

Product: 1998 Brother FAX3750/FAX-8650P,MFC7750 FACSIMILE EQUIPMENT Fax Service Repair Workshop Manual
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brother®

**FACSIMILE EQUIPMENT
SERVICE MANUAL**

**MODEL: FAX3750/FAX-8650P
MFC7750**

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Specifications are subject to change without notice.

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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.

CHAPTER I.	GENERAL DESCRIPTION
CHAPTER II.	INSTALLATION
CHAPTER III.	THEORY OF OPERATION
CHAPTER IV.	DISASSEMBLY/REASSEMBLY AND LUBRICATION
CHAPTER V.	MAINTENANCE MODE
CHAPTER VI.	ERROR INDICATION AND TROUBLESHOOTING
Appendix 1.	EEPROM Customizing Codes
Appendix 2.	Circuit Diagrams

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 Japanese products

MANUFACTURED:	MAY	1998	K
BROTHER INDUSTRIES, LTD.			
15-1 Naeshiro-cho, Mizuho-ku, Nagoya 467-8561, Japan.			
This product complies with FDA radiation performance standards, 21 CFR Subchapter J.			

CHAPTER I.

GENERAL DESCRIPTION

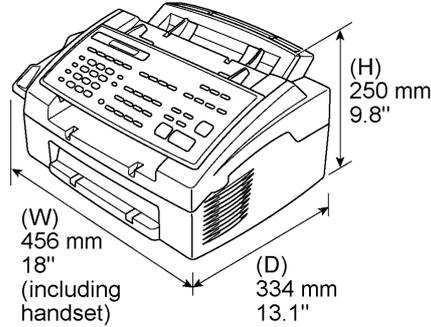
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1. EQUIPMENT OUTLINE

1.1 External Appearance and Weight

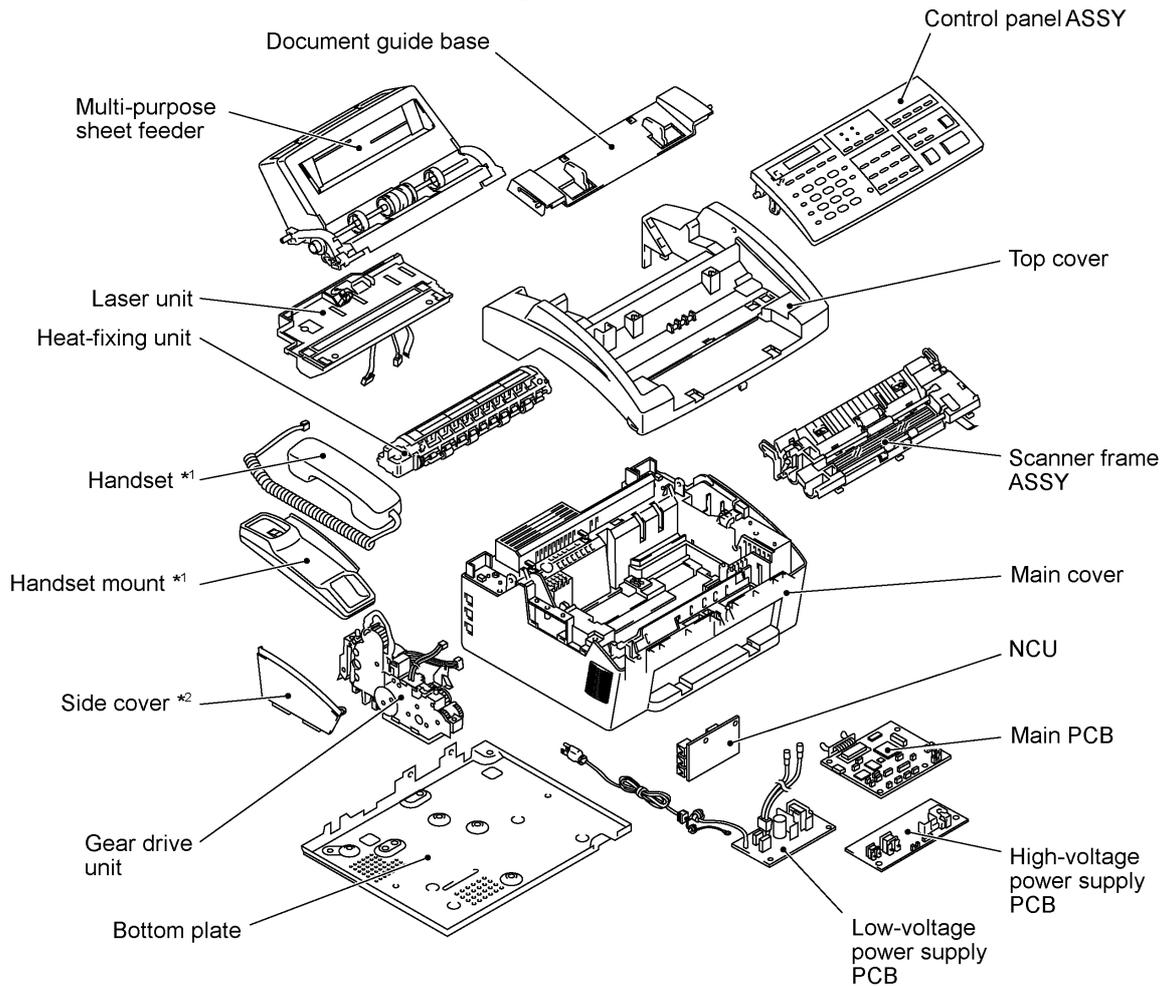
The figure below shows the equipment appearance and approximate dimensions.



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:



*1 Provided on the FAX3750/MFC7750.
*2 Provided on the FAX-8650P.

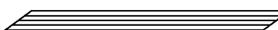
2. SPECIFICATIONS

(1/2)

Model	FAX3750	MFC7750
Color	White (1397)	White (1138)
PRINTER	Available with option *1	Yes
Engine/Type	[YL (VA)]	YL (VA)
PPM	[6 ppm]	6 ppm
dpi (output resolution)	[600 x 600]	600 x 600
Paper Capacity	[200]	200
Emulation (Standard)	-	PCL4
Standards	[Windows GDI (600 x 600)]	Windows GDI (600 x 600)
Memory (Typical)	[2 MB]	2 MB
Memory (Min.)	[1.2 MB]	1.2 MB
Fonts Resident	-	24-bit MAP (PCL4Comp)
Fonts Disk Based	[Yes - 35TT]	Yes - 35TT
Paper Handling	[LTR, LGL, A4, B5, A5, OHP]	LTR, LGL, A4, B5, A5, OHP
Multi-Purpose Sheet Feeder	[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)
Printer Driver	[Windows3.1/3.11, 95 and NT4.0 Driver with Auto Installer Program]	Windows3.1/3.11, 95 and NT4.0 Driver with Auto Installer Program
Utility Software	-	RPC
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/Interface Cable	[Yes (Bi Centro)/No]	Yes (Bi Centro)/Yes
SCANNER	Available with option *1	Yes
Color/Mono	[Mono]	Mono
dpi	[OPT 300 x 600 (1200 x 1200)]	OPT 300 x 600 (1200 x 1200)
Gray Scale	[256]	256
Twain	[Yes]	Yes
Formats (Import)	[TIFF/BMP/PCX/DCX/BTF/ BTX/MAX/PDF]	TIFF/BMP/PCX/DCX/BTF/ BTX/MAX/PDF
Formats (Export)	[TIFF/BMP/MAX/PDF]	TIFF/BMP/MAX/PDF
ADF (pages)	[20] *2	20 *2
OCR	[Xerox Textbridge]	Yes (Xerox Textbridge)
COPY	Yes	Yes
dpi	300 x 600	300 x 600
Collating	99	99
Reduction/Enlargement	50, 75, 87, 93, 100, 120, 125, 150, 200%	50, 75, 87, 93, 100, 120, 125, 150, 200%
Sorting	Yes	Yes
FAX	Yes	Yes
Modem/Speed (bps)	ROCKWELL F288R (33.6K FAX Only)	ROCKWELL F288R (33.6K FAX Only)
CCITT Group	Super G3	Super G3
Coding Method	MH/MR/MMR	MH/MR/MMR
Error Correction Mode (ECM)	Yes	Yes
Transmission Speed (sec)	3	3
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"
LCD Size	16 x 1	16 x 2
Handset	Yes *3	Yes
Duplex Speaker Phone	No	No

*1 Optional CD-ROM required.

*2 30 pages under the following conditions: - Temperature: 20°C to 30°C - RH: 50% to 70%
 - Forms type: Xerox 4200 (20 lb/LTR), Xerox 4024 (24 lb/LTR), M.PPC (64 g/m²/A4)
 - Loading as shown at right.
 (Loading more than 20 pages in any other way will result in a double feed or paper jam.)

ADF ← 

*3 No handset is provided on the Australian and New Zealand versions.

Specifications enclosed in brackets are available if options are used.

Model	FAX-8650P
Color	White (1138)
PRINTER	Yes
Engine/Type	YL (VA)
PPM	6 ppm
dpi (output resolution)	600 x 600
Paper Capacity	200
Emulation (Standard)	PCL4
Standards	Windows GDI (600 x 600)
Memory (Typical)	2 MB
Memory (Min.)	1.2 MB
Fonts Resident	24-bit MAP (PCL4Comp)
Fonts Disk Based	-
Paper Handling	LTR, LGL, A4, B5, A5, OHP
Multi-Purpose Sheet Feeder	Custom Size (2.75 x 5, 8.5 x 14) Envelop (DL/C5/CM10/Mona)
Printer Driver	Windows 3.1/3.11, 95 and NT4.0 Driver with Auto Installer Program (Except Germany)
Utility Software	-
Period to go in Sleep Mode	0-99
Output Size	LTR, LGL, A4, B5, A5
Optional LAN Board	No
Optional Mac Board	No
Interface/Interface Cable	Yes (Bi Centro) / No
SCANNER	-
Color/Mono	-
dpi	-
Gray Scale	-
Twain	-
Formats (Import)	-
Formats (Export)	-
ADF (pages)	-
OCR	-
COPY	Yes
dpi	300 x 600
Collating	99
Reduction/Enlargement	50, 75, 87, 93, 100, 120, 125, 150, 200%
Sorting	Yes
FAX	Yes
Modem/Speed (bps)	ROCKWELL F288R (33.6K FAX Only)
CCITT Group	Super G3
Coding Method	MH/MR/MMR
Error Correction Mode (ECM)	Yes
Transmission Speed (sec)	3
Gray Scale	64
Super Fine	Yes
Smoothing	Yes
Multi-Resolution TX	Yes
Input/Output Width	8.5" x 8.5"
LCD Size	16 x 2
Handset	No
Duplex Speaker Phone	No

*1 Optional CD-ROM required.

*2 30 pages under the following conditions: - Temperature: 20°C to 30°C - RH: 50% to 70%
 - Forms type: Xerox 4200 (20 lb/LTR), Xerox 4024 (24 lb/LTR), M.PPC (64 g/m²/A4)
 - Loading as shown at right.
 (Loading more than 20 pages in any other way will result in a double feed or paper jam.)

ADF ← 

*3 No handset is provided on the Australian and New Zealand versions.

Specifications enclosed in brackets are available if options are used.

Model	FAX3750	MFC7750
One-touch Dial	12 x 2	12 x 2
Speed Dial	100	100
Tel-Index	Yes	Yes
Chain Dialing	Yes	Yes
Contrast	SL/Auto/SD	SL/Auto/SD
FAX/TEL Switch	Yes	Yes
Distinctive Ringing	Yes	Yes
Caller ID	Yes	Yes
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	Std/Seq
Password Check	No	No
Delayed Timer	Yes, up to 50	Yes, up to 50
Broadcasting	Yes, up to 174	Yes, up to 174
Call Reservation	Yes	Yes
Page Memory (TX) * ⁴	Max 3 MB (300 pages: MMR)	Max 3 MB (300 pages: MMR)
Out-of-paper Reception * ⁴	Max 3 MB (300 pages: MMR)	Max 3 MB (300 pages: MMR)
Callback Message	Yes	Yes
Super Quickscan	Yes	Yes
Mail box	No	No
Multi-Transmission	No	No
Message Center	No	No
OGM	No	No
ICM Recording Time	No	No
Paging	Yes	Yes
Toll Saver	No	No
Fax & Voice Mail Box	No	No
Fax- & Voice-on-Demand	No	No
FAX Forwarding	Yes	Yes
FAX Retrieval	Yes	Yes
General		
Energy Star Compliance	Yes	Yes
Memory (Standard)	4 MB	4 MB
Memory (Opt Upgrade)	No	No
Simultaneous Operation	Available with option * ¹ [(PRINTER/FAX, PRINTER/SCAN, PRINTER/COPY)]	Yes (PRINTER/FAX, PRINTER/SCAN, PRINTER/COPY)
Data Modem	No	No
Bundled Software Applications	Available with option * ¹	Yes
PC-FAX (Send/Receive)	[SMSI]	SMSI
Scanner Application	[Brother]	Brother
Viewer Application	[Vioneer]	Vioneer
Network Application	No	-
Class 1	No	Yes

*¹ Optional CD-ROM required.

*⁴ According to the Brother chart in standard mode, MMR.

Specifications enclosed in brackets are available if options are used.

Model	MFC-8650P
One-touch Dial	12 x 2
Speed Dial	100
Tel-Index	Yes
Chain Dialing	Yes
Contrast	SL/Auto/SD
FAX/TEL Switch	Yes
Distinctive Ringing	No
Caller ID	Yes (U.K./French/Belgium/Netherlands versions only)
TAD Interface	Yes
Next FAX Reservation	Yes, Dual Access
Dual Access	Yes
Help	Yes
Coverpage	Yes, Super
Polling Type	Std/Seq/Sec
Password Check	No
Delayed Timer	Yes, up to 50
Broadcasting	Yes, up to 174
Call Reservation	Yes
Page Memory (TX) * ⁴	Max 3.0 MB (300 pages: MMR)
Out-of-paper Reception * ⁴	Max 3.0 MB (300 pages: MMR)
Callback Message	Yes
Super Quickscan	No
Mail box	No
Multi-Transmission	No
Message Center	No
OGM	No
ICM Recording Time	No
Paging	No
Fax & Voice Mail Box	No
Fax- & Voice-on-Demand	No
FAX Forwarding	Yes
FAX Retrieval	Yes
General	
Memory (Standard)	4 MB
Memory (Opt Upgrade)	No
Simultaneous Operation	No
Data Modem	No
Remote Diagnostics	Yes
Memory Security	Yes
Memory Backup	Yes
Bundled Software Applications	—
PC-FAX (Send/Receive)	—
Scanner Application	—
Viewer Application	—
Network Application	No
Class 1	Yes

*¹ Optional CD-ROM required.

*⁴ According to the Brother chart in standard mode, MMR.

Specifications enclosed in brackets are available if options are used.

CHAPTER II.

INSTALLATION

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1. INSTALLING THE UPDATE DATA TO THE FACSIMILE EQUIPMENT

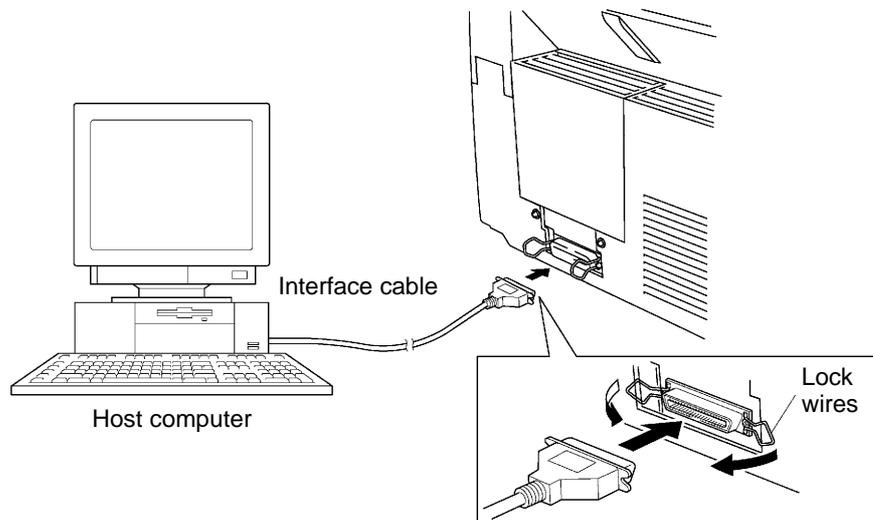
If the program version is updated or the main PCB is replaced, install the update program onto the flash ROM of the main PCB.

The program installation requires a host computer satisfying the following requirements:

- CPU Pentium 75 or higher
- RAM 8MB or greater (16MB recommended for Windows® 95)
- OS Windows® 3.1/3.11 or Windows® 95

Connecting the 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.



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

- (1) Load the floppy disk which stores the update data and transfer utility into the floppy disk drive of your computer.
(Or, copy the update data and transfer utility onto the same directory of the hard disk.)
- (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. If it is a floppy disk drive, type `A:\` from the command line 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:

```
A:\ICEN filename /b
```

Then press the **ENTER** key.

The equipment beeps and shows the "CONNECTING" on the LCD for one second.

Then, the equipment shows the "DOWNLOADING" on the LCD and starts receiving data downloaded from the host computer.

During downloading, the equipment beeps *intermittently*.

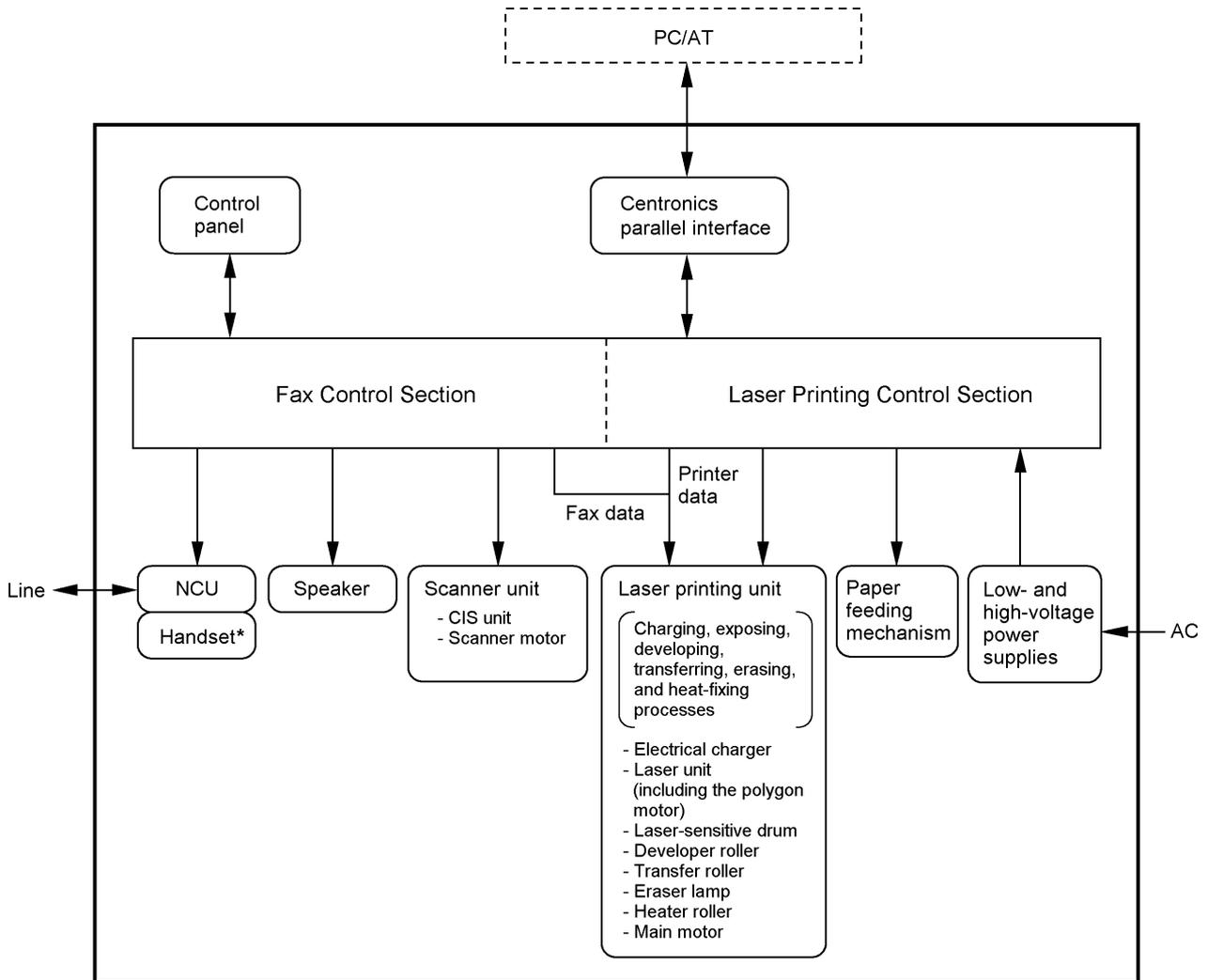
Upon completion of the downloading, the equipment beeps *continuously*.

CHAPTER III.
THEORY OF OPERATION

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1. OVERVIEW

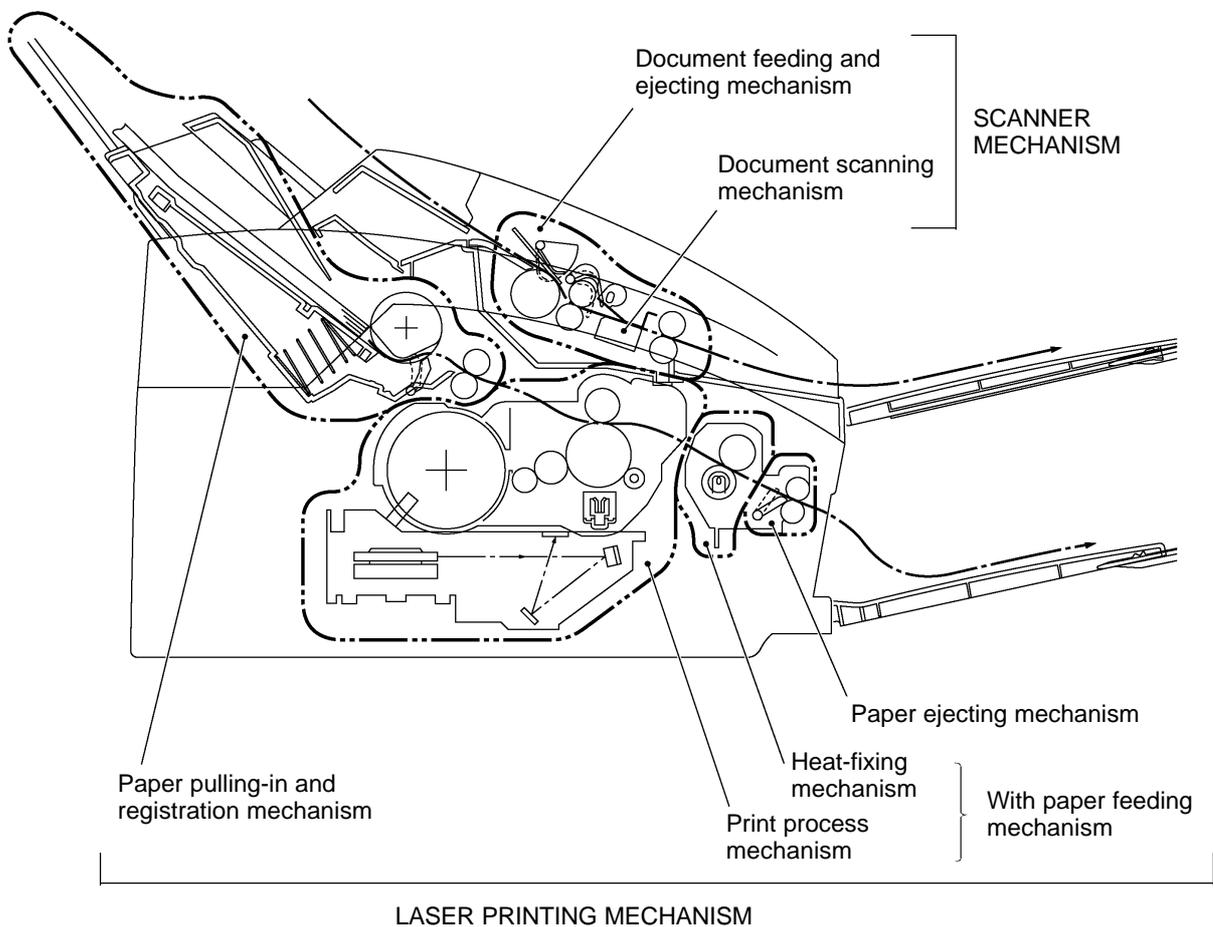


*Not provided on the FAX-8650P.

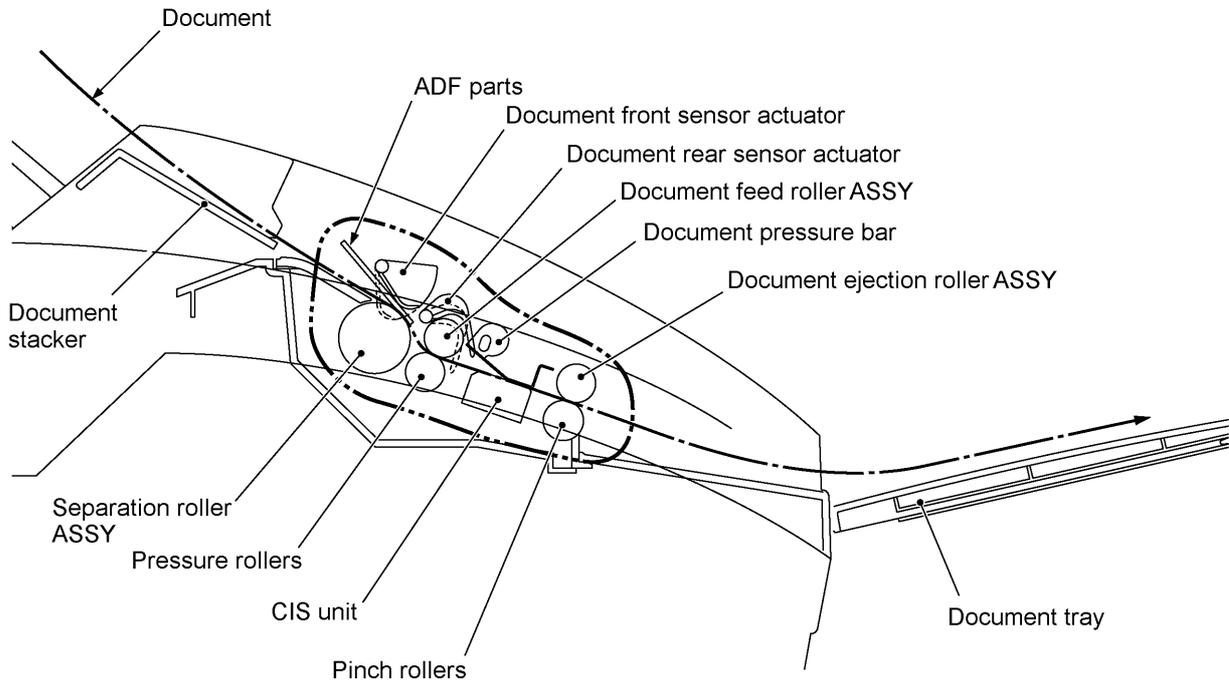
2. MECHANISMS

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



2.1 Scanner Mechanism



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.)

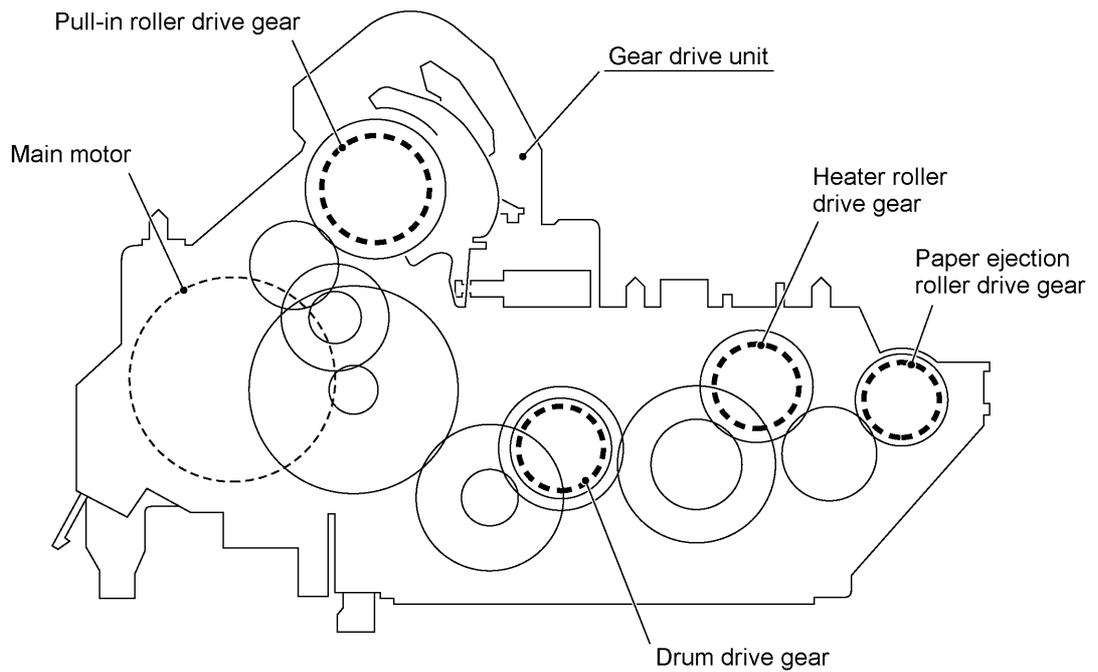
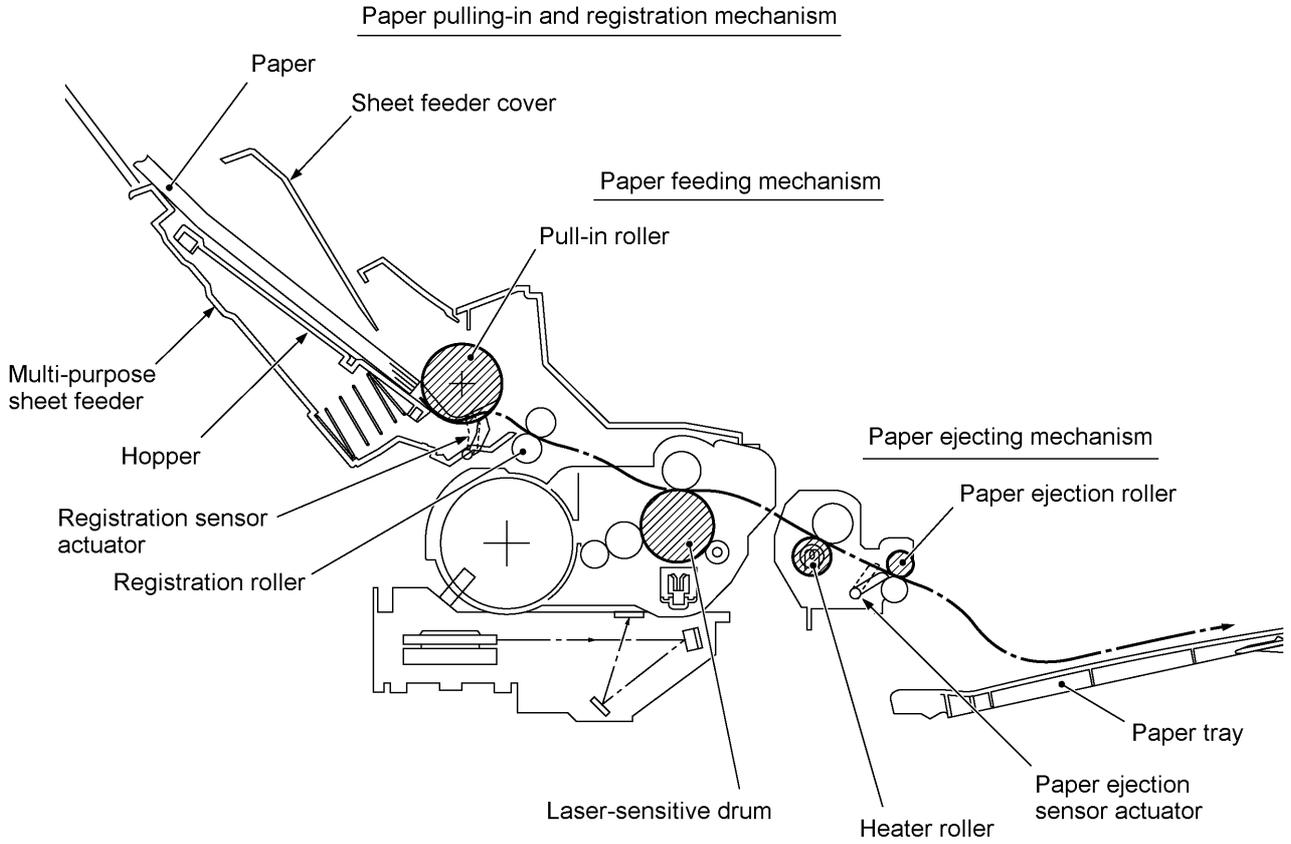
If the operator sets documents on the document stacker and starts the scanning operation, the scanner motor rotates so that the ADF (which consists of the separation roller and ADF parts) feeds those documents into the equipment, starting from the bottom sheet to the top, page by page. Each document 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

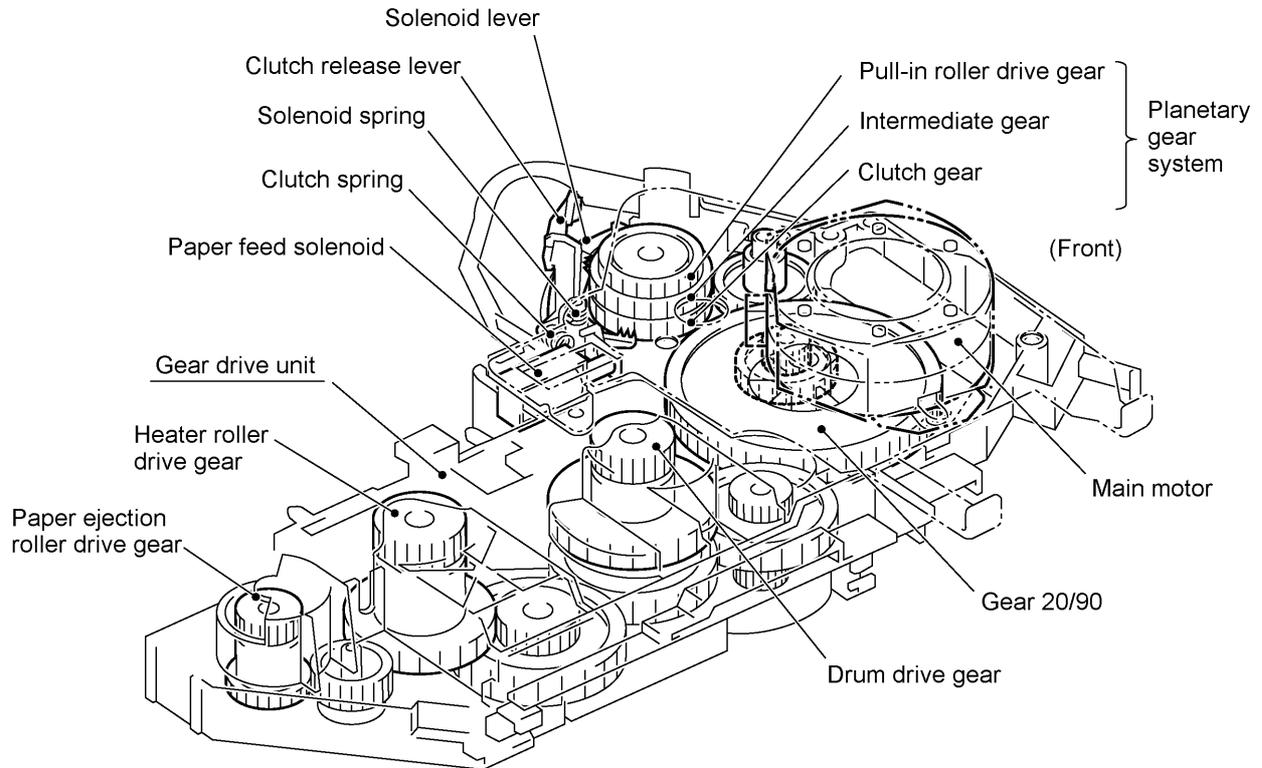
The scanner uses a contact image sensor (CIS) unit which consists of an LED array illuminating documents, a self-focus lens array collecting the reflected light, a CIS PCB carrying out photoelectric conversion to output picture element data, and a cover glass on which a document advances. When the document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



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.

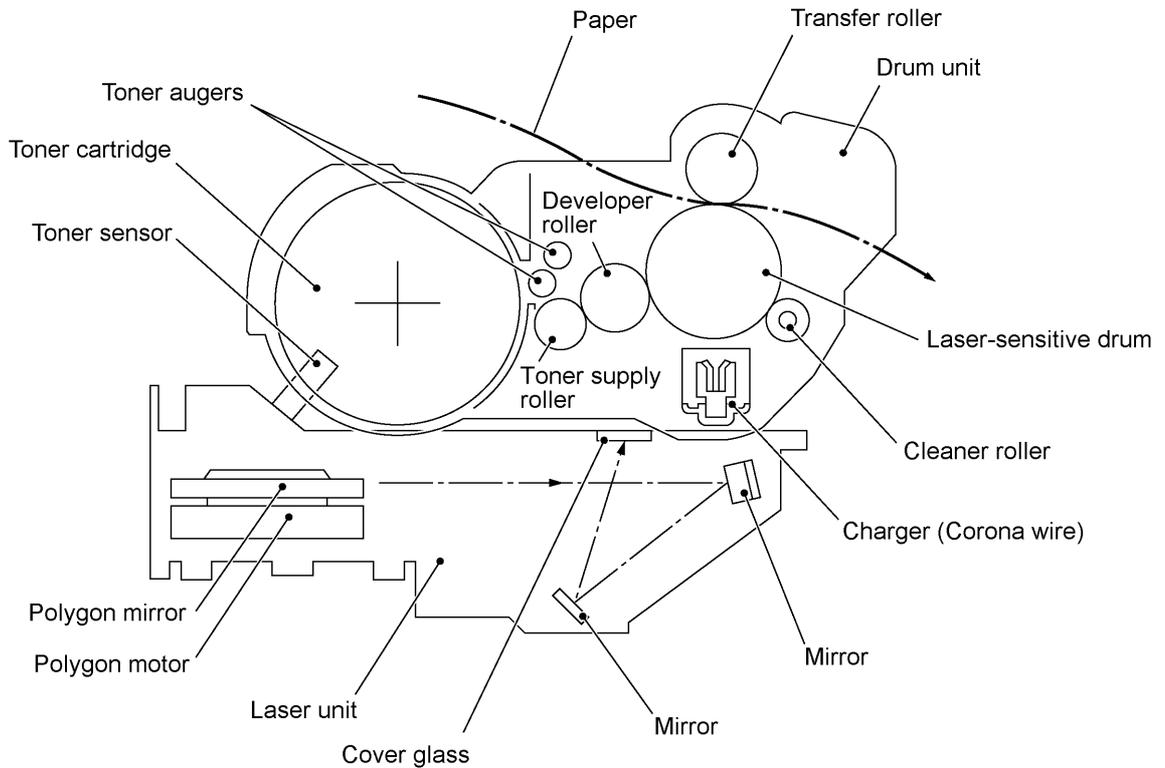
Paper feeding and ejecting mechanism

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.

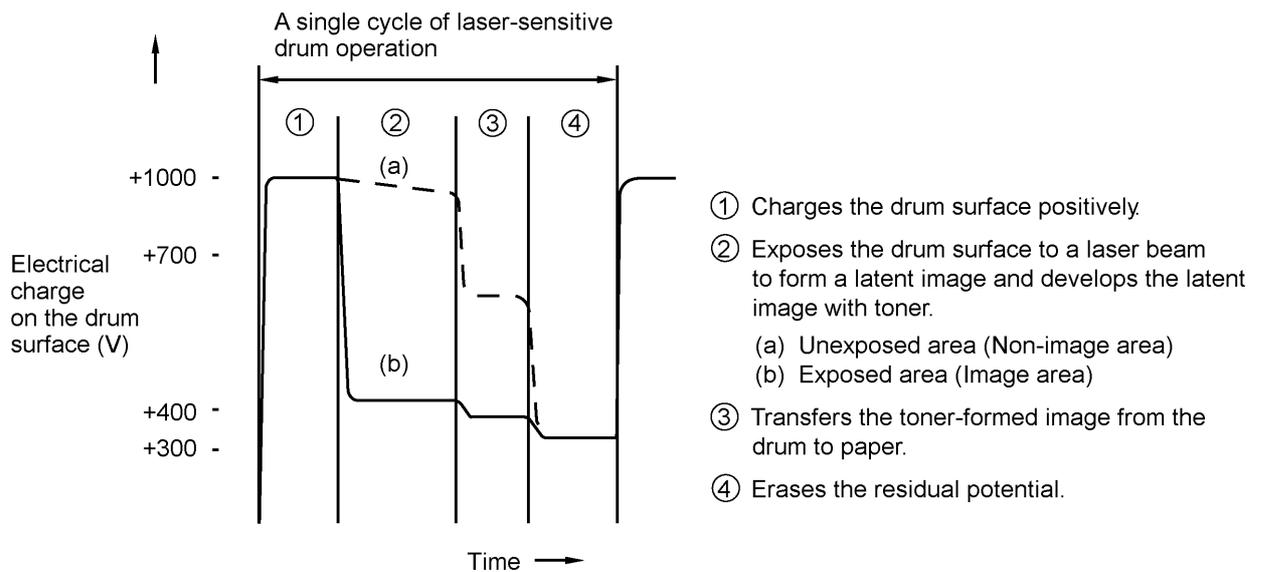
After the paper passes through the heat-fixing process, it will be ejected onto the paper tray.

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

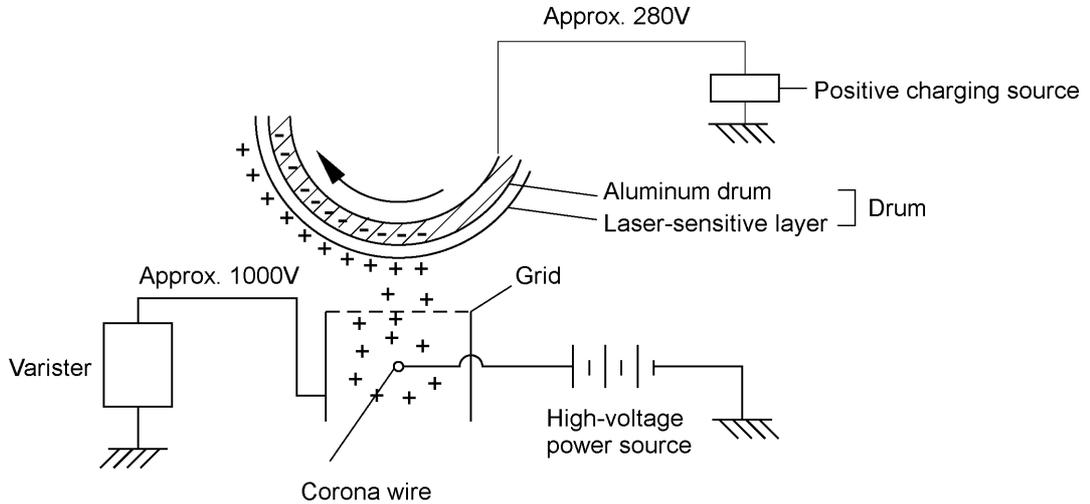


The print process unit works with laser beam, electrical charges, and toner. The graph below shows the transition of electrical charge on the surface of the laser-sensitive drum through the five processes: charging, exposing, developing, transferring, and erasing processes.



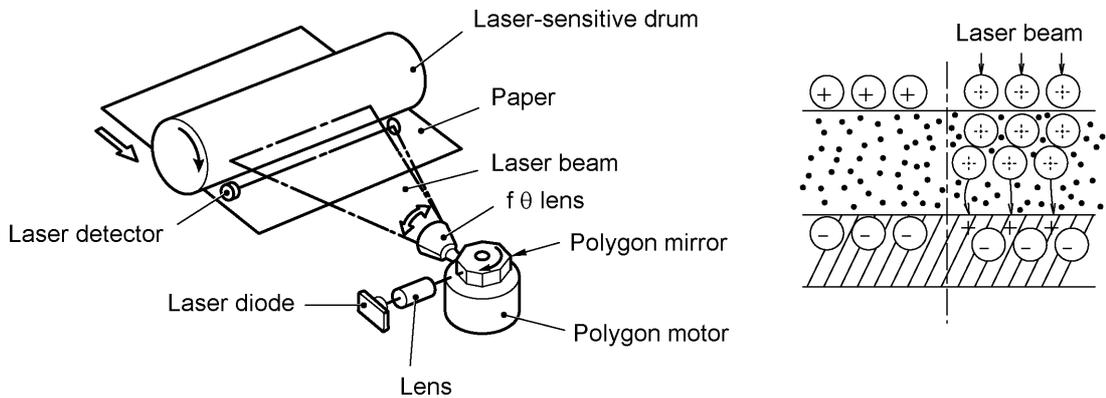
(1) Charging process

The high-voltage power supply applies DC bias to the corona wire to generate ion on the grid. The ion uniformly charges the surface of the laser-sensitive drum to approx. 1000V which is kept by the varister grounding the grid to the frame.



(2) Exposing process

When the laser-sensitive drum holds a positive electrical charge, the laser beam issued from the laser unit scans the drum according to the print image to expose the drum surface for neutralizing the spots where black should be, forming an electrostatic latent image.



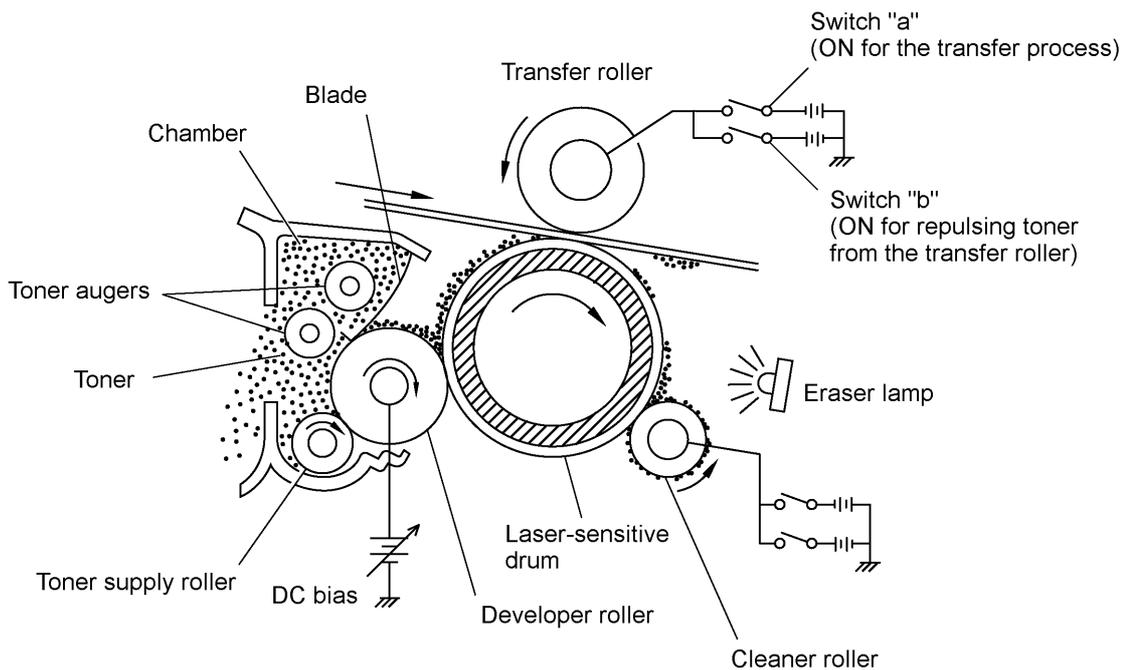
(3) Developing process

The developing process develops an electrostatic latent image formed on the drum in the exposing process, into a toner image.

The developer roller attracts the toner particles fed from the toner cartridge by the toner supply roller, and then conveys them to the contact section with the laser-sensitive drum

On the contact section between the developer roller and drum, the positive toner particles stick to the neutralized spots on the drum according to the principles of attraction and repulsion, transforming a latent image into a toner image.

The toner augers (which agitate toner particles in the chamber) and the blade allow toner particles to be fed onto the developer roller at an even thickness.



(4) Transferring process

When a paper passes between the drum and the transfer roller, the switch "a" (see the above illustration) is turned on to negatively charge the transfer roller. The toner is positive, so the toner image formed on the drum will be transferred onto the paper according to the same principle as for the developing process.

If the toner image fails to stick to the paper due to paper jam or other errors, it will stick to the transfer roller. To repulse this toner, the switch "b" (see the above illustration) is turned on to positively charge the transfer roller. The toner returns from the transfer roller to the drum.

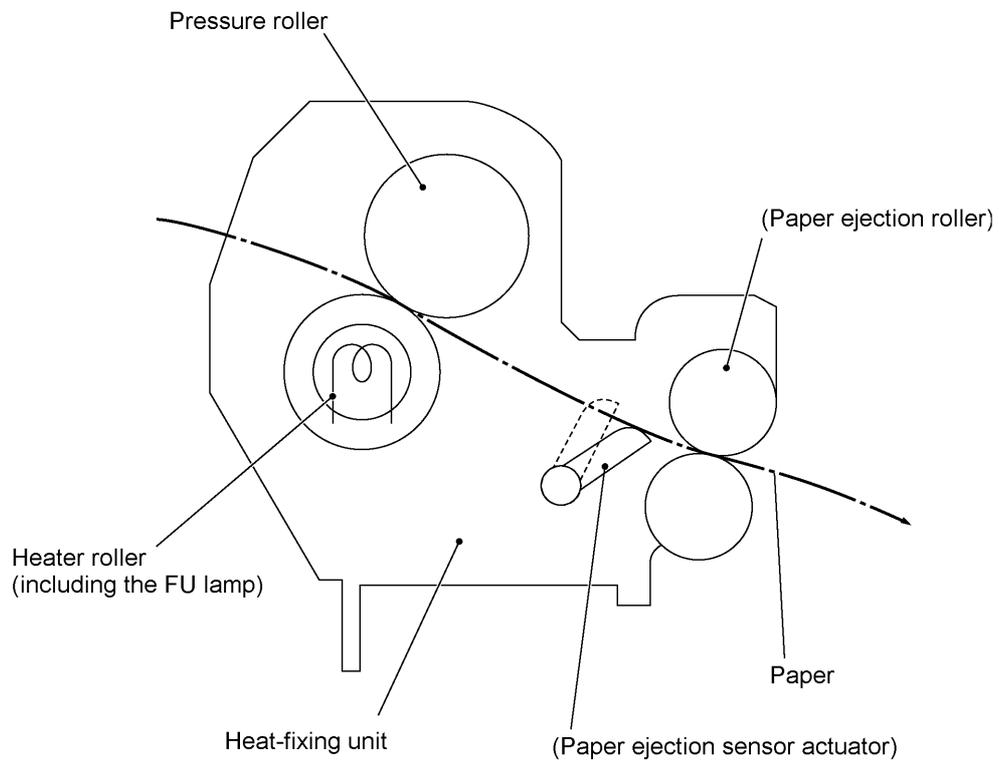
Cleaning the drum

In the transferring process, not all the toner particles on the drum are transferred onto the paper but some toner particles remain on the drum. The cleaner roller cleans the drum surface and collects the residual toner. When printing starts or during non-printing, the toner collected on the cleaner roller will be discharged onto the drum and returned to the chamber through the developer roller for recycling in the subsequent developing process.

(5) Erasing process

The eraser lamp emits light to expose the drum surface, which erases the residual electrical charge.

2.2.3 Heat-fixing mechanism



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

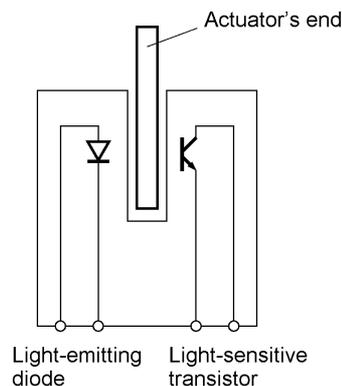
This equipment has ten sensors: seven photosensors, two thermisters and a mechanical switch as described below.

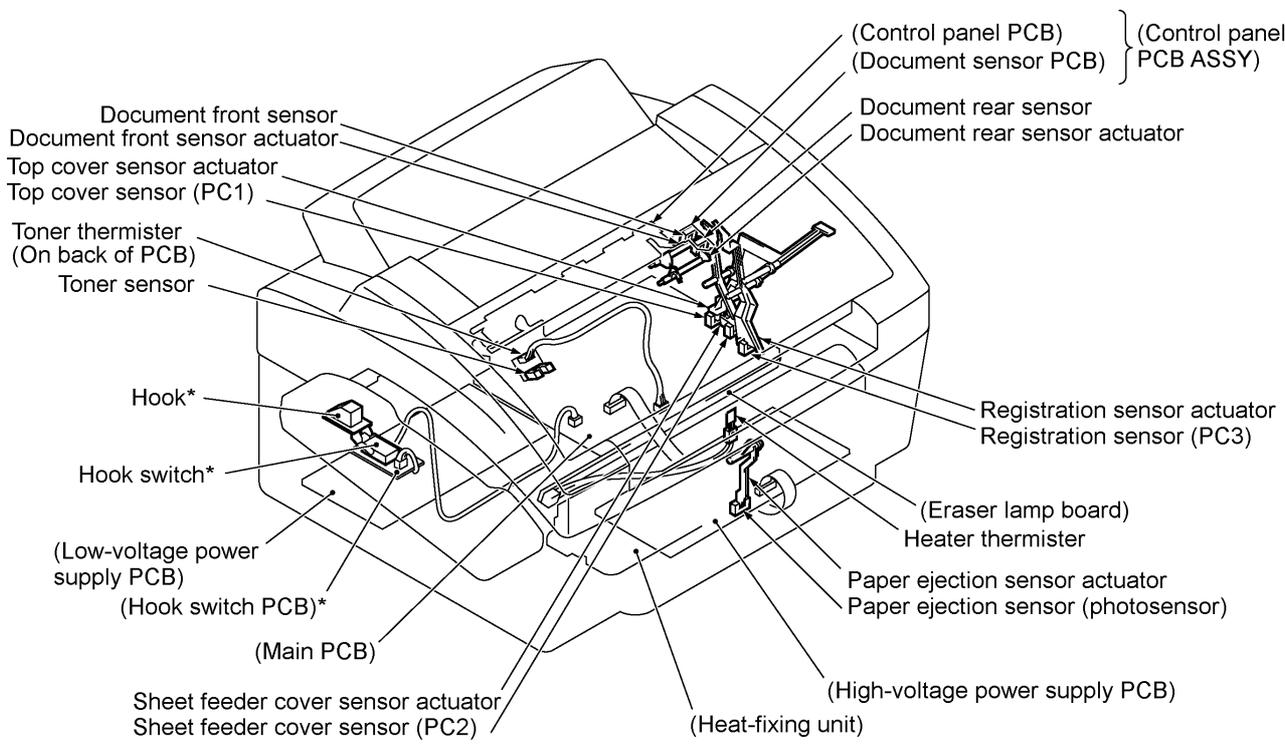
Sensor name	Type	Located on
Document front sensor	Photosensor	Control panel PCB ASSY (Document sensor PCB)
Document rear sensor	Photosensor	Control panel PCB ASSY (Document sensor PCB)
Top cover sensor	Photosensor	Main PCB
Sheet feeder cover sensor	Photosensor	Main PCB
Registration sensor	Photosensor	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 FAX-8650P.

- 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.
- Sheet feeder cover sensor which detects whether the sheet feeder 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.





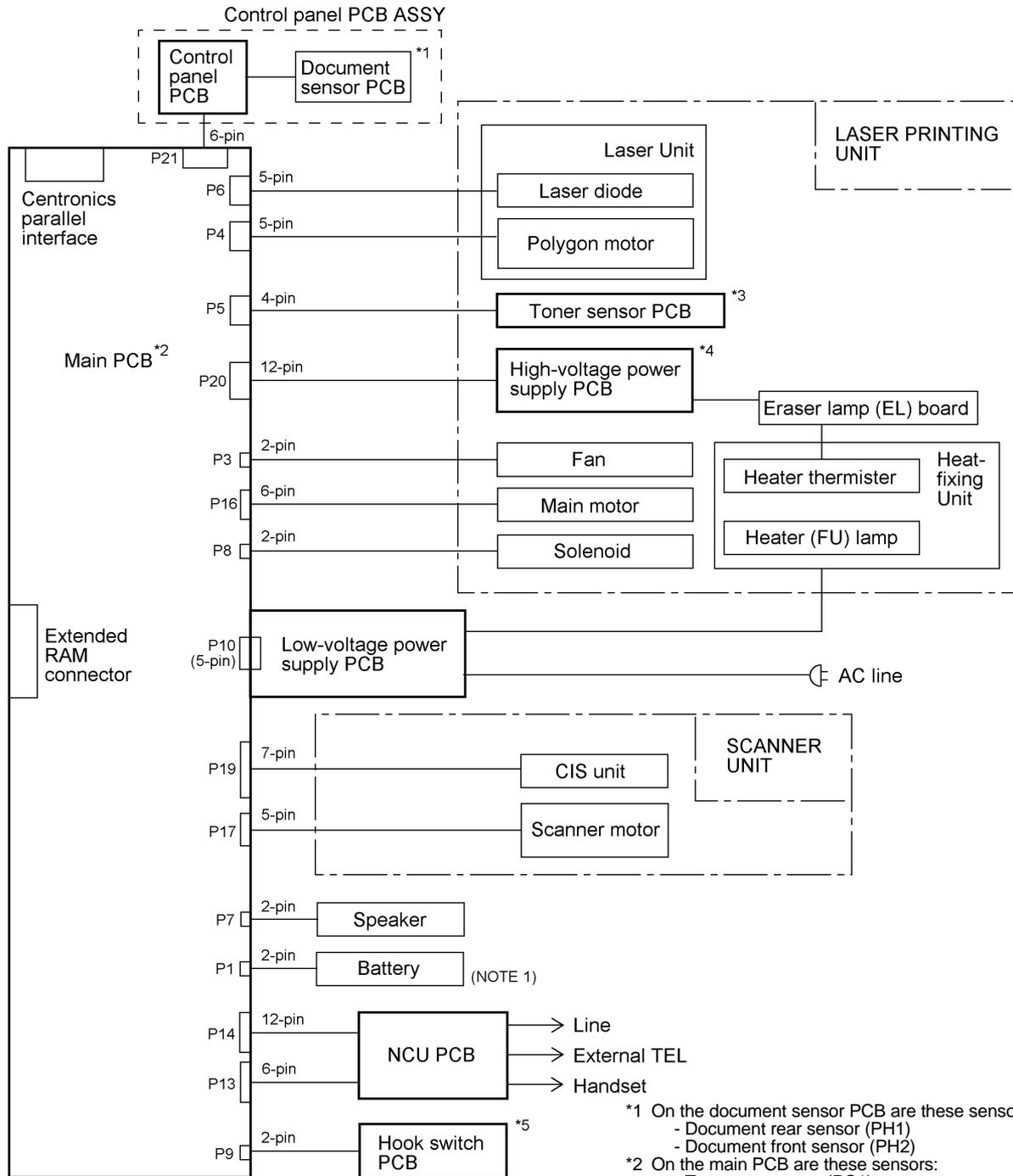
*Not provided on the FAX-8650P.

Location of Sensors and Actuators

3. CONTROL ELECTRONICS

3.1 Configuration

The hardware configuration of the facsimile equipment is shown below.



(NOTE 1) Provided on the FAX-8650P.

*1 On the document sensor PCB are these sensors:
 - Document rear sensor (PH1)
 - Document front sensor (PH2)

*2 On the main PCB are these sensors:
 - Top cover sensor (PC1)
 - Sheet feeder cover sensor (PC2)
 - Registration sensor (PC3)

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

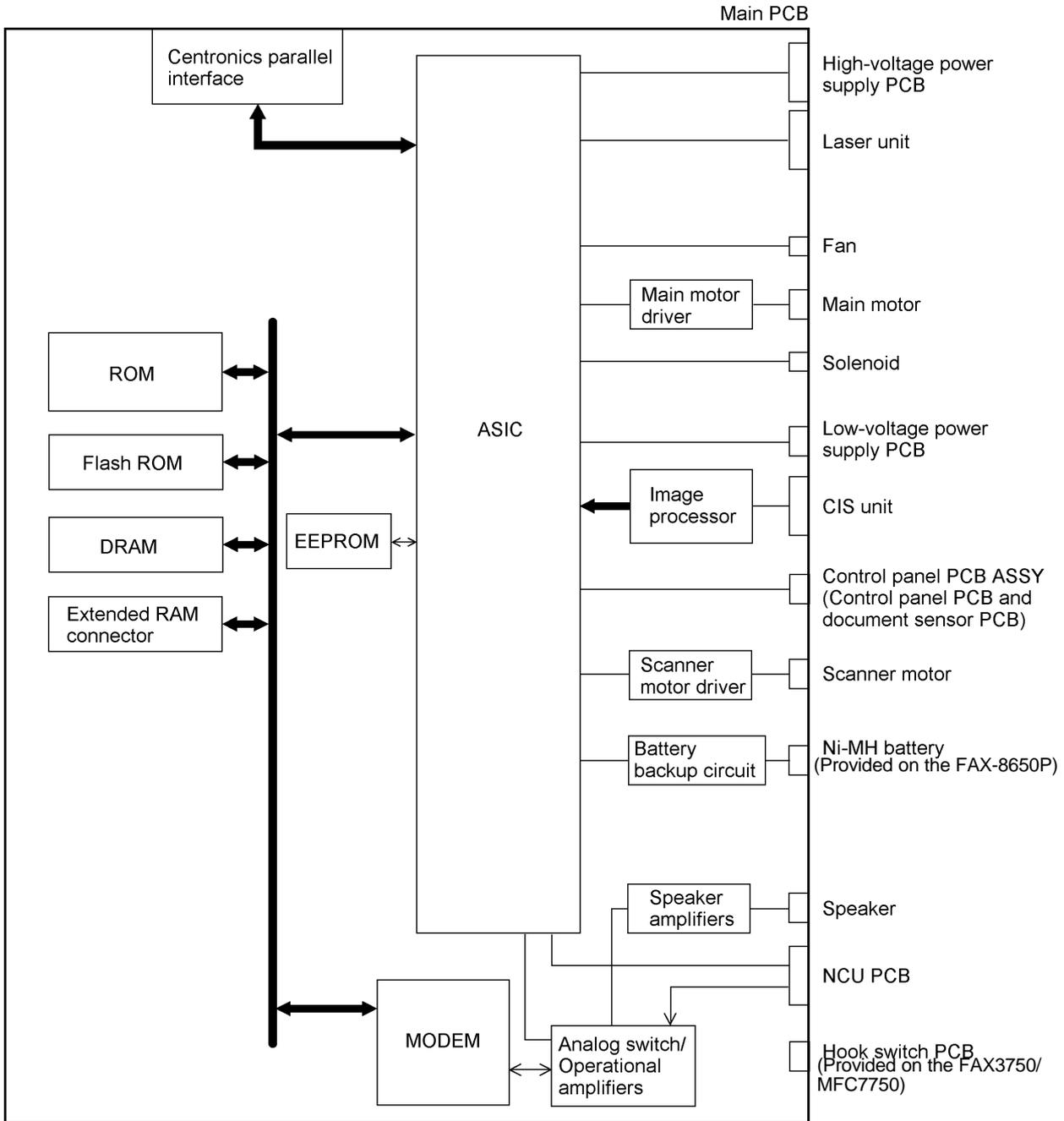
*4 On the high-voltage power supply PCB is the paper ejection sensor.

*5 On the hook switch PCB is the hook switch. (Not provided on the FAX-8650P.)

Configuration of Facsimile Equipment

3.2 Main PCB

The main PCB, which is the nucleus controlling the entire operation of the equipment, consists of a FAX engine (ASIC), memories, MODEM, motor drive circuitry, sensor detection circuitry, and analog circuits for scanning, printing, and power transmission shifting.



EEPROM: Electrically Erasable Programmable Read-only Memory
 DRAM: Dynamic Random Access Memory

Block Diagram of Main PCB