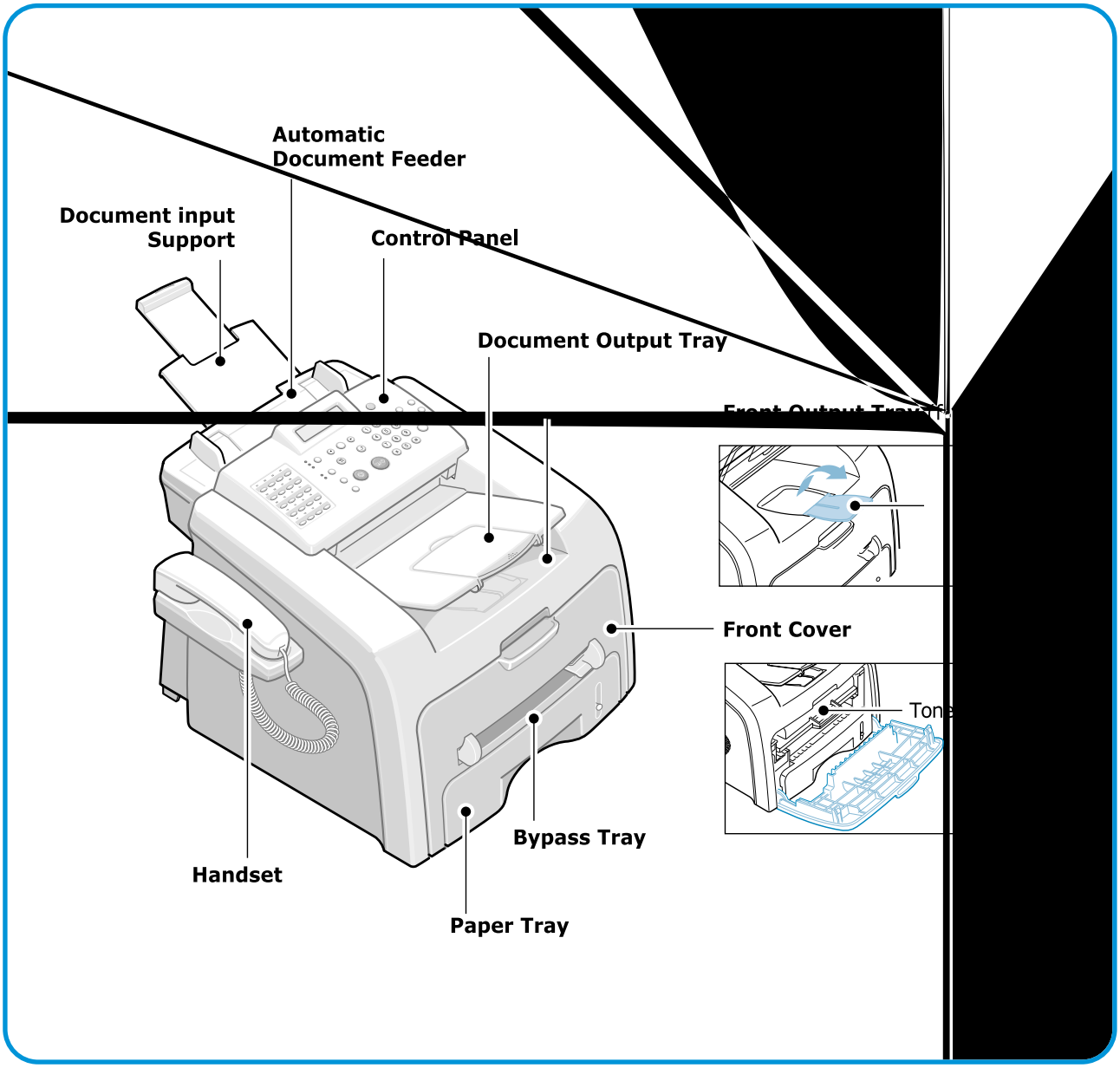
4. Summary of Product

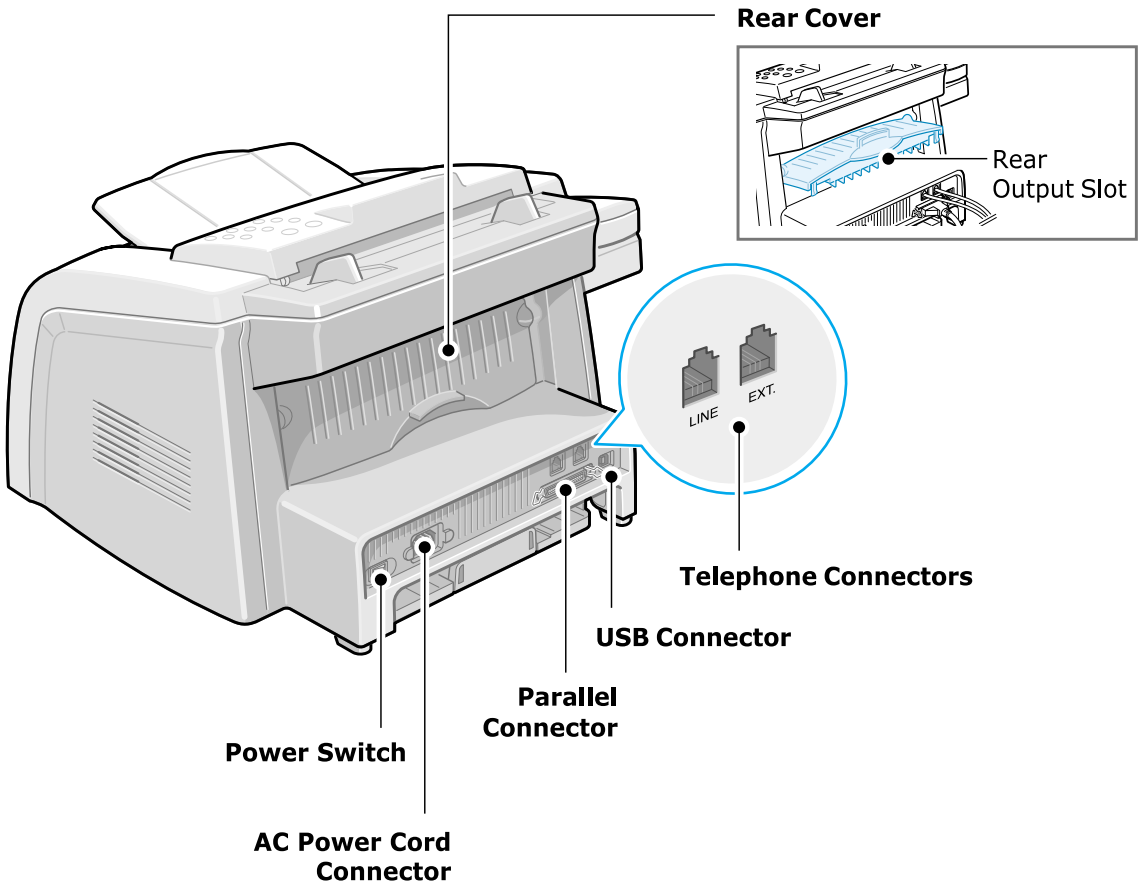
This chapter describes the functions and operating principals of the main components.

4.1 Printer Components

4.1.1 Front View

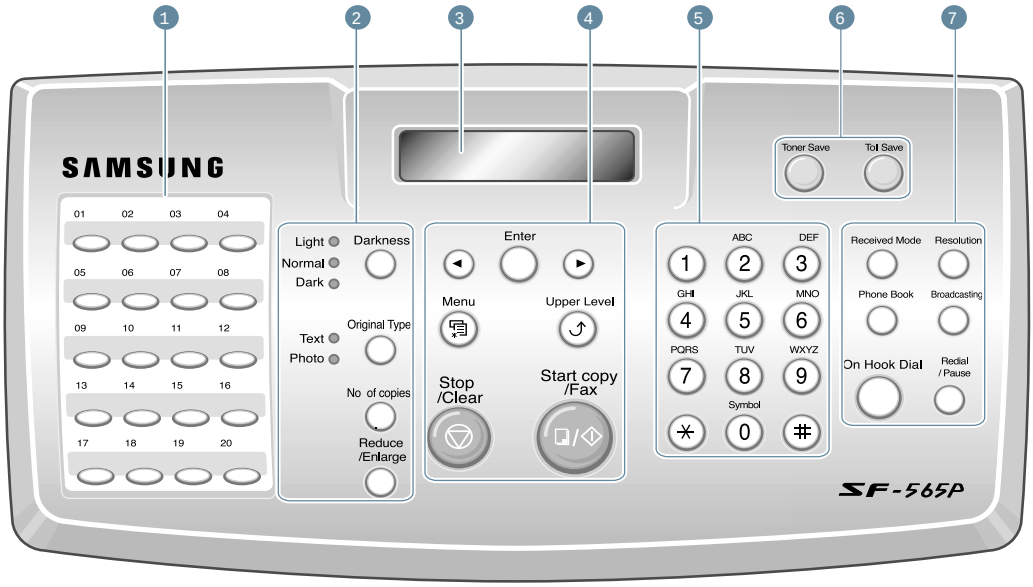


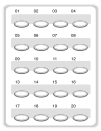
4.1.2 Rear View



4.1.3 Control Panel

< SF-560/565P >



1		Use to store frequently-dialed fax number and dial them with a single button touch.
2 COPY	Darkness	Adjusts the brightness of the documents for the current copy job.
	Original Type	Selects the document type for the current copy job.
	Reduce /Enlarge	Makes a copy smaller or larger than the original document.
	No. of copies	Selects the number of copies.
3		Displays the current status and prompts during an operation.
4	◄ ►	Scrolls through the options available for the selected menu item.
	Enter	Confirms the selection on the display.
	Menu	Enters Menu mode and scrolls through the menus available.

4	Upper Level 	Sends you back to the upper menu level.
	Stop /Clear 	Stops an operation at any time. In Standby mode clears/cancels the copy options such as the darkness, the document type setting, the copy size and the number of copies.
	Start copy /Fax 	Starts a job.
5		Dials a number or enters alphanumeric characters.
6 SAVE	Toner Save 	Allows you to save on toner by using less toner to print a document.
	Toll Save 	Allows you to save on call costs by sending a fax at a preset toll-saving time. Using this feature you can take advantage of lower long distance rates at night for example.
7 FAX	Received Mode 	Allows you to select the fax receiving mode.
	Phone Book 	•Allows you to store frequently-dialed fax numbers using a one or two-digit speed dial or group number for automatic dialling, and edit the stored numbers. •Allows you to print a Phonebook list.
	Resolution 	Adjusts the resolution of the documents for the current fax job.
	Broadcasting 	Allows you to send a fax to multiple destinations.
	On Hook Dial 	Engages the telephone line.
	Redial / Pause 	Redials the last number in Standby mode or inserts a pause into a fax number in Edit mode.

4.2 Overview of System

SF-560/SF-565P can be divided into the following main constituent parts: Main Controller, Operator's Panel, PC Interface, Scanner, Line Interface and Power Supply. The Main Controller uses an SPGPm processor. The Operator's panel; (OPE) has its own MICOM which communicates serially with a UART built into the SPGPm processor. The Scanner uses an Image Processor chip (CIP4) to control the CIS. The Line Interface an FM336 integrated with the Main Board and communicates with the LIU at speeds up to 33.6Kbps. The Power Supply has both the SMPS and HVPS integrated on one PBA.

4.2.1 Main Controller.

The Main Controller of the SF-560/565P consists of two ASICs (CPU, Image Processor), Scanner, Fax Modem and Print sections. Bus Control, I/O Handling, Scanner, all motor drivers and the PC Interface function is controlled by the CPU.
It uses the chorus2. These control the peripherals and the Image Processing.

4.2.2 Line Interface.

This part connects the set with the PSTN. The main functions of this section are Line Interface, Line Monitoring, and connection to an external phone or TAD using the built in EXT connector..

4.2.3 Print Engine.

The Print Engine consists of the following sections: Frame, Paper Feed, Image Transfer, Imaging Unit, Toner Cartridge, Fuser, High Voltage Supply and Scanner. The set uses an Electro Photographic process using the LSU to develop a latent image on the OPC drum. The Toner process is a single part diamagnetic process. Copy and Transfer processes use a CIS Module.

4.2.4 Scanner.

The scanner is designed around a 200dpi CIS module. The CIS scanning width is maximum 216mm, effective width is 208mm. The SF560 operates at 200lpi, the SF565 operates at 300 lpi.

4.2.5 Summary of Main Unit

- Main Board

This is an integral unit having the Engine and Video control on a single PBA. It controls the Electrophotographic Process to take the image from the PC Interface and generate the Video Data for the LSU. It also manages the transfer of that image onto paper and the fusing of the image. The main PBA unit consists of the following circuits: Motor (Paper Feed and Exit) Driver, the Clutch driver, Pre-transfer Lamp Driver, the Fuser Driver and the Fan Driver. The signals from the Paper Feed Sensor, the Paper Empty Sensor, MP sensor and Exit Sensor are input to the Main Board from the SMPS/HVPS PBA.

- SMPS Board & HVPS Board

These are integrated into a singe PBA. The Power Supply uses the 110VAC/220VAC supply voltage to generate the DC Voltages used by the system. The SMPS has 3 output channels (+5V, +12V, +24V, +24VS) and supplies the Main Board and the OPE Board.

The HVPS creates the high voltages (THV/MHV/Supply/Dev) used for the electrophotographic process. The high voltage is created from the 24VS line from the SMPS. High Voltage output is supplied to the Toner, the OPC Cartridge and the Transfer Roller.

- OPE Board

The Operation Panel is driven by its own internal program using the OPE MICOM chip separate from the Main Board processor. Data is transferred using the UART Port in the Main Controller serially. This unit consists of the MICOM, the Key Pad Matrix and the LCD.

- Toner Cartridge

The Toner Cartridge consists of integrated Exposure and Developer units. The Exposure Unit consists of the OPC Drum and the Charge Roller, and the Developer Unit consists of the toner particles and its tank, the Supply Roller and the Developer Roller.

- LSU (Laser Scanner Unit)

This is the core of the laser printer. It converts the video data received from the computer into an electrostatic latent image on the surface of the OPC drum. This is achieved by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC and each side of the mirror is one scan line. The OPC drum turns as the paper feeds to scan the image down the page.

The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror and this signal is sent to the controller. The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. In other words after the /HSYNC signal is detected the image data is sent to the LSU to adjust the left margin on the paper.

- Toner Transfer

Toner is transferred from the OPC drum onto the paper using a PTL (Pre-transfer Lamp) and a transfer roller. The PTL shines light onto the OPC, this reduces the electrical charge on the surface of the OPC surface and improves the efficiency of the transfer.
The transfer roller transfers toner from the OPC drum to the paper.
Life span: Print over 100,000 sheets (at 15~30ºC)

- Fuser

This consists of a heat lamp, heat roller, pressure roller, thermistor and thermostat. By use of heat and pressure toner is caused to melt and adhere to the paper surface in order to complete the printing process.

4.3 System Layout

4.3.1 Feeding section

There is a universal cassette which automatically loads paper and the manual feed which supplies paper single sheet at a time. The cassette has a friction pad which separates paper to ensure single sheet feeding, and it has a sensor, which checks when the paper tray is empty.

- Feeding Method: Universal Cassette Type
- Feeding Standard: Center Loading
- Feeding Capacity: Cassette-250 sheets (75g/m^2, 20lb paper standard)
  Manual 1 sheet (Paper, OHP, Envelop, etc.)
- Paper detecting sensor: Photo sensor
- Paper size sensor: None

4.3.2 Transfer Ass'y

This consists of the PTL (pre-transfer lamp) and the Transfer Roller. The PTL shines a light onto the OPC drum. This lowers the charge on the drum's surface and improves transfer efficiency.
The transfer roller transfers toner from the OPC drum surface to the paper.

- Life expectancy: Over 60,000 sheets (at 15~30°C)

4.3.3 Driver Ass'y

- Gear driven power unit. The motor supplies power to the paper feed unit, the fuser unit, and the toner cartridge.

4.3.4 Fixing Part(Fuser)

- The fuser consists of the Heat Lamp, Heat Roller, Pressure Roller, Thermistor, and Thermostat. It fixes toner to the paper using pressure and heat to complete the printing job.

4.3.4.1 Temperature-Intercepting Device (Thermostat)

The thermostat is a temperature sensing device, which cuts off the power to the heat lamp to prevent overheating fire when the heat lamp or heat roller overheats.

4.3.4.2 Temperature Detecting Sensor (Thermistor)

The Thermistor detects the surface temperature of the heat roller, this information is sent to the main processor which uses this information to regulate the temperature of the heat roller.

4.3.4.3 Heat Roller

The surface of the Heat Roller is heated by the Heat Lamp. As the paper passes between the Heat and Pressure rollers the toner is melted and fixed permanently to the paper. The surface of the roller is coated with Teflon. This ensures that toner does not adhere to the roller surface.

4.3.4.4 Pressure roller

The Pressure Roller mounted under the heat roller, it is made of a silicon resin, and the surface of the roller is coated with Teflon. This ensures that toner does not adhere to the roller surface.

4.3.4.5 Safety Features

• To prevent overheating
- 1st protection device: Hardware cuts off when overheated
- 2nd protection device: Software cuts off when overheated
- 3rd protection device: Thermostat cuts off mains power to the lamp.

• Safety device
- Fuser power is cut off when the front cover is opened
- LSU power is cut off when the front cover is opened
- The temperature of the fuser cover's surface is maintained at less than 80ºC to protect the user and a caution label is attached where the customer can see it easily when the rear cover is opened.

4.3.5 Scanner

• Scan Image Controller

1.Minimum Scan Line Time : 1.23ms
2.Scan Resolution : Color (Max 600 DPI)
3.Scan Width : 208mm
4.Function
- White Shading Correction
- Gamma Correction
- CIS Interface
- 256 Gray Scale

• CIS Driver Circuit

- CIS Max Frequency : 0.5MHz
- CIS Line Time : 5ms
- White Data Output Voltage : Max 1.2V

• Tx Driver Circuit

- Tx Motor Speed : Max 2200pps
- Motor Driver : STA471A
- Voltage : 24V DC

4.3.6 LSU (Laser Scanner Unit)

This is the core of the laser printer. It converts the video data received from the computer into an electrostatic latent image on the surface of the OPC drum. This is achieved by controlling the laser beam and exposing the surface of the OPC drum to the laser light. A rotating polygon mirror reflects the laser light onto the OPC and each side of the mirror is one scan line. The OPC drum turns as the paper feeds to scan the image down the page.

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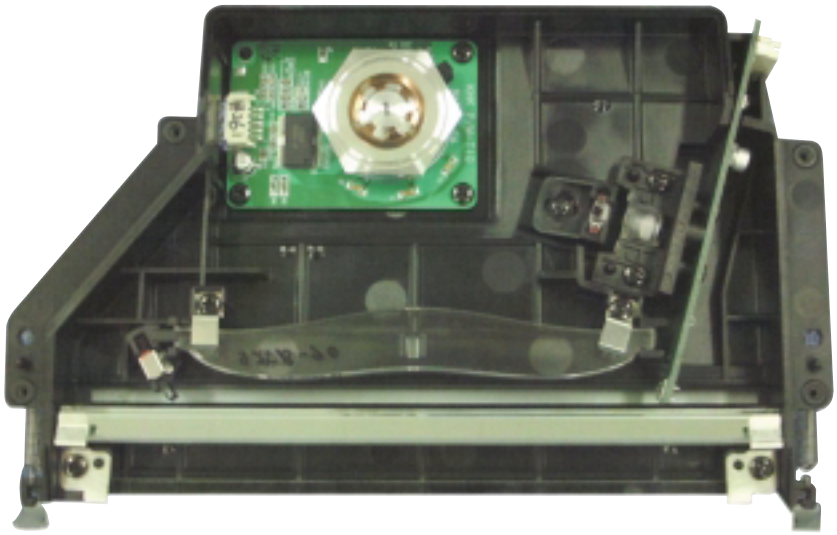
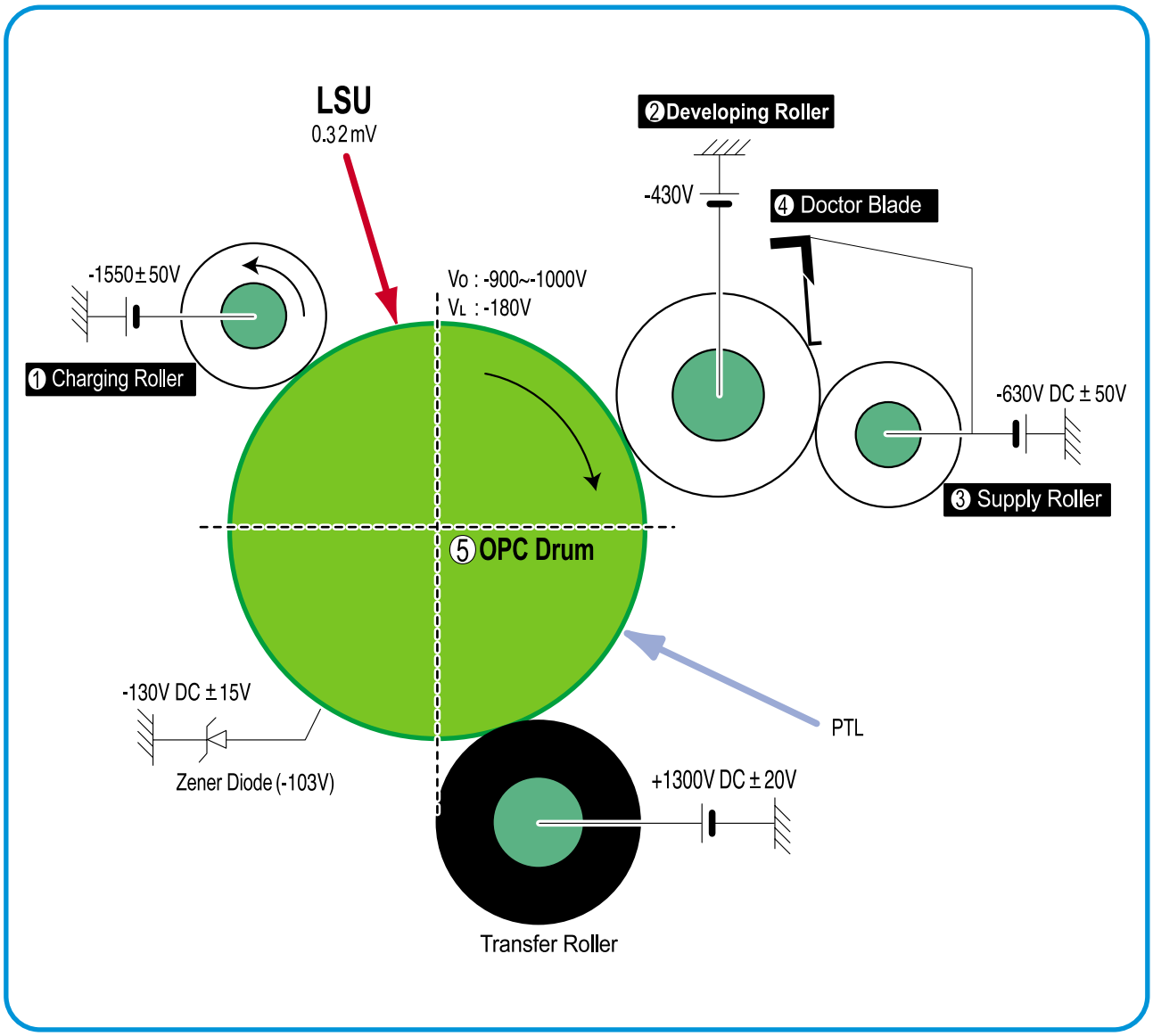


4.3.7 Toner Cartridge

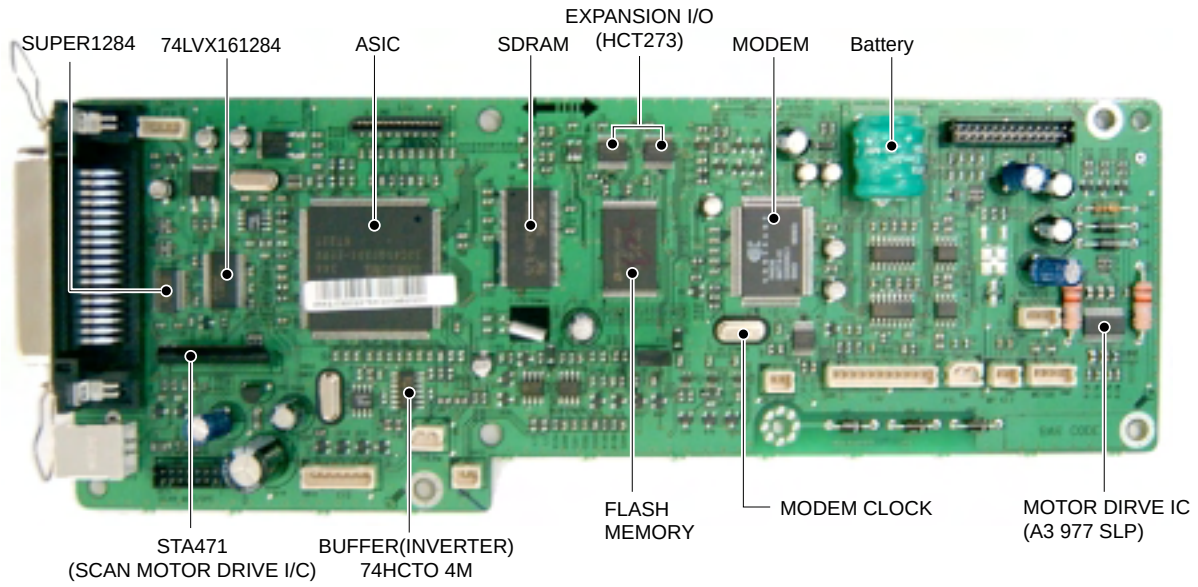
The toner cartridge is an integral unit containing the OPC unit and toner unit. The OPC unit consists of the OPC drum and charging roller, and the toner cartridge unit consists of the toner, supply roller, developing roller, and blade (Doctor blade)

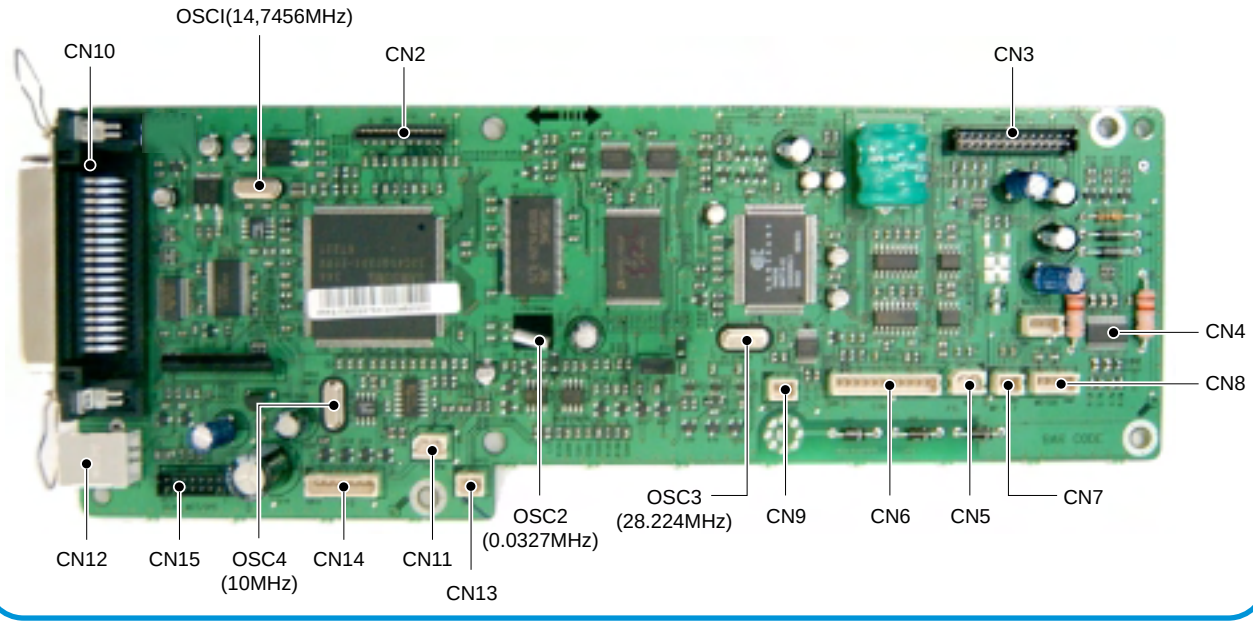
- Developing Method: Non magnetic 1 element contacting method
- Toner: Non magnetic 1 element shatter type toner
- The life span of toner: 3,000 sheets (IDC Pattern/A4 standard)
- Toner remaining amount detecting sensor: Yes
- OPC Cleaning: Electrostatic process
- Management of waste toner: Collect the toner using a Cleaning Blade
- OPC Drum protecting Shutter: Yes
- Classifying device for toner cartridge: ID is classified by interruption of the frame channel



4.4 Main PBA(SPL Model)

The Engine Board and Controller Board have been integrated into a single PBA. This consists of the CPU, printer scanner and line control functions. The CPU functions as the bus controller, I/O handler, motor driver and PC inter-face. The main board sends the Current Image Video data to the LSU and manages the Electrophotographic printing process. Circuits on the PBA drive include the main motor (paper feed, cartridge, fuser), clutch driver, pre-transfer lamp driver, heat-lamp driver, CIS driver, scan motor driver, modem and fan driver.
The signals from the paper feed jam sensor and paper empty sensor are inputted to the main board from the power supply PBA..





4.4.1 ASIC (Chorus2)

Samsung's S3C46Q0X 16/32-bit RISC micro controller is designed to provide a cost-effective, low power, small die size and high performance micro-controller solution for MFP.
The S3C46Q0X is developed using ARM7TDMI core, 0.18(m CMOS standard cell, and memory cell.

•Main function block

- 1.8V internal, 3.3V external (I/O boundary) microprocessor with 4KByte Cache
- Image Processor
- On-chip clock generator with PLL
- Memory & External Bank Control
- DMA Control (5-channel)
- Interrupt Control
- 2-port USB Host /1- port USB Device (ver 1.1) Interface Control
- Parallel Port Interface Control
- UART (2 Channel)
- Synchronous Serial Interface Control
- Timer (4 Channel)
- Watch Dog Timer
- Power control: Normal, Slow, Idle, Stop and SL_IDLE mode
- A/D Converter (10-bit, 2 Channel)
- General I/O Port Control
- Print Head Control
- Carrier Motor Control
- Paper Motor Control
- Tone Generator
- RTC with calendar function
- S/W Assistant function(Rotator)

4.4.2 Flash Memory

This stores the system program. Firmware upgrade is achieved by downloading from the new image using the PC Interface.

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

4.4.3 SDRAM

This is used as a buffer, system working memory area, etc. while printing and scanning. This memory is also used to store faxes waiting to be sent or waiting to be printed.

- Access Time : 60 nsec

4.4.4 Sensor input circuit

1) Paper Empty Sensor

The Paper Empty sensor (Photo Interrupter) on the SMPS/HVPS PBA is monitored by the CPU on signal(nP_EMPTY, CN3-Pin 1). When the cassette is empty the printer displays a message on the LCD panel.

2) MP Sensing

Presence of paper in the MP tray is detected by operation of the MP Sensor (Photo Interrupter) on the SMPS/HVPS PBA. The CPU monitors signal(MP_EMPTY, CN3-Pin 13) to recognize paper in the MP, and paper is fed from MP if there is paper present.

3) Paper Feed Sensor, (Toner Cartridge Sensor)

When paper passes the actuator on the feed sensor, it is detected by the Photo interrupter. signal(nP_FEED, CN3-Pin 2) monitored by the CPU and this signal starts the process of creating the image after certain delay time If the feed sensor is not detected within 1 sec. after paper is fed, a paper Jam0 occurs. (Displayed on the LCD panel).
When a toner cartridge is inserted it also operates the Paper Feed sensor. A message is displayed on the LCD if no cartridge is detected.

4) Paper Exit Sensor

This detects that paper exits cleanly from the Machine using an exit sensor on the engine board and actuator on the frame. The monitors signal(P_EXIT, CN3-Pin 26) and detects the on/off time of the exit sensor and if jam status is detected then JAM2 is displayed the on the LCD panel.

5) Cover Open Senser

The Cover open sensor actuator is located on the front cover and the senor is in the main frame. When the front cover is opened the +24VS to the DC fan, solenoid, main motor, polygon motor part of LSU, HVPS that are cut off. The CPU monitors signal(COVER_OPEN) to recognize when the cover is opened.

6) DC FAN / SOLENOID Driving

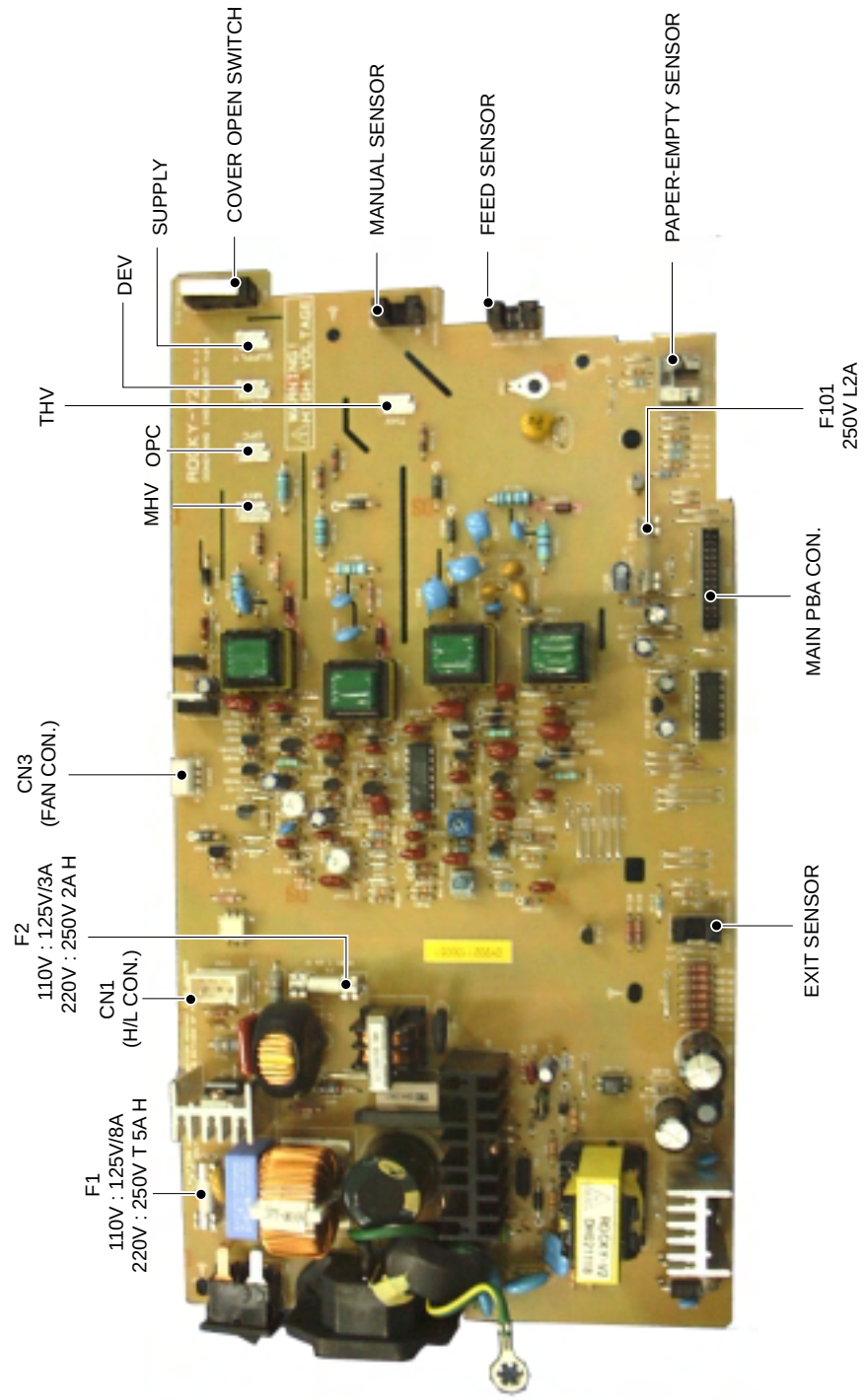
It is driven by a transistor and controlled by signal(FAN, CN3-Pin 24) bit of the CPU.
When it is high the fan is activated by turning on the TR, and it is off when the sleep mode is selected.
There are two solenoids and these are driven by the Paper Pick-up and MP signals. The drive time is 300ms. The diode protects the driving TR from the Back-EMF pulse which is generated when the solenoid is de-energized.

7) Motor Driving

The motor driving circuit is activated when the Driver IC is enabled. An A3977 (Motor driver IC) is used in this case. The resistance Rs value of sensing and the voltage value of the V reference can be changed by the motor driving voltage value.

4.5 SMPS & HVPS

The SMPS and HVPS are on one integrated board.
The SMPS supplies the DC power to the system. It takes either 110V or 220V and outputs the +5V, -5V/0.5A, 12V and 24V supplies to the main and ADF PBAs.
The HVPS creates the high voltage of THV/MHV/Supply/Dev and supplies it to the toner cartridge. The CPU is used to modify some of these voltage settings to provide the ideal voltages to create the image.
The HVPS part uses 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.



4.5.1 HVPS(High Voltage Power Supply)

1) Transfer High Voltage (THV+)

- Function : It is this voltage that transfers toner from the OPC Drum to the paper.
- Output voltage : +1300V DC±20V
- Error : IF THV (+) is not present, low density printing occurs due to toner on the OPC Drum not being transferred to the paper. It is possible that waste toner over-flow can occur if this condition persists. Ghost images may appear which repeat at 76mm intervals.

2) Charge Voltage (MHV)

- Function : It is this voltage that charges the surface of the OPC to -900V ~ -1000V.
- Output voltage : -1550V DC ± 50V
- Error : IF MHV is not present toner then since the OPC drum surface has no charge toner is attracted to the whole OPC surface. A black page is printed out when this happens.

3)Cleaning Voltage (THV-)

- Function : It removes toner contamination from the rear side of the paper by sending (-) polarity to the transfer roller forcing toner to transfer back to the to OPC drum.
- Output Voltage : +300V/-150V
- Error : Smudges and toner contamination on the reverse side of the printed page.

4) Developing Voltage (DEV)

- Function: It is this voltage that develops toner with on to the section of the OPC drum surface exposed by the LSU (Laser Scanning Unit).

* When printing the exposed voltage on the OPC is -180V, unexposed is -900~-1000V, and the exposing voltage on the DEV is -430V. Therefore toner with (-) polarity is developed onto an exposed section of the OPC.

- Output voltage: -430V DC ± 20V
- Error: a) If DEV is GND, print density gets extremely low.
  b) When DEV is floating due to poor connection between the frame and cartridge contacts etc., print density gets extremely high.

5) Supply Voltage (SUP)

- Function: It is this voltage that supplies toner to the developing roller.
- Output voltage: : -630V DC ± 50V (Use ZENER, DEV Gear)
- Error: a) When SUP is GND print density gets extremely low.
  b) If SUP is floating due to poor connection between the frame and cartridge contacts etc. density gets extremely low such that it is hard to see toner with the eyes

6) OPC Ground ZENER Voltage

- Function: It is this voltage that prevents image contamination under low temperature and low humidity environment conditions.
- When a set prints without an output voltage, -130V DC ± 15V is maintained on OPC ground. (-103V ZENER diode is connected to OPC ground)
- Error type: a) When the ZENER diode is - 0V there is no serious image problem in general environment, but in low temperature and low humidity environments it is possible that contamination can occur on the entire image
  b) When the ZENER diode is disconnected a blank page is printed out. (It is the same when a ZENER diode is disconnected from OPC ground.)

4.5.2 SMPS (Switching Mode Power Supply)

ItThis is the power source for the whole system. It is an independent module so that it is possible to use it for common use. It is mounted at the bottom of the set.
It consists of the SMPS section, which supplies the DC power to drive the system, and the AC heater control part, which supplies the power to the fuser. The SMPS has four output channels ((+5V, -5V, +12V, +12Vand +24Vs).
There are three kinds of power, 120V exclusive (America), 220V exclusive (Europe), and 220V for China (nations with unstable power supply).

1) AC Input

- Inputting rated voltage : AC 220V ~ 240V AC 100~127V
- Inputting voltage fluctuating range : AC 198V ~ 264V AC 90V ~ 135V
- Rated frequency : 50/60 Hz
- Frequency fluctuating range : 47 ~ 63 Hz
- Inputting Current : Under 4.0Arms/2.0Arms

2) Rated Power Output

NO	Item	CH1	CH2	CH3	CH4
1	Channel name	+5V	-5V	+24.0V	+24.0VS
2	CONNECTOR PIN	CON 2 3.3V PIN: 3, 4 GND PIN: 5, 6	CON2 -5V PIN : 7 GND PIN: 8	CON2 24V PIN: 11, 12 GND : 9, 10	CON2 24V PIN: 13, 16 GND : 18
3	Rated outputting voltage	+5V ± 5% (4.75 ~ 5.25V)	-5V ± 5% (-4.75~-5.25V)	+24V ± 10% (21.6 ~ 26.4V)	+24V ± 10% (21.6 ~ 26.4V)
4	Rated outputting current	1.5 A	0.5A	1.5 A	1.0 A
5	Ripple noise voltage	150mVp-p	150mVp-p	500mVp-p	500mVp-p
6	Maximum output	7.5W	0.6W	36.0W	24.0W

3) Consumption Power

NO	Item	CH1 (+5V)	CH2 (+12V)	CH3 (+24V)	CH4 (+24VS)	System
1	Stand-By	1.0 A	0.05A	1.0 A	0.5 A	AVG : 60 Wh : 220V AVG : 75 Wh : 110V
2	Operating	1.5 A	0.5A	1.5 A	1.0 A	AVG : 320 Wh
3	Sleep-Mode	0.3A	0.0A	0.0A	0.06A	AVG : 15 Wh

4) Length of Power Cord : 1830 ± 50mm

5) Power Switch : Fitted

6) Feature
- Insulating resistance : over 50MΩ (at DC500V)
- Insulating revisiting pressure : Must be no problem within 1min. (at 1500Vzc, 10mA)
- Leaking current : under 3.5mA
- Running current : under 40A peak (at 25°c, Cold start) Under 60A peak (in other conditions)
- Rising Time : Within 2Sec
- Falling Time : Over 20ms
- Surge : Ring Wave 6KV-500A (Normal, Common)

7) Environment Condition
- Operating temperature range : 0°c ~ 40°c
- Storage temperature range : -25°c ~ 85°c
- Storage humidity range : 30% ~ 90% RH
- Operating atmospheric pressure range : 1

8) EMI Requirement : CISPR ,FCC, CE, MIC, C-Tick,

9) Safty Requrement
- IEC950, C-UL, TUV,Semko,iK,CB, CCC, EPA,

4.5.3 Fuser AC Power Control

The Fuser (HEAT LAMP) is heated using AC power. The AC power is controlled by a Triac (THY1), a semiconductor switch. 'On/Off control' is achieved when the gate of the Triac is turned on/off by a Photo triac (PC1), this is an insulting part.
In the other words the AC control part is a passive circuit. It turns the heat lamp on/off by taking a signal from the engine control section. When the 'HEATER ON' signal is activated by the engine the LED of PC1 (Photo Triac) flashes. The flashing light causes the Triac (PC1) to switch and a voltage is supplied to the gate of Triac THY1.
As a result AC current flows in the heat lamp, and heat is produced.
On the other hand, when the signal is off, PC1 is off, the voltage is cut off at the gate of Triac THY1, this Triac is therefore off, and thus the heat lamp is turned off.

1) Triac (THY1) feature
- 12A,600V SWITCHING

2) Phototriac Coupler (PC3)
- Turn On If Current : 15mA ~ 50mA(Design: 16mA)
- High Repetive Peak Off State Voltage : Min 600V

4.6 Engine F/W

4.6.1 Feeding

If feeding from the cassette the drive of the pickup roller is controlled by controlling the pick-up solenoid. The on/off of the solenoid is controlled by controlling the general output port or the external output port. If feeding from the manual feeder the set decides to feed the paper according to the operation of the manual sensor, and by driving the main motor, insert the paper in front of the feed sensor. When paper moves the occurrence of a paper jam is judged as below.

4.6.1.1 Jam 0 – Jam in Feed area

- After a page was picked up, paper did not enter the unit due to a paper misfeed.
- After a page was picked up, paper entered but it did not reach the feed sensor in certain time due to slip, etc.
- After a page was picked up, if the feed sensor is not on try to pick up again. After retrying if the feed sensor is still not on after certain time, it is Jam 0.
  - this indicates that the leading edge of the paper doesn't pass the feed sensor within a certain time.
- Even though the paper reaches the feed sensor, the feed sensor does not turn on.
  - this indicates that the leading edge of the paper already passed the feed sensor or that the sensor is fauty.

4.6.1.2 Jam 1 – Jam inside the print engine

- After the leading edge of the paper passes the feed sensor, the trailing edge of the paper does not pass the feed sensor within certain time. (During this time the feed sensor cannot be Off)
- After the leading edge of the paper passes the feed sensor, the paper does not reach the exit sensor within certain time. (The exit sensor cannot be On during this time)
  - There is already paper between the feed sensor and the exit sensor.

4.6.1.3 Jam 2 – Jam in the Exit area

- After the trailing edge of the paper passes the feed sensor the trailing edge of the paper does not pass the exit sensor within certain time.

4.6.2 Drive

The main motor drives the paper feed, developing unit and the Fuser It is driven by software which controls the acceleration, constant speed and deceleration profiles. The Motor is managed with an A3977 driver IC and controlled by step and enable signals from the CPU.

4.6.3 Transfer

The charging voltage, developing voltage and the transfer voltage are controlled by PWM (Pulse Width Modulation). Each output voltage is changeable according to the PWM duty cycle. The transfer voltage used when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller changes due to the surrounding environment in the room or within the set, this change in resistance in turn changes the value of the voltage due to loading. This voltage is fed back into the set through the A/D converter. Based on this fed back value the PWM cycle is changed to maintain the required transfer voltage

4.6.4 Fusing

The temperature of the heat roller's surface is detected according to the resistance value of the thermistor. The thermistor resistance is measured using the A/D converter and thus the CPU can determine the temperature of the heat roller. The AC power is controlled by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of the controlling range while controlling the fusing process, the error stated in the table occurs. (For the domestic model, the Q-PID method has been applied.)

4.6.4.1 Error Type

Error	Description
Open heat error	When warming up, it has been lower than 68 °C over 25 sec
Lower heat error	• Standby: It has been lower than 100°C over 25 sec • Printing: - 2 consecutive pages: it has been lower than 145°C over 5 sec - 3 consecutive page; it has been 40°C lower than the fixed fusing temperature over 4 seconds.
Over heat error	It have been higher than 220°C over 3 seconds

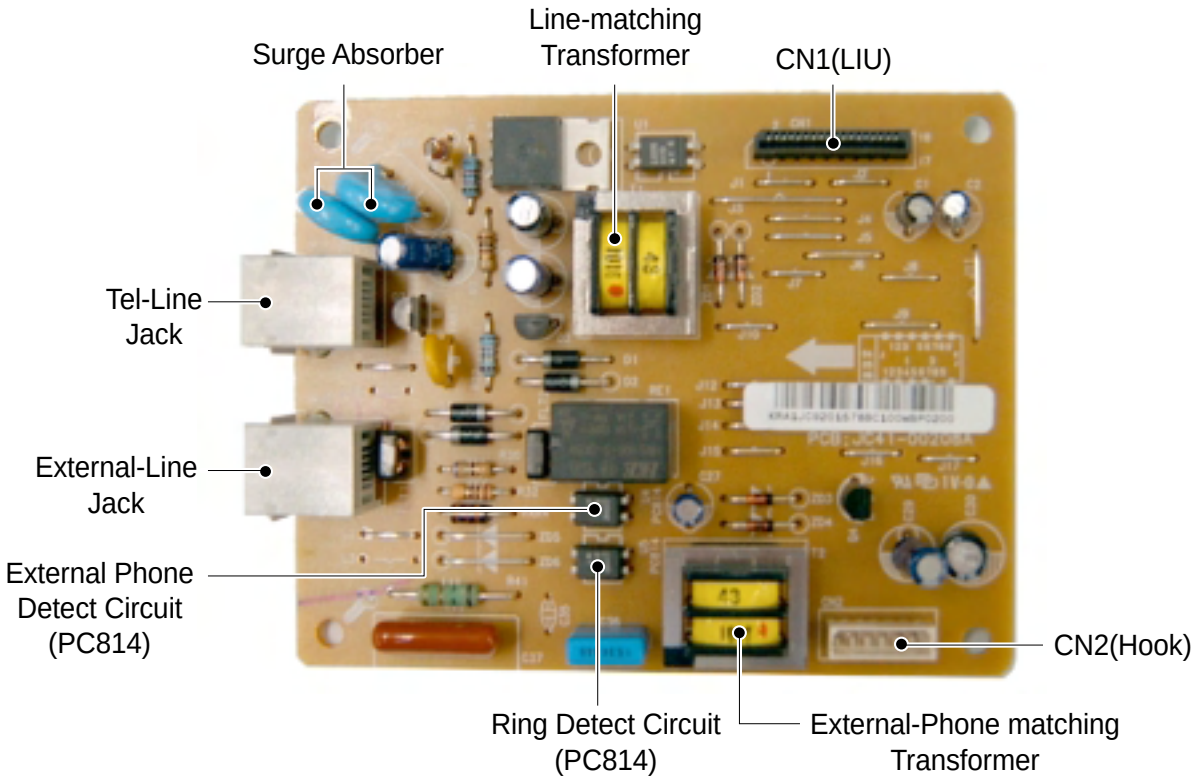
4.6.5 LSU

The LSU consists of the LD (Laser Diode) and the polygon motor control. When the printing signal occurs, the LD is turned on and the polygon motor is enabled. When the light sensor detects the beam, Hsync occurs. When the polygon motor speed becomes a normal, LReady occurs. If these two conditions are satisfied, the status bit of the LSU controller register becomes 1 ant the LSU is judged to be ready. If the two conditions are not satisfied, the error shown in the table below occurs.

Error	Description
Polygon motor error	When the polygon motor’s speed doesn’t become a normal
Hsync error	The polygon motor’s speed is normal, but the Hsync signal is not created.

4.7 LIU PBA

The LIU board is the Line interface unit, it is a circuit for interfacing a telephone line with a modem. The circuit consists of a matching transfer to conform to the impedance of the receiving telephone line and a circuit to conform to the impedance of a modem.
Also, there is a ring detect circuit to detect a ring signal from the switchboard and a surge absorber to protect against lighting strike surges on the incoming line.



4.8 OPE PBA

The OPE board consists of various function keys and an LCD to display set status and operator messages. A MICOM (HOLTEC HT48R50) and drives the LEDs and LCD. Communication between the OPE and the CPU on the main board is serial (related signals are /Reset, TXD, and RXD).