# 4. Alignment and Adjustments

4.1 Sample Pattern

This product has the several sample patterns for maintenance. With the sample patterns, check the existence of the abnormality. The patterns help to regularly maintain the product.
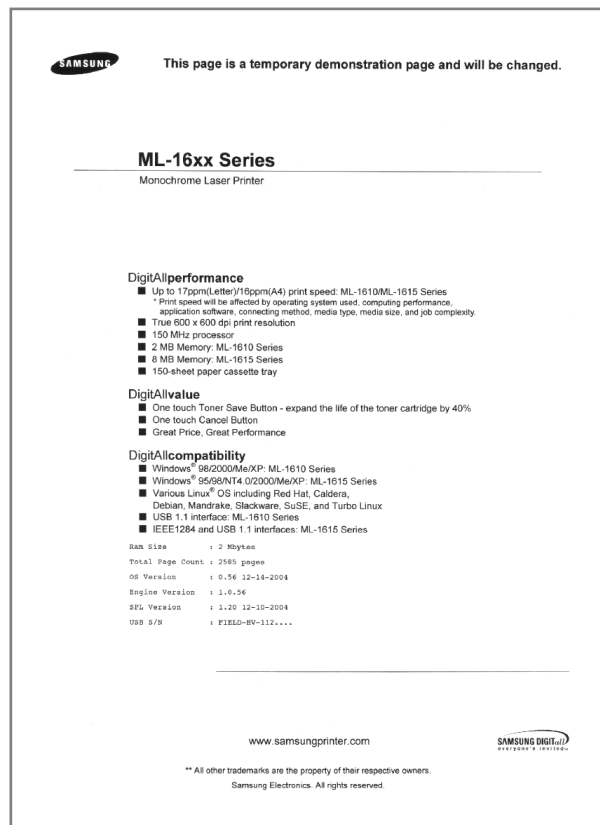
4.1.1 Printing a Demo Page

Print a demo page or a configuration sheet to make sure that the printer is operating correctly.

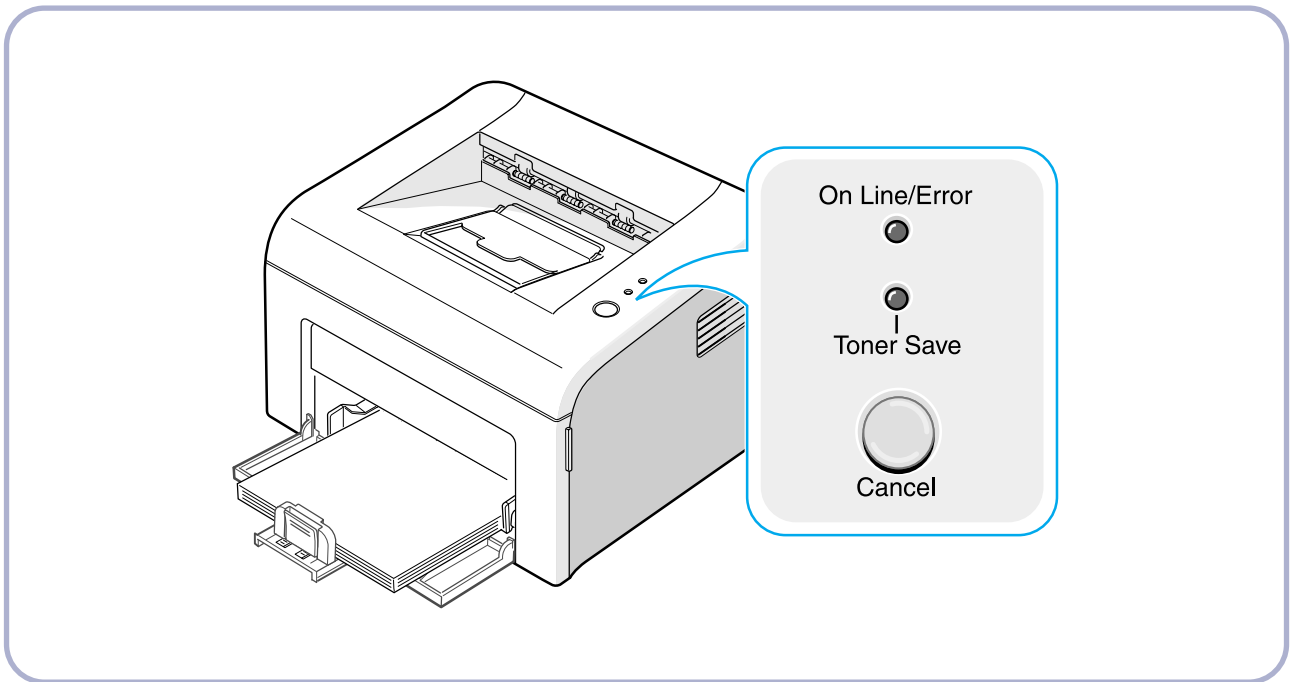   1) Hold down the Cancel button for about 2 seconds to print a demo page.
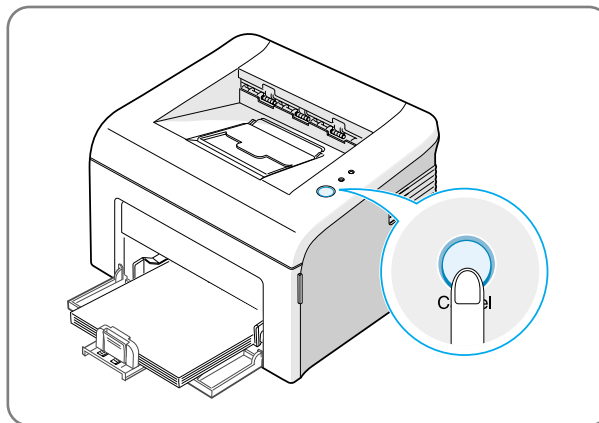
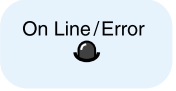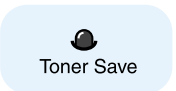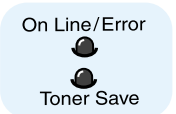   2) The Demo page or the configuration sheet shows the printer's current configuration.

Samsung Electronics

4.2 Control Panel

4.2.1 OP Panel

4.2.2 On Line/Error and Toner Save LEDs

LED	Description
On Line/Error	If the On Line/Error lights green, the printer is ready to print.
	If the On Line/Error lights red, the printer is experiencing an error, such as jammed paper, no paper, the open cover or the empty toner cartridge.
	If you press the Cancel button while the printer is receiving data, the On Line/Error LED blinks red to cancel printing.
	In Manual Feed mode, if there is no paper in the tray, the OnLine/Error LED blinks red. Load paper into the tray and the LED stops blinking.
	If the printer is receiving data, the On Line/Error LED slowly blinks green. If the printer is printing the received data, the On Line/Error LED blinks green fast.
Toner Save	If you press the Cancel button in Ready mode, this LED is on and the Toner Save mode is enabled. If you press this button once again, this LED is off and the Toner Save mode is disabled.
On Line/Error Toner Save	If the On Line/Error and Toner Save LEDs blink, your system has some problems.

4.2.3 Cancel button

LED	Description
Printing demo page	In Ready mode, press and hold this button for about 2 seconds until all LEDs blink slowly, and release.
Manual feeding	Press this button each time you load a sheet of paper in the tray, when you select Manual Feed for Source from your software application.
Canceling print job	Press this button during printing. The On Line/Error LED blinks while the print job is cleared from both the printer and the computer, and then return to Ready mode. This may take some time depending on the size of the print job. In Manual Feed mode, you can't cancel the print job by pressing this button.
Toner Save mode on/off	In Ready mode, press this button to turn the Toner Save mode on or off.

4.3 Consumables and Replacement Parts

The cycle period outlined below is a general guideline for maintenance.

The example list is for an average usage of 50 transmitted and received documents per day.

Environmental conditions and actual use will vary these factors.

The cycle period given below is for reference only.

| COMPONENT	REPLACEMENT CYCLE
Pick-up Roller	50,000 Pages
Transfer Roller	50,000 Pages
Fuser	50,000 Pages
Toner Cartridge	2,000 Pages(Sales), 1,000 Pages(Initial)

4.4 LED Status Error Message

ERROR	LED Status	DCU CODE
Open Fuser Error	The [Error] LED (red) and the [Toner Save] LED are simultaneously flashing every one-second.	60
Over Heat Error	The [Error] LED (orange) and the [Toner Save] LED are simultaneously flashing every one-second.	68
Low Heat Error	The [Error] LED (red) and the [Toner Save] LED are simultaneously flashing every 4 seconds.	62
LSU not Ready Error (Pmotor Error)	The [Error] LED (green) and the [Toner Save] LED are simultaneously flashing every one-second.	95
LSU Not Ready Error (HSYNC Error)	The printing is stop in the fad status, and the [Error] LED (green) and the [Toner Save] LED are simultaneously flashing every 4 seconds.	96

4.5 Periodic Defective Image

If the delinquent image regularly occurs in the printed-paper, it is due to delinquent or damaged roller.
Refer to the table in below and check the condition of the roller.

No	Roller	Defective image	Typical defect
1	OPC Drum	75.5mm	white spot on black image or black spot
2	Charge Roller	37.7mm	black spot
3	Supply Roller	47.5mm	light or dark horizontal image band
4	Developing Roller	35.2mm	horizontal image band
5	Transfer Roller	46.2mm	image ghost
6	Heat Roller	63.9mm	Black spot and image ghost
7	Pressure Roller	75.4mm	black spot on the backside

❶	OPC Drum	❺	Transfer Roller
❷	Charge Roller	❻	Heat Roller
❸	Supply Roller	❼	Pressure Roller
❹	Developing Roller		
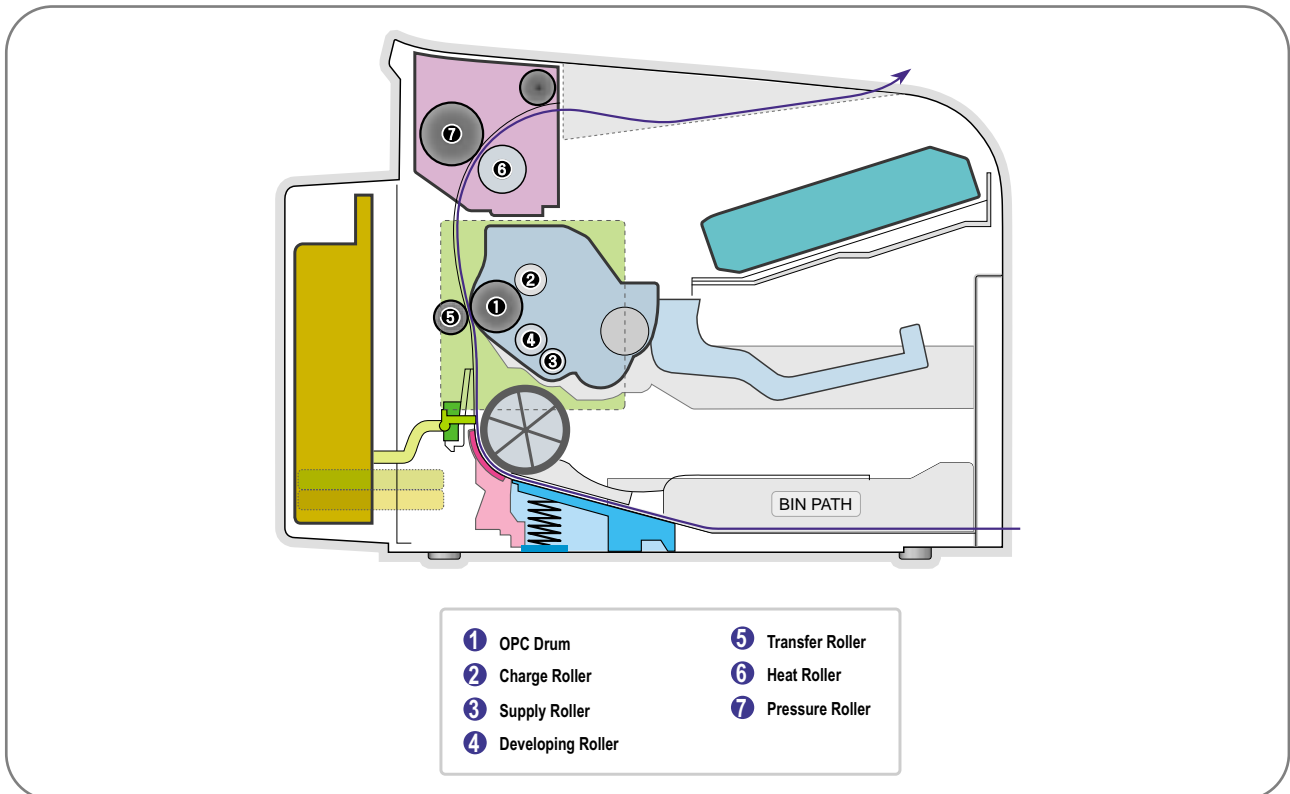
4.6 How to use DCU

4.6.1 DCU Setup

You can examine the malfunction of the printer. To perform DCU, open the front discharge cover and leave the connect the harness wire(10 pin/4 pin) to the CN1(ML-1610) of the Main control board.

SAMSUNG
ML SERIES DIAGNOSTIC CONTROL UNIT

04	DEV 300	DEV 350	DEV 350
05	LSU READY	LSU MT & LD	LSU MOTOR
07	PAPER EMPTY	PAPER WIDTH	NEW CRU
08		EXIT SENSOR	FEED SENSOR
09	COVER OPEN		
10	COER HEATING	PRINTING TEMP	READY HEAT

STATUS

DIAGNOSTIC

ON   OFF

SELF TEST

DIAGNOSTIC CODE

00	MAIN MOTOR OPERATING SYSTEM
01	MAIN HIGH-VOLTAGE ON
02	TRNSFER HIGH-VOLTAGE (-)ON
03	THV(+) REFERANCE VOLTAGE
04	DEV/SUPPLY HIGH-VOLTAGE ON/PTL ON
05	LSU OPERATING SYSTEM
06	PICKUP CLUTCH ON
07	PEEMPTY/PWITH/NEW CRU TEST
08	FEED & EXIT SENSOR TEST
09	COVER OPEN SENSOR TEST
10	FUSER TEST
11	HOT BURN TEST
12	CLEAN MODE PRINT
13	THV(+)TRIGGER, ALL HV & FAN ON
14	THV(+) REFERENCE ON

STATUS CODE

61	WARM UP
00	READY (REGAL)
01	READY (LETTER)
02	READY (A4)
03	READY (EXECUTIVE)
04	READY (B5)
20	PRINT START
30	FEED SENSOR ON
40	FEED SENSOR OFF
50	PAPER OUT
69	SLEEP MODE

ERROR STATUS CODE

60	OPEN FUSER ERROR
62	LOW TEMPERATURE ERROR
68	OVER HEATING ERROR
64	COVER OPEN ERROR
70	NO PAPERR
71	PAPER JAM 0
72	PAPER JAM 1
73	PAPER JAM 2
95	LSU NOT READY

DIAGNOSTIC MODE ——— DOWN ——— SHIFT ——— STOP

UP   ENTER

TO ENTER DIAGNOSTIC MODE, PUSH THREE BUTTONS SIMUL ANEOUSL AND TURN THE PRINTER POWER ON.

4.6.2 Code

Connect DCU to the printer and turn the power on. It show 7 Segment FND on the panel and each code tells the function of the printer.

1) Normal Code

While printing or warming up, it indicate the position of the paper

Code	State	Description
61	Warm up	The printer is on, the cover is open or close.
00~05	Ready(kind of paper)	The printer is ready, the paper is detected when the first paper is printed. 00: Legal ,01: Letter ,02: A4 ,03: EXEC ,04: B5 ,05: Folio, 06: A5/A6
20, 21, 22	Print Start	The engine controller received the print order from the video controller. 20: 1st, 21: MP, 22: SCF
30	Feed Sensor On	The paper is passing out of the Feed Sensor.
40	Feed Sensor off	The paper has passed out of the Feed Sensor.
50	Paper Out	The paper has passed out of Exit Sensor.
69	Sleep Mode	The fuser power turned off to minimize the power consumption.

2) Error Code

When detecting the malfunction, the printing is stopped to indicate error code.

Code	State	Description
60, 62, 68	Fuser Error	The error in the fuser occurred. There is a short circuit in the thermistor and the thermostat while printing, Low Temperature Error occurs. • 60: Open Fuser Error • 62: Low Heat Error • 68: Over Heat Error
64	Cover Open	The Printer Cover is open.
65	CRU Error	The Toner Cartridge not installed,
70	No Paper	No paper in the paper cassette.
71	Paper Jam 0	The front part of paper is jammed between pickup unit and Feed sensor.
72	Paper Jam 1	The front part of paper is jammed between the Discharge sensor and Feed sensor.
73	Paper Jam 2	The front part of paper is jammed just after passing through the discharge sensor.
76	Out Bin Full	The Out bin is filled with paper.
95	LSU Not Ready	LSU Scanner Motor not ready or Hsync signal not output.

4.6.3 Self Diagnostic Mode

If Error code occurs due to malfunction of the printer, perform Self Diagnostic Mode to solve the problem.

The printer works only in the self-test mode to solve the malfunction problem.
To enter the self-test mode, turn the power on pressing the buttons of [Down], [Shift] and [Stop] at the same time. Release the button within 2 or 3 seconds if 78 shows in the DCU. If 00 shows in the DCU, press the button [Up] or [Shift] to select the self+test , and press the button of [Enter] to operate. To stop, press the button of [shift] and [Enter] together.

Code	Description
00	**Main Motor Operating System** Only the main motor is in operation.
01	**Main High Voltage On(THV-)** -1400 voltage output by MHV terminal. *Caution : High voltage probe should be used.*
02	**Transfer High Voltage(-)On(THV-)** -1000 voltage output by MHV terminal. Caution : High voltage probe should be used.
03	**Transfer High Voltage (+)Reference on (THV +)** +1300 voltage output by MHV terminal. *Caution : High voltage probe should be used.*
04	**DEV/supply High Voltage** : DEV/Supply High Voltage Test. The left one of the three LEDs in the self-test panel is on when DEV high voltage Supply high voltage output by each HV terminal. Press the [Up] button to switch the voltage. The middle and right one of the three LEDs are on and -350 voltage output by DEV HV terminal. *Caution : High voltage probe should be used.*
05	**LSU Operating System** The scanning motor of LSU is in operation, the right LED of the three buttons on. Press the [Up] button to Check LD. LD is functioning and the middle button is on. If the LD is normal, all LEDs are on.
06	**Pickup clutch on** The Solenoid in the printer is in operation. To stop the operation, Press the button [shift] and [Enter] together.

Code	Description
07	Paper Empty Sensor Test : If activate the Actuator of the PEMPTY Sensor, the left and right of the three LEDs are on. Paper Empty Sensor ON/OFF 1st LED ON/OFF
08	Feed & Exit Sensor Test Test the Feed sensor and Discharge sensor in the same way as '07'. Feed Sensor ON/OFF 2nd LED ON/OFF Exit Sensor ON/OFF 3rd LED ON/OFF
09	Cover Open Sensor Test Test the Cover Open Sensor in th same way as code '07' Cover Open Sensor ON/OFF1st LED ON/OFF
10	Fuser Test If the [Enter] button pressed, the right LED is on and temperature of the fuser is up to READY Mode. If the [Up] button pressed, the middle LED is on and temperature of the fuser is up to Printing Mode. If you press the button once more, the left LED is on and temperature of the fuser is up to overheat Mode.
11	Hot Burn Test If the [enter] button pressed, the printer is continuously printing without detection. Turn the power off to stop operation.
12	Cleaning Mode Print Mode Print the paper to clean the OPC Drum in the Cartridge.
13	THV(+) TRIGGER. ALL HV : All high voltage output by each HV terminal and LSU and the fan is in operation. In this mode, electronic resistance of transfer roller and high voltage is detected.
14	PTL Test : (ML-1610 : not design) Indicates the function of the PTL, same method of the code '07'.
15	Fan Test : Indicates the function of the Fan, same method of the code '07'.
16	Manual Pickup Test : Indicates the function of th Manual Pickup, same method of the code '07'.
17	Manual Sensor Test : Indicates the function of the Manual Sensor, same method of the code '07'.

No.	Function	Enter	Up/Down			Stop	Remark
00	Motor	Motor Run				Motor Stop	
01	MHV	Mhv On				Mhv Off	-1300V
02	THV(-)	Thv Negative On				Thv Negative Off	-1000V
03	THV(+)	Thv On				Thv Off	+1300V
04	DEV	Dev On	Supply	DEV		Dev Off	-350V
			0 : -550V	0 : -350V			
05	LSU	LSU Run	● On	● Off	● Ready	LSU Stop	020mV
06	PickUp	Pickup On				Pickup Off	
07	PEmpty		● Paper Empty	●	●		
08	Sensor		●	● Exit	● Feed		
09	Cover		● Cover Open	●	●		
10	Fuser	Fuser On				Fuser Off	
11	HotBurn	HotBurn On					
12	Clean Print	Clean Printing					
13	Thv Reference		● low	● adequate	● high		
14	PTL	PTL On				PTL Off	PTL
15	FAN	Fan On				Fan Off	
16	Manual PickUp	Manual Pickup On				Manual Pickup Off	
17	Manual Sensor		● Manual Sensor	●	●		

〈DCU Function Table〉

4.6.4 Self Test Button

If the Self-Test button pressed, vertical lines are printed.

Turn the power on while pressing this button, '89' shows in the DCU and the printer is warming up. After warming-up the printer is in READY Mode, and '88' shows in the DCU. In this mode, without any detection, the printer begins printing(trial printing and data from the PC). It is convenient to use this mode when the engine malfunction is detected in the control board.

4.7 Paper Path

SMPS	Fuser
Toner Cartridge	LSU
Exit Roller	OPC
Pick-Up Roller	KNOCK-UP PLATE
KNOCK-UP PLATE DOWN	ASS'Y HOLDER PAD
Feed Sensor	MAIN PBA
SMPS	HVPS
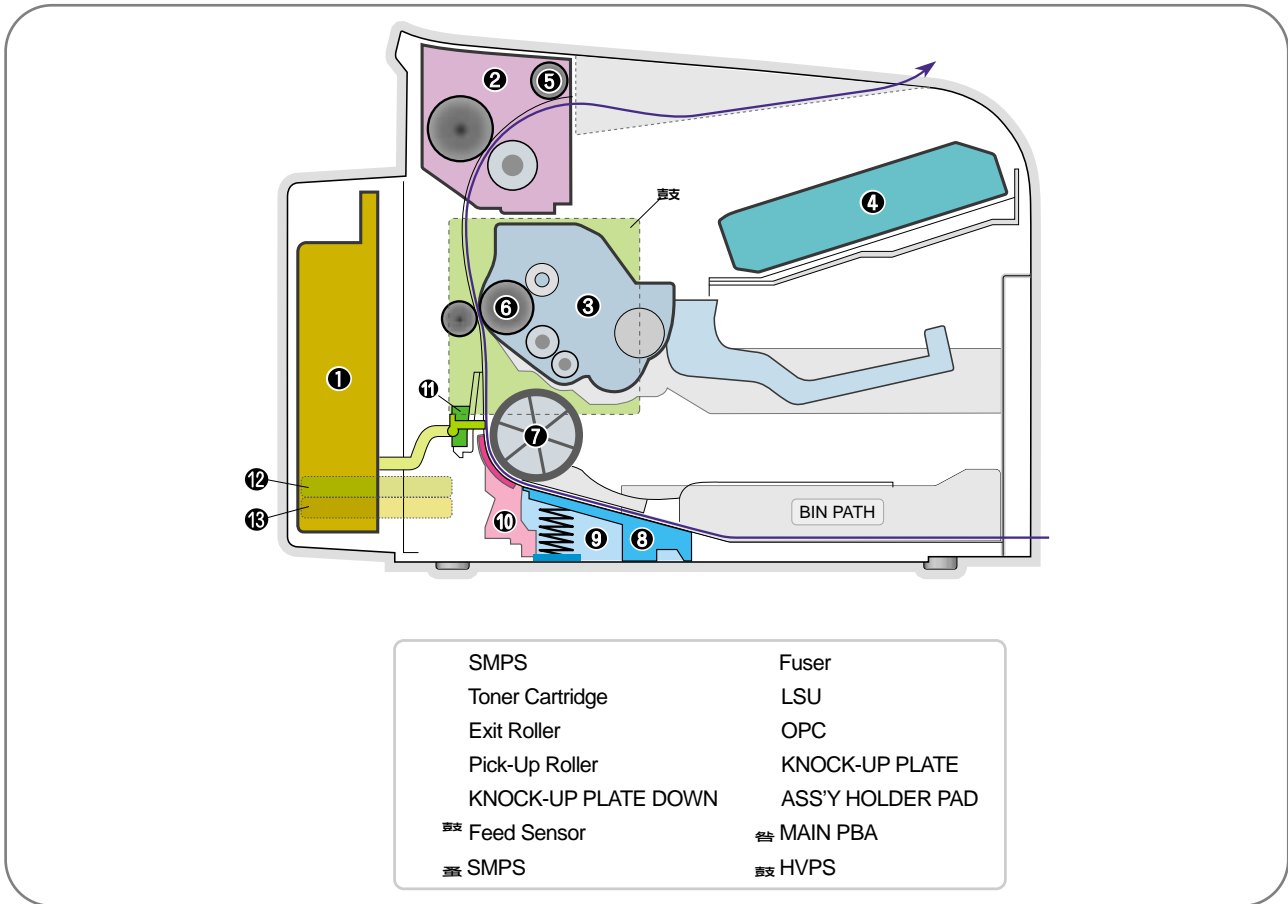
1) After taking order, the printer feeds the printing paper from the cassette or manual feeder.

2) The fad paper passes the paper feeding sensor. (Jam 0 occurs if the sensor is not operated after certain time passes)

3) The paper passed the paper feeding sensor moves to the paper exit sensor via printing process. (Jam 1 occurs if the sensor is not operated after certain time passes)

4) The paper passed the paper exit sensor moves out from the set. (Jam 2 occurs sometime after if the tailing edge of the paper is not coming out from the set after the leading edge of paper passes the paper exit sensor.)

⟨Jam0⟩

⟨Jam1⟩

⟨Jam2⟩
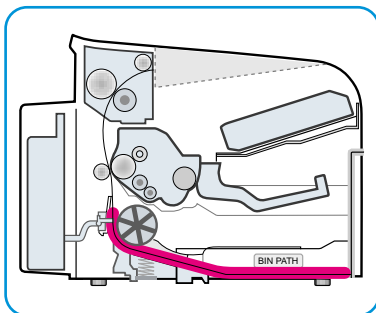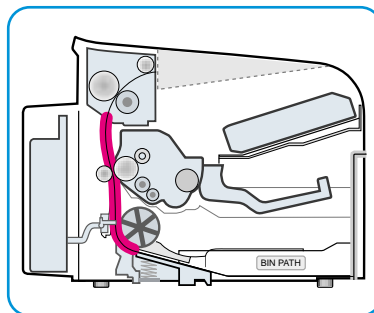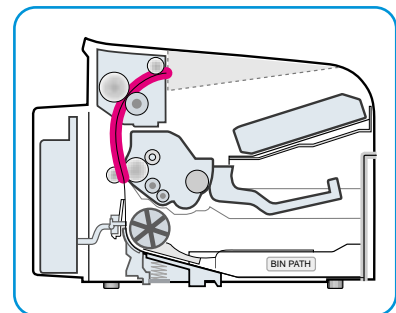
4.7.1 Clearing Paper Jams

Occasionally, paper can be jammed during a print job. Some of causes include:
- The tray is overfilled.
- The front cover has been opened during a print job.
- Paper that does not meet paper specifications has been used.
- Paper that is outside of the supported size range has been

If a paper jam occurs, the On Line/Error LED on the control panel lights red. Find and remove the jammed paper. If it is invisible, look inside the printer.
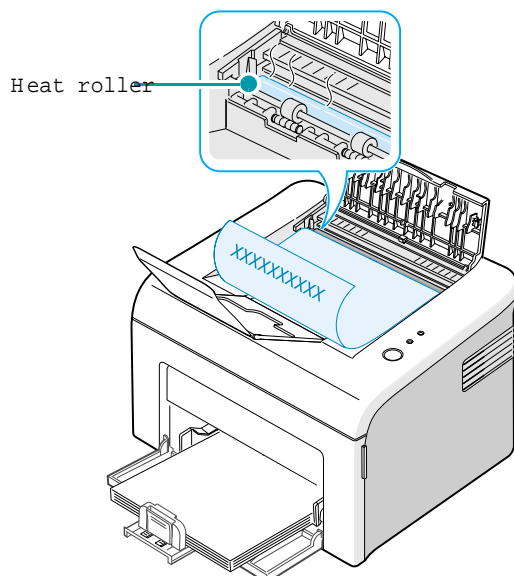
4.7.2 In the Paper Exit Area

1. If the paper jams as it exits to the output tray and a long portion of the paper is visible, pull the paper straight out.
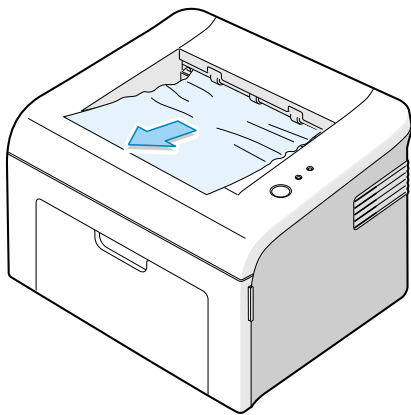
When you pull the jammed paper, if there is resistance and the paper does not move immediately, stop pulling. Continue with the next step.
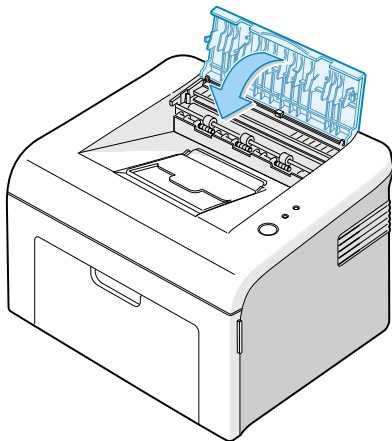
2. Open the top cover and the inner cover.

Heat roller

3. Loosen the paper if it is caught in the heat rollers. Then pull the paper gently out.
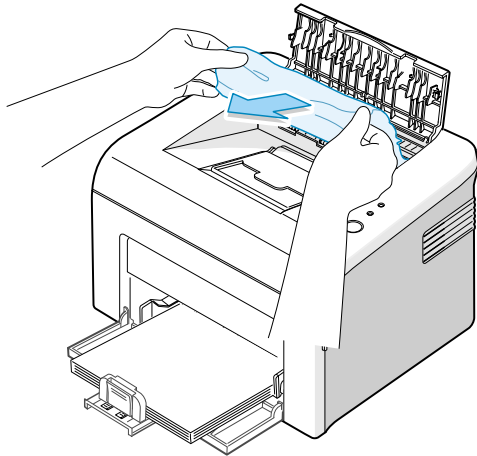
4. Close the inner cover and the top cover.

5. Open and close the front cover. Printing can be resumed.

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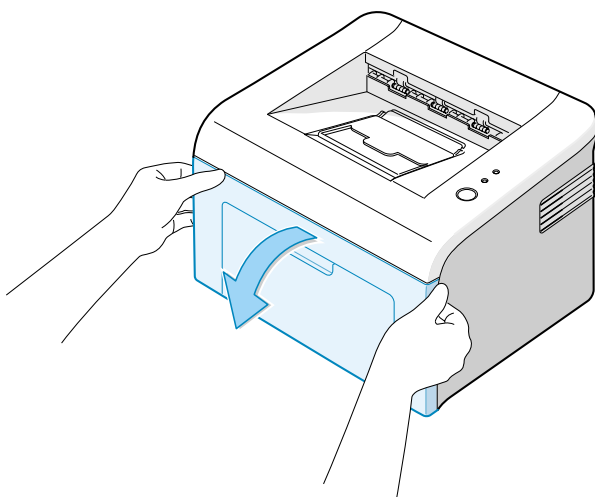
4.7.3 In the Paper Feed Area

1. Remove any missfeed paper by pulling it out by the visible edge from the tray. Make sure that all of the paper is properly aligned in the tray.
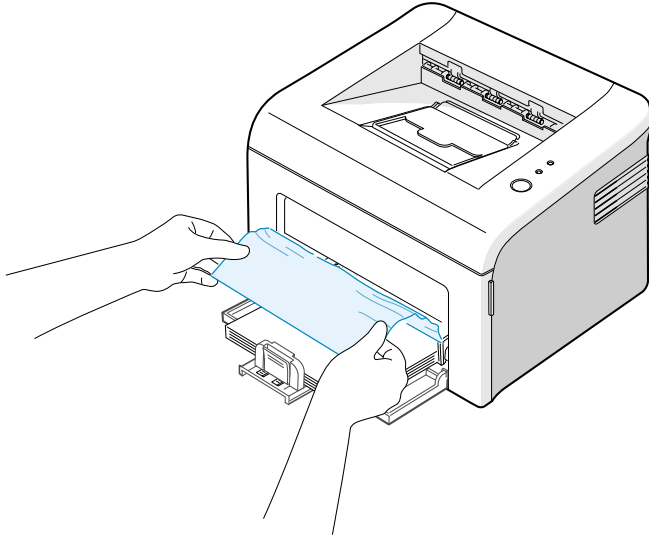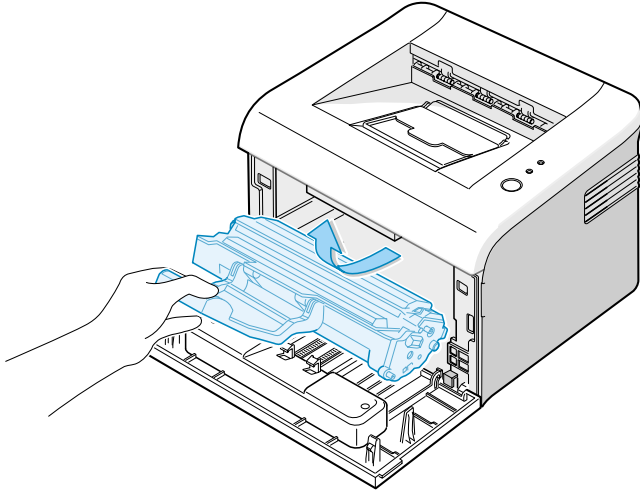

2. Open and close the front cover. Printing can be resumed.
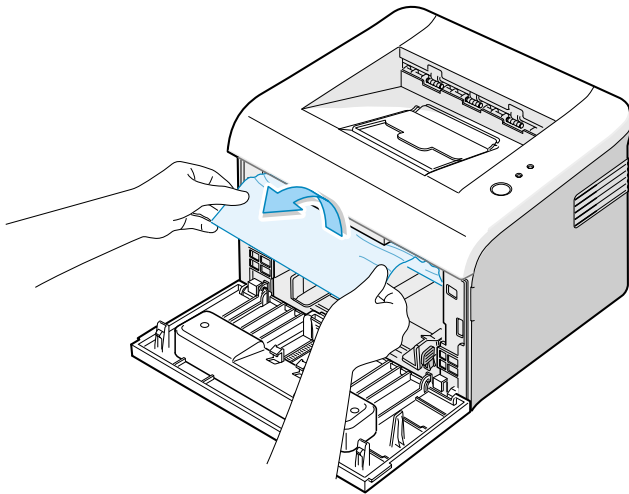
4.7.4 Around the Toner Cartridge

1. Open the front cover.

2. Pull the toner cartridge out and remove it from the printer.

3. Gently pull the paper toward you.

4. Check that there is no other paper in the printer.

5. Reinstall the toner cartridge, and then close the cover. Printing can be resumed.

4.7.5 Tips for Avoiding Paper Jams

By selecting the correct paper types, most paper jams can be avoided.
- Ensure that the adjustable guides are positioned correctly.
- Do not overload the tray.
- Do not remove the paper from the tray while printing.
- Flex, fan and straighten the paper before loading.
- Do not use creased, damp or highly curled paper.
- Do not mix paper types in the input tray.
- Use only recommended print media.
- Ensure that the recommended print side is facing up when loading paper into the input tray.

4.7.6 Solving Print Quality Problems

Print Quality Checklist

Print quality problems can be resolved by following the checklist below.
- Redistribute toner in the toner cartridge
- Clean the inside of the printer
- Adjust the print resolution from the printer properties
- Ensure that the Toner Save mode is off
- Clear general printing problems
- Install a new toner cartridge, and check the print quality