brother®

FACSIMILE EQUIPMENT
SERVICE MANUAL

MODEL: FAX2600/FAX-8060P
MFC4300/MFC4600/
MFC-9060

PREFACE

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

To perform appropriate maintenance so that the facsimile equipment 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: DEC   1999   U
KYOWA PLASTIC IND. (SHENZHEN) CO., LTD.
Fada Road, Wuhe Street Bantian Industry Zone, Buji Shenzhen,
P. R. China
This product complies with FDA radiation
performance standards, 21 CFR Subchapter J.

CHAPTER I.

GENERAL DESCRIPTION

CHAPTER I. GENERAL DESCRIPTION

CONTENTS

1. EQUIPMENT OUTLINE

1.1 External Appearance and Weight

The figure below shows the equipment appearance and approximate dimensions.

(H)
250 mm
9.8"

(W)
456 mm
18"
(including
handset)

(D)
334 mm
13.1"
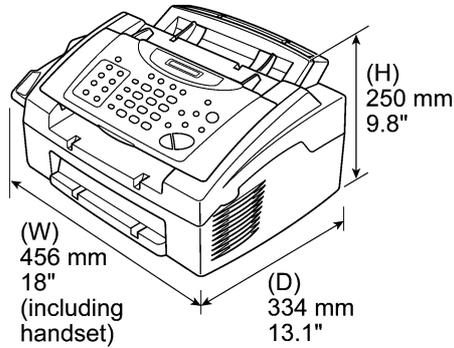
Weight:	Machine proper	Approx. 7.2 kg
	Machine (incl. drum unit & toner cartridge)	Approx. 8.5 kg
	In package	Approx. 12 kg

1.2 Components

The equipment consists of the following major components:

Document guide base

Control panel ASSY

Multi-purpose sheet feeder

Laser unit

Heat-fixing unit

Top cover

Handset * 1

Scanner frame ASSY

Handset mount * 1

Main cover

Side cover * 2

NCU

Main PCB

Gear drive unit

High-voltage power supply PCB

Bottom plate

Low-voltage power supply PCB
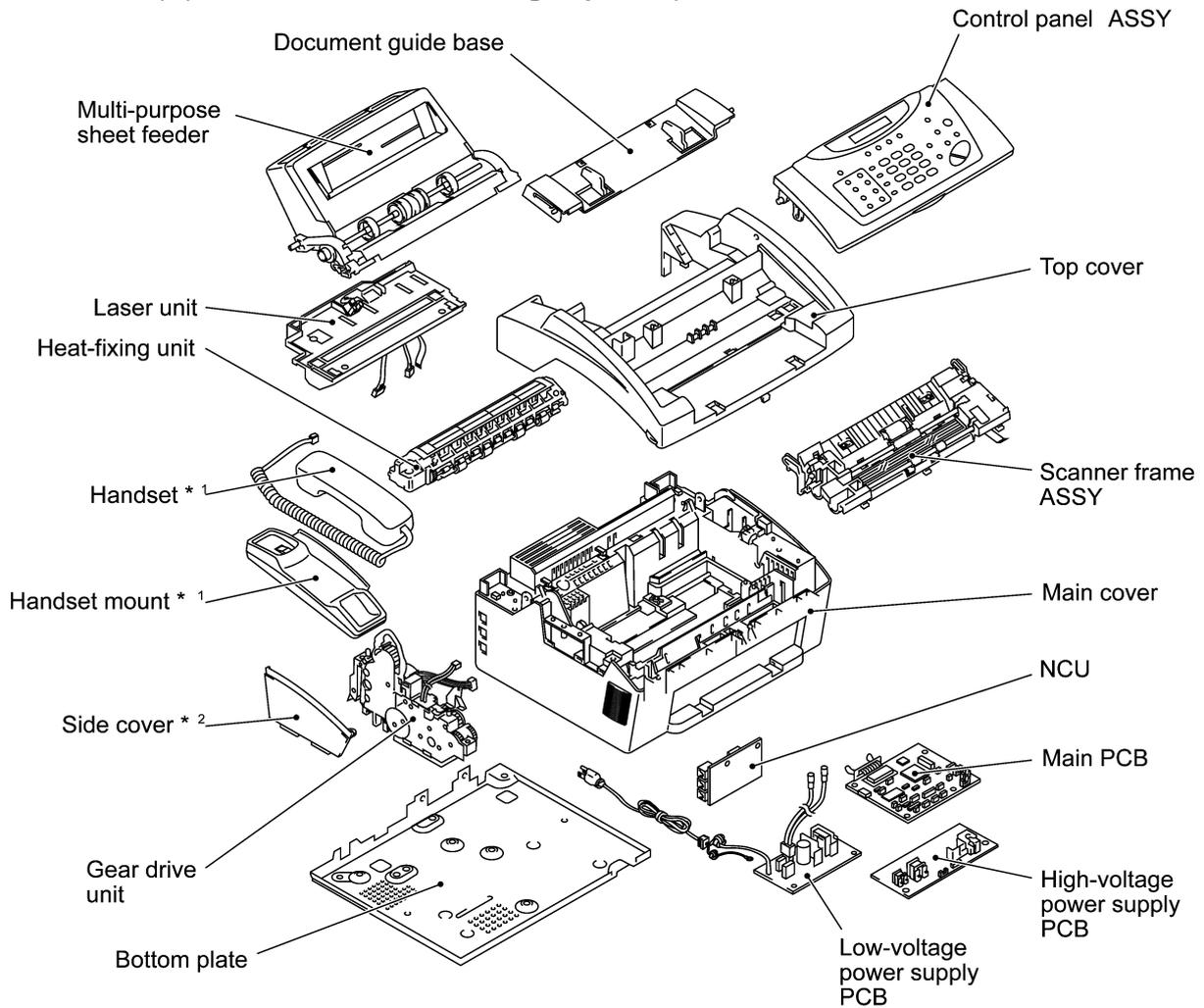
*1 Not provided on the FAX8060P/MFC9060.
*2 Provided on the FAX8060P/MFC9060.

2. SPECIFICATIONS

Model	FAX2600	MFC4300	MFC4600
Color	Gray 1495	Gray 1495	Gray 1495
FAX	Yes	Yes	Yes
Modem Speed (bps)	14.4K (FAX Only)	14.4K (FAX Only)	14.4K (FAX Only)
CCITT Group	G3	G3	G3
Coding Method	MH/MR/MMR	MH/MR/MMR	MH/MR/MMR
Error Correction Mode (ECM)	Yes	Yes	Yes
Transmission Speed (sec)	6	6	6
Gray Scale	64	64	64
Super Fine	Yes	Yes	Yes
Smoothing	Yes	Yes	Yes
Multi Resolution TX	Yes	Yes	Yes
Input/Output Width	8.5" x 8.5"	8.5" x 8.5"	8.5" x 8.5"
ADF (pages)	20	20	20
LCD Size	16 x 1	16 x 1	16 x 1
Handset	Yes	Yes	Yes
One-touch Dial	16 (8 x 2)	8	8
Speed Dial	30	30	30
Tel-Index	Yes (Search)	Yes (Search)	Yes (Search)
Chain Dialing	Yes	Yes	Yes
Contrast	SL/Auto/SD	SL/Auto/SD	SL/Auto/SD
FAX/TEL Switch	Yes	Yes	Yes
Distinctive Ringing	Yes	Yes	Yes
Caller ID	Yes (Call Waiting)	Yes (Call Waiting)	Yes (Call Waiting)
TAD Interface	Yes	Yes	Yes
Next FAX Reservation	Yes - Dual Access	Yes - Dual Access	Yes - Dual Access
DUAL ACCESS	Yes	Yes	Yes
Help	Yes	Yes	Yes (Combined with Copy key)
Coverpage	Yes - Super	Yes - Super	Yes - Super
Polling Type	Std/Seq	Std/Seq	Std/Seq
Delayed Timer	Yes - up to 50	Yes - up to 50	Yes - up to 50
Broadcasting [1]	Yes (up to 96)	Yes (up to 88)	Yes (up to 88)
Call Reservation	Yes	Yes	Yes
Page Memory (TX) [2]	Max 1.3 MB (130 pages)	Max 1.3 MB (130 pages)	Max 1.3 MB (130 pages)
Out-of-paper Reception [2]	Max 1.3 MB (130 pages)	Max 1.3 MB (130 pages)	Max 1.3 MB (130 pages)
Call Back Message	Yes	Yes	Yes
Paging	Yes	Yes	Yes
FAX Forwarding	Yes	Yes	Yes
FAX Retrieval	Yes	Yes	Yes
Super Quickscan	Yes	Yes	Yes

[1] The number of dials for broadcasting is the total of "One-touch dials (16/8)" + "Speed dials (30)" + "Manual dials (50)".
[2] According to the Brother chart in standard mode, MMR.

Model	FAX8060P	MFC9060
Color	Gray 1495	Gray 1495
FAX	Yes	Yes
Modem Speed (bps)	14.4K (FAX Only)	14.4K (FAX Only)
CCITT Group	G3	G3
Coding Method	MH/MR/MMR	MH/MR/MMR
Error Correction Mode	Yes	Yes
Transmission Speed (sec)	6	6
Gray Scale	64	64
Super Fine	Yes	Yes
Smoothing	Yes	Yes
Multi Resolution TX	Yes	Yes
Input/Output Width	8.5" x 8.5"	8.5" x 8.5"
ADF (pages)	20	20
LCD Size	16 x 1	16 x 1
Handset	No	No
Duplex Speaker Phone	No	No
One-touch Dial	16 (8x2)	16 (8x2)
Speed Dial	30	30
Tel-Index	Yes	Yes
Chain Dialing	Yes	Yes
Contrast	SL/Auto/SD	SL/Auto/SD
FAX/TEL Switch	Yes	Yes
FAX/TEL OGM	No	No
Distinctive Ringing	Yes (UK, DEN only)	Yes (UK, DEN only)
Caller ID *1	No	No
TAD Interface	Yes	Yes
Next FAX Reservation	Yes - Dual access	Yes - Dual access
DUAL ACCESS	Yes	Yes
Help	Yes	Yes
Coverpage	Yes - Super	Yes - Super
Polling Type	Std/Seq/Del (Sec)	Std/Seq/Del (Sec)
Password Check	No	No
Delayed Timer	Yes (up to 50)	Yes (up to 50)
Broadcasting	Yes (up to 96)	Yes (up to 96)
Call Reservation	Yes	Yes
Page Memory (TX) *2	Max. 1.3 MB (up to 130 pages: MMR)	Max. 1.3 MB (up to 130 pages: MMR)
Out-of-paper Reception *2	Max 1.3 MB (up to 130 pages: MMR)	Max 1.3MB (up to 130 pages: MMR)
Call Back Message	Yes	Yes

*1 Call Waiting Caller ID is not available.
*2 According to the Brother chart in standard mode, MMR.

Model	FAX2600	MFC4300	MFC4600
COPY	Yes	Yes	Yes
dpi	203 x 391	203 x 391	203 x 391
Collating	99	99	99
Reduction/Enlarge	50, 75, 87, 93, 100, 120, 125, 150, 200%	50, 75, 87, 93, 100, 120, 125, 150, 200%	50, 75, 87, 93, 100, 120, 125, 150, 200%
Sort	Yes (w/o Key)	Yes (w/o Key)	Yes (w/o Key)
PRINTER	N/A	Yes	Yes
Engine/Type	-	YL2	YL2
PPM	-	6 ppm	6 ppm
DPI (output resolution)	-	600 x 600	600 x 600
Paper Capacity	-	200	200
Emulation (Standard)	-	PCL4	PCL4
Standards	-	Windows GDI (600 x 600)	Windows GDI (600 x 600)
Memory (Typical)	-	1 MB	1 MB
Memory (MIN.)	-	600 KB	600 KB
Fonts Resident	-	-	-
Fonts Disk Based	-	Yes - 35TT	Yes - 35TT
Paper Handling	-	LTR, LGL, A4, B5, A5, OHP	LTR, LGL, A4, B5, A5, OHP
Multi-Purpose Tray	-	Custom size (2.75 x 5, 8.5 x 14) Envelop (DL/C5/CM10/Mona)	Custom size (2.75 x 5, 8.5 x 14) Envelop (DL/C5/CM10/Mona)
Toner Life (Starter)	1,000 pages with 5% black	1,000 pages with 5% black	1,000 pages with 5% black
Toner Life (Supply)	2,200 pages with 5% black	2,200 pages with 5% black	2,200 pages with 5% black
Drum Life	Up To 20,000 pages (20 pages/job) Up To 8,000 pages (1 page/job)	Up To 20,000 pages (20 pages/job) Up To 8,000 pages (1 page/job)	Up To 20,000 pages (20 pages/job) Up To 8,000 pages (1 page/job)
Utility Software	-	RPC	RPC
Period to go in Sleep Mode	-	0-99	0-99
Output size	-	LTR, LGL, A4, B5, A5	LTR, LGL, A4, B5, A5
Interface/Interface cable	No/No	Yes (Bi Centro)/No	Yes (Bi Centro)/Yes
SCANNER	N/A	N/A	Yes
Color/Mono	-	-	Mono
dpi	-	-	Opt. 200 x 400 (Int. 600 X 600)
Gray Scale	-	-	256
Twain	-	-	Yes
Formats (Import)	-	-	TIFF/BMP/PCX/DCX/BTF/ BTX/MAX/PDF
Formats (Export)	-	-	TIFF/BMP/MAX/PDF
ADF (pages)	-	-	20
OCR	-	-	Yes (ScanSoft: TextBridge)

Model	FAX8060P	MFC9060
Super Quickscan	No	No
Mail box	No	No
Multi-Transmission	No	No
PRINTER	N/A	Yes
Engine/Type	-	YL (VA)
PPM	-	6 ppm
DPI (output resolution)	-	600 x 600
Paper Capacity	-	200
Emulation (Standard)	-	-
	-	Windows GDI (600x600)
Memory (Typical)	-	1 MB
Memory (MIN.)	-	600 KB
Fonts Resident	-	-
Fonts Disk Based	-	-
Paper Handling	-	LTR, LGL, A4, B5, A5, OHP
Multi-Purpose Tray	-	Custom size (2.75x5, 8.5x14) Envelop (DL/C5/CM10/Mona)
Support Windows OS (Printer Driver)	-	Windows95/98 and NT4.0/2000 Driver with Auto Installer Program
Toner Life (Standard)	1,000 pages with 5% black	1,000 pages with 5% black
Toner Life (Supply)	2,200 pages with 5% black	2,200 pages with 5% black
Drum Life	20,000 pages (20 pages/job) 8,000 pages (1 page/job)	20,000 pages (20 pages/job) 8,000 pages (1 page/job)
Utility Software for DOS	-	-
Period to go in Sleep Mode	0-99	0-99
Output size	(LTR, LGL, A4, B5, A5)	LTR, LGL, A4, B5, A5
Optional LAN Board	No	No
Optional Mac Board	No	No
Interface connector	No	Yes (Bi Centro)
Interface cable	No	Yes [3]
SCANNER	N/A	Yes (TWAIN only)
Color/Mono	-	-
dpi	-	-
Gray Scale	-	-
Twain	-	Yes
Formats (Import)	-	-
Formats (Export)	-	-
ADF (pages)	-	-
OCR	-	-

[3] Only for GER, UK, FRA, AUS, IRE, and S.AF

(3/3)

Model	FAX2600	MFC4300	MFC4600
General			
Energy Star Compliance	Yes	Yes	Yes
Memory (Standard)	2MB	2MB	2MB
Memory (Opt Upgrade)	N/A	N/A	N/A
Simultaneous Operation	N/A	Yes (PRINTER/FAX, PRINTER/COPY)	Yes (PRINTER/FAX, PRINTER/SCAN, PRINTER/COPY)
Bundled Software Applications	N/A	Yes	Yes
Printer Driver	-	Windows3.1x/95/98/ME, NT 4.0/2000 Driver with Auto Installer Program	Windows3.1x/95/98/ME, NT 4.0/2000 Driver with Auto Installer Program
Scanner (TWAIN) Application	-	No	Yes (Brother)
Viewer Application	-	No	Yes (ScanSoft: PaperPort 6.1)
PC-FAX (Send/Receive)	-	No	Yes (SMSI)
Internet Fax	-	No	No
Automatic E-mail Printing	-	Yes (Brother)	Yes (Brother)
Remote Setup	-	Yes (Brother)	Yes (Brother)

Model	FAX8060P	MFC9060
COPY	Yes	Yes
dpi	203 x 391	203 x 391
Collating	99	99
Reduction/Enlarge	50, 75, 87, 93, 100, 120, 125, 150, 200%	50, 75, 87, 93, 100, 120, 125, 150, 200%
Sort	Yes	Yes
Message Center	No	No
OGM	No	No
ICM Recording Time	No	No
Paging	No	No
Fax & Voice Mail Box	No	No
Fax & Voice on Demand	No	No
FAX Forwarding	Yes	Yes
FAX Retrieval	Yes	Yes
General		
Memory (Standard: Physical)	2MB	2MB
Memory (Opt. Upgrade)	No	No
Simultaneous Operation	N/A	Yes (PRINTER/FAX, PRINTER/SCANNER, PRINTER/COPY)
Data Modem	No	No
Remote Diagnostics	Yes	Yes
Memory Backup	No	No
Memory Security	No	No
Pin TX LOCK	Yes	Yes
Bundled Software Applications	N/A	Yes
Printer Driver	-	Yes (Brother)
PC-FAX (Send/Receive)	-	-
Scanner Application	-	TWAIN (Brother)
Viewer Application	-	Yes (PaperPort: ScanSoft)
Network Application	No	No
Class1	No	No

CHAPTER II.

INSTALLATION

CHAPTER II. INSTALLATION

CONTENTS

1. INSTALLING THE UPDATE DATA TO THE FACSIMILE EQUIPMENT

If the program version is updated or the main PCB is replaced, 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 equipment to your computer

(1)   Make sure that the equipment's power cord is unplugged from a wall socket.

(2)   Make sure that your computer is powered off.

(3)   Connect the interface cable to the parallel interface port on the back of the equipment 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)   Power on your computer.

(6)   Plug the equipment's power cord into a wall socket.

Interface cable

Host computer

Lock wires
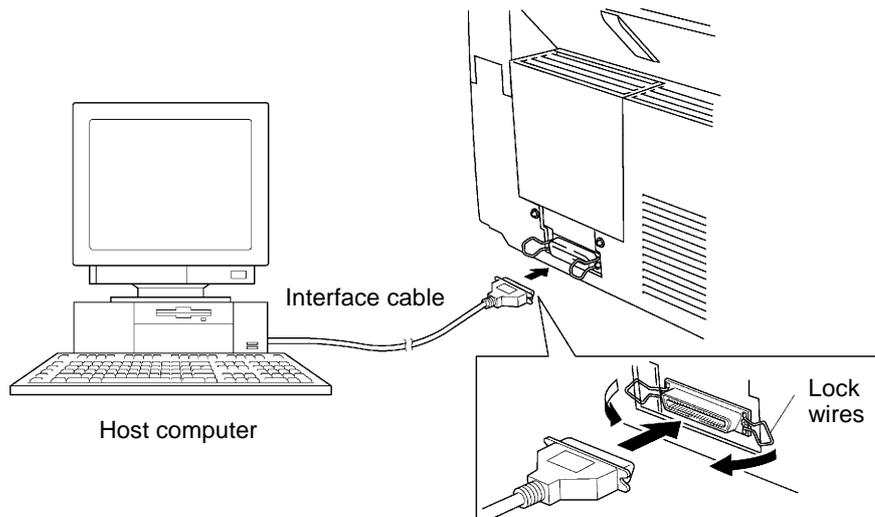
Installing the update data onto the flash ROM of the facsimile equipment

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 equipment correctly.

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

```
ICEN filename /b
```

Then press the **ENTER** key.

During downloading, the equipment beeps *intermittently*.

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

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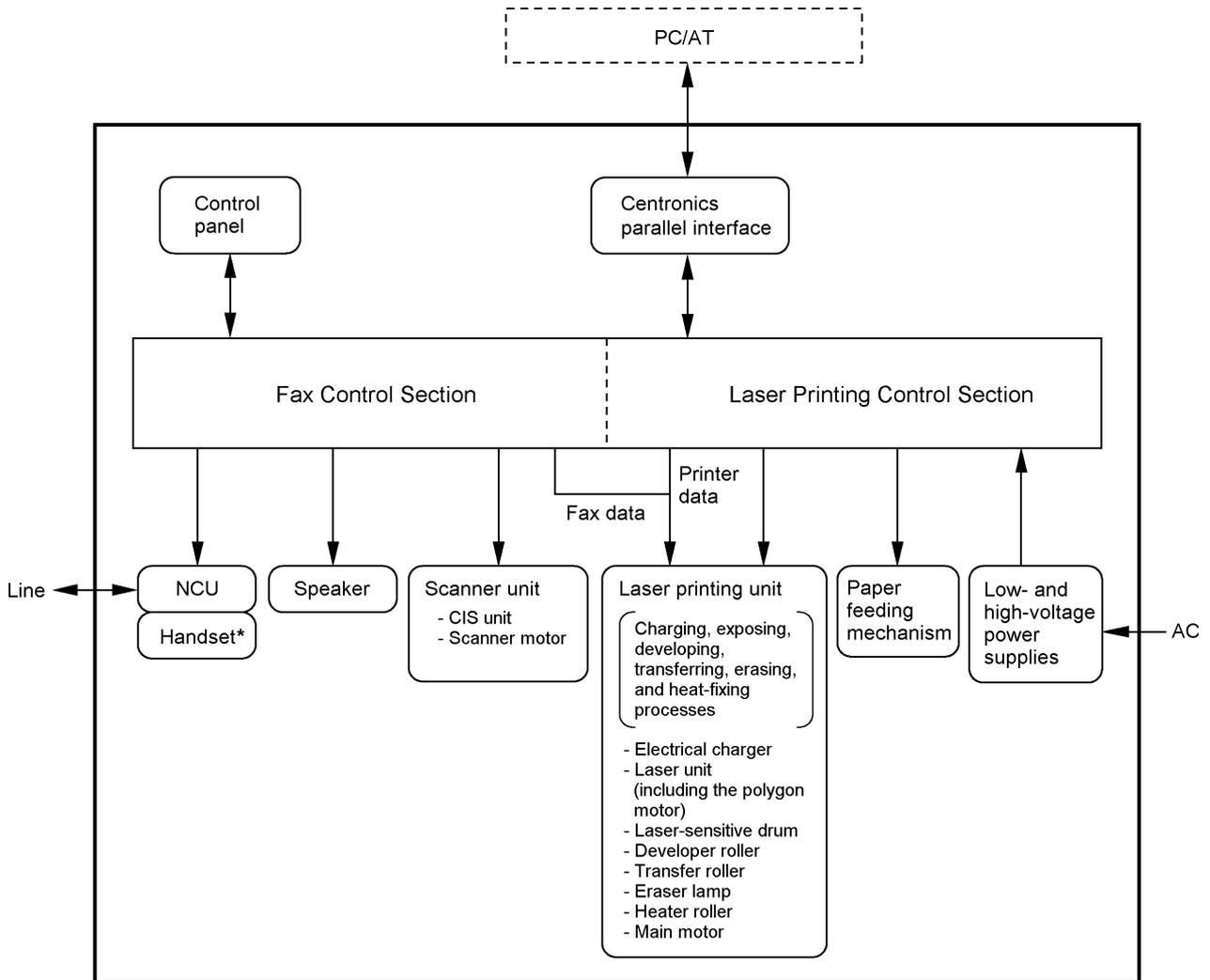
CHAPTER III.

THEORY OF OPERATION

CHAPTER III. THEORY OF OPERATION

CONTENTS

1. OVERVIEW

PC/AT

Control panel

Centronics parallel interface

Fax Control Section | Laser Printing Control Section

Printer data

Fax data

Line

NCU

Handset*

Speaker

Scanner unit
- CIS unit
- Scanner motor

Laser printing unit

Charging, exposing, developing, transferring, erasing, 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

Paper feeding mechanism

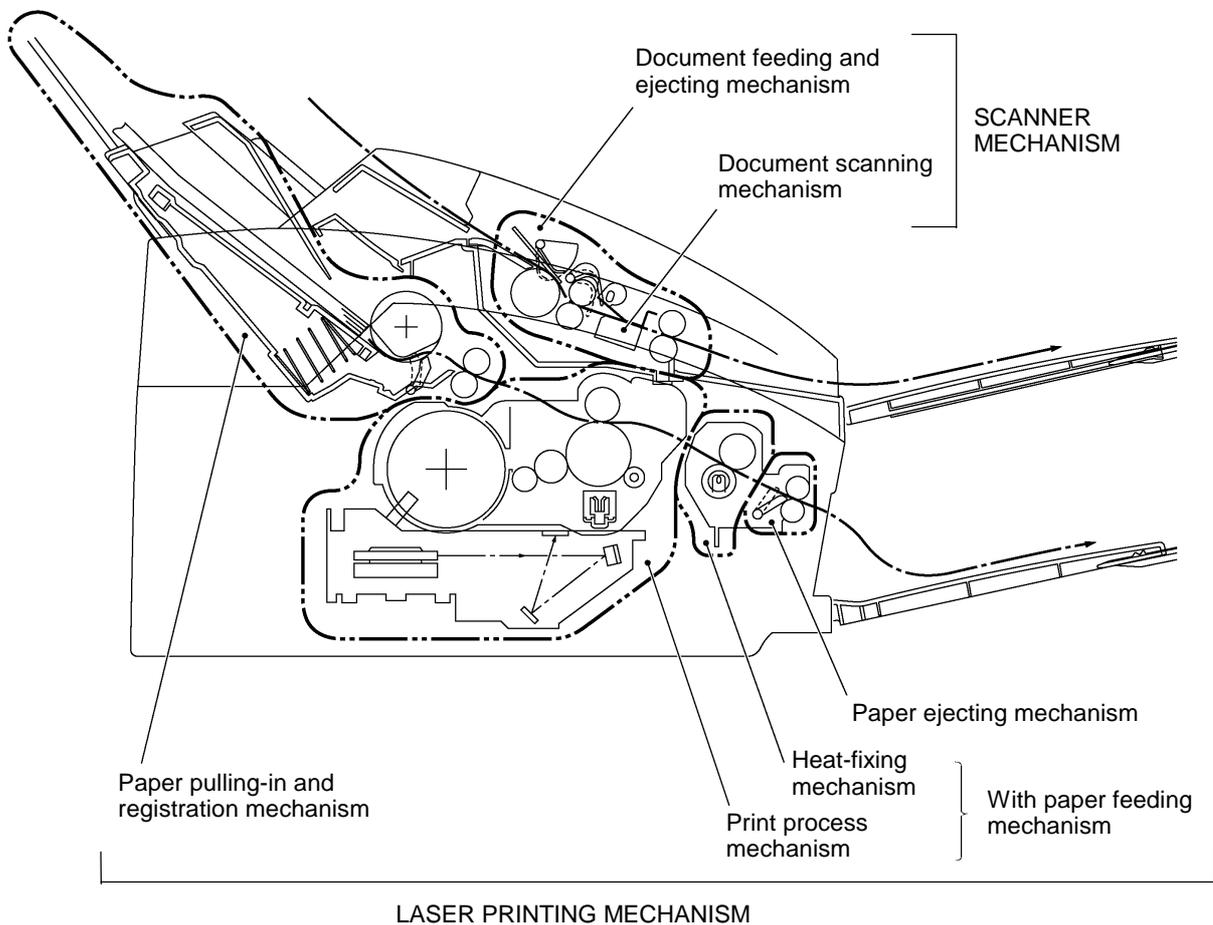Low- and high-voltage power supplies
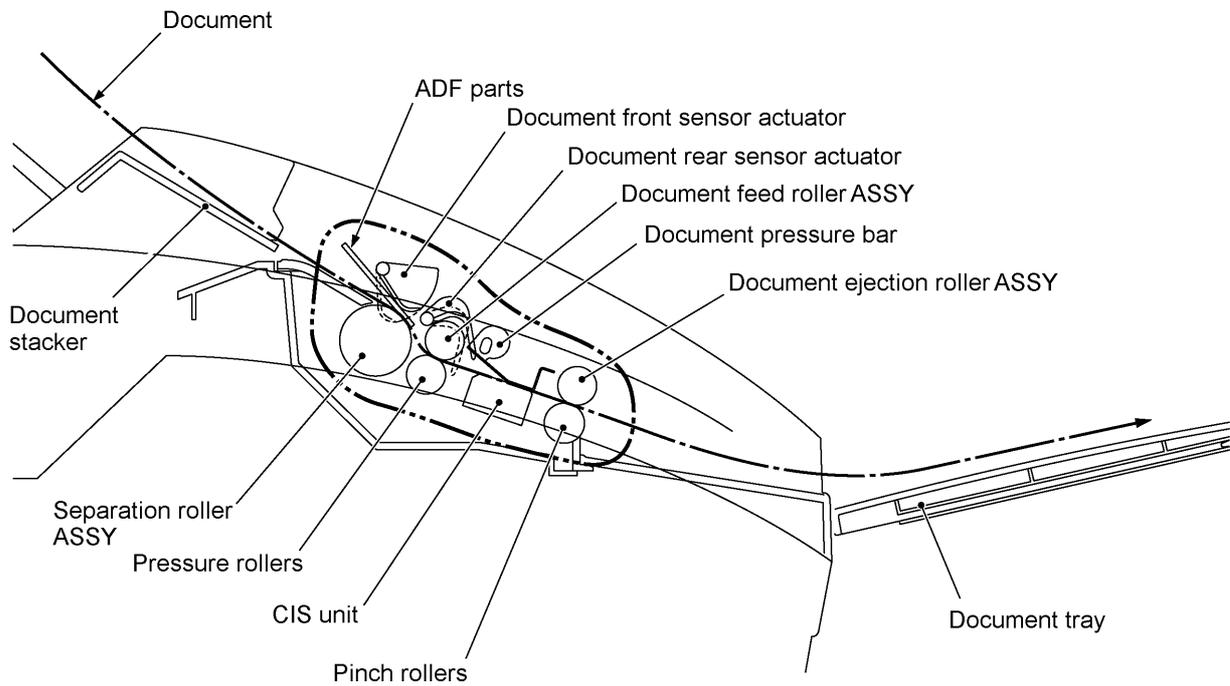
AC

*Not provided on the FAX8060P/MFC9060.

2. MECHANISMS

The facsimile equipment is classified into the following mechanisms:

- ■ SCANNER MECHANISM
  - Document feeding and ejecting mechanism
  - Document scanning mechanism
- ■ LASER PRINTING MECHANISM
  - Paper pulling-in, registration, feeding, and ejecting mechanisms
  - Print process mechanism (consisting of charging, exposing, developing, transferring, and erasing processes)
  - Heat-fixing mechanism
- ■ SENSORS AND ACTUATORS

LASER PRINTING MECHANISM

2.1 Scanner Mechanism

Document

ADF parts

Document front sensor actuator

Document rear sensor actuator

Document feed roller ASSY

Document pressure bar

Document ejection roller ASSY

Document stacker

Separation roller ASSY

Pressure rollers

CIS unit

Pinch rollers

Document tray

2.1.1 Document feeding and ejecting mechanism

This mechanism consists of the document stacker, automatic document feeder (ADF), document ejection roller ASSY, and document sensors. (For details about the sensors, refer to Section 2.3.)
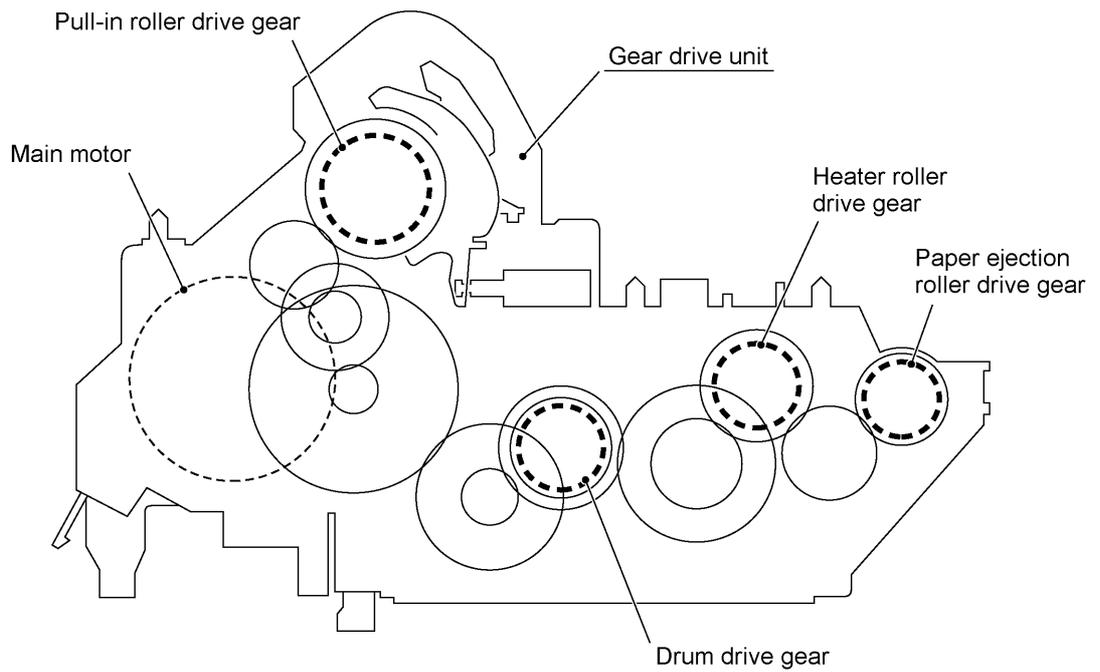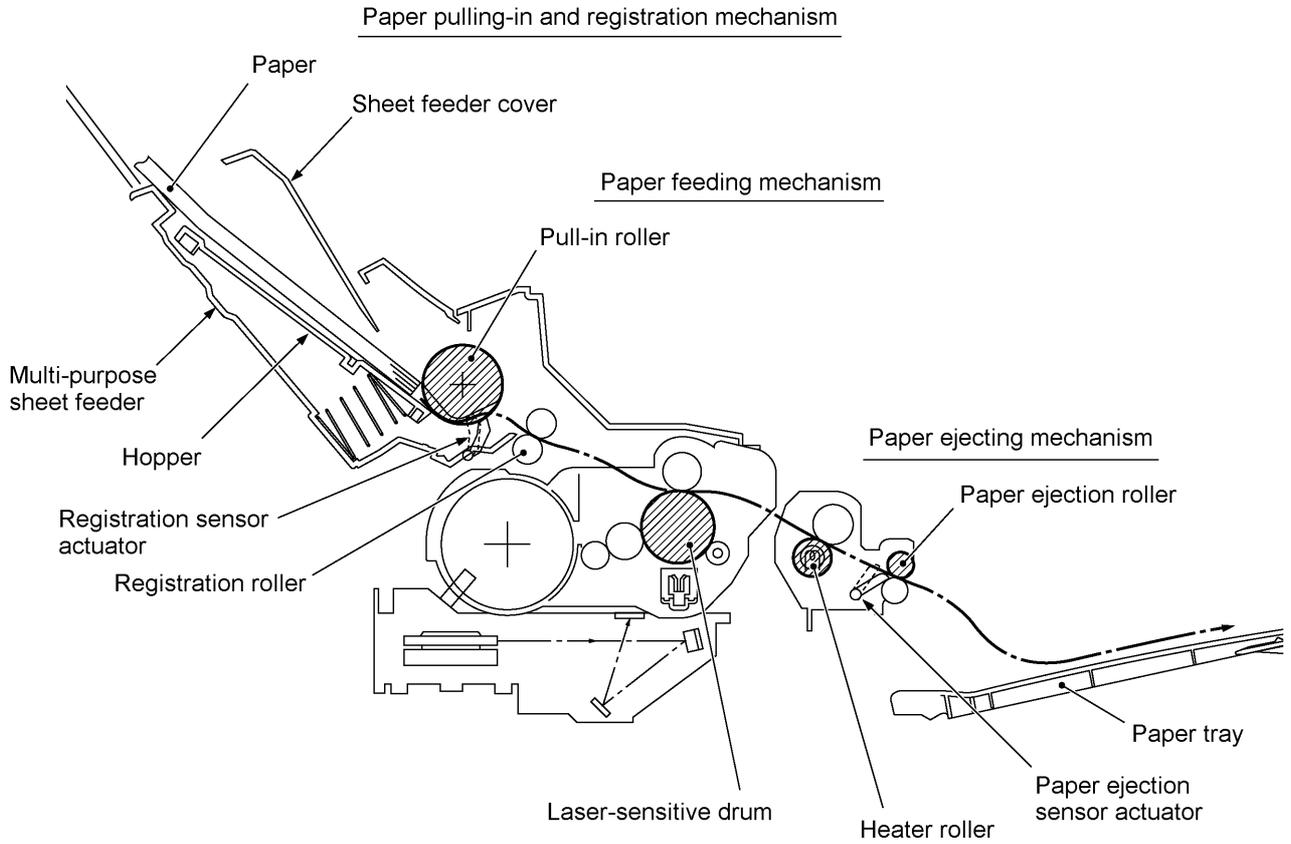
If the operator sets documents on the document stacker and starts the scanning operation, the scanner motor rotates so that the ADF (which consists of the separation roller and ADF parts) feeds those documents into the equipment, starting from the bottom sheet to the top, page by page. Each document advances with the document feed roller ASSY to the scanner, and then it is fed out of the equipment with the document ejection roller ASSY.
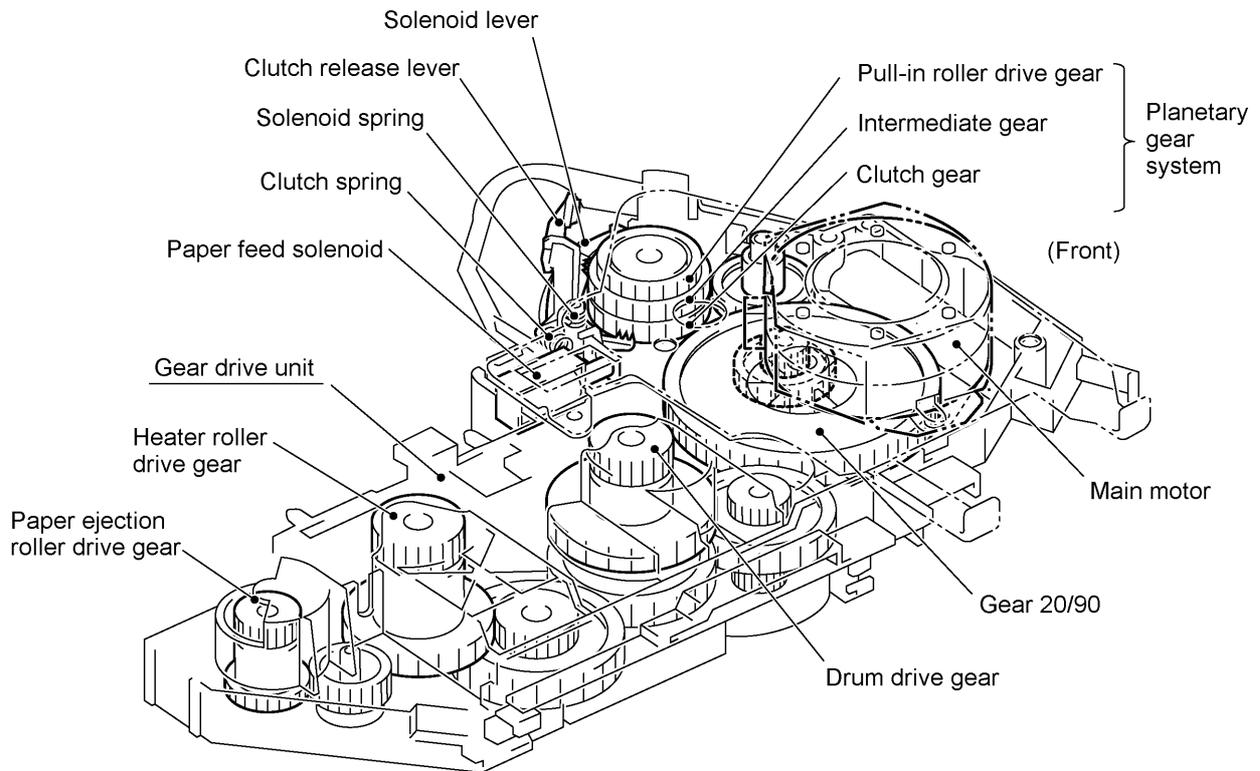
2.1.2 Scanner

The scanner uses a contact image sensor (CIS) unit which consists of an LED array illuminating documents, a self-focus lens array collecting the reflected light, a CIS PCB carrying out photoelectric conversion to output picture element data, and a cover glass on which a document advances. When the document passes between the document pressure bar and the cover glass, it is scanned.

2.2 Laser Printing Mechanism

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

Paper pulling-in and registration mechanism

Paper

Sheet feeder cover

Paper feeding mechanism

Pull-in roller

Multi-purpose
sheet feeder

Hopper

Paper ejecting mechanism

Paper ejection roller

Registration sensor
actuator

Registration roller

Paper tray

Laser-sensitive drum

Heater roller

Paper ejection
sensor actuator

Pull-in roller drive gear

Gear drive unit

Main motor

Heater roller
drive gear

Paper ejection
roller drive gear

Drum drive gear

Paper pulling-in and registration mechanism

The paper pulling-in and registration mechanism consists of the pull-in roller gear (incorporated in the multi-purpose sheet feeder), planetary gear system, paper feed solenoid, solenoid lever, clutch release lever, and registration sensor. (For the details about the sensor, refer to Section 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 multi-purpose sheet feeder rotates to pull in paper into the equipment, 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 gear so as to release the clutch gear, the clutch gear rotates and the pull-in roller drive gear does not rotate. In 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.
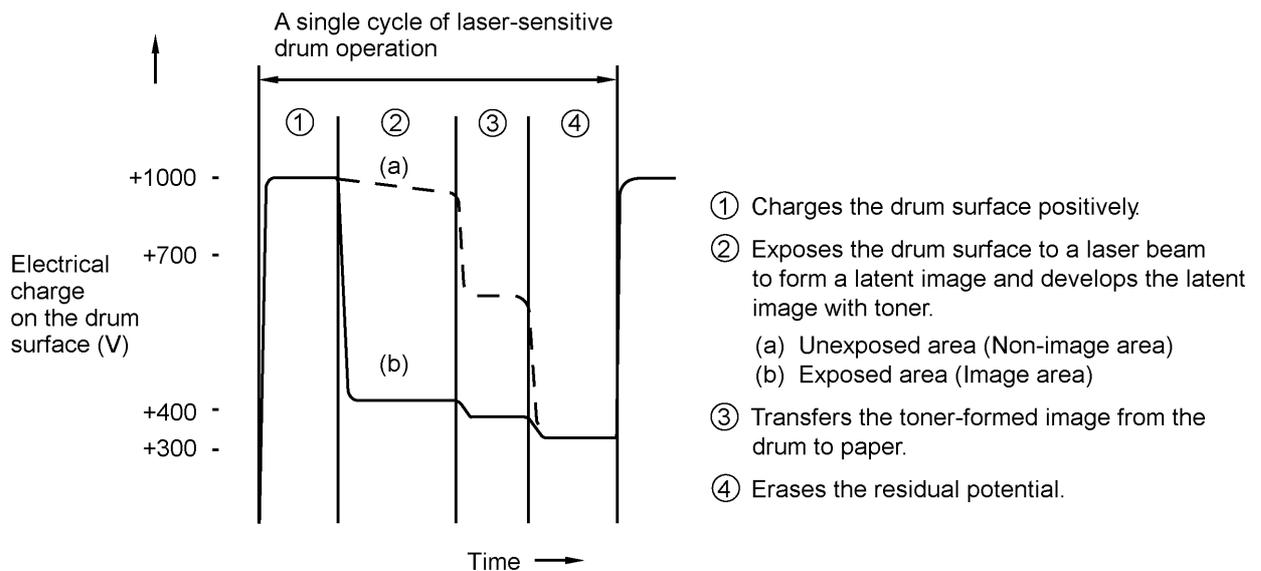
After the paper passes through the heat-fixing process, it will be ejected onto the paper tray.

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.
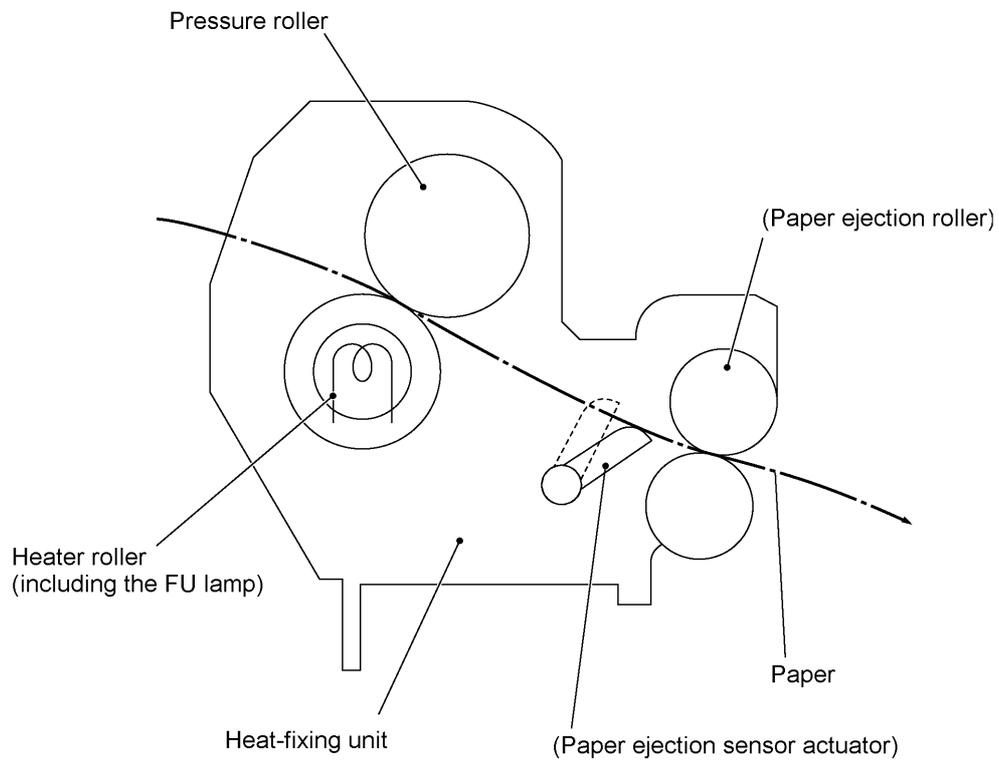
2.2.2 Print process mechanism
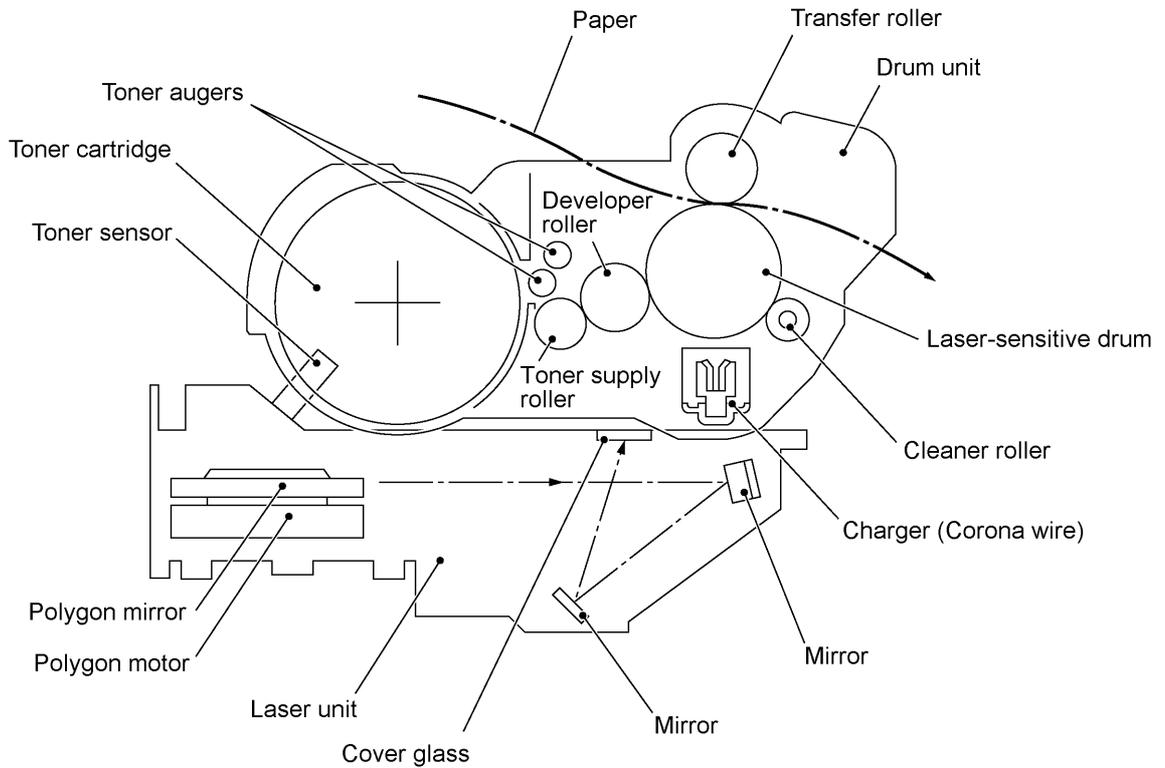
The print process unit works with laser beam, electrical charges, and toner. The graph below shows the transition of electrical charge on the surface of the laser-sensitive drum through the five processes: charging, exposing, developing, transferring, and erasing processes.

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.

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.
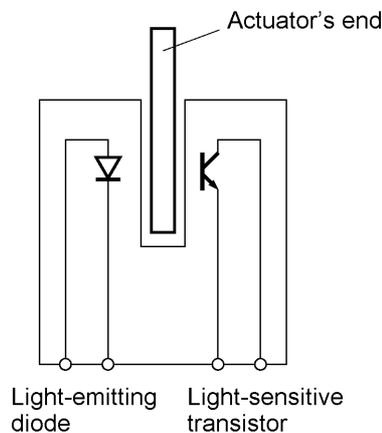
2.3   Sensors and Actuators

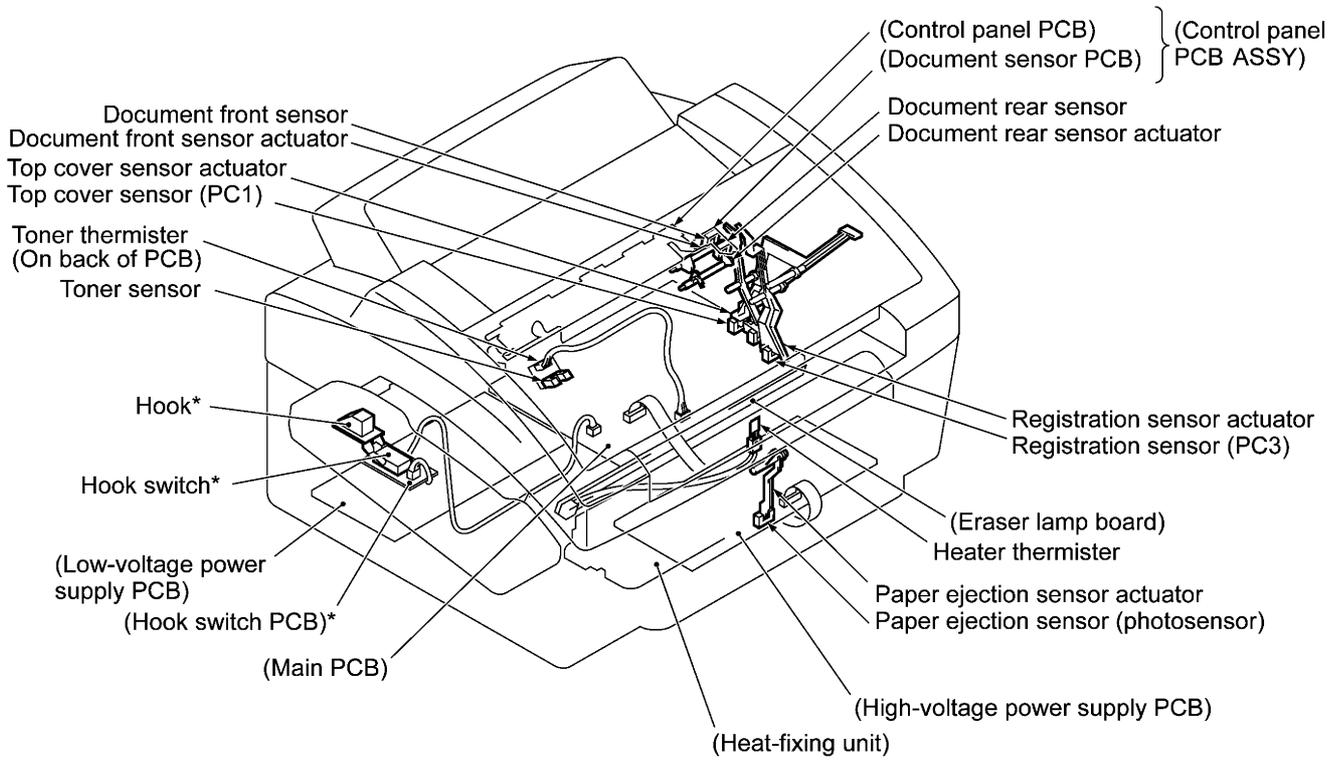This equipment has ten sensors: six photosensors, two thermisters and a mechanical switch as described below.

Sensor name	Type	Located on
Document front sensor	Photosensor	Control panel PCB ASSY (Document sensor PCB)
Document rear sensor	Photosensor	Control panel PCB ASSY (Document sensor PCB)
Top cover sensor	Photosensor	Main PCB
Registration sensor	Photosensor	Main PCB
Paper ejection sensor	Photosensor	High-voltage power supply PCB
Toner sensor	Photosensor	Toner sensor PCB
Toner thermister	Thermister	Toner sensor PCB
Heater thermister	Thermister	Heat-fixing unit
Hook switch*	Mechanical switch	Hook switch PCB*

*Not provided on the FAX8060P/MFC9060.

• 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.

• Top cover sensor which detects whether the top cover 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 equipment.

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

• Toner thermister which detects the ambient temperature of the toner cartridge.

• Heater thermister which detects the temperature of the heater roller of the fixing unit.

• Hook switch* which detects whether the handset is placed on the handset mount.

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.


Actuator's end

Light-emitting diode   Light-sensitive transistor

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Document front sensor
Document front sensor actuator
Top cover sensor actuator
Top cover sensor (PC1)

Toner thermister
(On back of PCB)
Toner sensor

Hook*

Hook switch*

(Low-voltage power
supply PCB)
(Hook switch PCB)*

(Main PCB)

(Control panel PCB)   ⎤ (Control panel
(Document sensor PCB) ⎰ PCB ASSY)

Document rear sensor
Document rear sensor actuator

Registration sensor actuator
Registration sensor (PC3)

(Eraser lamp board)
Heater thermister

Paper ejection sensor actuator
Paper ejection sensor (photosensor)

(High-voltage power supply PCB)

(Heat-fixing unit)

*Not provided on the FAX8060P/MFC9060.

Location of Sensors and Actuators

3. CONTROL ELECTRONICS

3.1 Configuration

The hardware configuration of the facsimile equipment is shown below.
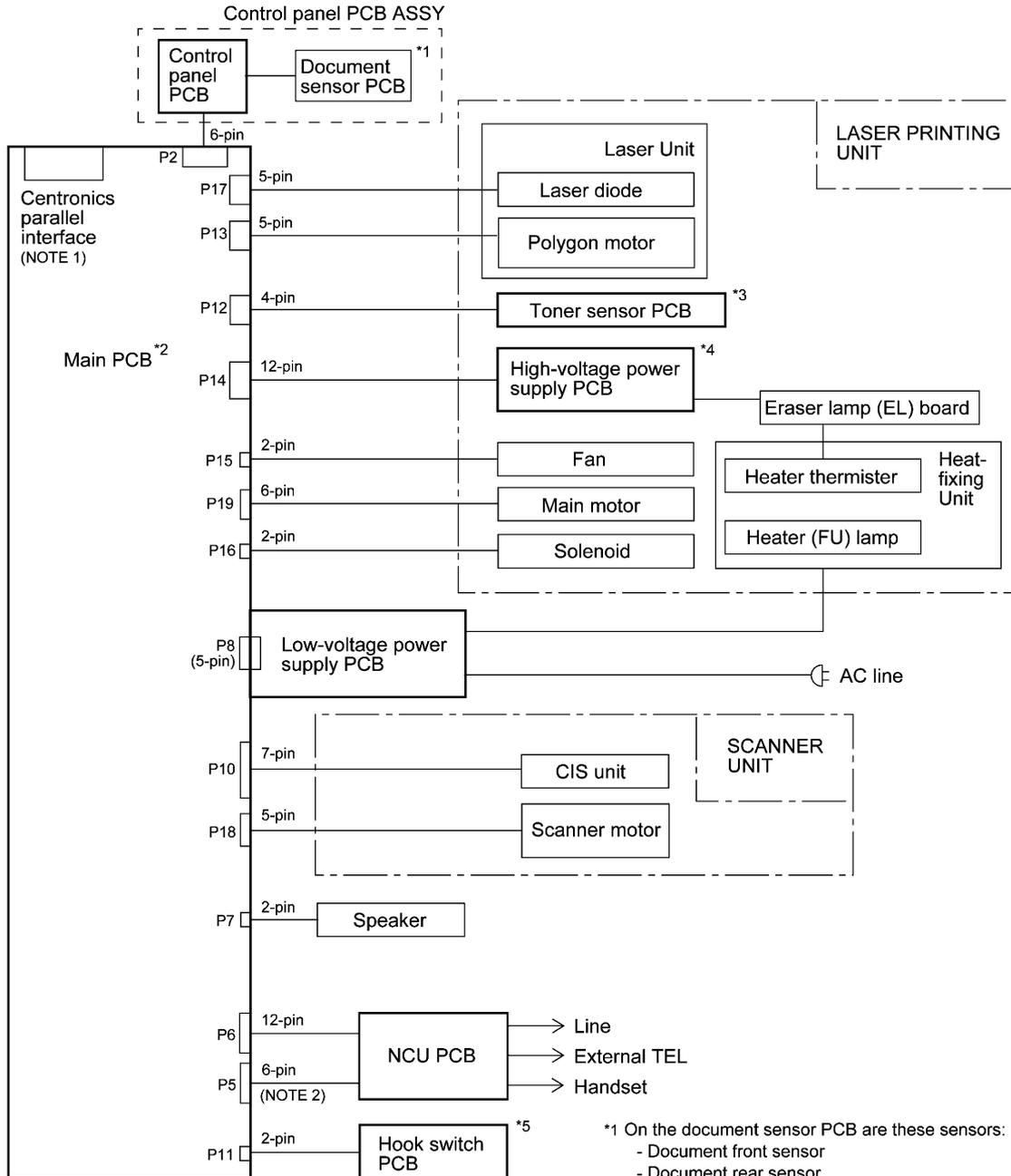
(NOTE 1)   Not provided on the FAX2600/FAX8060P

(NOTE 2)   Provided on the European, Australian, Indonesian, and Asian versions.

*1 On the document sensor PCB are these sensors:
- Document front sensor
- Document rear sensor

*2 On the main PCB are these sensors:
- Top cover sensor
- Registration sensor

*3 On the toner sensor PCB are these sensors:
- Toner sensor
- Toner thermister

*4 On the high-voltage power supply PCB is the paper ejection sensor.

*5 On the hook switch PCB is the hook switch. (Not provided on the FAX8060P/MFC9060.)

Configuration of Facsimile Equipment

CHAPTER IV.

DISASSEMBLY/REASSEMBLY AND LUBRICATION