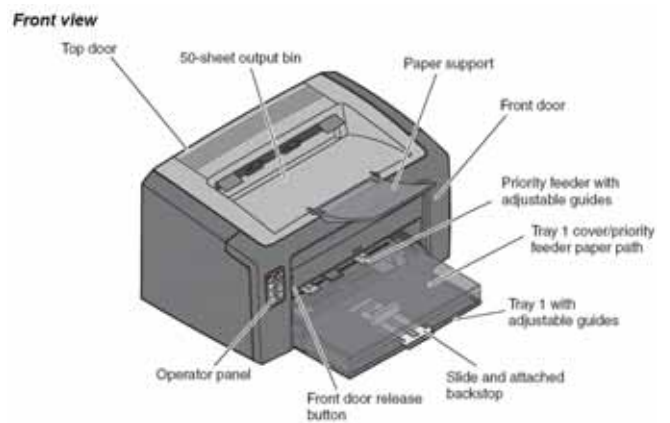
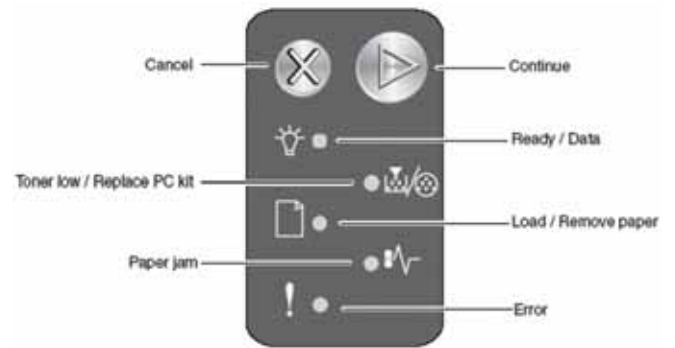
OVERVIEW OF THE PRINTER

There are two versions of the printer. The differences are shown on the table below:

Item	Lexmark E120 (4506-100)	Lexmark E120n (4506-110)
Base memory	8MB	16MB
Maximum memory	8MB	16MB
Paper	inputs	Primary tray (tray 1), Priority feeder (manual feeder)
Emulations	PCL	PostScript emulation (Mac only), PCL, XL
Compatibility	Windows	Windows, Macintosh
Connectivity	USB 2.0	USB 2.0, Ethernet
Photoconductor kit yield*	25,000 pages	

* Photoconductor yield based on approximately 5% coverage of pages.

- **E120 operator panel** - This model has two lights and two buttons.
- **E120n operator panel** - This model has six lights, two buttons, and an internal network adapter:



DIAGNOSTIC INFORMATION FOR LEXMARK E120

Here follows a brief description of the ways to diagnose the E120 printer. The E120n model's diagnosis will not be discussed here. For detailed description of both models refer to the service manual.

Light patterns and error messages


User attendance messages, paper jam errors, and service errors display an initial light pattern. This may be all the information you need. However, if you double-click the green button on the panel, a second pattern may appear with more detailed information. If you double-click again, a tertiary light pattern may appear. If there is not a tertiary pattern, the initial pattern reappears. Not all initial level light patterns have secondary patterns; when you double-click, the pattern does not change.

All service errors are indicated by all lights flashing as the primary notification or code. The secondary code indicates an area or function which has the error. Additional tertiary codes used for service indicate specific errors.

Primary, secondary, and tertiary light patterns

The table below uses the following symbols to indicate solid, or blinking light patterns. When a number accompanies the blinking symbol, it refers to the number of times the light turns off and on:

●	Light continuously on
	Light off
*	Light blinks continuously
3*	Light blinks three times, pauses and repeats pattern
x	Light blinking slowly

Primary		Secondary		Tertiary		Description	Action
Ready/ Data	!	Ready/ Data	!	Ready/ Data	!		
●						Ready/Power Saver	
x						Hex Trace Ready or Demo Mode ready	
*						Busy, printing job, printing font list, printing menu settings, printing the print quality test page.	
						Resolution reduced (no pattern displays)	
●	●					Flushing buffer, resolution reduced while cancelling job, resetting printer	
	*					Waiting or Not Ready (printer offline)	
	●					Close door	
*	*					Service error. Double-click  to display additional secondary and tertiary light patterns.	
	●	1*			1*	Close door (front door, rear door, or top cover door)	<ol style="list-style-type: none"> 1. Make sure the top cover door, front door and rear doors are closed. 2. Make sure the front and rear door posts which close the switches are not damaged. Replace the door if the part is damaged. 3. Check the switches of the front and rear doors. With the door closed, the outermost pins (1 and 5) of J14 or J11 should indicate continuity when checked with a meter. If a switch has failed, replace the printer.
	●	1*			3*	13 Invalid engine code or the code is not programmed. Code must be successfully downloaded to continue.	If the printer has had a code update just prior to this message, reload the code. Otherwise, replace the controller card.
	●	3*			1*	31 Defective toner cartridge or missing cartridge	<ol style="list-style-type: none"> 1. Verify that the toner cartridge and PC kit are correctly installed. 2. Wait 10–20 seconds for the printer to verify the units. 3. Replace the toner cartridge or PC kit if necessary.
	●	3*			2*	32 Unsupported toner cartridge	Replace the toner cartridge with one that is supported.
	●	3*			3*	33 Change cartridge or invalid refill	Install a new toner cartridge.

Primary		Secondary		Tertiary		Description	Action
Ready/ Data	!	Ready/ Data	!	Ready/ Data	!		
	●	3*			5*	35 Resource Save off; insufficient memory	<ol style="list-style-type: none"> Briefly press to temporarily disable Resource Save. Set Link Buffer to Auto.
	●	4*			2*	42 Cartridge region mismatch	<p>While the message is displayed, the following steps may be taken:</p> <ol style="list-style-type: none"> Go to the Diagnostics menu and print the print quality test pages. The first page shows the regions under "Cartridge Information." Change the cartridge to one corresponding to the region where the printer was purchased. Call the next level of support.
	*	1*			2*	12 Load media, load the manual feeder, or load the tray to complete side two of the manual duplex.	<ol style="list-style-type: none"> Load paper in the main tray. Check the driver for incorrect paper selections. Load paper for the manual duplex.
	*	1*			4*	14 Not Ready	<ul style="list-style-type: none"> Briefly press to return to the Ready state. Briefly press to return to the Ready state. Hold longer to reset the printer.
	*	3*			4*	34 Short paper	<ul style="list-style-type: none"> Verify the actual paper size matches the selected size in the driver or application. Briefly press to cancel the job. Briefly press to clear the message and continue printing. Hold longer to reset the printer.
	*	3*			7*	37 Insufficient collation area, memory too full	<ul style="list-style-type: none"> Set Collation to Off in driver. Briefly press to cancel the job. Briefly press to clear memory and continue printing the remainder of the job. Some data will be lost. Hold longer to reset the printer.
	*	3*			8*	38 Memory full	<ul style="list-style-type: none"> Delete fonts, macros, and other data in RAM. Simplify the print job. Briefly press to cancel the job. Briefly press to clear the message and continue printing. Some data may be lost. Hold longer to reset the printer.
	*	3*			9*	39 Complex page	<ul style="list-style-type: none"> Try simplifying the job. Briefly press to cancel job. Briefly press to clear message and continue printing. Hold longer to reset the printer.
	*	5*			4*	54 ENA connection lost during POR	<ul style="list-style-type: none"> Check the connections to the ENA and POR the printer. Briefly press to clear the message.
	*	8*			4*	84 Photoconductor near full	<ul style="list-style-type: none"> Customer should make plans to replace the PC kit. Briefly press to clear the message and continue printing.

Primary		Secondary		Tertiary		Description	Action
Ready/ Data	!	Ready/ Data	!	Ready/ Data	!		
	*	8*			8*	88 Toner low	<ol style="list-style-type: none"> 1. Replace the toner cartridge. 2. Briefly press  to clear the message and continue printing.
	*	10*	●	●	1*	201 Paper jam between input sensor and exit sensor	<ol style="list-style-type: none"> 1. Open the rear and top doors, remove the PC kit if necessary and clear the paper jam. 2. Check the paper path for the cause of the jam and repair as necessary.
	*	10*	●	●	2*	202 Paper jam at the exit sensor	<ol style="list-style-type: none"> 1. Open the rear and top doors and remove the paper jam. 2. Check the paper path for the cause of the jam and repair as necessary.
	*	10*	●	●	10*	200 Paper jam at the input sensor	<ol style="list-style-type: none"> 1. Open the front and rear covers, remove the toner cartridge and PC kit if necessary. Remove the paper jam. 2. Check the paper path for the cause of the jam and repair as necessary.
Service codes							
*	*	10*			10*	900	Reprogram or replace the controller card.
*	*	10*			1*	901 Service—Engine flash error	Flash memory if faulty. Replace the controller card.
*	*	10*			2*	902 Engine service errors	Replace the controller card.
*	*	10*			3*	903 Engine service errors	
*	*	10*			4*	904 Engine service errors	
*	*	10*			5*	905 Engine service errors	
*	*	10*			6*	906 Engine service errors	
*	*	1*			7*	917 Transfer roll	
*	*	2*			10*	920 Fuser is below temperature.	<ul style="list-style-type: none"> • Check all connectors to the fuser assembly. • Replace the fuser.
*	*	2*			1*	921 Fuser is below standby temperature.	
*	*	2*			2*	922 Fuser failed to reach standby temperature.	
*	*	2*			3*	923 Fuser is too hot during printing or at idle.	
*	*	2*			4*	924 The thermistor has an open circuit.	
*	*	2*			5*	925 Incorrect fuser lamp	

Primary		Secondary		Tertiary		Description	Action
Ready/ Data	!	Ready/ Data	!	Ready/ Data	!		
*	*	3*			10*	930 Wrong printhead installed	<ul style="list-style-type: none"> • Check all connections to the printhead. • Replace the printhead.
*	*	3*			1*	931 No first HYSNC	
*	*	3*			2*	932 Lost HYSNC	
*	*	3*			3*	933 Mirror motor locked	
*	*	3*			4*	934 Mirror motor lost lock.	
*	*	3*			5*	935 Mirror motor unable to reach operating speed	
*	*	3*			6*	936 Transport motor initial lock failed	<ul style="list-style-type: none"> • Check the connection to the main motor. • Verify continuity in the cable. • Call the next level of support.
*	*	3*			7*	937 Transport motor lost lock	
*	*	3*			9*	939 RIP to engine communications error	Replace the controller card.
*	*	4*			10*	940 Zero crossing failure	<ul style="list-style-type: none"> • Check the connections on the LVPS card. • Replace the LVPS.
*	*	5*			10*	950 Controller card failure—Data mismatch between secure EEPROM and NVRAM	If either the operator panel or controller card were replaced proceeding the error message, then either an incorrect card was installed or the printer was improperly powered on.
*	*	5*			1*	951 Controller card failure—Secure EEPROM failure	Note: The controller card and operator panel cannot be replaced at the same time without a POR in between. Printer settings on each FRU are obtained from the other. The settings are lost if both are installed and powered on at the same time.
*	*	5*			2*	952 NVRAM CRC failure	<ul style="list-style-type: none"> • Check all the connections on the controller card. • Replace the controller card.
*	*	5*			4*	954 NVRAM chip failure	
*	*	5*			5*	955 Code ROM/NAND failure	Replace the controller card.
*	*	5*			6*	956 Controller card failure	
*	*	5*			7*	957 Controller card failure	
*	*	5*			9*	959 Controller card failure	
*	*	5*			8*	958 NAND failure	
*	*	6*			10*	960 RAM memory errors	
							Replace the controller card.

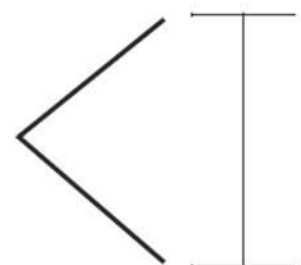
PRINT DEFECTS GUIDE

Match a set of repeating defects on a print job to the marks on one of the vertical lines. The line that best matches the defect on the print job indicates which particular part may be causing the defect.

Notes: Defects in graphics will be spaced very slightly further apart for the print cartridge and PC kit but the difference will not be noticed between two adjacent defects. Some components can be cleaned with a clear, dry, and lint-free cloth. If the defect appears on the printed side of a single-

sided print job, replace the toner cartridge before replacing the fuser.

For example, the distance between these two marks represents a repeating defect that occurs every 29.0 mm (1.14 in.), which means the charge roll may need to be replaced.



Primary		Secondary		Tertiary		Description	Action
Ready/ Data	!	Ready/ Data	!	Ready/ Data	!		
*	*	8*			10*	980 Engine is experiencing unreliable communications with the specified device.	Replace the controller card.
*	*	8*			1*	981 Engine protocol violation is detected by the device.	
*	*	8*			2*	982 Communication error is detected by the specified device.	
*	*	8*			3*	983 Invalid command is received by the specified device.	
*	*	8*			4*	984 Invalid command parameter is received by the specified device.	
*	*	9*			10*	990 Device equipment check	Replace the controller card.
*	*	9*			1*	991 Device system card failure	Replace the controller card.



free-tech

Hand solution

...serving the color

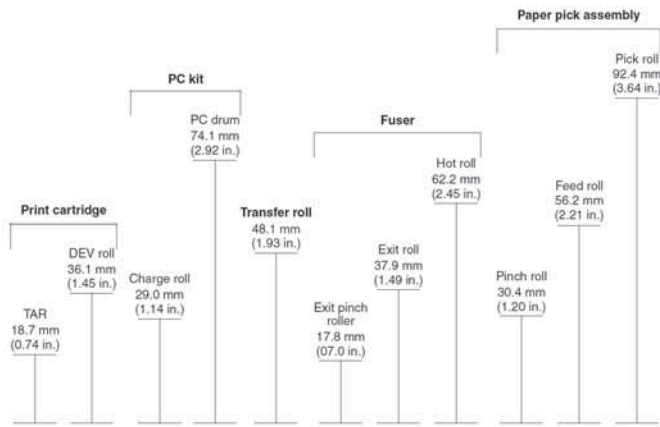
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Via S. Antonio, 51 loc. Giardoni - 82030 Limatola (BN) - ITALY pbx. +39 (0) 823484101 - fax +39 (0) 823487244
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Cod. F1110SA1640
**CONVERSION
SAMSUNG ML1610**
IN
**ML 1640
SCX-4725
XEROX PE220**
€ 0,9 each

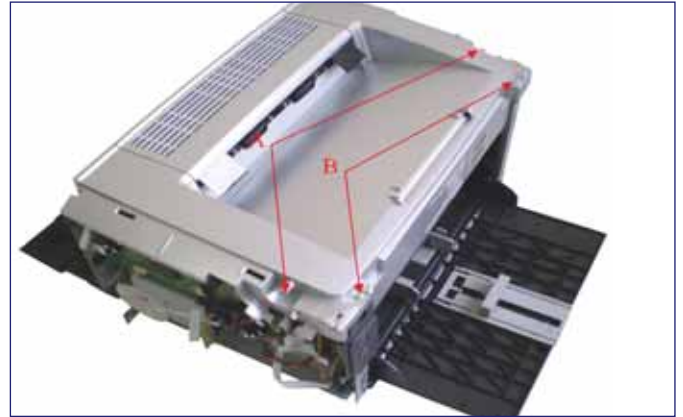


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€ 0,8 each





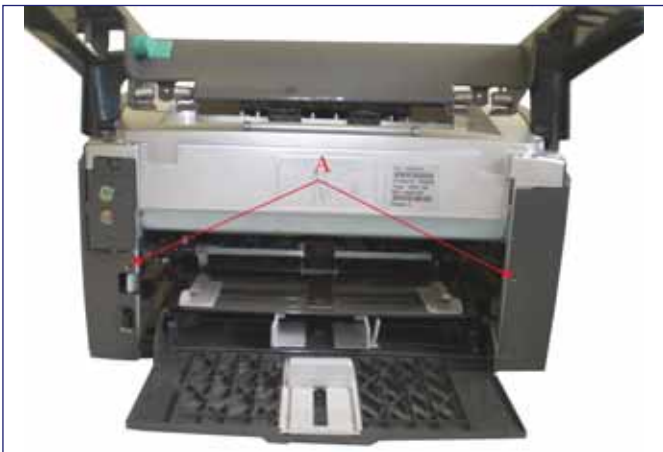
3. With the side panels removed, remove the front lid cover by bending the two hinges A aside. Remove screws B and then the top cover of the printer:



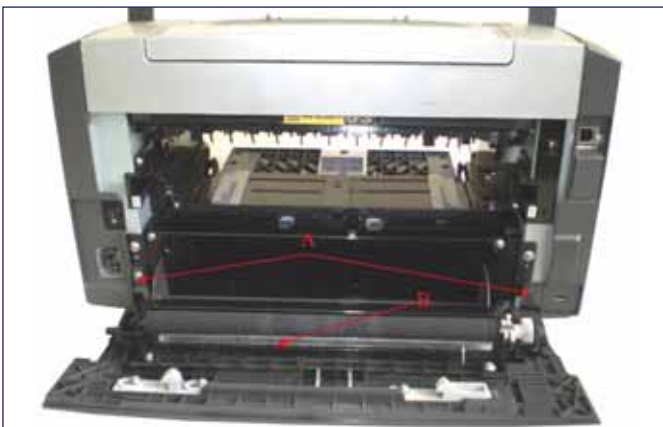
DISASSEMBLY AND MAINTENANCE OF THE PRINTER

The disassembly process of this printer is very simplified. Also the simplicity of its construction is confirmed by the modular structure of the laser scanner, fuser, paper feeder and transfer assemblies.

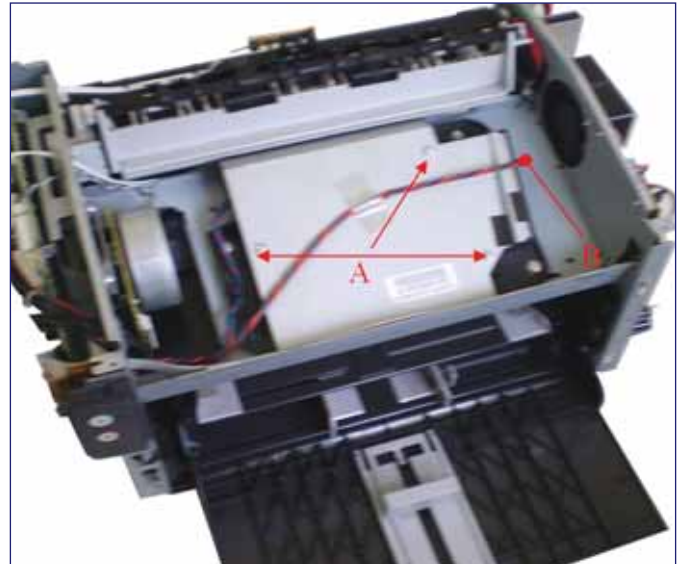
1. First we must remove the printer's covers. Open the front cover and remove screws A:



2. Open the rear cover of the printer and remove screws A. Notice the unconventional position of the transfer roller. This design helps for easier cleaning and change of the roller. At this point the transfer roller and the static charge eliminator B can be vacuum cleaned. Remove the two side covers by prying them apart sideways.



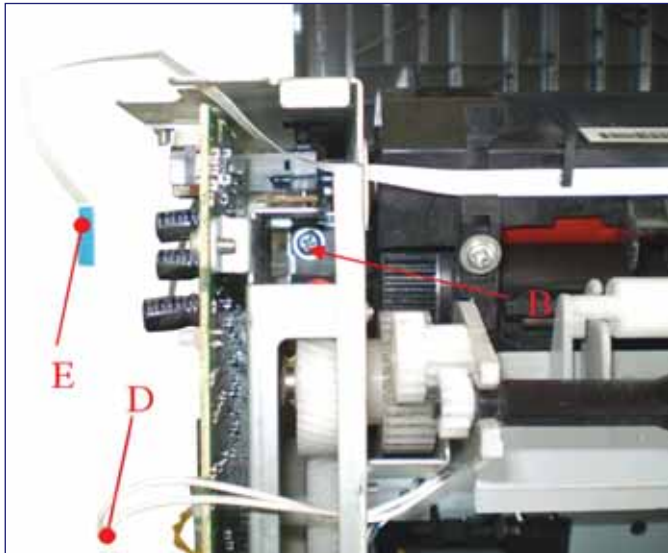
4. At this point it is time to clean the laser scanner assembly. Notice the easy way to reach it by removing simply three covers. Remove three screws A and a connector B.



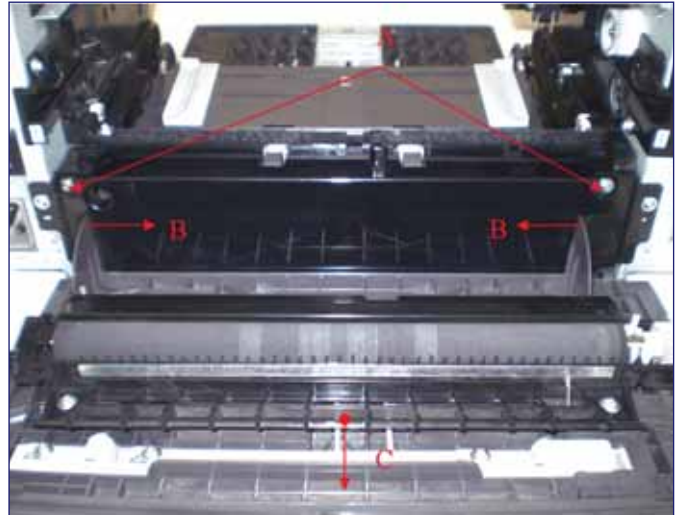
5. Vacuum the inside of the unit with a very soft brush. If necessary clean the lenses and polygonal mirror with cotton swab dipped in alcohol.



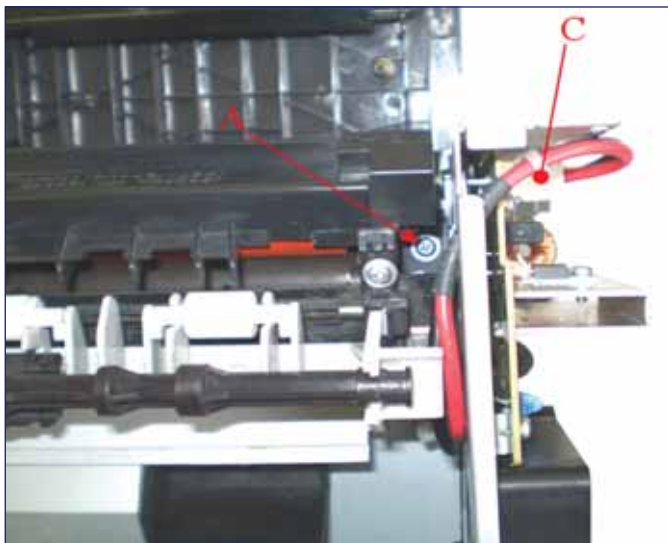
6. It is now time to remove the fuser unit. This operation is pretty straight forward. Remove screws A and B. Remove two connectors C, D and a flat cable E and remove the unit in the direction of arrow. Here again is visible the simplicity of the printer, especially in the drive gears which are not complicated at all.



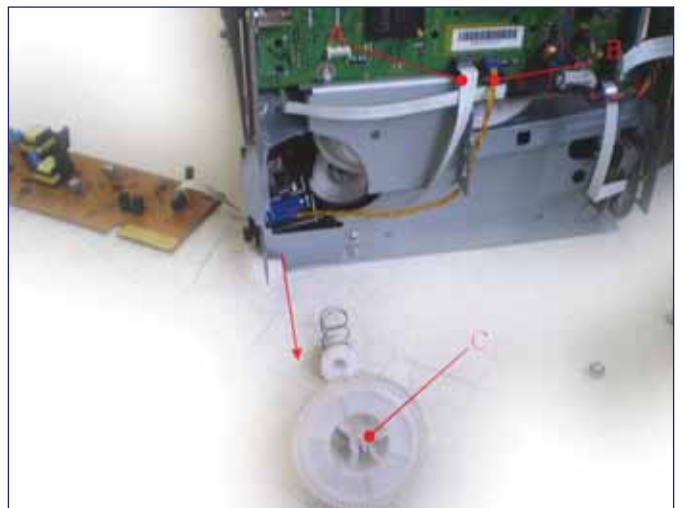
7. It is now time to remove the feeder assembly. Remove screws A. Bend arms B and remove the rear lid cover. Remove the inner cover C.



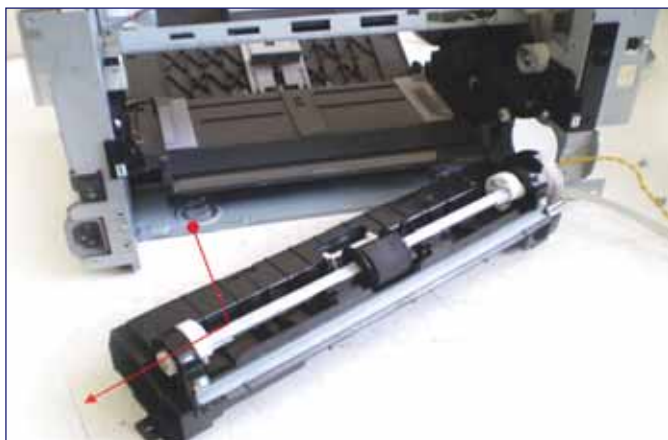
8. Remove screws A, unplug the flat cable and remove the board B. Remove screws C.



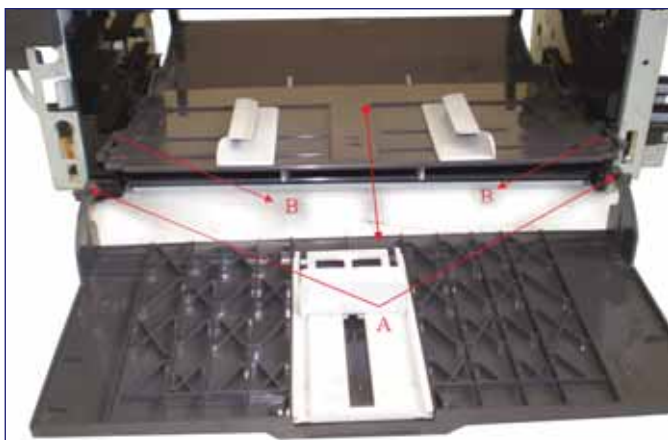
9. Unplug the connectors A and B. Remove the gear coupler C by prying it off the feed roller shaft.



10. Remove the feeder unit.



11. Remove the front paper tray by bending it and releasing the legs A. Remove the paper guide plate by pressing the tabs B and pulling it out. Now you can completely clean the inside of the printer with vacuum cleaner.

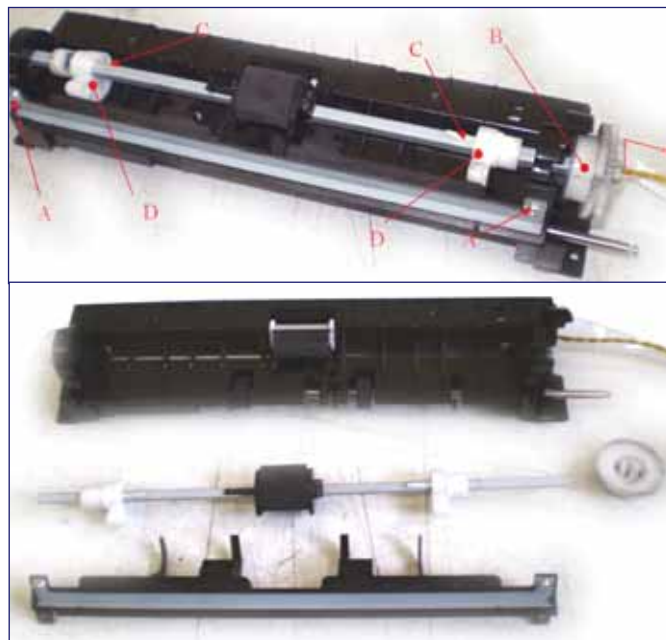


12. Now the entire printer is taken apart, clean it and all its modules with vacuum cleaner



13. Now it is time to take apart the paper feeder unit. It is very simple in construction and the replacement of the paper pick up roller doesn't require the entire printer to be taken apart. The module looks reliable and the only concern is the use of

solenoid to control the movement of the feed roller. Sometimes these fail and are expensive to buy. Remove screws A. Remove the gear coupler B by lifting the plastic tab on the gear. Lift plastic tabs C and slide inwards the paper tray control cams D. Now the entire paper feed shaft can be removed and the paper feed tire and the separation pad can be cleaned or changed.



14. Finally, it is time to take apart the fuser unit. The first thing that makes impression is the use of aluminum Teflon heat roller on such cheap printer, rather than a fixing film. This speaks well about the reliability of the module. Also the construction of the fuser is very simple and easy to work on. Start by removing screws A and taking apart the two parts of the module. Be careful with the heater lamp. Remove screws B and the exit assembly C. Remove screws D of the heater lamp. Now you can remove the heat roller with the lamp and the paper guide altogether. At this point it is good to clean the components of the unit with acetone, excluding the heater lamp. Namely – the Teflon heat roller, the pressure roller, the thermo fuse and the thermistor all become dirty with fused toner, and acetone is the solution.



The assembly of the printer can be done in the opposite manner. There are no special requirements and adjustments needed. **RCE**