brother®

Multi-Function Machine

SERVICE MANUAL

**MODEL: MFC6800/DCP1000
MFC9180/MFC9160**

PREFACE

This publication is a Service Manual covering the specifications, construction, theory of operation, and maintenance of the Brother multi-function machine. It includes information required for field troubleshooting and repair--disassembly, reassembly, and lubrication--so that service personnel will be able to understand machine function, to rapidly repair the machine and order any necessary spare parts.

To perform appropriate maintenance so that the machine is always in best condition for the customer, the service personnel must adequately understand and apply this manual.

This manual is made up of six chapters and appendices.

This manual describes the models and their versions to be destined for major countries. The specifications and functions are subject to change depending upon each destination.

SAFETY INFORMATION

Laser Safety (110-120V Model only)

This printer is certified as a Class 1 laser product under the US Department of Health and Human Services (DHHS) Radiation Performance Standard according to the Radiation Control for Health and Safety Act of 1968. This means that the printer does not produce hazardous laser radiation.

Since radiation emitted inside the printer is completely confined within the protective housings and external covers, the laser beam cannot escape from the machine during any phase of user operation.

CDRH Regulations (110-120V Model only)

The Center for Device and Radiological Health (CDRH) of the US Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States. The label shown below indicates compliance with the CDRH regulations and must be attached to laser products marketed in the United States.

The label for Chinese products

MANUFACTURED: JUNE   2001   C
BROTHER CORP. (ASIA) LTD.
BROTHER BUJI NAN LING FACTORY
Gold Garden Industry, Nan Ling Village, Buji,
Rong Gang, Shenzhen, China.
This product complies with FDA radiation
performance standards, 21 CFR Subchapter J.

CHAPTER 1

GENERAL DESCRIPTION

CHAPTER 1 GENERAL DESCRIPTION

CONTENTS

1.1 OUTLINE

1.1.1 External Appearance and Weight

The figure below shows the machine appearance and approximate dimensions.

(H) 354 mm
13.9"

(D) 458 mm
18.0"

(W) 459 mm
18.1"
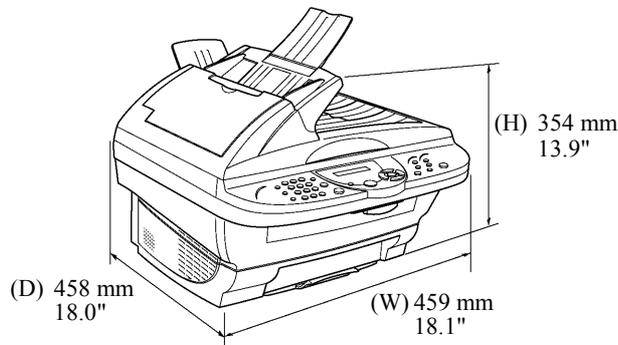
Weight:	Machine proper	Approx. 11 kg
	Machine (incl. drum unit & toner cartridge)	Approx. 12 kg
	In package	Approx. 16 kg

1.1.2 Components

The machine consists of the following major components:

Scanner top cover

ADF & document tray ASSY

Scanner base

Control panel ASSY

ASF

Scanner mount

Board access cover

Front cover

Main cover

Laser unit

Gear drive unit

Heat-fixing unit

Low-voltage power supply PCB

Bottom plate

Main PCB

NCU PCB

High-voltage power supply PCB
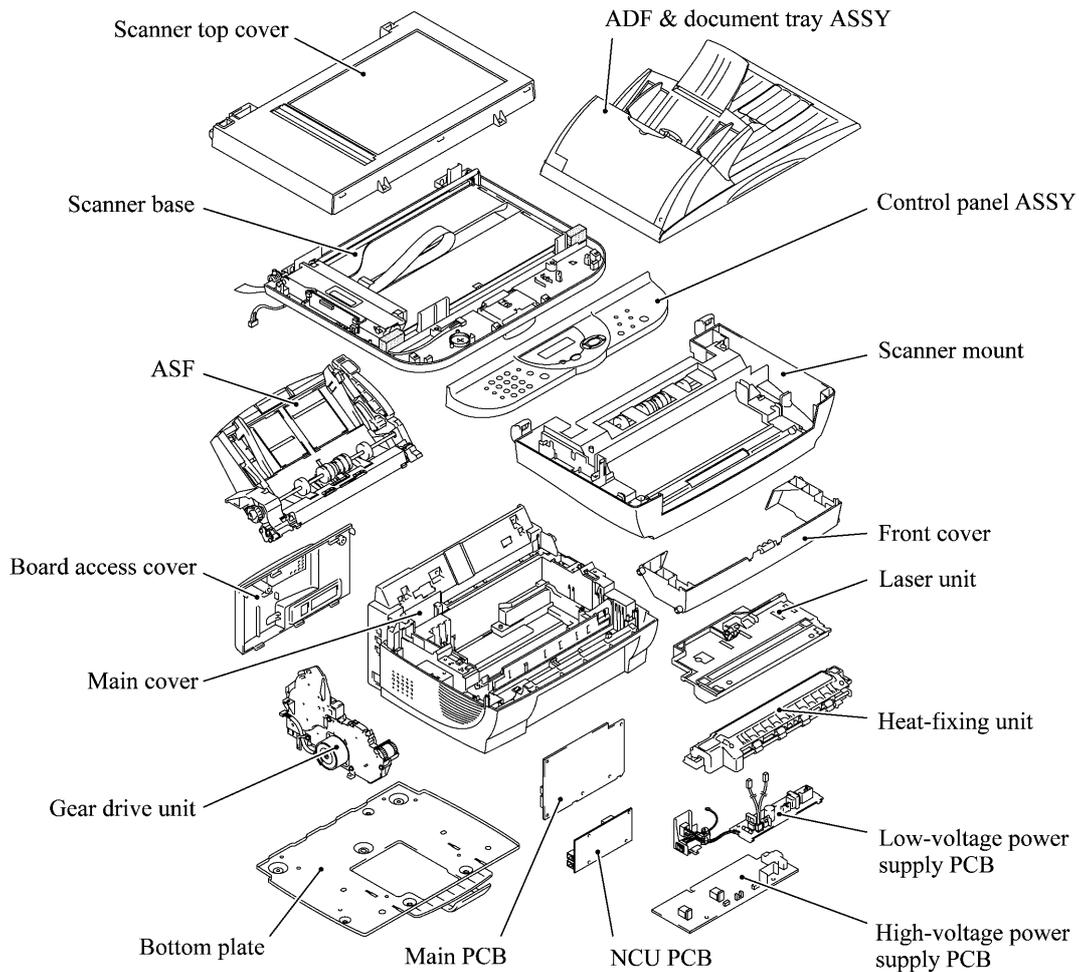
1.2 SPECIFICATIONS

	YL4-FB(MFC)	YL4-DCP
Model Name	MFC 6800	DCP 1000
GENERAL		
Print Engine	Laser (YL4)	Laser (YL4)
Modem Speed (bps)	14,400 (Fax)	-
Transmission Speed (sec.)	6 (Brother#1,MMR)	-
ITU-T Group	G3	-
Coding Method	MH/MR/MMR	-
Input/Output Width	5.8"-8.5"/3.5"-8.5"	5.8"-8.5"/3.5"-8.5"
Input/Output Length	5"-14"/5"-14"	5"-14"/5"-14"
ADF (pages)	Up to 30	Up to 30
LCD Size	16 characters x 2 lines	16 characters x 2 lines
LCD Backlight	No	No
Backup Clock	Yes (1 hour)	Yes (1 hour)
Memory Capacity (physical)	8 Mbytes (RAM)	8 Mbytes (RAM)
Optional Memory	No	No
Dimensions w/ Carton (WxDxH)	596 x 566 x 452 mm	596 x 566 x 452 mm
Dimensions w/o Carton (WxDxH)	459 x 458 x 354 mm	459 x 458 x 354 mm
Weight w/ Carton	16 kg	16 kg
Weight w/o Carton	11 kg	11 kg
Color	Gray 1495	Gray 1495
Operating Environment Temperature	10 - 32.5 degrees Centigrade	10 - 32.5 degrees Centigrade
Humidity	20 - 80%	20 - 80%
Power Source	120 VAC 50/60Hz	120 VAC 50/60Hz
Power Consumption (Sleep/Standby/Peak)	15W/ 75W/ 940W or less	15W/ 75W/ 940W or less
On/Off Switch	Yes	Yes
Warm Up Time	Approx. 13 sec.	Approx. 13 sec.
TELEPHONE		
Handset	No	-
One-Touch Dial	No	-
Speed Dial	100	-
Speaker Phone	No	-
Chain Dialing	Yes	-
Caller ID	Yes	-
Call Waiting Caller ID	No	-
Distinctive Ringing	Yes	-
Call Manage	No	-
Hold/Mute Key	No	-
Power Failure Dialing	No	-
Speaker (Volume)	Yes (3 steps + OFF)	-
Ring (Volume)	Yes (3 steps + OFF)	-
Handset Volume	-	-
PBX Feature	No	-
Transfer Method	No	-
FAX		
Internet FAX	N/A	-
Easy Receive/Fax Detect	Yes	-
Fax/Tel Switch	-	-
Enhanced Remote Activate	Yes	-
Scan Speed (sec./page, A4:Standard)	Approx. 3	-
Memory Transmission (Brother#1 Chart)	500 pages (MMR/Standard Resolution)	-
Memory Transmission (ITU-T Chart)	400 pages (MMR/Standard Resolution)	-
Broadcasting	Yes (150 locations)	-
Manual Broadcasting	Yes	-
Out-of-Paper Reception (Brother #1 Chart)	500 pages (MMR/Standard Resolution)	-
Out-of-Paper Reception (ITU-T Chart)	400 pages (MMR/Standard Resolution)	-
Auto Reduction	Yes	-
ECM (Error Correction Mode)	Yes	-
Group Dial	Yes (up to 6)	-
Memory Security	No	-
Memory Backup	No	No
Color FAX (Document Send/Receive)	No	-
Color FAX (Memory Send/Receive)	No	-
LIST/REPORT		
Activity Report/Journal Report	Yes (up to 200)	-
Transmission Verification Report	Yes	-
INTERFACE		
External TAD Interface	Yes	No
Host Interface (Serial)	No	No
Host Interface (IEEE1284)	Yes	Yes
Host Interface (USB)	Yes	Yes
LAN Interface	No	No
Acceptable Media Card Slot	N/A	N/A
Analog Video Port	N/A	N/A

	YL4-FB(MFC)	YL4-DCP
Model Name	MFC 6800	DCP 1000
PRINTER		
Color/Mono	Mono	Mono
Engine Type	Laser (YL4)	Laser (YL4)
Resolution (dpi)	600 x 600	600 x 600
Speed (ppm)	up to 10	up to 10
Paper Capacity (sheets)	200	200
Additional Paper Capacity (sheets)	No	No
Output Paper Capacity (sheets)	50	50
Standard Print Language	Windows GDI	Windows GDI
Emulation	No	No
Resident Fonts	No	No
Fonts Disk Based	Yes	Yes
Paper Handling Size	LTR, LGL, A4, B5, A5, EXE	LTR, LGL, A4, B5, A5, EXE
Manual Feed Slot	N/A	N/A
Other Paper Type	OHP, Envelopes, Organizer	OHP, Envelopes, Organizer
Sheet Weight (Paper Tray)	64-158 g/m^2 (16 - 42 lb)	64-158 g/m^2 (16 - 42 lb)
(Manual Slot)	N/A	N/A
Printer Driver	Win95/98/98SE/Me/2000Professional/ NT4.0WS MacOS 8.5.1-9.1	Win95/98/98SE/Me/2000Professional/ NT4.0WS MacOS 8.5.1-9.1
COPY		
Color/Mono	Mono	Mono
Speed (cpm)	Up to 10	Up to 10
Multi Copy (Stack)	Yes	Yes
Multi Copy (Sort)	Yes (ADF only)	Yes (ADF only)
Reduction/Enlargement (%)	25 -- 400 in 1% increments	25 -- 400 in 1% increments
Resolution (dpi)	300 x 300	300 x 300
First Copy Out Time (From Ready Mode/ADF)	Approx. 13 sec.	Approx. 13 sec.
(From Ready Mode/FB)	Approx. 12 sec.	Approx. 12 sec.
SCANNER		
Color/Mono	Color	Color
Resolution(Optical : dpi)	600x300 (Max. 600x2,400)	600x300 (Max. 600x2,400)
Resolution(Int. : dpi)	9,600x9,600	9,600x9,600
Gray Scale	256	256
Color Depth	24 bit (8 bits x 3)	24 bit (8 bits x 3)
TWAIN Compliant&Operating System	Win95/98/98SE/Me, WinNT4.0WS/ 2000Professional, MacOS 8.6-9.1	Win95/98/98SE/Me, WinNT4.0WS/ 2000Professional, MacOS 8.6-9.1
PCI Scanner (Parallel/Serial)	Parallel/USB	Parallel/USB
BUNDLED SOFTWARE		
For Windows		
Support OS version	Win95/98/98SE/Me, WinNT4.0WS/2000Professional	Win95/98/98SE/Me, WinNT4.0WS/2000Professional
Printer Driver	Yes	Yes
TWAIN	Yes	Yes
Viewer	Yes	Yes
Pop Up Menu	Yes	Yes
OCR	Yes	Yes
PC Fax	Yes(TX:FAX Share only)	N/A
Remote Setup	Yes	No
PC Diagnostics	Yes	No
Others	Auto E-mail Printing(Win 95/98(SE)/Me only)	Auto E-mail Printing(Win 95/98(SE)/Me only)
For iMac/G3/G4		
Support OS version Printer Driver	MacOS 8.5.1-9.1	MacOS 8.5.1-9.1
TWAIN	MacOS 8.6-9.1	MacOS 8.6-9.1
Printer Driver	Yes	Yes
TWAIN	Yes	Yes
Viewer	Yes	Yes
Pop Up Menu	No	No
OCR	Yes	Yes
PC Fax	Yes	No
Remote Setup	No	No
PC Diagnostics	No	No
Others	-	-
ACCESSORY		
Life / Yield	Starter: 2,200 pages @5% coverage	Stater: 2,200 pages @5% coverage
Toner : TN-250	Regular:2,200 pages @5% coverage	Regular:2,200 pages @5% coverage
Drum : DR-250	20,000 pages @5% cvrg: 20 pages/job 8,000 pages @5% cvrg: 1 page/job	20,000 pages @5% cvrg: 20 pages/job 8,000 pages @5% cvrg: 1 page/job

Model Name	YL4-FB(w/ Modem) MFC-9180	YL4-FB(w/o Modem) MFC-9160
GENERAL		
Print Engine	Laser (YL4)	Laser (YL4)
Modem Speed(bps)	14,400 (Fax)	-
Transmission Speed(sec.)	Approx. 6 (brother #1chart,MMR)	-
ITU-T Group	G3	-
Coding Method	MH/MR/MMR	-
Input/Output Width	5.8"-8.5"/3.5"-8.5"	5.8"-8.5"/3.5"-8.5"
Input/Output Length	5"-14"/5"-14"	5"-14"/5"-14"
ADF(pages)	Up to 30 (75 g/m^2)	Up to 30 (75 g/m^2)
LCD size	16 characters x 2 lines	16 characters x 2 lines
LCD Backlight	Yes	Yes
Backup Clock	Yes (9 hours)	Yes (1 hour)
Memory Capacity (physical)	8 Mbytes (RAM)	8 Mbytes (RAM)
Optional Memory	N/A	N/A
Dimensions w/ Carton (WxDxH)	596 x 566 x 452 mm	596 x 566 x 452 mm
Dimensions w/o Carton (WxDxH)	459 x 458 x 354 mm	459 x 458 x 354 mm
Weight w/ Carton	16 kg	16 kg
Weight w/o Carton	11 kg	11 kg
Color	Gray 1495	Gray 1495
Operating Environment Temperature	10 - 32.5 degrees Centigrade	10 - 32.5 degrees Centigrade
Humidity	20 - 80 %	20 - 80 %
Power Source	220-240 VAC 50/60Hz	220-240 VAC 50/60Hz
Power Consumption (Sleep/Standby/Peak)	15W/ 75W/ 940W or less	15W/ 75W/ 940W or less
On/Off Switch	Yes	Yes
Warm Up Time	Approx. 12 sec.	Approx. 12 sec.
TELEPHONE		N/A
Handset	No	-
One-Touch Dial	No	-
Speed Dial	100	-
Speaker Phone	No	-
Chain Dialing	Yes	-
Caller ID	N/A	-
Call Waiting Caller ID	N/A	-
Distinctive Ringing	Yes (UK.DEN only)	-
Call Manage	No	-
Hold/Mute key	N/A	-
Power Failure Dialing	N/A	-
Speaker Volume	Yes (3 steps + OFF)	-
Ring Volume	Yes (3 steps + OFF)	-
Handset Volume	N/A	-
PBX Feature	Yes	-
Transfer Method	Flash	-
FAX		N/A
Internet FAX	N/A	-
Easy Receive/Fax Detect	Yes	-
Fax/Tel Switch	Yes	-
Enhanced Remote Activate	Yes	-
Quick Scan(Memory transmission)	Yes as default. Approx.2.8 sec/page (A4 standard)	-
Memory Transmission (ITU-T #1 Chart)	400 pages (MMR/Standard Resolution)	-
Memory Transmission (Brother#1 Chart)	500 pages (MMR/Standard Resolution)	-
Broadcasting	Yes (150 locations)	-
Manual Broadcasting	Yes (50 locations)	-
Out-of-Paper Reception (ITU-T #1 Chart)	400 pages (MMR/Standard Resolution)	-
Out-of-Paper Reception (Brother#1 Chart)	500 pages (MMR/Standard Resolution)	-
Auto Reduction	Yes	-
ECM(Error Correction Mode)	Yes	-
Group Dial	Yes (up to 6)	-
Memory Security	Yes	-
Memory Backup	Yes (Max. 4 days)	-
Color FAX (Document Send/Receive)	No / No	-
Color FAX (Memory Send/Receive)	No / No	-
LIST/REPORT		
Activity Report/Journal Report	Yes (up to 200)	-
Transmission Verification Report	Yes	-
INTERFACE		
External TAD Interface	Yes	No
Host Interface (Serial)	No	No
Host Interface (IEEE1284)	Yes	Yes
Host Interface (USB)	Yes	Yes
LAN Interface	No	No
Acceptable Media Card Slot	N/A	N/A
Analog Video Port	N/A	N/A

	YL4-FB(w/ Modem)	YL4-FB(w/o Modem)
Model Name	MFC-9180	MFC-9160
PRINTER		
Color/Mono	Mono	Mono
Engine Type	Laser (YL4)	Laser (YL4)
Resolution (dpi)	600 x 600	600 x 600
Speed (ppm)	up to 10	up to 10
Paper Capacity (sheets)	200 (75 g/m^2)	200 (75 g/m^2)
Additional Paper Capacity (sheets)	No	No
Output Paper Capacity (sheets)	50	50
Standard Print Language	Windows GDI	Windows GDI
Emulation	Yes (PCL5e)	Yes (PCL5e)
Resident Fonts	Yes (Bitmap font: LetterGothic16.66, OCR-A, OCR-B, Scalable font: 49 fonts)	Yes (Bitmap font: LetterGothic16.66, OCR-A, OCR-B, Scalable font: 49 fonts)
Fonts Disk Based	Yes	Yes
Paper Handling Size	LTR, LGL, A4, A5, EXE, A6, ISO B5, ISO B6	LTR, LGL, A4, A5, EXE, A6, ISO B5, ISO B6
Manual Feed Slot	N/A	N/A
Other Paper Type	OHP, Envelopes, Organizer	OHP, Envelopes, Organizer
Sheet Weight (Paper Tray)	64-158 g/m^2 (16 - 42 lb)	64-158 g/m^2 (16 - 42 lb)
(Manual Slot)	N/A	N/A
Printer Driver	Win95/98(SE)/Me/NT4.0WS/2000 professional	Win95/98(SE)/Me/NT4.0WS/2000 professional
COPY		
Color/Mono	Mono	Mono
Speed (cpm)	Up to 10	Up to 10
Multi Copy (Stack)	Yes	Yes
Multi Copy (Sort)	Yes (on ADF only)	Yes (on ADF only)
Reduction/Enlargement (%)	25 to 400 in 1% increments	25 to 400 in 1% increments
Resolution (dpi)	300 x 300 (print)	300 x 300 (print)
First Copy Out Time (From Ready Mode/ADF)	Approx. 13 sec.	Approx. 13 sec.
(From Ready Mode/FB)	Approx. 12 sec.	Approx. 12 sec.
SCANNER		
Color/Mono	Color/Mono	Color/Mono
Resolution (Optical: dpi)	600 x 2,400	600 x 2,400
Resolution (Int.: dpi)	9,600 x 9,600	9,600 x 9,600
Gray Scale	256	256
Color Depth	24 bits (8 bits x 3)	24 bits (8 bits x 3)
TWAIN Compliant&Operating System	Win95/98(SE)/Me/NT4.0WS/2000Professional MacOS 8.6-9.1	Win95/98(SE)/Me/NT4.0WS/2000Professional MacOS 8.6-9.1
PCI Scanner (Parallel/Serial)	Parallel/USB	Parallel/USB
BUNDLED SOFTWARE(For Windows)		
For Windows		
Support OS version	Win95/98/98SE/Me, WinNT4.0WS/2000Profrssional	Win95/98/98SE/Me, WinNT4.0WS/2000Profrssional
Printer Driver	Yes	Yes
TWAIN	Yes	Yes
Viewer	Yes	Yes
Pop Up Menu	Yes	Yes
OCR	Yes	Yes
PC Fax	Yes	No
Remote Setup	Yes	No
PC Diagnostics	Yes	Yes
Others	No	No
For iMac/G3/G4		
Support OS version Print	MacOS8.5.1-9.1	MacOS8.5.1-9.1
Others	MacOS8.6-9.1	MacOS8.6-9.1
Printer Driver	Yes	Yes
TWAIN	Yes	Yes
Viewer	No	No
Pop Up Menu	No	No
OCR	No	No
PC Fax	Yes	No
Remote Setup	No	No
PC Diagnostics	No	No
Others	No	No
ACCESSORY		
Life / Yield	Starter: N/A	Starter: N/A
Toner:TN-8000	Regular:2,200 pages @5% coverage	Regular:2,200 pages @5% coverage
Drum:DR-8000	20,000 pages @5% cvrg: Continuous printing 8,000 pages @5% cvrg: 1 page/job	20,000 pages @5% cvrg: Continuous printing 8,000 pages @5% cvrg: 1 page/job

CHAPTER 2

INSTALLATION

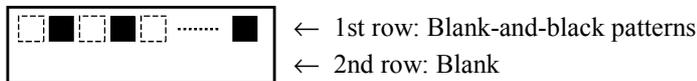# CHAPTER 2 INSTALLATION

CONTENTS

2.1 INSTALLING THE UPDATE DATA TO THE FACSIMILE MACHINE

If the program version is updated or the main PCB is replaced, then install the update program onto the flash ROM of the main PCB.
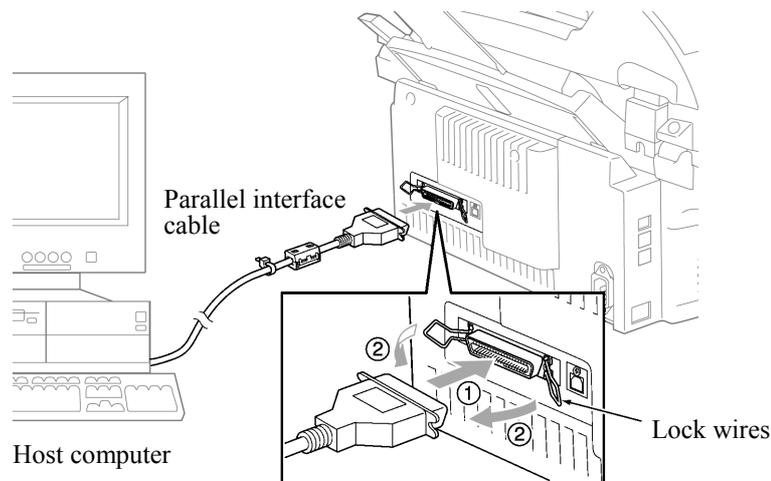
The program installation requires a PC/AT-compatible computer (which is capable of running MS-DOS or its compatible OS).

Connecting the facsimile machine to your computer

(1) Make sure that your computer is turned off.

(2) Make sure that the machine's power cord is unplugged from a wall socket. (If the machine has a power ON/OFF switch, make sure that the switch is turned off.)

(3) Connect the parallel interface cable to the parallel port on the back of the machine and secure it with the lock wires.

(4) Connect the other end of the interface cable to the printer port of your computer and secure it with the two screws.

(5) While pressing the **5** key on the machine's control panel, plug the machine's power cord into a wall socket (or turn on the power ON/OFF switch if the machine has the switch).

(6) Check to see that the following pattern displays on the LCD. If it does not display, go back to step (2) above.

       ← 1st row: Blank-and-black patterns
       ← 2nd row: Blank

(7) Turn on your computer.

Parallel interface cable

Lock wires

Host computer

Installing the update data onto the flash ROM of the facsimile machine

NOTE: The following is an installation procedure example on a PC that is running Windows 95/98.

(1) Copy the update data and transfer utility onto the desired directory of the hard disk.
e.g., C:\UPDATE

(2) Click the Start button, point to Programs, and then click MS-DOS Prompt to open an MS-DOS window.

(3) Type the drive letter where the update data and transfer utility are located. In the above example, type C:\ from the command line and press the **ENTER** key.

Then type CD UPDATE and press the **ENTER** key.

(4) Check that your computer is connected with the facsimile machine correctly.

(5) To start the transfer utility transmitting the update data to the flash ROM of the facsimile machine, type the following:

`ICEN filename /b`

Then press the **ENTER** key.

During downloading, the machine beeps *intermittently*.

Upon completion of the downloading, the machine beeps *continuously*.

NOTE: If the facsimile machine cannot return to the standby state after completion of downloading, turn the power off and on.

2.2 SETTING ID CODES TO FACSIMILE MACHINES

■ **Function**

Brother facsimile machines are assigned unique ID codes (character strings) at the factory. If you replace the main PCB of the machine, the machine will lose its assigned ID code so that it will not be identified by the connected PC*.

You need to assign a unique ID code (character string) to the machine according to the procedure given here. For models covered by this manual, set serial numbers given to individual machines as ID codes.

(*ID codes are essential when more than one machine is connected to a single PC via USB.)

■ **Connecting each of facsimile machines to your PC**

    (1) Make sure that your PC is turned off.

    (2) Make sure that the machine's power cord is unplugged from a wall socket or other power source.

    (3) Connect the interface cable to the parallel interface port on the back of the facsimile machine and secure it with the lock wires.

    (4) Connect the other end of the interface cable to the printer port of your PC and secure it with the two screws.

    (5) Plug the machine's power cord into a wall socket or other power source.

    (6) Turn on your PC.

■ **Operating Procedure**

    (1) On your PC, run the ID setting utility. Follow the instructions shown on the PC's screen and enter the 9-digit serial number (e.g., G01012345) printed on the nameplate labeled to the back of the facsimile machine as an ID code. Then press the Enter key.

        The ID setting utility will transmit the ID code data from your PC to the facsimile machine and then it will terminate.

        The facsimile machine will automatically return to the standby mode.

    (2) To check whether the entered character string (ID code) is correct, make the machine enter the maintenance mode (refer to CHAPTER 5, Section 5.1) and then press the **1** key twice (Subsection 5.3.5).

        The facsimile machine will print out a Configuration List. At the right top of the list, "SER.#: BROXXXXXXXXX" is printed.

    (3) Check that the character string entered in step (2) is printed in "XXXXXXXXX."

        If it is OK, press the **9** key twice to exit from the maintenance mode.

        If something other than that is printed in XXXXXXXXX, check the connection between the PC and facsimile machine and go back to step (1).
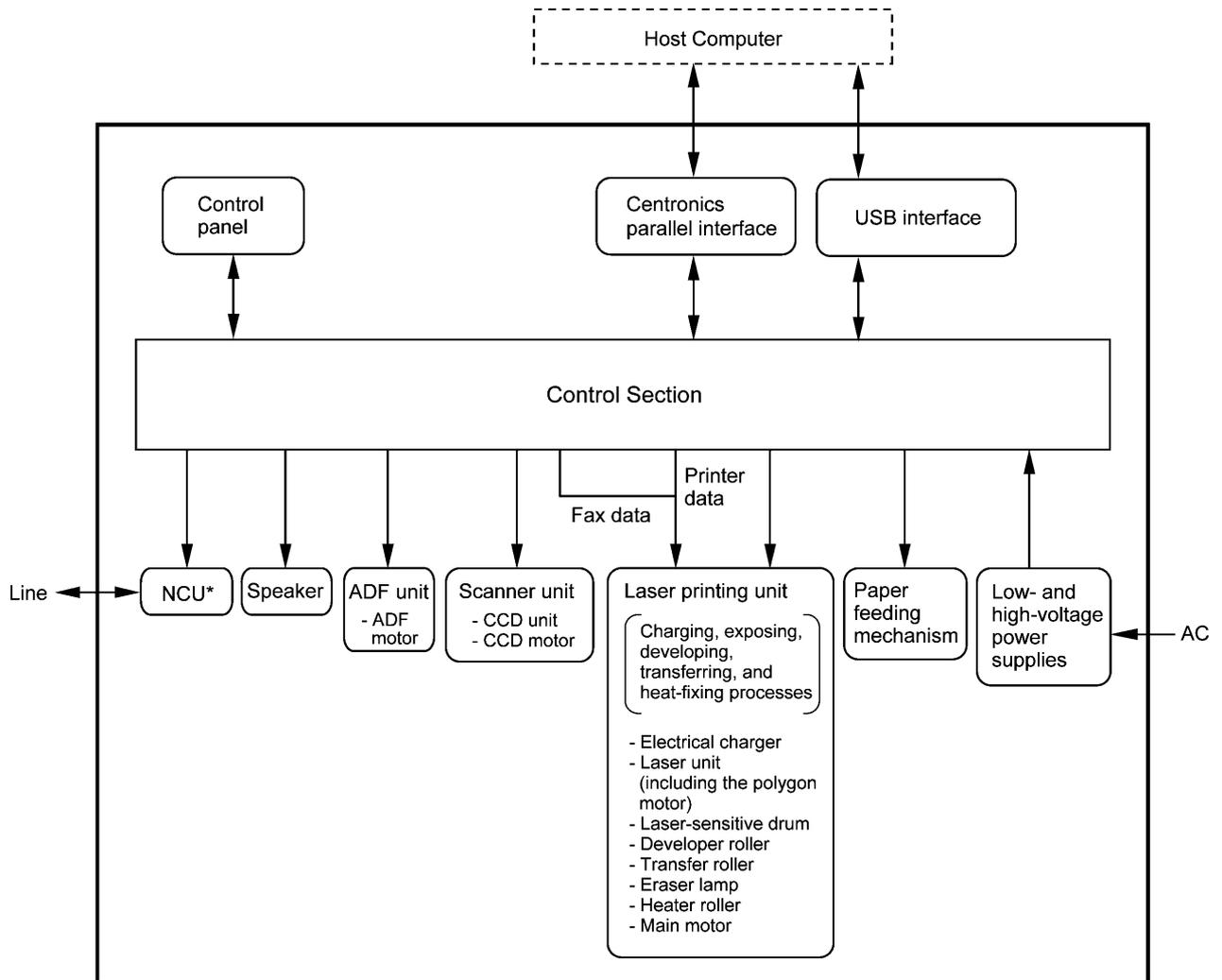
CHAPTER 3

THEORY OF OPERATION

CHAPTER 3 THEORY OF OPERATION

CONTENTS

3.1 OVERVIEW

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                              ┌ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                              │    Host Computer     │
                              └ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘
                                    ↕         ↕
┌──────────────────────────────────────────────────────────────────────────┐
│                                                                            │
│  ┌──────────┐              ┌──────────────┐   ┌──────────────┐             │
│  │ Control  │              │  Centronics  │   │ USB interface│             │
│  │ panel    │              │parallel interface│  │             │           │
│  └──────────┘              └──────────────┘   └──────────────┘             │
│       ↕                          ↕                 ↕                        │
│  ┌──────────────────────────────────────────────────────────────────┐     │
│  │                       Control Section                            │     │
│  └──────────────────────────────────────────────────────────────────┘     │
```

Printer
data

Fax data

```
Line ←──→   NCU*  Speaker  ADF unit  Scanner unit  Laser printing unit   Paper      Low- and       ←── AC
                           - ADF     - CCD unit                          feeding    high-voltage
                             motor   - CCD motor                         mechanism  power
                                                   ┌─────────────────┐              supplies
                                                   │ Charging, exposing,│
                                                   │ developing,       │
                                                   │ transferring, and │
                                                   │ heat-fixing processes│
                                                   └─────────────────┘
                                                   - Electrical charger
                                                   - Laser unit
                                                     (including the polygon
                                                     motor)
                                                   - Laser-sensitive drum
                                                   - Developer roller
                                                   - Transfer roller
                                                   - Eraser lamp
                                                   - Heater roller
                                                   - Main motor
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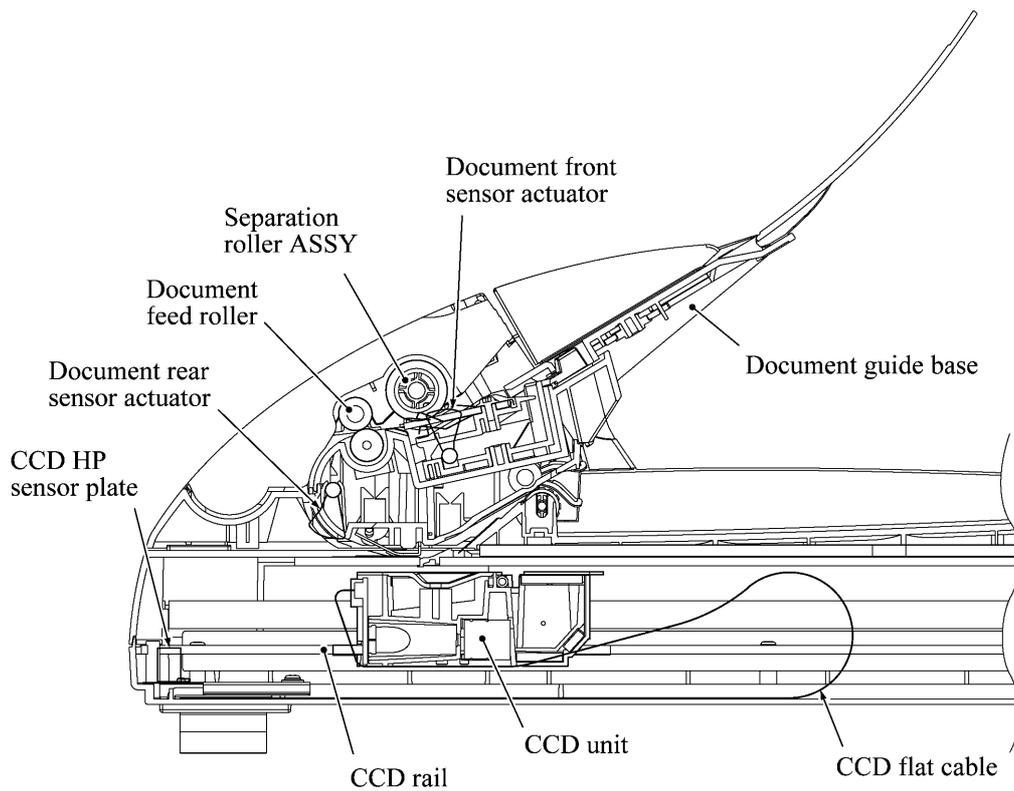
* Provided on models supporting facsimile function.

3.2 MECHANISMS

The facsimile machine is classified into the following mechanisms:

- ■ SCANNER MECHANISM - ADF mechanism
  - Document scanning mechanism

- ■ LASER PRINTING MECHANISM - Paper pulling-in and registration mechanism
  - Print process mechanism (consisting of charging, exposing, developing, transferring, and erasing processes) with paper feeding mechanism
  - Heat-fixing mechanism with paper feeding mechanism
  - Paper ejecting mechanism

- ■ SENSORS AND ACTUATORS

Document front
sensor actuator

Separation
roller ASSY

Document
feed roller

Document rear
sensor actuator

Document guide base

CCD HP
sensor plate

CCD unit

CCD rail

CCD flat cable

SCANNER MECHANISM (Viewed from the front)

SCANNER MECHANISM

Paper ejecting mechanism

Paper pulling-in and
registration mechanism

Heat-fixing mechanism
Print process mechanism

With paper
feeding
mechanism
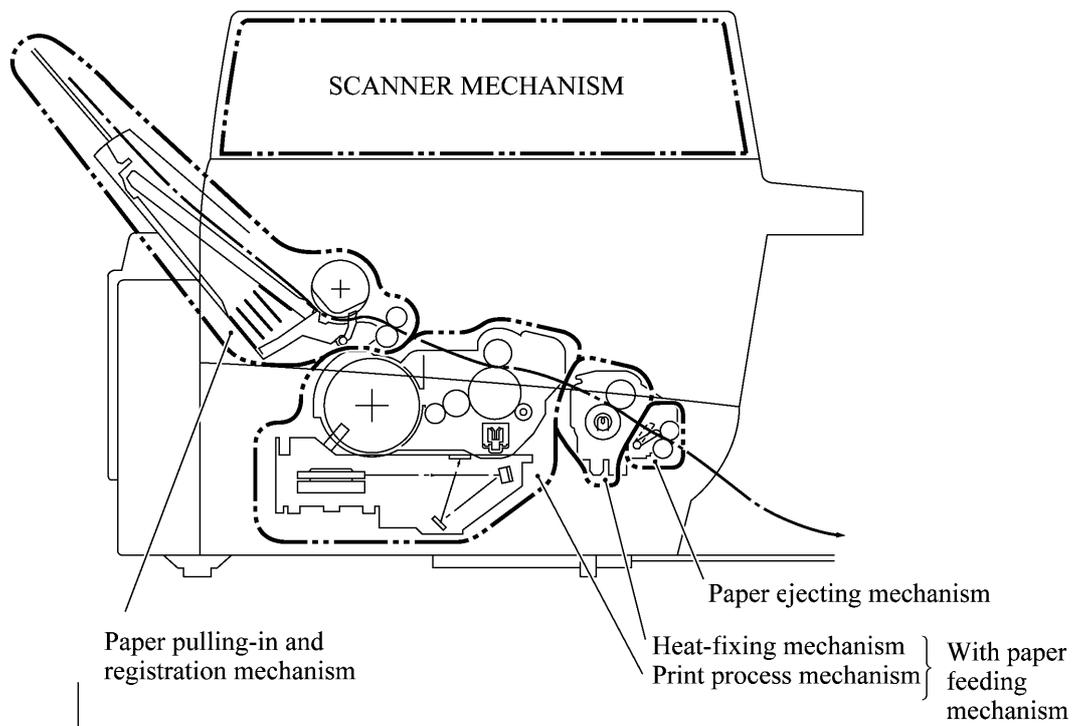
LASER PRINTING MECHANISM (Viewed from the left)

3.2.1 Scanner Mechanism

This mechanism consists of the document guide base, ADF & document tray ASSY and scanner unit.

The ADF (automatic document feeder) unit contains a separation roller ASSY, document feed roller ASSY, document ejection roller, ADF motor, and document front and rear sensors.

The scanner unit consists of a scanner top cover, CCD unit, CCD drive mechanism, CCD HP sensor, and scanner base.

For details about the sensors, refer to Subsection 3.2.3.
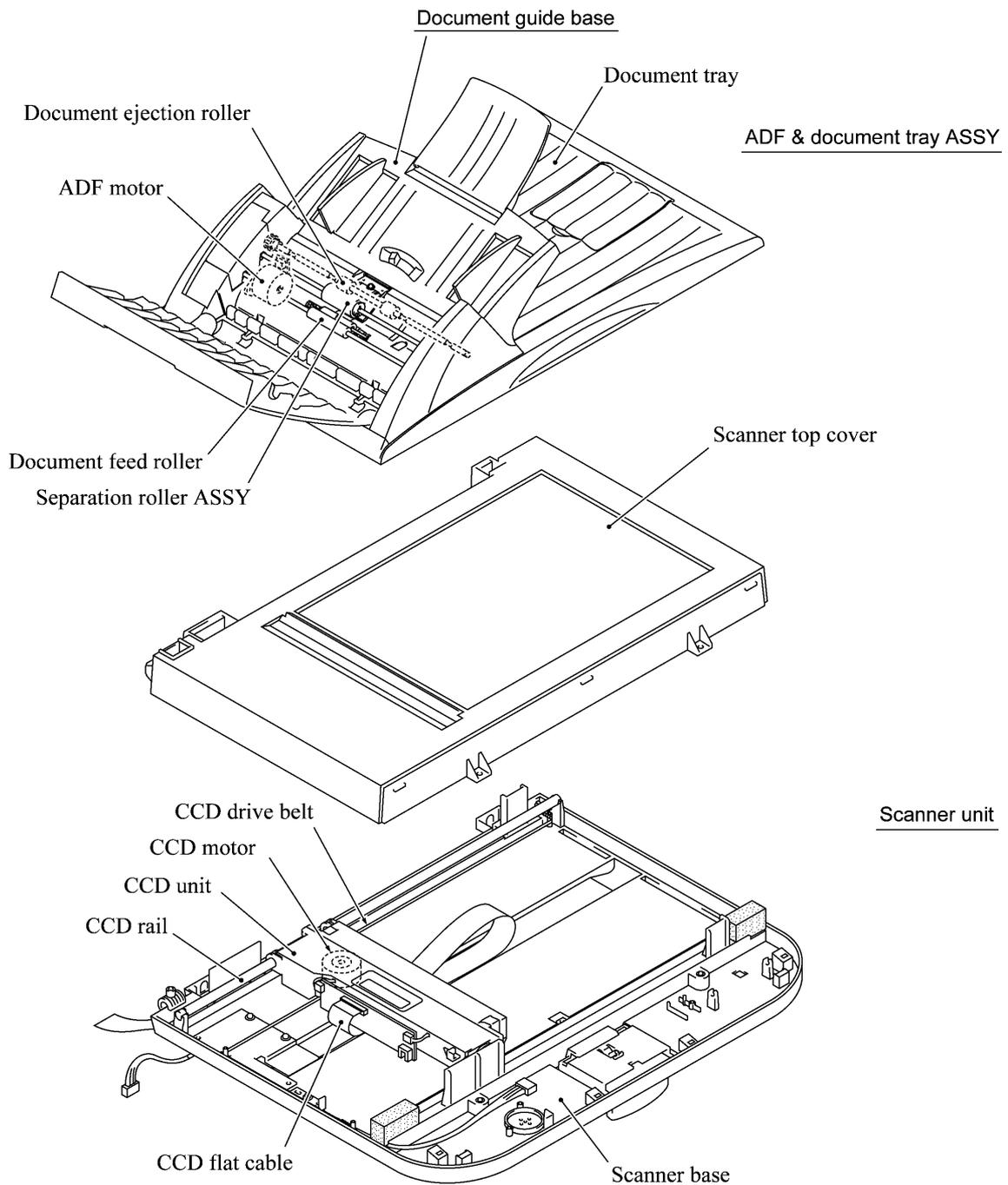
This scanner mechanism supports a dual scanning system.

(1) If you set documents on the document guide base with their faces up and start the scanning operation, then the ADF motor rotates to pull in those documents into the ADF unit, starting from the top sheet to the bottom, page by page. Each document curves downwards and turns to the right with the document feed roller so as to advance above the CCD unit, and then it is fed out to the document tray with the document ejection roller ASSY.

This way, documents move above the CCD unit being kept in a stationary position.

(2) If you open the ADF & document tray ASSY, put a sheet of document (or put a bound book opened) on the glass of the scanner top cover, close the ADF & document tray ASSY, and start the scanning operation, then the CCD drive mechanism will be driven.

The CCD motor built in the CCD unit rotates. As illustrated below, the CCD drive gear and idle pulley carry the CCD drive belt on the underside of the CCD unit, so clockwise and counterclockwise rotations of the CCD motor move the CCD unit to the right and left, respectively.
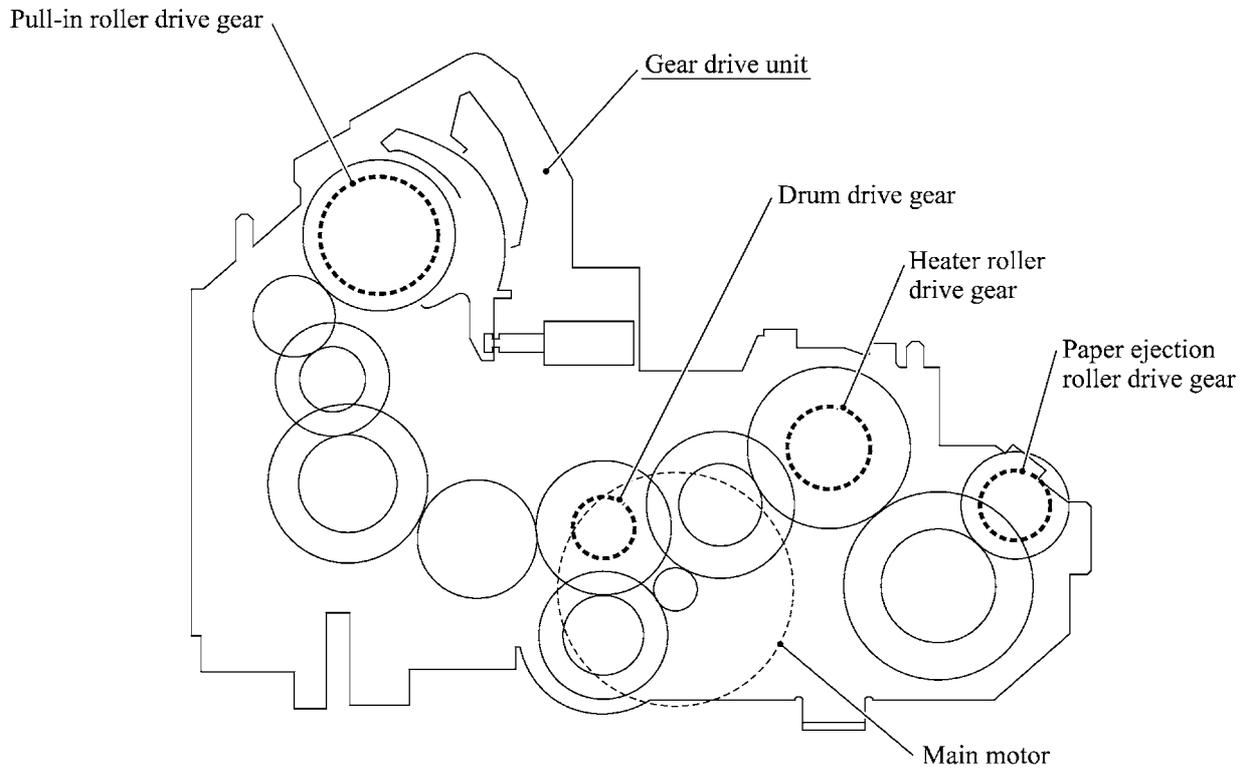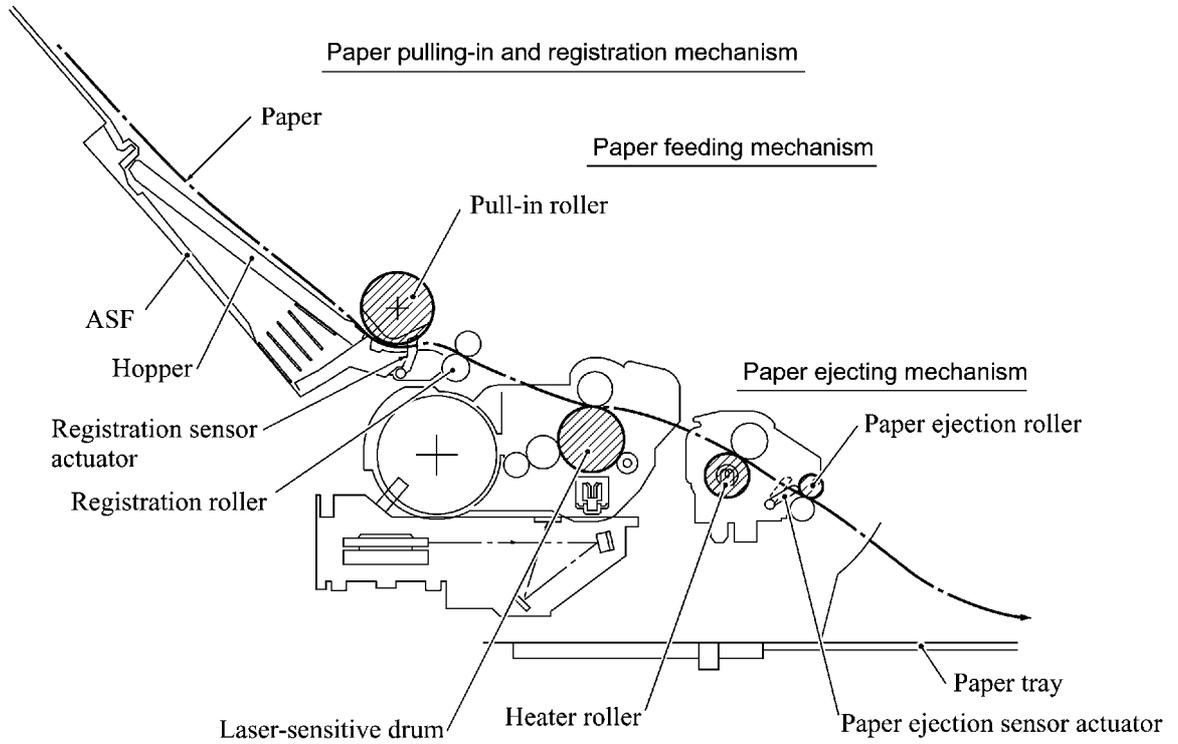
In this scanning system, the CCD unit moves horizontally beneath a document being kept in stationary position.
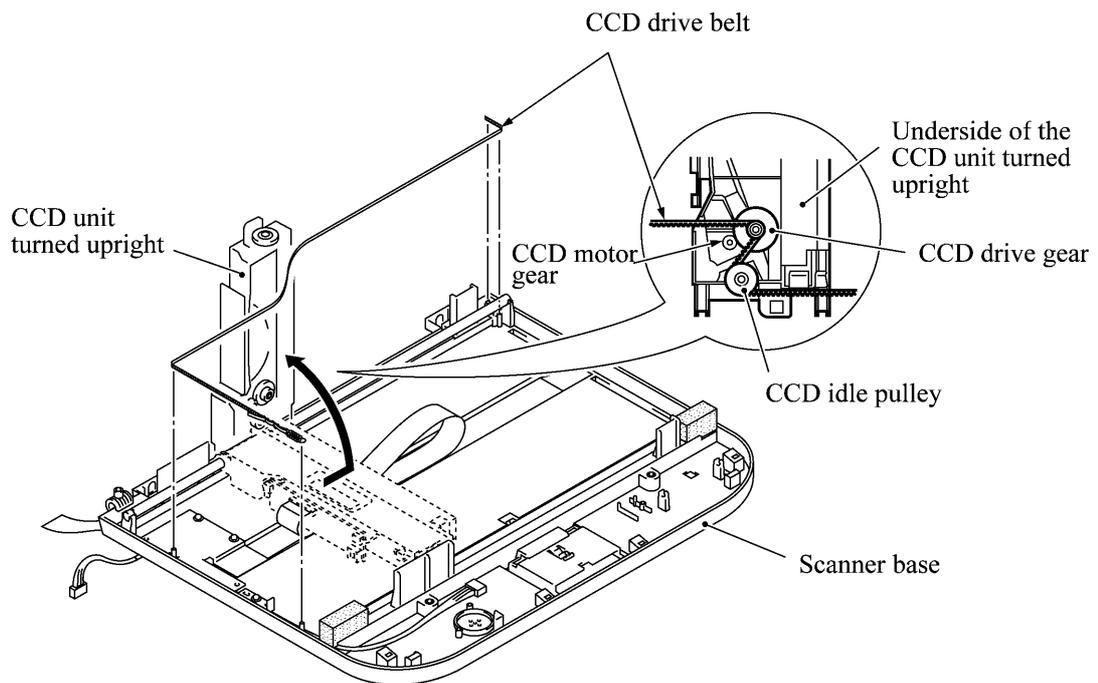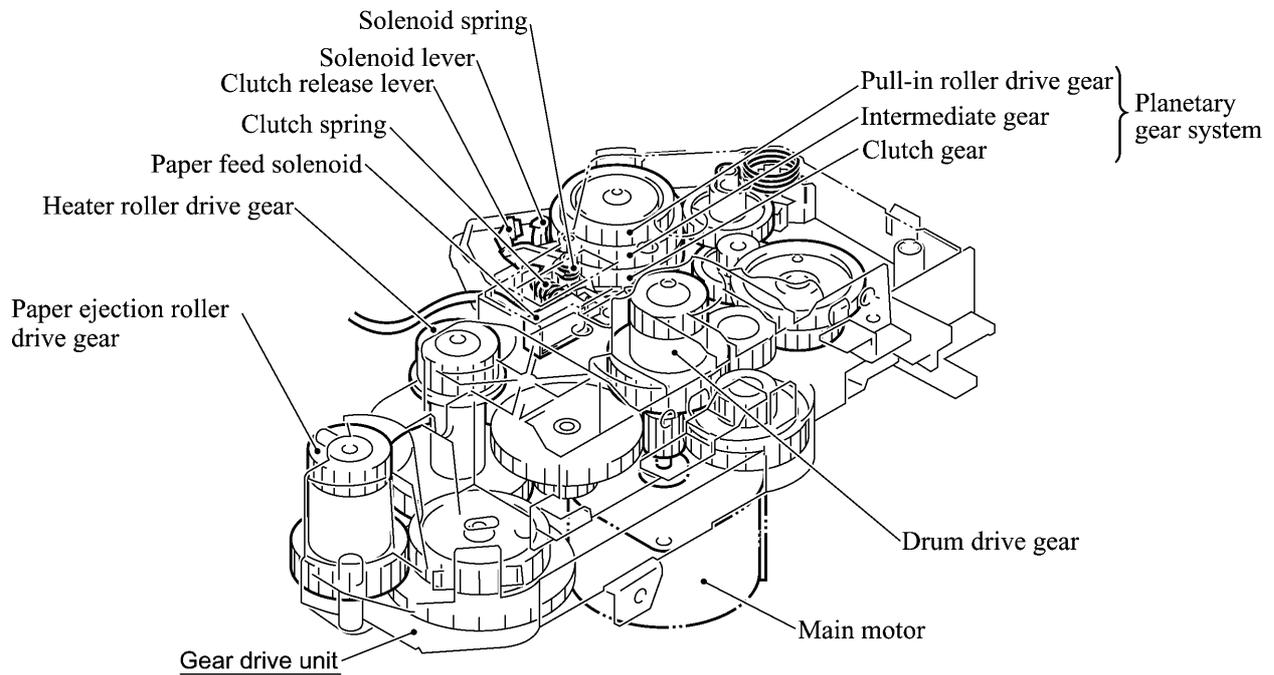

The CCD unit contains a charge coupled device (CCD) image sensor. The cold-cathode fluorescent lamp illuminates a document and the reflected light of the scanned image data is transmitted via the mirrors into the lens which reduces the scanned data so as to form the image on the CCD.

3.2.2 Laser Printing Mechanism

3.2.2.1 Paper pulling-in, registration, feeding, and ejecting mechanism

Paper pulling-in and registration mechanism

Paper feeding mechanism

Paper

Pull-in roller

Paper ejecting mechanism

Paper ejection roller

ASF

Hopper

Registration sensor actuator

Registration roller

Laser-sensitive drum

Heater roller

Paper tray

Paper ejection sensor actuator

Pull-in roller drive gear

Gear drive unit

Drum drive gear

Heater roller drive gear

Paper ejection roller drive gear

Main motor

Paper pulling-in and registration mechanism

Solenoid spring
Solenoid lever
Clutch release lever
Clutch spring
Paper feed solenoid
Heater roller drive gear

Paper ejection roller
drive gear

Pull-in roller drive gear
Intermediate gear
Clutch gear

Planetary
gear system

Drum drive gear

Main motor

Gear drive unit

The paper pulling-in and registration mechanism consists of the pull-in roller gear (incorporated in the auto sheet feeder ASF), planetary gear system, paper feed solenoid, solenoid lever, clutch release lever, and registration sensor. (For the details about the sensor, refer to Subsection 3.2.3.)

If the main motor rotates clockwise, the rotation is transmitted to the intermediate gear of the planetary gear system. As the intermediate gear rotates, the pull-in roller drive gear also rotates since the clutch gear is locked by the solenoid lever and the clutch release lever. Accordingly, the pull-in roller in the ASF rotates to pull in paper into the machine, a sheet at a time.

If the paper feed solenoid is retracted and the clutch release lever is operated according to the cam profile of the pull-in roller drive gear so as to release the clutch gear, the clutch gear rotates and the pull-in roller drive gear does not rotate. This way, the clutch gear switches the transmission of the motor rotation to the pull-in roller drive gear on and off.

The solenoid on/off timing and the clutch release lever timing allow this mechanism to pull in a sheet and register it against the registration roller.

Paper feeding and ejecting mechanism

If the main motor rotates clockwise, the rotation is transmitted via the gear train to the drum drive gear, heater roller drive gear, and paper ejection roller drive gear.
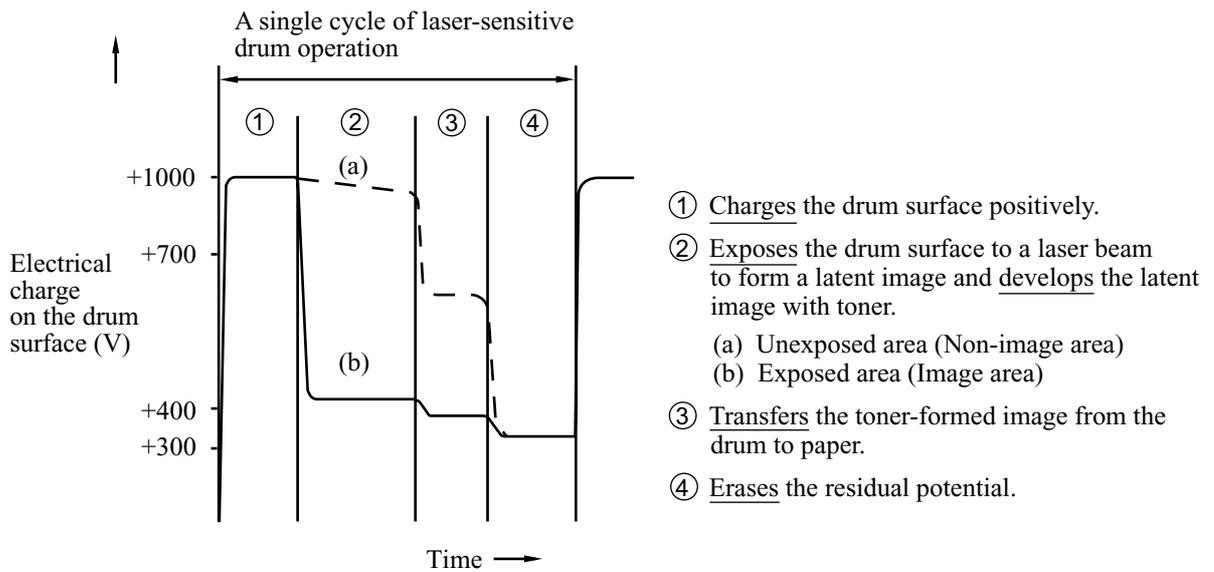
After the paper passes through the heat-fixing process, it will be ejected onto the paper tray.

If the leading edge of the paper pushes up the actuator of the paper ejection sensor, the photosensor becomes opened, signaling the start of paper ejection. If the trailing edge has passed through the sensor actuator, the sensor becomes closed, signaling the completion of paper ejection. Then, the main motor stops rotation.
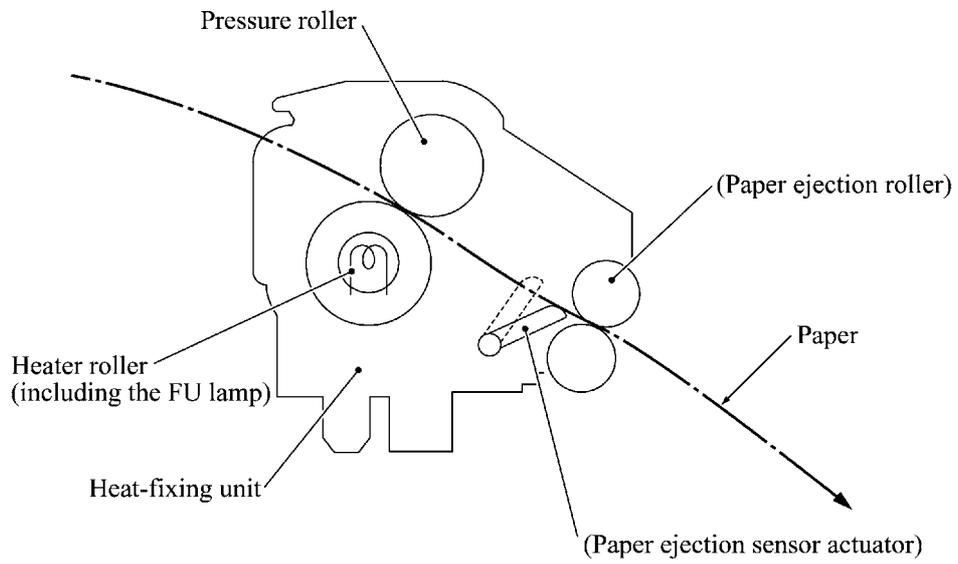
3.2.2.2 Print process mechanism
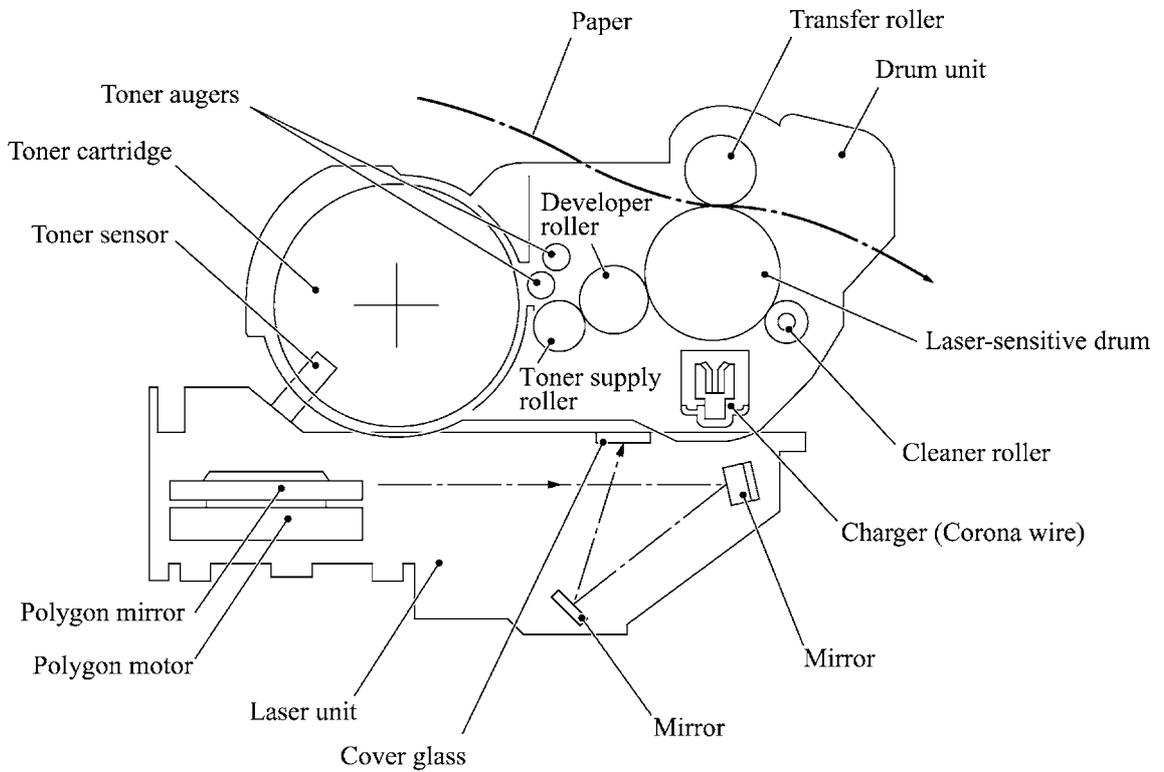
The print process unit works with laser beam, electrical charges, and toner. The graph below shows the transition of electrical charge on the surface of the laser-sensitive drum through the five processes: charging, exposing, developing, transferring, and erasing processes.

A single cycle of laser-sensitive drum operation

Electrical charge on the drum surface (V)

+1000

(a)

+700

(b)

+400

+300

Time →

① Charges the drum surface positively.

② Exposes the drum surface to a laser beam to form a latent image and develops the latent image with toner.
  (a) Unexposed area (Non-image area)
  (b) Exposed area (Image area)

③ Transfers the toner-formed image from the drum to paper.

④ Erases the residual potential.

3.2.2.3 Heat-fixing mechanism

Pressure roller

(Paper ejection roller)

Heater roller
(including the FU lamp)

Paper

Heat-fixing unit

(Paper ejection sensor actuator)

As the paper passes between the heater roller and the pressure roller in the heat-fixing unit, the heater roller fuses the toner on the paper.
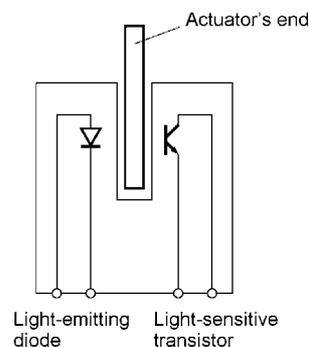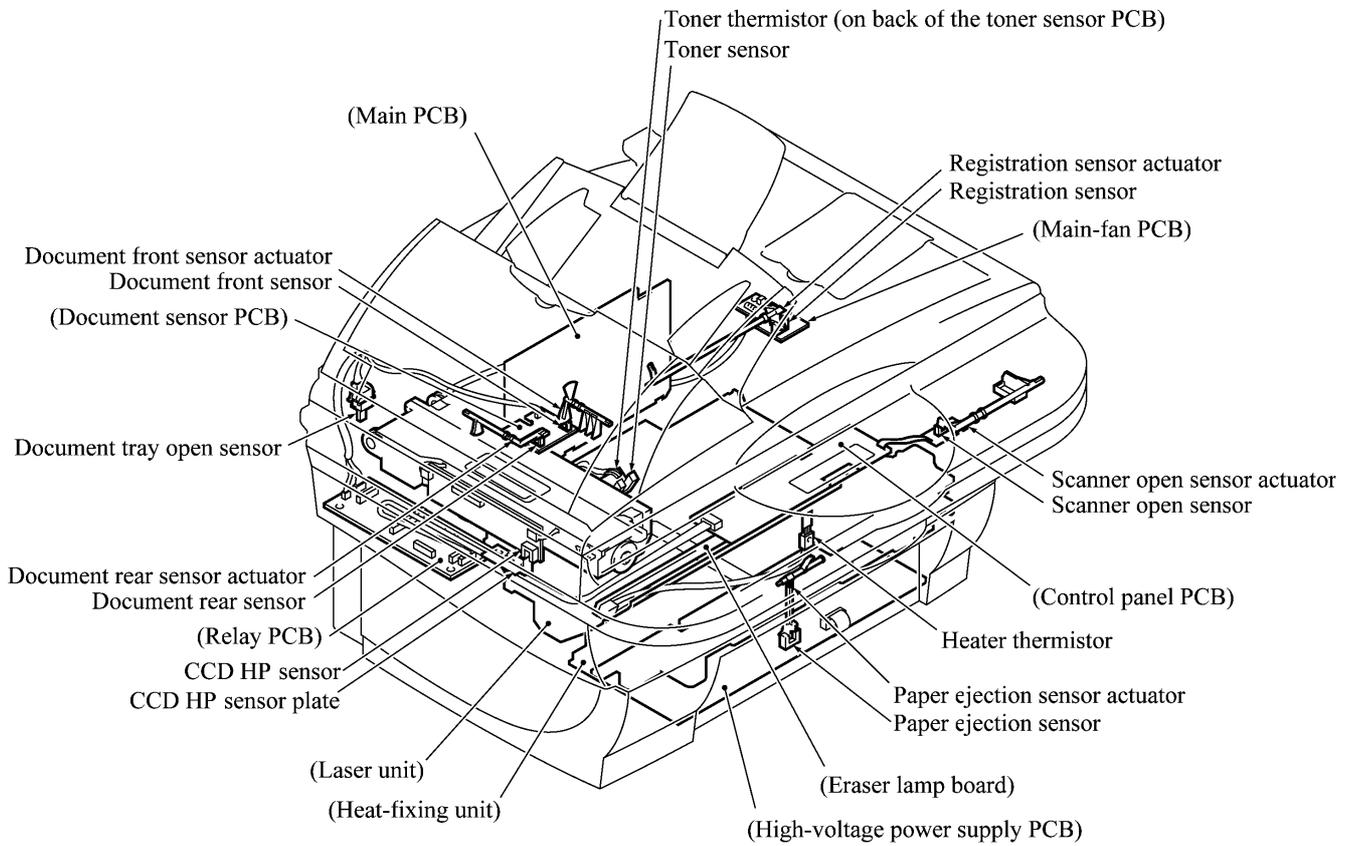
3.2.3 Sensors and Actuators

This machine has ten sensors: seven photosensors, two thermistors and a mechanical switch as described below.

Sensor name	Type	Located on
Document front sensor	Photosensor	Document sensor PCB in the ADF
Document rear sensor	Photosensor	
Document tray open sensor	Mechanical switch	Document tray
Scanner open sensor	Photosensor	Control panel PCB
Registration sensor	Photosensor	Main-fan PCB
Paper ejection sensor	Photosensor	High-voltage power supply PCB
CCD HP sensor	Photosensor	CCD PCB on the CCD unit
Toner sensor	Photosensor	Toner sensor PCB
Toner thermistor	Thermistor	
Heater thermistor	Thermistor	Heat-fixing unit

- Document front sensor which detects the presence of documents.

- Document rear sensor which detects the leading and trailing edges of pages to tell the control circuitry when the leading edge of a new page has reached the starting position and when the scan for that page is over.

- Document tray open sensor which detects whether the document tray is closed.

- Scanner open sensor which detects whether the scanner unit is closed.

- Registration sensor which detects the leading and trailing edges of paper, which allows the controller to determine the registration timing and check paper jam.

- Paper ejection sensor which detects whether the recording paper goes out of the machine.

- CCD HP sensor which detects whether the CCD unit is placed in the home position.

- Toner sensor which detects whether there is toner or a toner cartridge is loaded.

- Toner thermistor which allows the controller to monitor the ambient temperature of the toner cartridge.

- Heater thermistor which allows the controller to monitor the temperature of the heater roller of the fixing unit.

These photosensors are a photointerrupter consisting of a light-emitting diode and a light-sensitive transistor. Each of them has an actuator separately arranged as shown on the next page.

Toner thermistor (on back of the toner sensor PCB)
Toner sensor

(Main PCB)

Registration sensor actuator
Registration sensor

(Main-fan PCB)

Document front sensor actuator
Document front sensor
(Document sensor PCB)

Document tray open sensor

Scanner open sensor actuator
Scanner open sensor

Document rear sensor actuator
Document rear sensor
(Relay PCB)
CCD HP sensor
CCD HP sensor plate

(Control panel PCB)

Heater thermistor

Paper ejection sensor actuator
Paper ejection sensor

(Laser unit)
(Heat-fixing unit)

(Eraser lamp board)
(High-voltage power supply PCB)

Location of Sensors and Actuators

3.3 CONTROL ELECTRONICS

3.3.1 Configuration

The hardware configuration of the facsimile machine is shown below.
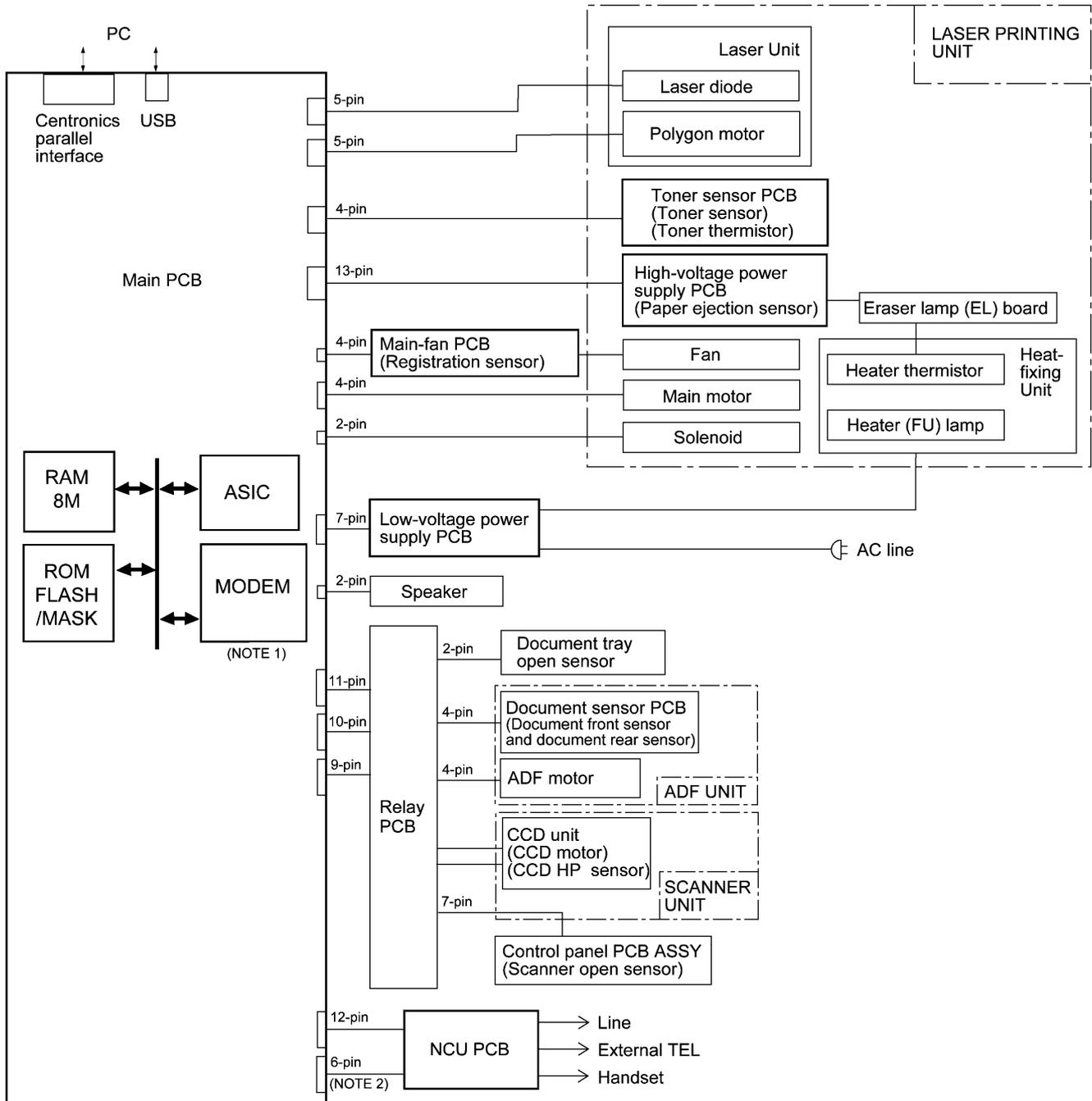
Configuration of Facsimile Machine

(NOTE 1) Provided on models equipped with facsimile function.
(NOTE 2) Provided on the European, Pacific, and Asian versions.

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