

3. System Overview

3.1 System Construction

3.1.1 Printer

Printer consists of the Engine parts and F/W, and engine parts consist of the mechanical parts comprising Frame, Feeding, Developing, Driving, Transferring, Fusing, Cabinet and H/W comprising the main control board, power board, operation panel, PC Interface. The main controller consists of ASIC (CHORUSm) parts, Memory parts, Engine Interface parts and it functions as Bus Control, I/O Handling, drivers & PC Interface by CPU.

The Engine Board and the Controller Board are in one united board, and it consists of CPU part and print part in functional aspect. The CPU is functioned as the bus control, I/O handling, drivers, and PC interface.

The main board sends the Current Image, Video data to the LSU and manages the conduct of Electro photography for printing. It consists of the circuits of the motor (paper feed, pass) driving, clutch driving, pre-transfer lamp driving, current driving, and fan driving. The signals from the paper feed jam sensor and paper empty sensor are directly inputted to the main board.

3.1.2 Scanner

Pictorial signal input part : output signal of CCD passes through Bypass Cap change to ADC at HT82V26A, and defined signal between HT82V26A and CHORUSm processes the Image signal. When AFE accept each pixel, CDS(Correlated Double Sampling) technique which samples arm-level twice is used on each pixel by using CHORUSm IP signal.

Pictorial image processing part : read CCD Pixel data in terms of 600dpi Line and process Error Diffusion Algorithm on Text mode and Photo mode, and then store Data at Scan Buffer on PC Scan mode without algorithm.

On every mode Shading Correction and Gamma Correction are executed ahead, then processing is executed later.

3.1.3 Copier

1) Original Type

Text Scan : 600x300dpi , Printing 600x600dpi

Mixed Scan : 600x300dpi , Printing 600x600dpi

Photo Scan 600x600dpi @ Platen or 600x300dpi @ ADF Printing 600x600dpi

2) Automatic Background Suppression : Yes (On/Off)

3) Darkness Control : 5 level

4) FCOT(Platen)

Ready : 10 Seconds

Power Save : 35 Seconds(after 10minutes from sleep mode, Ltr size)

5) Copy Speed-For all tray

Simplex Copy Speed <ADF>

- @SDMC, Text : 23cpm/Ltr. 22cpm/A4

- @MDMC, Text : 17cpm/Ltr, 16cpm/A4

<DADF>

- @SDMC, Text : 23cpm/Ltr. 22cpm/A4

- @MDMC, Text : 21cpm/Ltr, 20cpm/A4

Duplex Copy Speed : Yes

6) Auto return to default mode : Yes(Configurable, Default is 30 Sec)

7) Changeable Default mode : Darkness, Image, Reduce/Enlarge, No. of Copies,

8) Zoom Range : 25% to 400% for Platen 25% to 100% for ADF

9) Multi Copy : 1~999

10) Preset Auto Fit, Clone

11) Manual Duplex : YES

12) Department Codes : Yes

13) Collation Copy : Yes

14) CCD Sleep Time : 30 minutes

15) Special Copy

ID Card Copy : Yes

Margin Shift : Yes

Book Copy : Yes

Auto Suppression : Yes

Covers : No

Transparencies : No

Create Booklet : No

N-up copy 2-up(ADF and Platen, 4-up (ADF only)

Clone : Yes (Platen Only)

Poster : Yes(Platen Only)

3.1.4 Fax

1) Modem part

Implemented by based on Conexant DAA (Data Access Arrangement) Solution, and is roughly composed of two kinds Chip Solution

- CX86710 (SFX336) : Existing Modem Chip which adds SSD (System Side Device) for interfacing between LSD and DIB of FM336Plus Core
- CX20493 (LSD) : LIU (Line Interface Unit) Chip which is controlled by SSD and satisfies each PSTN Requirements by modulating internal Configuration with connecting Tel Line.

2) Line Interface Part

This is Connection Part between system and PSTN(Public Switched Telephone Network), and primary circuit is usually located. Main functions are Line Interface, Telephone Connection and Line Condition Monitoring.

3.1.5 Mechanical

1) Feeding Part

Feed Type : Universal Cassette Type

Feed Standard : Side Loading

Feed Capacity

<Cassette> : 550sheets (75g/ m², 20lb paper based on)

<Bypass tray> : 100sheets (75g/ m², 20lb paper based on)

Feed Separation Method

<Cassette> : Separation Claw Method

<Bypass tray> : Friction Pad Method

Driving System : Driving by gearing from Main Motor

Pickup Roller Driving Control : Solenoid

Pickup Roller Rubber Material

<Cassette > : EPDM+IR

<Bypass tray> : EPDM+IR

Paper detection Sensor : Photo Sensor

Paper Size Sensor : None

Feed Type : Face Up

Paper Exit Type : Face Down

2) Transfer Ass'y

High Pressure Voltage Type : Constant Voltage PWM Control Type

Roller Material : NBR Sponge Rubber

Roller Structure : Mono-layer

Life : 100,000 pages printing or more

3) Driver Ass'y

Motor Specification : BLDC Motor DC24V

Driving Force Transmission by Gearing :

- Motor 1 : Developing/OPC/Feeding
- Motor 2 : Fixing/Duplex

4)Fuser

Unfused / Poor fusing temperature Poor Fusing Temperature : 170°C

Maximum fuser temperature : 197°C

Minimum fuser temperature : 180°C

Heater : E-coil type

Thermostat Type : Non-Contact Type THERMOSTAT

3.1.6 LSU

Optical Resolution : Real 600 dpi

Motor : Brushless DC motor PLL control

3.1.7 CRUM

Once toner sensor determines "toner empty" (section 4.7.1), this state is written to the CRUM and the Vendor ID location is erased on the CRUM. Erasing the vendor ID will prevent an unauthorized (3rd party) refilled cartridge from being identified as a genuine Samsung toner cartridge.

Toner status : Toner Status has Normal, Low, and Empty, Exhausted State.

Usage data saved in CRUM :

- Page count using this cartridge(Print Page Counter)
- Installed date of New cartridge(copier/Fax configuration)
- Whether cartridge has ever exhausted (used to stop printing)(Exhaust)
- Large or small capacity cartridge (used by Capacity)(Capacity)

Disabling of features when non-Samsung cartridge :

- No working CRUM, stops printing.
- Print cartridge for different product, stops printing. "Invalid Toner" will be displayed on LCD in above 2 cases.

3.1.8 Drum Cartridge

Drum Cartridge to have a fuse to enable resetting of Drum Page counter.

Low Drum Warning : Message displayed on LCD "Drum Warning" after printing 18,000 images.

Out-of -Drum : Message displayed on LCD "Replace Drum" after printing 20,000 images.

Or after additional 2000 images from "Drum Warning

Life(Service) Time : 20,000 images

3.2 Engine H/W

3.2.1 Overview

Briefly, Elbruz consists of Main Control Part, Operation Panel Part, Scanner Part, Line Interface Part, Power Part and Network Interface Card.

Main Controller is commonly applied in all products, Elbruz, and in case of necessary a part of components or Module is selectively adopted in accordance with required feature of each model.

Each Part is designed with emphasis on Common-Use/Standardization with other models as independent module.

3.2.2 Main Controller

The Main Control has functionalities like a Printer engine controller, a Scanner, a Copier and a FAX machine.

As a Printer engine controller, Main controller controls the paper pick-up part, Laser scanning Unit, High voltage power supply(HVPS) and fixing unit.

As a Scanner, Main controller controls the image sensor(CCD) and the scan motor, and optimize the scanned image in order to transfer to the Computer or to send the image via Fax, or to copy it.

As a FAX machine, Main Controller controls the scanner part, and it driving the FAX communication part in order to communicate with the other FAX machine.

It makes a connection with the other FAX machine, send or receive an image, and it can print the received image.

1) CPU

CHORUSm is the CPU of the ElbruzSEC Main controller. It is made based on the ARM920T core and is optimized for the Laser multi functional peripheral.

Image Processor is intergrated in the CPU.

2) Flash Memory

Flash Memory is used to store system program code and system configuration contexts.

Machine is able to be up-graded by transferring newer ROM-file via computer interface or Tel-Line interface or Network interface.

- Capacity: total 16MB (8MB x 2ea)
- Access Time: 90ns

3) SDRAM

SDRAM memory are used as Print Buffer for Printing, Scan Buffer for Scanning, FAX receive memory for Facsimile and System Working Memory Area.

- Operating Frequency: 80MHz
- Total Capacity: 64MByte

4) USB 2.0 & IEEE1284

Elbruz machine can be connected to Host computer through IEEE1284 Parallel cable or USB cable.

IEEE1284 communication function is provided by the CHORUSm and USB function is provided by ISP1582-USB2.0 controller.

5) Engine Interface.

Engine interface is comprised of HVPS interface, SCF interface, motor interface, LSU interface, fixing unit interface and the other photo-sensors.

All engine interface is connected directly to the Main CPU and is controlled by Firmware.

6) Scan Interface

Scan interface is comprised of CCD interface, Platen and ADF interface.

CCD is interconnected to the CPU via CCD interface and Platen motor also connects to the CPU so that move the CCD along its way.

ADF Kit will be connected through scan interface and is recognized and enabled by the CPU.

7) Network Option Kit Interface

Network Option Kit is able to installed by end user easilly. After align its connector he or she only push option card against Main board.

Network option card enables PostScript function at the same time as it installed properly.

Network option enables ElbruzSEC to connect to the LAN or Internet network.

Many users can share the machine and print out by internet or LAN connection.

8) Control Panel

Control Panel is prepared for communication with user.

Control panel gets the user's command input and displays the machine status.

Command input will be achieved by pressing a specific key then Micom recognize which key is pressed and machine will respond proper action.

And machine can notify its state by displaying text on the LCD panel.

- Liquid Crystal Display

- Micom : OPE Micom gathers Key pressing information ,controls the LCD and LED.

OPE Micom always communication with Main CPU periodically in order to send key input information, to receive text which will be display on LCD and to receive the LED information which LED must be lighted.

9) Modular Board

Modular board, treated as LIU board, has only RJ-11 modular jack and some protection parts in it.

DAA has almost function of LIU board, only modular jack is needed for Line connection.

3.2.3 SMPS & HVPS

3.2.3.1 SMPS

1) 110 V Power Supply Specification - Not compatible with 220-volt operation.

Input Voltage : AC 110~127V(-10%~+6%)/6 A

Rated Frequency : 50 / 60Hz

Power Switch : Yes

Average Power Consumptions

- in Power save mode : 28 Watts
- in Stand by mode : 100 Watts
- in Printing simplex : 400 Watts
- in Printing duplex : 300 Watts
- in ADF Copy mode (1-1 copy, Tray1) : 450Watts
- Instantaneous Max Power Consumption : 1,500 Watts Peak power
- Fixing Unit Power Consumption : 900W

2) 220V Power Supply Specification - Not compatible with 110-volt operation

Input Voltage : AC 220-240V(-10%~+6%)/ 3.5A

Rated Frequency : 50 / 60Hz

Power Switch : Yes

Average Power Consumptions

- in Power save mode : 28 Watts
- in Stand by mode : 100 Watts
- in Printing simplex : 400 Watts
- in Printing duplex : 300 Watts
- in ADF Copy mode (1-1 copy, Tray1) : 450Watts
- Instantaneous Max Power Consumption : 1,500 Watts Peak power
- Fixing Unit Power Consumption : 900W

3.2.3.2 HVPS

1) Transfer High Voltage (THV)

- Input Voltage : 24 V DC $\pm 15\%$
- Transfer Output Voltage : MAX +5.0kV DC $\pm 10\%$ (non-load)
- Transfer Cleaning Voltage : -1.0kV DC $\pm 15\%$ (when cleaning, 200 M Ω)
- Voltage Stability comparing with Input : $\pm 5\%$ or less (Input Fluctuation 21.6V ~ 26.4V comparing with Load : $\pm 5\%$ or less)
- Output Voltage Rising Time : 100 ms Max (tbc)
- Output Voltage Falling Time : 100 ms Max (tbc)
- Environmental Transfer Variable Voltage : 500 V ~ 4.5 kV
- Environment Recognition Control Method : It detects resistance by recognizing the current by feedback with impressing the environment recognition voltage.
- Transfer Output Voltage Control Method : It controls the output by duty change of THV PWM Signal.
- Cleaning Voltage Control Method : Stationary voltage output when THV-EA signal is 'LOW'

2) Charge Voltage (MHV)

- Input Voltage : 24 V DC $\pm 15\%$
- Output Voltage : -1.3kV ~ -1.45KV DC $\pm 5\%$
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Load range : 30 M Ω ~ 2000 M Ω
- Output Control Signal : CPU outputs high voltage when MHV-PWM is 'ON'

3) Developing Voltage (DEV)

- Input Voltage : 24 V DC $\pm 15\%$
- Output Voltage : -250V ~ -500V DC $\pm 5\%$
- Output Voltage Variable range : PWM control
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Load range : 10M Ω ~ 1000 M Ω
- Output Control Signal : CPU outputs high voltage when BIAS-PWM is 'ON'

4) Supply Voltage

- Input Voltage : 24 V DC $\pm 15\%$
- Output Voltage : -400V ~ -650V DC $\pm 5\%$
- Output Voltage Variable Range : fixed by Zenner diode
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Load Range : 10M Ω ~ 1000 M Ω
- Output Control Signal : CPU outputs high voltage when BIAS-PWM is 'ON'

5) Blade Voltage

- Input Voltage : 24 V DC $\pm 15\%$
- Output Voltage : -300V ~ -550V DC $\pm 5\%$
- Output Voltage Variable Range fixed by Zenner diode
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Load Range : 10M Ω ~ 1000 M Ω
- Output Control Signal : CPU outputs high voltage when BIAS-PWM is 'ON'

* In case of SUPPLY/BLADE/DEV, in single high voltage output it outputs by inter-working as potential difference of ZENER-DIODE