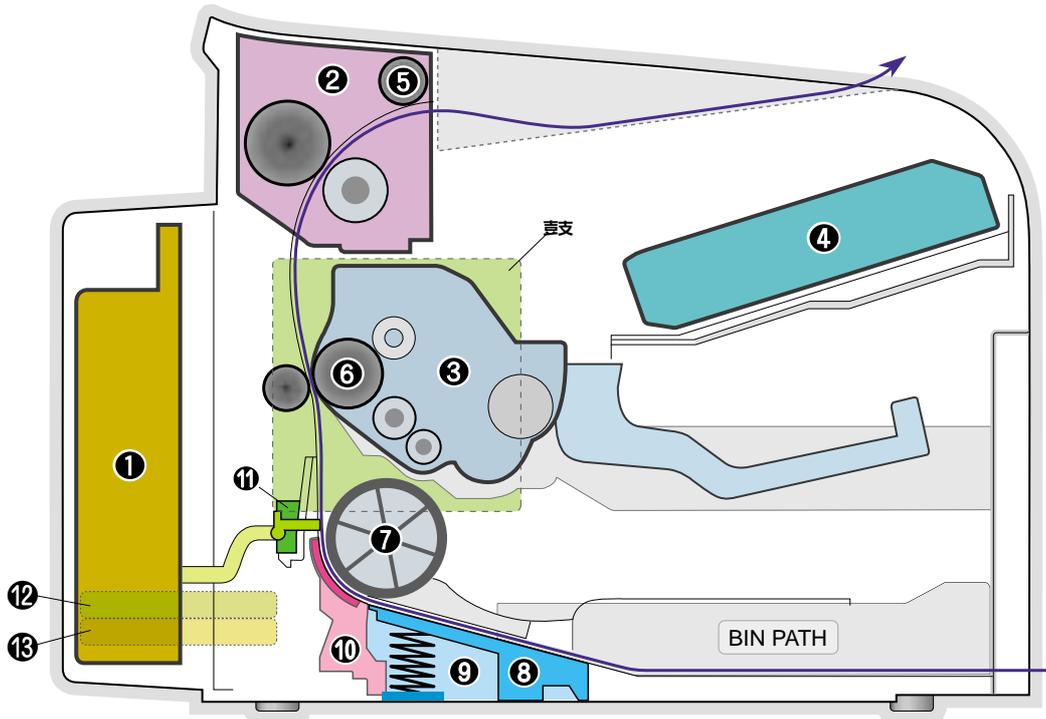


3. System Overview

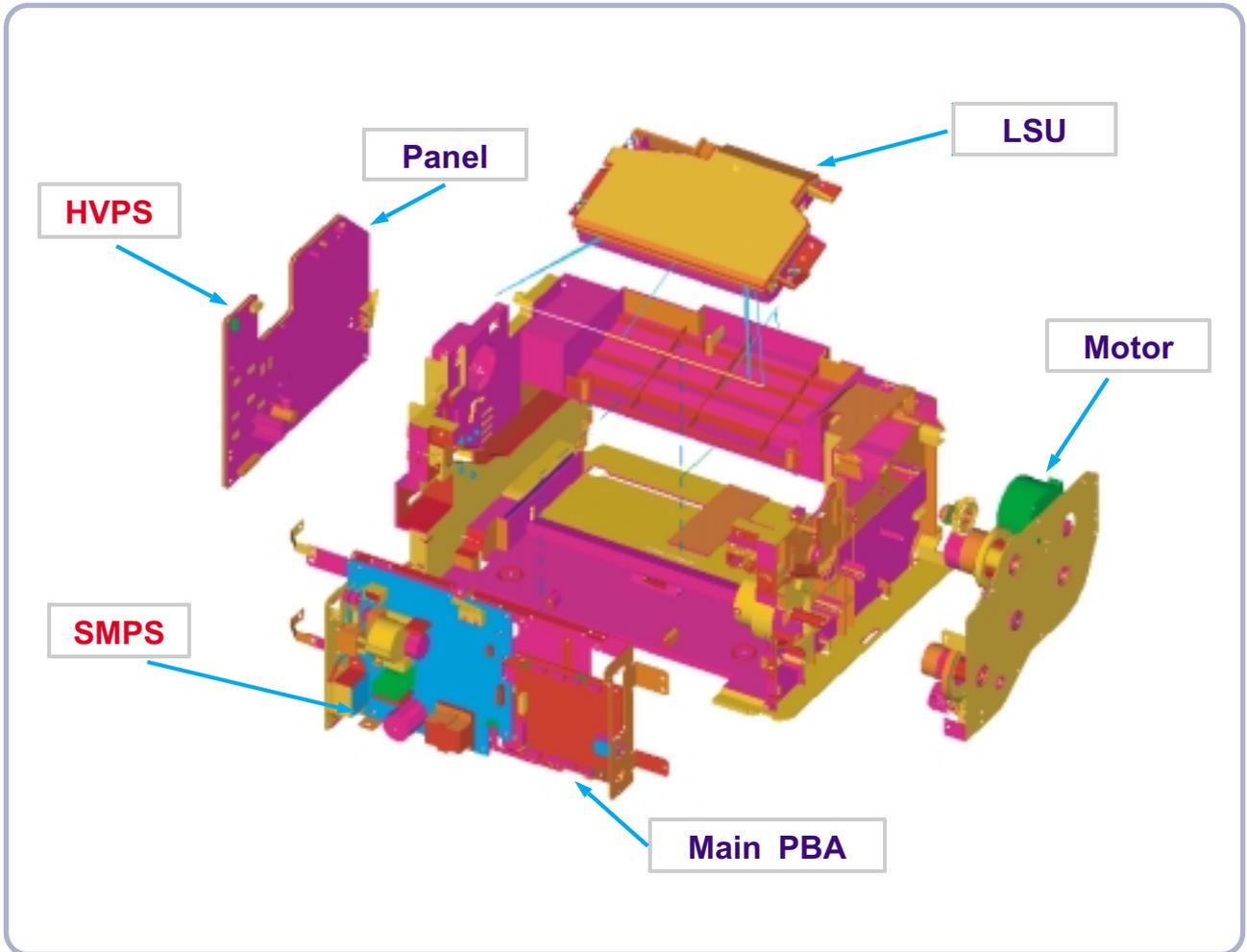
3.1 System Outline

▣ Paper Path Layout



SMPS	Fuser
Toner Cartridge	LSU
Exit Roller	OPC
Pick-Up Roller	KNOCK-UP PLATE
KNOCK-UP PLATE DOWN	ASS'Y HOLDER PAD
鼓 Feed Sensor	管 MAIN PBA
蓋 SMPS	鼓 HVPS

Unit Layout



3.1.1 Feeding

There are the C-path type, which loads papers, and the manual feeder, which supplies paper one by one. The cassette has the function pad which separates paper one by one, and it has the sensor function to check the existence of the loading paper.

- 1) Feeding Type : MPF Type
- 2) Feeding Standard : Center Loading
- 3) Feeding Qty : Cassette 150 sheets (75g/m², 20lb paper standard)
- 4) Manual 1 sheet (Paper, OHP, Envelope etc.)
- 5) Separating Type : Cassette - Friction Pad Type
- 6) Manual : None
- 7) Driver Type : Driving by Gearing from Main Motor
- 8) Pick_up Roller Driver : Solenoid
- 9) Paper detecting Sensor : Photo Sensor
- 10) Paper Size Sensor : None
- 11) Paper Exit Type : Face Down
- 12) MP Tray : MP Cassette Type (Center Loading)

3.1.2 Transfer Ass'y

The transfer roller delivers the toner of the OPC drum to the paper.

- The life span : Print over 50,000 sheets (in 16 ~30°C)

3.1.3 Driver Ass'y

It is a power delivery unit by gearing. By driving the motor, it supplies the power to the feeding unit, the fusing unit, and the distributing unit. (Motor drive IC : A3977)

- It is a power delivery unit by gearing : Feeder/Developer ← Motor → Fuser/Exit

3.1.4 FUSER

The fuser is consisted of the Heat Lamp, Heat Roller, Pressure Roller, Thermister and Thermostat. It adheres the toner on the paper with pressure and heat to complete the printing job.

- Life Cycle : 50K(pages)

1) Heat Lamp

- . Heat Lamp Terminal Shape : Terminal Single Type
- . Voltage 120 V : 115 +/- 5 %
220 V : 230 +/- 5 %
- . Capacity : 600 Watt +/- 30 W
- . Life : 3000 Hr

2) Thermostat

- . Thermostat Type : Non-Contact type THERMOSTAT
- . Control Temperature : 150°C ± 5°C

3) Thermistor

- . Thermistor Type : HF-R0060 (SEMITEC 364FL Type)
- . Temperature Resistance : 7 kΩ (180°C)
- . SYSTEM Temperature SETTING
 - Stand by : 165 +/- 5°C
 - Printing : 175 +/- 5°C (5 minutes before)
170°C +/- 5°C (5 minutes after)
 - Overshoot : 200°C or less
 - Overheat : 210°C or less

4) Heat roller

- . Length : 254 mm
- . Valid length : 222 mm
- . GND Type : H/R Bearing Grounding type By SECC Fuser frame

5) Pressure roller

- . Shaft
 - Length : 239.5 mm
- . Rubber
 - Length : 222 mm

6) Paper separation method

Teflon Coating with SUS Plate Claw System

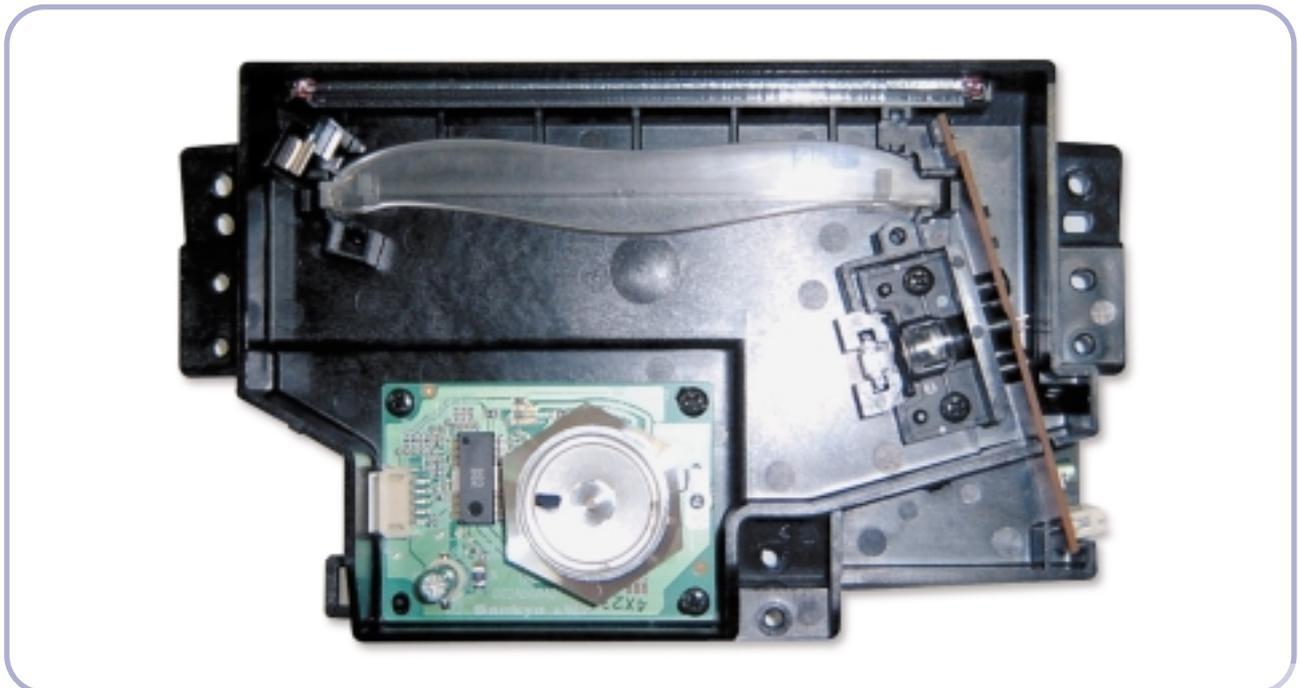
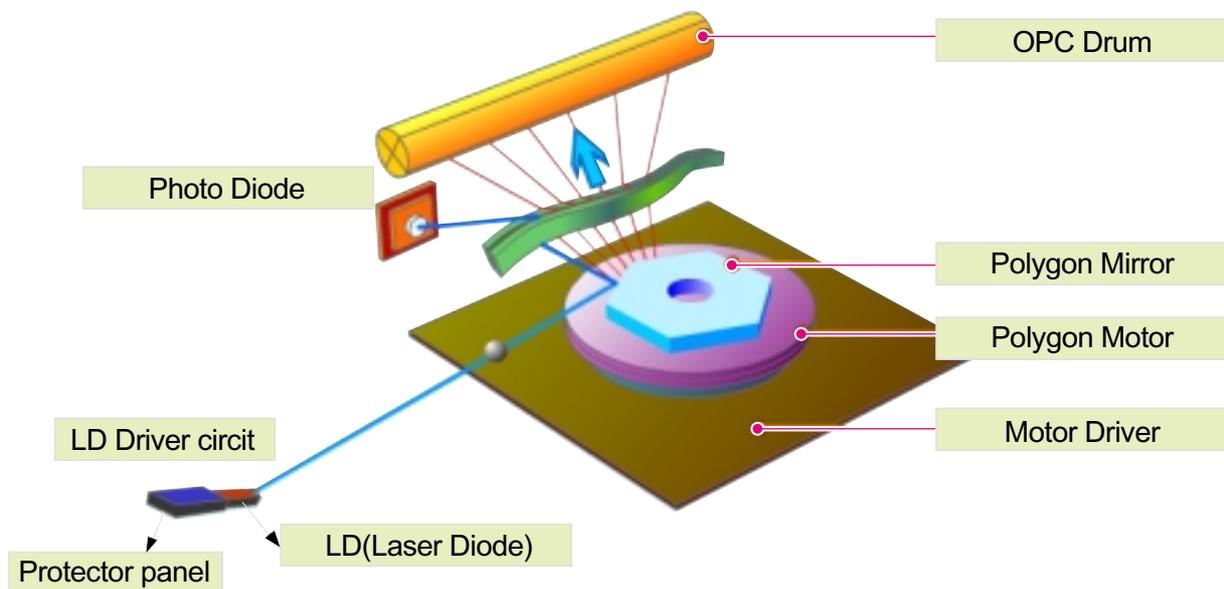
7) Safety Relevant Facts

- . Protecting device when overheating
 - 1st protecting device : H/W cuts off when detecting an overheating
 - 2st protecting device : S/W cuts off when detecting overheating
 - 3st protecting device : Thermostat cuts off the power
- . Safety device
 - The power of Fuser is cut-off after front cover is open.
 - The overheating safety device for customer
 - The surface temperature of the Fuser Cover is under 80°C

3.1.5 LSU (Laser Scanner Unit)

The LSU unit is controlled by video controller. It scans the video data received from video controller with laser beam by using the rotation principle of the polygon mirror to create the latent image on the OPC drum. It is the core part of LBP.

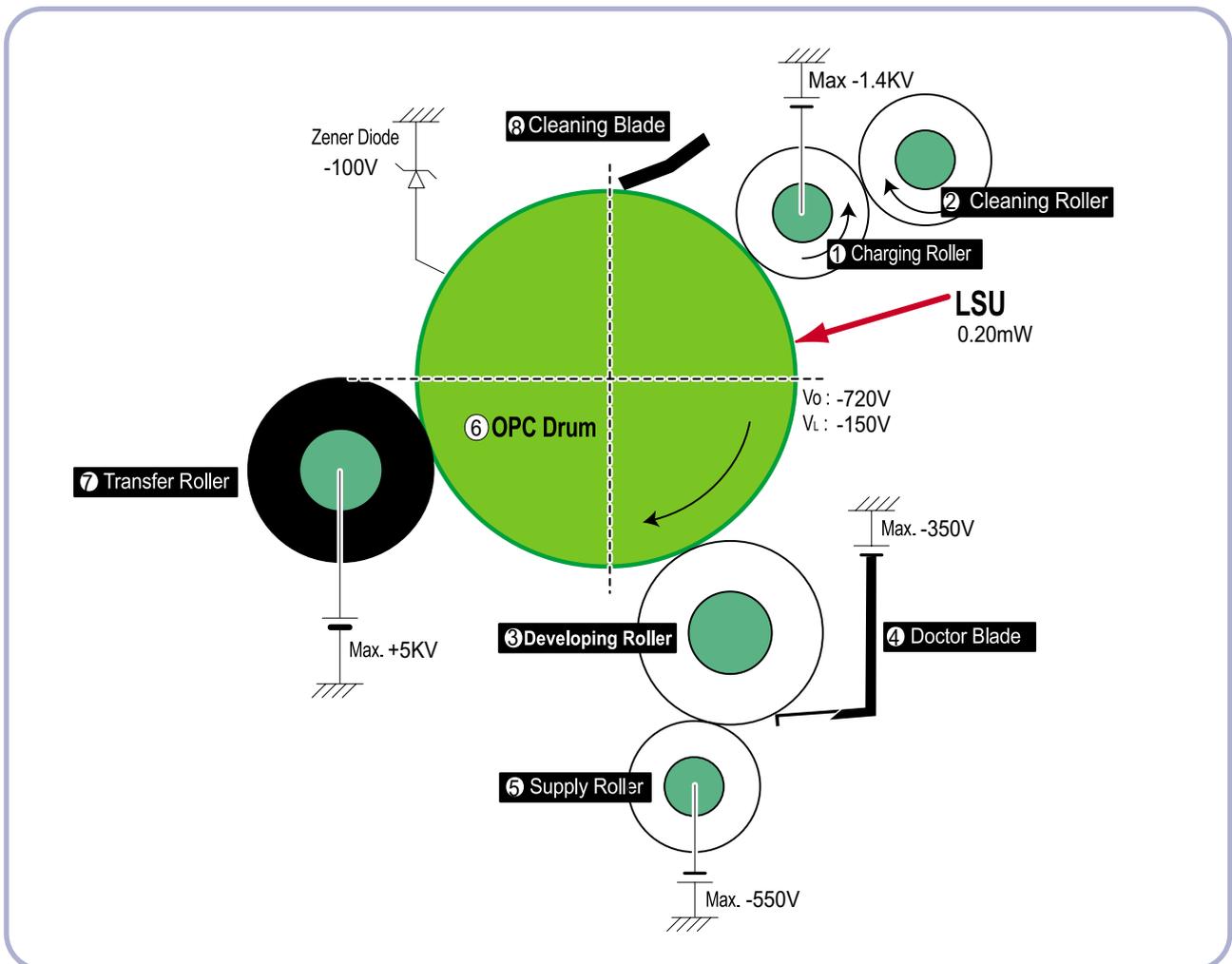
The OPC drum rotates as the same speed as the paper feeding speed. It creates the /HSYNC signal and sends it to the engine when the laser beam of the LSU reaches the end of the polygon mirror, and the engine detects the /HSYNC signal to arrange the vertical line of the image on the paper. After detecting the /HSYNC signal, the image data is sent to the LSU to arrange the its margin on the paper. The one side of the polygon mirror is one line for scanning..



3.1.6 Toner Cartridge

By using the electronic photo process, it creates a visual image. In the toner cartridge, the OPC unit and the developer unit are in a body. The OPC unit has OPC drum and charging roller, and the developer unit has toner, toner cartridge, supply roller, developing roller, and blade (Doctor blade)

- Developing Method: Non magnetic 1 element contacting method
- Toner: Non magnetic 1 element shatter type toner
- The life span of toner: 2,000 sheets (ISO 19752 Pattern/A4 standard)
- Toner Cartridge : Initial(1,000), Sales(3,000)
- Toner remaining amount detecting sensor: None
- OPC Cleaning: Collect the toner by using electric static + FILM OPC
- Management of disusable toner: Collect the toner by using electric static (Clenerless Type- No disusable toner)
- OPC Drum protecting Shutter: None
- Classifying device for toner cartridge: ID is classified by interruption of the frame channel.



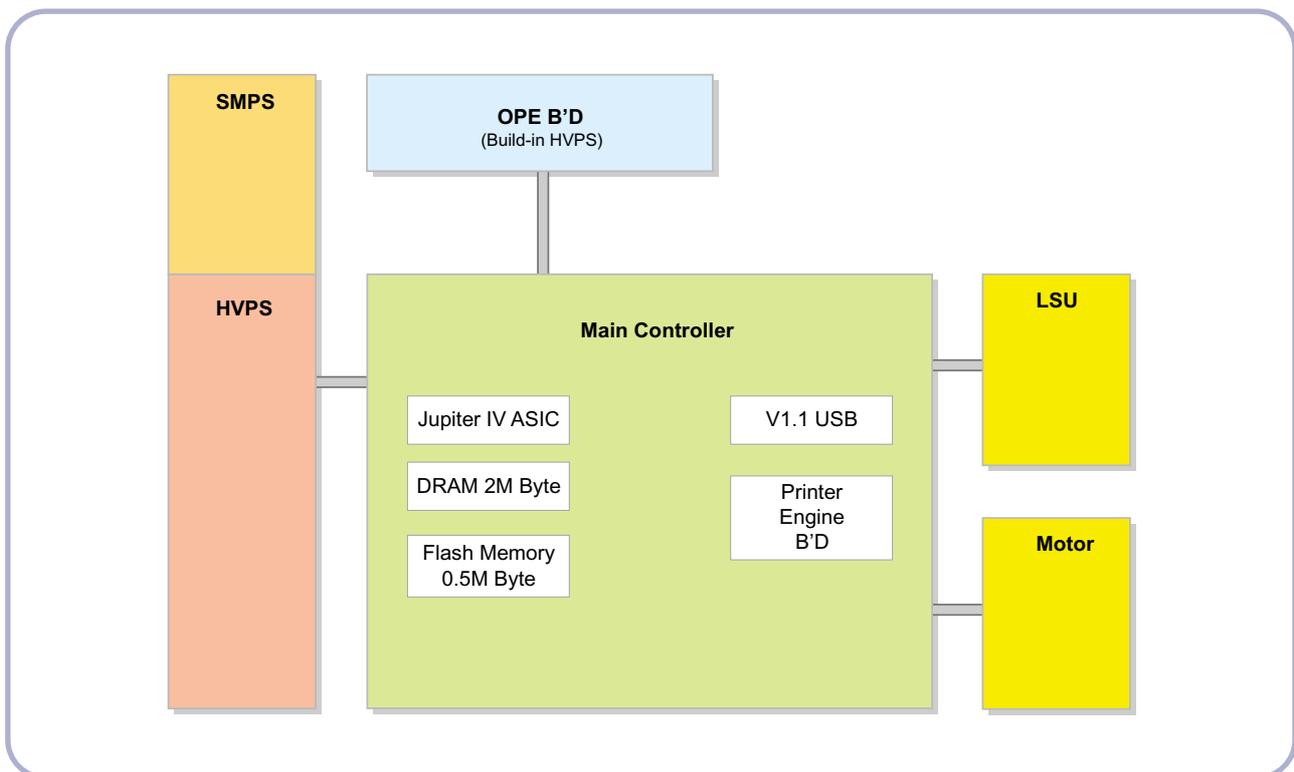
3.2 H/W Structure and Descriptions

3.2.1 H/W Overview

ML-2010 is roughly made up Main Control part and SMPS/HVPS part.

Main Controller uses Jupiter4E for its ASIC, which is on chip micro controller and developed for Low-end Laser Beam Printer.

Jupiter4E provides the integrated printing functions such as Printer video controller, Laser Scan Unit controller, PWM controller and Bi-polar Stepper Motor Controller and has USB interface and built-in Flash memory with 4Mbits capacity.



3.2.1.1. Main Control

ML-2010 of Main Control are composed of CPU and Print and operate follows function by CPU

- Bus Control, I/o
- Handling, each Driver and PC Interface

Main Control operate its full function on the Main B'd and CPU control Controller ASIC and build-in Memory.

3.2.1.2 CPU

Use 32Bit RISC Processor of Jupiter4e, and control system by operating Operation Block of the System Program inside Flash Memory.

- Main Function Block:
 - Completely Integrated System for Embedded Applications,
 - 32 Bit Risc Architecture, Efficient and Powerful ARM9 CPU
 - LSU Interface Module for Interfacing PVC with LSU
 - 2 Channel General Purpose DMA Controller for High Speed I/O
 - Dual Memory Bus Architecture
- Operation Frequency : 150MHz
- Operation Voltage : 3.3V
- POWER ON RESET TIME : 6.6ms below

3.2.1.3 Flash Memory

Store System Program and can be down load System Program through PC Interface

- Capacity : 0.5M Byte
- Access Time : 70 nsec

3.2.1.4 DRAM

When Printing, use Band Buffer, System Working Memory Area .

- 8M capa : 8M Byte basic.
- 2M :Printing System Working Memory Area
- Access Time : 60 nsec

3.2.1.5 ENGINE

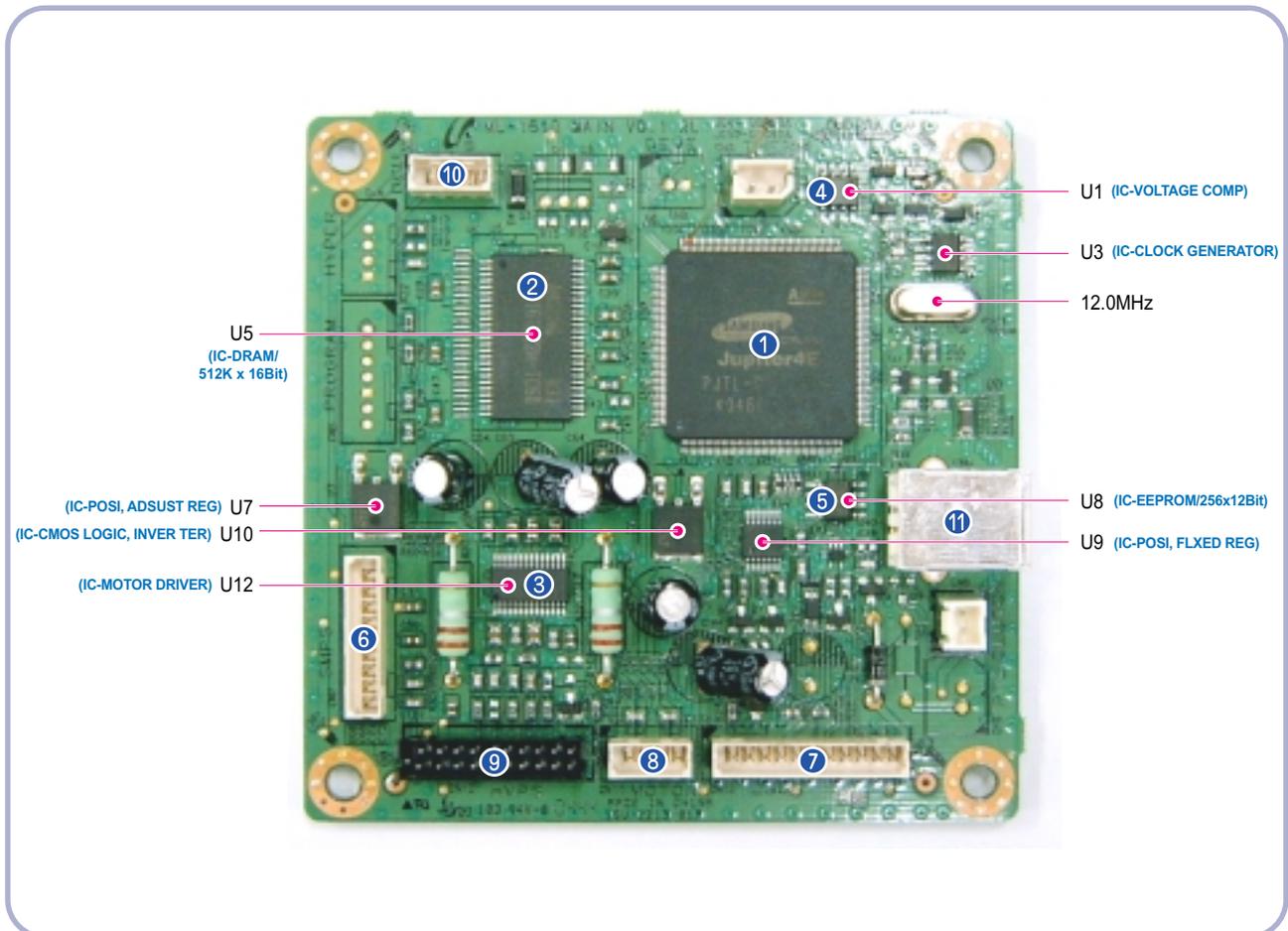
This recording method is electrophography method using LSU, which toner is composed of 1 component and non magnetic.

- 1) Recording Method : LSU(Laser Scanning Unit)
- 2) Printing Speed : 20ppm
(In continuing printing base A4, printing pages from 2nd to last during 1min)
- 3) Recording Density : 600 dpi × 1200 dpi
- 4) Cassette Capa. : Cassette ; 150sheets(75g m² Base),
Manual : N/A((DRIVE Selection : Paper, OHP, Envelop - 1 sheet)
- 5) Paper Size : Cassette ,Manual; Width = 76 ~ 216mm, Length = 125mm ~ 356mm
- 6) Effective recording size
 - A4 : 202 x 291 mm
 - Letter : 208 x 273 mm
 - Legal : 208 x 350 mm
 - Folio : 208 x 325 mm
 - Top Margin : 4.23 ° ± 3 mm
 - Left, Right Margin : 4.23 ° ± 3 mm
- 7) CRU(Toner Cartridge)Life : 2,000pages Printing(A4, 5% Pattern Printing)
- 8) First Print Out Time : within 11sec(Standby)
- 9) Warming up time : within 30sec (Ambient : 25°C)

3.2.2 Main Board

Main Board are composed of Engine and Controller on the one-Board.

Main Board control to send Current Imagedml Video Data to LSU to print and have motor Driving and Circuit for the current driving and also include Paper Exit Sensor, Cover Open s/w, panel s/w.



- ① U6(Jupiter 4E)
 - It is a main CPU and an Asic of Jupiter4E which has a CPU core CLK with over 150MHz and a System bus 75MHz.
 - It use 3.3V for operation voltage and I/O, It uses 75MHz for system bus CLK, Built in Flash Memory.
- ② SDRAM
 - Main memory. SDCLK is 75Mhz.
- ③ A3977
 - It is an Main motor driver IC and controls the motion of main motor.
- ④ Regulator
 - It Supplies the core voltage to CPU by converting 3.3V to 1.8V.
- ⑤ EEPROM(U8 : 93C66)
 - It is an EEPROM with 12C method.
- ⑥ SMPS connector(CN8)
 - It connects SMPS, supplies the power, and delivers the high voltage contol signal, etc. If a harness is not normally connected to this connector, power cannot be supplied.
- ⑦ LSU connector(CN12)
 - It connects a LSU.
- ⑧ DC Motor connector(CN11)
 - It connects an main motor and drive a DC motor.
- ⑨ HVPS connector(CN10)
 - It connects a HVPS.
- ⑩ DCU connector(CN1)
 - It interface a DCU-JIG.
- ⑪ USB connector(CN6)
 - It interface a the printer.

3.2.3 Asic(SPGPm) Specification

3.2.3.1 Introduction

Jupiter4E is One-Chip micro-Controller for Low cost Laser beam Printer.

1. One Chip Laser Beam Printer Controller

- GDI only
- AMBA AHB used for high speed bus transactions between masters and slaves
- AMBA APB used for low speed bus transactions between ARM core and peripherals
- 3 PLLs (2 Dithered PLL and 1 General PLL)
 - first for CPU(150MHz), AHB(75MHz), APB(75MHz),
 - second for USB(48MHz)
 - third for PVC(59MHz)
- 75MHz system operation
- 1.8V power operation
- 3.3V tolerant input and bi-directional I/Os
- SDRAM and IO Address / Data signals multiplexing

2. Integrated ARM940T 32-bit RISC embedded processor core

- 150MHz core frequency operation
- Harvard Architecture Cache : 4KByte Instruction cache, 4KByte Data cache
- Single memory bus architecture

3. Built in Flash Memory

- 4Mbits (128Kx32bits)
- Serial programming mode using flash programmer tool
- Internally flash memory read / write operation support
- Programmable access timing control

4. 32MB Special function Register Area

5. Directly connected to 3 external IO banks (IOC)

- 32 MB size in each IO bank
- Programmable setup, access, hold timing
- Programmable recovery time for slow devices
- Allows to access peripheral devices such as GPIO control logic

6. Directly connected to 1 external ROM bank (ROMC)

- 32 MB size for one ROM bank
- One external flash memory attachable.

7. Directly connected to two SDRAM banks (SDRAMC)

- Extensible architecture
- Two external SDRAM attachable.
- SDRAM controller supports PC-100 and PC-133 SDRAM running at 75MHz
- Up to 32MB per bank.
- Support for SDRAM configurations including programmable column address
- Programmable refresh interval

8. Interrupt Controller (INTC)

- FIQ or IRQ mode operation selectable
- Programmable Interrupt Enable/Disable

9. USB interface

- Version 1.1
- Four 128x8 FIFOs for Data transmission.
- Interrupt based input / output interface, no DMA based interface support
- USB wrapper for AHB interface
- AHB Bus interface

10. Serial port interface (UART)

- Programmable Baud Rate
- 2 channel Independent Full Duplex UART
- Polling, Interrupt based operation support
- Max 16 byte FIFO to handle SIR Bit Rate Speed

11. Printer video controller for LBP engines (PVC)

- 80MHz video rate (Hummingbird 2 : letter - 21 ppm, A4 : 20ppm)
- video data transmitted through LSU Controller

12. Laser Scan Unit (LSU) Controller

- Laser Scan Unit (LSU) Interface for Laser Diode turn on/off timing control
- Sample & hold period generation.
- Auto Power Control for Laser Diode with PID control method using internal 10 bits DAC.
- LSU clock generation
- Brushless DC motor control clock generation

13. ADC Interface

- 4 channels ADC interface for analog devices such as temperature sensor.
- Programmable ADC Clock Cycle.
- Automatic or Manual AD Conversion support.
- 4 Special Function Registers for monitoring the ADC results for 4 channels.

14. PWM Controller

- 4 PWM output ports - THV, BIAS, FAN control and AC ELECTRIFICATION

15. Bi-polar Stepper Motor controller (MOTORC)

- Phase generation for the purpose of paper feeding
- fixed hardware phase and current table
- programmable phase and interval time
- Interrupt based phase change operation

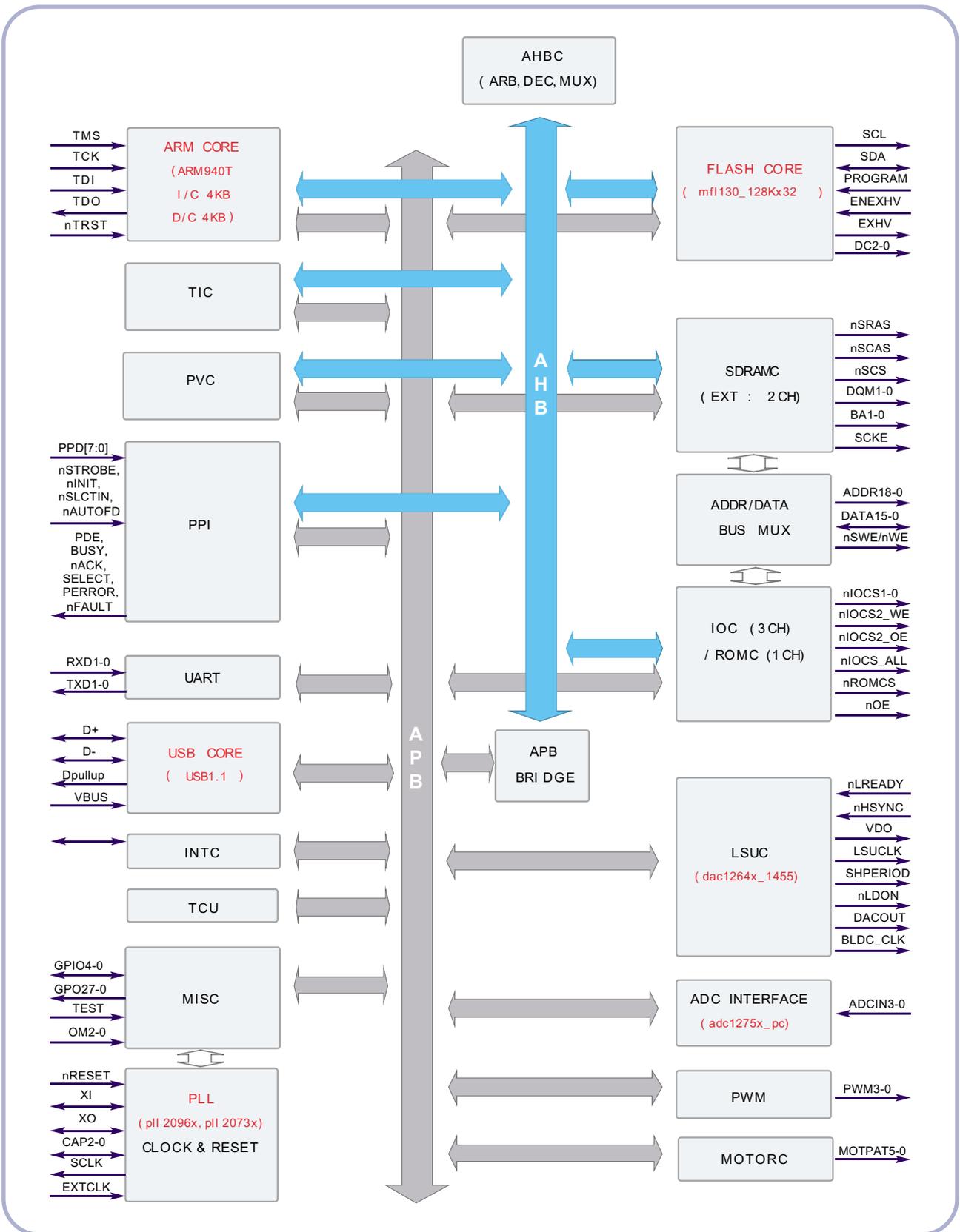
16. Timer

- 3 Independent Programmable Timers
- Watch Dog Timer for SW Trap

17. Miscellaneous

- Mux controlled 24 GPI, 28 GPO & 5 GPIO ports .
- Mutual exclusive GPO/GPIO ports control by the port control enable register
- Programmable Bus Master Priority.
- Project code added.

3.2.3.2 Jupiter4E Internal Block Diagram



3.2.4 Sensor Controller

3.2.4.1 Paper Feeding/Width

When a paper passes an actuator of a feed sensor unit after feeding a paper into a set, it detects a signal of the photo interrupter and informs the paper feeding status to CPU. After sensing the signal and certain time later, it sends an image data. (Related in Paper Front Edge Adjustment)

If it could not detect the feed sensor within 1 second after feeding a paper, a paper jam0 (CPU#_) occurs. ML-1610 differs from other general printers because it doesn't have a paper empty sensor. It recognizes the paper existing status by using a firmware. If a paper is not fed, it recognizes the state as no paper (Red and Yellow lights turn on among other LEDs). With the same principle, it senses the OPC unit. After OPC unit is mounted, the actuator operates. When it passes the actuator of sensor unit, it detects the signal of the photo interrupter, informs the existing OPC unit to CPU, and then stays at the status.

3.2.4.2 Paper Empty Sensing

The paper empty is detected by the empty sensor mounted to an engine board and the actuator mounted to a frame. Paper senses the on/off time of the empty sensor by using CPU and informs the normal operation status and the jam occurrence status to CPU.

3.2.4.3 Jam Cover/Cover Open Sensing

ML-1610 uses two M/S: one senses the cover open and the other senses the jam cover open.

The cover open sensor is located on the left bottom of HVPS. When the front cover is open, +24V supplied to each unit (DC fan, Solenoid, Main Motor, Polygon Motor Unit of LSU in Fusing Unit, and HVPS) is interrupted.

The jam cover open sensor is located on the left bottom of SMPS. When the jam cover is open, +24V supplied to each unit (DC fan, Solenoid, Main Motor, Polygon Motor Unit of LSU in Fusing Unit, and HVPS) is interrupted.

D0 bit of CPU detects the jam cover open/cover open, and D7 bit of CPU detects the existence of OPC. In this case, it informs the status to user by turning on the red LED among OP panel LEDs.

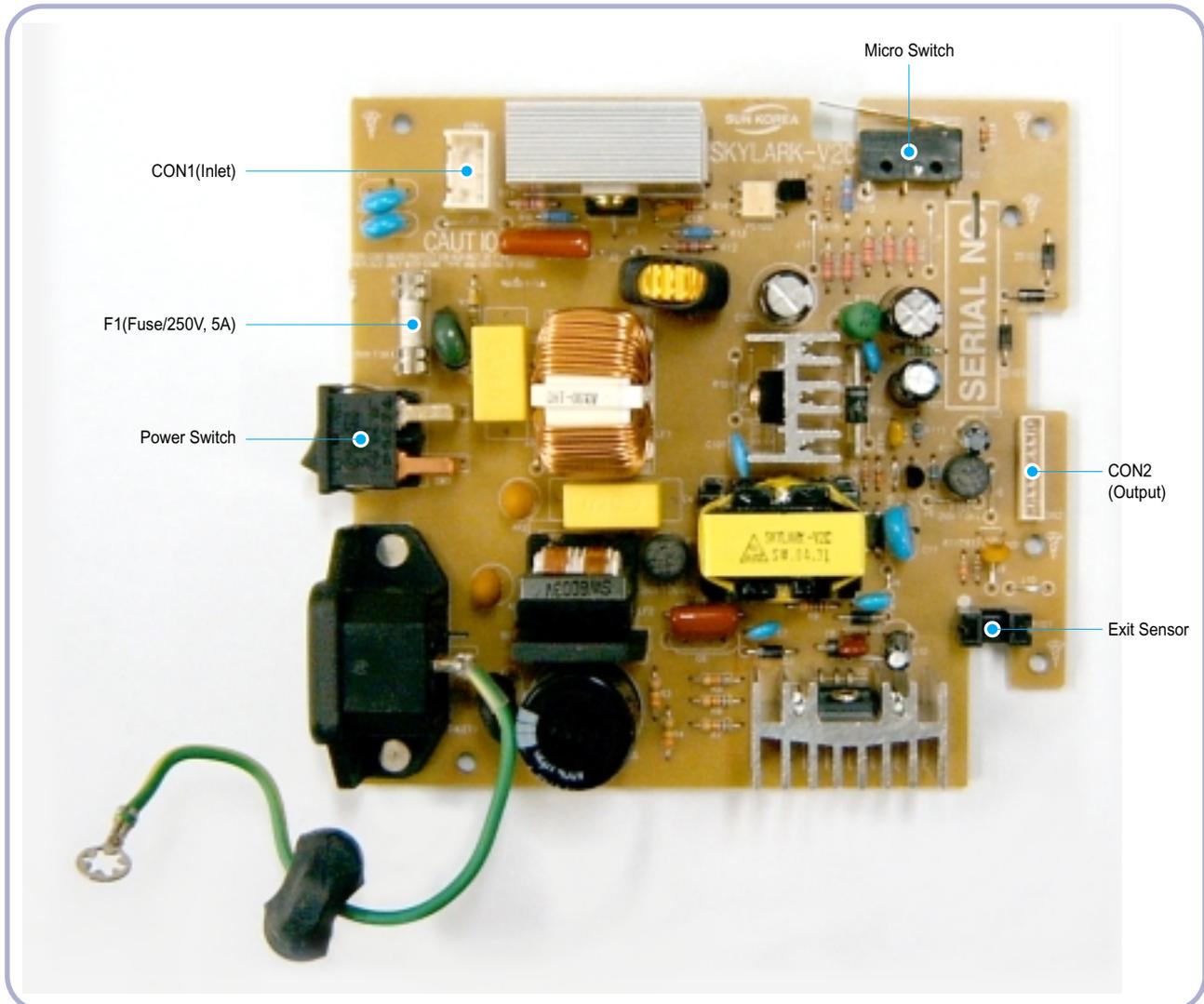
3.2.4.4 Solenoid Driving Circuit

The solenoid consists of two used for paper pick-up and MP signal. D4 bit of CPU turns it on/off, and its driving time is 300ms. The diode protects the drive TR from the pulse (noise) generated by de-energizing operation of solenoid.

3.2.5 SMPS board (Switching Module Power Supply)

The SMPS supplies DC Power to the System.

It takes 110V/220V and outputs the +5V, +24V to supply the power to the main board and other board. It is consisted of the AMPS part, which supplies the DC power for driving the system, and the AC heater control part, which supplies the power to fuser. SMPS has two output channels. Which are 5V and +24V



Pin Signal

Pin No	Pin Name
1	+24VS2
2	+24V
3	+24VS1
4	+24VS1
5	+5V
6	DGND
7	DGND
8	P_REGI
9	FUSER ON

1) SMPS Specification

- AC Input

- ① Input Rated Voltage : AC 220V ~ 240V, AC 120V / AC 220V(110V version)
- ② Input Voltage fluctuating range : AC 90V ~ 135V / AC 180V ~ 270V(220V version)
- ③ Rated Frequency : 50/60 Hz
- ④ Frequency Fluctuating range : 47 ~ 63 Hz
- ⑤ Input Current : Under 4.0Arms / 2.5Arms
(But, the status when lamp is off or rated voltage is inputted/outputted)

- Rated Output Power

No	Items	CH1	CH2	Remarks
1	Channel	+5V	+24.0V	
2	Connector pin	CON 3 5V PIN : 11, 12 GND PIN : 8, 9	CON 3 24V PIN : 2, 3, 4 GND PIN : 6, 7	
3	Rated Output	+5V \pm 5% (4.75 ~ 5.25V)	+24V \pm 15% (20.4 ~ 27.6V)	
4	Max. Output current	0.8A	2.0A	
5	Peak Loading current	1.0A	2.5A	1ms
6	RIPPLE NOISE Voltage	100mVp-p or less	500mVp-p or less	
7	Maximum output	4W	24W	
8	Peak output	5W	48W	1ms
9	Protection for loading storage and overflowing current			

- Consumption Power

No	Items	CH1(+5V)	CH2(+24V)	System
1	Stand-by	1.0 A	0.4 A	AVG : 55 Wh
2	PRINTING	1.0 A	2.0 A	AVG : 250 Wh
3	Sleep-Mode	0.8 A	0.4 A	AVG : 10 Wh

- Power Cord Length : 1830° \pm 50mm

- Power Cord Switch : Use

- Feature

- . Insulating Resistance : 100 M Ω or more (at DC 500V)
- . Insulating revisiting pressure : Must be no problem within 1 min. (at 1000Vac,10mA)
- . Leaking Current : under 3.5mA
- . Running Current : under 40A PEAK (AT 25°C, COLD START)
under 50A PEAK (In other conditions)
- . Rising Time : within 2Sec
- . Falling Time : over 20ms
- . Surge : Ring Wave 6KV-500A (Normal, Common)

- Environment Condition
 - . Operating temperature range : 0°C ~ 40°C
 - . Maintaining temperature range : -20°C ~ 40°C
 - . Preserving Humidity Condition : 10% ~ 90% RH
 - . Operating atmospheric pressure range : 1atm
- EMI Requirement : CISPR ,FCC, CE, MIC,
- Safty Requirement : IEC950 UL1950, CSA950, C-UL,Semko, EK,CB,
CCC(CCIB),GOST, EPA, Power Save

3.2.6 HVPS board (High Voltage Power Supply)

The HVPS board creates the high voltage of THV/MHV/Supply/Dev and supplies it to the developer part for making best condition to display the image. The HVPS part takes the 24V and outputs the high voltage for THV/MHV/BIAS, and the outputted high voltage is supplied to the toner, OPC cartridge, and transfer roller.

1) Transfer High Voltage (THV+)

- Input Voltage : 24 V DC $\pm 15\%$
- Out Voltage : Max. +1.3KV $\pm 15\%$ (Cleaning,200 M Ω)
- Out Voltage Trigger : 6.5 μ A
- Input Voltage Variation : $\pm 5\%$ below(Variation 21.6V \neq 26.4V)
Load Variation : \pm % below
- Out Voltage Rising Time : 100 ms Max
- Out Voltage Falling Time : 100 ms Max
- Transfer Variation Voltage on Environment Variation : +650 V(Duty 10%) ~ 5KV (Duty 90%)
- Control Method on environment : THV-PWM ACTIVE,transfer Active signal, of environment sensing voltage is input and get feed back current, and recalculate it to resistance .
- Control method on transfer output voltage : It is controlled by changing its duty of THVPWM Signal as follows. 10% Duty : +650V, 90% Duty : +5KV $\pm 5\%$

2) Charge Voltage (MHV)

- Input Voltage : 24 V DC $\pm 15\%$
- Out Voltage : -1.3KV ~ $\pm 3.2\%$
- Out Voltage Rising Time : 50 ms Max
- Out Voltage Falling Time : 50 ms Max
- Out Voltage Range : 30 M Ω ~ 1000 M Ω
- Output Control Signal(MHV-PWM) : CPU is HV output when PWM is Low

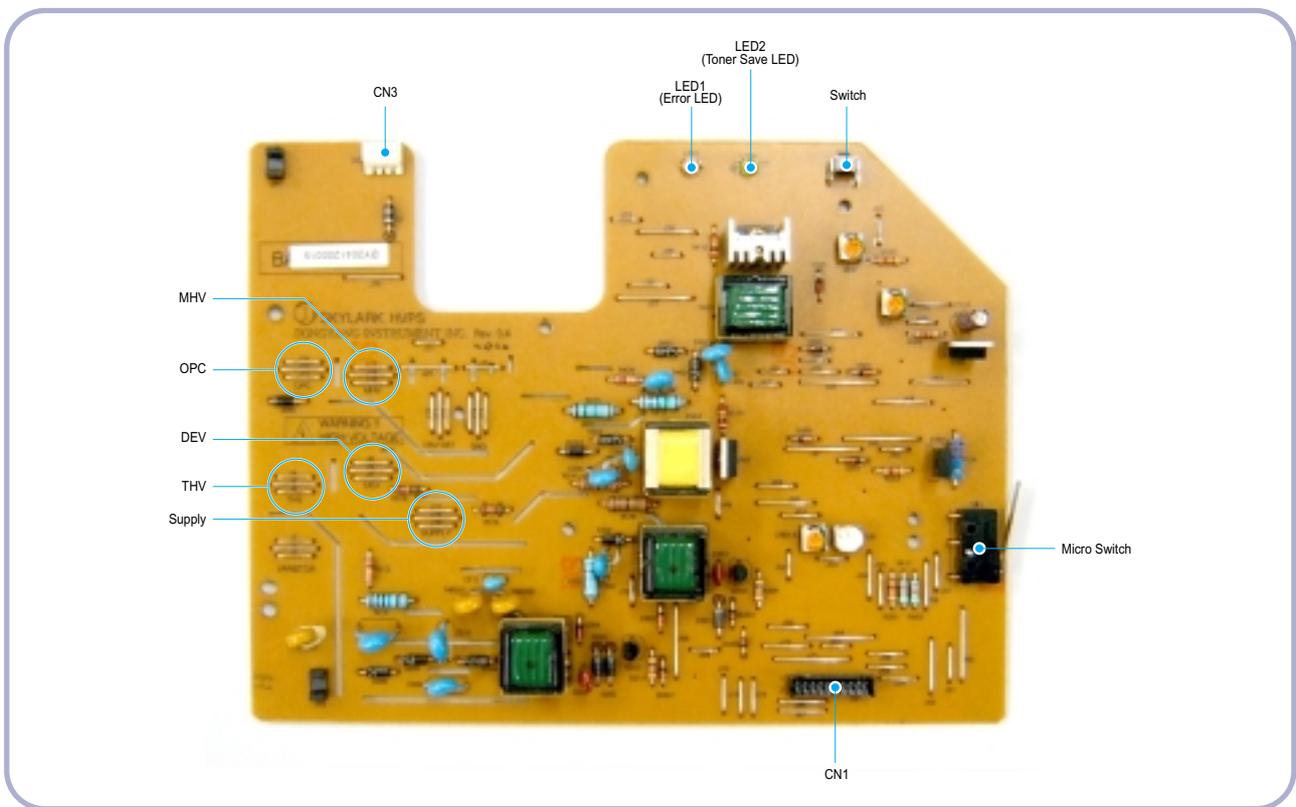
3) Developing Voltage (DEV)

- Input Voltage : 24 V DC $\pm 15\%$
- Output Voltage: -350V $\pm 4.6\%$
- Output Voltage Fluctuation range: PWM Control
- Input contrast of the output stability degree : $\pm 5\%$ or less
- Loading contrast : $\pm 5\%$ or less
- Output Voltage Rising Time : 50 ms Max

- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

4) Supply

- Output Voltage : -550 V ± 8.6%(ZENER using, DEV)
- Input contrast of the output stability degree : under ± 5 %
- Loading contrast : ± 5 % or less
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Loading range : 10 MΩ ~ 1000 MΩ
- Output Control Signal (BIAS-PWM) : the CPU is HV output when PWM is low.



Input

Pin NO	Signal Name	Remark	Pin NO	Signal Name	Remark
1	+24VS		2	+24VS	
3	+24VS2		4	+24VS2	
5	+3.3V		6	DGND	
7	+5V		8	P_EXIT	
9	THV_PWM		10	THV_EN	
11	MHV_PWM		12	THV_READ	
13	BIAS-PWM		14	FAN	
15	P_EMPTY		16	CRU_DET	
17	KEY_IN		18	TONER_SAVE	
19	ERROR		20	READY	

3.2.7 FUSER AC POWER CONTROL

Fuser(HEAT LAMP) gets heat from AC power. The AV power controls the switch with the Triac, a semiconductor switch. The 'ON/OFF control' is operated when the gate of the Triac is turned on/off by Phototriac (insulating part). In other words, the AC control part is passive circuit, so it turns the heater on/off with taking signal from engine control part.

When the 'HEATER ON' signal is turned on at engine, the LED of PC1 (Photo Triac) takes the voltage and flashes. From the flashing light, the Triac part (light receiving part) takes the voltage, and the voltage is supplied to the gate of Triac and flows into the Triac. As a result, the AC current flows in the heat lamp, and heat is occurred.

On the other hand, when the signal is off, the PC1 is off, the voltage is cut off at the gate of Triac, the Triac becomes off, and then the heat lamp is turned off.

- 1) Triac (THY1) feature :16A, 600V SWITCHING
- 2) Phototriac Coupler (PC3)
 - . Turn On If Current : 16mA
 - . High Repetive Peak Off State Voltage : Min 600V

3.3 S/W Structure and Descriptions

The purpose of this document is to describe the design specification of the Engine Control F/W for the ML-1610.

3.3.1 Introduction

This Engine Control Firmware is a program that controls LBP Engine of the ML-1610.

This firmware is executed every 10msec as an interrupt routine of the main system. At stand-by state, this firmware monitors the enable print command from the main system. If the enable print command is detected, this firmware controls the Engine Mechanism according to the printing process and paper feeding state. And with the Sleep command or Wake-Up command, this firmware controls the Engine state.

3.3.2 Engine Control F/W Overview

Engine Control F/W is executed every 10msec by timer interrupt of main system. And it consists of 3 control modules.

- Engine Main Control, Interface Control and Sensing & Unit Control Module.

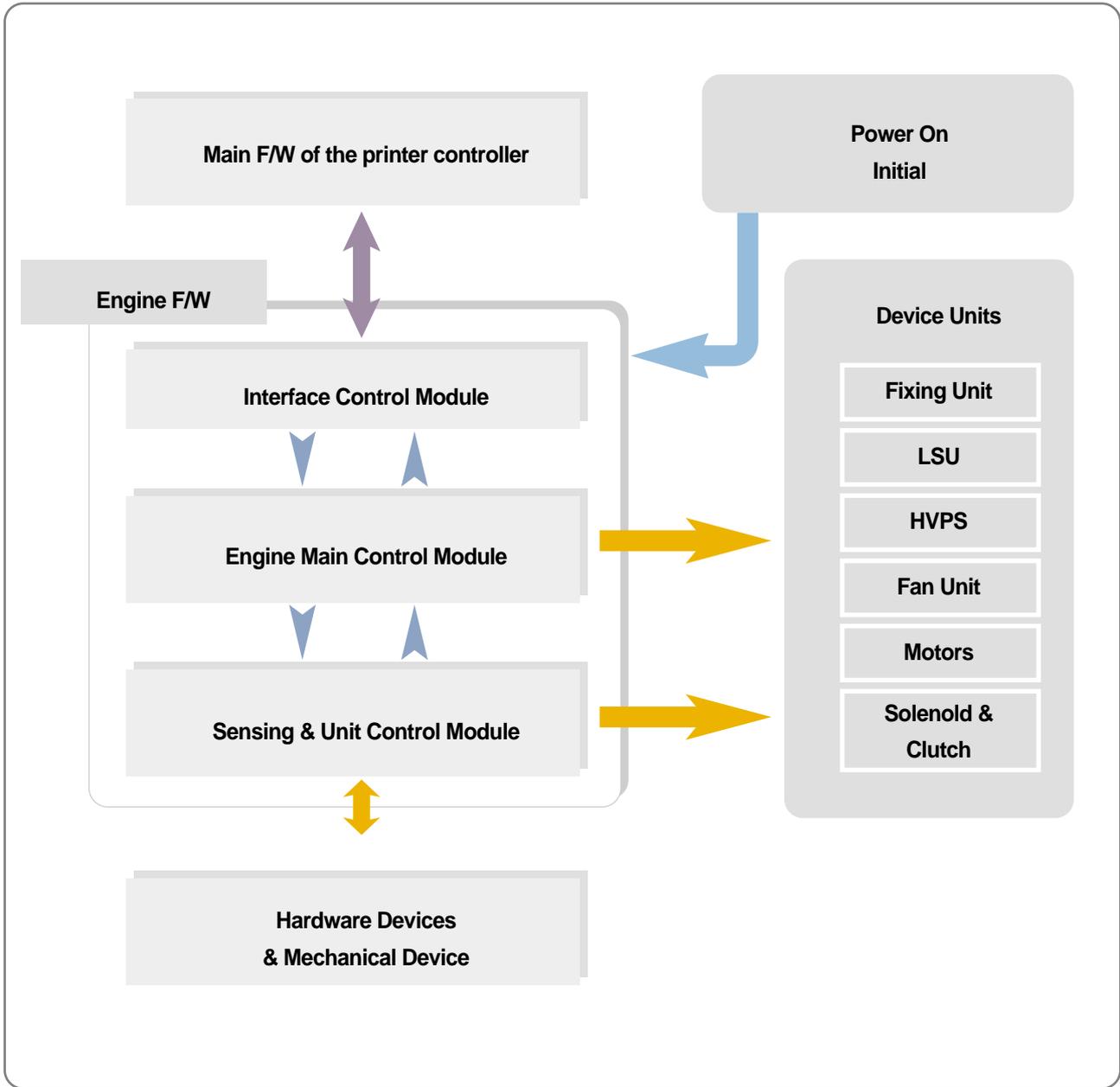
Major operations of the Engine Control F/W are following.

- Control the Pick-Up, Feeding and Discharging of Paper
- Control the LSU
- Control the HVPS for the Developer Process
- Control the Temperature of Fixing unit

Controlling selection to here is added.

- Second Cassette Feeder(SCF) : N/A

- Architecture of Engine Control F/W



3.3.3 F/W Architecture of Engine Control Firmware

- The Engine Control Module is executed every 10msec as interrupt job of main system. There are three control modules, i.e., Engine Main Control Module, Engine Interface Module and Sensing & Unit Control Module.

- Probably from usual state it will be able to rehabilitated a prior to entry error state in error condition it is to confirm. When the if rehabilitation is possible then after rehabilitating it goes back in usual state, else with an error condition it goes in error state. Currently the rehabilitation function of the low heat error , the over heat error and the LSU error is embodied.

- Low Heat Error
When the error occurs, it does not indicate an error. It stores the present temperature and supplies the heat to the fixing unit during the scheduled time. If the temperature goes up after scheduled time, it goes back to a normal state. However, if not, it is formed that an error occurs.

- Over Heat Error
When the error occurs, it informs an error first. It stores the present temperature as well and waits a scheduled time. If the temperature goes down after scheduled time, then it goes back to a normal state. However, if not, it is formed that an error occurs.

- Lsu Error
When the error occurs, it does not indicate an error. It accomplishes printing only again. If even time when it judges an error, it informs an error. Concretely speaking, if the LReady or Hsync error happens, the paper exits out beforehand. And then the engine mode is changed to recovery mode and the engine informs the main system of the engine mode. And the engine checks the LSU error in itself. If the error doesn't happen, the printing job will be proceeding.

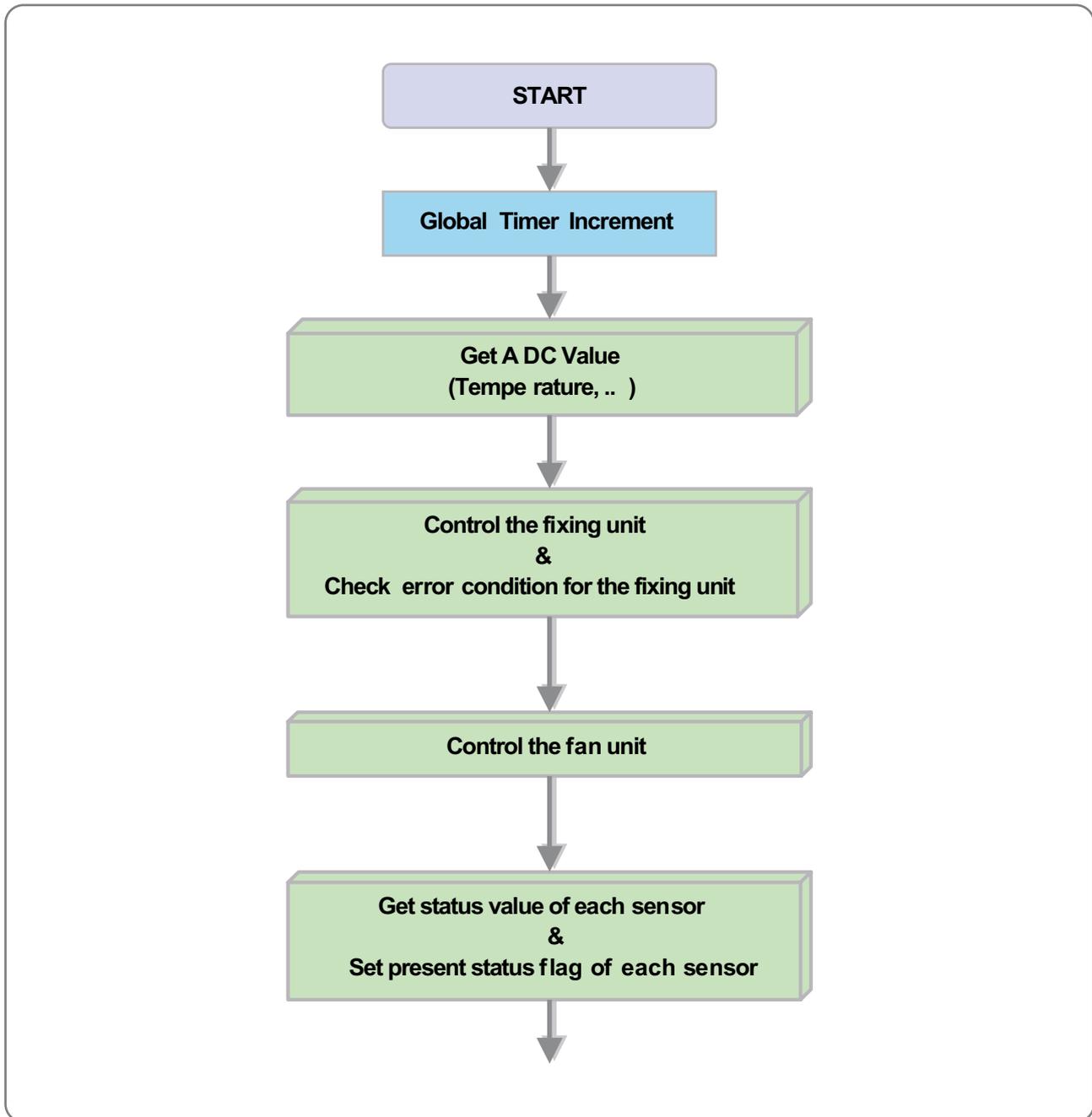
3.3.4 Engine Interface Module Design

Engine Interface Module communicates with the main system in order to receive the command from main system and to transmit the present engine status for the requested status. There are two sub functions. One is a function to receive the command from the main system. The other is a function that informs the main system of the current engine status for the requested item.

3.3.5 Engine Sensing & Unit Control Module Design

Engine Sensing & Unit Control Module consists of 4 sub-functions. The first function is an ADC function that reads the ADC values of the temperature of the fixing unit. The second one is a fixing unit control function. This function regulates the temperature of the fixing unit within a fixed range to be set by the paper type and the number of pages to print out. The third one is a fan control function that controls the fan unit. And the last one sets the flag that describes the present status of each sensor.

- F/W Architecture



3.3.6 LED Behaviors

Ready	LED Error	LED Toner Save	LED Status
ON	OFF	N/A	Ready to receive the data.
SLOW BLINK	OFF	N/A	Receiving the data from the host. In case that toner save mode is ON.
FAST BLINK	OFF	N/A	Printing the page. In case that toner save mode is ON.
N/D	N/D	N/D	Recovery mode
OFF	ON	N/A	Out of paper
BLINK	BLINK	BLINK	Service error (LSU or Fuser error)
N/A	N/A	ON	Toner save mode is ON
N/A	N/A	OFF	Toner save mode is OFF

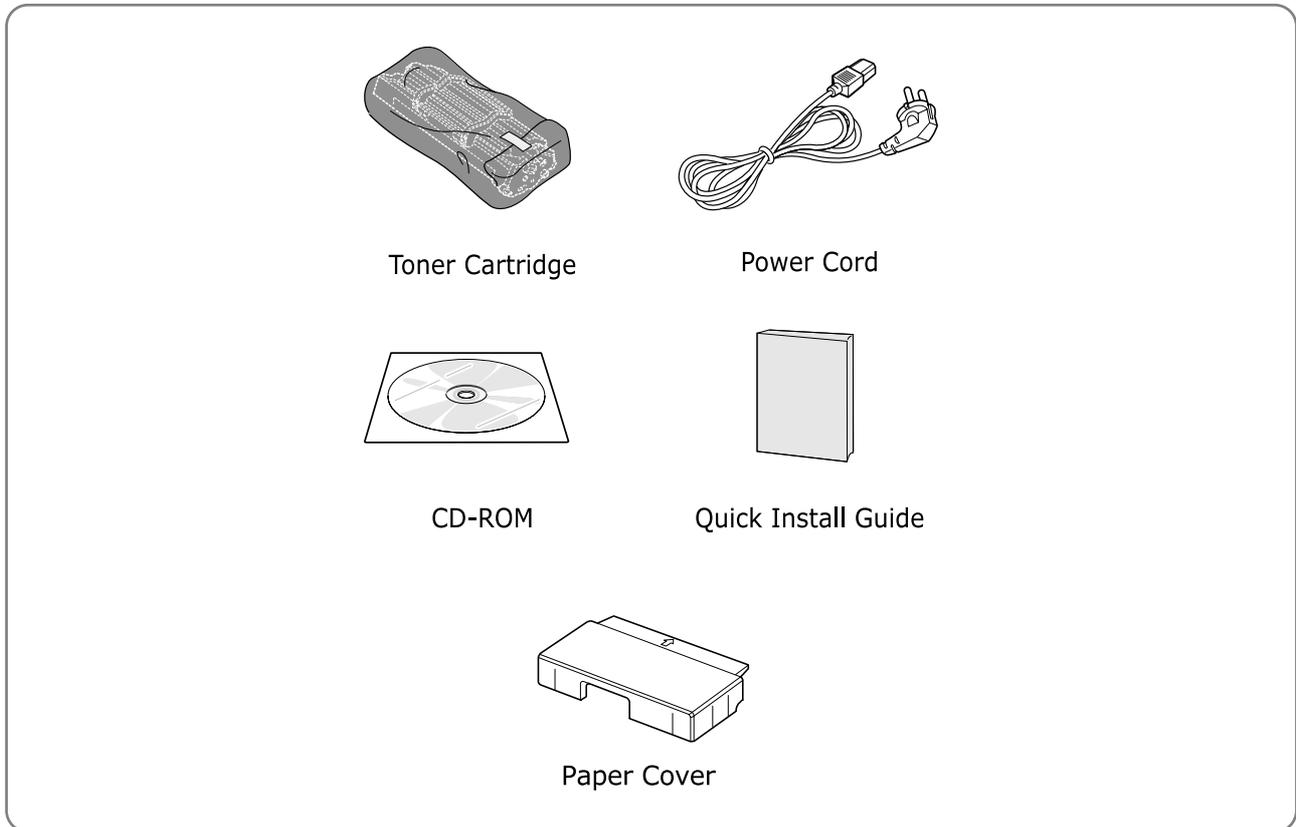
3.3.7 Error LED Operation

Error LED Operation		
All LEDs blink the each time interval.		
Service Error		LED operation
Fuser Error	Open Fuser Error	All LEDs (Toner save LED, Error LED) blink a time interval of 1 second.
	Low Heat Error	All LEDs (Toner save LED, Error LED) blink a timeinterval of 4 seconds.
	Over Heat Error	All LEDs (Toner save LED, Ready LED and Error LED) blink a time interval of 1 second.
LSU Error	LReady Error	All LEDs (Toner save LED, Ready LED) blink a time interval of 1 second.
	Hsync Error	All LEDs (Toner save LED, Ready LED) blink a time interval of 4 seconds.

3.4 Initial Product Installation

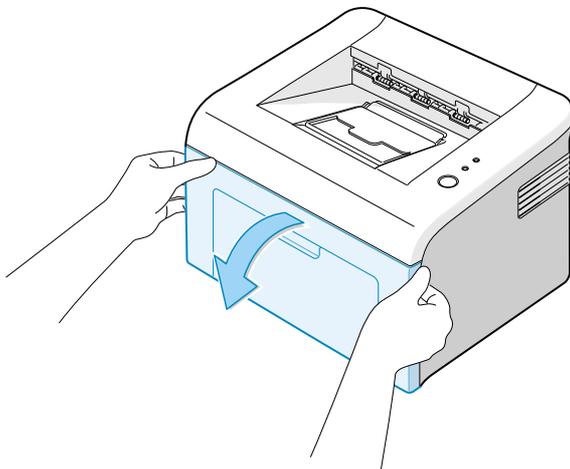
3.4.1 Accessory List

Remove the printer and all accessories from the packing carton. Make sure that the printer has been packed with the following items:

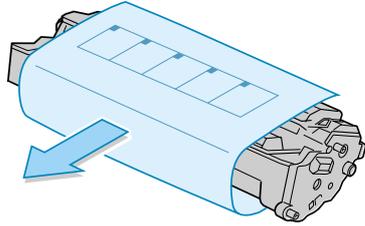


3.4.2 Installing the Toner Cartridge

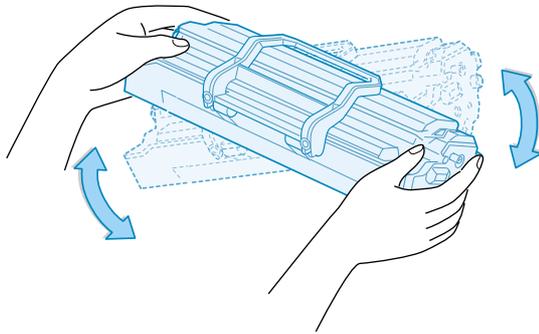
1. Grasp the front cover and pull it toward you to open.



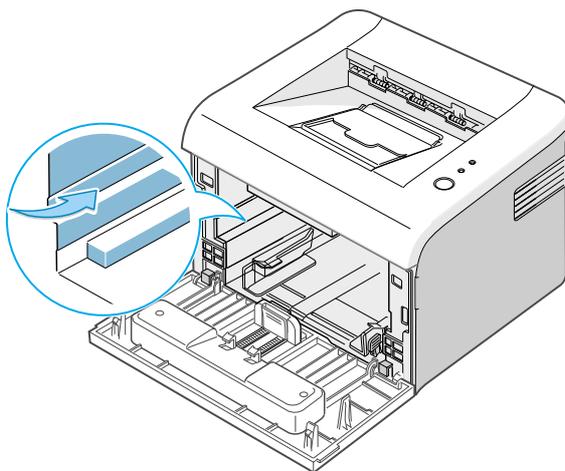
2. Remove the toner cartridge from its bag and remove the paper covering the cartridge.



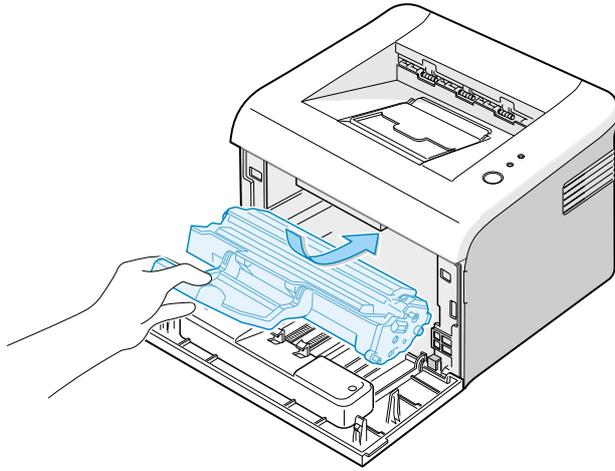
3. Gently shake the cartridge from side to side to distribute the toner evenly inside the cartridge.



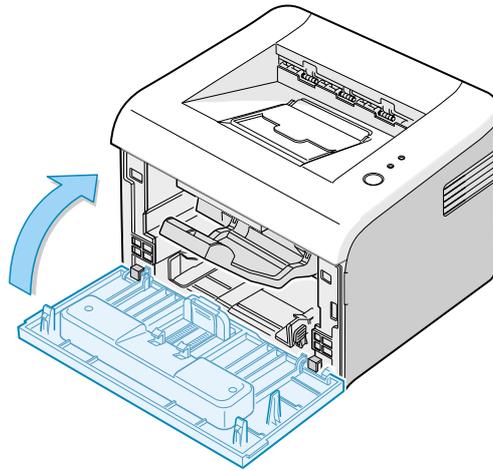
4. Locate the cartridge slots inside the printer, one on each side.



5. Unfold the toner cartridge handle and grasp it. Insert the cartridge in the printer until it snaps into place.



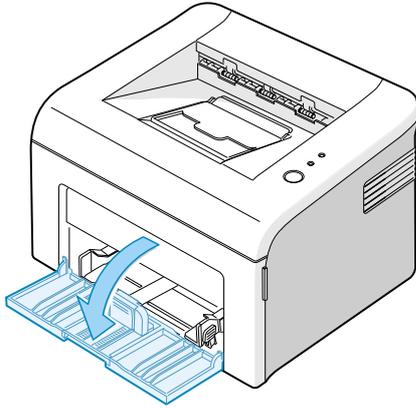
6. Close the front cover. Make sure that the cover is securely closed. If the cover is not firmly closed, printing errors may occur when you print.



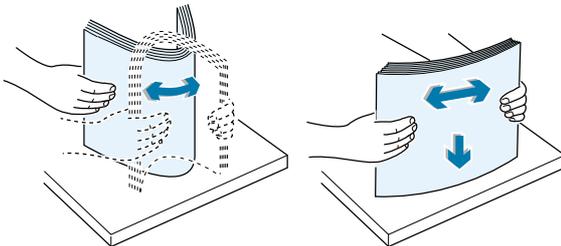
3.4.3 Loading Paper

You can load approximately 150 sheets of paper in the tray.

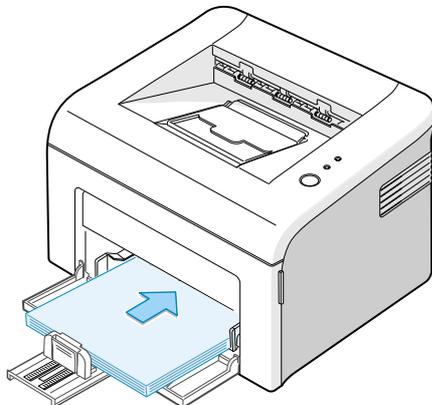
1. Grasp the paper input tray and pull it toward you to open.
Pinch the rear guide and pull it out to extend the tray.



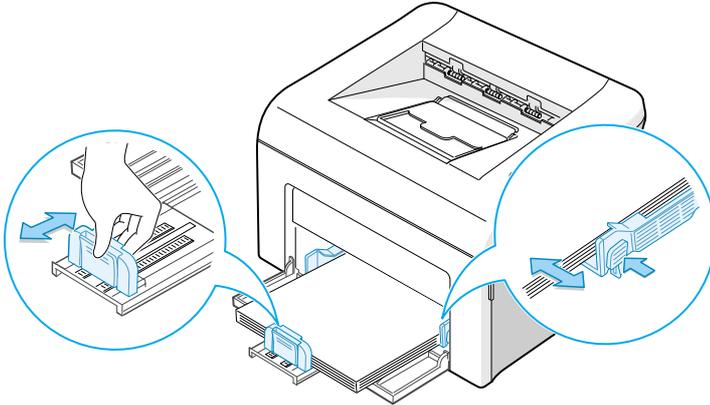
2. Prepare a stack of paper for loading by flexing or fanning them back and forth. Straighten the edges on a level surface.



3. Load paper with the print side facing up. Make sure that all four corners are flat in the tray.



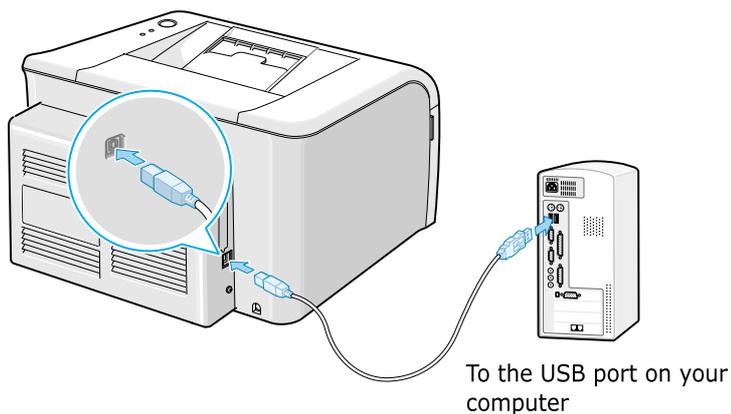
4. Pay attention not to overload paper. Paper overloading may cause paper jams.
5. If necessary, pinch the rear guide to adjust for the paper length and pinch the side guide and slide it to the left flush against the paper.



3.4.4 Connecting a Printer Cable

To print from your computer, you need to connect your printer to your computer with a Universal Serial Bus (USB) cable.

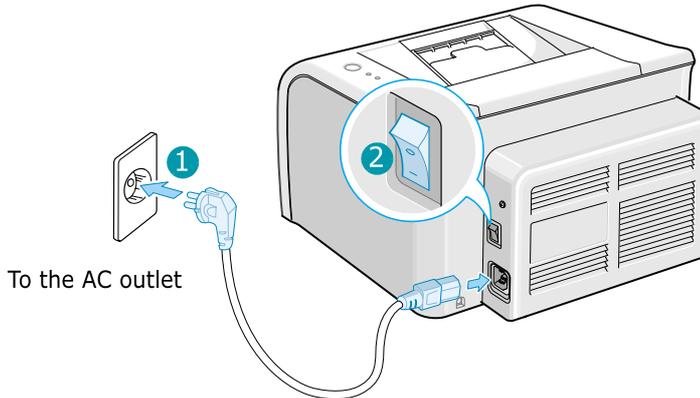
1. Make sure that both the printer and the computer are turned off.
2. Plug the USB printer cable into the connector on the back of the printer.



3. Connect the other end of the cable to the USB port on your computer.
See your computer User's Guide if you need help.

3.4.5 Turning the Printer on

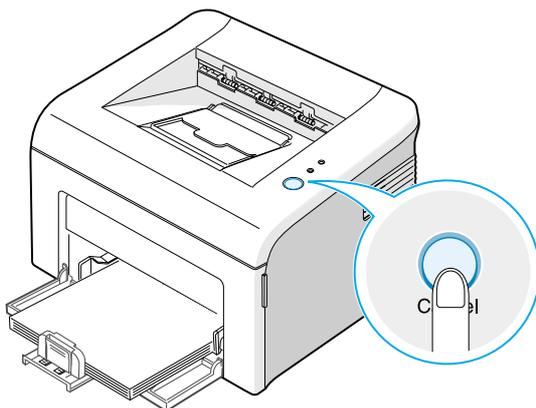
1. To print from your computer, you need to connect your printer to your computer with a Universal Serial Bus (USB) cable.
2. Plug the other end into a properly grounded AC outlet and turn on the printer using the power switch.



3.4.6 Printing a Demo Page

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

1. Press and hold down the Cancel button on the control panel for about 2 seconds to print a demo page.



2. The Demo page shows the printer's current configuration.

3.4.7 Installing Printer Software

The supplied CD-ROM contains Windows printing software, Linux printing software, on-line User's Guide and Acrobat Reader to view the User's Guide.

1. If you are printing from Windows

- You can install the following printer software using the CD-ROM.
 - Printer driver for Windows. Use this driver to take full advantage of your printer's features. For details, see Software User Guide.
 - Status Monitor allows you to see the printing status of the printer. For details, see Software User Guide.

2. If you are printing in Linux

- Go to Software User Guide for information about installing the Linux driver.

3. System Requirements

Your machine supports following operating system.

- Windows 98/Me/2000/XP - The following table shows Windows requirements.

Item	Requirements	
Operating System	Window 98/Me/2000/XP	
CPU	Window 98/Me/2000/XP	Pentium II 400 or higher
	Window XP	Pentium II 933 Ghz or higher
RAM	Window 98/Me/2000	64 MB or higher
	Window XP	128 MB or higher
Free Disk Space	Window 98/Me/2000	300 MB or higher
	Window XP	1 GB or higher
Internet Explorer	5.0 of higher	