

Product: 1997 Brother FAX1170/1270/1570MC,FAX1010/1020/1030,MFC1770/1870MC/1970MC FACSIMILE EQUIPMENT
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FACSIMILE EQUIPMENT SERVICE MANUAL

**MODEL: FAX1170/1270/1570MC
FAX1010/1020/1030
MFC1770/1870MC/1970MC**

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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 adjustment—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
APPENDICES	Circuit Diagrams

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

CHAPTER I.

GENERAL DESCRIPTION

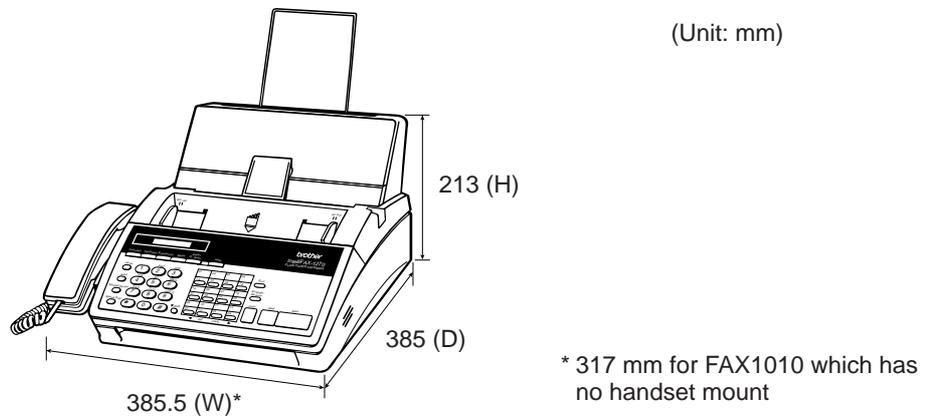
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1. EQUIPMENT OUTLINE

1.1 External Appearance and Weight

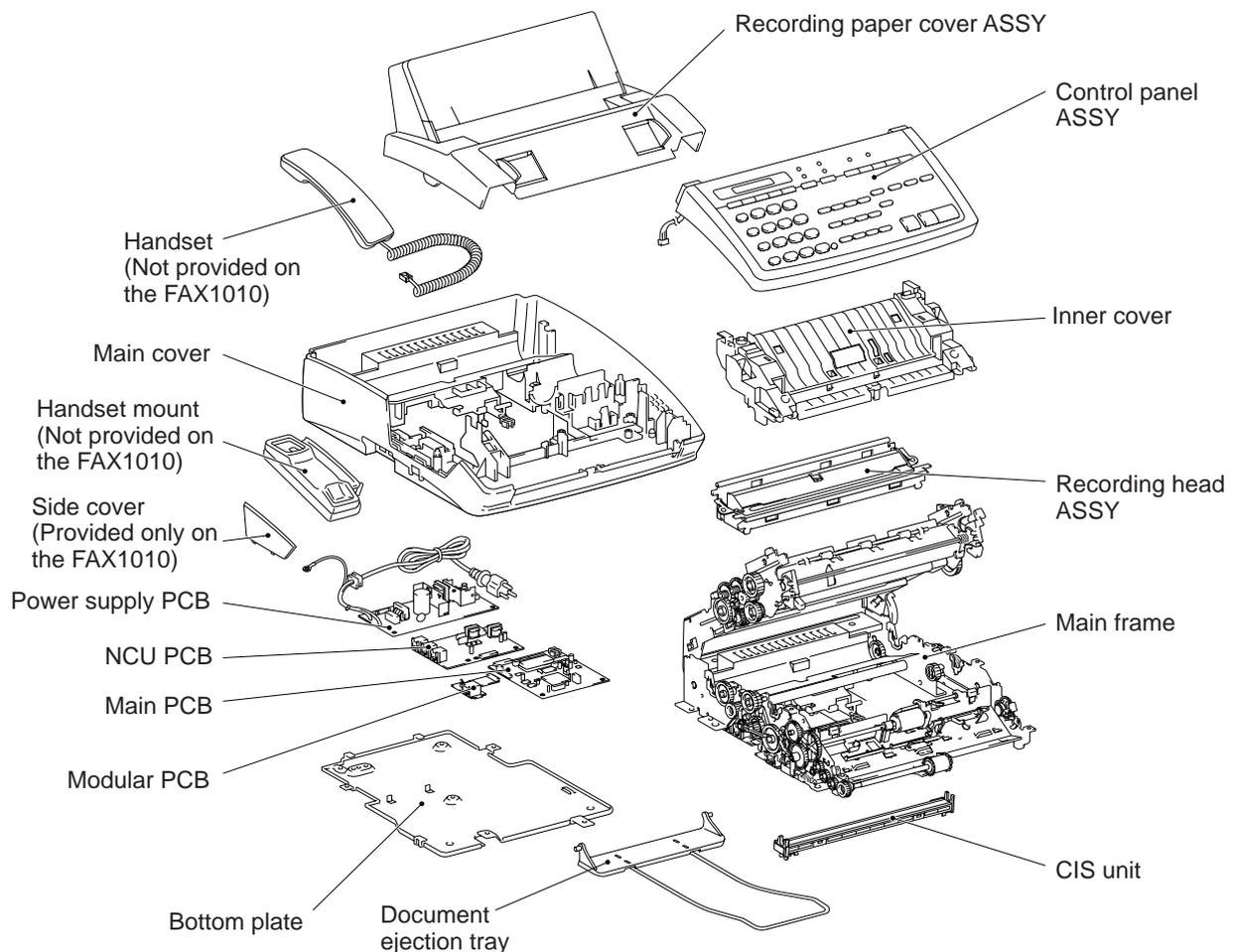
The figure below shows the equipment appearance and approximate dimensions.



Weight: Machine proper	FAX1010:	Approx. 5.0 kg (excluding a ribbon cartridge)
	Other models:	Approx. 5.2 kg (excluding a ribbon cartridge)
In package	FAX1010:	Approx. 8.7 kg
	Other models:	Approx. 8.9 kg

1.2 Components

The equipment consists of the following major components:



2. SPECIFICATIONS

Model	FAX1170	FAX1270	FAX1570MC
Color	Gray (1395)	White (1397)	White (1397)
Modem Speed	9600 bps	9600 bps	14400 bps
CCITT Group	G3	G3	G3
Coding Method	MH	MH	MH
Transmission Speed	15 sec.	15 sec.	9 sec.
Input/Output Width	8.5"/8.5"	8.5"/8.5"	8.5"/8.5"
ADF Capacity (pages)	20	20	20
Recording Paper Loadable	200 sheets	200 sheets	200 sheets
Paper Size	Letter/Legal/A4	Letter/Legal/A4	Letter/Legal/A4
Ribbon Life (Letter-size print)	450 pages	450 pages	450 pages
Handset	Yes	Yes	Yes
LCD Size	16 x 1	16 x 1	16 x 1
On-screen Programming	Yes	Yes	Yes
Gray Scale	64 by Dithered	64 by Dithered	64 by E/D
Smoothing	Yes	Yes	Yes
One-touch Dial	12 x 2	12 x 2	12 x 2
Speed Dial	26	36	100
Telephone Index	Yes	Yes	Yes
Multi-resolution Transmission	Yes	Yes	Yes
FAX/TEL Switch	Yes	Yes	Yes
Distinctive Ringing	Yes	Yes	Yes
Next Fax-reservation	Yes	Yes	Yes
Help	Yes	Yes	Yes
TAD Interface	Yes	Yes	Yes
Coverpage	Yes, Super	Yes, Super	Yes, Super
Polling Type	Sim/Del/Seq	Sim/Del/Seq	Sim/Del/Seq
Receive Password (password plus)	Yes	Yes	Yes
Delayed Transmission	3, timers	3, timers	3, timers
Call Reservation	Yes	Yes	Yes
Call-back Message	Yes	Yes	Yes
Speaker Phone	Monitor	Monitor	Yes, Full-duplex
Activity Report	Yes	Yes	Yes
Transmission Verification Report	Yes	Yes	Yes
Page Memory	512 KB (20 pages)	512 KB (20 pages)	1 MB (50 pages)
Out-of-paper Reception	Yes	Yes	Yes
Quick Scan	Yes	Yes	Yes
Super Quick Scan	No	No	No
Broadcasting	Yes	Yes	Yes
ECM	Yes	Yes	Yes
Multi-transmission	Yes	Yes	Yes
Multi-copying w/Sorting	Yes	Yes	Yes
Enlargement/Reduction Ratio	Yes (50-150%)	Yes (50-150%)	Yes (50-150%)
TAD Type	No	No	DSP
OGM	No	No	Yes
ICM Recording Time	No	No	Yes, 30 min.
FAX Forwarding/Paging	No	Yes	Yes
FAX Retrieval	No	Yes	Yes
PCI (Missing link)	Ready	Ready	Ready
Message Center	No	No	Yes
Caller ID	Yes	Yes	Yes
Fax-/Voice-on-demand	No	No	Voice-on-demand
Mail Box	No	No	Yes
Remote Control	Yes	Yes	Yes
Toll Saver	No	No	Yes
Memo/2-Way Recording	No	No	Yes
Auto Reduction	Yes	Yes	Yes
Confidential Mailbox	No	No	No
Optional Memory	No	No	No

Model	FAX1010	FAX1020	FAX1030
Color	White (1138)	White (1138)	White (1138)
Modem Speed	9600 bps	9600 bps	14400 bps
CCITT Group	G3	G3	G3
Coding Method	MH	MH	MH
Transmission Speed	15 sec.	15 sec.	10 sec.
Input/Output Width	A4/A4	A4/A4	A4/A4
ADF Capacity (pages)	20	20	20
Recording Paper Loadable	200 sheets	200 sheets	200 sheets
Paper Size	Letter/Legal/A4	Letter/Legal/A4	Letter/Legal/A4
Ribbon Life (A4-size print)	420 pages	420 pages	420 pages
Handset	No	Yes	Yes
LCD Size	16 x 1	16 x 1	16 x 1
On-screen Programming	Yes	Yes	Yes
Gray Scale	64 by Dithered	64 by Dithered	64 by E/D
Smoothing	Yes	Yes	Yes
One-touch Dial	12 x 2	12 x 2	12 x 2
Speed Dial	36	36	100
Telephone Index	Yes (Not Super)	Yes (Not Super)	Yes (Not Super)
Multi-resolution Transmission	Yes	Yes	Yes
FAX/TEL Switch	Yes	Yes	Yes
Distinctive Ringing	Yes	Yes	Yes
Next Fax-reservation	Yes	Yes	Yes
Help	Yes, Simple	Yes, Simple	Yes, Simple
TAD Interface	Yes	Yes	Yes
Coverpage	Yes, Super	Yes, Super	Yes, Super
Polling Type	Std/Sec/Del/Seq	Std/Sec/Del/Seq	Std/Sec/Del/Seq
Receive Password (password plus)	Yes	Yes	Yes
Delayed Transmission	3, timers	3, timers	3, timers
Call Reservation	Yes	Yes	Yes
Call-back Message	Yes	Yes	Yes
Speaker Phone	Monitor	Monitor	Yes, Full-duplex
Activity Report	Yes	Yes	Yes
Transmission Verification Report	Yes	Yes	Yes
Page Memory	512 KB (20 pages)	512 KB (20 pages)	1 MB (50 pages)
Out-of-paper Reception	Yes (20 pages)	Yes (20 pages)	Yes (50 pages)
Quick Scan	Yes (18 pages)	Yes (18 pages)	Yes (18 pages)
Super Quick Scan	No	No	No
Broadcasting	Yes, 60 locations	Yes, 60 locations	Yes, 124 locations
ECM	Yes	Yes	Yes
Multi-transmission	Yes	Yes	Yes
Multi-copying w/Sorting	Yes	Yes	Yes
Enlargement/Reduction Ratio	Yes (50-150%)	Yes (50-150%)	Yes (50-150%)
TAD Type	No	No	DSP
OGM	No	No	Yes
ICM Recording Time	No	No	Yes, 30 min.
FAX Forwarding/Paging	Yes/No	Yes/No	Yes
FAX Retrieval	Yes	Yes	Yes
PCI (Missing link)	Ready	Ready	Ready
Message Center	No	No	Yes
Caller ID	UK, Sw., Holland (Ready for France)	UK, Sw., Holland (Ready for France)	UK, Sw., Holland (Ready for France)
Fax-/Voice-on-demand	No	No	Voice-on-demand
Mail Box	No	No	Yes, 5
Remote Control	Yes	Yes	Yes
Toll Saver	No	No	Yes
Memo/2-Way Recording	No	No	Yes
Auto Reduction	Yes	Yes	Yes
Confidential Mailbox	No	No	No
Optional Memory	No	No	No

Model	MFC1770	MFC1870MC	MFC1970MC
Color	White (1138)	White (1138)	White (1138)
Modem Speed	9600 bps	14400 bps	14400 bps
CCITT Group	G3	G3	G3
Coding Method	MH	MH	MH
Transmission Speed	15 sec.	9 sec.	9 sec.
Input/Output Width	8.5"/8.5"	8.5"/8.5"	8.5"/8.5"
ADF Capacity (pages)	20	20	20
Recording Paper Loadable	200 sheets	200 sheets	200 sheets
Paper Size	Letter/Legal/A4	Letter/Legal/A4	Letter/Legal/A4
Ribbon Life (Letter-size print)	450 pages	450 pages	450 pages
Handset	Yes	Yes	Yes
LCD Size	16 x 1	16 x 1	16 x 1
On-screen Programming	Yes	Yes	Yes
Gray Scale	64 by Dithered	64 by Dithered	64 by E/D
Smoothing	Yes	Yes	Yes
One-touch Dial	12 x 2	12 x 2	12 x 2
Speed Dial	36	36	100
Telephone Index	Yes	Yes	Yes
Multi-resolution Transmission	Yes	Yes	Yes
FAX/TEL Switch	Yes	Yes	Yes
Distinctive Ringing	Yes	Yes	Yes
Next Fax-reservation	Yes	Yes	Yes
Help	Yes	Yes	Yes
TAD Interface	Yes	Yes	Yes
Coverpage	Yes, Super	Yes, Super	Yes, Super
Polling Type	Sim/Del/Seq	Sim/Del/Seq	Sim/Del/Seq
Receive Password (password plus)	Yes	Yes	Yes
Delayed Transmission	3, timers	3, timers	3, timers
Call Reservation	Yes	Yes	Yes
Call-back Message	Yes	Yes	Yes
Speaker Phone	Monitor	Yes, Full-duplex	Yes, Full-duplex
Activity Report	Yes	Yes	Yes
Transmission Verification Report	Yes	Yes	Yes
Page Memory	512 KB (20 pages)	512 KB (20 pages)	1 MB (50 pages)
Out-of-paper Reception	Yes	Yes	Yes
Quick Scan	Yes	Yes	Yes
Super Quick Scan	No	No	No
Broadcasting	Yes	Yes	Yes
ECM	Yes	Yes	Yes
Multi-transmission	Yes	Yes	Yes
Multi-copying w/Sorting	Yes	Yes	Yes
Enlargement/Reduction Ratio	Yes (50-150%)	Yes (50-150%)	Yes (50-150%)
TAD Type	No	DSP	DSP
OGM	No	Yes	Yes
ICM Recording Time	No	Yes, 15 min.	Yes, 30 min.
FAX Forwarding/Paging	Yes	Yes	Yes
FAX Retrieval	Yes	Yes	Yes
PCI (Missing link)	Included (MFL3)	Included (MFL3)	Included (MFL3)
Message Center	No	Yes	Yes
Caller ID	Yes	Yes	Yes
Fax-/Voice-on-demand	No	Voice-on-demand	Voice-on-demand
Mail Box	No	Yes	Yes
Remote Control	Yes	Yes	Yes
Toll Saver	No	Yes	Yes
Memo/2-Way Recording	No	Yes	Yes
Auto Reduction	Yes	Yes	Yes
Confidential Mailbox	No	No	No
Optional Memory	No	No	No

CHAPTER **II**.

INSTALLATION

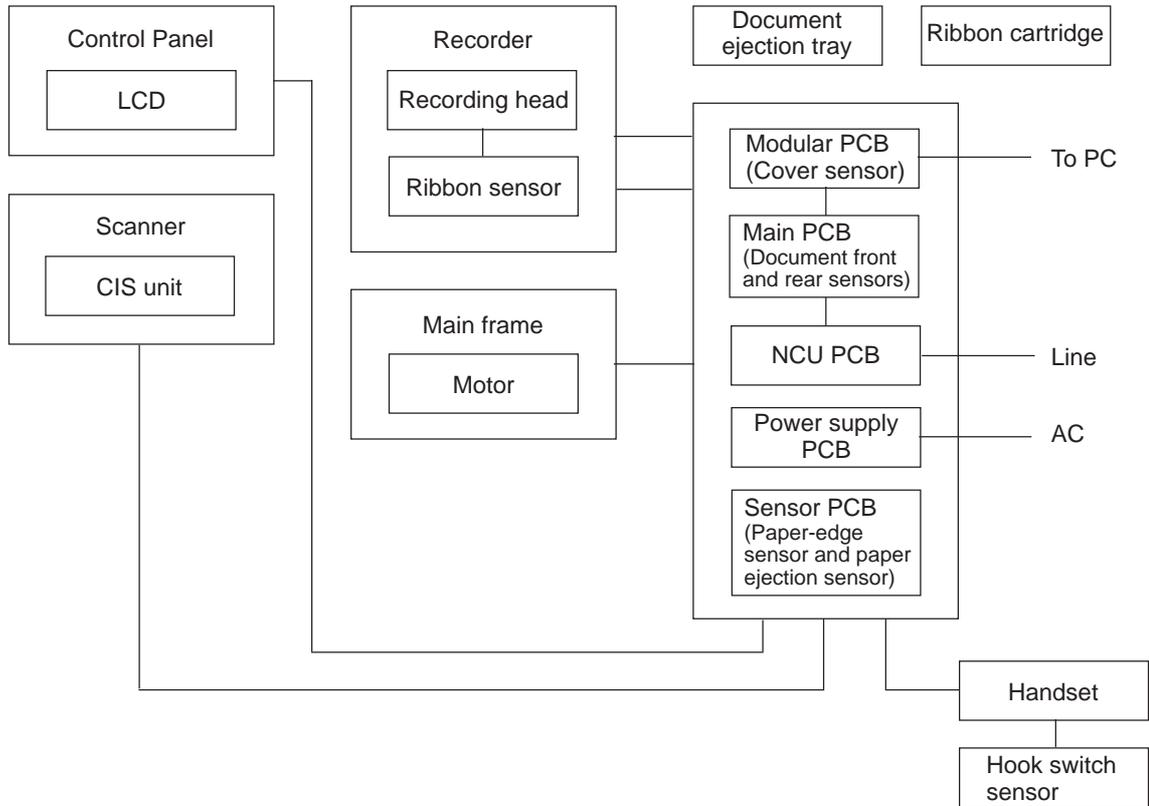
CHAPTER **III**.
THEORY OF OPERATION

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1. OVERVIEW

1.1 Functional Block Diagram



2. MECHANISMS

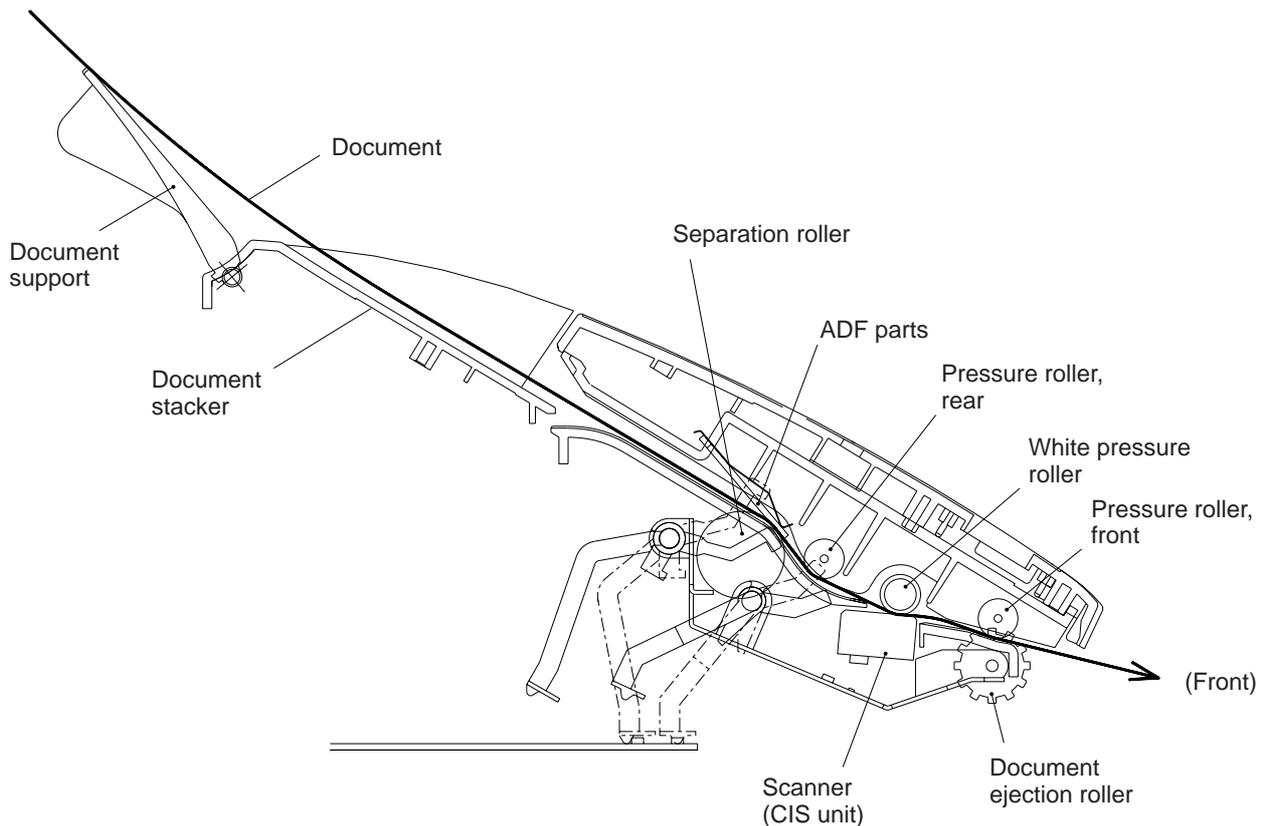
The equipment is classified into the following mechanisms:

- Transmitting Mechanism Feeding and scanning documents
- Receiving Mechanism Feeding paper and printing data
- Power Transmission Mechanism Switching the power transmission route
- Sensors and Actuators

2.1 Transmitting Mechanism (Feeding and scanning documents)

The transmitting mechanism consists of the document stacker, automatic document feeder (ADF), document feeding related rollers, scanner, and document sensors. (For details about the sensors, refer to Section 2.4.)

For the drive power source, refer to Section 2.3.



2.1.1 Automatic document feeder (ADF)

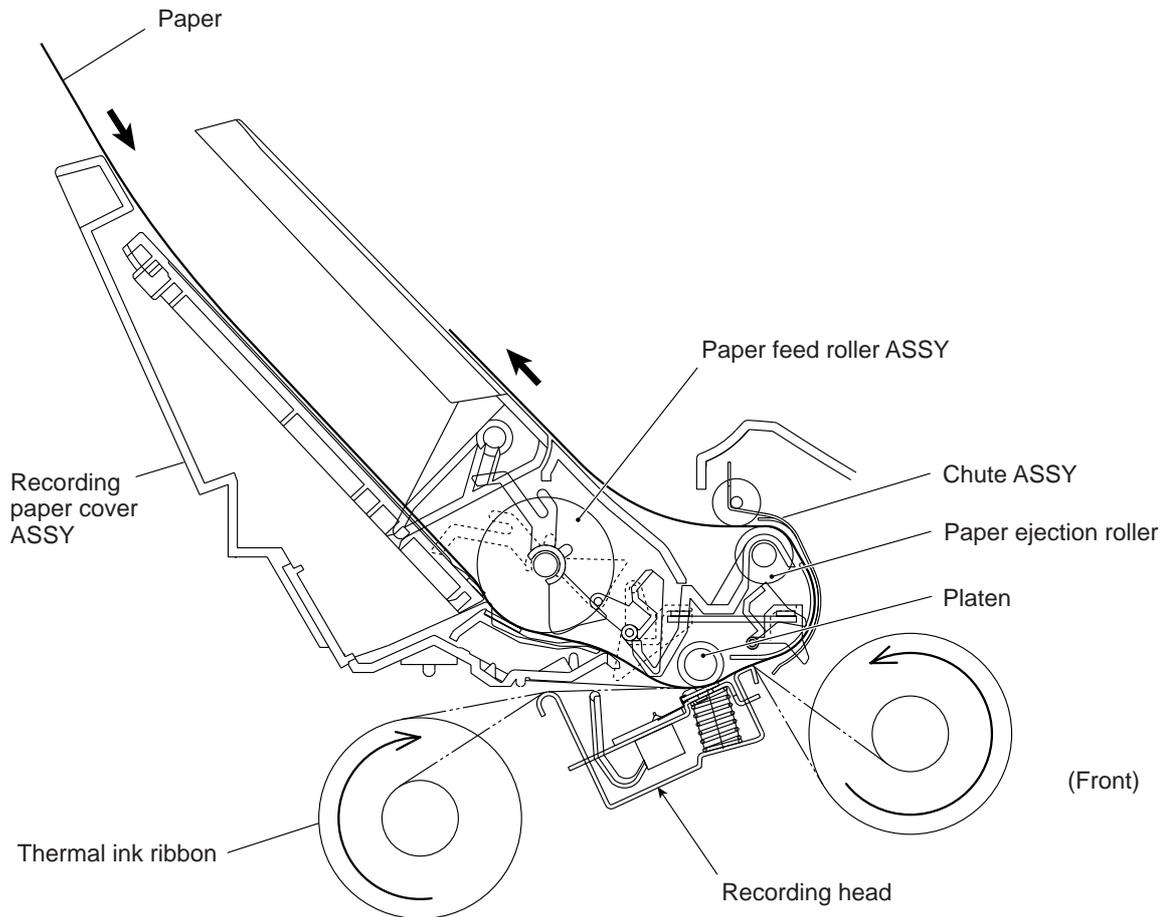
If the operator sets documents on the stacker and starts the transmitting operation, the ADF (consisting of the separation roller and ADF parts) feeds those documents into the equipment, starting from the bottom sheet to the top, page by page. Each document advances to the scanner, and then it is fed with the white pressure roller and document ejection roller.

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 white pressure roller and the cover glass, it is scanned.

2.2 Receiving Mechanism (Feeding paper and printing data)

The receiving mechanism consists of the recording paper cover ASSY, paper feed roller ASSY, platen, thermal recording head, paper ejection roller, and sensors. (For details about the sensors, refer to Section 2.4.)



STEP 1: In the paper feeding mode

If the equipment receives data, the control electronics activates the solenoid and rotates the motor counterclockwise to drive the paper feed roller (and paper ejection roller). This pulls in a sheet of paper and feeds it until its leading edge reaches the point just before the printing position.

STEP 2: In the recording (platen drive & ribbon take-up) mode

The control electronics deactivates the solenoid and rotates the motor clockwise to drive the platen gear and the ribbon take-up gear as well as the paper ejection roller. This feeds the paper up to the printing position where the thermal recording head prints, as well as feeding the thermal ink ribbon.

STEP 3: In the paper ejecting mode

The same operation as for STEP 1 takes place so as to eject the paper.

2.3 Power Transmission Mechanism

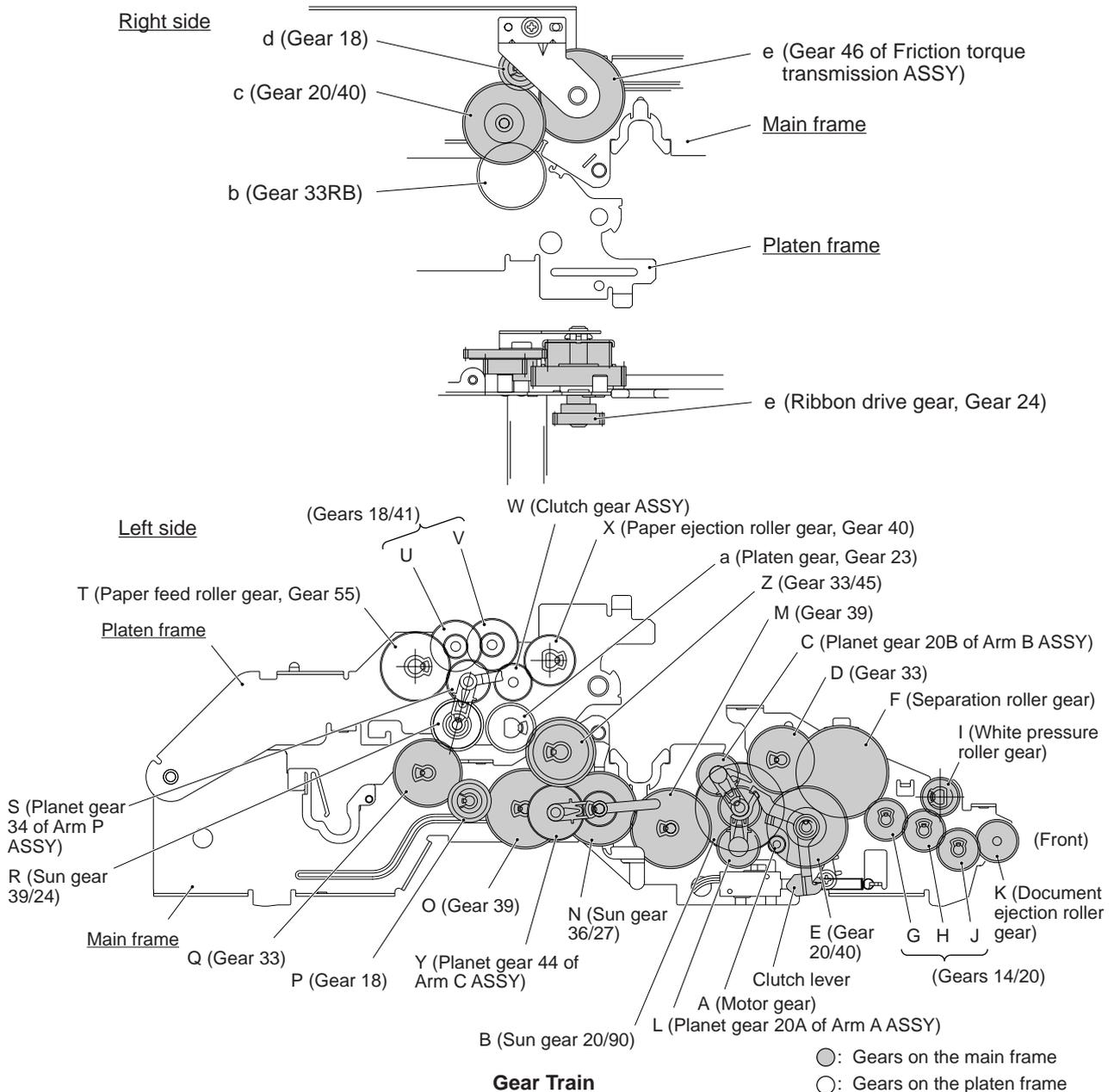
The equipment has a single drive motor whose power transmission route can be switched by the planetary gear systems and the solenoid. This switching allows the equipment to function in four operation modes (scanning, paper feeding/ejecting, recording, and copying modes). For the details about the planetary gear systems, refer to Subsection 2.3.2.

2.3.1 Structure of the gear train

At the left side of the equipment, the rotational torque of the motor on the main frame is transmitted to the gears on the main frame and then to the gears on the platen frame. These gears drive the document feeding/ejecting related rollers, paper feeding/ejecting related rollers, and the platen.

If the platen gear ("a" in the figure below) on the left end of the platen shaft rotates, the gear 33RB ("b") on the right end also rotates. This way, the rotational torque is transmitted to the gears on the right side of the equipment.

At the right side of the equipment, the rotational torque is further transmitted via the friction torque transmission ASSY to the ribbon drive gear ("e") which drives the ribbon take-up gear in the ribbon cartridge.

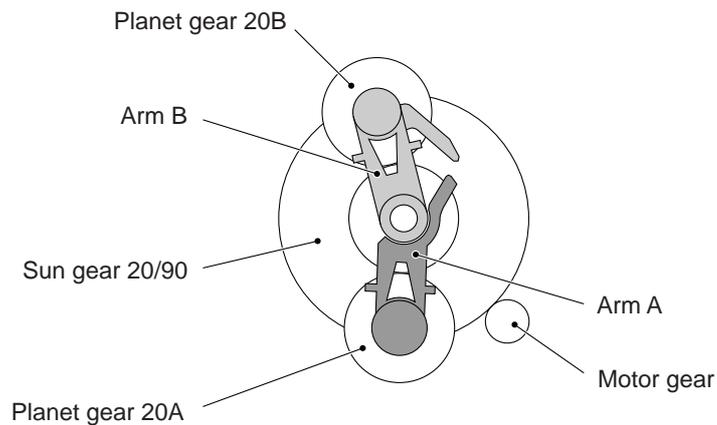


2.3.2 Description of planetary gear system

The equipment uses the following three planetary gear systems:

- Sun gear 20/90 ("B" in the figure given on the previous page) and its planet gears
- Sun gear 36/27 ("N") and its planet gear
- Sun gear 39/24 ("R") and its planet gear

This section describes the planetary gear system of the sun gear 20/90 ("B"). It consists of the sun gear 20/90, two planet gears 20, arm A, and arm B, as shown below.



Planetary Gear System

If the motor rotates, the sun gear 20/90 rotates so that the rotational torque is transmitted to the engagement between the sun gear and the planet gears 20. Since the arms and planet gears are so designed that the moment of the arms is less than that of the planet gears, the arms turn around the center shaft in the same direction as the sun gear 20/90.

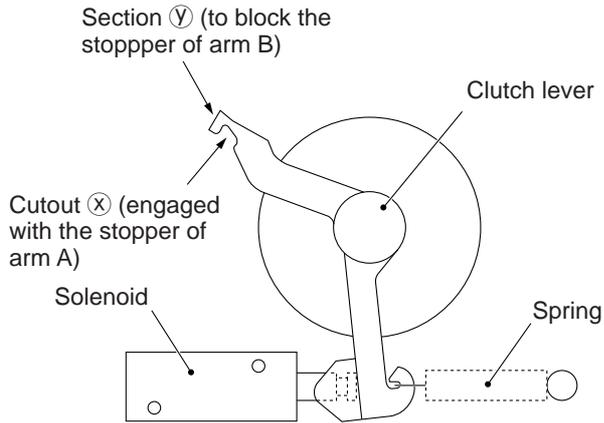
If the planet gear(s) becomes engaged with any other gear so that the arm cannot turn furthermore, the rotational torque of the sun gear 20/90 is transmitted to that planet gear. Accordingly, the planet gear starts rotation in the opposite direction of the sun gear 20/90.

2.3.3 Power transmission for four operation modes

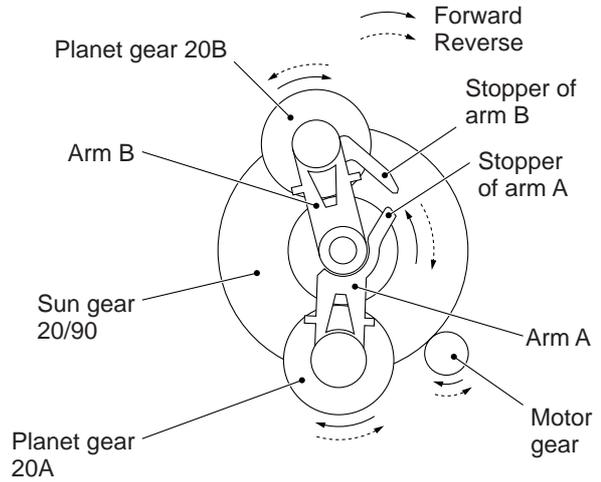
Depending upon the solenoid ON/OFF state and the motor rotation direction, the planetary gear train switches the power transmission route for the four operation modes.

Solenoid ON/OFF state

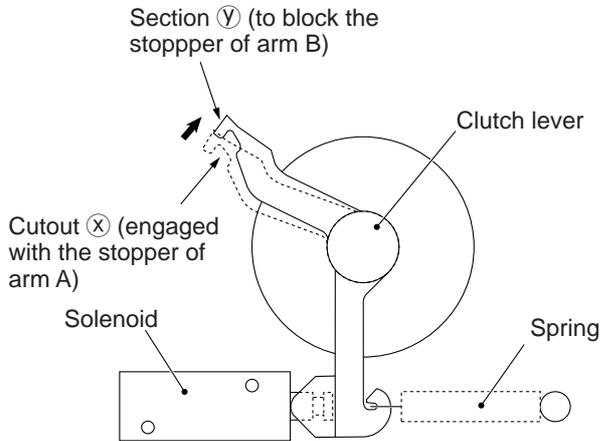
Solenoid: OFF



Motor rotation direction



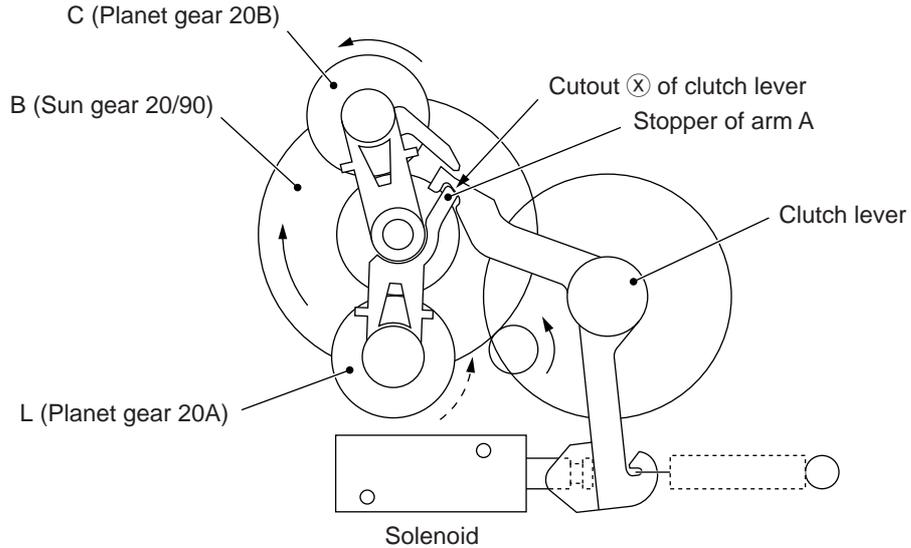
Solenoid: ON



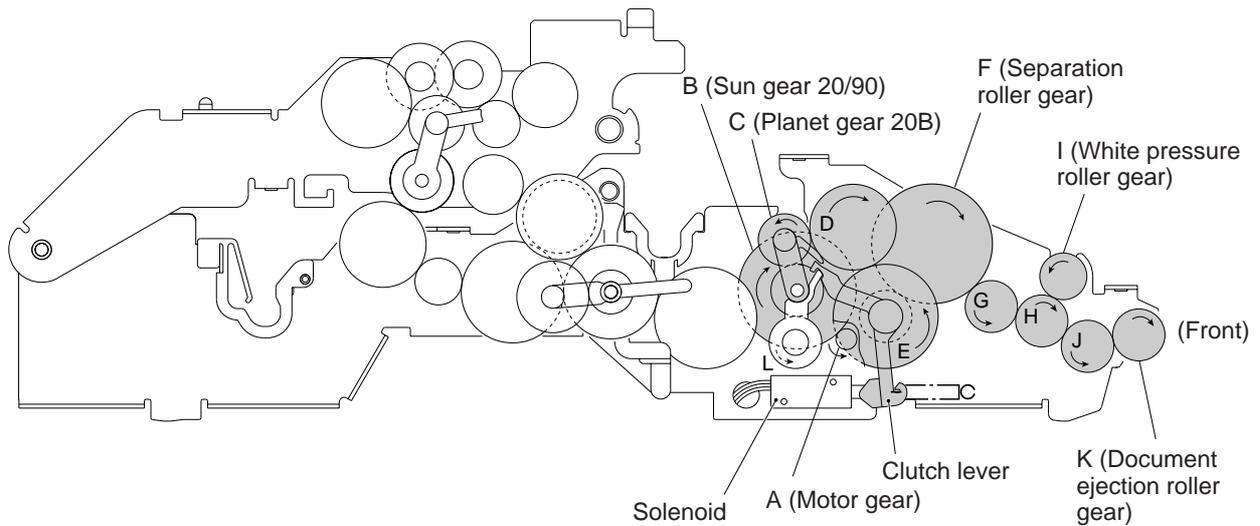
[1] Scanning mode (Solenoid: OFF, Motor rotation: Reverse)

In the scanning mode, the control electronics deactivates the solenoid. When the motor rotates in the reverse direction, the clutch lever turns counterclockwise with the spring so that its cutout (⊗) becomes engaged with the stopper of arm A. Once arm A is locked, the planet gear 20A ("L") will not be engaged with any other gear but simply idle.

The motor's rotational torque turns the sun gear 20/90 ("B") clockwise so that the planet gear 20B ("C") transmits the torque to the separation roller gear ("F"), white pressure roller gear ("I") and document ejection roller gear ("K") via the several gears.



Arm A Locked by Cutout (⊗) of Clutch Lever

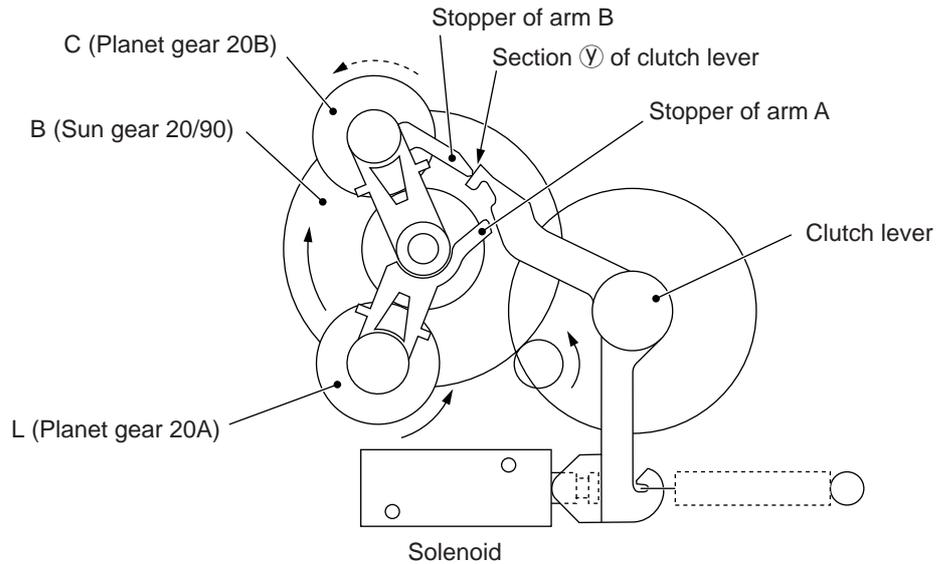


Active Gears

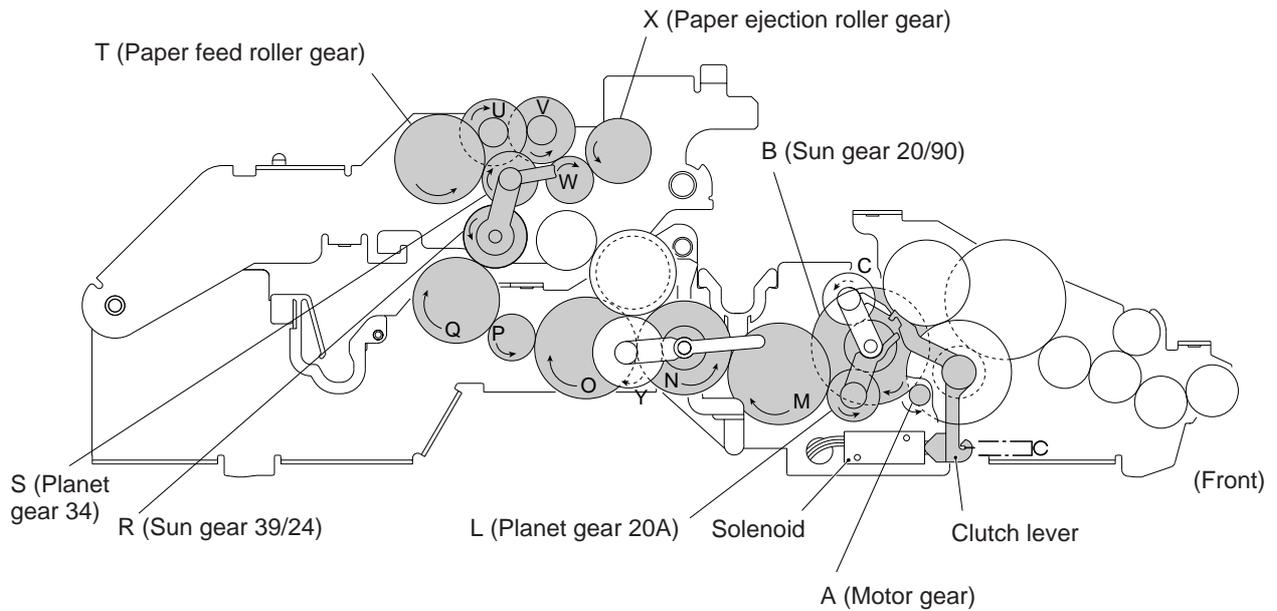
[2] Paper feeding/ejecting mode (Solenoid: ON, Motor rotation: Reverse)

In the paper feeding/ejecting mode, the control electronics activates the solenoid to release the stopper of arm A. When the motor rotates in the reverse direction, the sun gear 20/90 ("B") rotates clockwise so that the planet gear 20A ("L") transmits the torque via the gear 39 ("M") and other gears to the paper feed roller gear ("T") and paper ejection roller gear ("X").

Since the stopper of arm B is blocked by the section ⑤ of the clutch lever, the planet gear 20B ("C") is merely idle without engaging with any other gear.



Arm B Blocked by Section ⑤ of Clutch Lever



Active Gears

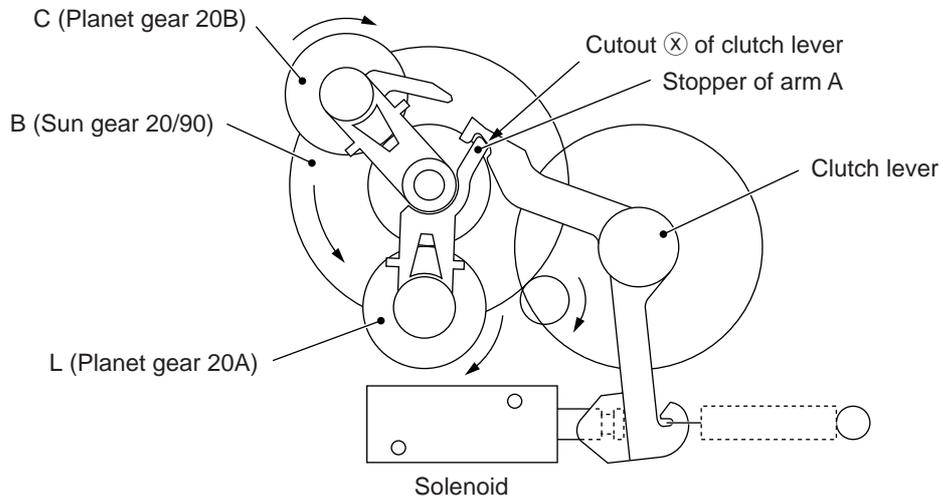
[3] Recording mode (Solenoid: OFF, Motor rotation: Forward)

In the recording mode, the control electronics deactivates the solenoid. When the motor rotates in the forward direction, the clutch lever turns counterclockwise with the spring so that its cutout (⊗) becomes engaged with the stopper of arm A. Once arm A is locked, the planet gear 20A ("L") will not be engaged with any other gear but simply idle.

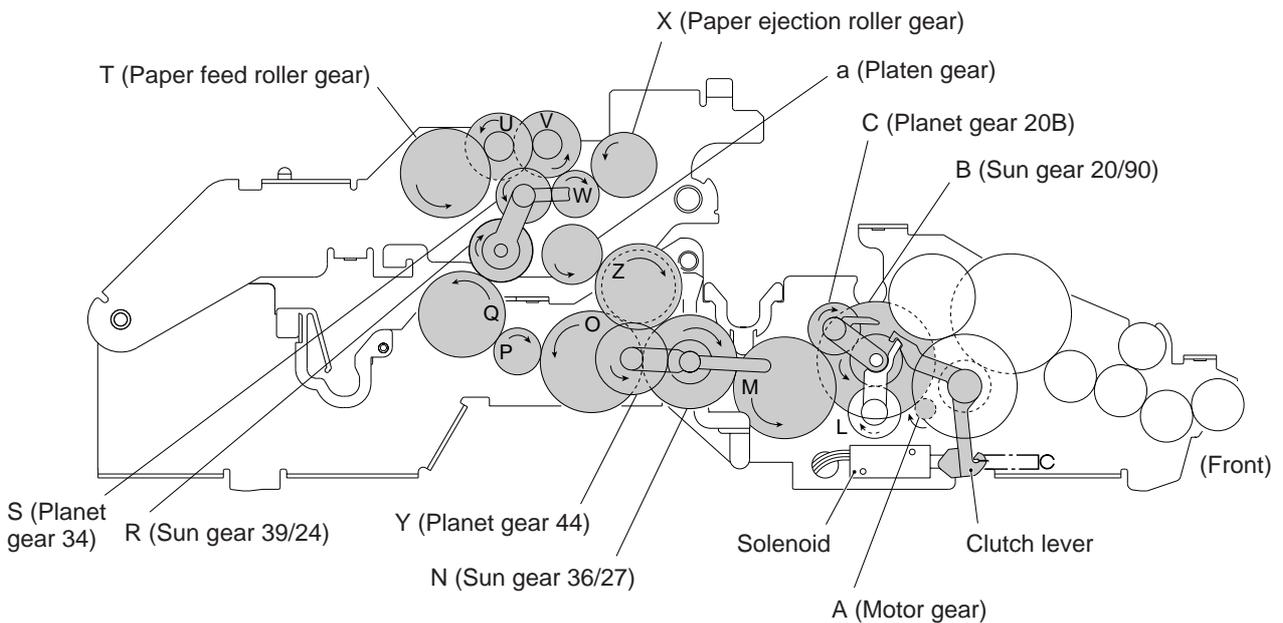
The motor's rotational torque turns the sun gear 20/90 ("B") counterclockwise so that the planet gear 20B ("C") transmits the torque via the gear 39 ("M") and other gears to the platen gear ("a") as well as the paper ejection roller gear ("X").

The platen advances recording paper and its paper movement rotates the paper feed roller. Consequently, the paper feed roller shaft rotates faster than the paper feed roller gear ("T").

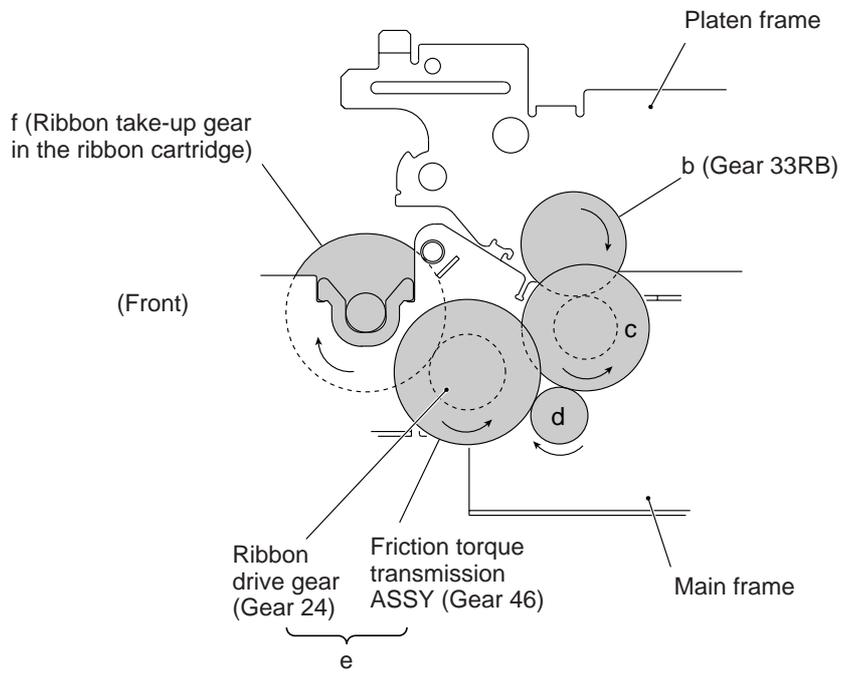
If the platen gear ("a" in the figure below) on the left end of the platen shaft rotates, the gear 33RB ("b") on the right end also rotates so as to drive the friction torque transmission ASSY and ribbon drive gear ("e") that rotates the ribbon take-up gear ("f") in the ribbon cartridge, as shown on the next page.



Arm A Locked by Cutout (⊗) of Clutch Lever



Active Gears on the Left Side

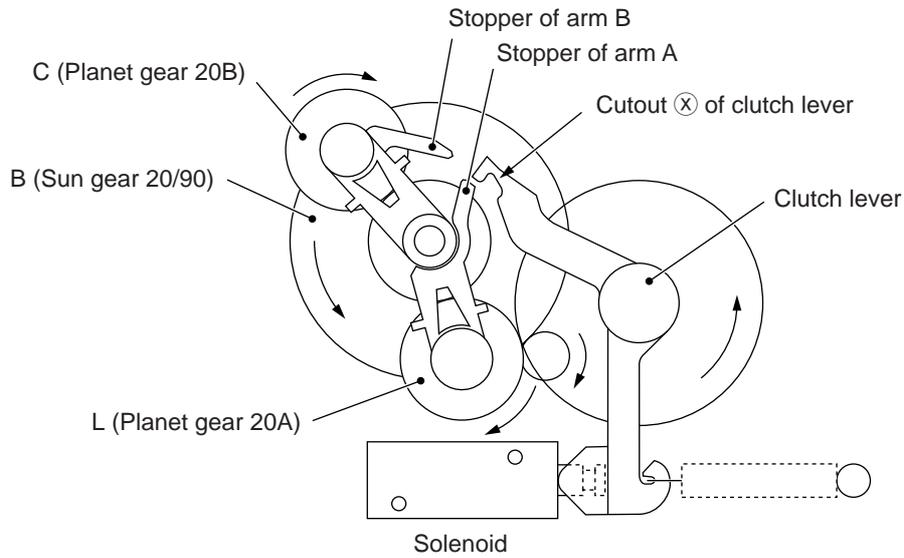


Active Gears on the Right Side

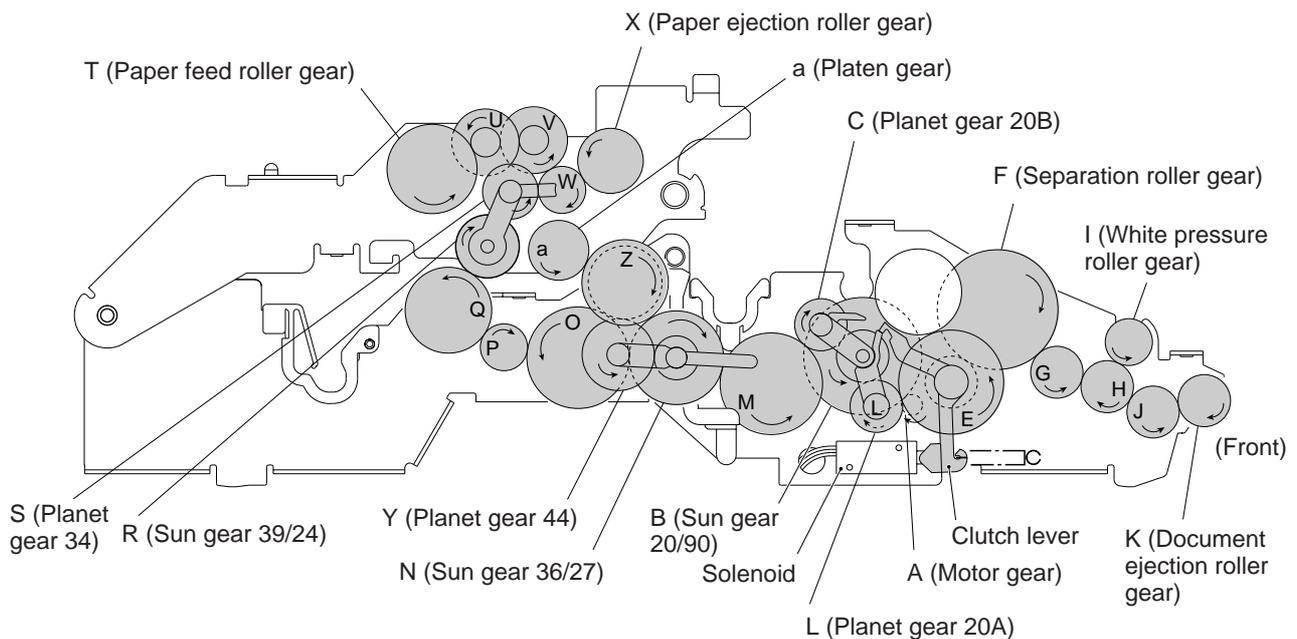
[4] Copying mode (Solenoid: ON, Motor rotation: Forward)

The control electronics activates the solenoid to release the stopper of arm A from the clutch lever. When the motor rotates in the forward direction, the sun gear 20/90 ("B") rotates counterclockwise so that the planet gear 20A ("L") transmits the torque to the document scanner mechanism (e.g., the separation roller gear ("F"), white pressure roller gear ("I") and document ejection roller gear ("K")) and the planet gear 20B ("C") transmits the torque to the recording mechanism (e.g., the platen gear ("a"), paper feed roller gear ("T"), and paper ejection roller gear ("X")).

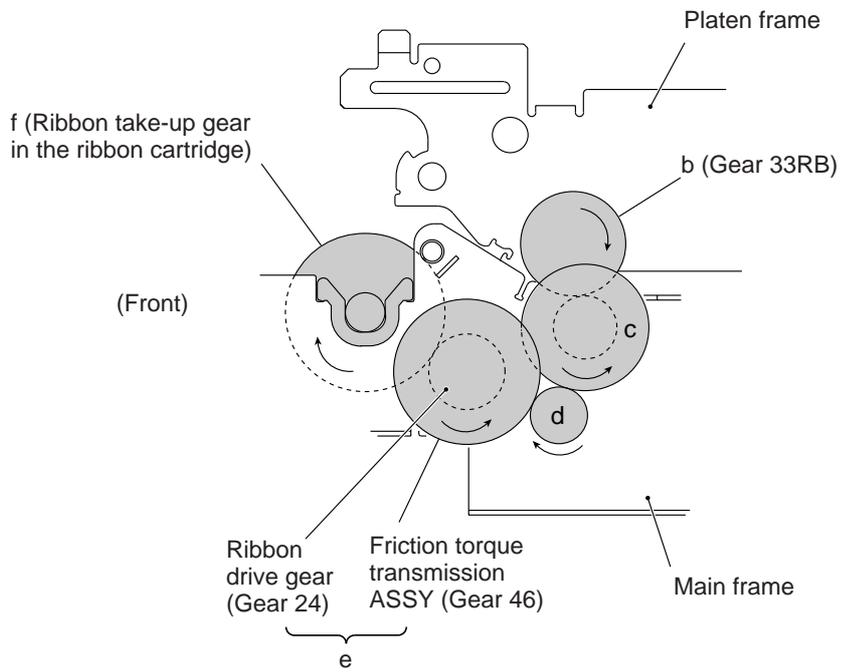
If the platen gear ("a" in the figure below) on the left end of the platen shaft rotates, the gear 33RB ("b") on the right end also rotates so as to drive the friction torque transmission ASSY and ribbon drive gear ("e") that rotates the ribbon take-up gear ("f") in the ribbon cartridge, as shown on the next page.



Arm A Released from Coutout (X) of Clutch Lever



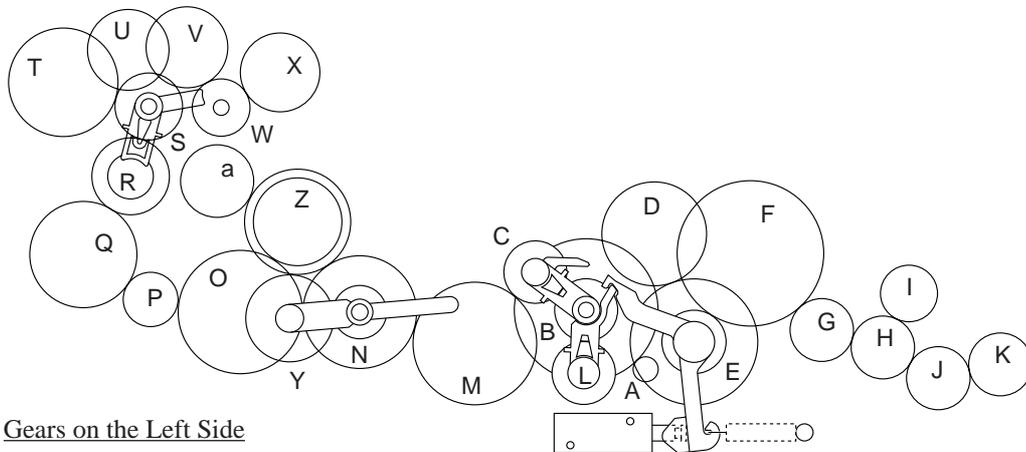
Active Gears on the Left Side



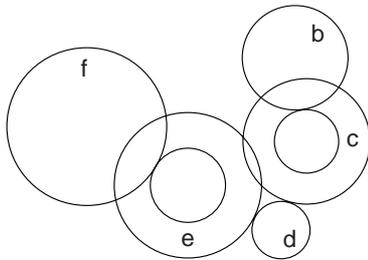
Active Gears on the Right Side

2.3.4 Power transmission route

Rotation of the motor gear is transmitted as shown below.



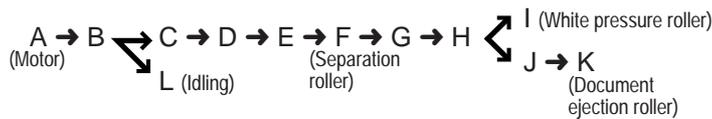
Gears on the Left Side



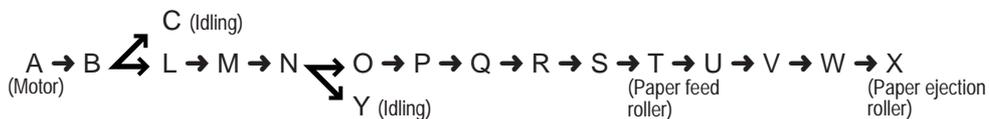
Gears on the Right Side

- | | |
|----------------------------------|---|
| A: Motor gear | Q: Gear 33 |
| B: Sun gear 20/90 | R: Sun gear 39/24 |
| C: Planet gear 20B | S: Planet gear 34 |
| D: Gear 33 | T: Paper feed roller gear |
| E: Gear 20/40 | U: Gear 18/41 |
| F: Separation roller gear | V: Gear 18/41 |
| G: Gear 14/20 | W: Clutch gear |
| H: Gear 14/20 | X: Paper ejection roller gear, Gear 40 |
| I: White pressure roller gear | Y: Planet gear 44 |
| J: Gear 14/20 | Z: Gear 33/45 |
| K: Document ejection roller gear | a: Platen gear, Gear 23 |
| L: Planet gear 20A | b: Gear 33RB |
| M: Gear 39 | c: Gear 20/40 |
| N: Sun gear 36/27 | d: Gear 18 |
| O: Gear 39 | e: Friction torque transmission ASSY (Gear 46)
and ribbon drive gear (Gear 24) |
| P: Gear 18 | f: Ribbon take-up gear in the ribbon cartridge |

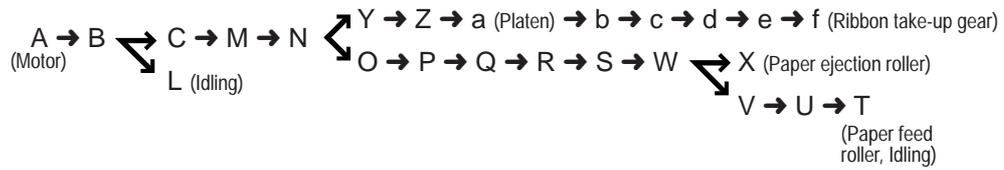
[1] Scanning Mode (Solenoid: OFF, Motor rotation: reverse)



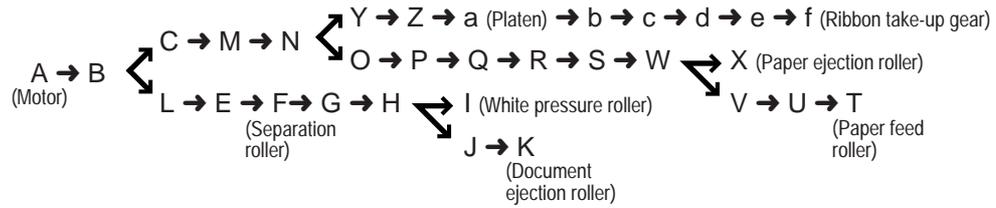
[2] Paper Feeding/Ejecting Mode (Solenoid: ON, Motor rotation: reverse)



[3] Recording Mode (Solenoid: OFF, Motor rotation: forward)



[4] Copying Mode (Solenoid: ON, Motor rotation: forward)



2.4 Sensors and Actuators

This equipment has four photosensors and three mechanical switches (two for the FAX1010) as described below.

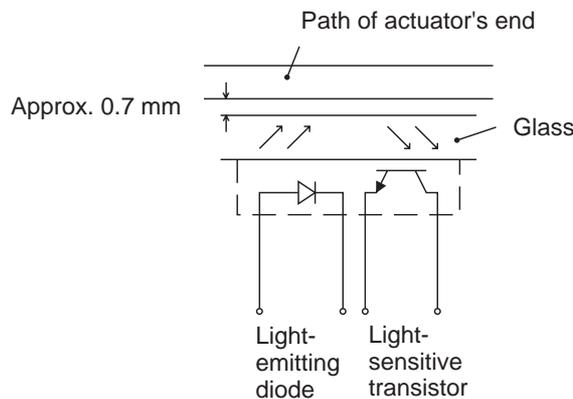
Sensor name	Type	Located on
Document front sensor	Photosensor (PH1)	Main PCB
Document rear sensor	Photosensor (PH2)	Main PCB
Paper ejection sensor	Photosensor (PH1)	Sensor PCB
Paper-edge sensor	Photosensor (PH2)	Sensor PCB
Cover sensor	Mechanical switch (SW1)	Modular PCB
Ribbon sensor	Mechanical switch (SW1)	Recording head
Hook switch sensor*	Mechanical switch (SW1)	Hook switch PCB

- 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.
- Paper ejection sensor which detects whether a paper jam has occurred.
- Paper-edge sensor which detects the leading and trailing edges of paper and the presence of paper as well as detecting whether the paper front cover is closed.

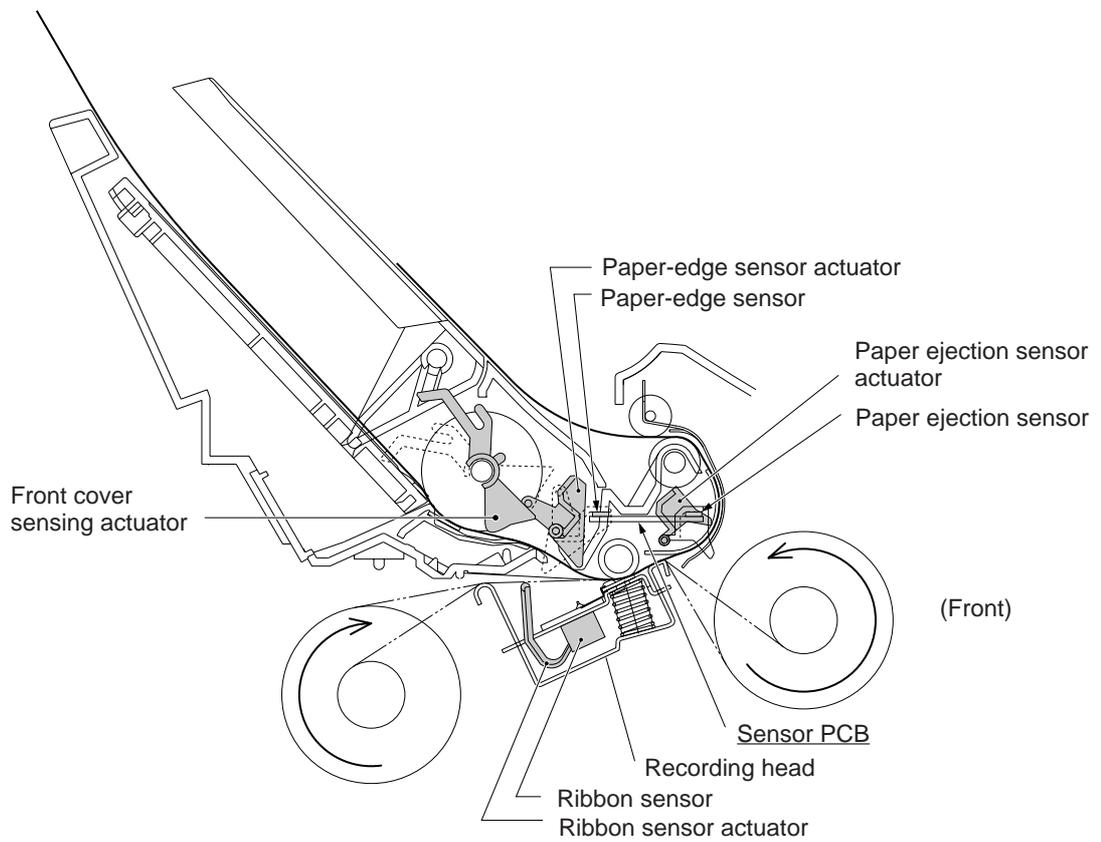
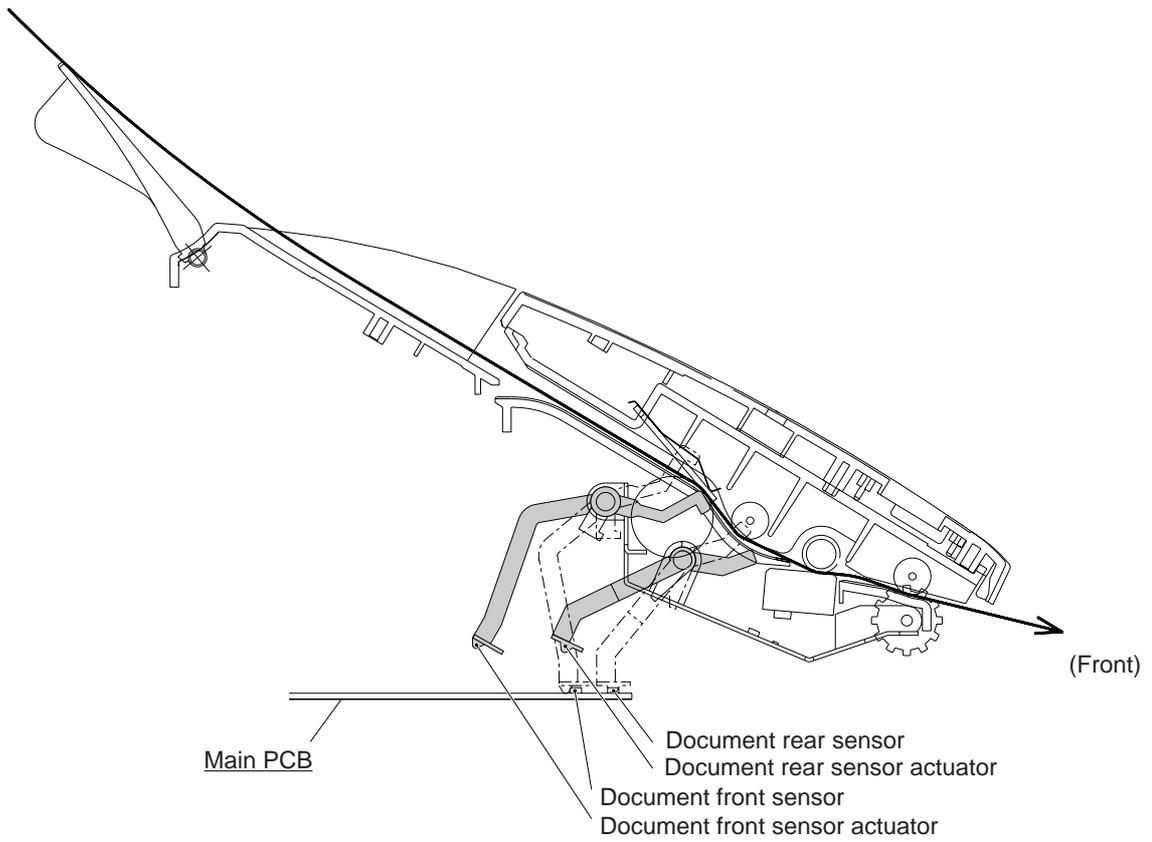
These photosensors are of a reflection type consisting of a light-emitting diode and a light-sensitive transistor. Each of them has an actuator separately arranged (see the next page), except that the paper-edge sensor has two actuators for sensing the paper and the paper front cover. When an actuator is not activated, its white end lies in the path of light issued from the light-emitting diode and reflects its light so that the reflected light enters the light-sensitive transistor. If a document or paper comes in so as to activate the actuator, the actuator's white end goes out of the light path and no reflected light enters the light-sensitive transistor. This way, the sensor detects the presence of documents or paper.

- Cover sensor which detects whether the recording paper cover ASSY is closed.
- Ribbon sensor which detects whether the ink ribbon is loaded.
- Hook switch sensor* which detects whether the handset is placed on the handset mount.

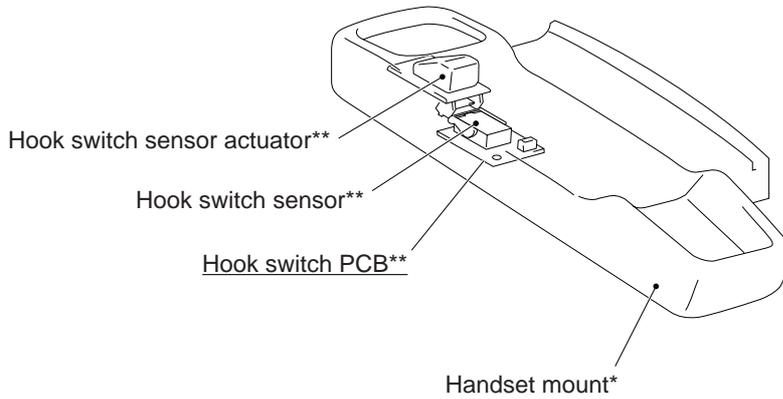
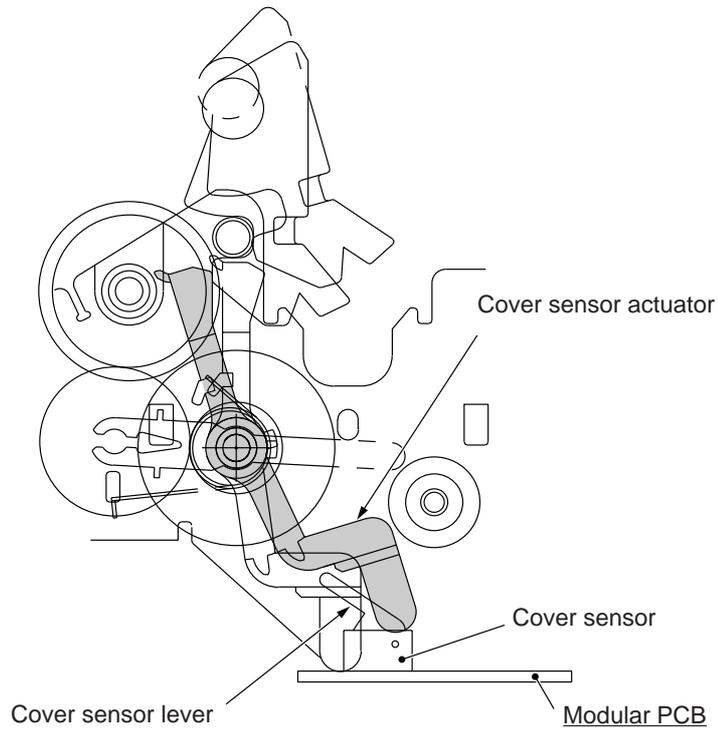
The cover sensor has an actuator separately arranged (see page III-18). If the actuator is activated, its lower end releases the cover sensor lever so that the sensor signals the detection.



* Not provided on the FAX1010



Location of Sensors and Actuators (1)



Location of Sensors and Actuators (2)

* Not provided on the FAX1010

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