brother

FACSIMILE EQUIPMENT
SERVICE MANUAL

MODEL: MFC7000FC/7200FC

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

CHAPTER I.

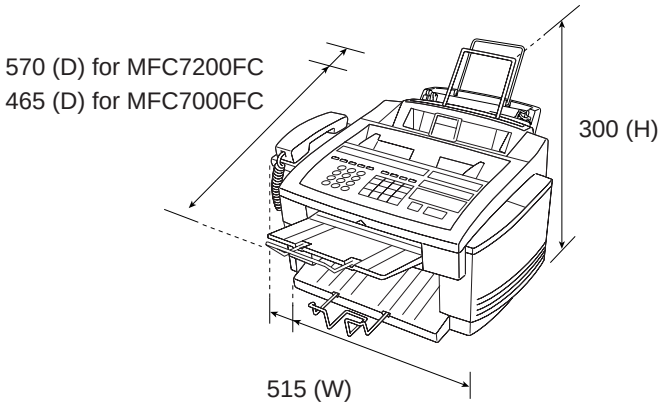
GENERAL DESCRIPTION

CONTENTS

1. EQUIPMENT OUTLINE

1.1 External Appearance and Weight

The figure below shows the equipment appearance and approximate dimensions.

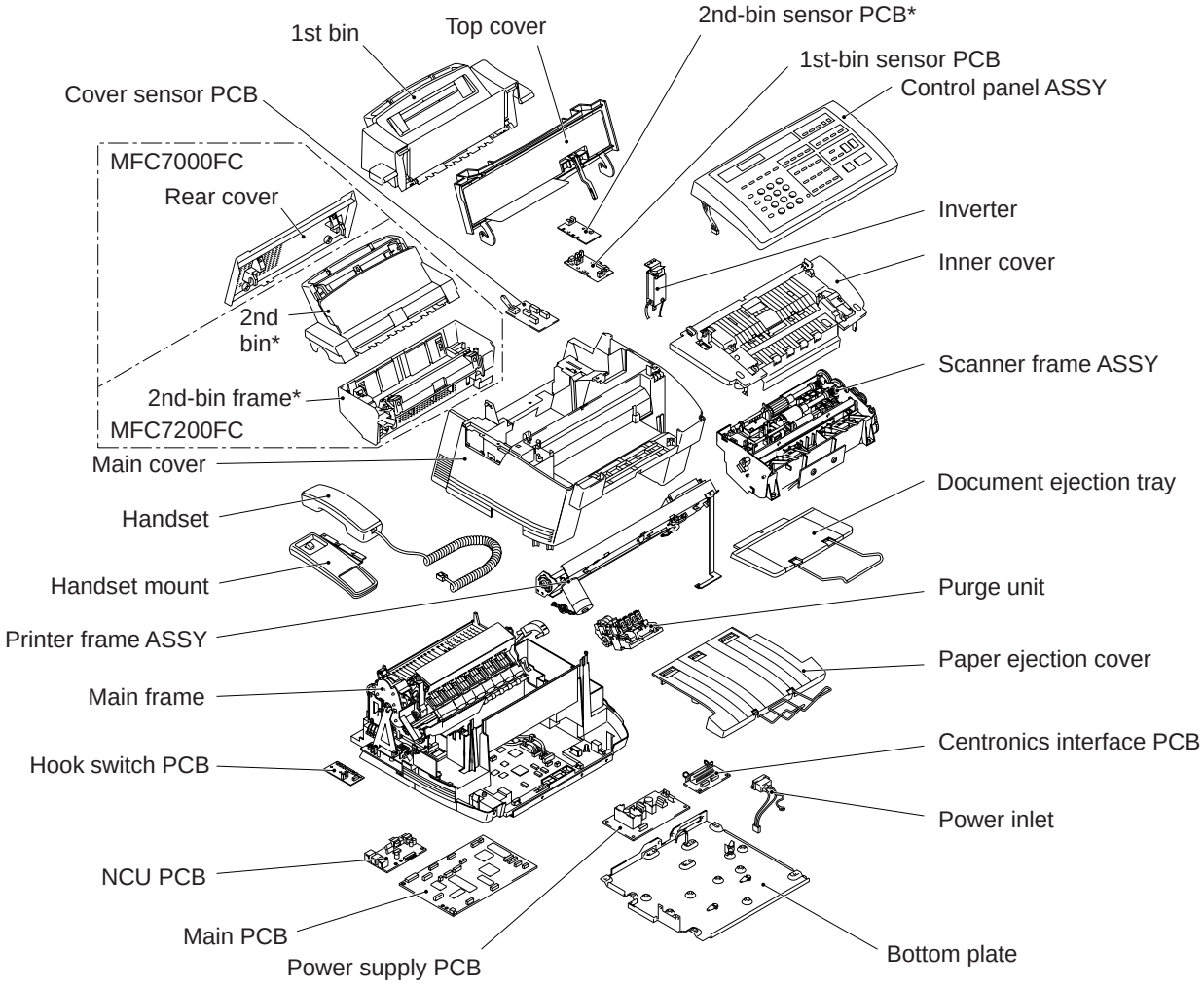


(Unit: mm)

		MFC7200FC	MFC7000FC
Weight:	Machine proper	Approx. 11 kg	Approx. 10 kg
	In package	Approx. 16 kg	Approx. 15 kg

1.2 Components

The equipment consists of the following major components:



* Provided on the MFC7200FC only.

2. SPECIFICATIONS

Model	MFC7200FC	MFC7000FC
Color	White (1138)	White (1138)
PRINTER		
Engine/Type	BY2/Liquid ink jet	BY2/Liquid ink jet
PPM	5 ppm/mono, 2.5 ppm/color (360 x 180) 1 ppm/mono, 0.5 ppm/color (720 x 720)	5 ppm/mono, 2.5 ppm/color (360 x 180) 1 ppm/mono, 0.5 ppm/color (720 x 720)
DPI (Output Resolution)	720 x 720	720 x 720
Emulation (Standard)	GDI/EPSON, ESC/P	GDI/EPSON, ESC/P
Printer Driver	Windows Ver. 3.1/3.11, Windows 95 Driver with Auto Installer Program	Windows Ver. 3.1/3.11, Windows 95 Driver with Auto Installer Program
Fonts Resident	3 (10, 12, 15 cpi, and Ps for each font)	3 (10, 12, 15 cpi, and Ps for each font)
Fonts Disk Based	35	35
Paper Handling	Letter, Legal, A4, B5, A5, OHP	Letter, Legal, A4, B5, A5, OHP
Bin	Cut sheet: Min. 2.75" (W) x 5.0" (L), Max. 8.5" (W) x 14.0" (L) Envelop: BL/C5/CM10/Monarch	Cut sheet: Min. 2.75" (W) x 5.0" (L), Max. 8.5" (W) x 14.0" (L) Envelop: BL/C5/CM10/Monarch
Bin	Double-bin (200 sheets/bin)	Single-bin (200 sheets)
Paper Capacity	400	200
No. of Ink Cartridges	4	4
Ink Cartridge Life (5% duty)	700 pages/black 300 pages/color	700 pages/black 300 pages/color
Interface	IEEE1284 (Bidirectional)	IEEE1284 (Bidirectional)
Network Card (Option)	Yes	No
SCANNER		
Color	Color CCD	Color CCD
dpi	1200 x 1200 (Optical 300)	1200 x 1200 (Optical 300)
Gray Scale	256 shades	256 shades
Color Depth	24-bit	24-bit
Twain	Yes	Yes
Formats	Up to Visioneer	Up to Visioneer
ADF capacity (pages)	30	30
Input Size	Letter/Legal	Letter/Legal
OCR	Yes (Xerox Textbridge)	Yes (Xerox Textbridge)
COPY		
Color Copy	Yes (via PC and Direct)	Yes (via PC and Direct)
dpi	Min. 360 x 360, Max. 720 x 720	Min. 360 x 360, Max. 720 x 720
Multi-Copy (No. of sheets)	99 (Mono & Color)	99 (Mono & Color)
Sorting	Color-No, Mono-Yes	Color-No, Mono-Yes
Reduction/Enlargement	Yes (Ratio 50% to 200%)	Yes (Ratio 50% to 200%)
FAX		
Modem Speed (bps)	14400	14400
ITU-T Group	G3	G3
Coding Method	MH/MR/MMR	MH/MR/MMR
Error Correction Mode (ECM)	Yes	Yes
Transmission Speed (sec) (Brother chart)	6	6
Gray Scale	256 (Error diffusion)	256 (Error diffusion)
Super Fine	Yes	Yes
Smoothing	Yes	Yes
Multi-Resolution Transmission	Yes	Yes
LCD Size	16 x 2	16 x 2
Handset	Yes	Yes
Speaker Phone	Yes, Full-duplex	Yes, Full-duplex
One-touch Dial	12 x 2	12 x 2
Speed Dial	100	56
Telephone Index	Yes	Yes
Constant	SL/Auto/SD	SL/Auto/SD
FAX/TEL Switch	Yes	Yes
Distinctive Ringing	Yes	Yes
Caller ID	Yes (Name & Tel number)	Yes (Name & Tel number)

Model	MFC7200FC	MFC7000FC
FAX		
TAD Interface	Yes	Yes
Next FAX Reservation	Yes (Dual access)	Yes (Dual access)
Coverpage	Yes, super	Yes, super
Polling Type	Std/Del/Seq	Std/Del/Seq
Password Check	No	No
Memory Reception	Yes	Yes
Delayed Timer	Yes, 3 timers	Yes, 3 timers
Auto Paper Select	Yes	No
Broadcasting	Yes	Yes
Call Reservation	Yes	Yes
Callback Message	Yes	Yes
Super Quick Scan	Yes	Yes
Scanning Speed	6 ppm	6 ppm
Color File Transfer	Yes (via BFT from PC)	Yes (via BFT from PC)
Multi-Transmission	Yes	Yes
Dual Access	Yes	Yes
Input/Output Width	8.5" x 8.5"	8.5" x 8.5"
Help	Yes	Yes
Auto Reduction	Yes	Yes
Message Center	Yes	Yes
OGM	Yes	Yes
ICM Recording Time	99 min.	50 min.
Paging	Yes	Yes
Toll Saver	Yes	Yes
Fax & Voice-on-Demand	No	No
Fax & Voice Mail Box	No	No
FAX Forwarding	Yes	Yes
FAX Retrieval	Yes	Yes
Message Center (PC MC)	Yes	Yes
OGM	Yes	Yes
ICM Recording Time	Yes	Yes
Fax-on-Demand	Yes	Yes
Voice-on-Demand	No	No
Fax & Voice Mail Box	Yes	Yes
FAX Forwarding	No	No
General		
Energy Star Compliance	Yes	Yes
Memory (Standard)	4 MB	2 MB
Extented Memory (Option)	1 MB or 2 MB	1 MB or 2 MB
Simultaneous Operation	Yes (Printer/Fax, Printer/Scan, Printer/Copy)	Yes (Printer/Fax, Printer/Scan, Printer/Copy)
PC-FAX-Host Software Std.	Yes	Yes
Host Interface (Scan/Print/PC-FAX)	Bi Centro	Bi Centro
Video Capture	Yes (RCA pinjack)	Yes (RCA pinjack)
PC-FAX Protocol Compliance	CLASS 2	CLASS 2
Data Modem	No	No
Bundled Software Applications		
Bundled Applications	• Corel "Print & Phone House" • My-software "My Marketing Materials" • Meta Tools "Kai's Power Goo" • InfoImaging "3D FAX Speed"	• Corel "Print & Phone House" • My-software "My Marketing Materials" • Meta Tools "Kai's Power Goo" • InfoImaging "3D FAX Speed"
PC-FAX (Send/Receive)	Yes (SMSI)	Yes (SMSI)
Scanner Application	Visioneer	Visioneer
Color Viewer	Yes (Visioneer)	Yes (Visioneer)
Binary File Transfer	Yes (3D FAX Speed)	Yes (3D FAX Speed)

CHAPTER II.

INSTALLATION

CONTENTS

1. INSTALLING THE UPGRADE PROGRAM ONTO THE FLASH ROM

If the program version is upgraded or the main PCB is replaced, install the upgrade 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.

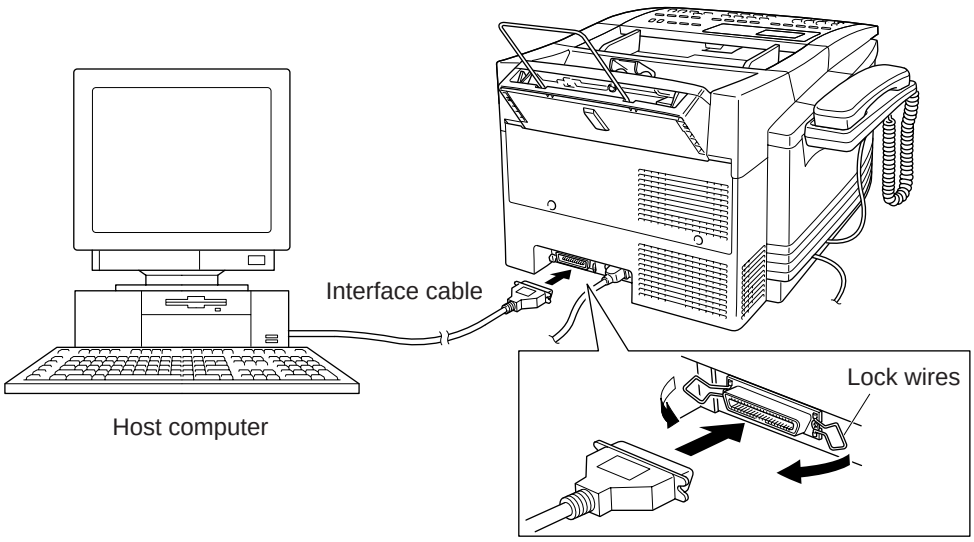
(2) Make sure that your computer is powered off.

(3) Connect the interface cable (IQ7208A) 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.

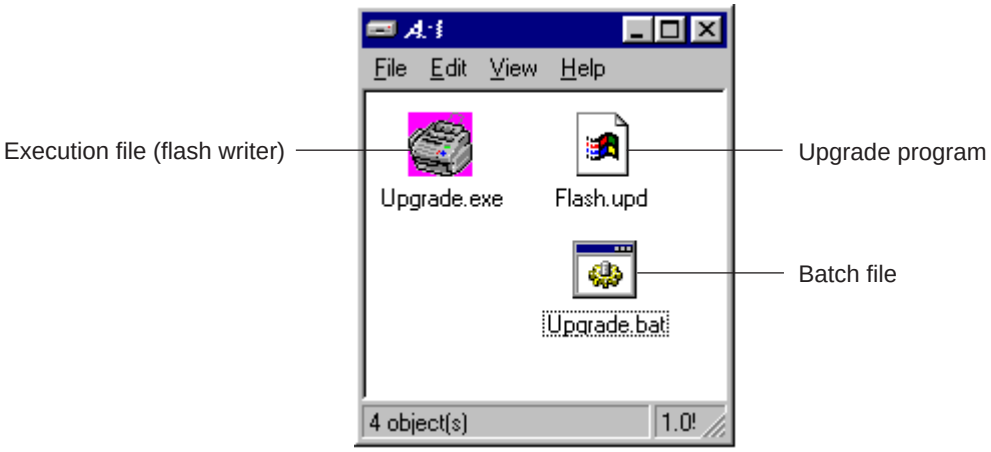
(6) Plug the equipment's power cord into a wall socket.



Installing the upgrade program onto the flash ROM of the equipment

(1) Load the upgrade program floppy disk into a floppy disk drive of the host computer.

(2) Open the target hard disk drive, create a new folder, and then copy the three files stored in the floppy disk to the folder.



(3) Double-click the "Upgrade.exe" icon.

To start installation on MS-DOS, type the following at the MS-DOS command prompt:

```
A:>Upgrade.bat
```

On the computer screen, the "Please check your MFC connection" message appears.

(4) Check that the equipment is connected to the host computer correctly, and then press any key on the computer's keyboard.

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*.

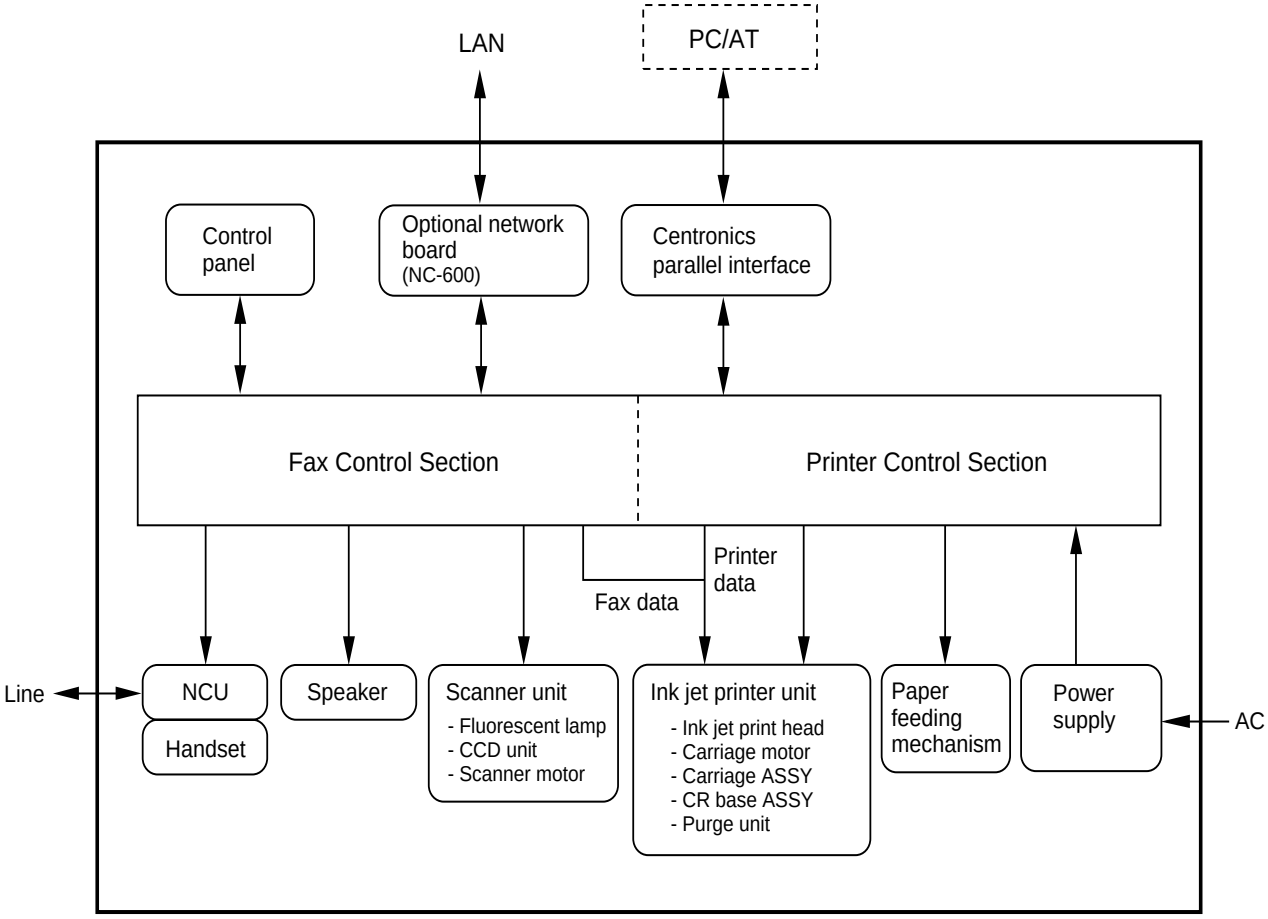
Upon completion of the downloading, the equipment beeps *continuously*.

CHAPTER III.

THEORY OF OPERATION

CONTENTS

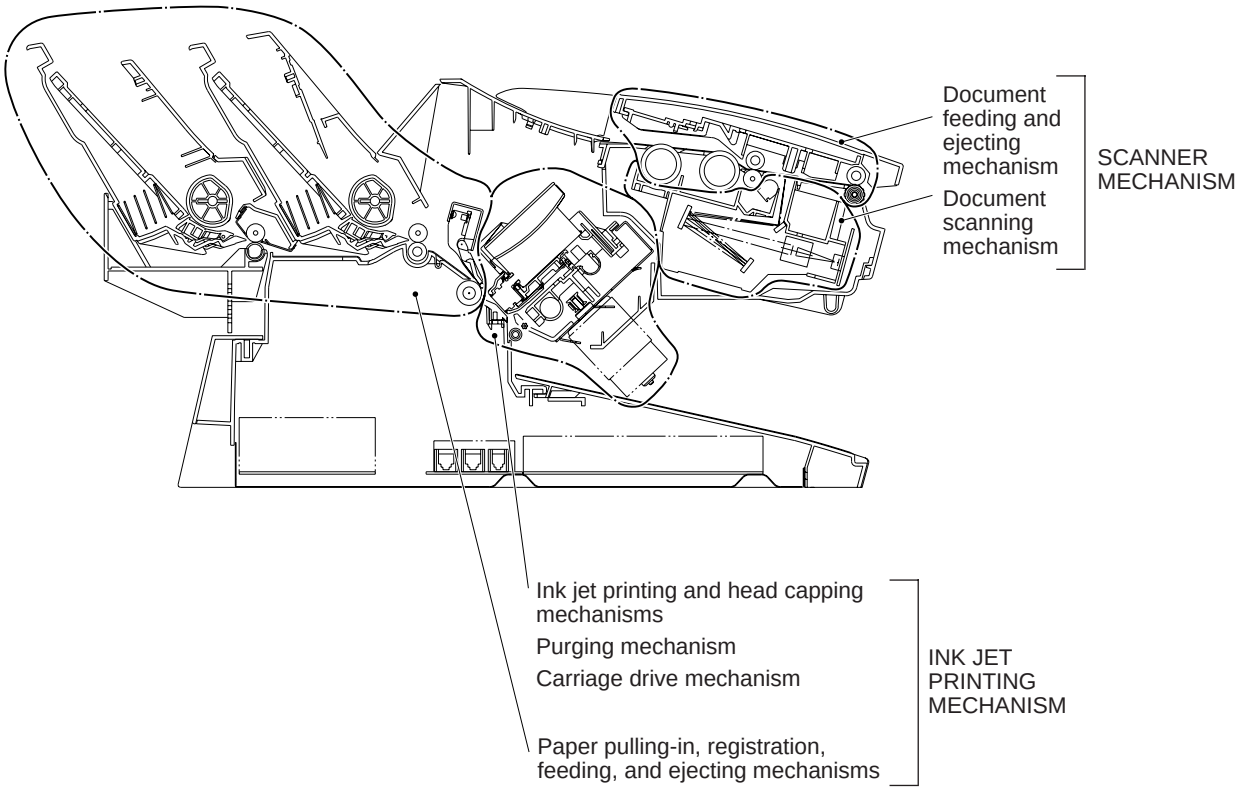
1. OVERVIEW


LAN
PC/AT
Control panel
Optional network board (NC-600)
Centronics parallel interface
Fax Control Section
Printer Control Section
Printer data
Fax data
Line
NCU
Handset
Speaker
Scanner unit
- Fluorescent lamp
- CCD unit
- Scanner motor
Ink jet printer unit
- Ink jet print head
- Carriage motor
- Carriage ASSY
- CR base ASSY
- Purge unit
Paper feeding mechanism
Power supply
AC

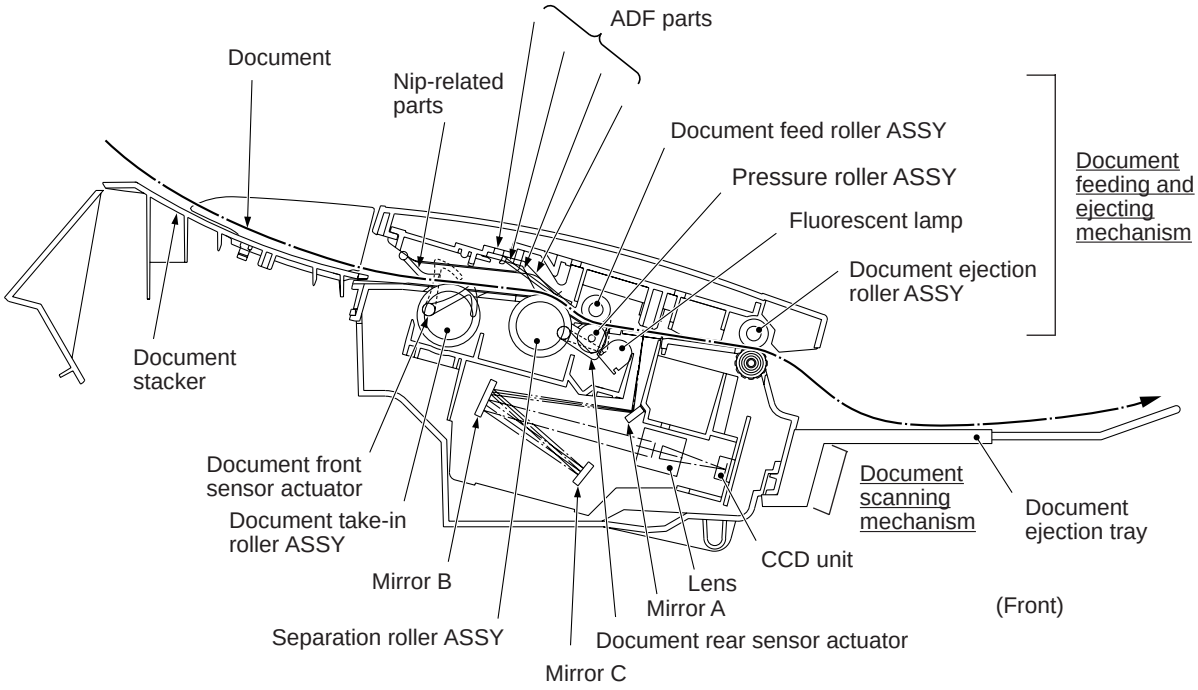
2. MECHANISMS

The equipment is classified into the following mechanisms:

- ■ SCANNER MECHANISM
  - – Document feeding and ejecting mechanism
  - – Document scanning mechanism
- ■ INK JET PRINTING MECHANISM
  - – Paper pulling-in, registration, feeding, and ejecting mechanisms
  - – Ink jet printing and head capping mechanisms
  - – Purging mechanism
  - – Carriage drive 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 feed roller ASSY, 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 document take-in roller ASSY, separation roller ASSY, ADF parts and nip-related 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.

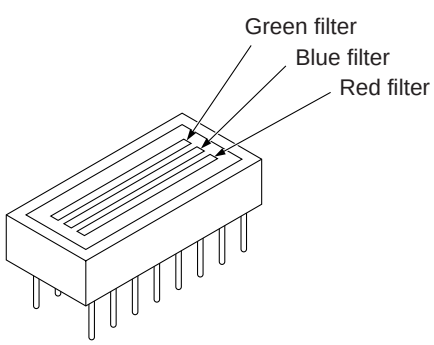
2.1.2 Document scanning mechanism

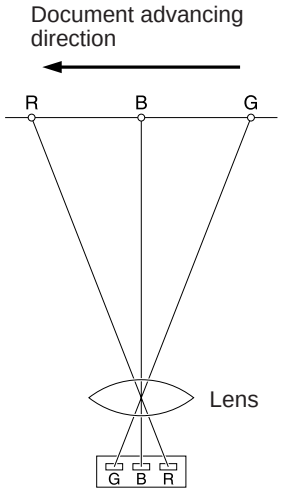
The scanner uses a triple-in-line linear image sensor which is composed of three charge coupled devices (CCDs) covered with green-, blue-, and red-colored filters. The light source uses a white fluorescent lamp whose spectrum has the peak intensity of red, green, and blue rays.

As illustrated on the previous page, the 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 CCDs.

The scanner scans green-, blue-, and red-colored images by the green-, blue-, and red-filtered CCDs, respectively. Since the scanning positions for those three colors are shifted as shown below, color scanning of a single scan line can be completed after a document has advanced starting from the green scanning position and passed through the blue and red scanning positions.

When a color image is passing through the area from the green scanning start position to the blue scanning start position, only the green image can be captured; when it is passing through the area from the blue scanning start position to the red scanning start position, the blue image can be captured; when it is passing through the red scanning start position, the red image can be captured.





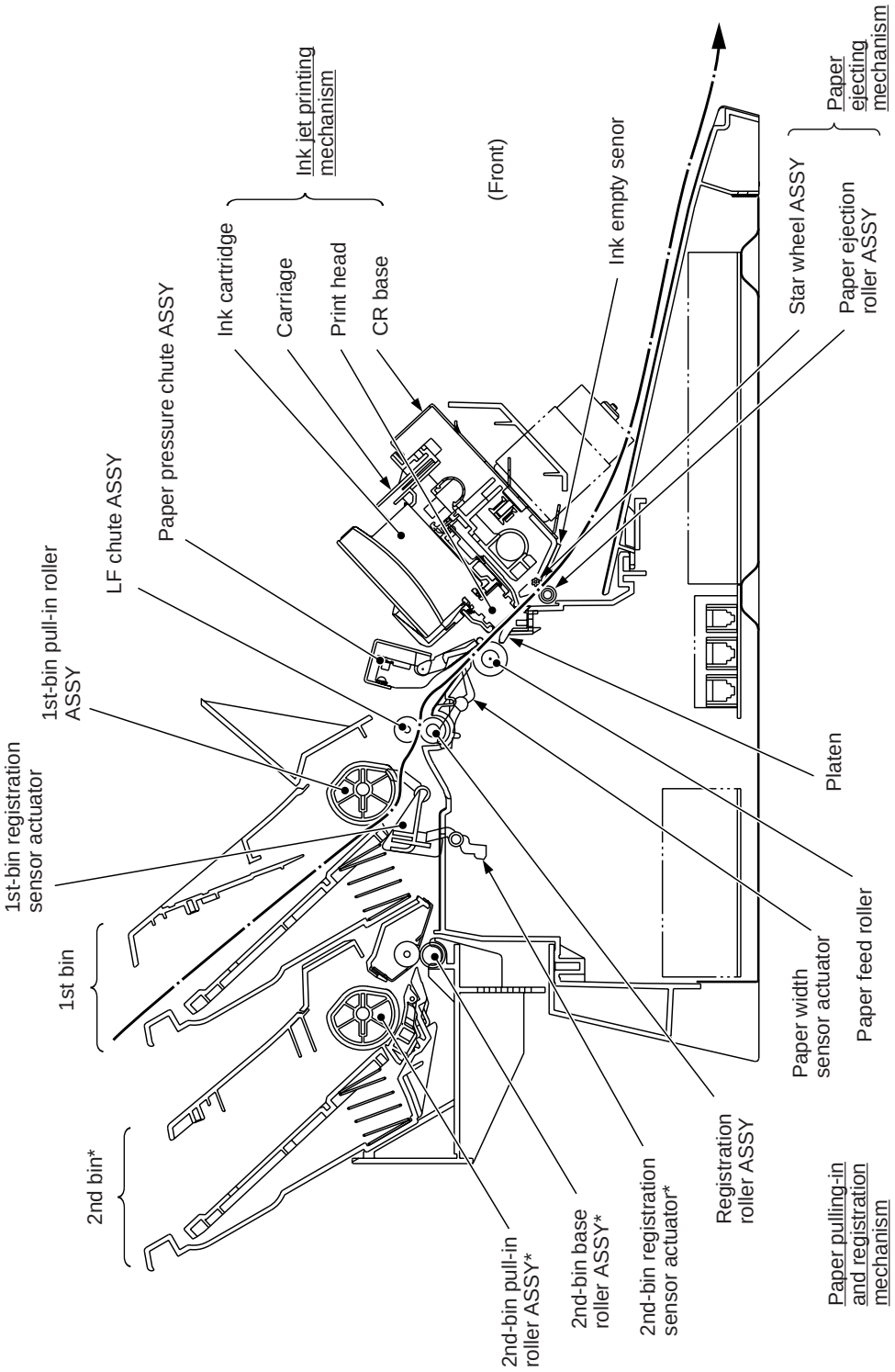
The number of scan lines between the green and blue scanning start positions and between the blue and red scanning start positions is eight. The scanner retains 16 scan lines of green image and eight scan lines of blue image. The moment a red image is captured, the scanner superimposes all of those three color data of a same scan line to generate a full-color image.

image captured on the green-filtered CCD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	...
image captured on the blue-filtered CCD								1	2	3	4	5	6	7	8	9	10	11	12	...
image captured on the red-filtered CCD															1	2	3	4	5	...
Full-colored image															1	2	3	4	5	...

For monochrome scanning, the scanner uses only green image data.

2.2 Ink Jet Printing Mechanism

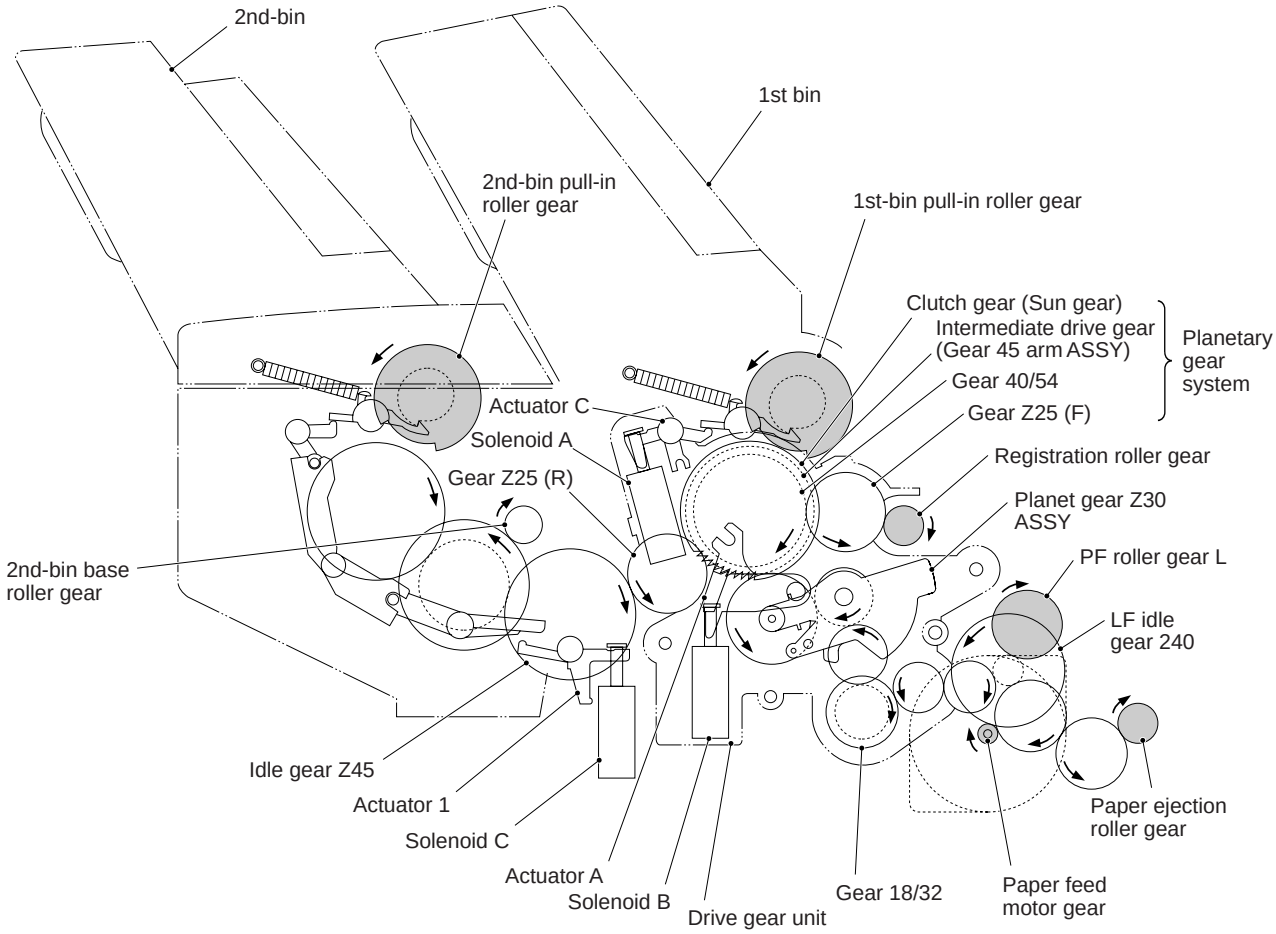
2.2.1 Paper pulling-in, registration, feeding, and ejecting mechanisms



* Provided on the MFC7200FC only.

Paper pulling-in and registration mechanism

MFC7200FC:



The paper pulling-in and registration mechanism consists of the 1st bin, 1st-bin pull-in roller ASSY, 2nd bin, 2nd-bin pull-in roller ASSY, 2nd-bin base roller ASSY, registration roller ASSY, LF chute ASSY, paper pressure chute ASSY, paper feed roller, paper ejection roller ASSY, and sensors.

The MFC7200FC has a single motor and three solenoids (A, B, and C). Solenoid A, B, or C releases the 1st-bin pull-in roller gear, clutch gear of the planetary gear system, or 2nd-bin pull-in roller gear via the related actuators and links in order to pull in paper from the 1st bin, deactivate the registration roller, or pull in paper from the 2nd bin, respectively.

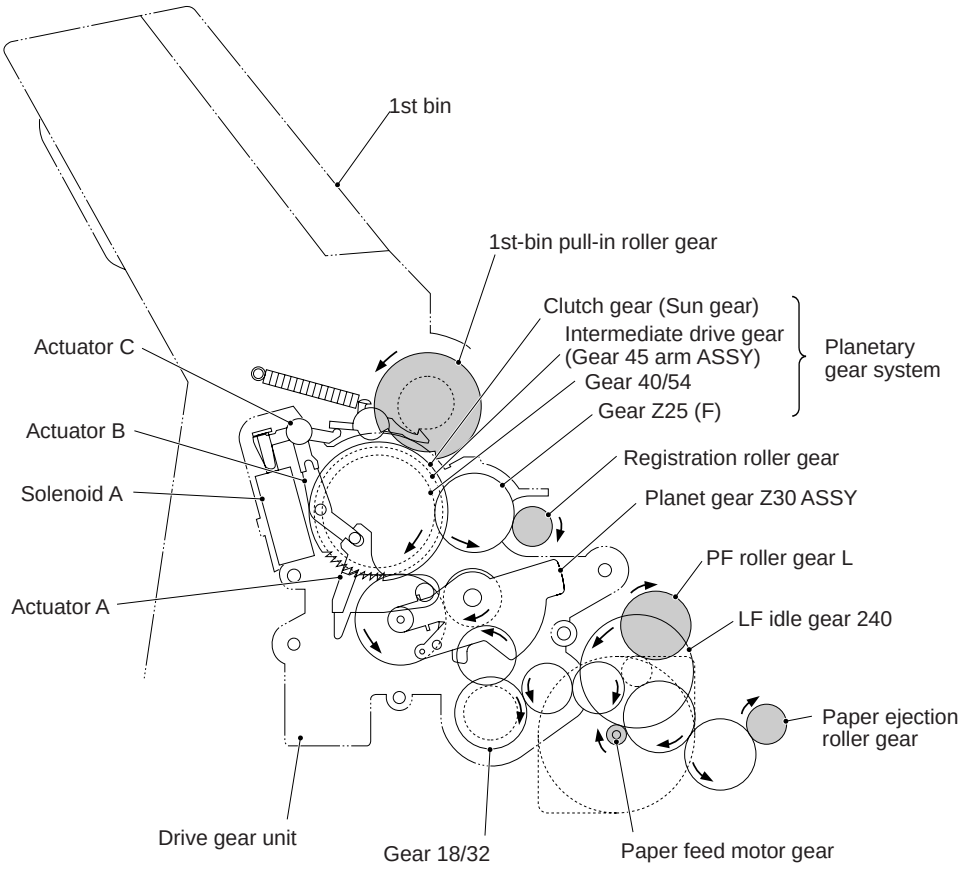
As long as the paper feed motor rotates clockwise, its rotational torque is always transmitted to the intermediate drive gear of the planetary gear system via the gear train. To pull in paper from the 1st bin, the equipment energizes solenoid A to retract actuator C for releasing the 1st-bin pull-in roller gear. Engaged with the intermediate drive gear, the 1st-bin pull-in roller gear (released by solenoid A) rotates to pull in paper from the 1st bin, a sheet at a time.

To pull in paper from the 2nd bin, the equipment energizes solenoid C (instead of solenoid A) to drive actuator 1 and its related links for releasing the 2nd-bin pull-in roller gear. The rotation of the intermediate drive gear is transmitted via the gear Z25 (R) and the related gear train to the 2nd-bin pull-in roller gear (released by solenoid C) which pulls in paper from the 2nd bin, a sheet at a time.

To register the leading edge of the pulled-in paper, the equipment energizes solenoid B to retract actuator A for releasing the clutch gear of the planetary gear system for the specified time length. Once the clutch gear is released, the rotation of the intermediate drive gear will be switched to the clutch gear instead of the gear 40/54. Engaged with the gear 40/54, the gear Z25 (F) and registration roller gear will no longer rotate. After the specified time length, the equipment deenergizes solenoid B to rotate the gear 40/54 and the registration roller gear for feeding paper.

If a paper jam occurs, you may pull paper in the backward direction. Doing so will force the paper feed roller and paper ejection roller to rotate counterclockwise. When the reverse rotation is transmitted to the planet gear Z30 ASSY, the ASSY rotates counterclockwise so that its planet gear will be disengaged from the intermediate drive gear. This way, the planet gear Z30 ASSY prevents the pull-in roller gear and registration roller gear from rotating in the reverse direction.

MFC7000FC:



The paper pulling-in and registration mechanism consists of the 1st bin, 1st-bin pull-in roller ASSY, registration roller ASSY, LF chute ASSY, paper pressure chute ASSY, paper feed roller, paper ejection roller ASSY, and sensors.

The MFC7000FC has a single motor and solenoid (solenoid A). Solenoid A releases not only the 1st-bin pull-in roller gear but also the clutch gear via actuator B in order to pull in paper from the 1st bin and deactivate the registration roller gear.

As long as the paper feed motor rotates clockwise, its rotational torque is always transmitted to the intermediate drive gear of the planetary gear system via the gear train. The equipment energizes solenoid A to retract actuator C. The retracted actuator C releases the 1st-bin pull-in roller gear. Engaged with the intermediate drive gear, the 1st-bin pull-in roller gear (released by solenoid A) rotates to pull in paper from the 1st bin, a sheet at a time. The retracted actuator C drives also actuator A via actuator B for releasing the clutch gear of the planetary gear system. Once the clutch gear is released, the rotation of the intermediate drive gear will be switched to the clutch gear instead of the gear 40/54. Engaged with the gear 40/54, the gear Z25 (F) and registration roller gear will no longer rotate. After the specified time length, the equipment deenergizes solenoid A to rotate the gear 40/54 and the registration roller gear for feeding paper.

If a paper jam occurs, you may pull paper in the backward direction. Doing so will force the paper feed roller and paper ejection roller to rotate counterclockwise. When the reverse rotation is transmitted to the planet gear Z30 ASSY, the ASSY rotates counterclockwise so that its planet gear will be disengaged from the intermediate drive gear. This way, the planet gear Z30 ASSY prevents the pull-in roller gear and registration roller gear from rotating in the reverse direction.

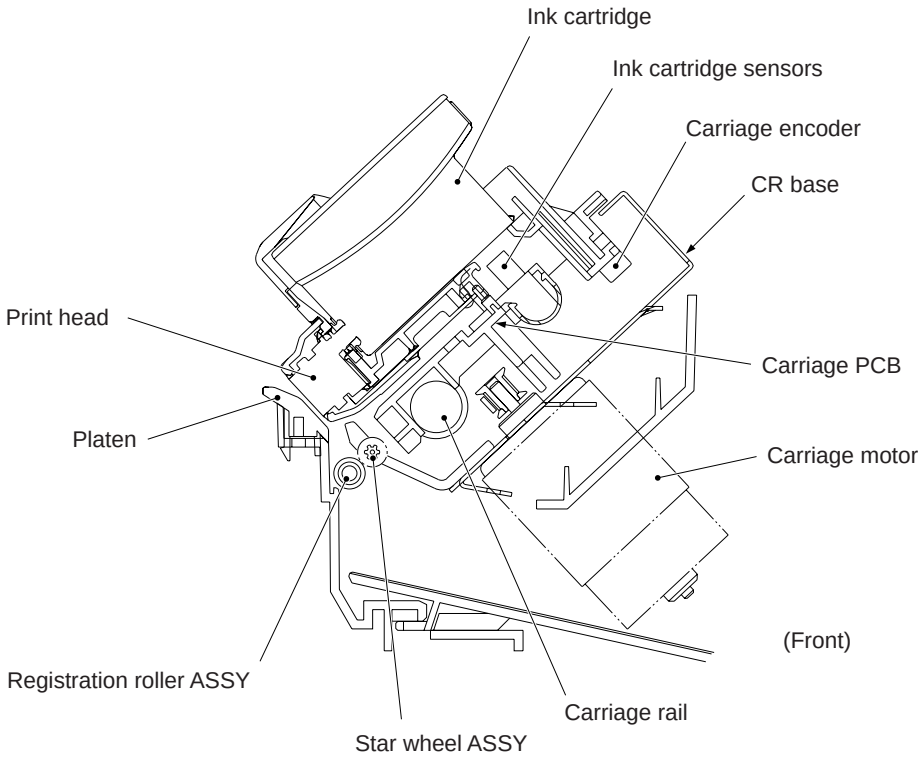
Paper feeding and ejecting mechanism

The rotation of the paper feed motor is transmitted via the LF idle gear 240 to the PF roller gear L which drives the paper feed roller. The rotation is further transmitted to the paper ejection roller gear.

After the paper passes through the print head, it will be ejected onto the paper tray.

If the leading edge of the paper pushes down the registration sensor's actuator, the sensor becomes opened, signaling the start of paper entry. If the trailing edge has passed through the sensor actuator, the sensor becomes closed, signaling the completion of paper ejection. Then the paper feed motor stops rotation.

2.2.2 Ink jet printing and capping mechanisms



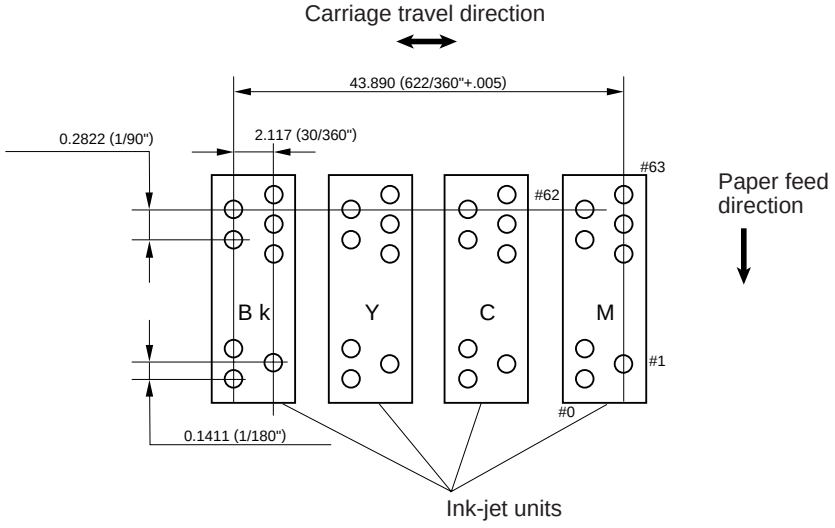
(1) Print head

This equipment uses drop-on-demand ink jet printing. The print head has four ink-jet units for four color inks, each of which consists of 64 nozzles, 64 channels sandwiched by a pair of piezoelectric ceramic actuators (PZT), manifold, and filter.

If a drive voltage* is applied to the electrodes formed on the surface of the piezoelectric actuators, those actuators will be distorted as shown with broken lines on the next page so that the ink in the manifold will be vacuumed out to the channel.

(*The controller switches the drive voltage between 8 levels within 14V to 30V ±3% depending upon the ambient temperature detected by the head thermister.)

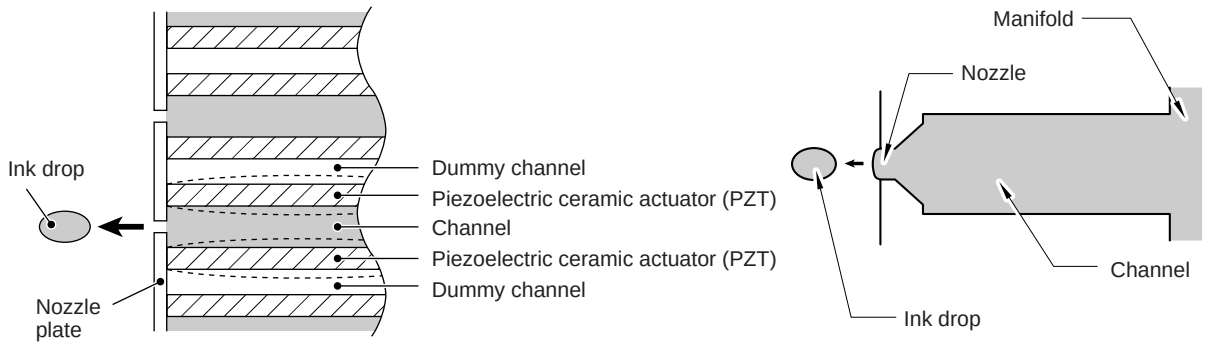
If deenergized, the piezoelectric actuators return to the previous form so as to apply pressure to the ink in the channel, causing the ink to jet out through the nozzle. The jetted-out ink drop will be splashed and produce a dot on paper held by the platen.



Nozzle Layout
(viewed from the bottom)

As the carriage holding the print head travels at the printing speed, the character generator sends print command pulses to the circuits driving the piezoelectric actuators embedded in the print head.

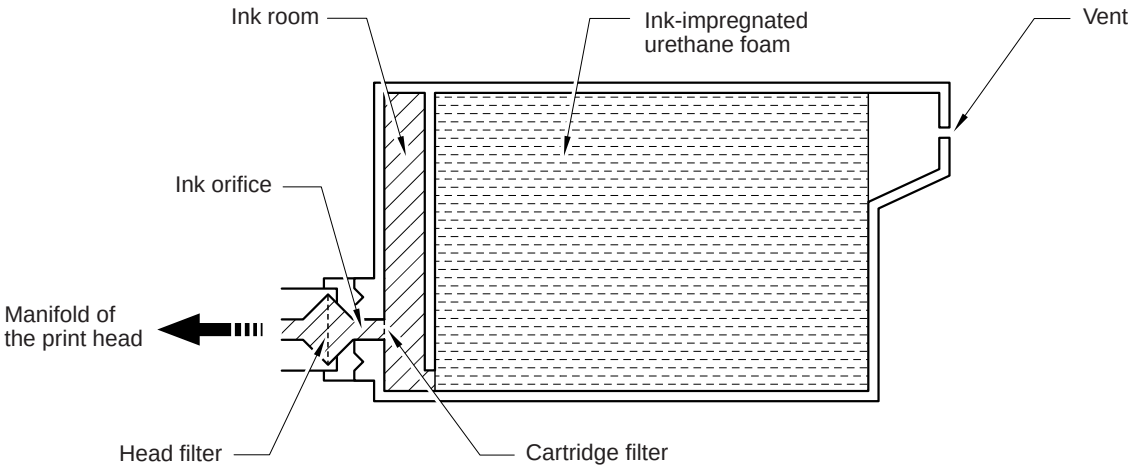
For the head thermister and the head property detector, refer to Section 2.3.



(2) Ink cartridge

The equipment uses four ink cartridges (black, yellow, cyan, and magenta) of disposable type to supply ink to the print head. As shown below, an ink cartridge contains an ink-impregnated urethane foam. If ink-jet print operation or purging operation takes place, ink comes out of the urethane foam and is supplied to the print head through the ink room, filters, and manifold.

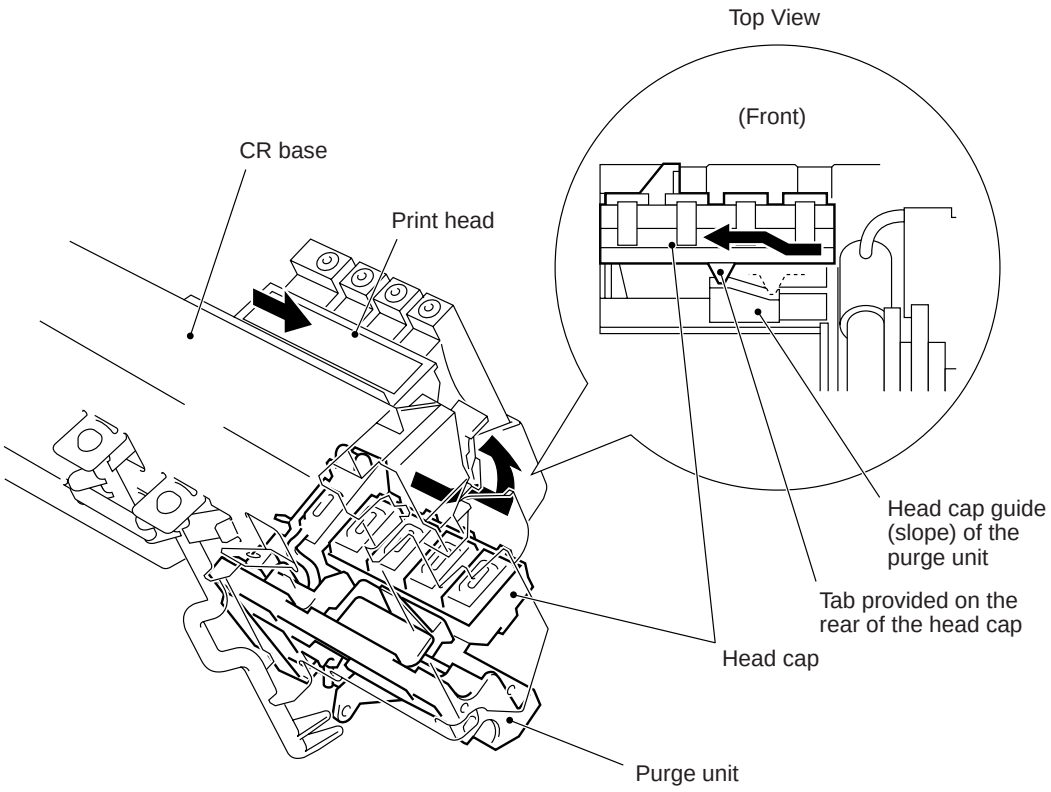
For the ink cartridge sensors on the carriage PCB, refer to Section 2.3.



(3) Head cap

Shown below is a head cap which prevents the nozzles of the print head from drying up when they are not in use.

Upon completion of printing, the carriage travels to the right and moves the head cap provided on the purge unit together. On the rear side of the head cap is a tab which is lead by the head cap guide of the purge unit. Accordingly, the rightward movement brings the head cap into an upright position where the head cap is in tight contact with the print head so as to cap the nozzles.



2.2.3 Purging mechanism

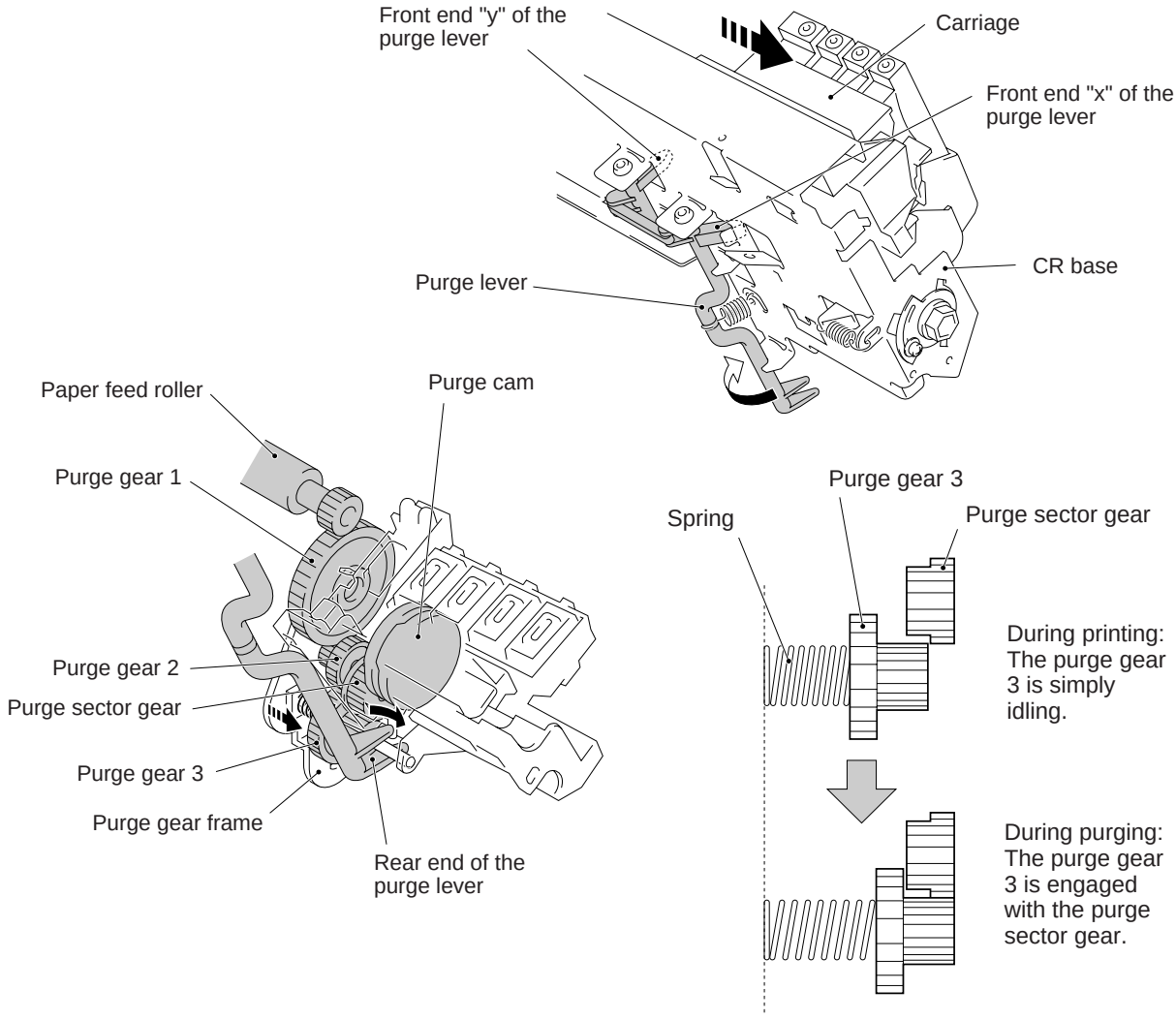
The purging mechanism is driven by the paper feed motor located at the left side of the main frame.

The rotation of the paper feed motor is transmitted to the paper feed roller. At the right end of the paper feed roller is the PF gear (R) which is always engaged with the purge gear train (purge gears 1 through 3). The purge gear 3 works as a clutch gear which engages with or disengages from the purge sector gear.

If the carriage travels from the left to right to reach the purge position, the left tab provided on the bottom of the carriage turns the front end "x" of the purge lever clockwise. Accordingly, the purge gear 3 (which was shifted to the left by the purge lever's rear end) will move to the right by the spring so that the right-side small gear of the purge gear 3 will be engaged with the purge sector gear* which drives the purge cam. (*The right half of the purge sector gear is fully toothed, but the left half is a sector gear.)

On the contrary, if the carriage travels from the purge position to the left, the right tab on the bottom of the carriage turns the front end "y" of the purge lever counterclockwise. The purge lever's rear end shifts the purge gear 3 to the left so that the right-side small gear of the purge gear 3 will be positioned into the toothless section of the purge sector gear, where the purge gear 3 will simply idle.

That is, when the carriage is in printing operation or the purge cam is in the home position, no rotation of the paper feed motor is transmitted to the purge sector gear; when the carriage is in the purge position, the motor rotation is transmitted to the purge sector gear which rotates the purge cam.



The purge cam is so designed that:

- the carriage lock pops up to lock the carriage before purging and goes down before cleaning with the wiper,
- the purge cap comes out and becomes pressed against the nozzle ends of an ink-jet unit,
- the pump works to draw out ink from the head nozzles and drains it into the ink absorber, and
- the head wiper comes out to clean the nozzle surface.

A sequence of the above operations is carried out by one rotation of the purge cam. The home position of the purge cam is detected by the HP switch. For the purge cam HP switch, refer to Section 2.3.

(1) Carriage lock

If the purge cam is driven, the carriage lock of the purge unit pops up and locks the carriage to align a particular ink-jet unit with the purge cap during purging operation. After purging but before cleaning with the wiper, it goes down to release the carriage. When the power is off, the carriage lock keeps the print head pressed against the head cap.

(2) Pressing the purge cap against the nozzle ends

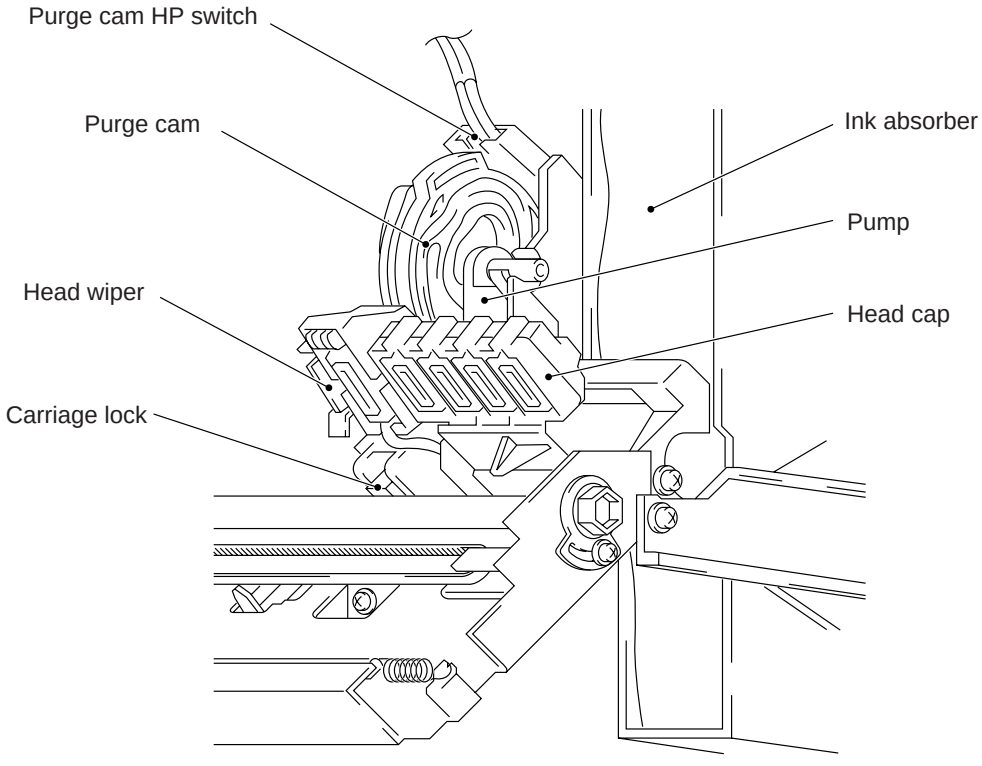
The purge cap comes out and becomes pressed against the nozzle ends of an ink-jet unit.

(3) Purging

If activated, the pump draws out ink from the head nozzles and drains it into the ink absorber to remove air bubbles or dust from the inside of the nozzles and channels.

(4) Cleaning with the wiper

After purging operation, the wiper comes out and the carriage moves from the right to left so as to clean ink remaining on the head surface.

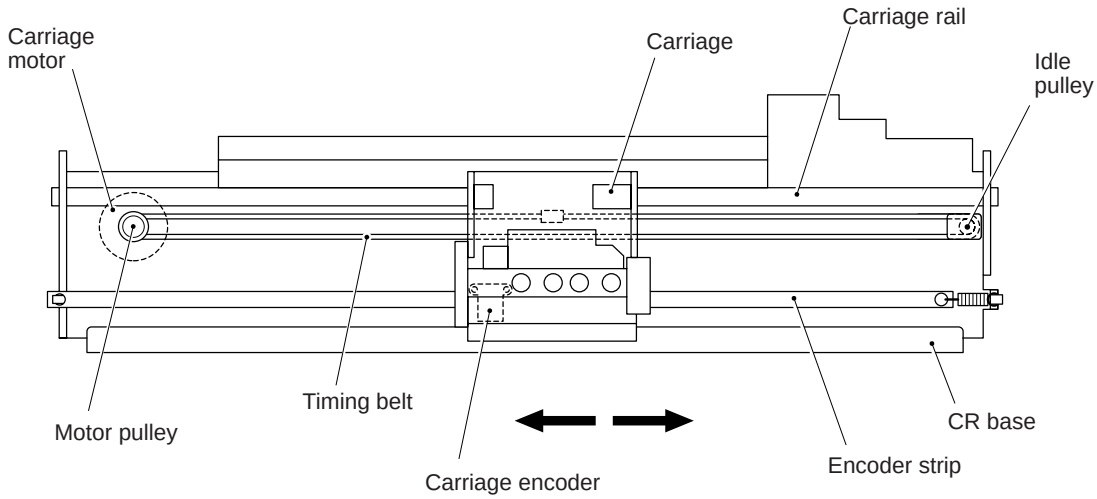


2.2.4 Carriage drive mechanism

The carriage motor controls horizontal motion. The motor rotation is transmitted via the motor pulley to the timing belt.

The carriage, which is supported and guided by the carriage rail, is secured to the timing belt. Clockwise and counterclockwise rotations of the carriage motor move the carriage to the right and left, respectively.

On the bottom of the carriage is the carriage encoder which tells the control circuitry the current carriage position counted based on the carriage home position by using the encoder strip attached to the CR base.



2.3 Sensors and Actuators

This equipment has the following sensors and thermister.

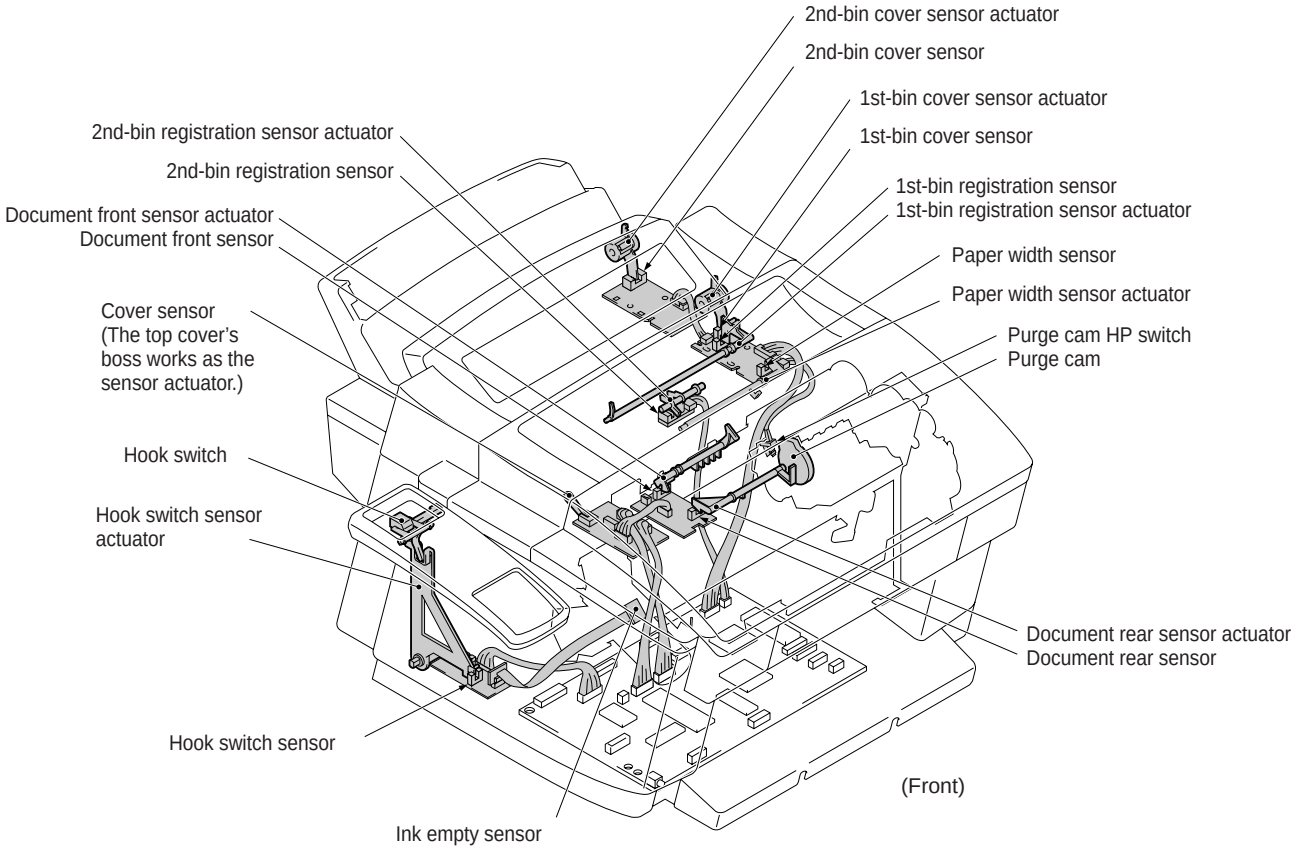
Sensor name	Type	Located on
Hook switch sensor	Photosensor	Hook switch PCB
Cover sensor	Mechanical switch	Cover sensor PCB
1st-bin cover sensor	Photosensor	1st-bin sensor PCB
2nd-bin cover sensor	Photosensor	2nd-bin sensor PCB (MFC7200FC only)
1st-bin registration sensor	Photosensor	1st-bin sensor PCB
2nd-bin registration sensor	Photosensor	2nd-bin registration sensor PCB (MFC7200FC only)
Paper width sensor	Photosensor	1st-bin sensor PCB
Document front sensor	Photosensor	Document sensor PCB
Document rear sensor	Photosensor	Document sensor PCB
Ink empty sensor	Photosensor	Ink empty sensor PCB
Purge cam HP switch	Mechanical switch	Purge cam (→ 1st-bin sensor PCB)
Ink cartridge sensors	Mechanical switch	Carriage PCB
Carriage encoder	Photosensor	Carriage PCB
Head property detector	Solder points	Print head unit (Head PCB)
Head thermister	Thermister	Carriage PCB

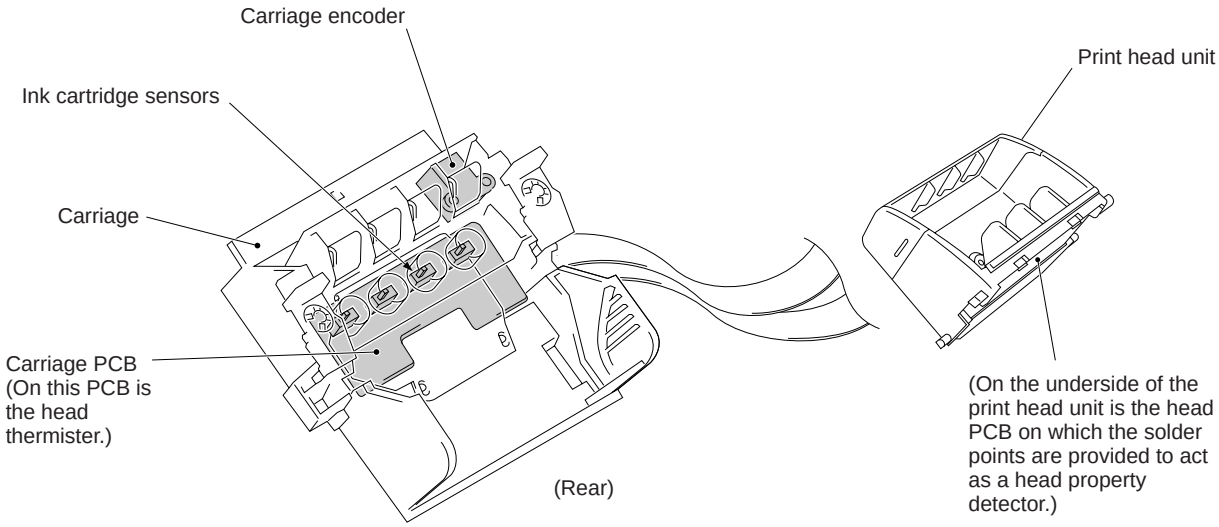
- Hook switch sensor which detects whether the handset is placed on the handset mount.
- Cover sensor which detects whether the top cover is closed.
- 1st-bin and 2nd-bin cover sensors which detect whether the 1st-bin's and 2nd-bin's front covers are closed, as well as detecting whether the 1st bin and 2nd bin are mounted, respectively.
- 1st-bin and 2nd-bin registration sensors which detect the leading and trailing edges of paper, which allow the controller to determine the registration timing and check paper jam.
- Paper width sensor which detects whether the paper width is A4-size or wider.
- 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.
- Ink empty sensor which detects the density of a printed ink-empty mark, as well as detecting whether paper has been ejected.
- Purge cam HP switch which detects whether the purge cam is in the home position.
- Ink cartridge sensors, each of which detects whether an ink cartridge is loaded.
- Carriage encoder which detects the current carriage position and carriage travel speed. If the carriage travel speed varies abnormally, the controller regards it as a paper jam.

- Head property detector which refers to the solder points and resistors provided on the head PCB of a print head unit. When a print head leaves the factory, the solder points and resistors are set according to the property of the ink jet speed (rank A^-, A^+, B^-, B^+, C^-, and C^+).

  If you install the print head on the carriage, the control circuitry on the main PCB reads the property information of the solder points and regulates the drive voltage applied to the head's piezoelectric ceramic actuators.
- Head thermister which detects the ambient temperature of the print head. According to the signal from this thermister, the control circuitry regulates the drive voltage applied to the head's piezoelectric ceramic actuators since the viscosity of the ink varies depending upon the temperature. If the head thermister detects 5.5˚C or below, or 48˚C or higher after two hours of powering-on state, the equipment stops printing and stores print data into the DRAM.

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.



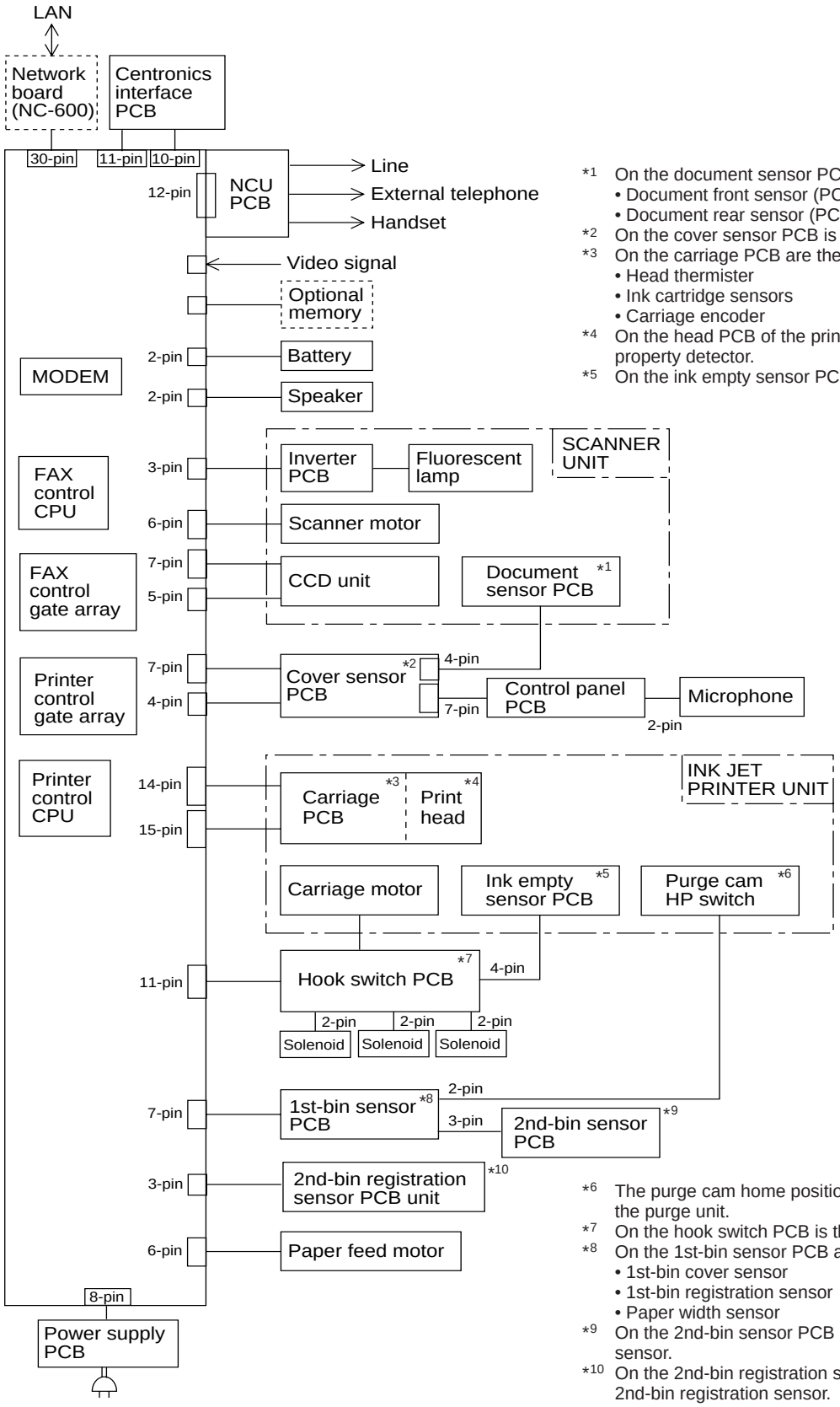


Location of Sensors and Actuators

3. CONTROL ELECTRONICS

3.1 Configuration

The hardware configuration of the facsimile equipment is shown below.



*1 On the document sensor PCB are these sensors:
- Document front sensor (PC1)
- Document rear sensor (PC2)

*2 On the cover sensor PCB is the cover sensor.

*3 On the carriage PCB are these sensors:
- Head thermister
- Ink cartridge sensors
- Carriage encoder

*4 On the head PCB of the print head unit is a head property detector.

*5 On the ink empty sensor PCB is the ink empty sensor.

*6 The purge cam home position switch is located on the purge unit.

*7 On the hook switch PCB is the hook switch sensor.

*8 On the 1st-bin sensor PCB are these sensors:
- 1st-bin cover sensor
- 1st-bin registration sensor
- Paper width sensor

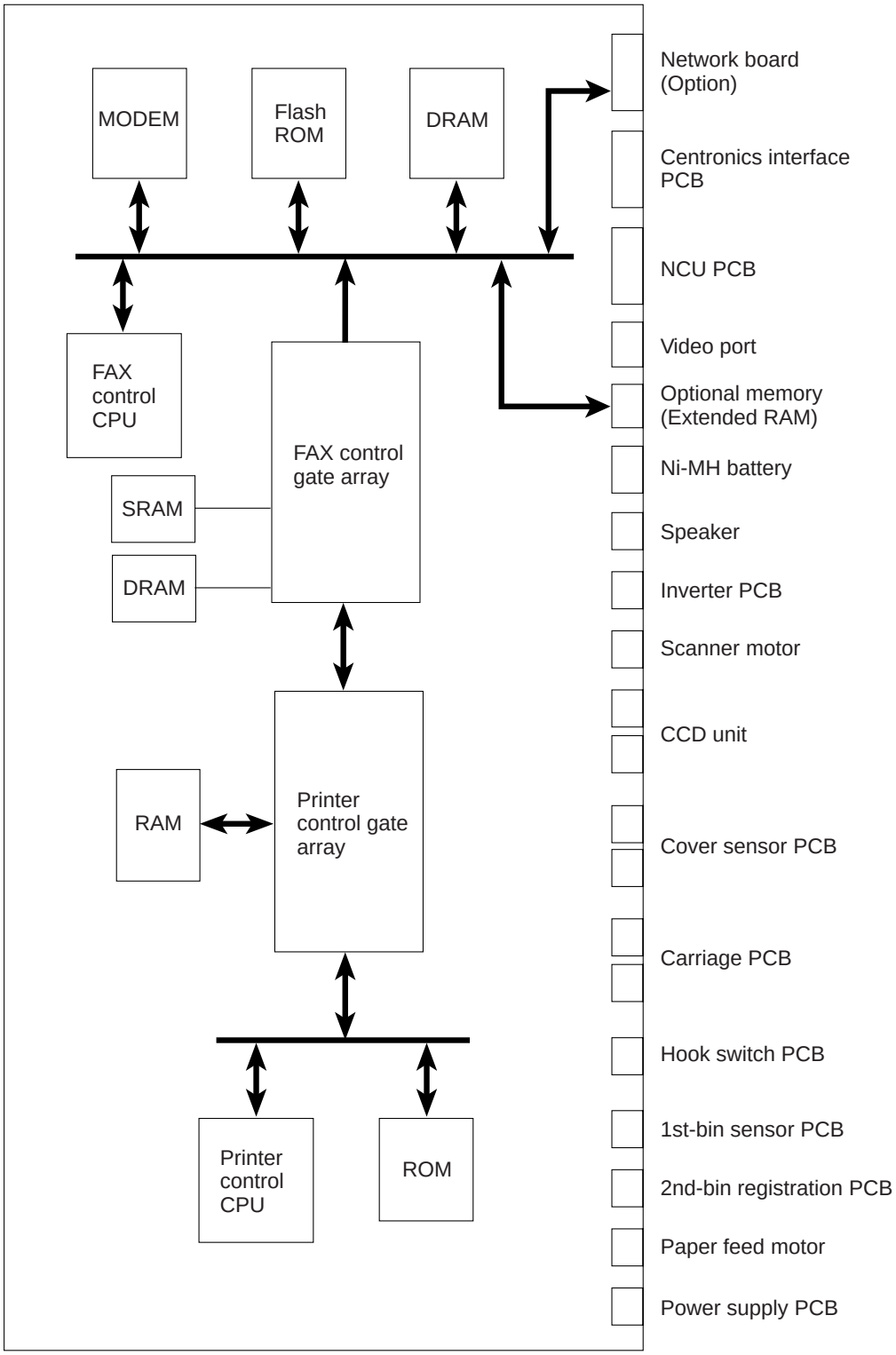
*9 On the 2nd-bin sensor PCB is the 2nd-bin cover sensor.

*10 On the 2nd-bin registration sensor PCB unit is the 2nd-bin registration sensor.

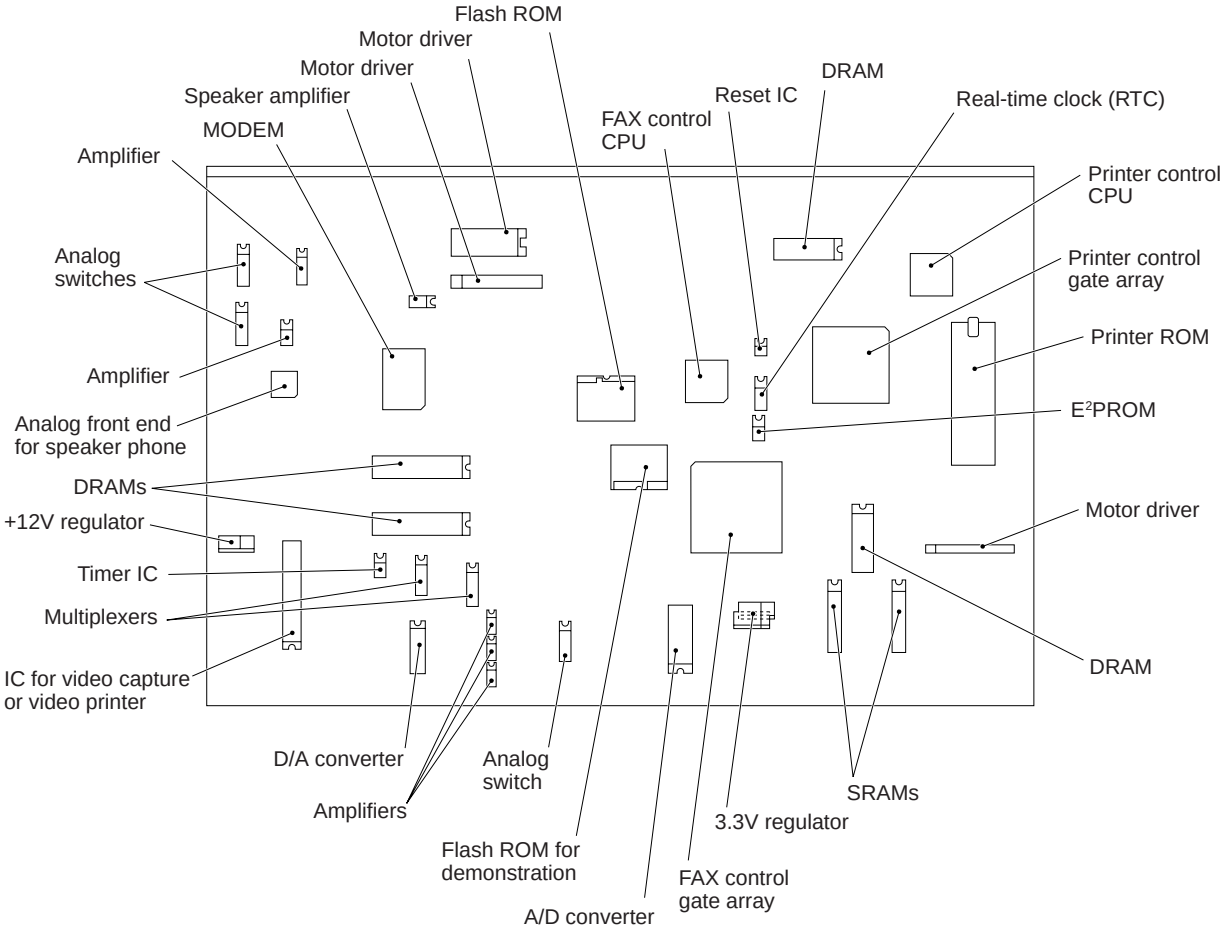
Configuration of Facsimile Equipment

3.2 Main PCB

The main PCB, which is the nucleus controlling the entire operation of the equipment, consists of two CPUs (ASICs), two gate arrays, memories, MODEM, motor drive circuitry, sensor detection circuitry, and analog circuits for scanning and printing.

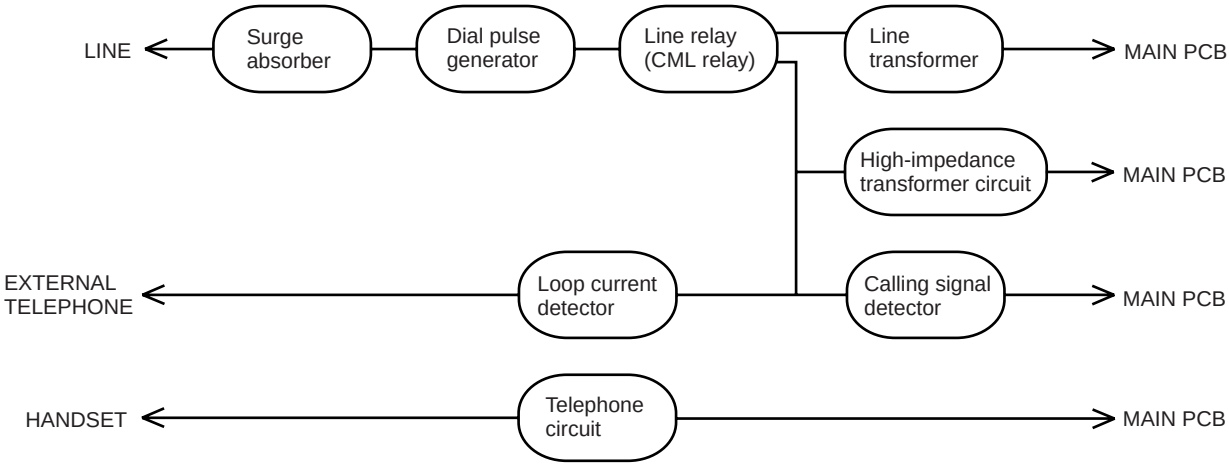


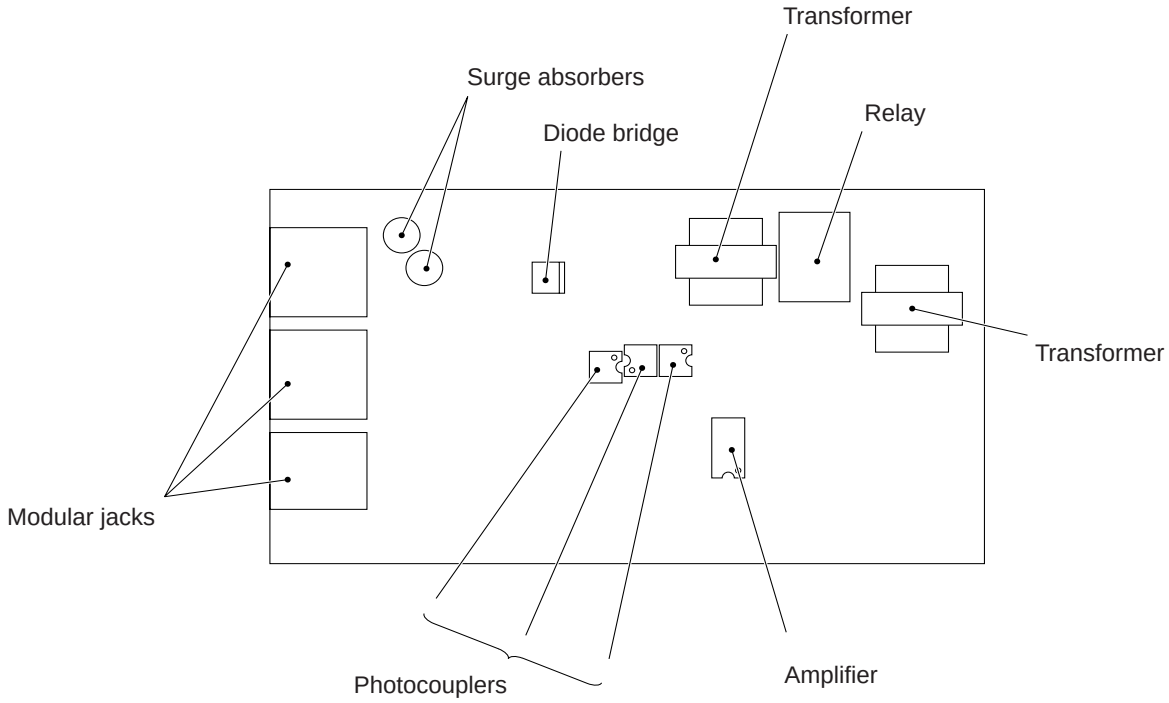
Block Diagram of Main PCB


Flash ROM
Motor driver
Motor driver
Speaker amplifier
MODEM
Amplifier
Analog switches
Amplifier
Analog front end for speaker phone
DRAMs
+12V regulator
Timer IC
Multiplexers
IC for video capture or video printer
D/A converter
Amplifiers
Analog switch
Flash ROM for demonstration
A/D converter
FAX control gate array
3.3V regulator
SRAMs
DRAM
Motor driver
DRAM
Reset IC
Real-time clock (RTC)
FAX control CPU
Printer control CPU
Printer control gate array
Printer ROM
E²PROM

3.3 NCU PCB

The NCU PCB switches the communications line to telephone or built-in MODEM, under the control of the main PCB.





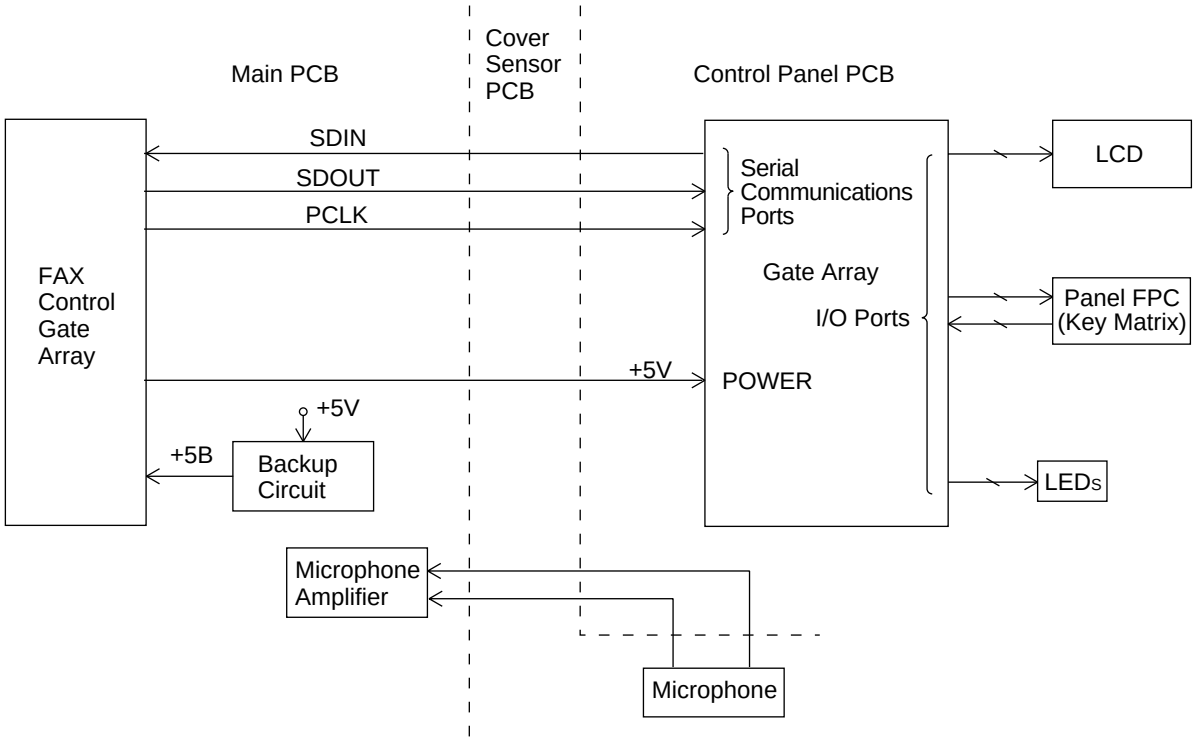
3.4 Control Panel PCB

The control panel PCB and the main PCB communicate with each other by serially transmitting commands and data.

The control panel unit consists of a gate array, an LCD and LEDs, which are controlled by the gate array according to commands issued from the FAX control CPU on the main PCB.

The calendar clock is backed up by the backup circuit on the main PCB.

The panel FPC is a flexible keyboard PCB which integrates the key matrix having rubber keytops.



Control Panel PCB and its Related Circuit

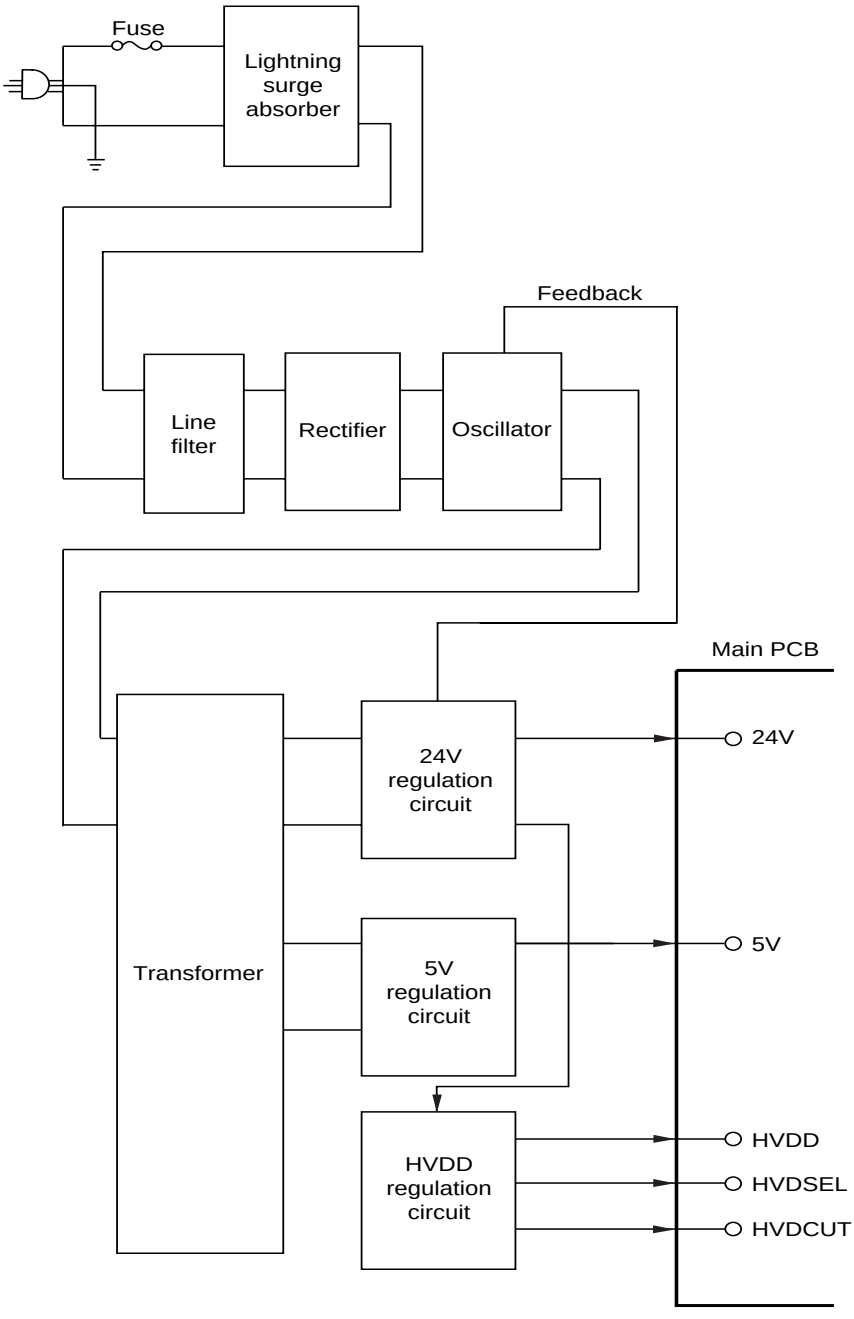
3.5 Power Supply PCB

The power supply uses the switching regulator to generate DC power (+24V, +5V, and HVDD) from a commercial AC power supply.

The +24V source is stabilized and fed to the motors and solenoids for feeding documents and recording paper, as well as to the fluorescent lamp of the CCD unit via the inverter.

The +5V source is stabilized and fed to the logic, etc.

The HVDD generated from +24V is fed to the piezoelectric ceramic actuators embedded in the print head. It is switched between 8 levels within 13V to 30V depending upon the ambient temperature detected by the head thermister.



Power Supply Circuit

CHAPTER IV.

DISASSEMBLY/REASSEMBLY, LUBRICATION AND ADJUSTMENT

CONTENTS

1. DISASSEMBLY/REASSEMBLY

■ Safety Precautions

To prevent the creation of secondary problems by mishandling, observe the following precautions during maintenance work.

(1) Always turn off the power before replacing parts or units. When having access to the power supply, be sure to unplug the power cord from the power outlet.

(2) Be careful not to lose screws, washers, or other parts removed for parts replacement.

(3) When using soldering irons and other heat-generating tools, take care not to damage the resin parts such as wires, PCBs, and covers.

(4) Before handling the PCBs, touch a metal portion of the equipment to discharge static electricity; otherwise, the electronic parts may be damaged due to the electricity charged in your body.

(5) When transporting PCBs, be sure to wrap them in conductive sheets such as aluminum foil.

(6) Be sure to reinsert self-tapping screws correctly, if removed.

(7) Tighten screws to the torque values listed on the next page.

(8) When connecting or disconnecting cable connectors, hold the connector bodies not the cables. If the connector has a lock, always slide the connector lock to unlock it.

(9) Before reassembly, apply the specified lubricant to the specified points. (Refer to Section 2 in this chapter.)

(10) After repairs, check not only the repaired portion but also that the connectors and other related portions function properly before operation checks.

(11) Once the print head prints, it will start head locking operation after five seconds from the end of printing. The head locking operation will take 5 to 10 seconds. NEVER unplug the power cord before the equipment completes the head locking operation; doing so will make the print head unusable and require replacement with a new print head.

When you receive the equipment from the user or when you pack it for sending it back to the user, check the head locking state.

Tightening Torque List

Location	Screw type	Q'ty	Tightening torque (kg•cm)	Loosening torque (kg•cm)
2nd-bin sensor cover*	Taptite, cup B 3x10	1	7 ±2	Min. 2
2nd-bin base*	Taptite, cup B 3x10	2	7 ±2	Min. 2
Rear cover**	Taptite, cup B 3x10	2	7 ±2	Min. 2
Panel rear cover	Taptite, cup B 3x8	2	5 ±1	Min. 2
Inner cover	Taptite, cup B 3x10	5	9 ±1	Min. 2
Paper ejection cover	Screw, pan (washer) 3x8DB	2	4 ±1	Min. 2
Scanner motor	Screw, pan (washer) 3x8DB	2	7 ±2	Min. 3
Inverter ASSY				
(Grounding terminal)	Taptite, cup B 3x10	1	9 ±2	Min. 2
(Upper inverter support)	Taptite, cup S 3x5	2	6 ±2	Min. 2
Grounding terminal	Taptite, cup S 3x5	1	6 ±2	Min. 2
Handset mount	Taptite, cup B 3x10	2	7 ±2	Min. 2
Main cover (Bottom)	Taptite, cup B 4x10	2	8 ±2	Min. 3
(Front)	Taptite, cup B 3x10	2	7 ±2	Min. 2
(Rear)	Taptite, cup B 4x10	2	10 ±2	Min. 3
Speaker clamp spring	Taptite, cup B 3x10	1	9 ±2	Min. 2
1st-bin sensor PCB holder	Taptite, cup B 3x10	2	7 ±2	Min. 2
1st-bin sensor PCB	Taptite, cup B 3x10	1	7 ±2	Min. 2
CR-LF chute grounding plate	Taptite, cup S 3x5	1	9 ±2	Min. 2
Hook switch PCB	Taptite, cup B 3x10	1	6 ±2	Min. 2
2nd-bin gear plate*	Taptite, cup S 3x5	1	6 ±2	Min. 2
	Taptite, cup B 3x10	1	7 ±2	Min. 2
Drive gear unit	Taptite, cup B 3x10	1	5 ±1	Min. 2
Registration roller grounding plate	Taptite, cup B 3x10	1	7 ±2	Min. 2
LF chute ASSY	Screw, pan (washer) 3x12DB	1	7 ±2	Min. 3
Paper pressure chute ASSY				
(R side)	Stepped screw	2	7 ±2	Min. 3
(L side)	Taptite, cup S 3x8	1	9 ±2	Min. 3
LAN cover	Screw, pan (washer) 3x8DB	1	4 ±1	Min. 2
Bottom plate	Taptite, cup S 3x5	2	9 ±2	Min. 2
	Taptite, cup B 3x10	9	9 ±2	Min. 2
Power supply PCB	Taptite, cup S 3x5	2	6 ±2	Min. 2

Location	Screw type	Q'ty	Tightening torque (kg•cm)	Loosening torque (kg•cm)
Power inlet	Screw, pan (washer) 3x8DB	2	4 ±1	Min. 2
Grounding terminal	Screw, pan (washer) 4x8DB	1	6 ±2	Min. 3
Centronics interface PCB	Machine screw, pan 3x6	2	7 ±2	Min. 2
Paper feed motor	Screw, pan (washer) 3x6DB	2	7 ±2	Min. 3
NCU shield plate	Taptite, cup B 3x10	2	7 ±2	Min. 2
Platen	Taptite, cup B 3x6	3	3 ±1	Min. 0.5
2nd-bin registration sensor PCB*	Taptite, bind B 3x12	1	5 ±1	Min. 2

* For the MFC7200FC

** For the MFC7000FC

■ Preparation

Prior to proceeding to the disassembly procedure,

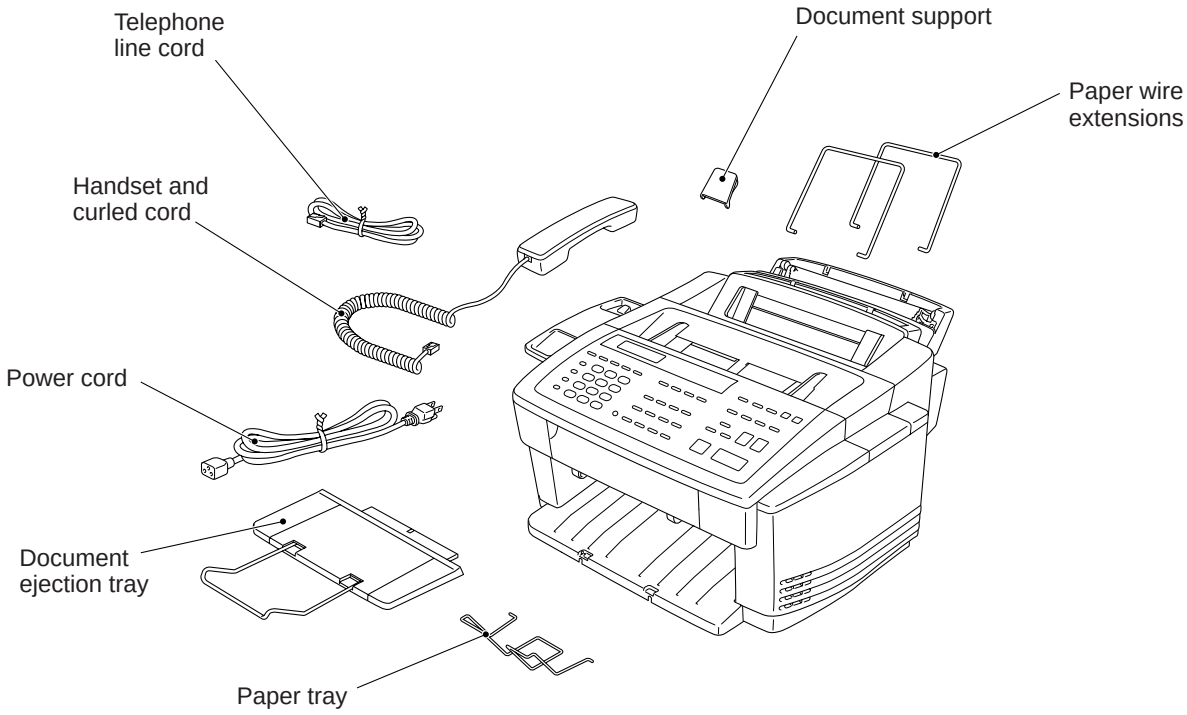
(1) Unplug

- the modular jack of the telephone line,
- the modular jack of the curled cord (and remove the handset), and
- the modular jack of an external telephone set if connected. (Not shown below.)

(2) Remove

- the two paper wire extensions (the single paper wire extension for the MFC7000FC),
- the document support,
- the document ejection tray,
- the paper tray, and
- the power cord.

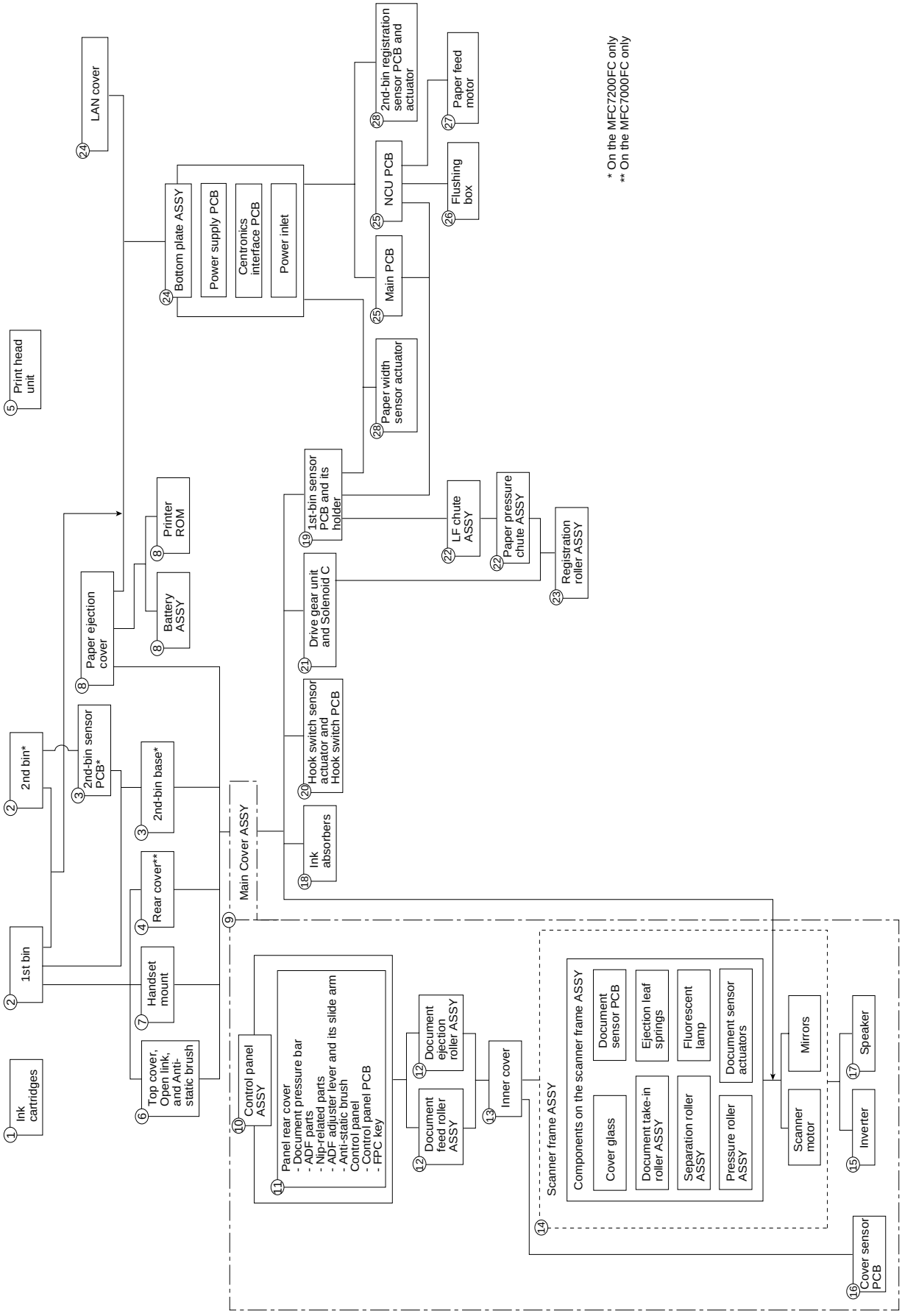
NOTE: Do not remove the ink cartridges when disassembling the equipment except when removing the print head.



■ How to Access the Object Component

- On the next page is a disassembly order flow which helps you access the object component. To remove the drive gear unit, for example, first find it on the flow and learn its number (21 in this case). You should remove parts numbered 2 to 4 and 6 to 9 so as to access the drive gear unit.
- Unless otherwise specified, the disassembled parts or components should be reas-

■ Disassembly Order Flow



1.1 Ink Cartridges

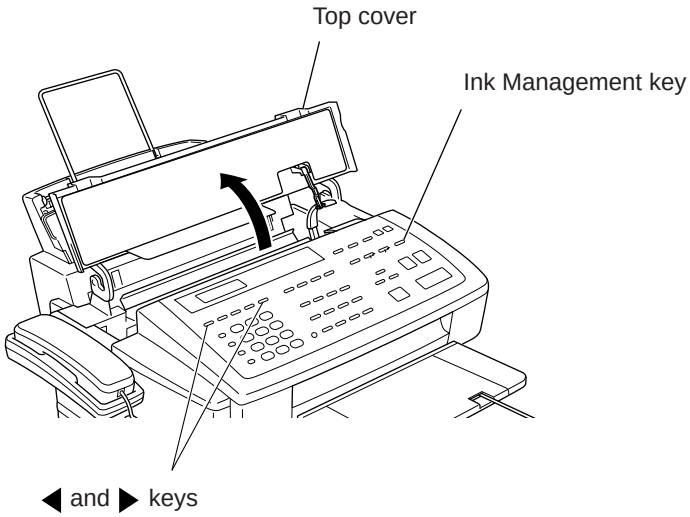
During disassembly jobs (except when removing the print head), all of the four ink cartridges should be kept in place. The following ink cartridge replacement procedure should apply only when you replace ink cartridges. When replacing the print head, do not apply this procedure but the procedure given in Section 1.5.

(1) Plug the power cord into a wall socket.

(2) If any ink empty message (INK EMPTY BLACK, CYAN, MAGENT, or YELLOW) is displayed on the LCD, open the top cover to place the equipment in the ink cartridge replacement mode.

If any ink near-empty message (NEAR EMPTY BLACK, CYAN, MAGENT, or YELLOW) or no message is displayed on the LCD, follow the steps below in order to place the equipment in the ink cartridge replacement mode.

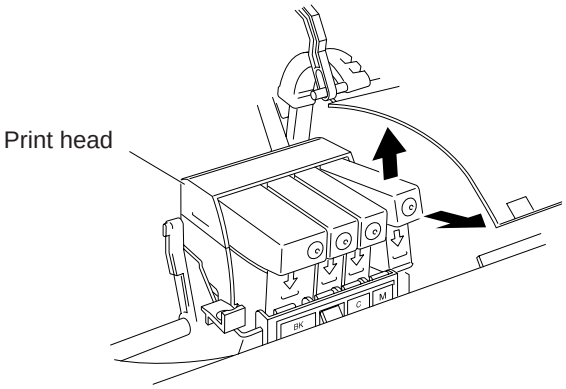
1) Press the Ink Management key.
2) Use the [◀] and [▶] keys to show the "2.REPLACE INK" on the LCD.
3) Press the [2] key or the [Set] key.
4) Open the top cover.



The carriage automatically moves left to the ink cartridge replacement position.

(3) Take out the four ink cartridges from the print head.

NOTE: When handling ink cartridges, do not touch their orifices which may stain your hands or clothing with ink.

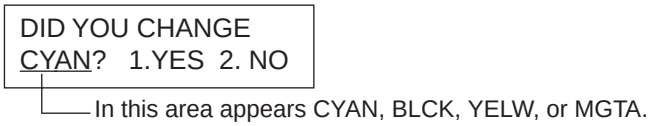


(4) Load new or removed ink cartridges in the order of black, yellow, cyan, and magenta. Be sure to snap them into place.

NOTE: When using a new cartridge, first open the cartridge bag, take out the cartridge, and remove the sealing tape gently.

(5) Close the top cover.

For each of the ink cartridges loaded, the confirmation message will appear as shown below, asking you whether the ink dot counter should be reset to zero.



If you have loaded a new ink cartridge in step (4), press the [1] key to reset the ink dot counter; if you have reloaded the removed one, press the [2] key.

NOTE: Pressing the [1] key although you have reloaded the removed one could cause inkless printing.

(6) The equipment automatically enters the purge mode. Select the related ink-jet unit(s) of the print head for purging air bubbles.

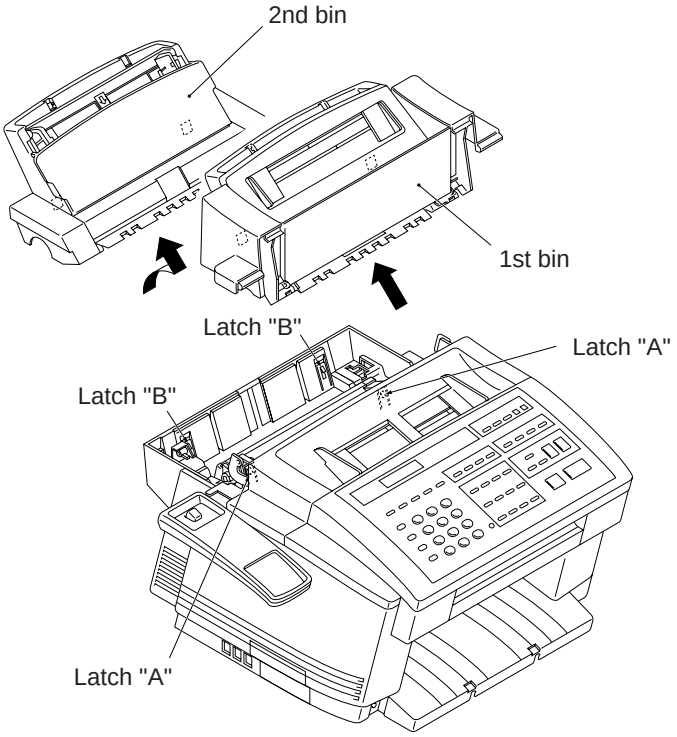
1.2 1st Bin and 2nd Bin*

* The MFC7200FC has double bins (1st bin and 2nd bin). The MFC7000FC has a singe bin (1st bin) only.

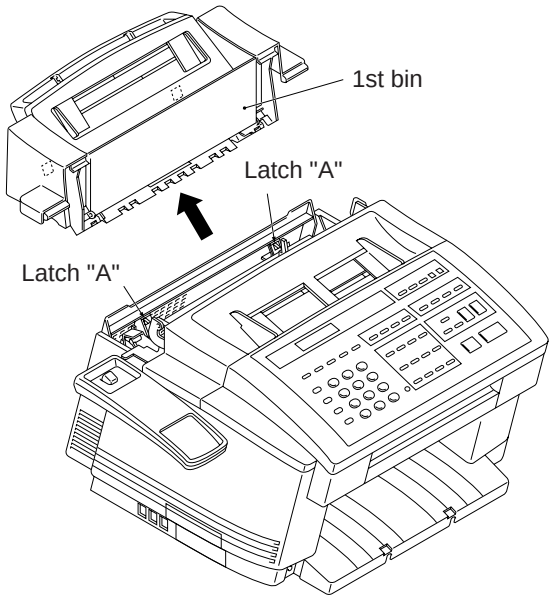
(1) Slightly pull up the rear of the 1st bin to release it from two latches "A", then lift up the bin.

(2) Slightly pull up the rear of the 2nd bin to release it from two latches "B", then lift up the bin. (Only for the MFC7200FC)

MFC7200FC



MFC7000FC

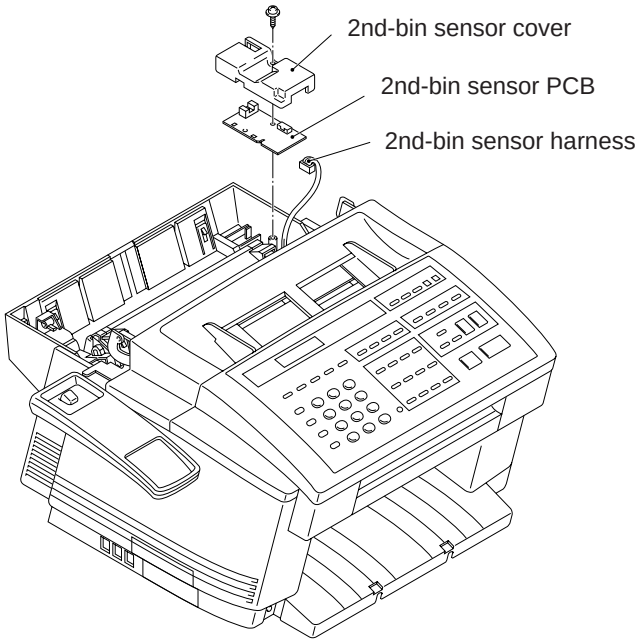


1.3 2nd-bin Sensor PCB and 2nd-bin Base (MFC7200FC)

(1) Remove the screw from the 2nd-bin sensor cover, then take out the cover.

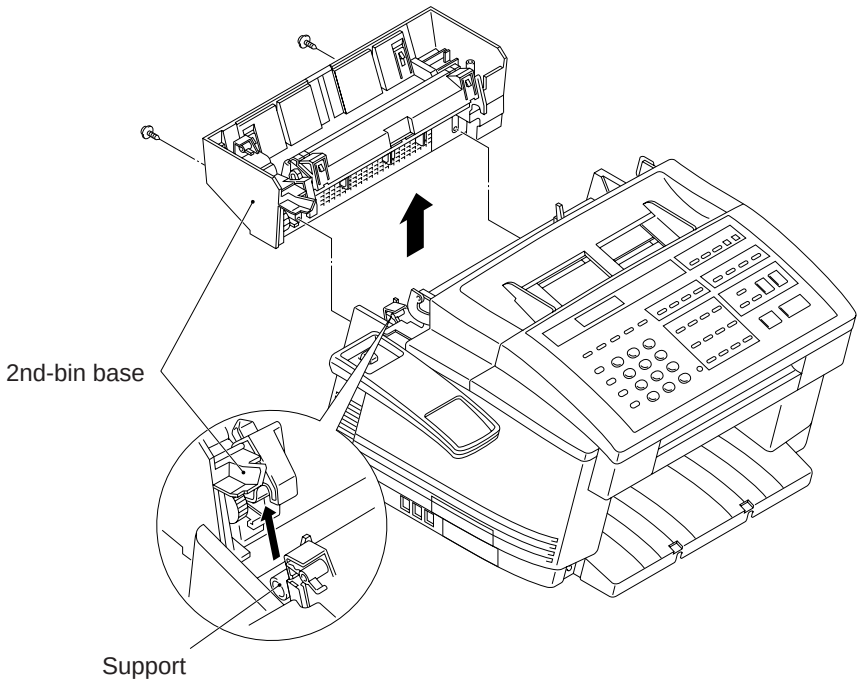
(2) Disconnect the 2nd-bin sensor harness from the 2nd-bin sensor PCB, then remove the PCB.

MFC7200FC



(3) Remove the two screws from the rear of the 2nd-bin base, then lift up the base.

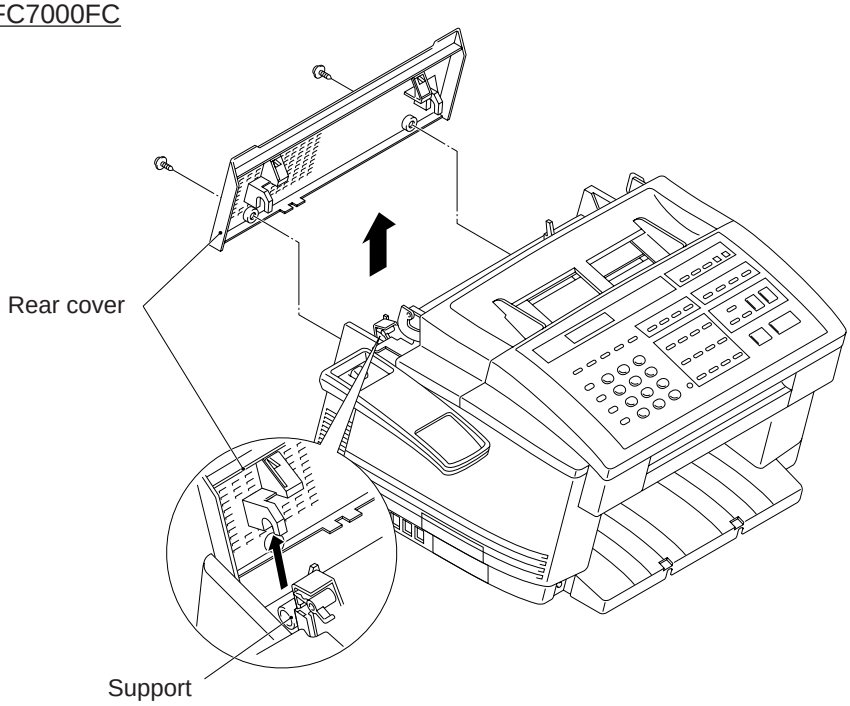
MFC7200FC



1.4 Rear Cover (MFC7000FC)

(1) Remove the two screws from the rear cover, then take out the cover.

MFC7000FC



1.5 Print Head Unit

During disassembly jobs, the print head and all the four ink cartridges should be kept in place. The following print head replacement procedure should apply only when you replace the print head unit.

(1) Plug the power cord into a wall socket.

(2) Open the top cover.

(3) Press the Ink Management key.

(4) Use the [◀] and [▶] keys to show the "3.REPLACE HEAD" on the LCD.

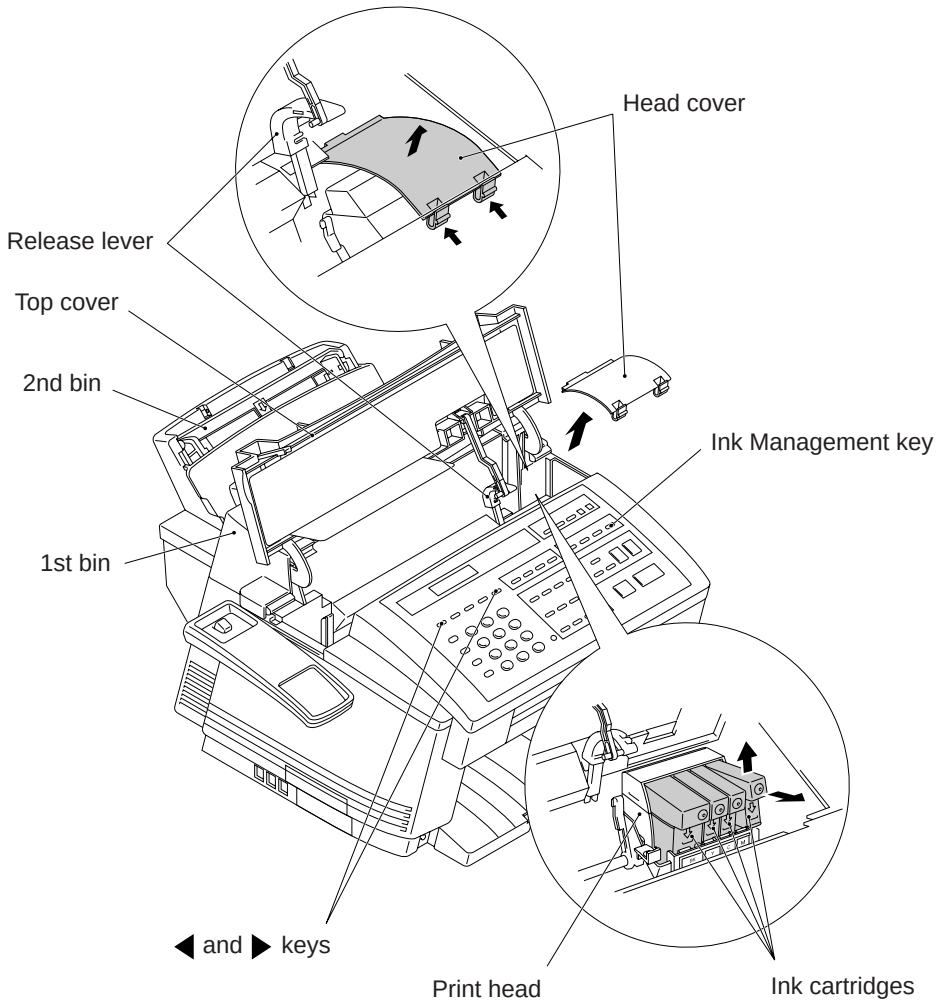
(5) Press the [3] key or the [Set] key to place the equipment in the head replacement mode.

The carriage automatically moves to the head replacement position (slightly to the left from the home position).

(6) Remove the head cover by releasing the two pawls.

(7) Remove all ink cartridges, one at a time.

NOTE: When handling ink cartridges, do not touch their nozzles which may stain your hands or clothes with ink.



(8) Pinch the tab of each head lock (blue) with your fingers and turn it inwards.

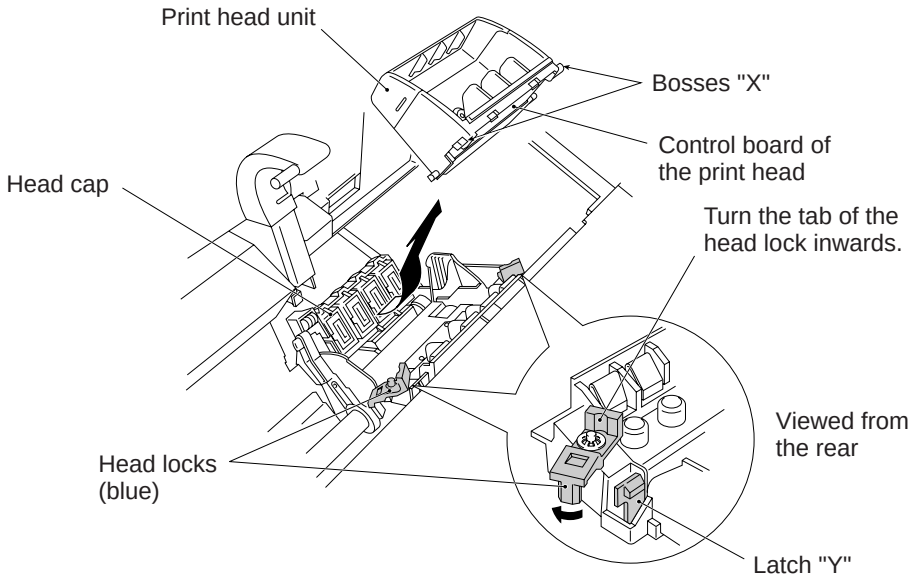
(9) Press the top of the print head unit to the rear in order to release bosses "X" from latches "Y" provided on the carriage, and then lift the print head unit up and out of the carriage.

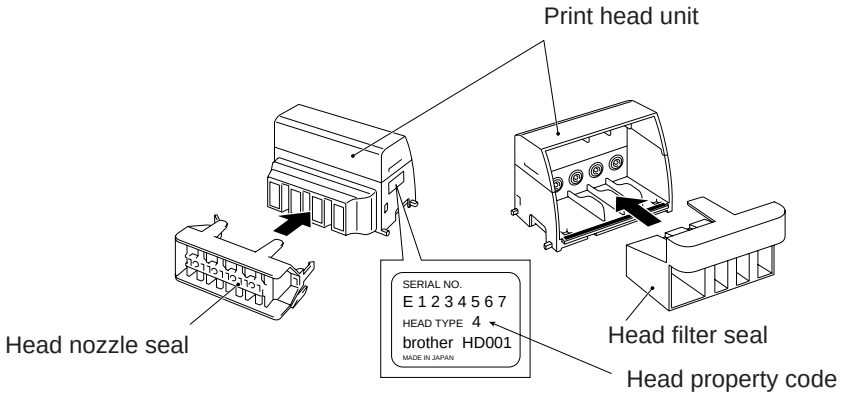
NOTE: Do not touch the printing ends (nozzles) of the print head; doing so will stain your hands with ink.

NOTE: Be sure to put a head nozzle seal and filter seal on the print head as shown below. Leaving the print head without those seals will dry up its printing ends and filters, resulting in a damaged head.

NOTE: Do not touch the control board provided on the bottom of the print head.

(10) If the head cap has collected ink, clean it with a head cleaner. If the surrounding parts are stained with ink, wipe them off with a clean cloth.





(11) Enter the head property code (any of 04 through 11) given on the side of a print head unit to be installed by using the ◀ or ▶ key, and then press the Set key.

```
HEAD TYPE:07
SELECT<>&SET
```

(12) To install a new (or removed) print head unit, take off the yellow head nozzle seal and then put the print head unit onto the carriage, taking care not to touch the control board provided on the bottom of the print head.

(13) Secure the print head with the blue head locks.

(14) Remove the yellow head filter seal, then load ink cartridges in the order of black, yellow, cyan, and magenta. Be sure to snap them into place.

(15) Put the print head cover back into place.

(16) Close the top cover.

For each of the ink cartridges loaded, the confirmation message will appear as shown below, asking you whether you loaded a new cartridge.

```
DID YOU CHANGE
CYAN? 1.YES 2.NO
```

(17) If you have loaded a new cartridge, press the [1] key within one minute. The ink dot counter will be reset to zero.

If you have reloaded the removed one, press the [2] key within one minute.

(18) The equipment automatically carries out purging operation for the ink-jet unit of the print head. Upon completion purging operation, the following messages appear alternately:

```
TEST PRINT          TEST PRINT
SET PAPER AND   ⟷   PRESS START KEY
```

Make sure that paper is loaded in the bin, then press the [Start] key.

The equipment prints Test Sheet No. 1 and then shows the following message:

```
PRINT OK?
1.YES 2.NO
```

(19) Check the print quality, following the instructions given on Test Sheet No. 1.

If the print quality is OK, press the [1] key and proceed to step (20).

If any of the horizontal lines are missing, press the [2] key within one minute, and go back to step (18).

Pressing neither key within one minute makes the equipment proceed to step (20).

(20) The following messages appear alternately:

```
VERTICAL ALIGN          VERTICAL ALIGN
SET PAPER AND     ⟷     PRESS START KEY
```

Make sure that paper is loaded in the bin, then press the [Start] key within one minute. The equipment prints Test Sheet No. 2.

If the [Start] key is not pressed within one minute, the equipment automatically returns to the initial stage of the maintenance mode.

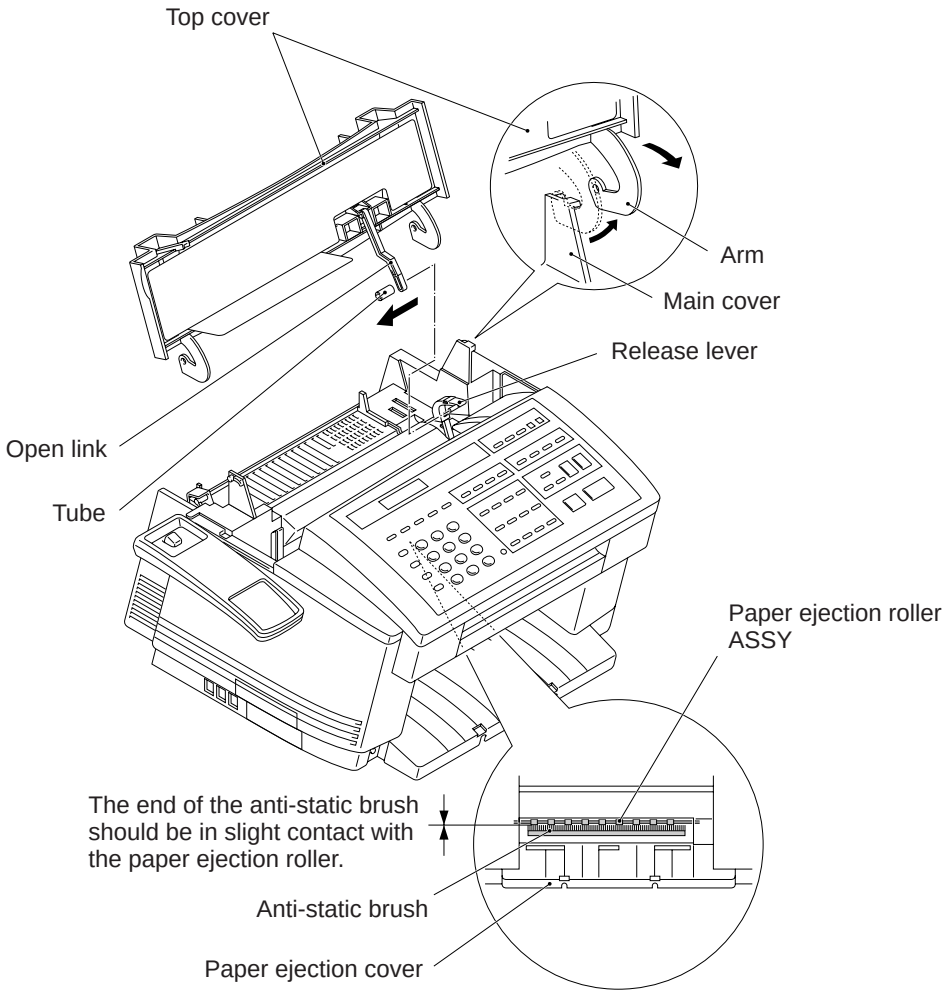
(21) According to the instructions given on Test Sheet No. 2, adjust the alignment of vertical print lines.

1.6 Top Cover, Open Link, and Anti-static Brush

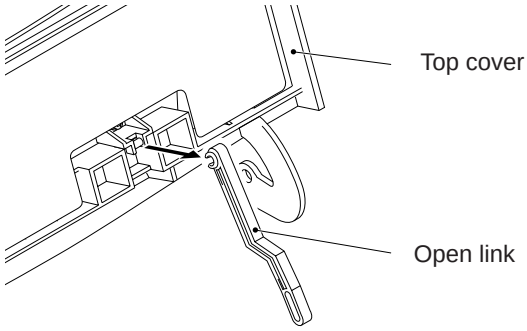
(1) Fully open the top cover.

(2) Disengage the open link from the shaft of the release lever.

(3) Push the right and left arms of the top cover outwards to unhook them from the bosses provided on the main cover, then remove the top cover.



(4) Pull out the open link from the top cover.



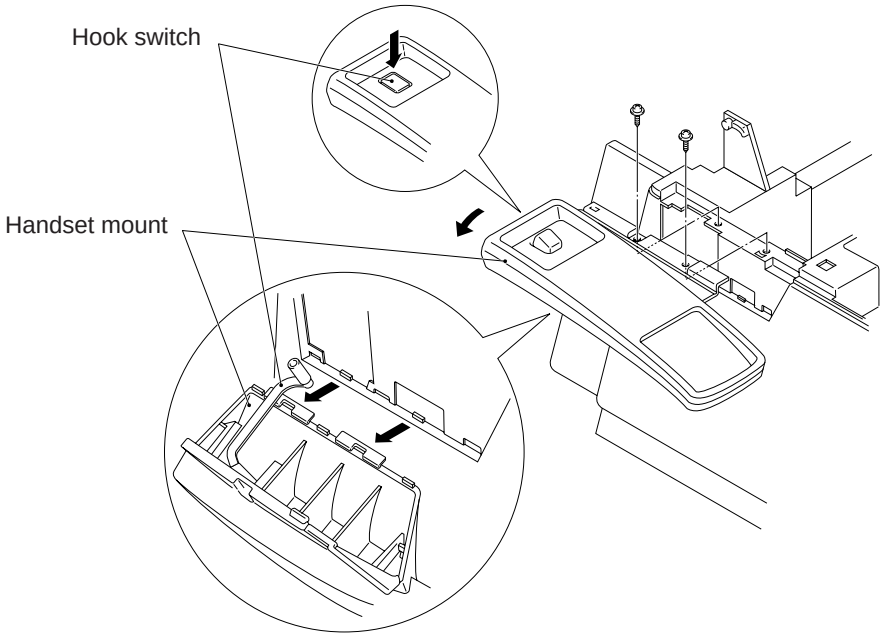
■ Reassembling Notes

- Once removed, the anti-static brush will become unusable and a new one will have to be put back in. When attaching the new anti-static brush, make the end of the brush come into slight contact with the paper ejection roller.

1.7 Handset Mount

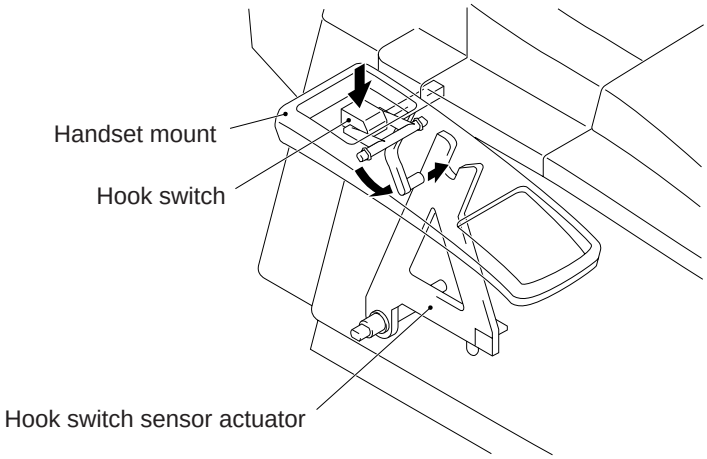
(1) Remove the two screws from the handset mount.

(2) Twist the handset mount so that it tilts over to the left and its upper end works out of the bosses provided on the main cover.



■ Reassembling Notes

- While holding down the hook switch, set the handset mount to the main cover so that the bottom end of the hook switch becomes fitted in the U-shaped socket of the hook switch sensor actuator.



1.8 Paper Ejection Cover, Battery ASSY and Printer ROM

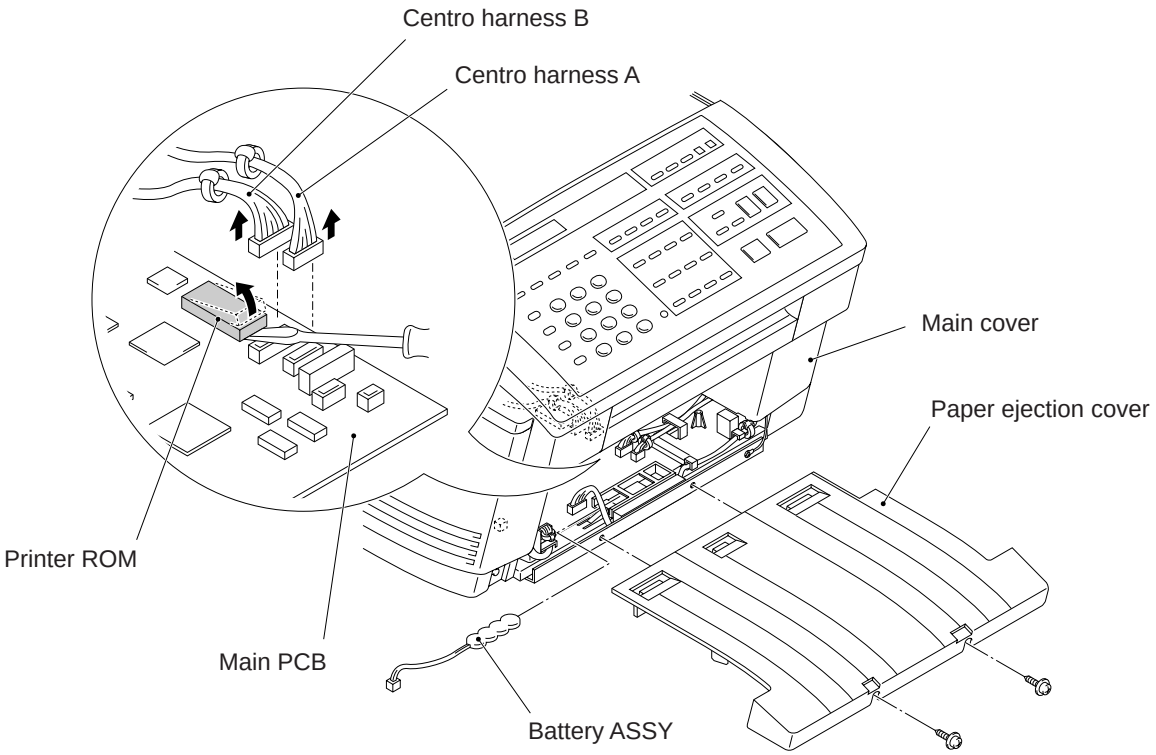
(1) Remove the two screws from the paper ejection cover, then pull out the cover.

(2) If you need to replace the battery ASSY, disconnect the battery harness from the main PCB and take out the ASSY.

CAUTION: Avoid disconnecting the battery ASSY from the main PCB except when replacing the battery ASSY itself or the main PCB. Doing so will lose the calendar clock data, TAD data, and received data stored in the DRAM.

(3) To replace the printer ROM, first disconnect the Centro harnesses A and B from the main PCB. As shown below, insert the tip of a flat screwdriver between the printer ROM and its socket and then pull up the printer ROM gently.

NOTE: Take care not to break or bend the Centro connector pins on the main PCB.



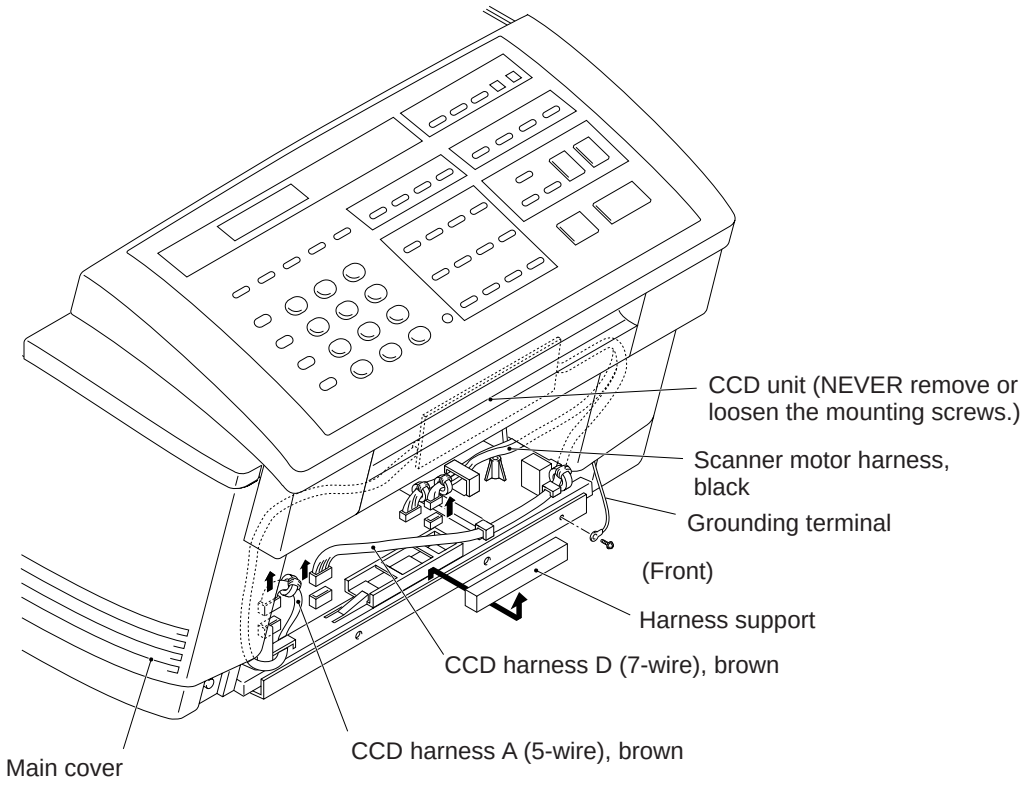
1.9 Main Cover ASSY (and Speaker Clamp Spring)

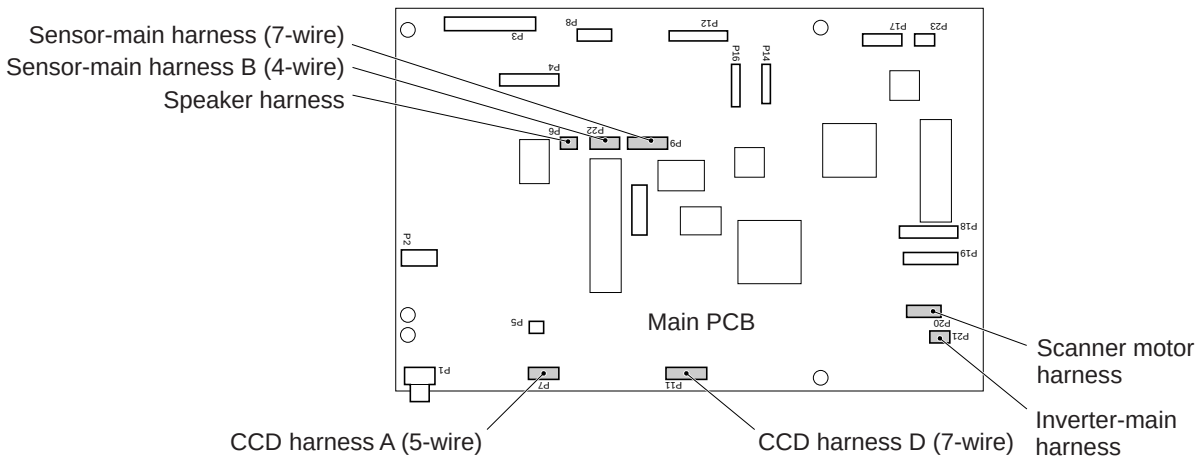
(1) Remove the harness support which secures the CCD harness D.

(2) Disconnect the following harnesses from the main PCB:

- CCD harness A
- CCD harness D
- Inverter-main harness
- Scanner motor harness
- Speaker harness
- Sensor-main harness B (4-wire)
- Sensor-main harness (7-wire)

(3) Take off the grounding terminal from the bottom plate by removing the screw.



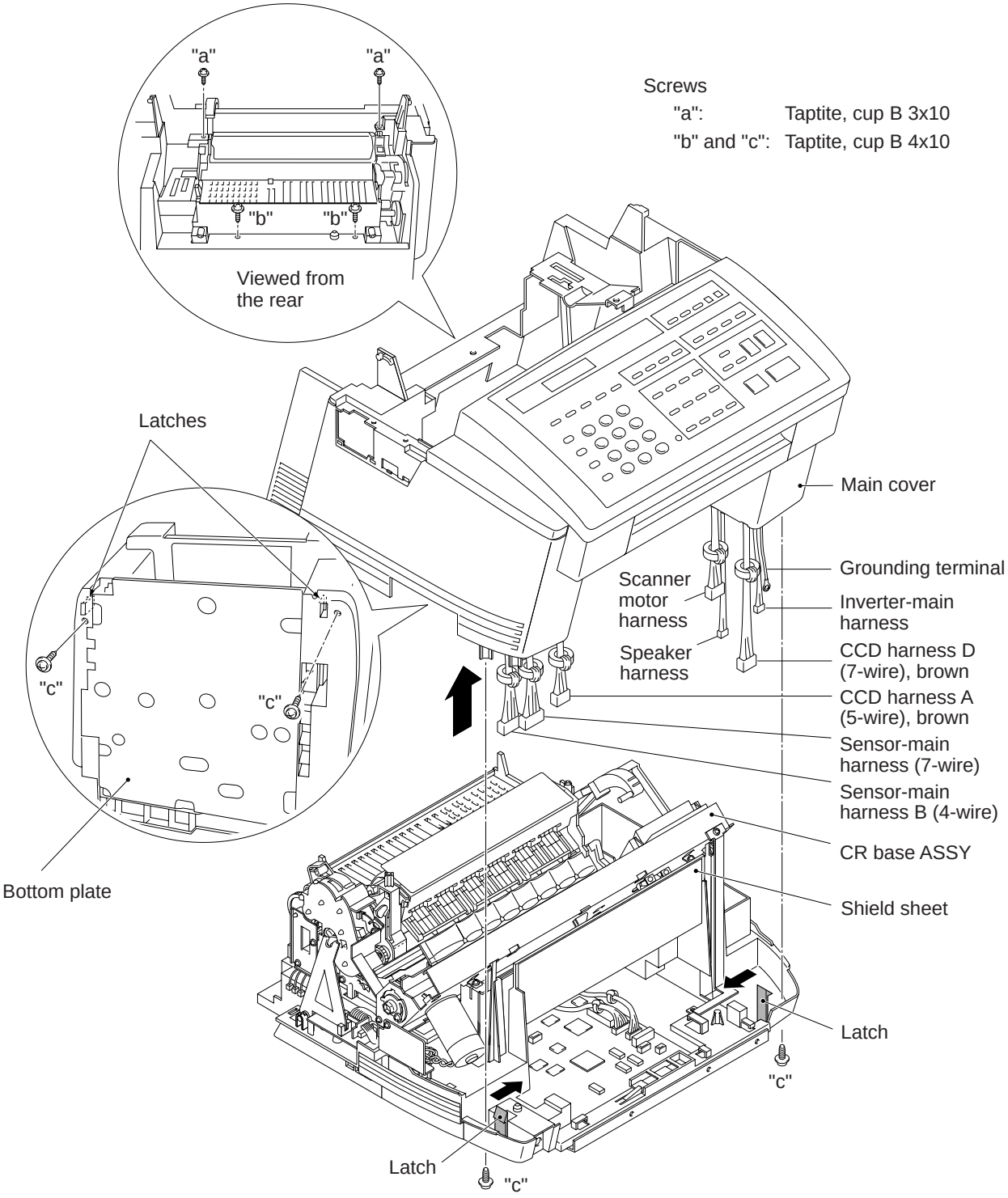


(4) Remove the four screws ("a" and "b").

(5) Turn the main frame upside down.

(6) Remove the two screws ("c") from the bottom of the main cover.

(7) Place the main frame rightside up.

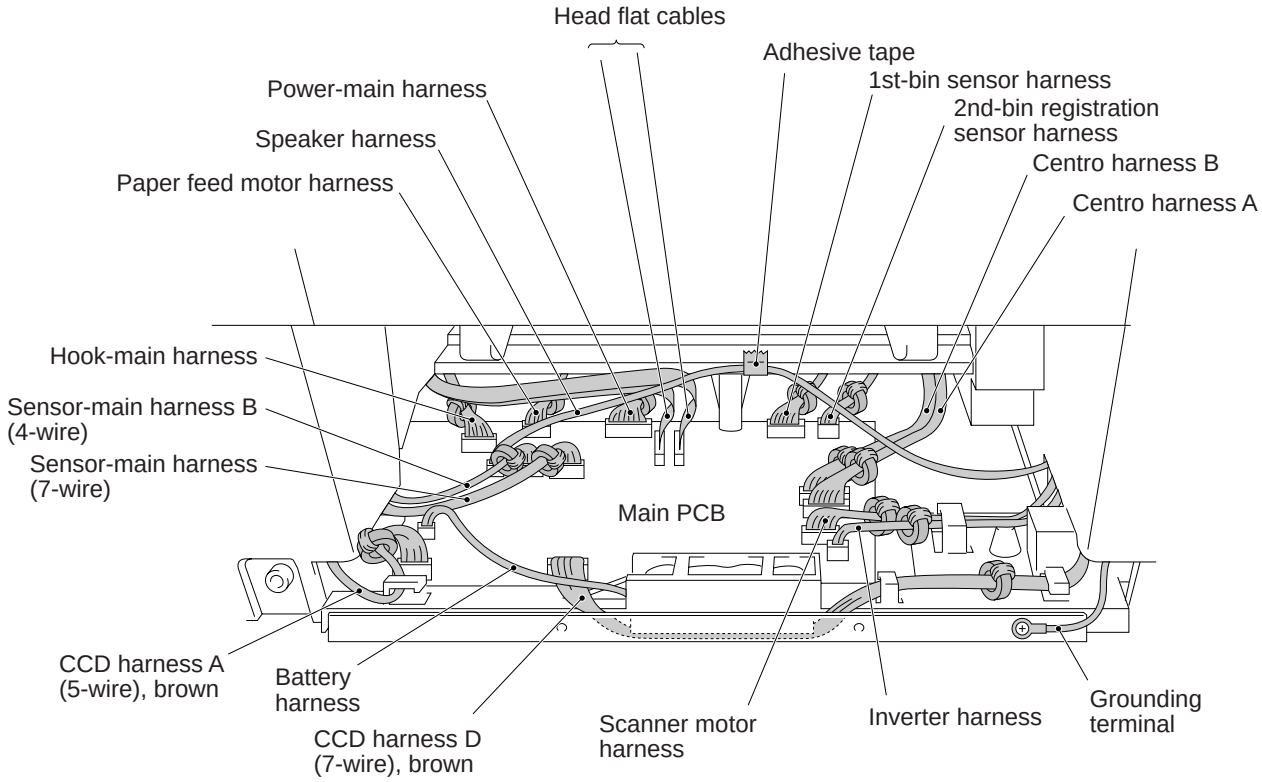


(8) Pull up the rear edge of the main cover and release the front edge from the latch, then lift up the main cover.

(9) To remove the speaker clamp spring, remove the screw from the bottom of the main cover.

■ Reassembling Notes

- The shield sheet is attached to the main frame. Once removed, it will become unusable and a new part will have to be put back in.
- When connecting the harnesses to the main PCB, be sure to route them as shown below.



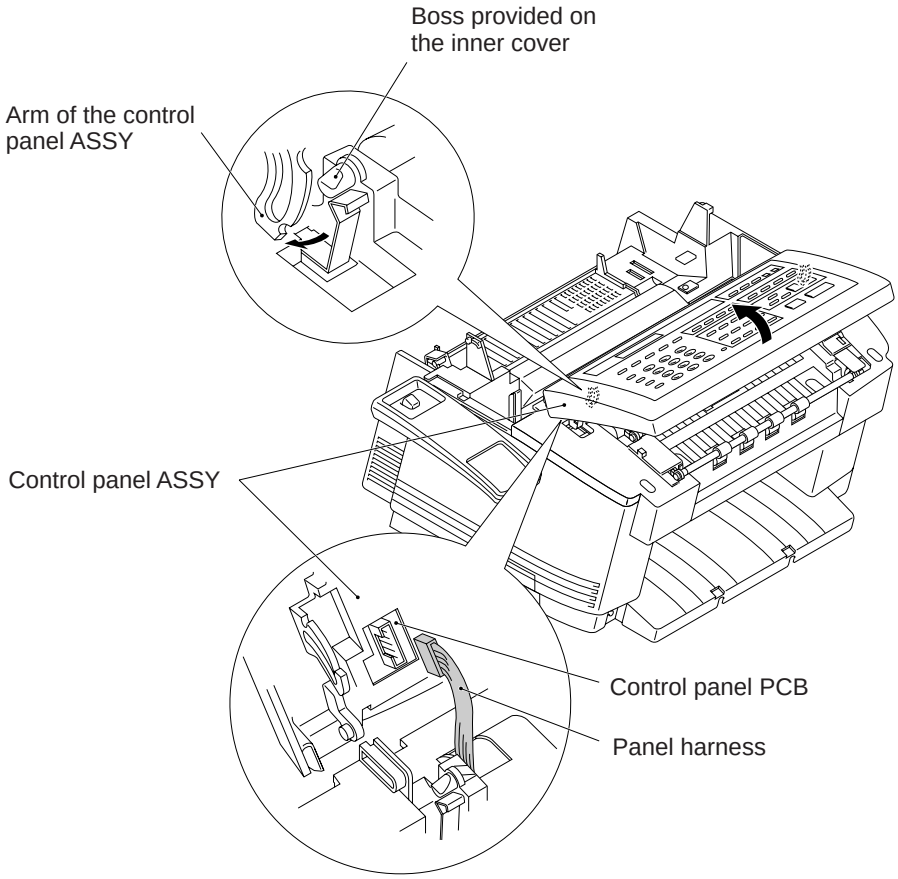
1.10 Control Panel ASSY

(1) Fully open the top cover.

(2) Slightly open the control panel ASSY.

(3) Push the right and left arms of the control panel ASSY outwards with your thumbs to unhook them from the bosses provided on the inner cover, then slide the control panel ASSY to the rear.

(4) Disconnect the panel harness from the control panel PCB.



1.11 Panel Rear Cover and Control Panel

(1) Place the control panel ASSY upside down.

(2) Remove the document pressure bar, nip-related parts, and ADF parts from the panel rear cover.

NOTE: Once removed, the spring plates of the ADF parts will become unusable and new parts will have to be put back in.

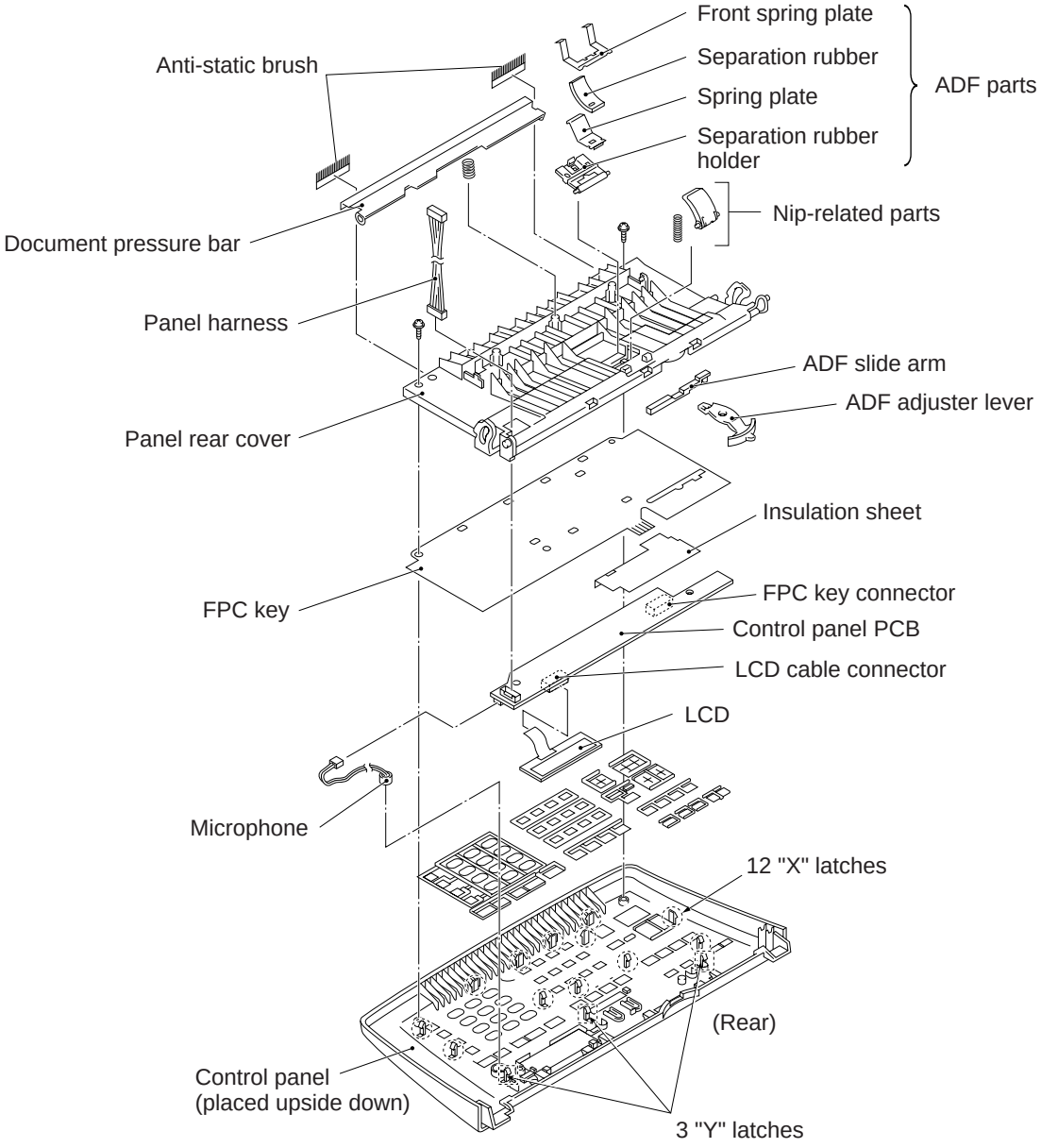
(3) Remove the two screws from the panel rear cover.

(4) While lifting up the front edge of the panel rear cover, unhook it from the 12 "X" latches provided on the control panel.

(5) Remove the ADF adjuster lever from the inside of the panel rear cover. While pressing down the ADF parts from the inside, remove the ADF slide arm.

(6) Remove the insulation sheet.

(7) To take out the control panel PCB, FPC key and microphone, unhook the PCB from the three "Y" latches on the control panel. Unlock the LCD cable connector and disconnect the LCD flat cable.



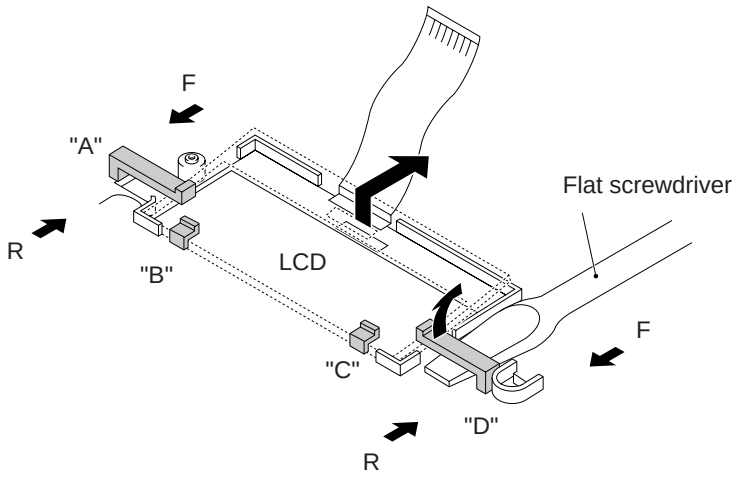
(8) To separate the FPC key from the control panel PCB, unlock the FPC key connector and disconnect the FPC key.

(9) Disconnect the microphone harness from the control panel PCB.

(10) To take out the LCD, remove the control panel PCB, FPC key and microphone in step (7). As shown below, insert the tip of a flat screwdriver under clamp "D" in the direction of arrow F and push up clamp "D" slightly to release the LCD from clamp "C." In the same way, insert the screwdriver under clamp "A" to release the LCD from clamp "B."

NOTE: Take care not to break or damage the clamps.

Then push out the LCD with your fingers in the direction of arrow R.



■ Reassembling Notes

- To put the LCD back into place, insert the tip of a flat screwdriver under clamp "D" (see the above illustration) in the direction of arrow R, push up clamp "D" slightly, and then put the right edge of the LCD under clamp "D." In the same way, insert the screwdriver under clamp "A" to put the left edge of the LCD under clamp "A."

  Then push the LCD into place with your fingers in the direction of arrow F.

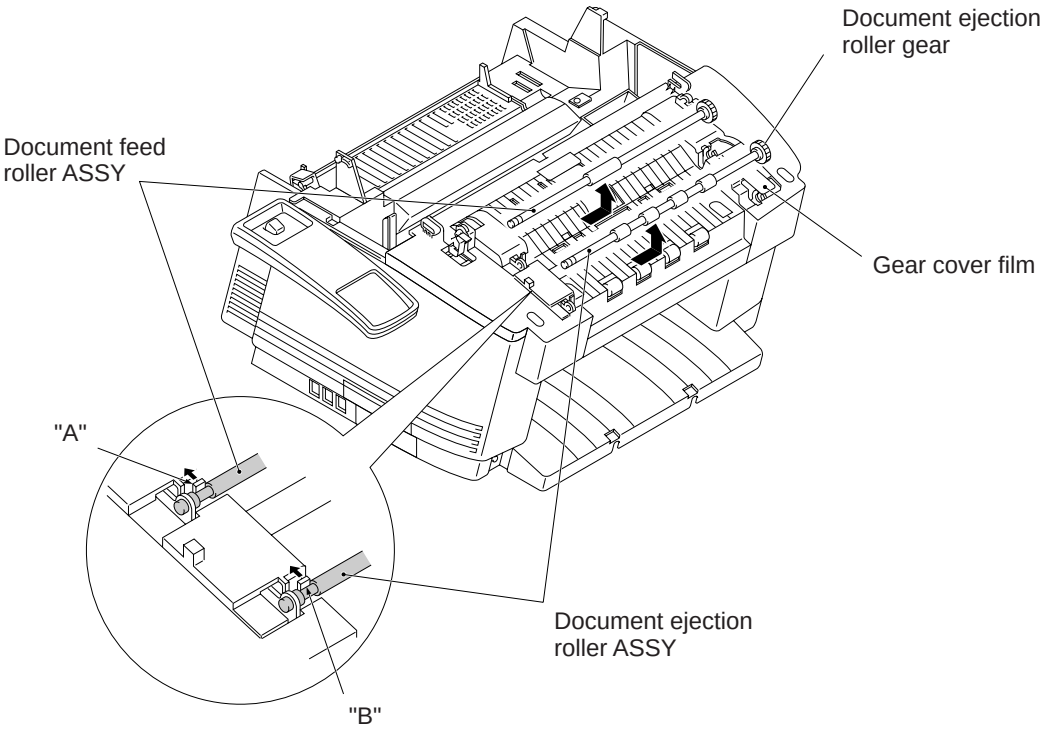
- When handling the LCD, take care not to scratch or damage the panel sheet. Replace it if scratched or damaged.
- A new LCD is covered with a protection sheet. Before installing it, remove the protection sheet.
- After setting the ADF slide arm and adjuster lever, check that the ADF adjuster lever can be moved to the right or left when the ADF parts are lightly held down. Also check that moving the ADF adjuster lever moves the ADF parts up and down.

  Set the ADF adjuster lever to the inward position (the regular paper thickness position) so that the ADF parts move up.

1.12 Document Feed Roller ASSY and Ejection Roller ASSY

(1) Push arm rib "A" to the rear, then shift the document feed roller ASSY to the right and upwards.

(2) Push arm rib "B" to the rear, then shift the document ejection roller ASSY to the right and upwards.



■ Reassembling Notes

- Make sure that the gear cover film is on the document ejection roller gear and not bent down by that gear.

1.13 Inner Cover

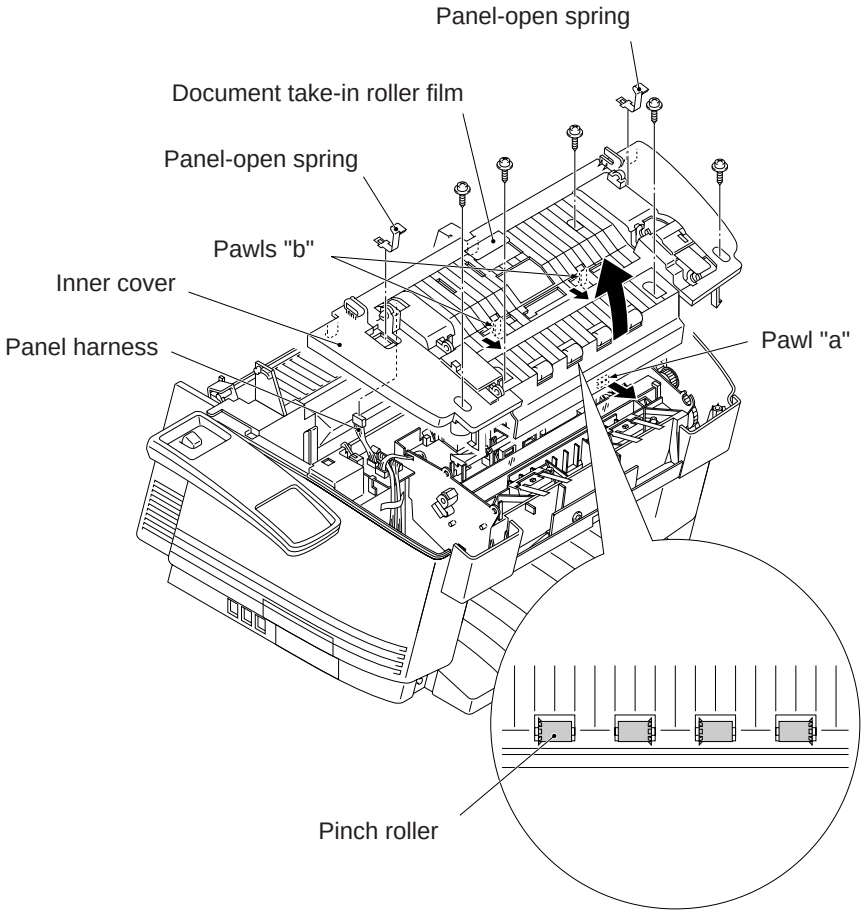
(1) Remove the five screws.

(2) Unlatch the pawl "a."

(3) While lifting up the inner cover, unlatch the two pawls "b".

NOTE: Take care not to scratch or drop the cover glass on the scanner frame ASSY.

(4) Turn the inner cover upside down and remove the panel-open springs using a flat screwdriver.



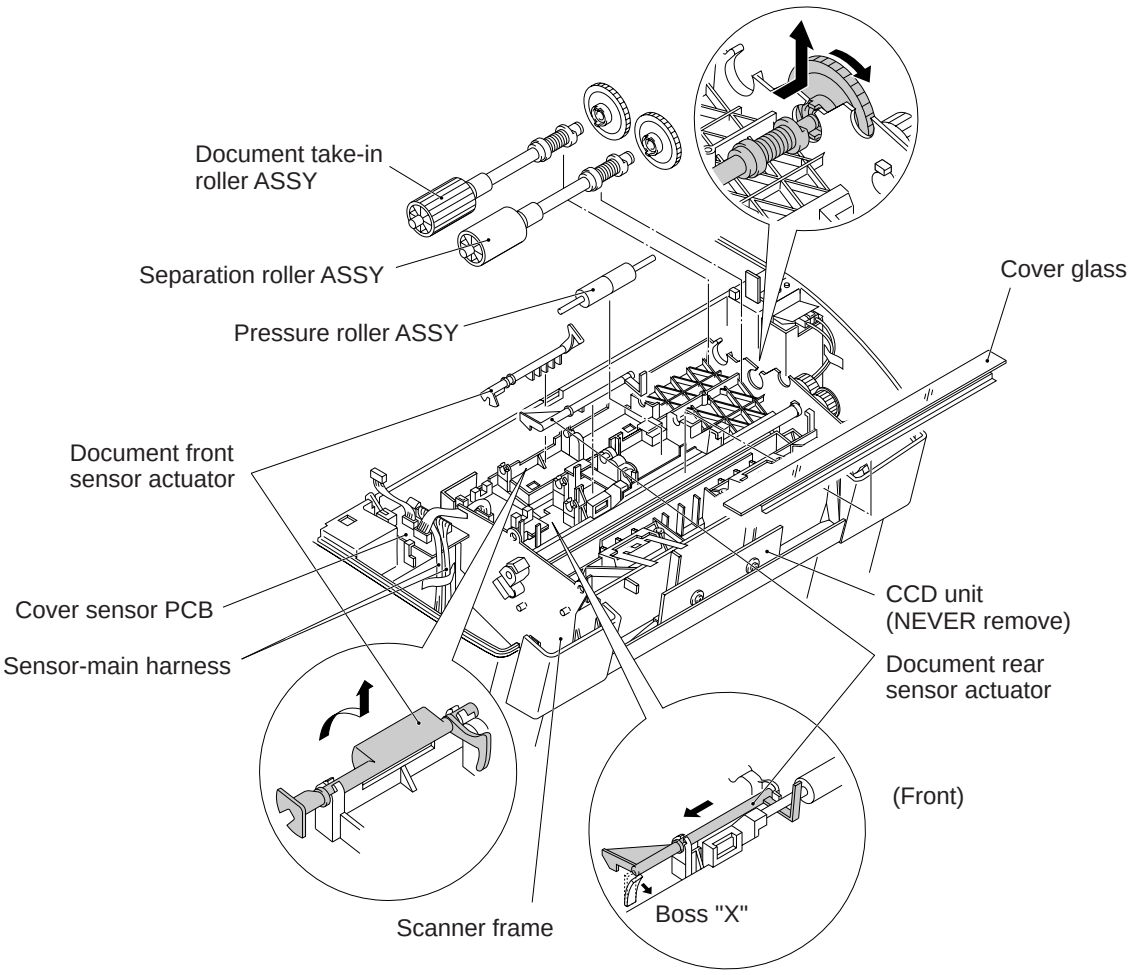
■ Reassembling Notes

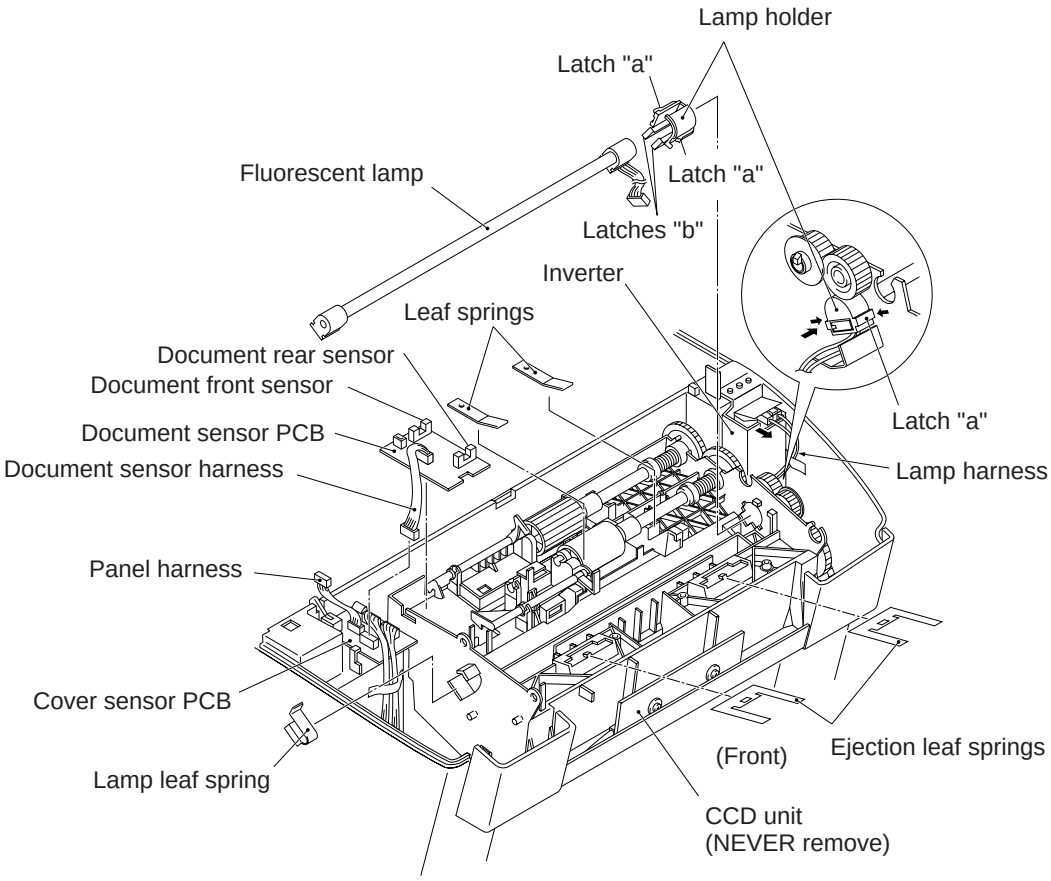
- Before putting the inner cover on the main cover, make sure that:
  - The panel-open springs are set in the inner cover.
  - The pinch roller ASSY is set with its rollers' fringes facing as shown above.
  - The panel harness connector comes out from the cutout provided in the inner cover.
- Once removed, the document take-in roller film will become unusable and a new one will have to be put back in.

1.14 Scanner Frame ASSY

(1) You can remove the following parts from the top of the scanner frame ASSY without taking out the ASSY from the main cover.

- Cover glass. Turn the cover glass up towards you.
- Document take-in roller ASSY. Unhook the latch of the gear, take it off, and then remove the roller ASSY.
- Separation roller ASSY. Unhook the latch of the gear, take it off, and then remove the roller ASSY.
- Pressure roller ASSY. While pressing down the leaf springs, remove the roller ASSY.
- Document front sensor actuator. Turn it towards you and lift it up.
- Document rear sensor actuator. While pulling the boss "X" provided on the scanner frame ASSY to the front, slightly move the actuator to the left and lift it up.
- Document sensor PCB. Disconnect the document sensor harness from the cover sensor PCB, and then unlatch the document sensor PCB.
- Ejection leaf springs
- Fluorescent lamp, lamp holder, and lamp leaf spring.
  1) Disconnect the lamp harness from the inverter.
  2) Remove the lamp leaf spring from the left end of the fluorescent lamp.
  3) Press latches "a" of the lamp holder from the outside of the scanner frame and push the holder to the left.
  4) To separate the lamp from its holder, release latches "b."

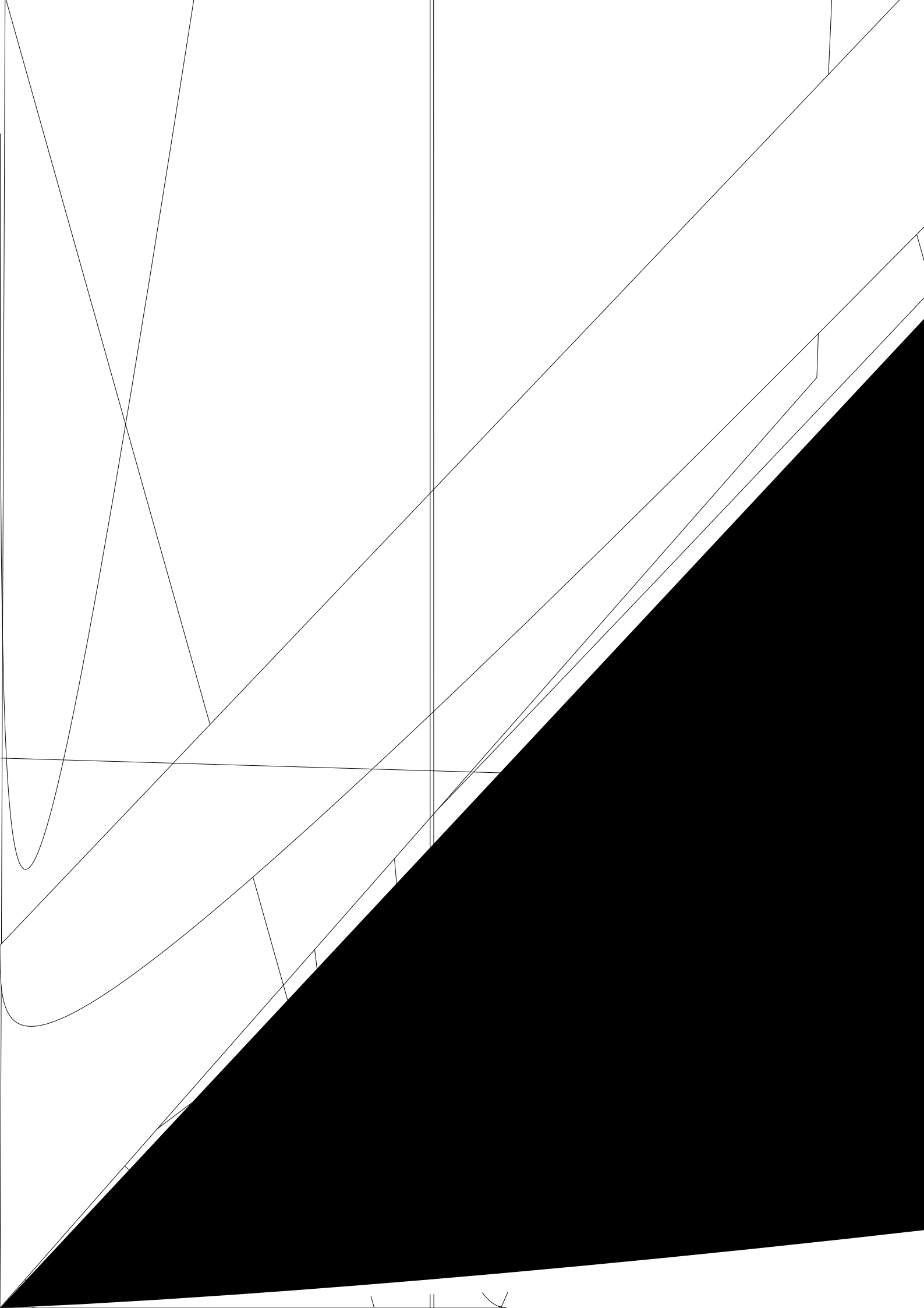




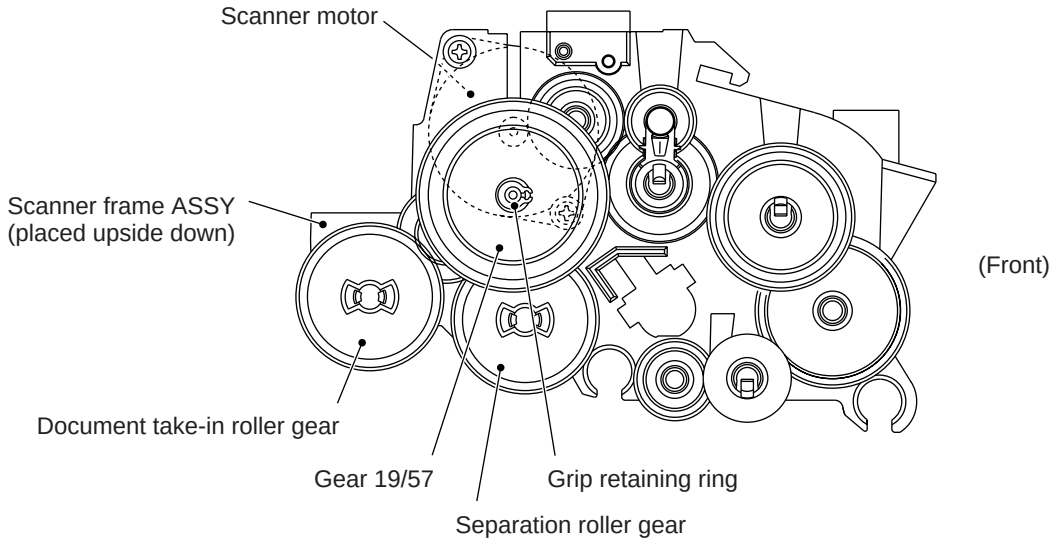
(2) Before taking out the scanner frame ASSY, make sure that the cover glass is removed.

(3) Disconnect the document sensor harness from the document sensor PCB.

(4) Disconnect the lamp harness from the inverter.



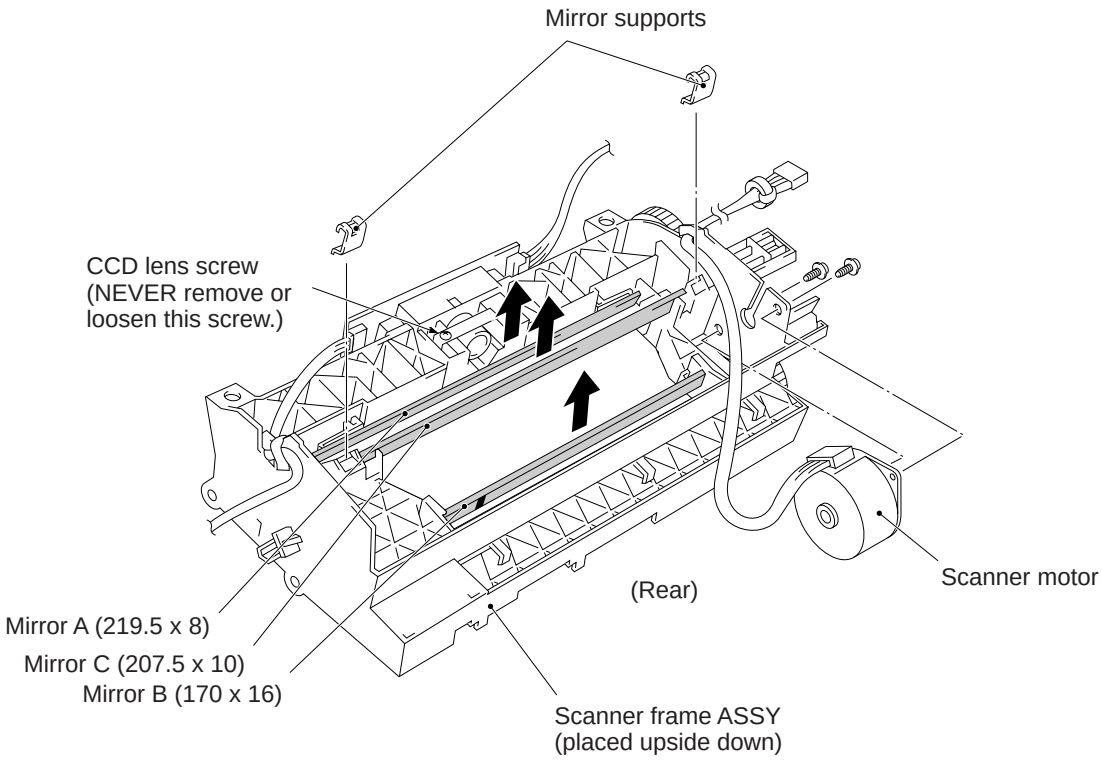
(7) Remove the gear 19/57 and the grip retaining ring.



(8) Take out the scanner motor by removing the two screws.

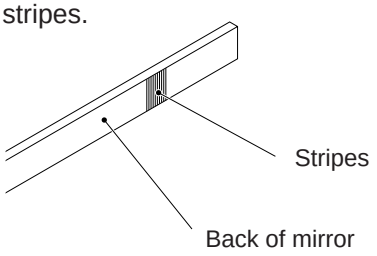
(9) Remove mirrors A, B, and C. To remove mirror C, you need to remove the mirror supports with a screwdriver. To remove mirror A, remove mirror C beforehand.

NOTE: Mirrors A and B are paint-locked.



■ Reassembling Notes

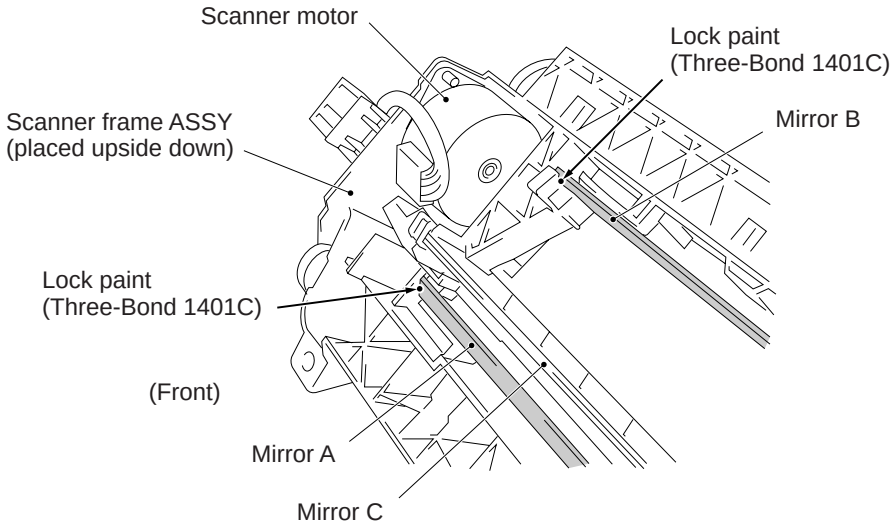
- Check that the mirrors and cover glass are not stained. Wipe them with a soft cloth if necessary.
- When setting the mirrors, be careful with the mounting direction. The backs of those mirrors are marked with stripes.



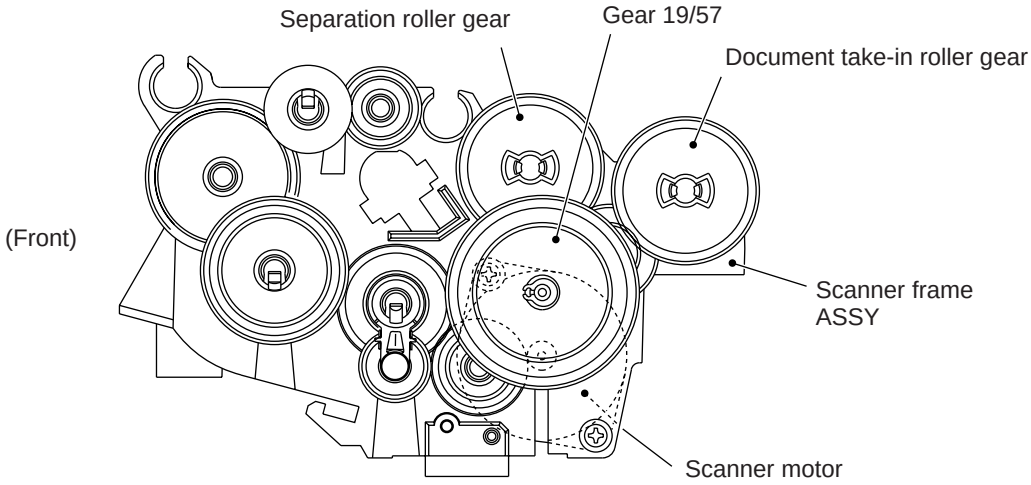
The non-marked sides of the mirrors A and C should face towards the rear of the scanner frame ASSY; the non-marked side of the mirror B should face to the front.

- Mirrors A and B are paint-locked. Once you have removed them, wipe off the lock paint applied to those mirrors and the related sections of the scanner frame with a cloth dampened with ethyl alcohol.

  After installing those mirrors, be sure to apply a bean-sized pinch of lock paint to both ends of each mirror while pulling those mirrors towards the scanner motor as illustrated below.

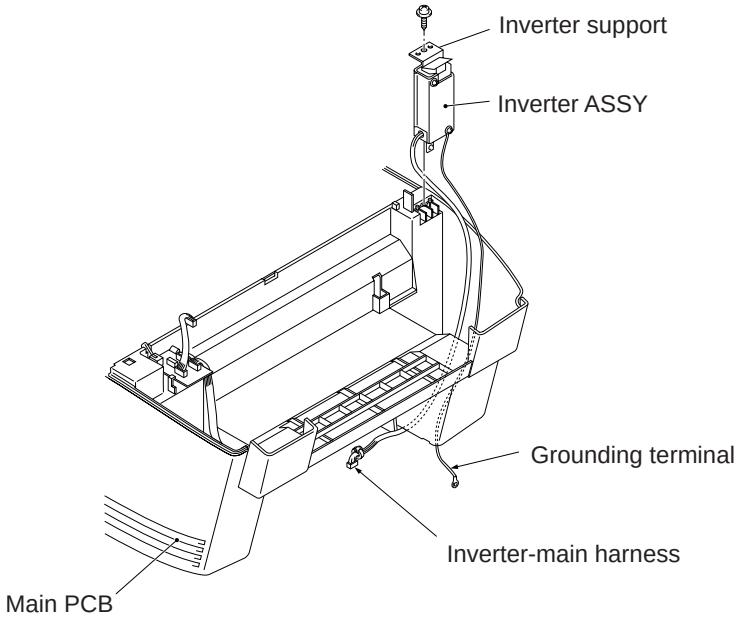


- Make sure that mirror C is clamped by the mirror supports.
- If you have disassembled the gear train on the right side of the scanner frame ASSY, reassemble it referring to the illustration below.



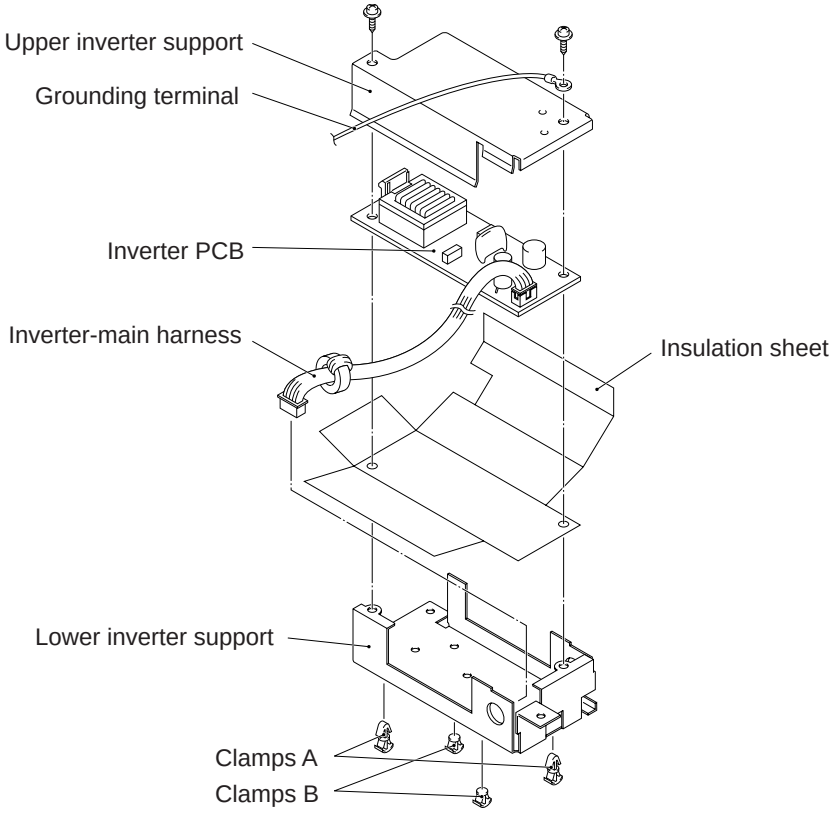
1.15 Inverter

(1) Take out the inverter ASSY by removing the screw from the inverter support.



(2) To disassemble the inverter ASSY, remove the two screws from the upper inverter support.

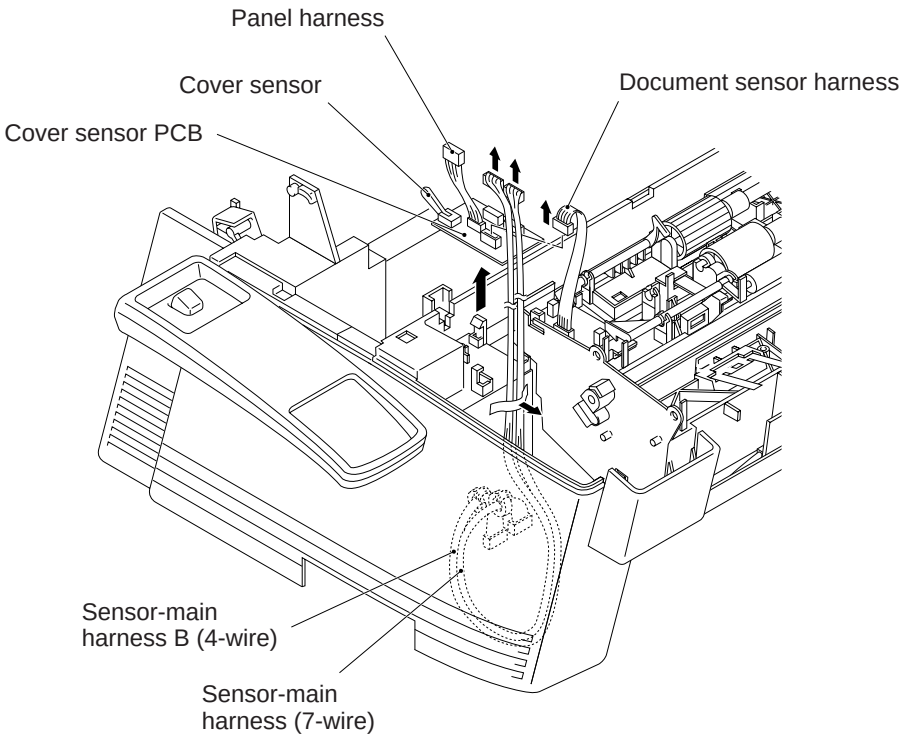
(3) To remove the inverter PCB, pinch the clamps with a pliers and pull out the inverter PCB.



1.16 Cover Sensor PCB

(1) Disconnect the document sensor harness, sensor-main harness (7-wire), and sensor-main harness B (4-wire) from the cover sensor PCB.

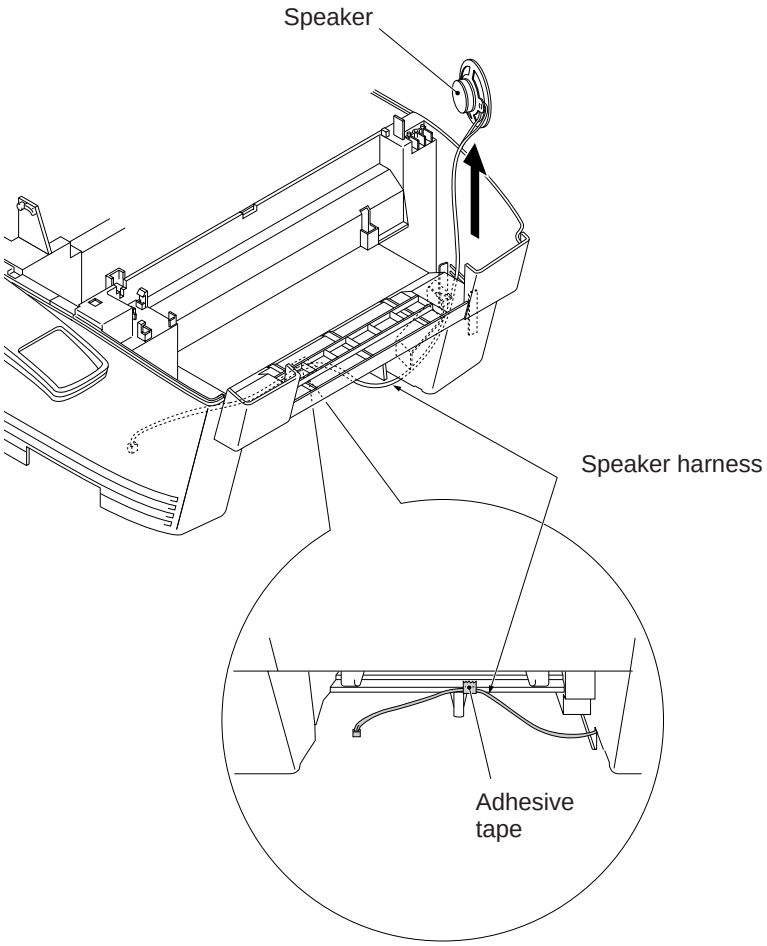
(2) Unlatch the cover sensor PCB and take it up.



1.17 Speaker

(1) Release the speaker harness taped to the main frame.

(2) Pull up the speaker.



1.18 Ink Absorbers

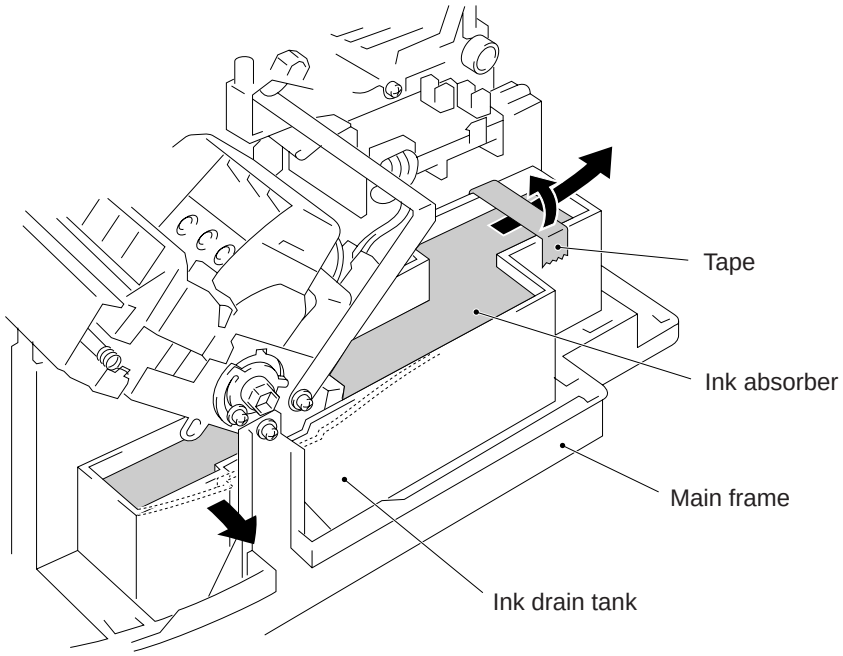
Only after the main PCB is replaced with a new one, replace the ink absorbers with new ones.

(1) Peel off the tape from the ink drain tank as illustrated below.

(2) Pull out the ink absorbers.

NOTE: Use vinyl gloves to prevent your hands from becoming dirty.

(3) If the ink drain tank or the surrounding parts are stained with ink, wipe them with a waste cloth.



■ Reassembling Notes

- When setting ink absorbers into the ink drain tank, pull the tank outwards as illustrated above.

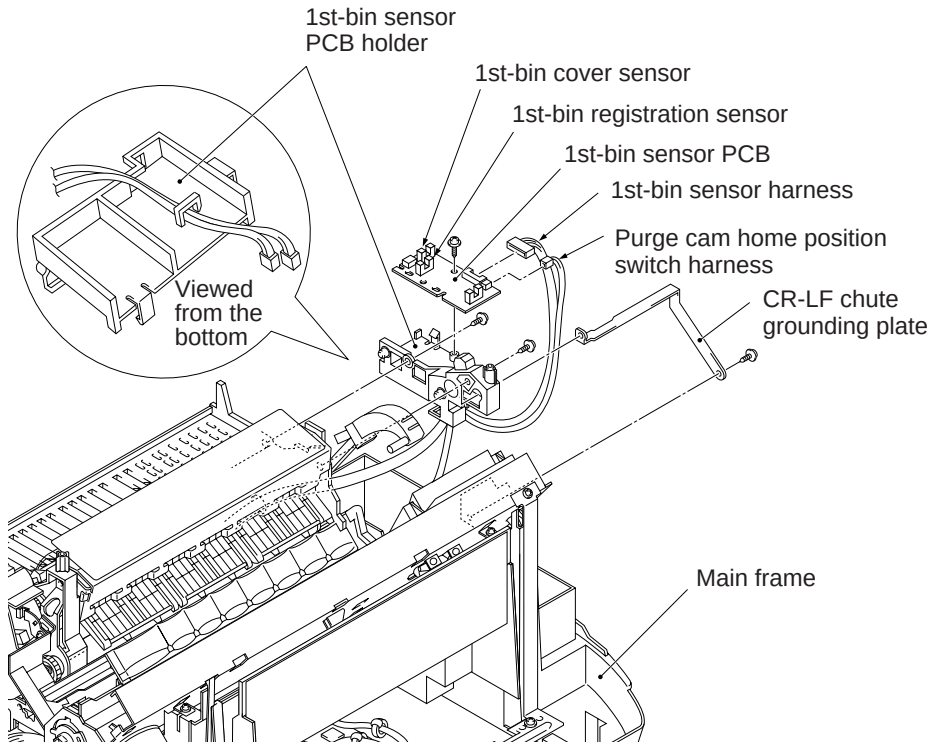
1.19 1st-bin Sensor PCB and its Holder

(1) Disconnect the 1st-bin sensor harness and the purge cam home position switch harness from the 1st-bin sensor PCB.

(2) Remove the screw which secures the bottom end of the CR-LF chute grounding plate.

(3) Take off the 1st-bin sensor PCB holder by removing the two screws.

(4) Take off the 1st-bin sensor PCB from its holder by removing the screw.



■ Reassembling Notes

- Be sure to route the 1st-bin sensor harness and the purge cam home position switch harness as shown above.

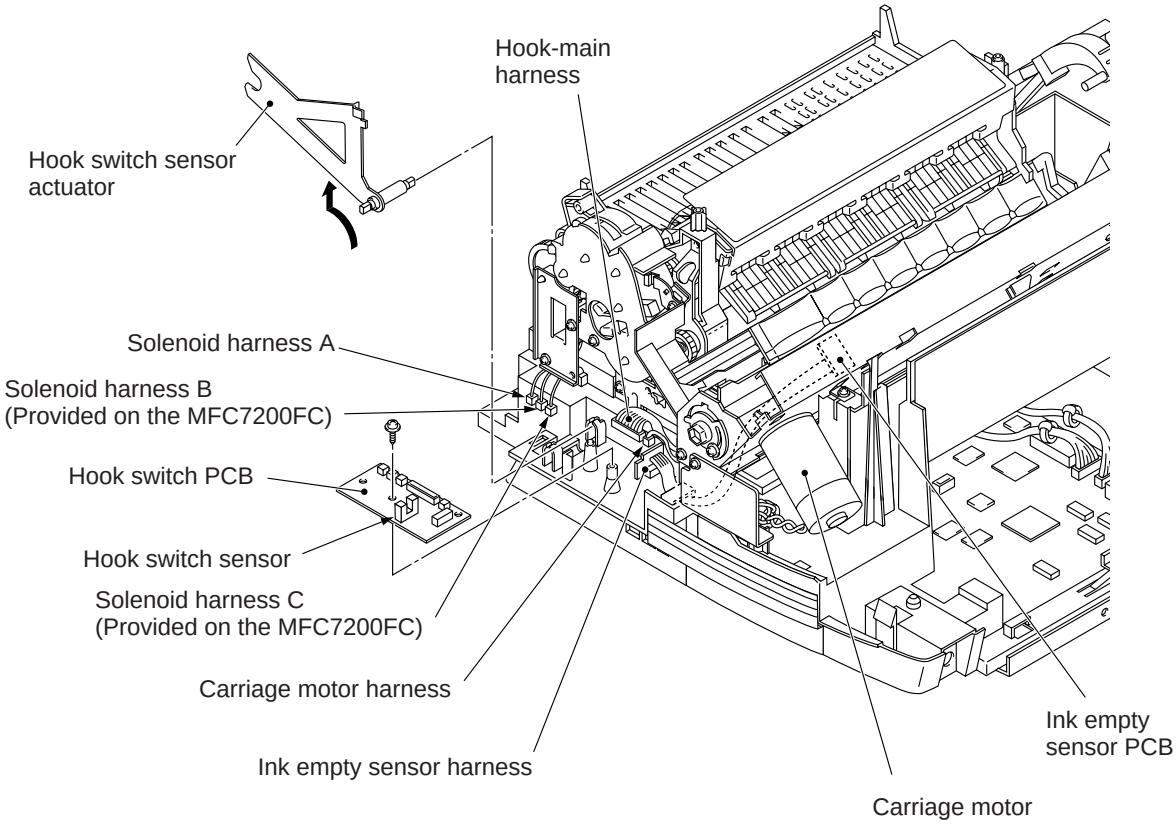
1.20 Hook Switch Sensor Actuator and Hook Switch PCB

(1) Turn the hook switch sensor actuator to the rear and lift it up.

(2) Disconnect three solenoid harnesses A, B, and C (solenoid harness A only for the MFC7000FC) from the hook switch PCB.

(3) Remove the screw from the hook switch PCB.

(4) Slightly lift up the hook switch PCB and then disconnect the hook-main harness, carriage motor harness, and ink empty sensor harness from the hook switch PCB.



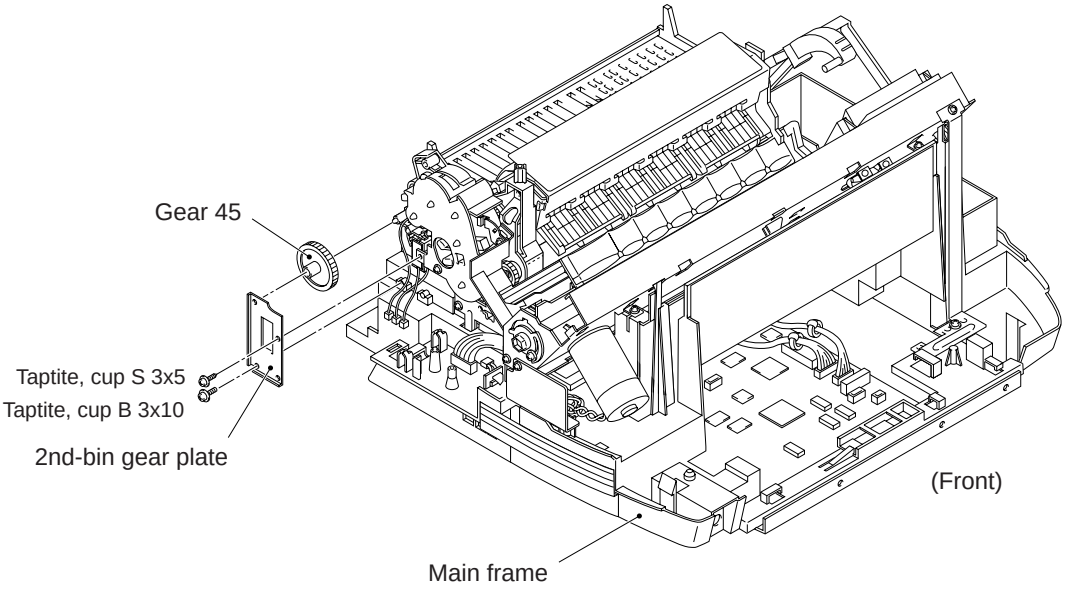
■ Reassembling Notes

- When routing the hook-main harness, put the harness end equipped with a ferrite core inside the main frame and then pass the other end through the cutout provided in the main frame from the inside.

1.21 Drive Gear Unit and Solenoid C

(1) Take off the 2nd-bin gear plate by removing the two screws.

(2) Remove the gear 45.

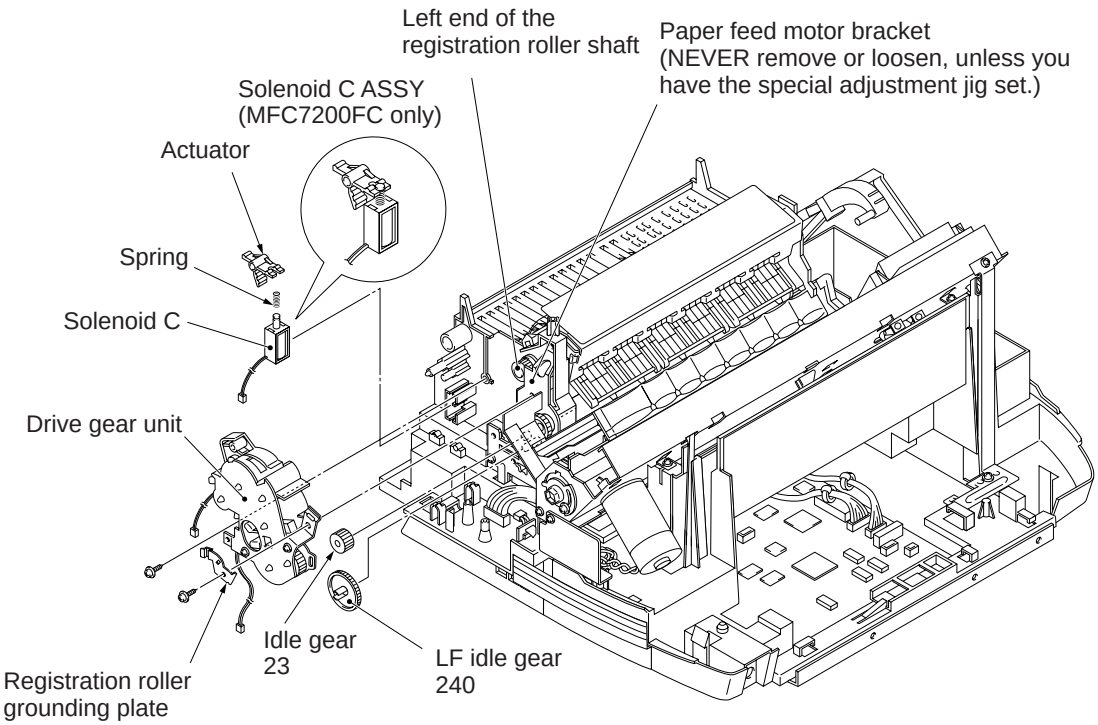


(3) For the MFC7200FC: Disconnect the solenoid C harness from the hook switch PCB, then remove the solenoid C together with the actuator and spring.

(4) Remove the LF idle gear 240 by unhooking the latches of the gear.

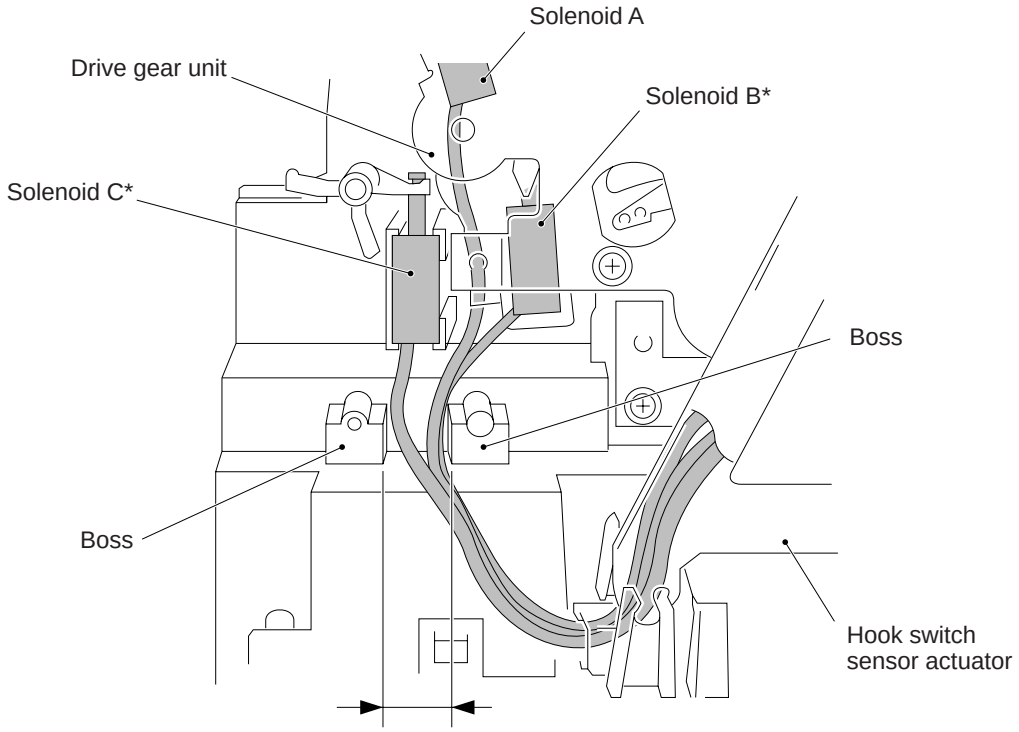
(5) Remove the idle gear 23.

(6) Take off the drive gear unit by removing the two screws. The registration roller grounding plate also comes off.



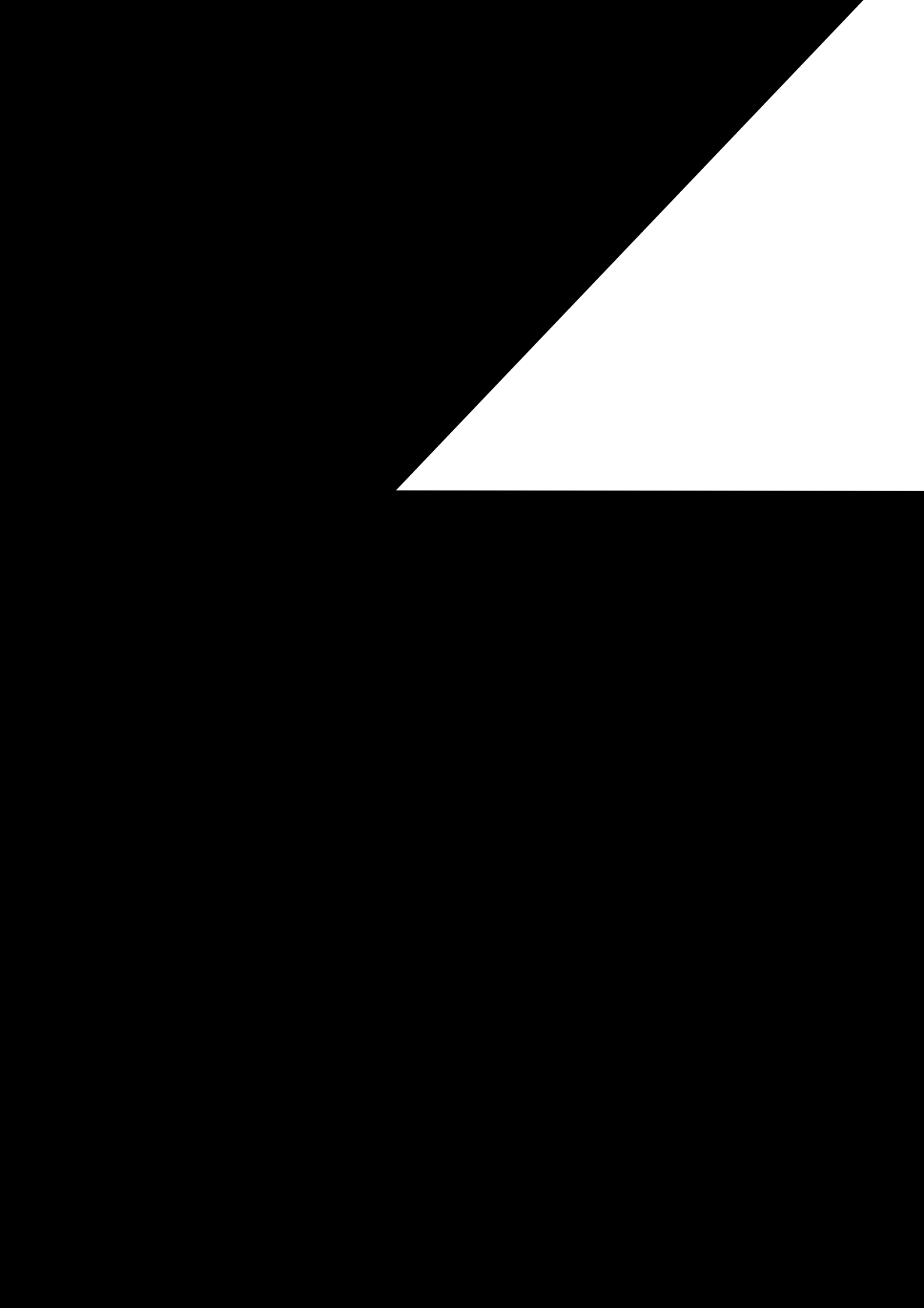
■ Reassembling Notes

- Make sure that the registration roller grounding plate is in contact with the left end of the registration roller shaft.
- When installing the 2nd-bin gear plate, route three solenoid harnesses A, B, and C (solenoid harness A only for the MFC7000FC) through the bosses as illustrated below.



* Only for the MFC7200FC

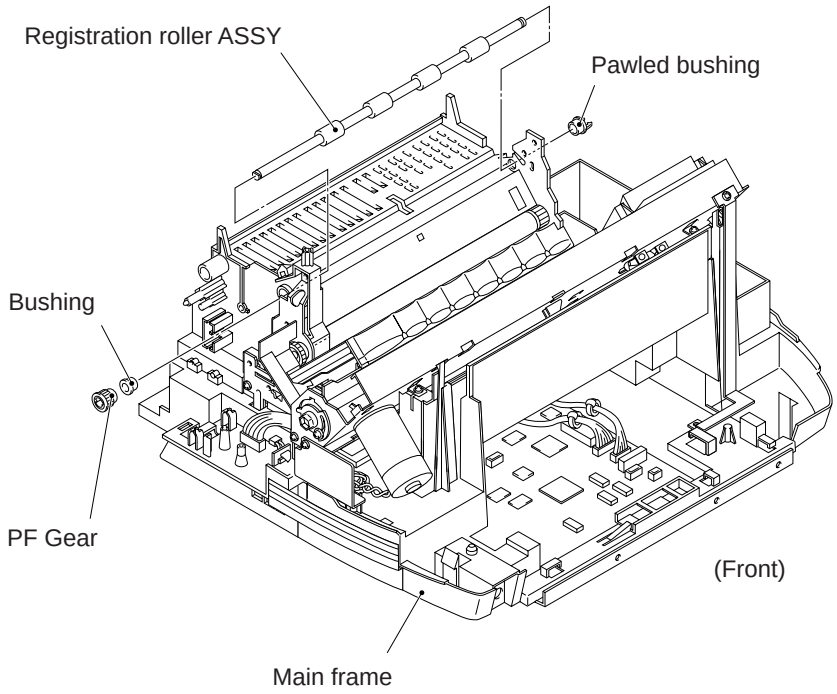
(Left side)



1.23 Registration Roller ASSY

(1) Remove the pawled bushing from the right end of the registration roller ASSY.

(2) Remove the PF gear and bushing from the left end, and take out the registration roller ASSY.



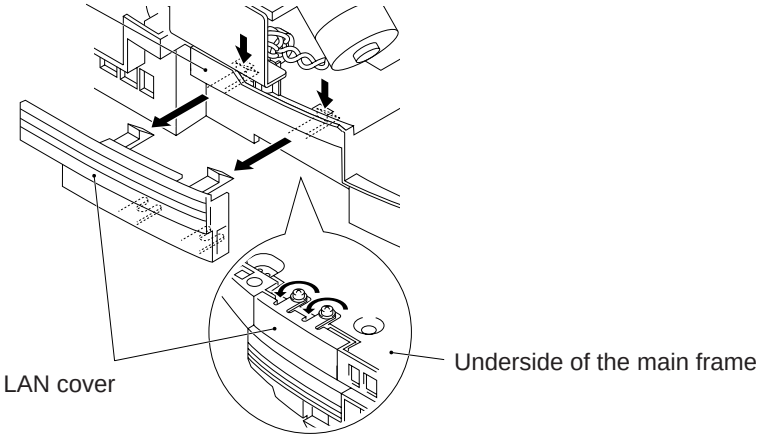
1.24 LAN Cover, Bottom Plate, Power Supply PCB, Power Inlet, and Centronics Interface PCB

(1) Turn the main frame upright on the rear end.

(2) Loosen the two screws that secure the LAN cover.

(3) Turn the main frame rightside up.

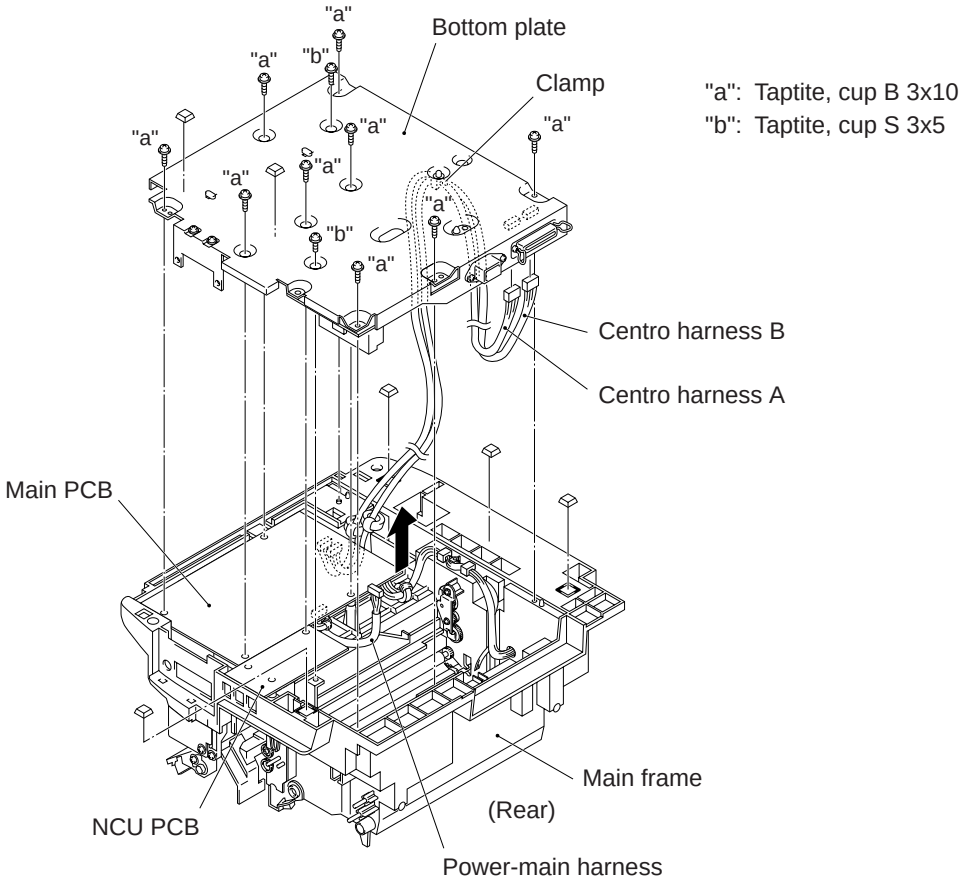
(4) Remove the LAN cover by pushing down the latches with a flat screwdriver.



(5) Turn the machine upside down (nine "a" screws and two "b" screws).

(6) Take off the bottom plate by removing the 11 screws.

(7) Lift up the bottom plate, take out the Centro harnesses A and B from the clamp provided on the bottom plate, and disconnect them from the Centronics interface PCB. Also disconnect the power-main harness from the power supply PCB.

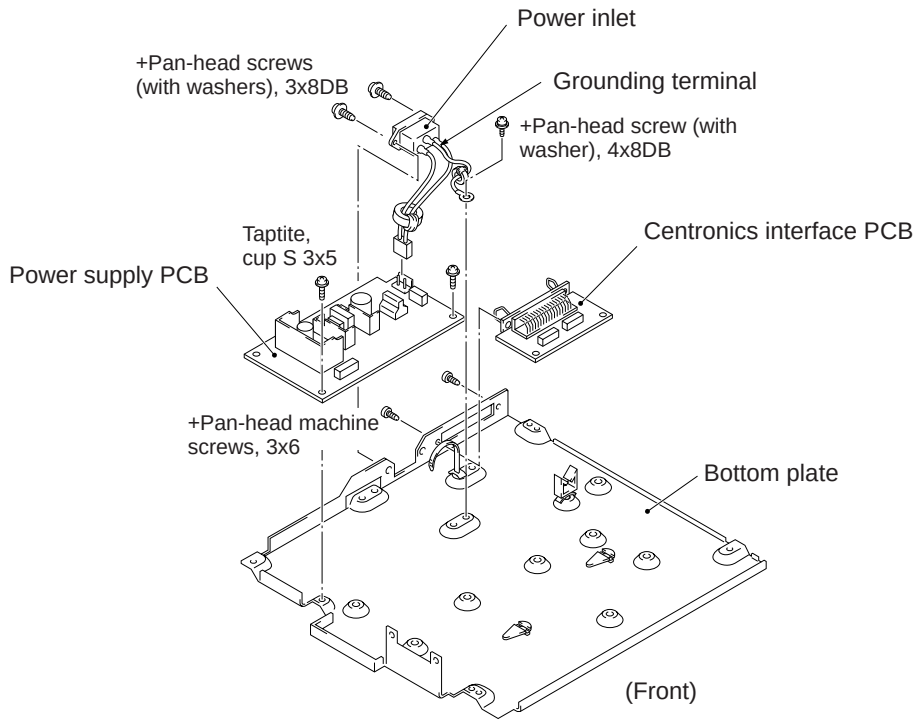


(8) Disconnect the power inlet harness from the power supply PCB, then take off the power supply PCB from the bottom plate by removing the two screws.

(9) Take off the grounding terminal from the bottom plate by removing the screw and releasing it from the binder.

(10) Take off the power inlet by removing the two screws.

(11) Take off the Centronics interface PCB by removing the two screws.



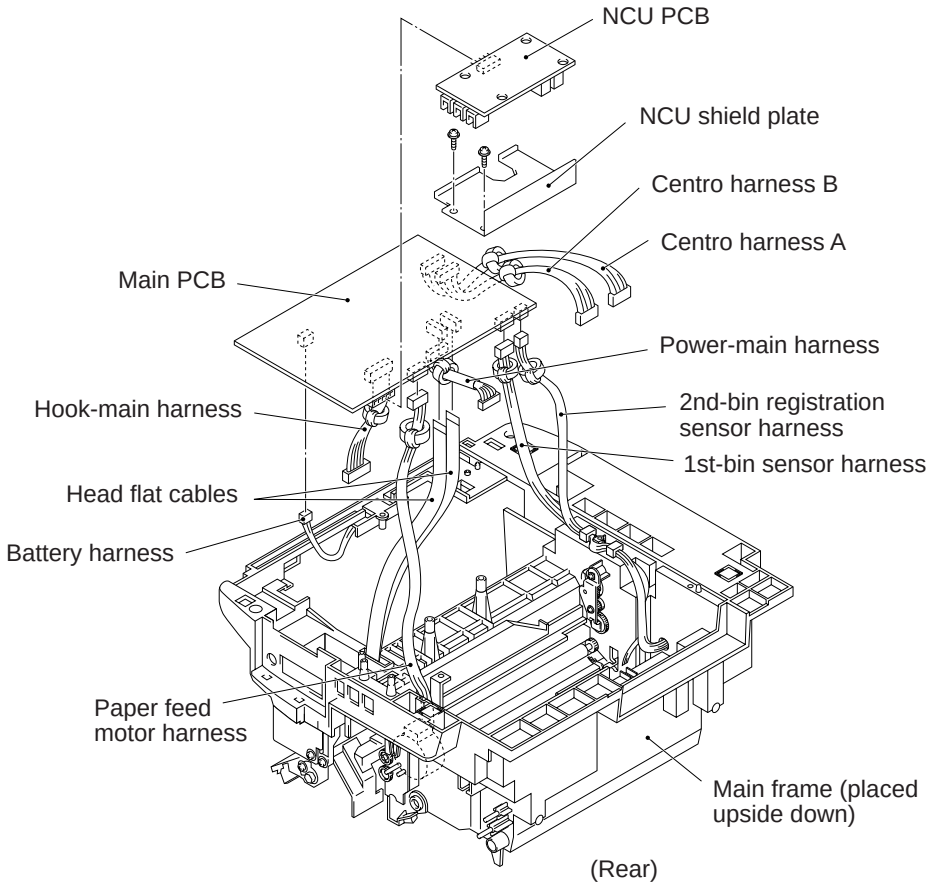
1.25 NCU PCB and Main PCB

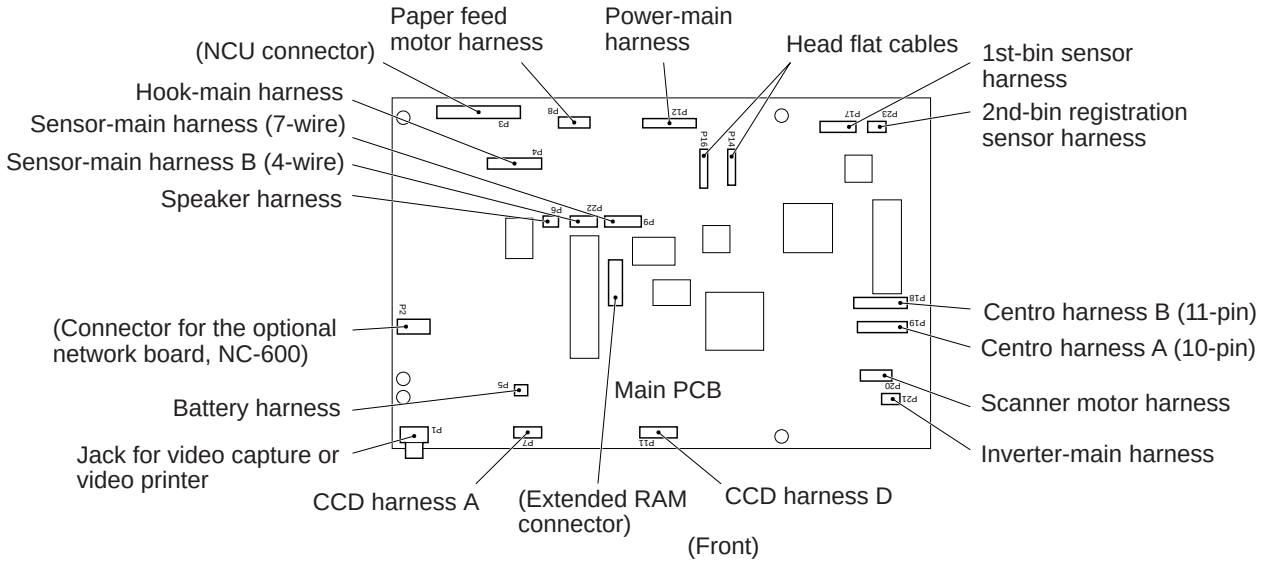
(1) Lift up the main PCB and disconnect the NCU.

(2) Take off the NCU shield plate by removing the two screws.

(3) While holding up the main PCB, disconnect the following harnesses from the main PCB:

- Battery harness
- Hook-main harness
- Head flat cables
- Paper feed motor harness
- 1st-bin sensor harness
- 2nd-bin registration sensor harness



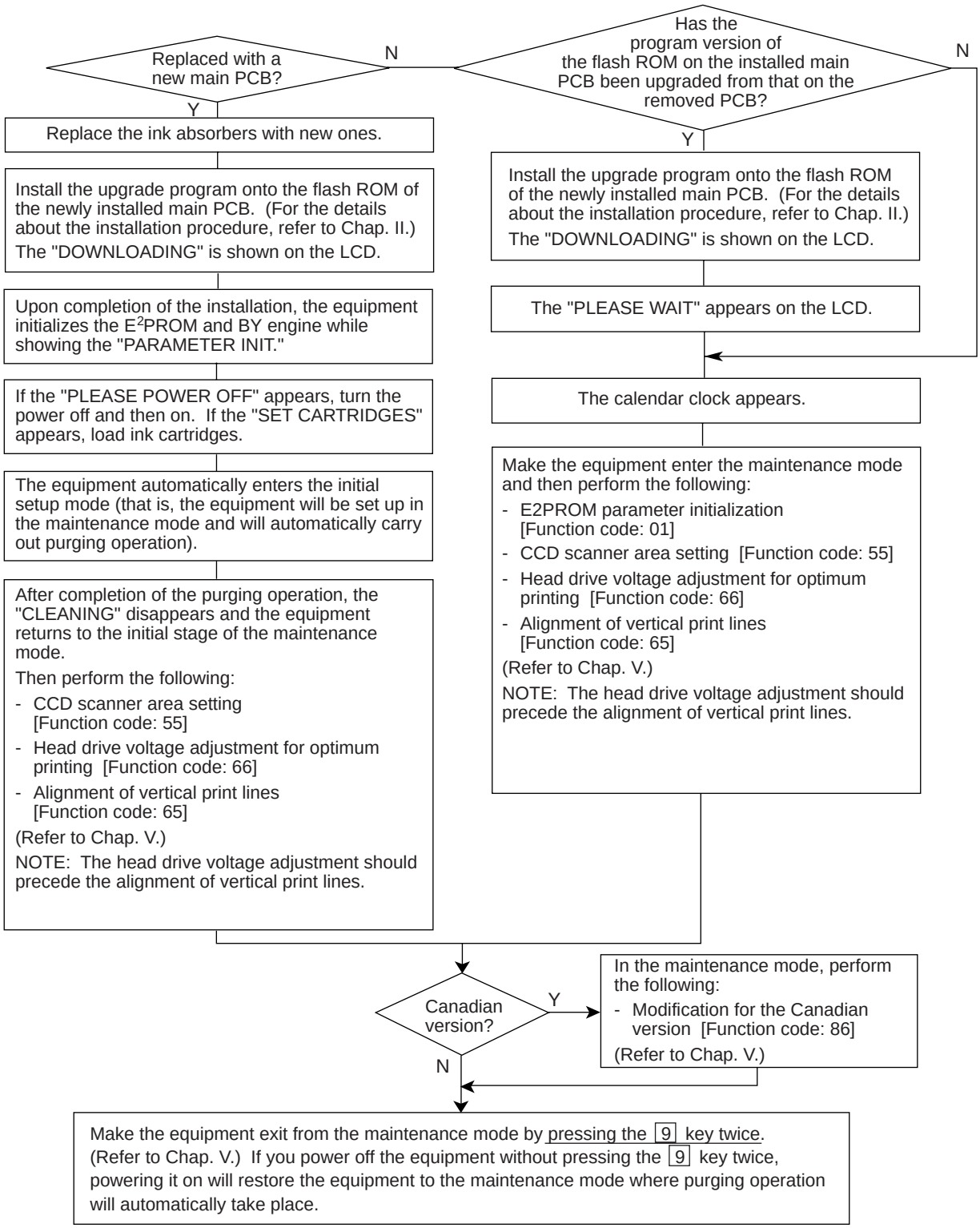


■ Reassembling Notes

- Important -

- After you replace the main PCB, be sure to follow the flowchart given below.

  NOTE: Before starting the following procedure, make sure that the print head unit is installed.

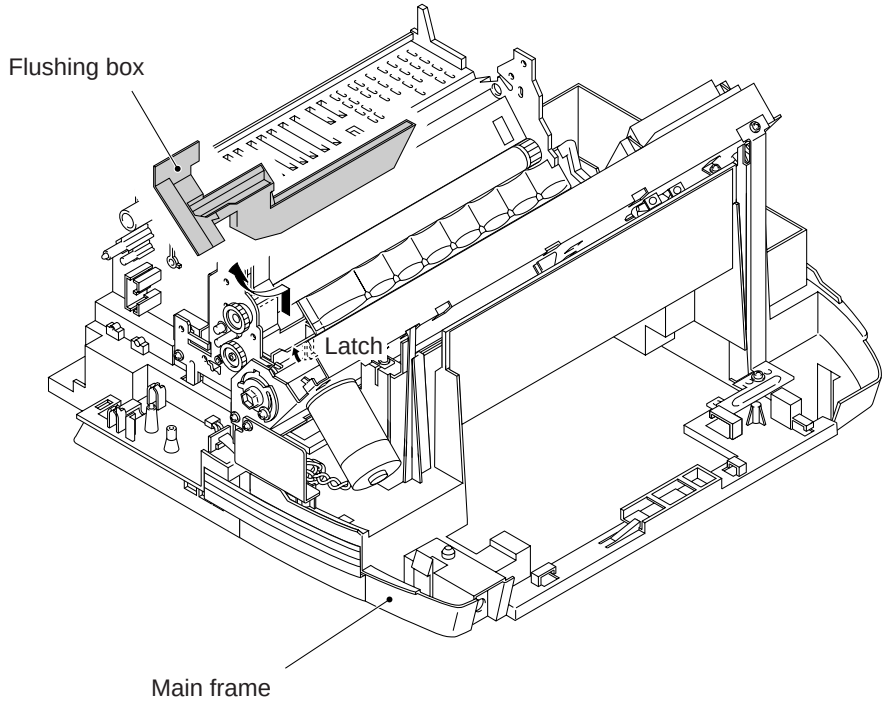


- -

When replacing the main PCB, it is recommended to replace all ink cartridges in order to maintain accurate ink level information.

1.26 Flushing Box

(1) Slightly pull up the left end of the flushing box, then take it up to unlatch from the main frame.

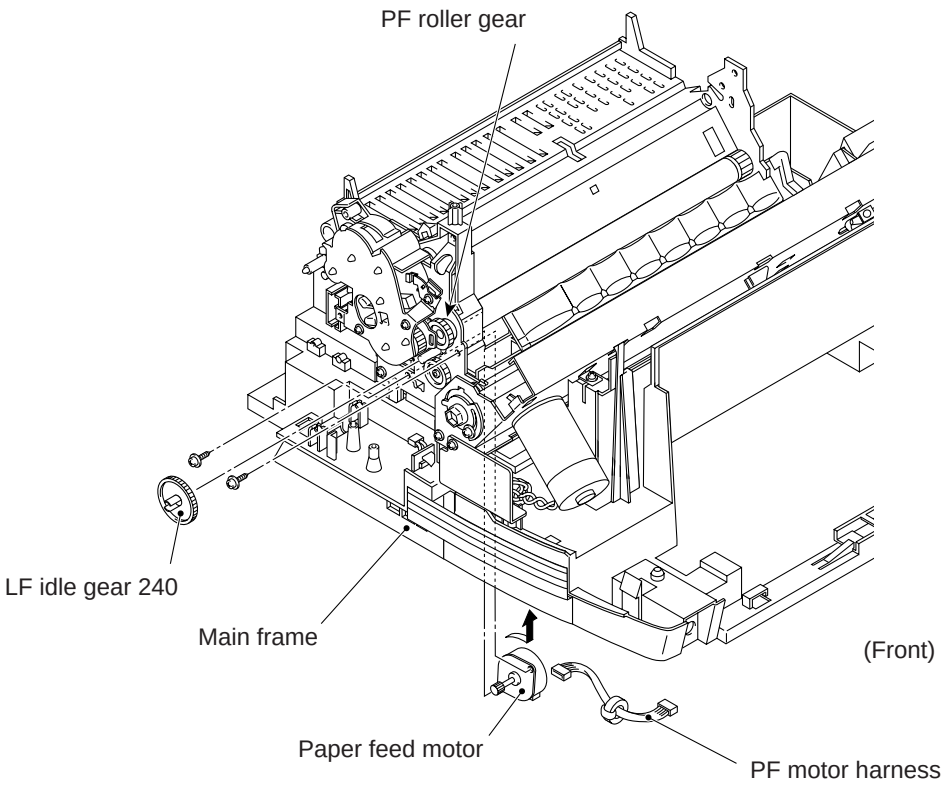


1.27 Paper Feed Motor

(1) Remove the LF idle gear 240 by pulling its pawls outwards.

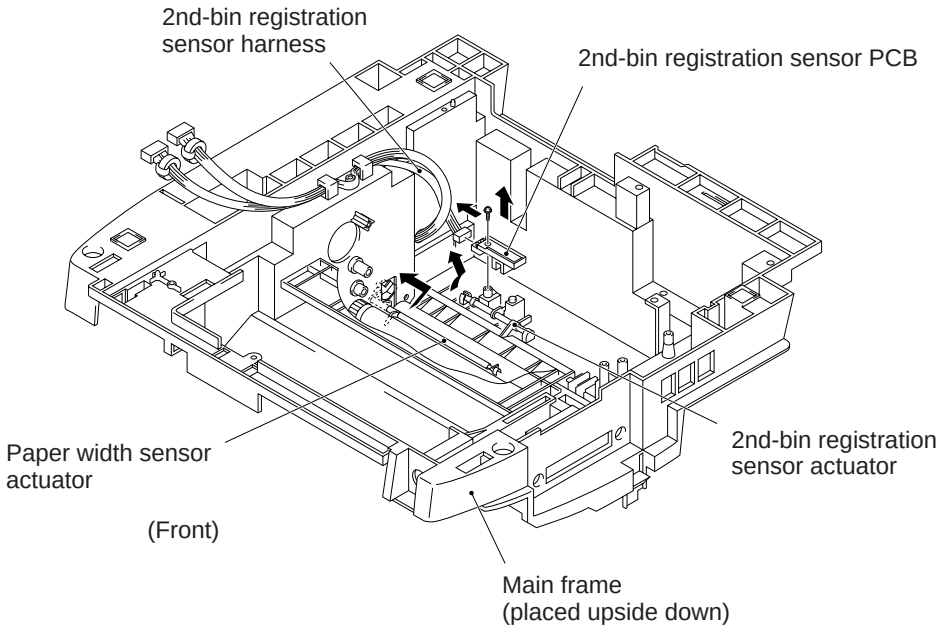
(2) Take off the paper feed motor by removing the two screws.

NOTE: Take care not to scratch or damage the PF roller gear when using a screwdriver.



1.28 Paper Width Sensor Actuator, 2nd-bin Registration Sensor PCB and its Actuator

(1) Place the main frame upside down.
(2) Remove the paper width sensor actuator in the direction shown below.
(3) Take off the 2nd-bin registration sensor PCB by removing the screw.
(4) Remove the 2nd-bin registration sensor actuator in the direction shown below.

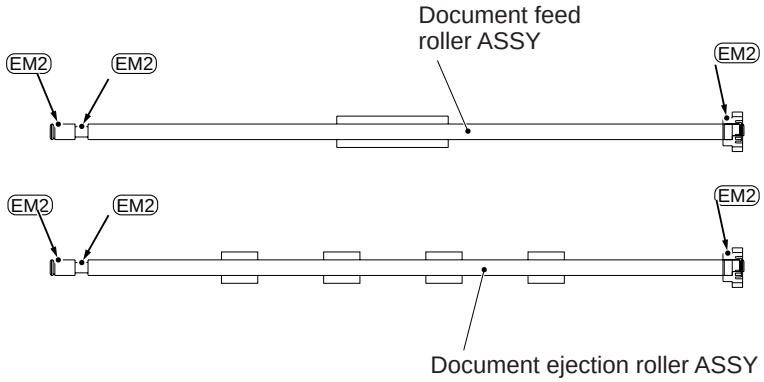


2. LUBRICATION

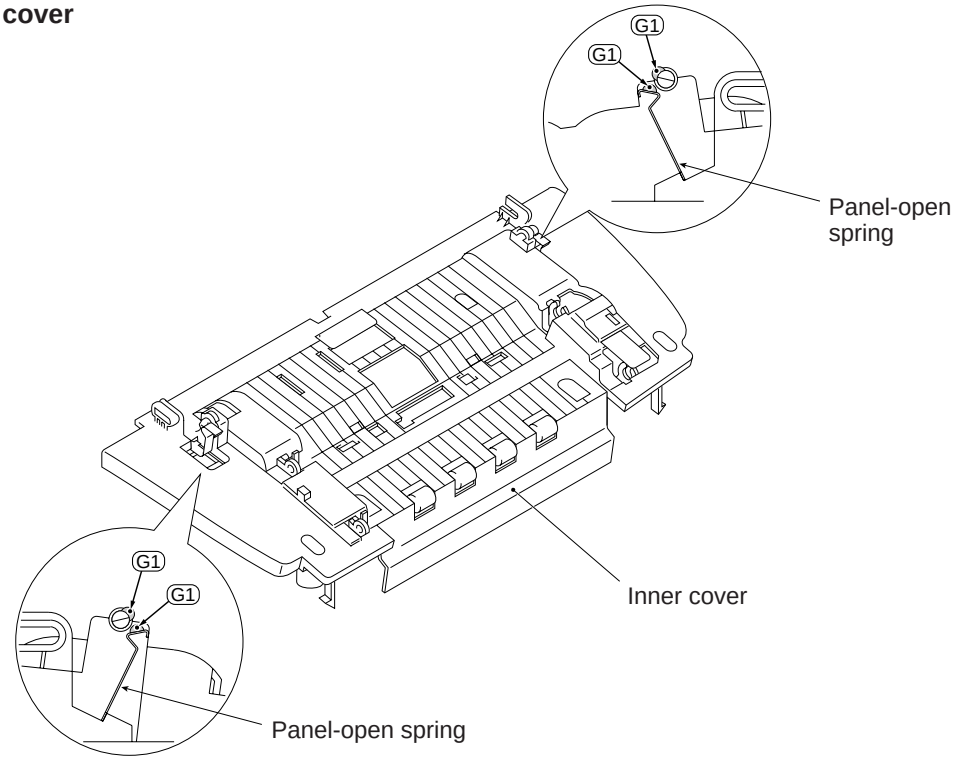
Apply the following lubricants to the lubrication points as illustrated below.

Lubricant type (Manufacturer)	Lubricant amount		
	Half of a rice-sized pinch of grease (3 mm^3)	Rice-sized pinch of grease (6 mm^3)	Bean-sized pinch of grease (12 mm^3)
Molykote EM-30L (Dow Corning)	———	(EM1)	(EM2)
Silicone grease G501 (Shin-etsu Silicone)	———	(G1)	———
Silicone oil KF-96-100CS (Shin-etsu Silicone)	(KF0.5)	———	———

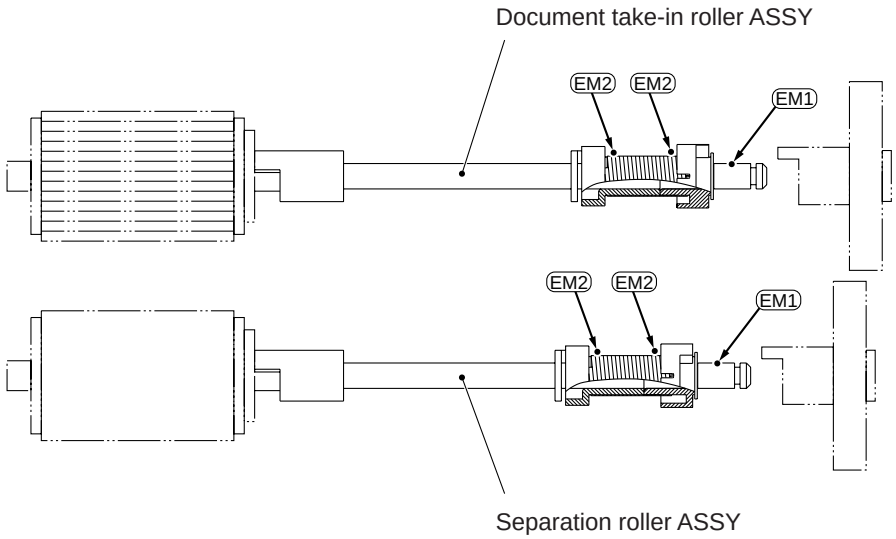
[1] Document feed roller ASSY and document ejection roller ASSY

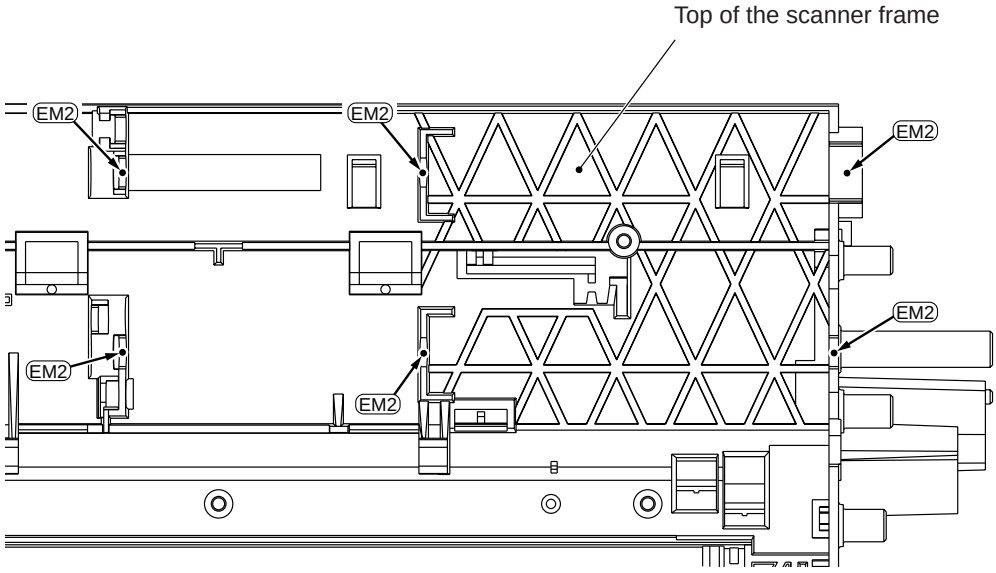


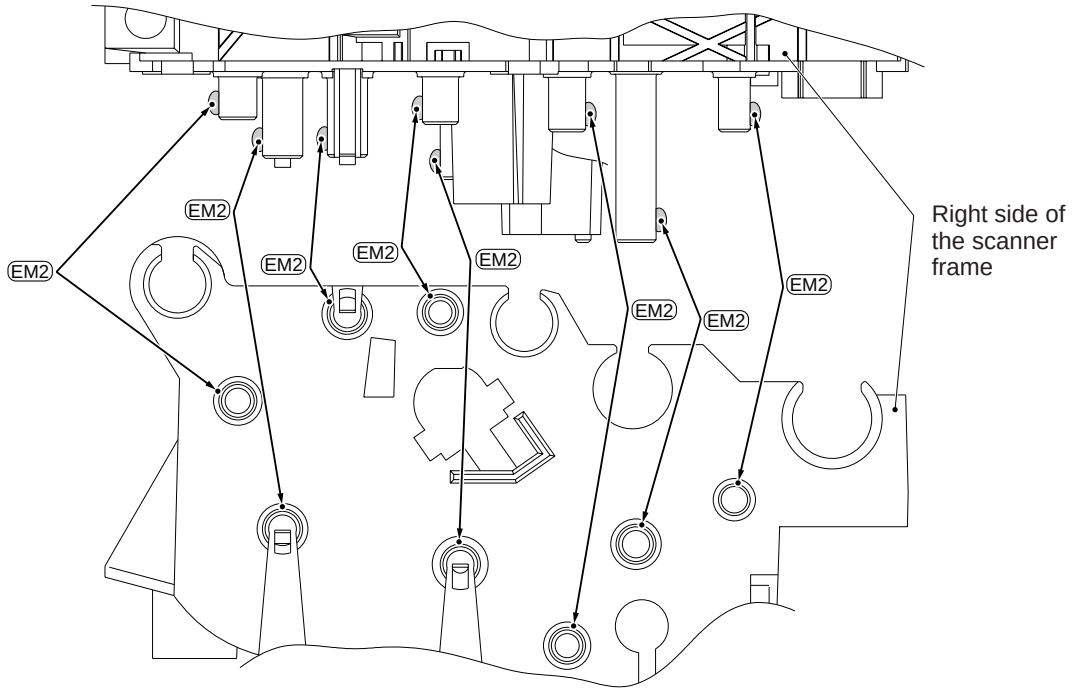
[2] Inner cover



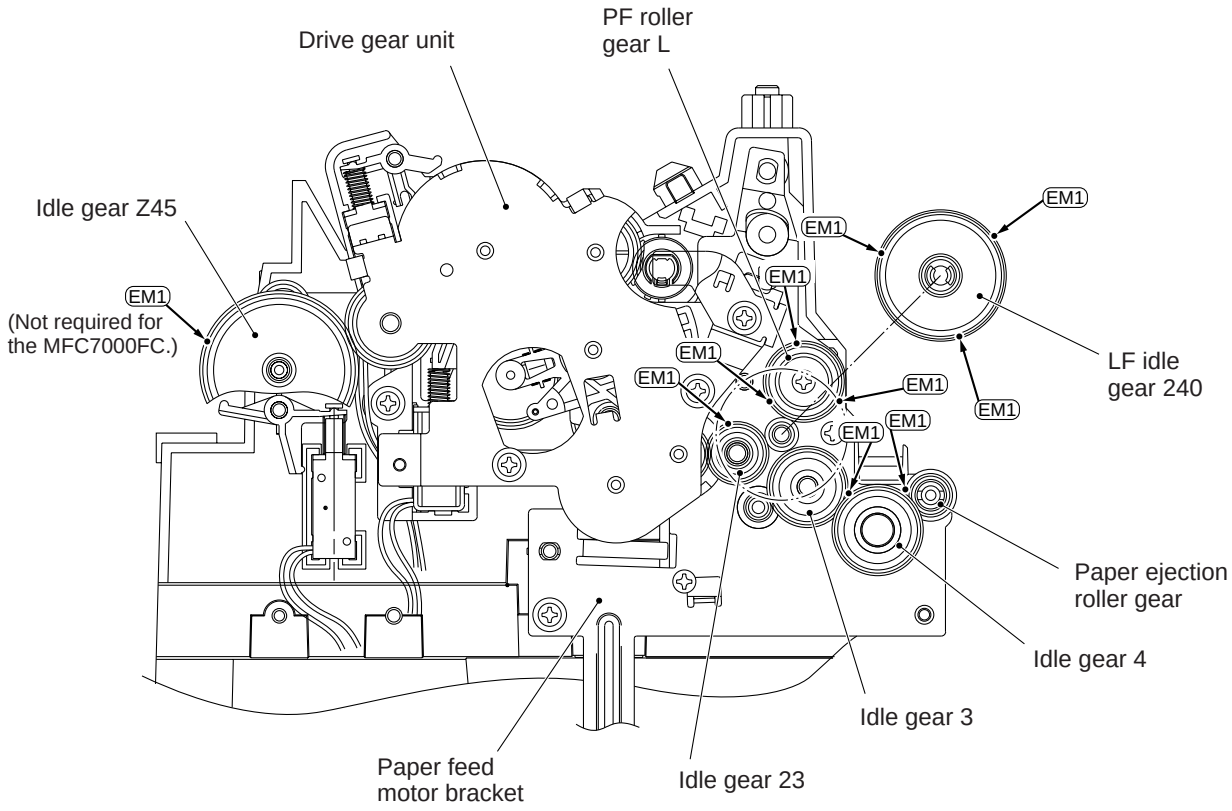
[3] Scanner frame ASSY

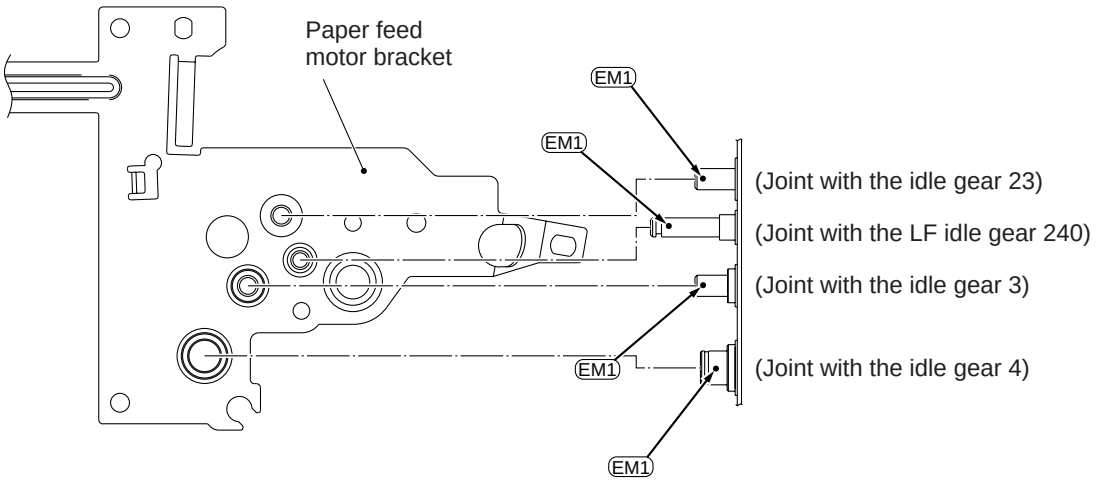


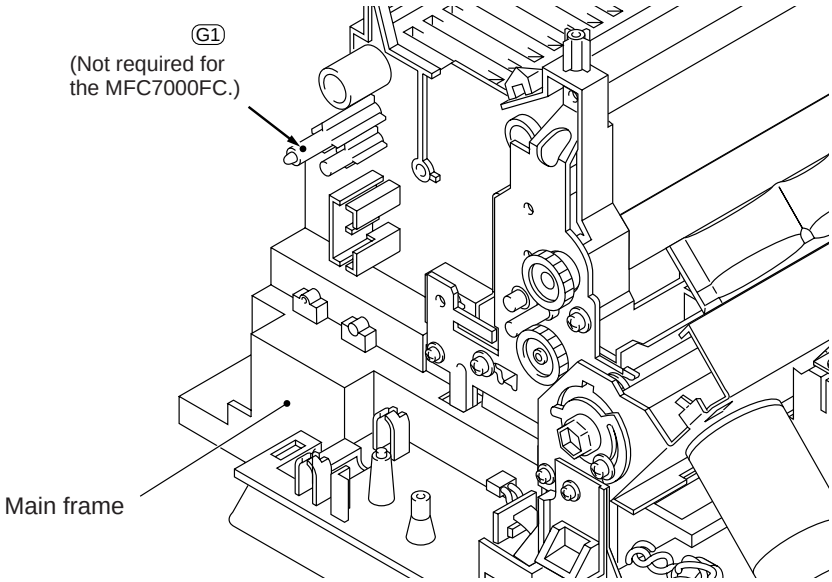




[4] Gears and shafts on the left side of the main frame




Paper feed
motor bracket
EM1
EM1
(Joint with the idle gear 23)
(Joint with the LF idle gear 240)
(Joint with the idle gear 3)
EM1
(Joint with the idle gear 4)
EM1


G1
(Not required for
the MFC7000FC.)
Main frame

CHAPTER V.

MAINTENANCE MODE

CONTENTS

1. ENTRY INTO THE MAINTENANCE MODE

To make the facsimile equipment enter the maintenance mode, press the [Function], [*], [2], [8], [6], and [4] keys in this order.

⟵ Within 2 seconds ⟶

The equipment beeps for approx. one second and displays "▮▮ MAINTENANCE ▮ｱ▮ " on the LCD, indicating that it is placed in the initial stage of the maintenance mode, a mode in which the equipment is ready to accept entry from the keys.

To select one of the maintenance-mode functions listed in Section 2, enter the corresponding 2-digit function code with the numerical keys on the control panel. (The details of each maintenance-mode function are described in Section 3.)

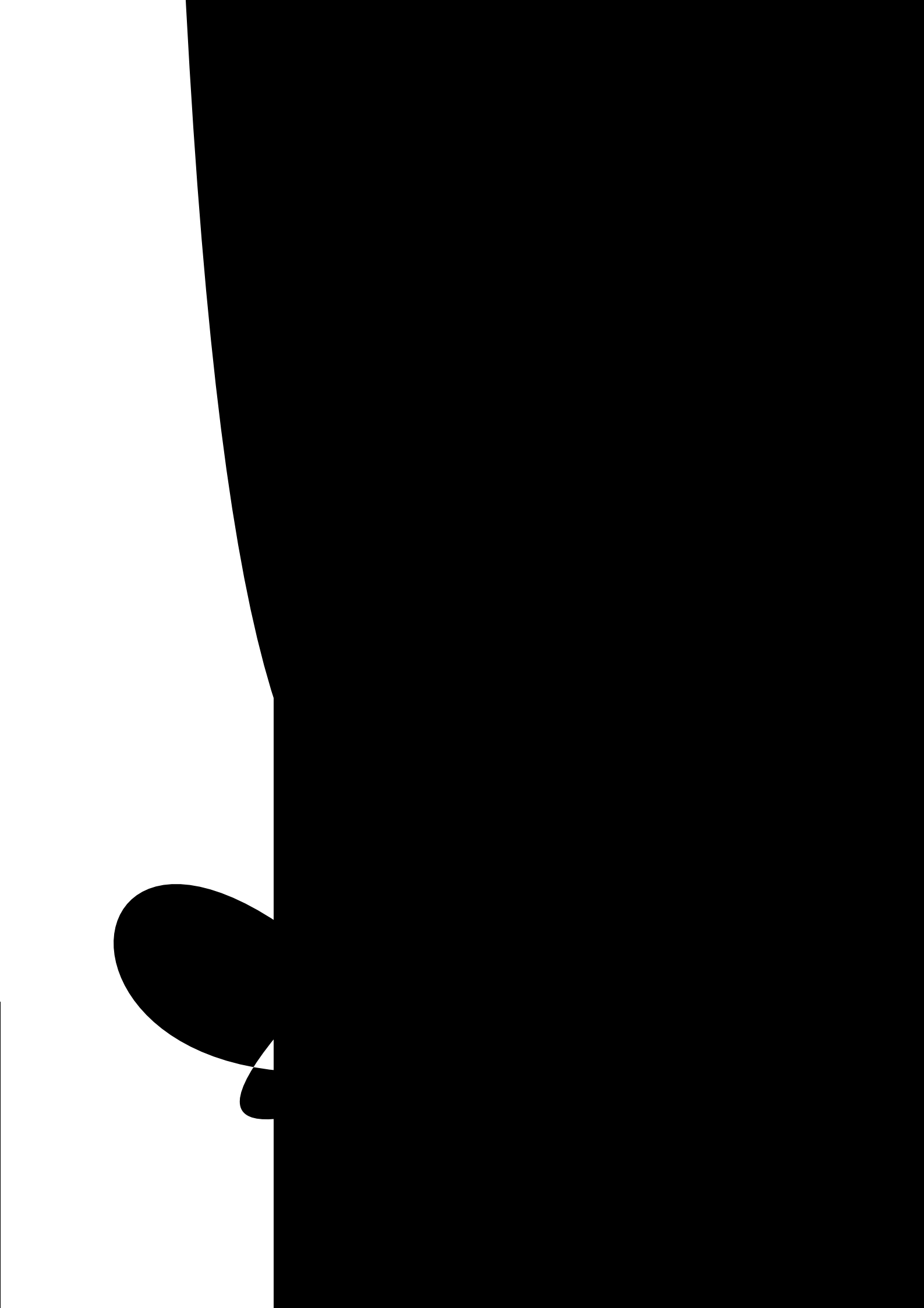
NOTES:
- Pressing the [9] key twice in the initial stage of the maintenance mode restores the equipment to the standby state.
- Pressing the [Stop] button after entering only one digit restores the equipment to the initial stage of the maintenance mode.
- If an invalid function code is entered, the equipment resumes the initial stage of the maintenance mode.
- The " ｱ " in the "▮▮ MAINTENANCE ▮ｱ▮ " is used for checking LCDs in the factory.

2. LIST OF MAINTENANCE-MODE FUNCTIONS

Maintenance-mode Functions

Function Code	Function	Reference Subsection (Page)
01	E^2PROM Parameter Initialization	3.1 (V-4)
02	Scanning Compensation Data Initialization	3.2 (V-5)
03	————	——
04	————	——
05	Printout of Scanning Compensation Data	3.3 (V-6)
06	————	——
07	————	——
08	ADF* Performance Test	3.4 (V-8)
09	Test Pattern 1	3.5 (V-9)
10	Firmware Switch Setting	3.6 (V-10)
11	Printout of Firmware Switch Data	3.6 (V-42)
12	————	——
13	Operational Check of Control Panel PCB (Check of Keys and Buttons)	3.7 (V-43)
14	————	——
15	————	——
32	Sensor Operational Check	3.8 (V-44)
55	CCD Scanner Area Setting	3.9 (V-45)
65	Alignment of Vertical Print Lines	3.10 (V-46)
66	Head Drive Voltage Adjustment for Optimum Printing	3.11 (V-48)
69	Initial Adjustment of PWM Value (Aging of the Carriage)	3.12 (V-49)
82	Equipment Error Code Indication	3.13 (V-49)
86	Modification for the Canadian Version	3.14 (V-50)
87	Output of Transmission Log to the Telephone Line	3.15 (V-50)
91	E^2PROM Parameter Initialization (except the telephone number storage area)	3.1 (V-4)

* ADF: Automatic document feeder



3. DETAILED DESCRIPTION OF MAINTENANCE-MODE FUNCTIONS

3.1 E²PROM Parameter Initialization

■ Function

The equipment initializes the parameters, user switches, and firmware switches registered in the E²PROM, to the initial values. Entering the function code 01 initializes all of the E²PROM areas, but entering 91 does not initialize some areas, as listed below.

Data item \ Function code	01	91
Maintenance-mode functions User switches Firmware switches Remote activation code Distinctive ringing patterns registered (only for the U.S.A. versions)	All of these will be initialized.	These will be initialized.
Station ID data Outside line number Telephone function registration One-touch dialing Speed dialing		These will not be initialized.
Ink dot counter	This will not be initialized.	

■ Operating Procedure

(1) Press the [0] and [1] keys (or the [9] and [1] keys according to your need) in this order in the initial stage of the maintenance mode.

The "PARAMETER INIT" will appear on the LCD.

(2) Upon completion of parameter initialization, the equipment returns to the initial stage of the maintenance mode.

3.2 Scanning Compensation Data Initialization

■ Function

The equipment first scans the white pressure bar without turning on the fluorescent lamp to obtain the black level data. Then, it turns on the fluorescent lamp and scans the white pressure bar to obtain the white level data. The controller checks the obtained black and white level data for compensation of individual CCD properties in the scanning operation.

■ Operating Procedure

(1) Press the 0 and 2 keys in this order in the initial stage of the maintenance mode.

The "BLACK LEVEL INIT" will appear on the LCD, indicating that the equipment is initializing the black level data.

Next, the "WHITE LEVEL INIT" will appear, indicating that the equipment is initializing the white level data.

(2) Upon completion of compensation data initialization, the equipment beeps for one second and returns to the initial stage of the maintenance mode.

NOTE: If any error occurs in the above initializing sequence, the "SCANNER ERROR" will appear on the LCD.

3.3 Printout of Scanning Compensation Data

■ Function

The equipment prints out the white and black level data for scanning compensation.

■ Operating Procedure

Do not start this function merely after powering on the equipment but start it after carrying out a sequence of scanning operation. Unless the equipment has carried out any scanning operation, this function cannot print out correct scanning compensation data. This is because the equipment initializes white and black level data and takes in the scanning compensation reference data at the start of scanning operation.

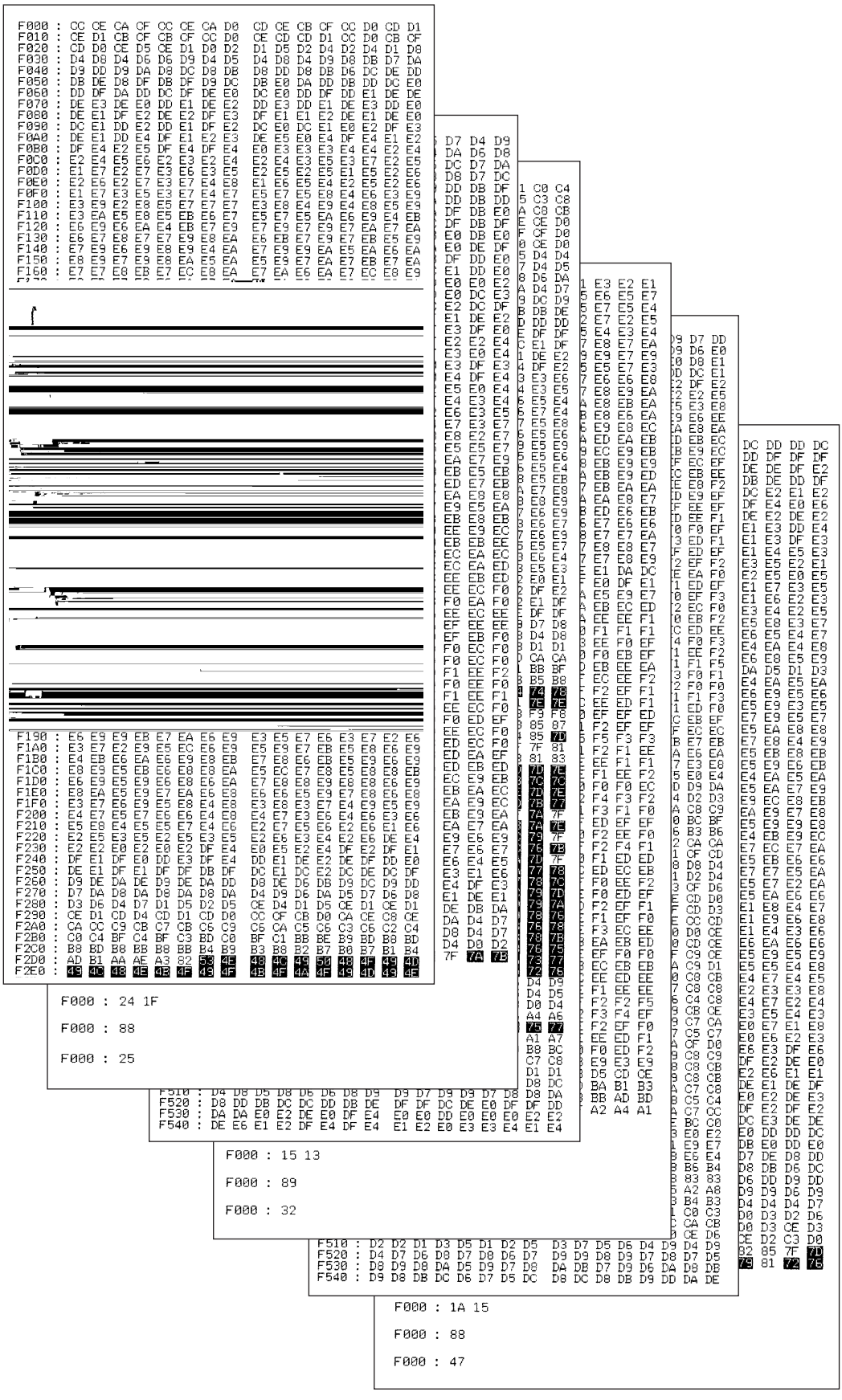
(1) Press the 0 and 5 keys in this order in the initial stage of the maintenance mode.
The "WHITE LEVEL 1" will appear on the LCD.

(2) The equipment prints out the scanning compensation data list containing the following:
   a) White level data for red image (2480 bytes)
   b) Black level data for red image (2 bytes, in the order of odd and even numbers)
   c) A/D DOS reference value for red image (1 byte)
   d) A/D GC reference value for red image (1 byte)
   e) White level data for green image (2480 bytes)
   f) Black level data for green image (2 bytes, in the order of odd and even numbers)
   g) A/D DOS reference value for green image (1 byte)
   h) A/D GC reference value for green image (1 byte)
   i) White level data for blue image (2480 bytes)
   j) Black level data for blue image (2 bytes, in the order of odd and even numbers)
   k) A/D DOS reference value for blue image (1 byte)
   l) A/D GC reference value for blue image (1 byte)

(3) Upon completion of recording of the compensation data list, the equipment returns to the initial stage of the maintenance mode.

NOTE: When the equipment prints monochrome images after monochrome scanning, only the green data is valid.

NOTE: If any data is abnormal, its code will be printed in inline style, as shown on the next page.



Scanning Compensation Data List

3.4 ADF Performance Test

■ Function

The equipment counts the documents fed by the automatic document feeder (ADF) and displays the count on the LCD for checking the ADF performance.

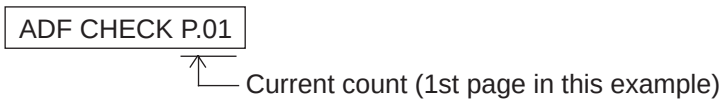
■ Operating Procedure

(1) Set documents. (Allowable up to the ADF capacity.)

The "DOC. READY" will appear on the LCD.

(2) Press the [0] and [8] keys in this order.

While counting the documents, the equipment feeds them in and out, displaying the current count on the LCD as shown below.



(3) After showing the final count, the equipment beeps for one second. To return the equipment to the initial stage of the maintenance mode, press the [Stop] key.

3.5 Test Pattern 1

■ Function

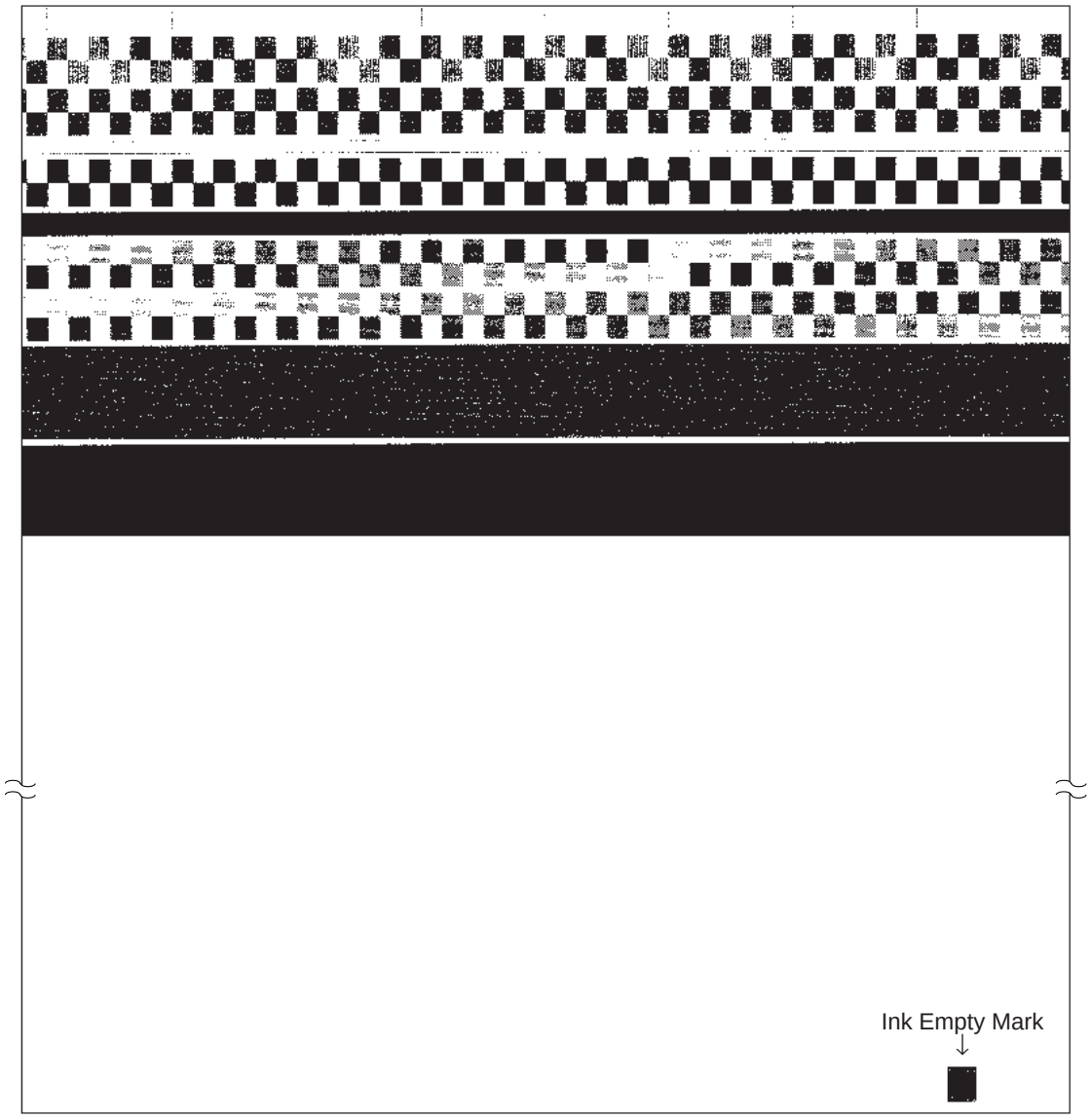
This function, much like the copying function, prints out test pattern 1 to allow the service personnel to check for record data missing or print quality.

■ Operating Procedure

Press the [0] and [9] keys in this order in the initial stage of the maintenance mode.

The figure below shows test pattern 1.

TIP: As shown below, an ink empty mark will be printed together with test pattern 1 by default. To cease printing of the ink empty mark in printing test pattern 1, simultaneously press the [◀] and [▶] keys when the calendar clock is displayed before the equipment enters the maintenance mode. Pressing these keys toggles the ink empty mark printing function on (activated) and off (deactivated).



Test Pattern 1

3.6 Firmware Switch Setting and Printout

[A] Firmware switch setting

■ Function

The facsimile equipment incorporates the following firmware switch functions (WSW01 through WSW34) which may be activated with the procedures using the control panel keys and buttons.

The firmware switches have been set at the factory in conformity to the communications standards and codes of each country. Do not disturb them unless necessary. Some firmware switches may not be applicable in some versions. The firmware switch data list indicates "Not used." for those inapplicable switches.

Firmware Switches (WSW01 through WSW34)

WSW No.	Function	Reference Page
WSW01	Dial pulse setting	V-12
WSW02	Tone signal setting	V-13
WSW03	————	——
WSW04	————	——
WSW05	1st dial tone and busy tone detection	V-14
WSW06	PAUSE key setting and 2nd dial tone detection	V-16
WSW07	————	——
WSW08	————	——
WSW09	Protocol definition 1	V-17
WSW10	Protocol definition 2	V-19
WSW11	Busy tone setting	V-20
WSW12	Signal detection condition setting	V-21
WSW13	Modem setting	V-22
WSW14	AUTO ANS facility setting	V-23
WSW15	REDIAL facility setting	V-24
WSW16	Function setting 1	V-25
WSW17	Function setting 2	V-26
WSW18	Function setting 3	V-27
WSW19	Transmission speed setting	V-28
WSW20	Overseas communications mode setting	V-29
WSW21	TAD setting 1	V-30
WSW22	PPI setting	V-30
WSW23	Communications setting	V-31
WSW24	TAD setting 2	V-32
WSW25	TAD setting 3	V-33
WSW26	Function setting 4	V-34
WSW27	Function setting 5	V-35
WSW28	Function setting 6	V-36
WSW29	————	——
WSW30	Function setting 8	V-37
WSW31	Function setting 9	V-38
WSW32	Function setting 10	V-39
WSW33	Function setting 11	V-40
WSW34	Function setting 12	V-41

■ Operating Procedure

(1) Press the [1] and [0] keys in this order in the initial stage of the maintenance mode.

The equipment displays the "WSW00" on the LCD and becomes ready to accept a firmware switch number.

(2) Enter the desired number from the firmware switch numbers (01 through 34).

The following appears on the LCD:

WSWXX = 0 0 0 0 0 0 0 0

(3) Use the [◀] and [▶] keys to move the cursor to the selector position to be modified.

(4) Enter the desired number using the [0] and [1] keys.

(5) Press the [Set] key. This operation saves the newly entered selector values onto the E^2PROM and readies the equipment for accepting a firmware switch number.

(6) Repeat steps (2) through (5) until the modification for the desired firmware switches is completed.

(7) Press the [Set] or [Stop] key to return the equipment to the initial stage of the maintenance mode.

NOTES:
- To cancel this operation and return the equipment to the initial stage of the maintenance mode during the above procedure, press the [Stop] key.
- If there is a pause of more than one minute after a single-digit number is entered for double-digit firmware switch numbers, the equipment will automatically return to the initial stage of the maintenance mode.

■ Note

The user-accessible selectors of the firmware switches are shaded in the tables given on the following pages.

■ Detailed Description for the Firmware Switches

WSW01 (Dial pulse setting)

Selector No.	Function	Setting and Specifications
1 2	Dial pulse generation mode	No. 1 2 0 0 : N 0 1 : N+1 1 0 : 10-N 1 1 : N
3 4	Break time length in pulse dialing	No. 3 4 0 0 : 60 ms 0 1 : 67 ms 1 0 : 40 ms (for 16 PPS) 1 1 : 64 ms (at 106-ms intervals)
5 6	Inter-digit pause	No. 5 6 0 0 : 800 ms 0 1 : 850 ms 1 0 : 950 ms 1 1 : 600 ms
7	Switching between pulse (DP) and tone (PB) dialing, by the function switch	0: Yes 1: No
8	Default dialing mode, pulse (DP) or tone (PB) dialing	0: PB 1: DP

- **Selectors 1 and 2: Dial pulse generation mode**

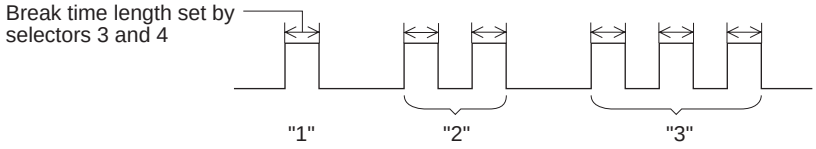
  These selectors set the number of pulses to be generated in pulse dialing.

  N: Dialing "N" generates "N" pulses. (Dialing "0" generates 10 pulses.)
  N + 1: Dialing "N" generates "N + 1" pulses.
  10 - N: Dialing "N" generates "10 - N" pulses.

- **Selectors 3 and 4: Break time length in pulse dialing**

  These selectors set the break time length in pulse dialing.

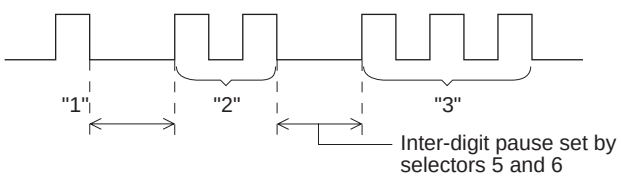
  (Example: If "1," "2," and "3" are dialled when N is set by selectors 1 and 2.)



- **Selectors 5 and 6: Inter-digit pause**

  These selectors set the inter-digit pause in pulse dialing.

  (Example: If "1," "2," and "3" are dialled when N is set by selectors 1 and 2.)



- **Selector 7: Switching between pulse (DP) and tone (PB) dialing, by the function switch**

  This selector determines whether or not the dialing mode may be switched between the pulse (DP) and tone (PB) dialing by using the function switch.

- **Selector 8: Default dialing mode, pulse (DP) or tone (PB) dialing**

  This selector sets the default dialing mode (pulse dialing or tone dialing) which may be changed by the function switch. If the user switches it with the function switch when selector 7 is set to "0," the setting specified by this selector will be also switched automatically.

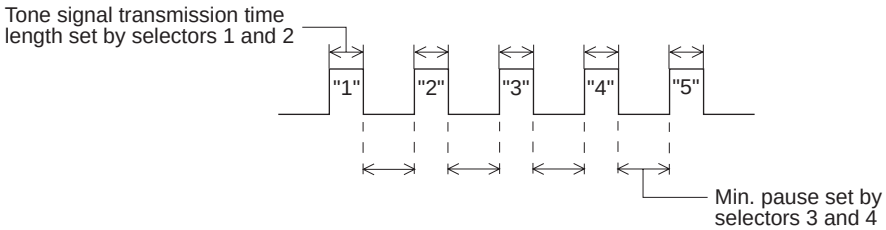
WSW02 (Tone signal setting)

Selector No.	Function	Setting and Specifications
1 2	Tone signal transmission time length	No. 1 2 0 0 : 70 ms 0 1 : 80 ms 1 0 : 90 ms 1 1 : 100 ms
3 4	Min. pause in tone dialing	No. 3 4 0 0 : 70 ms 0 1 : 80 ms 1 0 : 90 ms 1 1 : 140 ms
5 | 8	Attenuator for pseudo ring backtone to the line (selectable in the range of 0-15 dB)	0: 0 dB 1: 8 dB 0: 0 dB 1: 4 dB 0: 0 dB 1: 2 dB 0: 0 dB 1: 1 dB

- **Selectors 1 through 4: Tone signal transmission time length and Min. pause in tone dialing**

  These selectors set the tone signal transmission time length and minimum pause in tone dialing.

  (Example: If "1," "2," "3," "4," and "5" are dialled.)



- **Selectors 5 through 8: Attenuator for pseudo ring backtone to the line**

  These selectors are used to adjust the sound level of beep generated as a ring backtone in the F/T mode or as a signal during remote control operation or at the start of ICM recording.

  Setting two or more selectors to "1" produces addition of attenuation assigned to each selector. The default is 10 dB (8 dB + 2 dB).

  This setting will be limited if selector 8 of WSW23 is set to "0."

WSW03

Selector No.	Function	Setting and Specifications
1 | 8	Not used.	————————

WSW04

Selector No.	Function	Setting and Specifications
1 | 8	Not used.	————————

WSW05 (1st dial tone and busy tone detection)

Selector No.	Function	Setting and Specifications
1 | 3	1st dial tone detection	No. 1 2 3 0 0 0 : 3.5 sec. WAIT 0 0 1 : 7.0 sec. WAIT 0 1 0 : 10.5 sec. WAIT 0 1 1 : 14.0 sec. WAIT 1 0 0 : 17.5 sec. WAIT 1 0 1 : 21.0 sec. WAIT 1 1 0 : 24.5 sec. WAIT 1 1 1 : Detection (Without WAIT)
4	Max. pause time allowable for remote ID code detection	0: 2 seconds 1: 1 second
5 6	Busy tone detection in automatic sending mode	No. 5 6 0 0 : No detection 0 1 : Detection only after dialing 1 0 : No detection 1 1 : Detection before and after dialing
7	Busy tone detection in automatic receiving mode	0: Yes 1: No
8	DTMF detection time	0: 40 ms min. 1: 100 ms min.

NOTE: Selectors 5 through 7 are not applicable in those countries where no busy tone detection is supported, e.g., U.S.A.

- **Selectors 1 through 3: 1st dial tone detection**

  These selectors activate or deactivate the 1st dial tone detection function which detects the 1st dial tone issued from the PSTN when a line is connected to the PSTN.

  Setting all of these selectors to "1" activates the dial tone detection function so that the equipment starts dialing upon detection of a dial tone when a line is connected. (However, in those countries which support no dial tone detection function, e.g., in the U.S.A., setting these selectors to "1" makes the equipment start dialing after a WAIT of 3.5 seconds.) For the detecting conditions of the 1st dial tone, refer to WSW07 and WSW08.

  Other setting combinations deactivate the dial tone detection function so that the equipment starts dialing after the specified WAIT (3.5, 7.0, 10.5, 14.0, 17.5, 21.0, or 24.5 seconds) without detection of a dial tone when a line is connected to the PSTN.

- **Selector 4: Max. pause time allowable for remote ID code detection**

  This selector sets the maximum pause time allowable for detecting the second digit of a remote ID code after detection of the first digit in remote reception.

  If selector 4 is set to "0" (2 seconds), for instance, only a remote ID code whose second digit is detected within 2 seconds after detection of the first digit will become effective so as to activate the remote function.

- **Selectors 5 and 6: Busy tone detection in automatic sending mode**

  These selectors determine whether or not the equipment automatically disconnects a line upon detection of a busy tone in automatic sending mode.

  Setting selector 6 to "0" ignores a busy tone so that the equipment does not disconnect the line.

  Setting selectors 5 and 6 to "0" and "1," respectively, makes the equipment detect a busy tone only after dialing and disconnect the line.

  Setting both of selectors 5 and 6 to "1" makes the equipment detect a busy tone before and after dialing and then disconnect the line.

- **Selector 7: Busy tone detection in automatic receiving mode**

  This selector determines whether or not the equipment automatically disconnects a line upon detection of a busy tone in automatic receiving mode.

WSW06 (PAUSE key setting and 2nd dial tone detection)

Selector No.	Function	Setting and Specifications
1 | 3	[Pause] key setting and 2nd dial tone detection	No. 1 2 3 0 0 0 : No pause 0 0 1 : 3.5 sec. WAIT 0 1 0 : 7 sec. WAIT 0 1 1 : 10.5 sec. WAIT 1 0 0 : 14 sec. WAIT 1 0 1 : 17.5 sec. WAIT 1 1 0 : 2nd dial tone detection only in pulse dialing (DP) system 1 1 1 : 2nd dial tone detection both in DP and push-button (PB) dialing systems
4 | 8	Not used.	

NOTE: Selectors 4 through 8 are not applicable in those countries where no dial tone detection is supported, e.g., U.S.A.

- **Selectors 1 through 3: [Pause] key setting and 2nd dial tone detection**

Selectors 1	2	3	
0	0	0	No WAIT is inserted even if the [Pause] key is pressed.
0	0	1	Pressing the [Pause] key inserts WAIT in pulse dialing, as defined in the above table. If the [Pause] key is pressed repeatedly, the equipment beeps a refusal sound and refuses the entry. In hook-up dialing, however, the equipment allows repeated pressing with an acceptance sound, but inserts WAIT only for the first pressing.
0	1	0	
0	1	1	
1	0	0	
1	0	1	
1	1	0	Each time the [Pause] key is pressed, the equipment detects a 2nd dial tone. If no 2nd dial tone is inputted within the specified time, the equipment disconnects the line in automatic dialing, or it starts transmitting the dial signal if given after depression of the [Pause] key in hook-up dialing. (In those countries where no dial tone detection function is supported, setting these selectors to "1, 1, 0" or "1, 1, 1" inserts a WAIT of 3.5 seconds.)
1	1	1	

WSW07

Selector No.	Function	Setting and Specifications
1 | 8	Not used.	————————

WSW08

Selector No.	Function	Setting and Specifications
1 | 8	Not used.	————————

WSW09 (Protocol definition 1)

Selector No.	Function	Setting and Specifications
1	Frame length selection	0: 256 octets 1: 64 octets
2	Use of non-standard commands	0: Allowed 1: Prohibited
3 | 4	No. of retries	No. 3 4 0 0 : 4 times 0 1 : 3 times 1 0 : 2 times 1 1 : 1 time
5	T5 timer	0: 300 sec. 1: 60 sec.
6	T1 timer	0: 35 sec. 1: 40 sec.
7 8	Elapsed time for time-out control for no response from the called station in automatic sending mode	No. 7 8 0 0 : 50 sec. 0 1 : 70 sec. 1 0 : 90 sec. 1 1 : 35 sec.

NOTE: Selectors 1 through 5 are not applicable in those models which do not support ECM.

- **Selector 1: Frame length selection**

  Usually a single frame consists of 256 octets (1 octet = 8 bits). For communications lines with higher bit error rate, however, set selector 1 to "1" so that the facsimile equipment can divide a message into 64-octet frames.

  Remarks: The error correction mode (ECM) is a facsimile transmission manner in which the equipment divides a message into frames for transmission so that if any data error occurs on the transmission line, the equipment retransmits only those frames containing the error data.

- **Selector 2: Use of non-standard commands**

  If this selector is set to "0," the equipment may use non-standard commands (the machine's native-mode commands, e.g., NSF, NSC, and NSS) for communications. If it is set to "1," the equipment will use standard commands only.

- **Selectors 3 and 4: No. of retries**

  These selectors set the number of retries in each specified modem transmission speed.

- **Selector 5: T5 timer**

  This selector sets the time length for the T5 timer.

- **Selector 6: T1 timer**

  This selector sets the time length for the T1 timer.

- **Selectors 7 and 8: Elapsed time for time-out control**

  If the equipment receives no response (no G3 command) from the called terminal in automatic sending during the time set by these selectors, it disconnects the line.

WSW10 (Protocol definition 2)

Selector No.	Function		Setting and Specifications
1	Switching of DPS, following the CML ON/OFF		0: No 1: Yes
2	Time length from transmission of the last dial digit to CML ON		0: 100 ms 1: 50 ms
3	Time length from CML ON to CNG transmission		0: 2 sec. 1: 4 sec.
4	Time length from CML ON to CED transmission (except for facsimile-to-telephone switching)		0: 0.5 sec. 1: 2 sec.
5 6	No. of training retries		No. 5 6 0 0 : 1 time 0 1 : 2 times 1 0 : 3 times 1 1 : 4 times
7	Encoding system (Compression)	MR	0: Allowed 1: Not allowed
8		MMR	0: Allowed 1: Not allowed

- **Selector 1: Switching of DPS, following the CML ON/OFF**

  Setting this selector to "1" automatically switches DPS following the CML ON/OFF operation. This function is provided to conform to the Swedish standard.

- **Selector 2: Time length from transmission of the last dial digit to CML ON**

  This selector sets the time length from when the equipment transmits the last dial digit until the CML relay comes on.

- **Selector 3: Time length from CML ON to CNG transmission**

  This selector sets the time length until the equipment transmits a CNG after it turns on the CML relay.

- **Selector 4: Time length from CML ON to CED transmission**

  This selector sets the time length until the equipment transmits a CED after it turns on the CML relay. This setting does not apply to switching between facsimile and telephone.

- **Selectors 5 and 6: No. of training retries**

  These selectors set the number of training retries to be repeated before automatic fallback.

- **Selectors 7 and 8: Encoding system (Compression)**

  This selector determines whether or not use of the MR coding system will be allowed.

WSW11 (Busy tone setting)

Selector No.	Function	Setting and Specifications
1 2	Frequency band range	No. 1 2 0 0 : Narrows by 10 Hz 0 1 : Initial value 1 x : Widens by 10 Hz
3	Not used.	
4	ON/OFF time length ranges (More than one setting allowed)	1: 400-600/400-600 ms
5		1: 175-440/175-440 ms
6		1: 700-800/700-800 ms
7		1: 110-410/320-550 ms
8		1: 100-660/100-660 ms

NOTE: The WSW11 is not applicable in those countries where no busy tone detection is supported, e.g., U.S.A.

The setting of WSW11 is effective only when selectors 5 and 6 of WSW05 are set to "0, 1" or "1, 1" (Busy tone detection).

- **Selectors 1 and 2: Frequency band range**

  These selectors set the frequency band for busy tone to be detected.

- **Selectors 4 through 8: ON/OFF time length ranges**

  These selectors set the ON and OFF time length ranges for busy tone to be detected. If more than one selector is set to "1," the ranges become wider. For example, if selectors 4 and 5 are set to "1," the ON and OFF time length ranges are from 175 to 600 ms.

WSW12 (Signal detection condition setting)

Selector No.	Function	Setting and Specifications
1 2	Min. OFF time length of calling signal (Ci)	No. 1 2 0 0 : 300 ms 0 1 : 500 ms 1 0 : 700 ms 1 1 : 900 ms
3 4	Max. OFF time length of calling signal (Ci)	No. 3 4 0 0 : 6 sec. 0 1 : 7 sec. 1 0 : 9 sec. 1 1 : 11 sec.
5 6	Detecting time setting	No. 5 6 0 0 : 800 ms 0 1 : 200 ms 1 0 : 250 ms 1 1 : 150 ms
7	Delay	0: Yes 1: No
8	Not used.	

- **Selectors 1 through 4: Min. and max. OFF time length of calling signal (Ci)**

  If the equipment detects the OFF state of calling signal (Ci) for a time length which is greater than the value set by selectors 1 and 2 and less than the value set by selectors 3 and 4, it interprets the Ci signal as OFF.

- **Selectors 5 and 6: Detecting time setting**

  These selectors set the time length required to make the equipment acknowledge itself to be called. That is, if the equipment continuously detects calling signals with the frequency set by selectors 1 through 4 of WSW14 during the time length set by these selectors 5 and 6, it acknowledges the call.

- **Selector 7: Delay**

  Setting this selector to "0" allows the equipment to insert a 900 ms WAIT after acknowledgement of the call until the equipment turns on the CML relay to start receiving operation.

WSW13 (Modem setting)

Selector No.	Function	Setting and Specifications
1 2	Cable equalizer	No. 1 2 0 0 : 0 km 0 1 : 0 km 1 0 : 7.2 km 1 1 : 7.2 km
3 4	Reception level	No. 3 4 0 0 : -43 dBm 0 1 : -47 dBm 1 0 : -49 dBm 1 1 : -51 dBm
5 | 8	Modem attenuator	0: 0 dB 1: 8 dB 0: 0 dB 1: 4 dB 0: 0 dB 1: 2 dB 0: 0 dB 1: 1 dB

The modem should be adjusted according to the user's line conditions.

- **Selectors 1 and 2: Cable equalizer**

  These selectors are used to improve the pass-band characteristics of analogue signals on a line. (Attenuation in the high-band frequency is greater than in the low-band frequency.)

  Set these selectors according to the distance from the telephone switchboard to the facsimile equipment.

- **Selectors 3 and 4: Reception level**

  These selectors set the optimum receive signal level.

- **Selectors 5 through 8: Modem attenuator**

  These selectors are used to adjust the transmitting level of the modem when the reception level at the remote station is improper due to line loss. This function applies for G3 protocol signals.

  Setting two or more selectors to "1" produces addition of attenuation assigned to each selector. The default is 10 dB (8 dB + 2 dB).

  This setting will be limited if selector 8 of WSW23 is set to "0."

WSW14 (AUTO ANS facility setting)

Selector No.	Function	Setting and Specifications
1 2	Frequency band selection (Lower limit)	No. 1 2 0 0 : 13 Hz 0 1 : 15 Hz 1 0 : 23 Hz 1 1 : 20 Hz
3 4	Frequency band selection (Upper limit)	No. 3 4 0 0 : 30 Hz 0 1 : 55 Hz 1 X : 70 Hz
5 | 8	No. of rings in AUTO ANS mode	No. 5 6 7 8 0 0 0 0 : Fixed to once 0 0 0 1 : Fixed to 2 times 0 0 1 0 : Fixed to 3 times 0 0 1 1 : Fixed to 4 times 0 1 0 0 : 1 to 2 times 0 1 0 1 : 1 to 3 times 0 1 1 0 : 1 to 4 times 0 1 1 1 : 1 to 5 times 1 0 0 0 : 2 to 3 times 1 0 0 1 : 2 to 4 times 1 0 1 0 : 2 to 5 times 1 0 1 1 : 2 to 6 times 1 1 0 0 : 1 to 10 times 1 1 0 1 : 2 to 10 times 1 1 1 0 : 3 to 5 times 1 1 1 1 : 4 to 10 times

- **Selectors 1 through 4: Frequency band selection**

  These selectors are used to select the frequency band of calling signals for activating the AUTO ANS facility.

- **Selectors 5 through 8: No. of rings in AUTO ANS mode**

  These selectors set the number of rings to initiate the AUTO ANS facility.

WSW15 (REDIAL facility setting)

Selector No.	Function	Setting and Specifications
1 2	Selection of redial interval	No. 1 2 0 0 : 5 minutes 0 1 : 1 minute 1 0 : 2 minutes 1 1 : 3 minutes
3 | 6	No. of redialings	No. 3 4 5 6 0 0 0 0 : 16 times 0 0 0 1 : 1 time 0 0 1 0 : 2 times 0 0 1 1 : 3 times | | 1 1 1 1 : 15 times
7 8	Not used.	

- **Selectors 1 through 6: Selection of redial interval and No. of redialings**

  The equipment redials by the number of times set by selectors 3 through 6 at intervals set by selectors 1 and 2.

WSW16 (Function setting 1)

Selector No.	Function	Setting and Specifications	
1	Not used.		
2	CCITT superfine recommendation	0: OFF	1: ON
3	Remote reception	0: Only from the connected external telephone	1: From all telephones connected
4 5	Not used.		
6	Exclusive line mode	0: OFF	1: ON
7	Max. document length limitation	0: 400 cm	1: 90 cm
8	[Stop] key pressed during reception	0: Not functional	1: Functional

- **Selector 2: CCITT superfine recommendation**

  If this selector is set to "1," the equipment communicates in CCITT recommended superfine mode (15.4 lines/mm). If it is set to "0," it communicates in native superfine mode.

- **Selector 3: Remote reception**

  Setting this selector to "0" allows the facsimile equipment to receive data from the directly connected external telephone only. Setting it to "1" allows the equipment to receive data from all telephones sharing a modular wall socket with the equipment, as well as from the directly connected external telephone.

  If any of the following problems occurs frequently, set this selector to "0":

  - Dialing from any of the telephones sharing a modular wall socket starts the facsimile equipment.
  - Picking up the handset for any telephones sharing a modular wall socket while the equipment is in receiving operation disrupts the received image due to the superimposed noise.

- **Selector 6: Exclusive line mode**

  Setting this selector to "1" connects the equipment to the exclusive line, which enables transmission merely by pressing the [Start] key without dialing operation at both the calling and called terminals.

- **Selector 7: Max. document length limitation**

  This selector is used to select the maximum length of a document to be sent.

- **Selector 8: [Stop] key pressed during reception**

  If this selector is set to "1," pressing the [Stop] key can stop the current receiving operation. The received data will be lost.

WSW17 (Function setting 2)

Selector No.	Function	Setting and Specifications
1 2	Off-hook alarm	No. 1 2 0 0 : No alarm 0 1 : Always valid 1 X : Valid except when 'call reservation' is selected.
3	Power failure report output	0: ON 1: OFF
4	Calendar clock/prompt alternate display	0: NO 1: YES
5	Calendar clock type	0: U.S.A. type 1: European type
6	Not used.	
7	Non-ring reception	0: OFF 1: ON
8	Not used.	

- **Selectors 1 and 2: Off-hook alarm**

  These selectors activate or deactivate the alarm function which sounds an alarm when the communication is completed with the handset being off the hook.

- **Selector 3: Power failure report output**

  This selector determines whether or not the equipment outputs a power failure report when the power comes back on.

- **Selector 4: Calendar clock/prompt alternate display**

  If this selector is set to "1," the calendar clock and the prompt "INSERT DOCUMENT" appear alternately on the LCD while the equipment is on standby; if it is set to "0," only the calendar clock appears.

- **Selector 5: Calendar clock type**

  If this selector is set to "0" (U.S.A.), the MM/DD/YY hh:mm format applies; if it is set to "1" (Europe), the DD/MM/YY hh:mm format applies: DD is the day, MM is the month, YY is the last two digits of the year, hh is the hour, and mm is the minute.

- **Selector 7: Non-ring reception**

  Setting this selector to "1" makes the equipment receive calls without ringer sound if the ring delay is set to 0.

WSW18 (Function setting 3)

Selector No.	Function	Setting and Specifications
1	Not used.	
2 3	Detection enabled time for CNG and no tone	No. 2 3 0 0 : 40 sec. 0 1 : 0 sec. (No detection) 1 0 : 5 sec. 1 1 : 80 sec.
4 5	Not used.	
6	Registration of station ID	0: Permitted 1: Prohibited
7 8	Tone sound monitoring	No. 7 8 0 X : No monitoring 1 0 : Up to phase B at the calling station only 1 1 : All transmission phases both at the calling and called stations

- **Selectors 2 and 3: Detection enabled time for CNG and no tone**

  After the line is connected via the external telephone, the equipment can detect a CNG signal or no tone for the time length specified by these selectors. The setting specified by these selectors becomes effective only when selector 8 of WSW20 is set to "1."

- **Selector 6: Registration of station ID**

  Setting this selector to "0" permits the registration of station ID for Austrian and Czecho versions.

- **Selectors 7 and 8: Tone sound monitoring**

  These selectors sets monitoring specifications of the tone sound inputted from the line.

WSW19 (Transmission speed setting)

Selector No.	Function	Setting and Specifications
1 | 3	First transmission speed choice for fallback	No. 1 2 3 / No. 4 5 6 0 0 0 : 2,400 bps 0 0 1 : 4,800 bps 0 1 0 : 7,200 bps 0 1 1 : 9,600 bps 1 0 0 : 12,000 bps * 1 0 1 : 14,400 bps * 1 1 0 : 14,400 bps * 1 1 1 : 14,400 bps *
4 | 6	Last transmission speed choice for fallback	
7	Not used.	
8	V. 17 mode	0: Permitted 1: Prohibited

* In those models with a maximum of 9600 bps capability, selection of 12,000 bps or 14,400 bps will still only produce a set speed automatically reduced to 9600 bps.

- **Selectors 1 through 6: First and last choices of transmission speed for fallback**

  These selectors are used to set the MODEM speed range. With the first transmission speed choice specified by selectors 1 through 3, the equipment attempts to synchronize the data transmission via the MODEM. If the synchronization fails, the equipment automatically steps down to the next lowest speed and attempts to synchronize the data transmission again. The equipment repeats this sequence while stepping down the transmission speed to the last choice specified by selectors 4 through 6.

  If the MODEM always falls back to a low transmission speed (e.g., 4,800 bps), set the first transmission speed choice to the lower one (e.g., modify it from 12,000 bps to 7,200 bps) in order to deactivate the high-speed MODEM function and reduce the training time for shorter transmission time.

  Generally, to save the transmission time, set the last transmission speed choice to a higher one.

WSW20 (Overseas communications mode setting)

Selector No.	Function	Setting and Specifications
1	EP* tone prefix	0: OFF 1: ON
2	Overseas communications mode (Reception)	0: 2100 Hz 1: 1100 Hz
3	Overseas communications mode (Transmission)	0: OFF 1: Ignores DIS once.
4 5	Min. time length from reception of CFR to start of transmission of video signals	No. 4 5 0 0 : 100 ms 0 1 : 200 ms 1 0 : 300 ms 1 1 : 400 ms
6 7	Chattering elimination for CNG detection (Effective only when the modem TC35129F is used.)	No. 6 7 0 0 : A (During CNG ON and OFF) 0 1 : B (During CNG OFF only) 1 X : C (No elimination)
8	Not used.	

* EP: Echo protection

- **Selector 1: EP tone prefix**

  Setting this selector to "1" makes the equipment transmit a 1700 Hz echo protection (EP) tone immediately preceding training in V.29 modulation system to prevent omission of training signals.

  Prefixing an EP tone is effective when the equipment fails to transmit at the V.29 modem speed and always has to fall back to 4800 bps transmission.

- **Selectors 2 and 3: Overseas communications mode**

  These selectors should be used if the facsimile equipment malfunctions in overseas communications. According to the communications error state, select the signal specifications.

  Setting selector 2 to "1" allows the equipment to use 1100 Hz CED signal instead of 2100 Hz in receiving operation. This prevents malfunctions resulting from echoes, since the 1100 Hz signal does not disable the echo suppressor (ES) while the 2100 Hz signal does.

  Setting selector 3 to "1" allows the equipment to ignore a DIS signal sent from the called station once in sending operation. This operation suppresses echoes since the first DIS signal immediately follows a 2100 Hz CED (which disables the ES) so that it is likely to be affected by echoes in the disabled ES state. However, such a disabled ES state will be removed soon so that the second and the following DIS signals are not susceptible to data distortion due to echoes. Note that some models when called may cause error by receiving a self-outputted DIS.

WSW21 (TAD setting 1)

Selector No.	Function	Setting and Specifications
1 | 5	Max. waiting time for voice signal	No. 1 2 3 4 5 0 0 0 0 0 : No detection 0 0 0 0 1 : 1 sec. 0 0 0 1 0 : 2 sec. 0 0 0 1 1 : 3 sec. | | 0 1 0 0 0 : 8 sec. | | 1 1 1 1 1 : 31 sec.
6 7	Two-way recording	No. 6 7 0 0 : For U.S.A. (A) 0 1 : Except for U.S.A. (B) 1 0 : Without beep (C) 1 1 : OFF (D)
8	Erasure of message stored in the memory after the message transfer	0: YES 1: NO

- **Selectors 1 through 5: Max. waiting time for voice signal**

  In the TAD mode, the equipment waits for voice signal for the time length specified by these selectors before it automatically shifts to the facsimile message receive mode or disconnects the line.

- **Selectors 6 and 7: Two-way recording (For those models equipped with a built-in TAD)**

  These selectors select the specifications of the two-way recording feature.

- **Selector 8: Erasure of message (For those models equipped with a built-in TAD)**

  Setting this selector to "0" will erase the message recorded in the memory after the document retrieval feature transfers the message.

WSW22 (PPI setting)

Selector No.	Function	Setting and Specifications
1	ECM* in sending	0: OFF 1: ON
2	ECM* in receiving	0: OFF 1: ON
3 | 8	Not used.	

*ECM: Error correction mode

WSW23 (Communications setting)

Selector No.	Function	Setting and Specifications
1	Starting point of training check (TCF)	0: From the head of a series of zeros 1: From any arbitrary point
2 3	Allowable training error rate	No. 2 3 0 0 : 0% 0 1 : 0.5% 1 0 : 1% 1 1 : 2%
4 5	Decoding error rate for transmission of RTN	No. 4 5 0 0 : 16% 0 1 : 14% 1 0 : 10% 1 1 : 8%
6	Issue of RTN at the occurrence of a pagination error	0: YES 1: NO
7	Not used.	
8	Limitation of attenuation level	0: YES 1: NO

- **Selector 1: Starting point of training check (TCF)**

  At the training phase of receiving operation, the called station detects for 1.0 second a training check (TCF) command, a series of zeros which is sent from the calling station for 1.5 seconds to verify training and give the first indication of the acceptability of the line.

  This selector sets the starting point from which the called station should start counting those zeros. If this selector is set to "0," the called station starts counting zeros 100 ms after the head of a series of zeros is detected.

  If it is set to "1," the called station starts counting zeros upon detection of 10-ms successive zeros 50 ms after the head of a series of zeros is detected. In this case, if the detection of 10-ms successive zeros is too late, the data counting period will become less than 1.0 second, making the called station judge the line condition unacceptable.

- **Selectors 2 and 3: Allowable training error rate**

  The called station checks a series of zeros gathered in training (as described in Selector 1) according to the allowable training error rate set by these selectors. If the called station judges the line condition to be accepted, it responds with CFR; if not, it responds with FTT.

- **Selectors 4 and 5: Decoding error rate for transmission of RTN**

  The facsimile equipment checks the actual decoding errors and then transmits an RTN according to the decoding error rate (Number of lines containing an error per page ÷ Total number of lines per page) set by these selectors.

- **Selector 6: Issue of RTN at the occurrence of a pagination error**

  If this selector is set to "0," the facsimile equipment transmits an RTN when a pagination error occurs due to recording lag relative to receiving.

- **Selector 8: Limitation of attenuation level**

  Setting this selector to "0" limits the transmitting level of the modem to 10 dB.

  This setting has priority over the settings selected by WSW02 (selectors 5 through 8) and WSW13 (selectors 5 through 8).

WSW24 (TAD setting 2)

Selector No.	Function	Setting and Specifications
1 2	Maximum OGM recording time	No. 1 2 0 0 : 15 sec. 0 1 : 20 sec. 1 0 : 30 sec. 1 1 : 50 sec.
3 4	Time length from CML ON to start of pseud ring backtone transmission	No. 3 4 0 0 : 4 sec. 0 1 : 3 sec. 1 0 : 2 sec. 1 1 : 1 sec.
5 | 8	Attenuator for playback of ICM/ OGM to the line (Selectable from the range of 0-15 dB)	0: 0 dB 1: 8 dB 0: 0 dB 1: 4 dB 0: 0 dB 1: 2 dB 0: 0 dB 1: 1 dB

- **Selectors 1 and 2: Maximum OGM recording time (For those models equipped with a built-in TAD)**

  These selectors set the allowable maximum recording time for an OGM.

- **Selectors 3 and 4: Time length from CML ON to start of pseud ring backtone transmission**

  These selectors set the length of time from CML-ON up to the start of pseud ring backtone transmission.

  In those versions which have an OGM facility instead of pseud ring backtone, these selectors set the length of time from CML-ON up to the start of OGM transmission.

- **Selectors 5 through 8: Attenuator for playback of ICM/OGM to the line (For those models equipped with a built-in TAD)**

  Setting two or more selectors to "1" produces addition of attenuation assigned to each selector. The default is 11 dB (8 dB + 2 dB + 1 dB).

  This setting will not be limited by selector 8 of WSW23.

WSW25 (TAD setting 3)

Selector No.	Function	Setting and Specifications
1 | 4	Not used.	
5 | 7	Pause between paging number and PIN	No. 5 6 7 0 0 0 : 2 sec. 0 0 1 : 4 sec. 0 1 0 : 6 sec. 0 1 1 : 8 sec. 1 0 0 : 10 sec. 1 0 1 : 12 sec. 1 1 0 : 14 sec. 1 1 1 : 16 sec.
8	Automatic shift to facsimile message receive mode in ICM recording mode	0: YES 1: NO

- **Selectors 5 and 7: Pause between paging number and PIN (For those models equipped with a built-in TAD)**

  These selectors set the pause time between a telephone number being paged and PIN (private identification number) for the paging feature.

- **Selector 8: Automatic shift to facsimile message receive mode in ICM recording mode (For those models equipped with a built-in TAD)**

  If this selector is set to "0," the equipment automatically shifts to the facsimile message receive mode after recording an ICM. If it is set to "1," the equipment automatically disconnects the line after the waiting time has passed.

WSW26 (Function setting 4)

Selector No.	Function	Setting and Specifications
1 | 3	Not used.	
4 5	No. of CNG cycles to be detected (when the line is connected via the external telephone except in the external TAD mode)	No. 4 5 0 0 : No detection (A) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
6 7	No. of CNG cycles to be detected (when the line is connected via the external telephone in the external TAD mode or via the facsimile equipment in F/T mode)	No. 6 7 0 0 : 0.5 (A) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
8	FAX reception after the time-out of pseudo ring backtones in F/T mode	0: YES 1: NO

- **Selectors 4 and 5: No. of CNG cycles to be detected**

  The equipment interprets a CNG as an effective signal if it detects a CNG signal by the number of cycles specified by these selectors when the line is connected via the external telephone except in the external TAD mode.

- **Selectors 6 and 7: No. of CNG cycles to be detected (For those models not equipped with a built-in TAD)**

  The equipment interprets a CNG as an effective signal if it detects a CNG signal by the number of cycles specified by these selectors when the line is connected via the external telephone in the external TAD mode or via the facsimile equipment in F/T mode.

- **Selector 8: FAX reception after the time-out of pseudo ring backtones in F/T mode**

  If this selector is set to "0," the equipment enters the facsimile receive mode after issuing pseudo ring backtones. If it is set to "1," the equipment disconnects the line after issuing pseudo ring backtones.

WSW27 (Function setting 5)

Selector No.	Function	Setting and Specifications
1	Not used.	
2	Ringer OFF setting	0: YES 1: NO
3	Automatic playback of OGM at the start time of OGM ON mode	0: NO 1: YES
4	Detection of distinctive ringing pattern	0: NO 1: YES
5	Automatic erasure of voice alarm	0: YES 1: NO
6 | 8	Not used.	

- **Selector 2: Ringer OFF setting**

  This selector determines whether or not the ringer can be set to OFF.

- **Selector 3: Automatic playback of OGM at the start time of OGM ON mode (For those models equipped with a built-in TAD)**

  This selector determines whether or not the equipment automatically plays back an OGM the moment it switches to the OGM ON mode in the MC mode.

- **Selector 4: Detection of distinctive ringing pattern**

  If this selector is set to "0," the equipment detects only the number of rings; if it is set to "1," the equipment detects the number of rings and the ringing time length to compare the detected ringing pattern with the registered distinctive one.

- **Selector 5: Automatic erasure of voice alarm**

  This selector determines whether or not the voice alarm should be erased from the memory after it is issued.

WSW28 (Function setting 6)

Selector No.	Function	Setting and Specifications
1 | 3	Transmission level of DTMF high-band frequency signal	No. 1 2 3 0 0 0 : 0 dB 0 0 1 : +1 dB 0 1 0 : +2 dB 0 1 1 : +3 dB 1 0 0 : 0 dB 1 0 1 : –1 dB 1 1 0 : –2 dB 1 1 1 : –3 dB
4 | 6	Transmission level of DTMF low-band frequency signal	No. 4 5 6 0 0 0 : 0 dB 0 0 1 : +1 dB 0 1 0 : +2 dB 0 1 1 : +3 dB 1 0 0 : 0 dB 1 0 1 : –1 dB 1 1 0 : –2 dB 1 1 1 : –3 dB
7 8	Not used.	

- **Selectors 1 through 6: Transmission level of DTMF high-/low-band frequency signal**

  These selectors are intended for the manufacturer who tests the equipment for the Standard. Never access them.

WSW29

Selector No.	Function	Setting and Specifications
1 | 8	Not used.	————————

WSW30 (Function setting 8)

Selector No.	Function	Setting and Specifications
1 | 3	Detection level of dial tone or busy tone for the built-in TAD operation	No. 1 2 3 0 0 0 : -38.0 dBm (A) 0 0 1 : -39.5 dBm (B) 0 1 0 : -41.0 dBm (C) 0 1 1 : -42.5 dBm (D) 1 0 0 : -44.0 dBm (E) 1 0 1 : -45.5 dBm (F) 1 1 0 : -47.0 dBm (G) 1 1 1 : -48.5 dBm (H)
4	Not used.	
5	Speaker output level	0: Higher 1: Lower
6 | 8	Not used.	

- **Selectors 1 through 3: Detection level of dial tone or busy tone for built-in TAD operation (For those models equipped with a built-in TAD)**

  If dial tone or busy tone inputted during ICM recording is below the level specified by these selectors, the TAD stops recording and disconnects the line.

- **Selector 5: Speaker output level (For those models equipped with a built-in TAD)**

  This selector determines the speaker output level when the speaker volume switch is set to HIGH or LOW, as listed below.

Selector 5 of WSW30 / Speaker Volume Switch Position	0 (Higher)	1 (Lower)
HIGH	High	Medium-High
LOW	Medium-Low	Low

WSW31 (Function setting 9)

Selector No.	Function	Setting and Specifications
1	Not used.	
2	Default reduction rate for failure of automatic reduction during recording	0: 100% 1: 70%
3	Backing up received data	0: Yes 1: No
4	Not used.	
5	Minimum short-OFF duration in distinctive ringing	0: 130 ms 1: 90 ms
6 | 8	Not used.	

- **Selector 2: Default reduction rate for failure of automatic reduction during recording**

  This selector sets the default reduction rate to be applied if the automatic reduction function fails to record one-page data sent from the calling station in a single page of the current recording paper.

  If it is set to "0," the equipment records one-page data at full size (100%) without reduction; if it is set to "1," the equipment records it at 70% size.

- **Selector 3: Backing up received data**

  This selector determines whether the equipment backs up received data into the DRAM (just as in the backup operation to be performed if a paper-empty error, ink-empty error or cover-open error occurs) if it detects any light interference. Only the data received at the latest five transmission sequences may be backed up. To print out the backed-up data, press the Help key while holding down the Shift key, or carry out purging operation.

If selector 3 is set to:	If the ink-empty mark printing function is: (See Note 1.)	The equipment handles received data as follows:
0 (Yes)	ON (activated)	• If the equipment detects any light interference before starting receiving data: It will back up all the received data into the DRAM. • If the equipment detects any light interference during receiving operation: It will back up the data starting from the page being received when the light interference is detected. After completion of reception, the equipment will automatically attempt to print out the backed-up data, but if it detects light interference again, it will retain the data in the DRAM without printing it out. • If the density of a printed ink-empty mark is abnormal: The equipment will back up all the received data into the DRAM. After completion of reception, it will go into an error state, displaying the "CLEAN BLACK INK" message.
	OFF (deactivated)	• The equipment will back up all the received data into the DRAM regardless of whether light interference is detected or not.

If selector 3 is set to:	If the ink-empty mark printing function is: (See Note 1.)	The equipment handles received data as follows:
1 (No)	ON (activated)	• Even if the equipment detects any light interference before or during receiving, it will print out received data as usual (see Note 2). • If the density of a printed ink-empty mark is abnormal: The equipment will back up all the received data into the DRAM. After completion of reception, it will go into an error state, displaying the "CLEAN BLACK INK" message.
	OFF (deactivated)	• The equipment will print out received data as usual (see Note 2).

(Note 1) To activate or deactivate the ink-empty mark printing function, simultaneously press the ◀ and ▶ keys when the calendar clock is displayed before the equipment enters the maintenance mode.

(Note 2) "Printing as usual" refers to printing depending upon the count of the ink dot counter. If the count is less than the specified number of dots, it means that the black ink remains, so the equipment will print; if it is more than that, it means ink empty, so the equipment will back up data into the DRAM.

- **Selector 5: Minimum short-OFF duration in distinctive ringing**

  The ringer pattern consists of short and long rings, e.g., short-short-long rings. This selector sets the minimum OFF duration following a short ring in order to avoid missing ringer tones in distinctive ringing.

  If this selector is set to "1," when the short-OFF duration is a minimum of 90 ms long, then the equipment will interpret the short-OFF as OFF.

WSW32 (Function setting 10)

Selector No.	Function	Setting and Specifications
1 | 4	Not used.	
5 6	Default resolution	No. 5 6 0 0 : Standard 0 1 : Fine 1 0 : Super fine 1 1 : Photo
7 8	Default contrast	No. 7 8 0 X : Automatic 1 0 : Super light 1 1 : Super dark

- **Selectors 5 and 6: Default resolution**

  These selectors set the default resolution which applies when the equipment is powered up or completes a transaction.

- **Selectors 7 and 8: Default contrast**

  These selectors set the default contrast which applies when the equipment is powered up or completes a transaction.

WSW33 (Function setting 11)

Selector No.	Function	Setting and Specifications
1 | 3	Detection threshold level for voice signals inputted via the network in the built-in TAD operation	No. 1 2 3 0 0 0 : -42.5 dBm (A) 0 0 1 : -44.0 dBm (B) 0 1 0 : -45.5 dBm (C) 0 1 1 : -47.0 dBm (D) 1 0 0 : -48.5 dBm (E) 1 0 1 : -50.0 dBm (F) 1 1 0 : -51.5 dBm (G) 1 1 1 : -53.0 dBm (H)
4 5	First communications speed choice for PCI	No. 4 5 0 0 : 14,400 bps 0 1 : 12,000 bps 1 0 : 9,600 bps 1 1 : 7,200 bps
6	Report output of polled transmission requests	0: YES 1: NO
7 8	Not used.	

NOTE: The WSW33 is applicable to those models equipped with a built-in TAD.

- **Selectors 1 through 3: Detection threshold level for voice signals inputted via the network in the built-in TAD operation**

  If the equipment detects voice signals exceeding the threshold level set by these selectors, it will interpret them as effective voice.

- **Selectors 4 and 5: First communications speed choice for PCI (For those models equipped with a built-in TAD)**

  These selectors are used to set the first communications speed choice with which the equipment attempts to synchronize the data transmission via the PC interface. If the synchronization fails, the equipment automatically steps down to the next lowest speed.

- **Selector 6: Report output of polled transmission requests**

  This function does not apply in the U.S.A. versions.

WSW34 (Function setting 12)

Selector No.	Function	Setting and Specifications
1 | 3	Erasing time length of ICM tone recorded preceding the tone detection starting point in the case of automatic line disconnection due to no voice signal received	No. 1 2 3 0 0 0 : 0 sec. 0 0 1 : 1 sec. 0 1 0 : 2 sec. 0 1 1 : 3 sec. 1 0 0 : 4 sec. 1 0 1 : 5 sec. 1 1 0 : 6 sec. 1 1 1 : 7 sec.
4 5	Not used.	
6 7	Number of DTMF tone signals for inhibiting the detection of CNG during external TAD operation	No. 6 7 0 0 : 3 0 1 : 2 1 0 : 1 1 1 : OFF
8	CNG detection when the external telephone is connected with a line in TAD mode	0: Only when the equipment detects itself being called 1: Always

- **Selectors 1 through 3: Erasing time length of ICM tone recorded preceding the tone detection starting point in the case of automatic line disconnection due to no voice signal received**

  If the equipment has disconnected the line after detection of disconnection tone in ICM recording, it erases tone recorded preceding the tone detection starting point for the time length set by these selectors.

- **Selectors 6 and 7: Number of DTMF tone signals for inhibiting the detection of CNG during external TAD operation**

  If the equipment receives this specified number of DTMF tone signals during external TAD operation, it will not detect CNG afterwards.

  If these selectors are set to "1, 1," the CNG detection will not be inhibited.

- **Selector 8: CNG detection when the external telephone is connected with a line in TAD mode**

  If this selector is set to "0," the equipment will detect a CNG signal only when it detects itself being called. If the external telephone is connected with a line before the equipment detects itself being called, the equipment will no longer detect a CNG signal.

  If this selector is set to "1," the equipment will detect a CNG signal every time the external telephone is connected with a line, even without detecting itself being called.

[B] Printout of firmware switch data

■ Function

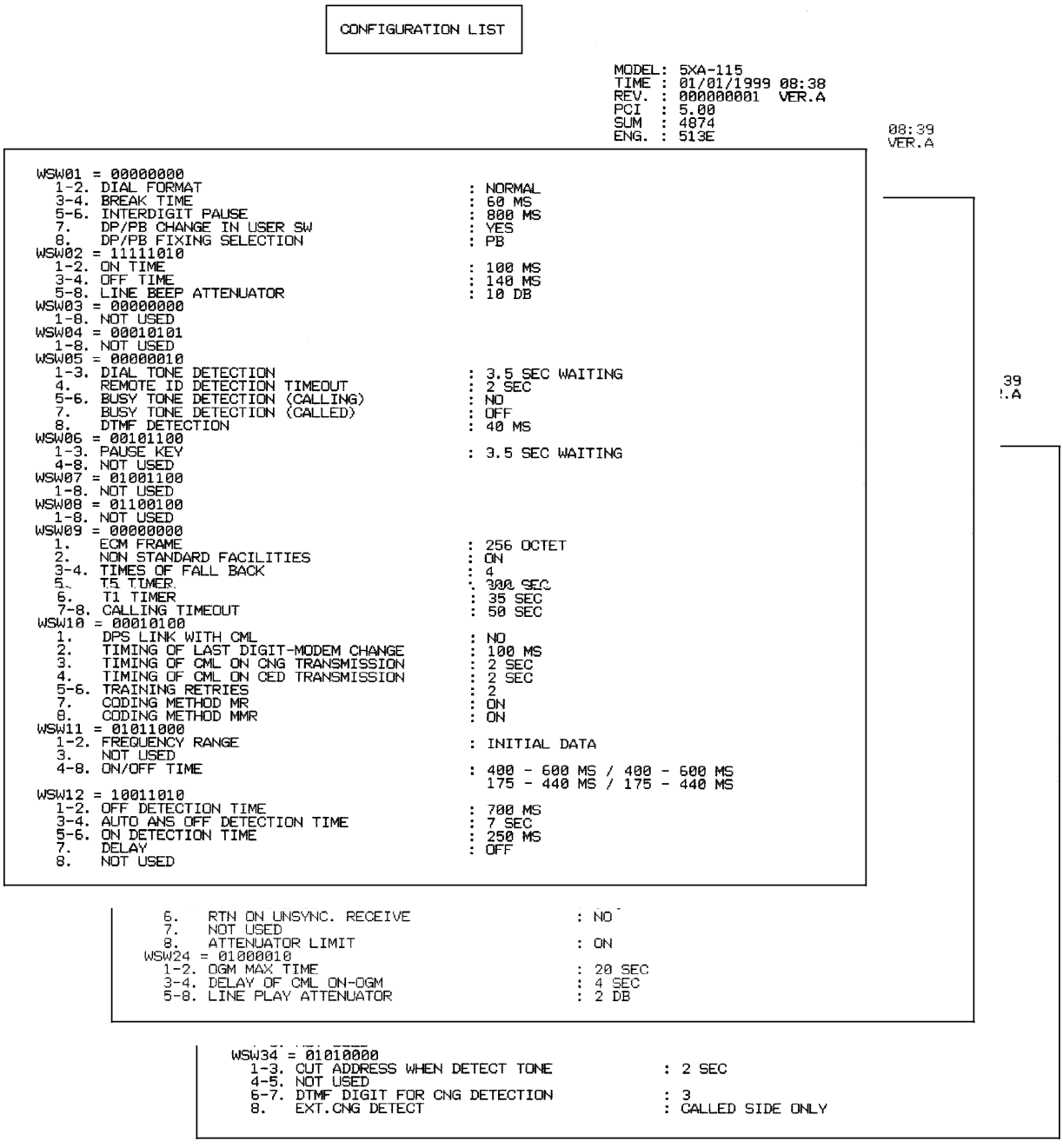
The equipment prints out the setting items and contents specified by the firmware switches.

■ Operating Procedure

(1) Press the [1] key twice in the initial stage of the maintenance mode.
The "PRINTING" will appear on the LCD.

(2) The equipment prints out the configuration list as shown in the figure below.

(3) Upon completion of printing, the equipment returns to the initial stage of the maintenance mode.



Configuration List

3.7 Operational Check of Control Panel PCB

■ Function

This function checks the control panel PCB for normal operation.

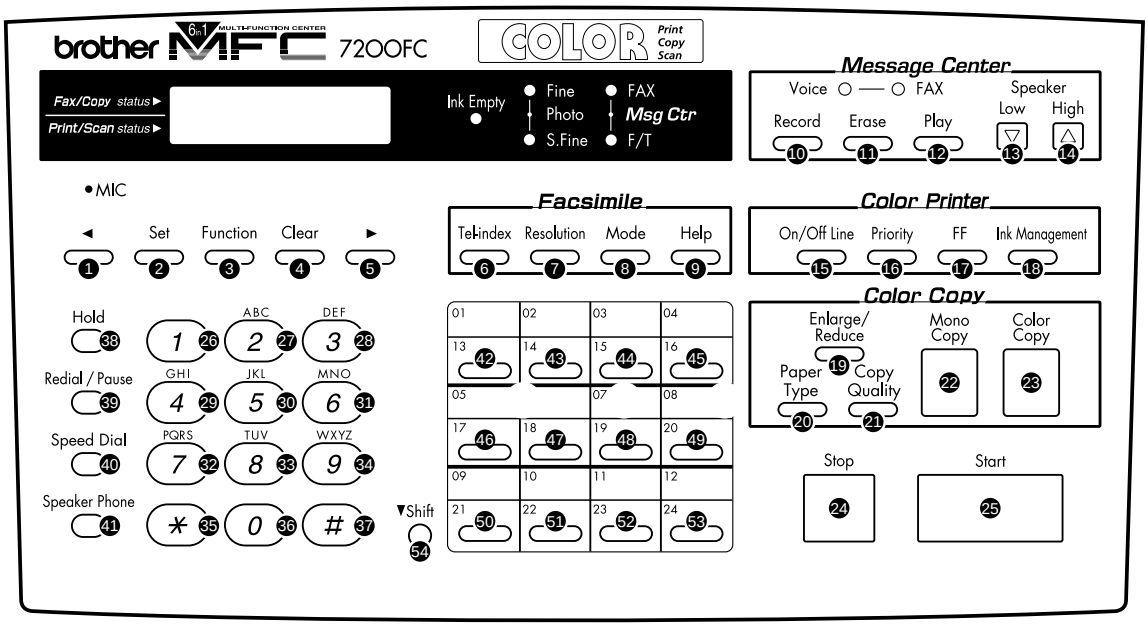
■ Operating Procedure

(1) Press the [1] and [3] keys in this order in the initial stage of the maintenance mode.
The "00 " will appear on the LCD.

(2) Press the keys and buttons in the order designated in the illustration shown below.
The LCD shows the corresponding number in decimal notation each time a key or button is pressed. Check that the displayed number is correct by referring to the illustration below.
If a key or button is pressed out of order, the equipment beeps and displays the "INVALID OPERATE" on the LCD. To go back to the status immediately preceding the wrong entry, press the [Stop] key once. To go back to the entry start status with the "00" indication, press the [Stop] key twice.

(3) After the last number key or button is pressed, the equipment beeps and returns to the initial stage of the maintenance mode.
To terminate this operation, press the [Stop] key. The equipment returns to the initial stage of the maintenance mode.

MFC7200FC/7000FC



Key & Button Entry Order

3.8 Sensor Operational Check

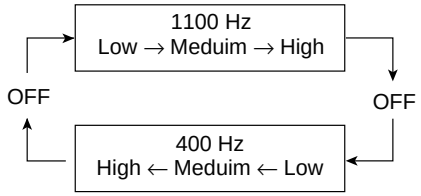
■ Function

This function allows you to check that the following 15 sensors operate correctly.

- Document front sensor
- Document rear sensor
- 1st-bin cover sensor
- 2nd-bin cover sensor
- Cover sensor
- 1st-bin registration sensor
- 2nd-bin registration sensor
- Hook switch sensor
- Paper width sensor
- Purge cam HP switch
- Head property detector
- Black ink cartridge sensor
- Yellow ink cartridge sensor
- Cyan ink cartridge sensor
- Magenta ink cartridge sensor

■ Operating Procedure

(1) Press the [3] and [2] keys in this order in the initial stage of the maintenance mode. The equipment sounds 1100 Hz and 400 Hz tones cyclically through the following volumes for testing the speaker:



If the sensors are ON as listed below, the LCD will show "FRRET1T2CVR1R2HK" ("FRRET1##CVR1##HK" on the MFC7000FC) and "ENPG##HDIKIYICIM," which can be switched by pressing the [Start] key. (## means that the area is not used.)

Given below is the relationship between the LCD indication, sensor name and sensor status.

LCD	Sensors	Sensor signal ON
FR	Document front sensor	No document detected.
RE	Document rear sensor	No document detected.
T1	1st-bin cover sensor	1st-bin's front cover closed.
T2	2nd-bin cover sensor	2nd-bin's front cover closed. (Only for the MFC7200FC)
CV	Cover sensor	Top cover closed.
R1	1st-bin registration sensor	No recording paper detected.
R2	2nd-bin registration sensor	No recording paper detected. (Only for the MFC7200FC)
HK	Hook switch sensor	On-hook state.
EN	Paper width sensor	No recording paper (A4 or wider) detected.
PG	Purge cam HP switch	Purge cam placed in the home position.
HD	Head property detector	Head (rank) detected.
IK	Black ink cartridge sensor	Ink cartridge loaded.
IY	Yellow ink cartridge sensor	Ink cartridge loaded.
IC	Cyan ink cartridge sensor	Ink cartridge loaded.
IM	Magenta ink cartridge sensor	Ink cartridge loaded.

(2) Change the detecting conditions and check that the displayed letters disappear. For example, insert a document through the document front sensor and check that the "FR" disappears.

(3) To stop this operation and return the equipment to the initial stage of the maintenance mode, press the [Stop] key.

3.9 CCD Scanner Area Setting

■ Function

The equipment sets the CCD scanner area and stores it into the E^2PROM.

■ Operating Procedure

(1) Press the [5] key twice in the initial stage of the maintenance mode.

The "SCANNER AREA SET" will appear on the LCD.

The equipment checks and sets the area to be scanned.

If no error is noted, the equipment returns to the initial stage of the maintenance mode.

If any error is noted, the "SCANNER ERROR" will appear on the LCD. To return the equipment to the initial stage of the maintenance mode, press the [Stop] key.

3.10 Alignment of Vertical Print Lines

■ Function

This function allows you to align vertical lines printed in the forward and backward direction of the carriage.

■ Operating Procedure

(1) Press the [6] and [5] keys in this order in the initial stage of the maintenance mode.

The equipment prints out a set of vertical alignment check patterns which consist of No. 1 to No. 9 lines for each of the 360 dpi and 720 dpi.

If the vertical alignment is on, No. 5 line (each in the 360 dpi and 720 dpi printouts) shows vertically aligned lines as shown on the next page.

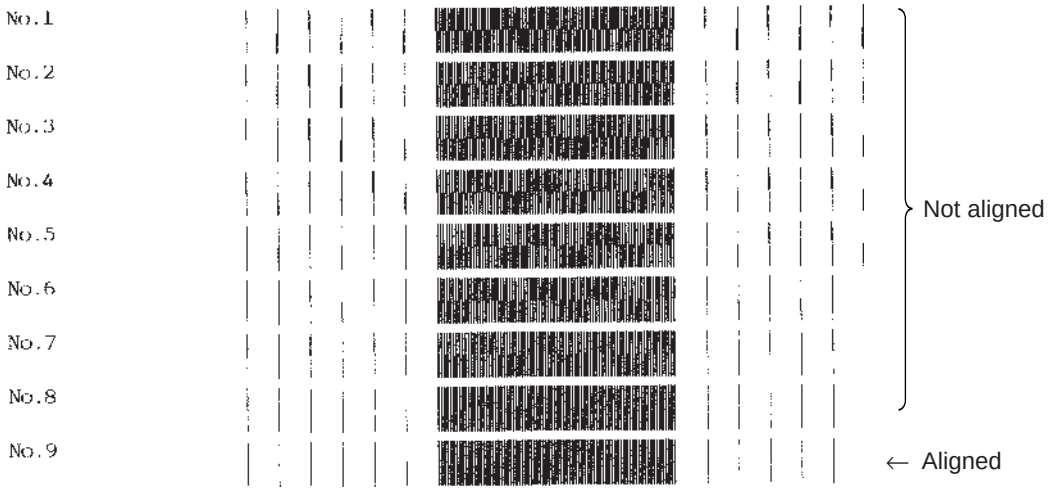
The LCD shows the "360DPI ADJUST" and "ENTER NO. (1-9)" alternately.

(2) Check the printed vertical alignment check patterns for the 360 dpi and find which number line shows full alignment. If the line is other than No. 5, enter that line number by using the numerical keys and press the [Set] key. In the example given below, No. 5 line is not aligned and No. 9 line is fully aligned, so press the [9] and [Set] keys.

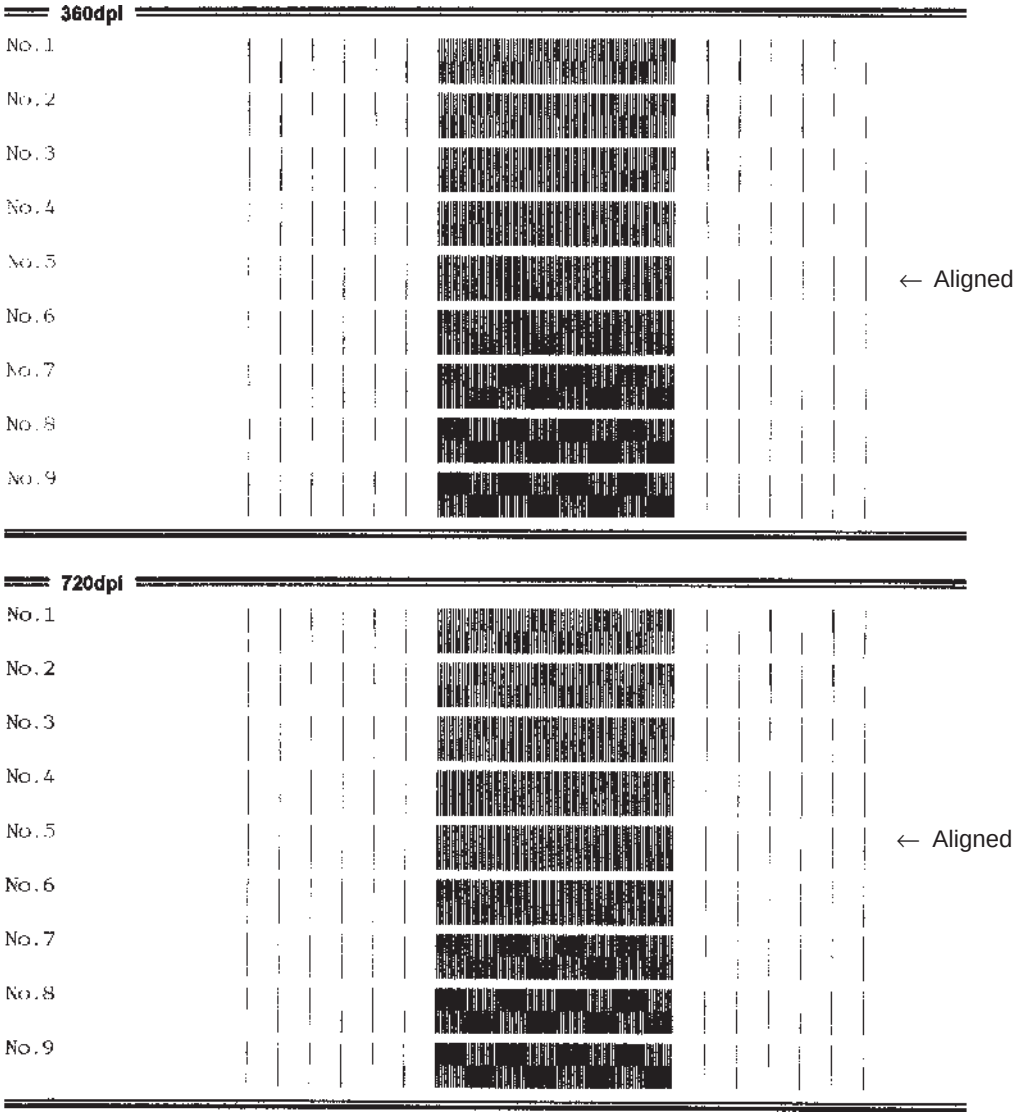
The LCD shows the "720DPI ADJUST" and "ENTER NO. & SET" alternately.

(3) For the 720 dpi, perform the same operation as in step (2).

The equipment automatically returns to the initial stage of the maintenance mode.



Vertical Alignment Check Pattern—Alignment OFF



Vertical Alignment Check Pattern—Alignment ON

3.11 Head Drive Voltage Adjustment for Optimum Printing

■ Function

This function allows you to adjust the head drive voltage to optimize the print quality, which can change depending on the electro-mechanical properties of individual print heads.

If you replace the main PCB, be sure to perform this procedure.

■ Operating Procedure

You should carry out this procedure preceding other print-related adjustments (e.g., Alignment of vertical print lines).

(1) Press the [6] key twice in the initial stage of the maintenance mode.

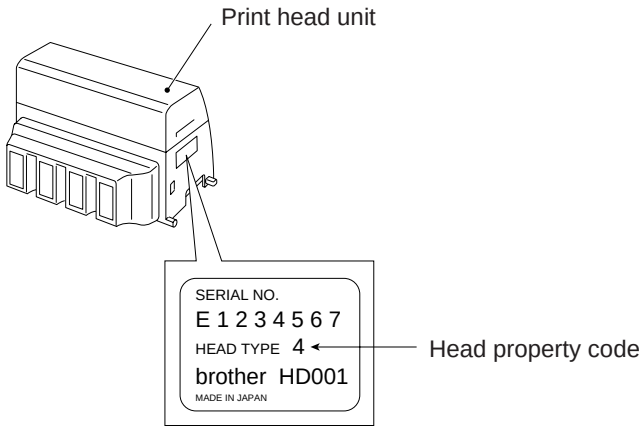
The "DENSITY NO = XX" appears on the LCD.

Head property code

(2) Enter the head property code (any of 04 through 11) given on the side of the print head unit by using the numerical keys.

NOTE: Be sure to enter a two-digit head property code. A single-digit code cannot complete this procedure.

In the illustration below, the head property code is 4, so enter 04.



If you enter any invalid code, the equipment beeps and ignores the entry.

Entry of a valid head property code will automatically return the equipment to the initial stage of the maintenance mode.

If you press the [Stop] or [Clear] key before completion of the two-digit code entry, the equipment returns to the initial stage of the maintenance mode.

3.12 Initial Adjustment of PWM Value (Aging of the Carriage)

■ Function

This function obtains the initial value of the PWM by aging the carriage and writes it onto the E^2PROM, as well as checking the head drive voltage level.

This aging procedure should be performed if you replace the print head or CR base ASSY (CR base, carriage ASSY, carriage motor, and encoder strip) or if you loosen the timing belt.

■ Operating Procedure

(1) Press the [6] and [9] keys in this order in the initial stage of the maintenance mode.

The equipment starts aging the carriage, showing the "CR AGING" on the LCD.

After writing the initial value of the PWM onto the E^2PROM and checking the head drive voltage level, the equipment automatically returns to the initial stage of the maintenance mode.

If any error occurs, the equipment beeps and shows "CR AGING :ERROR" on the LCD. To return to the initial stage of the maintenance mode, press the [Stop] key.

NOTE: Opening the top cover or the front cover of the bin during the aging procedure will result in an error. If you perform this aging procedure with the top cover opened, the equipment will slowly age the carriage resulting in an error after completion of the aging.

3.13 Equipment Error Code Indication

■ Function

This function displays an error code of the last error on the LCD.

■ Operating Procedure

(1) Press the [8] and [2] keys in this order in the initial stage of the maintenance mode.

The LCD shows the "MACHINE ERROR XX".

(2) To stop this operation and return the equipment to the initial stage of the maintenance mode, press the [Stop] key.

3.14 Modification for the Canadian Version

■ Function

This function modifies the equipment specifications for the Canadian version.

This procedure should be carried out only if you replace the main PCB in the Canadian version.

■ Operating Procedure

(1) Press the [8] and [6] keys in the initial stage of the maintenance mode.

The equipment automatically erases values registered to the FAX BACK SYSTEM for deactivating the function assigned to the speed dial 1, and then makes the busy tone-related setting as follows:

```
WSW05 = XXXX01XX
```

Then the equipment shows the "00 " on the LCD, where you may carry out the operational check of the control panel PCB (same as the maintenance-mode function No. 13).

(2) If you do not need to carry out the operational check of the control panel PCB, press the [Stop] key to make the equipment return to the initial stage of the maintenance mode.

If you complete the operational check, the equipment beeps and returns to the initial stage of the maintenance mode automatically.

NOTE: To exit from the maintenance mode, be sure to press the [9] key twice. If you power off the equipment without pressing the [9] key twice, powering it on will restore the equipment to the maintenance mode where purging operation will automatically take place.

3.15 Output of Transmission Log to the Telephone Line

■ Function

This function outputs the transmission log (that the equipment has stored about the latest transmission) to the telephone line. It allows the service personnel to receive the transmission log of the user's equipment at a remote location and use it for analyzing problems arising in the user's equipment.

■ Operating Procedure

(1) If the user's equipment has a transmission-related problem, call the user's equipment at a remote location from your equipment.

(2) If the line is connected, have the user perform the following:

1) Press the [Function], [Mode], and [0] keys in this order.

2) Press the [8] and [7] keys.

The above operation makes the user's equipment send CNG to your equipment for sending the transmission log.

(3) If you hear the CNG sent from the user's equipment, press the [Start] key of your equipment.

Your equipment will start to receive the transmission log from the user's equipment.

CHAPTER VI.

ERROR INDICATION AND TROUBLESHOOTING

CONTENTS

1. ERROR INDICATION

To help the user or the service personnel promptly locate the cause of a problem (if any), the facsimile equipment incorporates the self-diagnostic functions which display error messages for equipment errors and communications errors.

For the communications errors, the equipment also prints out the transmission verification report and the communications list.

1.1 Equipment Errors

If an equipment error occurs, the facsimile equipment emits an audible alarm (continuous beeping) for approximately 4 seconds and shows the error message on the LCD. For the error messages, see [1] below.

To display detailed error information, use the maintenance-mode function No. 82 described in Chapter V, Section 3.13 (that is, make the equipment enter the maintenance mode and then press the 8 and 2 keys). Following the MACHINE ERROR, one of the error codes listed in [2] will appear on the LCD.

[1] Error messages on the LCD

Messages on the LCD	Probable Cause
CHECK PAPER	(MFC7000FC only) The 1st-bin registration sensor detects no recording paper loaded in the bin.
CHECK PAPER#1	(MFC7200FC only) The 1st-bin registration sensor detects no recording paper loaded in the 1st bin.
CHECK PAPER#2	(MFC7200FC only) The 2nd-bin registration sensor detects no recording paper loaded in the 2nd bin.
PRINTER JAM	The ink empty sensor detects that a paper jam has occurred.
CHECK PAPER SIZE	The paper width sensor stays ON, detecting no recording paper wider than A4-size loaded. Or the sensor stays OFF too long, detecting that the paper is abnormally long.
COVER OPEN	The cover sensor detects that the top cover is not closed.
CHECK CASSETTE	(MFC7000FC only) The 1st-bin cover sensor detects that the bin's front cover is not closed.
CHECK CASSETTE#1	(MFC7200FC only) The 1st-bin cover sensor detects that the 1st-bin's front cover is not closed.
CHECK CASSETTE#2	(MFC7200FC only) The 2nd-bin cover sensor detects that the 2nd-bin's front cover is not closed.

Messages on the LCD	Probable Cause
DOCUMENT JAM	■ Document jam (1) The document length exceeds the limitation (400 or 90 cm) registered by firmware switch WSW16. (Refer to Chapter V, Section 3.6.) (Both the document front and rear sensors stay ON even after the document has been fed by the registered length.) (2) The document rear sensor detects no trailing edge of a document after the document has been fed by 400 cm. (The document rear sensor stays ON even after the document has been fed when the document front and rear sensors were OFF and ON, respectively.) ■ Document loading error (1) The document rear sensor detects no leading edge of a document within 10 seconds from the start of document loading operation. (The document rear sensor stays OFF even after the document has been fed when the document front sensor was ON.) (2) The loaded document is too short. (Since the document is shorter than the distance between the document front and rear sensors, the document front sensor is turned OFF before the document rear sensor is turned ON.)
CLEAN UP SCANNER	In the scanning compensation data list printed by the maintenance-mode function No. 05 (refer to Chap. V, Section 3.3), less than fifty percent of the white level data is faulty.
SCANNER ERROR	In the scanning compensation data list printed by the maintenance-mode function No. 05 (refer to Chap. V, Section 3.3), fifty percent or more of the white level data is faulty.
NEAR EMPTY CYAN NEAR EMPTY MGENT NEAR EMPTY YELLW NEAR EMPTY BLACK	The ink dot counter (for cyan, magenta, yellow, or black) in the E^2PROM has counted up the specified number of dots, meaning near empty of ink. Even if any of these messages is displayed, color printing is still possible.
INK EMPTY CYAN INK EMPTY MAGENT INK EMPTY YELLOW INK EMPTY BLACK	The ink dot counter (for cyan, magenta, yellow, or black) in the E^2PROM has counted up the specified number of dots, meaning that the ink has run out. Once any of these messages is displayed, color printing is no longer possible. (If black ink remains, printing of the received data record or monochrome copying is possible.)
SET CARTRIDGES	Any one of the four ink cartridge sensors detects no ink cartridge loaded.

If only an alarm beep is heard without any message on the LCD when the equipment is powered up, the ROM or RAM will be defective.

Messages on the LCD	Probable Cause
CLEAN BLACK INK	The density of a printed ink-empty mark is abnormally low. That is, the value of the A/D converter output measured on the printed ink-empty mark by the ink empty sensor is out of the specified range.
WARMING UP	The temperature inside the equipment has dropped to 5.5˚C or below after two hours of powering-on state, or it has dropped to 3.5˚C or below within two hours of powering-on state.
COOLING DOWN	The temperature inside the equipment has exceeded 48˚C.
SET INK HEAD	The CPU on the main PCB has detected no print head mounted by attempting to read the property information of the solder points (head property detector) on the head PCB.
OPEN COVER	If this message appears, use the maintenance-mode function No. 82 described in Chapter V, Section 3.13 (that is, make the equipment enter the maintenance mode and then press the [8] and [2] keys) to display the detailed error code.
PC BUSY OR FAIL	After connected with the host computer, the equipment has received no response from the computer. (A communications error has occurred.)

[2] Error codes shown in the "MACHINE ERROR X X" message

If the LCD shows the "OPEN COVER" message, you can display the detailed error code following the MACHINE ERROR, by using the maintenance-mode function No. 82 described in Chapter V, Section 3.13.

NOTE: When checking a PCB as instructed in the "Check:" column, check its harness also.

NOTE: To check sensors, use the maintenance-mode function No. 32 described in Chapter V, Section 3.8 (that is, press the 3 and 2 keys in the maintenance mode).

Error Code (Hex.)	Error factor	Check:
10	When the light source (fluorescent lamp) was OFF, no A/D reference values of CCD video signals could be detected since it is less than the lower limit.	• Fluorescent lamp • Inverter PCB • Mirrors • Scanner frame ASSY • Main PCB
13	When the light source (fluorescent lamp) was ON, the A/D reference values of CCD video signals were less than the lower limit.	
14	When the light source (fluorescent lamp) was ON, the A/D reference values of CCD video signals exceeded the upper limit.	
20	Head driver temperature error.	• Print head unit • Main PCB
21	No purge operation has started although commanded.	• Main PCB
22	A sequence of purge operation could not finish.	
23	Internal Centronics interface timeout.	• Print head unit • Main PCB
31	The carriage cannot travel to the right or left.	Before checking the following components, check the carriage movement as described in (Note 1) given on the next page. • Carriage ASSY • Encoder strip (Any stains or scratches? Hooked correctly?) • Paper feed motor • Hook switch PCB • Main PCB • Power supply PCB • Flushing box • Purge unit • CR base ASSY • Ink empty sensor PCB
32	After driven by the specified number of pulses, the carriage does not stop (since it cannot detect the left end of the travel).	
33	The carriage movement parameter exceeded the travel range during printing.	
34	When initialized, the carriage could not detect the right or left end of the travel range.	
35	The carriage cannot move by a shortest distance.	
36	The carriage cannot move by a short distance.	
37	The carriage cannot move at all.	
38	The carriage stop position is out of the travel range.	
3A	Sudden carriage stop during printing acceleration.	
3B	Sudden carriage stop during printing deceleration.	
3E	The carriage has overridden the travel range.	

(Note 1) Checking the carriage movement

(1) Unplug the equipment.
(2) Open the top cover.
(3) Unhook the release lever from the open link and push down the release lever.
(4) Plug the equipment in a wall socket.
(5) The carriage should move to the left end of its travel and then move to the right end.

- If the carriage does not move at all, check the components below.
  - Carriage ASSY
  - Paper feed motor
  - Hook switch PCB
  - Main PCB
  - Power supply PCB
- If the carriage moves but its movement is unsmooth or jerky, check the components below.
  - Encoder strip
  - Flushing box
  - Purge unit
  - CR base ASSY
  - Carriage ASSY
  - Main PCB
  - Ink empty sensor PCB (flat cable)

Error Code (Hex.)	Error factor	Check:
41	When the power was applied, the head power feed signal sticked to High even after the head current shutdown sequence.	• Main PCB • Power supply PCB
42	Even after the head current shutdown sequence for head replacement, the head power feed signal sticked to High.	
43	The head drive voltage sticks to Low.	• Print head unit • Main PCB • Power supply PCB
46	The number of performed purge sequences has reached the limit.	• Flushing box • Main PCB
47	ROM error.	• Main PCB
48	Internal RAM error.	
49	PWM value of the black LED out of the specified range.	• Ink empty sensor PCB • Hook switch PCB • Main PCB

Error Code (Hex.)	Error factor	Check:
4A	Ink cartridge load error detected when the power was applied.	• Ink cartridges (Were they loaded when the power was first applied after replacement of the main PCB?) • Main PCB • CR base ASSY
4B	Abnormal carriage travel speed detected when the power was applied.	• Encoder strip (Any stains or scratches? Hooked correctly?) • Purge unit • Flushing box • CR base ASSY • Carriage ASSY • Main PCB • Ink empty sensor PCB
4C	Head voltage error.	• Print head unit • Main PCB • Power supply PCB
50	The purge cam HP switch does not come ON or go OFF even after the purge cam has been driven by the specified number of pulses.	• Purge unit • Purge gear frame • CR base ASSY • Paper feed motor • 1st-bin sensor PCB • Main PCB
51	The purge cam HP switch sticks to ON in the initialization sequence.	
52	At the time of purge operation, the carriage has not stopped in the purge position.	
53	The purge cam HP switch has come ON when the carriage was in the wipe position.	
54	Abnormal number of pulses required for a single rotation of the purge cam.	
70	Ink-empty mark error.	• Ink empty sensor PCB • 1st-bin sensor PCB • 2nd-bin sensor PCB • 1st-bin registration sensor • 2nd-bin registration sensor • Main PCB

Error Code (Hex.)	Error factor	Check:
73	No ink cartridge loaded.	• Ink cartridge sensors • Main PCB • CR base ASSY
74	All the four color inks have run out.	• Operation procedure (Any wrong procedure?)
79	Head thermister broken.	• Carriage ASSY • Main PCB
7A	The carriage encoder failed to detect a paper jam.	• Encoder strip (Any stains or scratches? Hooked correctly?) • CR base ASSY
7E	No print head mounted.	• Print head unit • Main PCB • Carriage ASSY
80	Recording paper size error.	• Paper width sensor actuator • Main PCB • 1st-bin sensor PCB • 2nd-bin sensor PCB • 1st-bin registration sensor • 2nd-bin registration sensor
82	Recording paper feeding error.	• 1st bin • 2nd bin • 1st-bin sensor PCB • 2nd-bin sensor PCB • 1st-bin registration sensor • 2nd-bin registration sensor • Paper width sensor actuator • Main PCB

Error Code (Hex.)	Error factor	Check:
83	Recording paper jam. (MFC7200FC: The 2nd-bin registration sensor sticks to OFF, indicating that paper has jammed. MFC7000FC: The 1st-bin registration sensor sticks to OFF, indicating that paper has jammed.)	• 1st-bin sensor PCB • 2nd-bin sensor PCB • 1st-bin registration sensor • 2nd-bin registration sensor
84	Recording paper jam. (The ink empty sensor detects a paper jam.)	• Paper width sensor actuator • Ink empty sensor PCB • 1st-bin sensor PCB • 2nd-bin sensor PCB • 1st-bin registration sensor • 2nd-bin registration sensor
88	Recording paper jam (MFC7200FC: Even after the 2nd-bin registration sensor has come ON, the ink empty sensor does not detect paper. MFC7000FC: Even after the 1st-bin registration sensor has come ON, the ink empty sensor does not detect paper.)	
A1	Top cover opened.	• Cover sensor PCB • Main PCB
A2	Document too long to scan.	• Document front sensor actuator • Document rear sensor actuator • Document sensor PCB • Cover sensor PCB • Document feed roller • Scanner motor • Main PCB
A3	Document not detected by the document rear sensor.	
A4	50% or more faulty of white level data.	• Mirrors (Any stains or scratches?) • Cover glass (Any stains or scratches?) • Scanner frame ASSY • Main PCB

Error Code (Hex.)	Error factor	Check:
A5	Faulty operation of DMA0 during scanning.	• Main PCB
A6	Faulty operation of DMA1 during scanning.	
A7	One-line feeding timeout.	
A8	One-line scanning timeout.	
AC	Less than 50% faulty of white level data.	• Mirrors (Any stains or scratches?) • Cover glass (Any stains or scratches?) • Scanner frame ASSY • Main PCB
AD	1st-bin's or 2nd-bin's front cover opened.	• 1st-bin cover sensor • 2nd-bin cover sensor • Main PCB
E4	Out of recording paper.	• 1st bin • 2nd bin • Paper width sensor actuator • 1st-bin registration sensor actuator • 2nd-bin registration sensor actuator • Document feed roller • Drive gear unit • Main PCB
E6	Write error in E^2PROM	• Main PCB
F3	Voice message recording or playing-back not started.	• Main PCB
F6	PC interface error	• Interface cable • Main PCB • Centronics interface PCB

1.2 Communications Errors

If a communications error occurs, the facsimile equipment

1 emits an audible alarm (intermittent beeping) for approximately 4 seconds,
2 displays the corresponding error message, and
3 prints out the transmission verification report if the equipment is in sending operation.

■ Definition of Error Codes on the Communications List

(1) Calling

Code 1	Code 2	Causes
10	08	Wrong number called.
11	01	No dial tone detected before start of dialing.
11	02	Busy tone detected before dialing.
11	03	2nd dial tone not detected.
11	06	Busy tone detected after dialing or called.
11	07	No response from the remote station in sending.
11	10	No tone detected after dialing.
17	07	No response from the calling station in receiving.

(2) Command reception

Code 1	Code 2	Causes
20	01	Unable to detect a flag field.
20	02	Carrier was OFF for 200 ms or longer.
20	03	Abort detected ("1" in succession for 7 bits or more).
20	04	Overrun detected.
20	05	A frame for 3 seconds or more received.
20	06	CRC error in answerback.
20	07	Undefined command received.
20	08	Invalid command received.
20	09	Command ignored once for document setting or for dumping-out at turn-around transmission.
20	0A	T5 time-out error
20	0B	CRP received.
20	0C	EOR and NULL received.

(3) Compatibility [checking the NSF and DIS]

Code 1	Code 2	Causes
32	01	Remote terminal only with V.29 capability in 2400 or 4800 bps transmission.
32	02	Remote terminal not ready for polling.
32	10	Remote terminal not equipped with password function or its password switch OFF.
32	11	Remote terminal not equipped with or not ready for confidential mail box function.
32	12	Remote terminal not equipped with or not ready for relay broadcasting function.
32	13	No confidential mail in the remote terminal.
32	14	The available memory space of the remote terminal is less than that required for reception of the confidential or relay broadcasting instruction.

(4) Instructions received from the remote terminal [checking the NSC, DTC, NSS, and DCS]

Code 1	Code 2	Causes
40	02	Illegal coding system requested.
40	03	Illegal recording width requested.
40	05	ECM requested although not allowed.
40	06	Polled while not ready.
40	07	No document to send when polled.
40	10	Nation code or manufacturer code not coincident.
40	11	Unregistered group code entered for relay broadcasting function, or the specified number of broadcasting subscribers exceeding the limit.
40	12	Retrieval attempted when not ready for retrieval.
40	13	Polled by any other manufacturers' terminal while waiting for secure polling.
40	17	Invalid resolution selected.

(5) Command reception [checking the NSF and DIS after transmission of NSS and DCS]

Code 1	Code 2	Causes
50	01	Vertical resolution capability changed after compensation of background color.

(6) ID checking

Code 1	Code 2	Causes
63	01	Password plus "lower 4 digits of telephone number" not coincident.
63	02	Password not coincident.
63	03	Polling ID not coincident.
63	04	Entered confidential mail box ID uncoincident with the mail box ID.
63	05	Relay broadcasting ID not coincident.
63	06	Entered retrieval ID uncoincident with that of the mail box ID.

(7) DCN reception

Code 1	Code 2	Causes
74		DCN received.

(8) TCF transmission/reception

Code 1	Code 2	Causes
80	01	Fallback impossible.

(9) Signal isolation

Code 1	Code 2	Causes
90	01	Unable to detect video signals and commands within 6 seconds after CFR is transmitted.
90	02	Received PPS containing invalid page count or block count.

(10) Video signal reception

Code 1	Code 2	Causes
A0	03	Error correction sequence not terminated even at the final transmission speed for fallback.
A0	11	Receive buffer empty. (5-second time-out)
A0	12	Receive buffer full during operation except receiving into memory.
A0	13	Decoding error continued on 500 lines.
A0	14	Decoding error continued for 10 seconds.
A0	15	Time-out: Five seconds or more for one-line transmission.
A0	16	RTC not found and carrier OFF signal detected for 6 seconds.
A0	17	RTC found and command detected for 60 seconds.
AA	18	Receive buffer full during receiving into memory.

(11) General communications-related

Code 1	Code 2	Causes
B0	01	Polarity inversion detected.
B0	02	Unable to receive the next-page data.
B0	03	Unable to receive polling even during turn-around transmission due to call reservation.
B0	04	PC interface error.

(12) Maintenance mode

Code 1	Code 2	Causes
E0	01	Failed to detect 1300 Hz signal in burn-in operation.
E0	02	Failed to detect PB signals in burn-in operation.
E0	03	Failed to detect any command from the RS-232C interface in burn-in operation.

(13) Equipment error

Code 1	Code 2	Causes
FF	X X	Equipment error (For X X, refer to Subsection 1.1 [2].)

2. TROUBLESHOOTING

2.1 Introduction

This section gives the service personnel some of the troubleshooting procedures to be followed if an error or malfunction occurs with the facsimile equipment. It is impossible to anticipate all of the possible problems which may occur in future and determine the troubleshooting procedures, so this section covers some sample problems. However, those samples will help service personnel pinpoint and repair other defective elements if he/she analyzes and examines them well.

2.2 Precautions

Be sure to observe the following to prevent the secondary troubles from happening:

(1) Always unplug the AC power cord from the outlet when removing the covers and PCBs, adjusting the mechanisms, or conducting continuity testing with a circuit tester.

(2) When disconnecting the connectors, do not pull the lead wires but hold the connector housings.

(3) • Before handling the PCBs, touch a metal portion of the machine to discharge static electricity charged in your body.

• When repairing the PCBs, handle them with extra care.

After repairing the defective section, be sure to check again if the repaired section works correctly. Also record the troubleshooting procedure so that it would be of use for future trouble occurrence.

2.3 Checking prior to Troubleshooting

Prior to proceeding to the troubleshooting procedures given in Subsection 2.4, make the following initial checks:

Environmental conditions

Check that:

(1) The machine is placed on a flat, firm surface.

(2) The machine is used in a clean environment at or near normal room temperature (10˚C to 35˚C) with normal relative humidity (20 to 80%).

(3) The machine is not exposed to direct sunlight or harmful gases.

Power requirements

Check that:

(1) The power supply specified on the rating plate located on the bottom of the machine is used. The supply voltage stays within the rating ±10%.

(2) Each voltage level on AC input lines and DC lines is correct.

(3) All cables and harnesses are firmly connected.

(4) None of the fuses are blown.

Recording paper

Check that:

(1) A recommended type of recording paper is used.

(2) The recording paper is not dampened.

Ink cartridges

(1) Check that all of four ink cartridges are loaded.

Print head

(1) Check that the print head is installed on the carriage correctly. (Check the dimple contact between the print head PCB and the carriage PCB.)

(2) Repeat the head purging operation several times.

2.4 Troubleshooting Procedures

[1] Control panel related

Trouble	Check:
(1) LCD shows nothing.	• Panel harness • Sensor-main harness B (4-wire) and sensor-main harness (7-wire) • Power-main harness • Control panel PCB • Power supply PCB • Main PCB
(2) Control panel inoperative.	• Panel harness • Sensor-main harness B (4-wire) and sensor-main harness (7-wire) • Control panel PCB • FPC key • Main PCB

[2] Telephone related

Trouble	Check:
(1) No phone call can be made.	• FPC key • Hook switch PCB • Control panel PCB • NCU PCB • Main PCB
(2) Speed dialing or one-touch dialing will not work.	• Ordinary dialing function (other than the speed and one-touch dialing) If it works normally, check the main PCB; if not, refer to item (1) above.
(3) Speaker silent during on-hook dialing.	• Ordinary dialing function (other than the on-hook dialing with the hook key) If it works normally, proceed to the following checks; if not, refer to item (1) above. • Speaker
(4) Dial does not switch between tone and pulse.	• Main PCB

Trouble	Check:
(5) Telephone does not ring.	• Speaker • NCU PCB • Main PCB

[3] Communications related

Trouble	Check:
(1) No tone is transmitted.	• Main PCB • NCU PCB

[4] Paper/document feeding related

Trouble	Check:
(1) Neither “COPY: PRESS COPY” nor “FAX: NO. & START” message appears although documents are set.	• Sensors by using the maintenance-mode function No. 32. (Refer to Chapter V, Section 3.8.) • Actuators of the document front and rear sensor • Document sensor harness • Sensor-main harness B (4-wire) and sensor-main harness (7-wire) • Cover sensor PCB • Main PCB
(2) Document not fed.	• ADF and its related sections • Scanner motor and its harness • Document feed rollers and their related gears • Main PCB
(3) Document double feeding	• ADF adjuster lever (Placed in the inward position or in the regular paper thickness position?) • ADF parts • Nip-related parts
(4) Document jam	• Document sensor PCB • Document sensor harness • Sensor-main harness B (4-wire) and sensor-main harness (7-wire) • Scanner motor

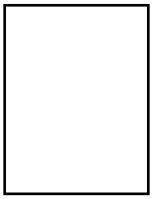
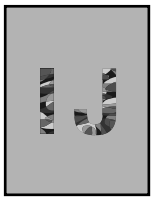
Trouble	Check:
(5) Recording paper not fed.	• 1st bin and its related gears • 2nd bin and its related gears (only for the MFC7200FC) • Gear drive unit • Main PCB
(6) Recording paper jam	• Paper feeding mechanism • 1st-bin sensor PCB • 2nd-bin sensor PCB • Gear drive unit

[5] Print-image related

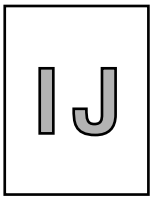
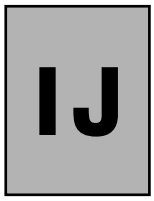
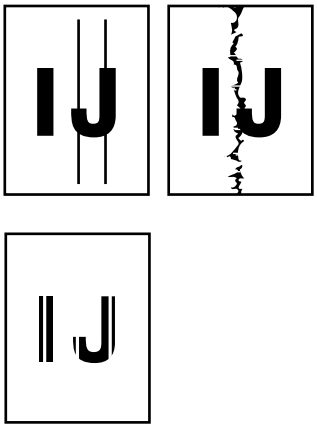
If the received or sent image has any problem, first make a copy with the facsimile equipment.

If the copied image is normal, the problem may be due to the remote terminal; if it is abnormal, proceed to the following checks:

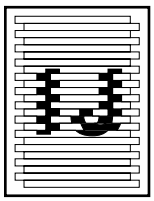
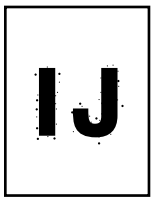
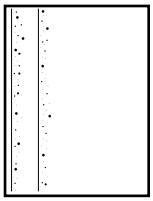
Jobs enclosed by parentheses (♦) requires the special adjustment jig set.

Trouble	Action to be taken
(1) Completely blank 	<u>At the scanner</u> Check the following components: - CCD harness A - CCD harness D - Main PCB - Scanner unit <u>At the printer</u> • Check the ink cartridges. If any cartridges have run out of ink, replace them. • Check the dimple contact between the print head PCB and the carriage PCB. Clean it if contaminated. (♦ If the problem persists, replace the carriage ASSY.) • Check the connection of the head flat cables on the main PCB. (♦ If either of those cables is broken or damaged, replace the carriage ASSY.) • Replace the main PCB.
(2) Random color 	
(3) All black 	<u>At the scanner</u> Check the following components: - CCD harness A - CCD harness D - Inverter and its harness - Scanner unit - Main PCB <u>At the printer</u> Check the following components: - Print head unit - Main PCB - Carriage ASSY (♦ Replace the carriage ASSY.)

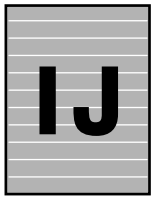
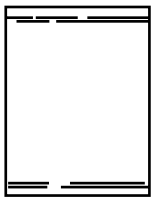
Jobs enclosed by parentheses (♦) requires the special adjustment jig set.

Trouble	Action to be taken
(4) Light 	<u>At the scanner</u> Check the following components: - Scanner unit - Main PCB <u>At the printer</u> Check the following components: - Ink cartridges - Print head unit - Main PCB - Power supply PCB
(5) Dark 	<u>At the scanner</u> Check the following components: - Scanner unit - Main PCB <u>At the printer</u> • For each of the four ink-jet units, perform the head purging operation several times to remove dust or air bubbles from its nozzles. If the problem persists, replace the print head unit. • Check the paper feed-related rollers. (♦ Replacement of the paper feed roller or paper ejection roller requires the special adjustment jig set.) • Replace the main PCB and power supply PCB.
(6) Black or blurred vertical stripes 	<u>At the scanner</u> Check the following components: - Scanner unit - Mirrors on the scanner unit for stains <u>At the printer</u> • Check whether paper is in abnormal contact with any other components during ejecting. • Check the encoder strip for stains or scratches. (♦ If the encoder strip is not hooked properly, correct it.) • (♦ Replace the CR base ASSY.)

Jobs enclosed by parentheses (♦) requires the special adjustment jig set.

Trouble	Action to be taken
(7) Print edges not aligned 	At the printer • Check the alignment of vertical print lines (refer to Chapter V, Section 3.10). • Check the print head unit. • Check the encoder strip for stains or scratches. (♦ If the encoder strip is not hooked properly, correct it.)
(8) Ink splash  	At the printer • For each of the four ink-jet units, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Check the ink cartridges. Any of them has run out of ink or the ink viscosity has been increased, so replace it. • Replace the print head unit. • Replace the main PCB. • Replace the power supply PCB. • Adjust the head-platen gap with the gap adjuster lever. (♦ If the problem persists, adjust the gap by turning the eccentric bearings on the carriage rail.)
(9) Random missing dots 	At the printer • For each of the four ink-jet units, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Check the ink cartridges. If any cartridges have run out of ink, replace them. • Check the dimple contact between the print head PCB and the carriage PCB. Clean it if contaminated. • Replace the print head unit. • (♦ If the problem persists, replace the carriage ASSY.) • Check the connection of the head flat cables on the main PCB. (♦ If either of those cables is broken or damaged, replace the carriage ASSY.) • Replace the main PCB. • (♦ Adjust the position of the purge unit.) • (♦ Clean the purge cap of the purge unit with the head cleaner. If the wiper or the pump of the purge unit is defective, replace the purge unit.)

Jobs enclosed by parentheses (♦) requires the special adjustment jig set.

Trouble	Action to be taken
(10) White horizontal streaks 	• For each of the four ink-jet units, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Replace the print head unit. • Check the paper feed-related rollers. (♦ Replacement of the paper feed roller or paper ejection roller requires the special adjustment jig set.)
(11) Stained leading edge of recording paper 	<u>At the printer</u> • Clean the nozzle ends of the ink-jet units. • Adjust the head-platen gap with the gap adjuster lever. (♦ If the problem persists, adjust the gap by turning the eccentric bearings on the carriage rail.) • Check that the release lever is completely pushed down.

[6] PC-driven or video capture-driven printing

Trouble	Check:
(1) PC-driven printing is impossible.	• Interface with the host computer • PC interface cable • Main PCB • Centronics interface PCB • Centro harnesses A and B
(2) Video capture-driven printing is impossible.	• Video cable • Main PCB • Centronics interface PCB • Centro harnesses A and B
(3) Video printing is impossible.	• Video cable • Main PCB