brother

FACSIMILE EQUIPMENT
SERVICE MANUAL

MODEL: MFC-3900ML / 4000ML
4500ML / 5500ML

PREFACE

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

In order 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 consists of six chapters and the appendices.

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

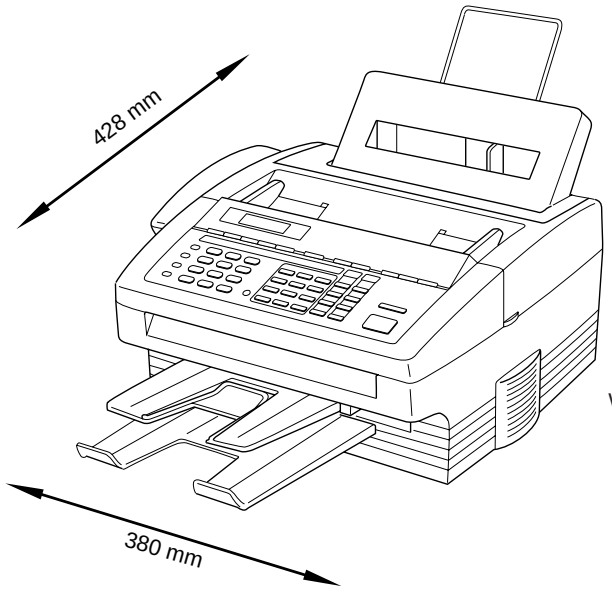
CHAPTER I.
GENERAL DESCRIPTION

CONTENTS

1. EQUIPMENT OUTLINE

1.1 External Appearance

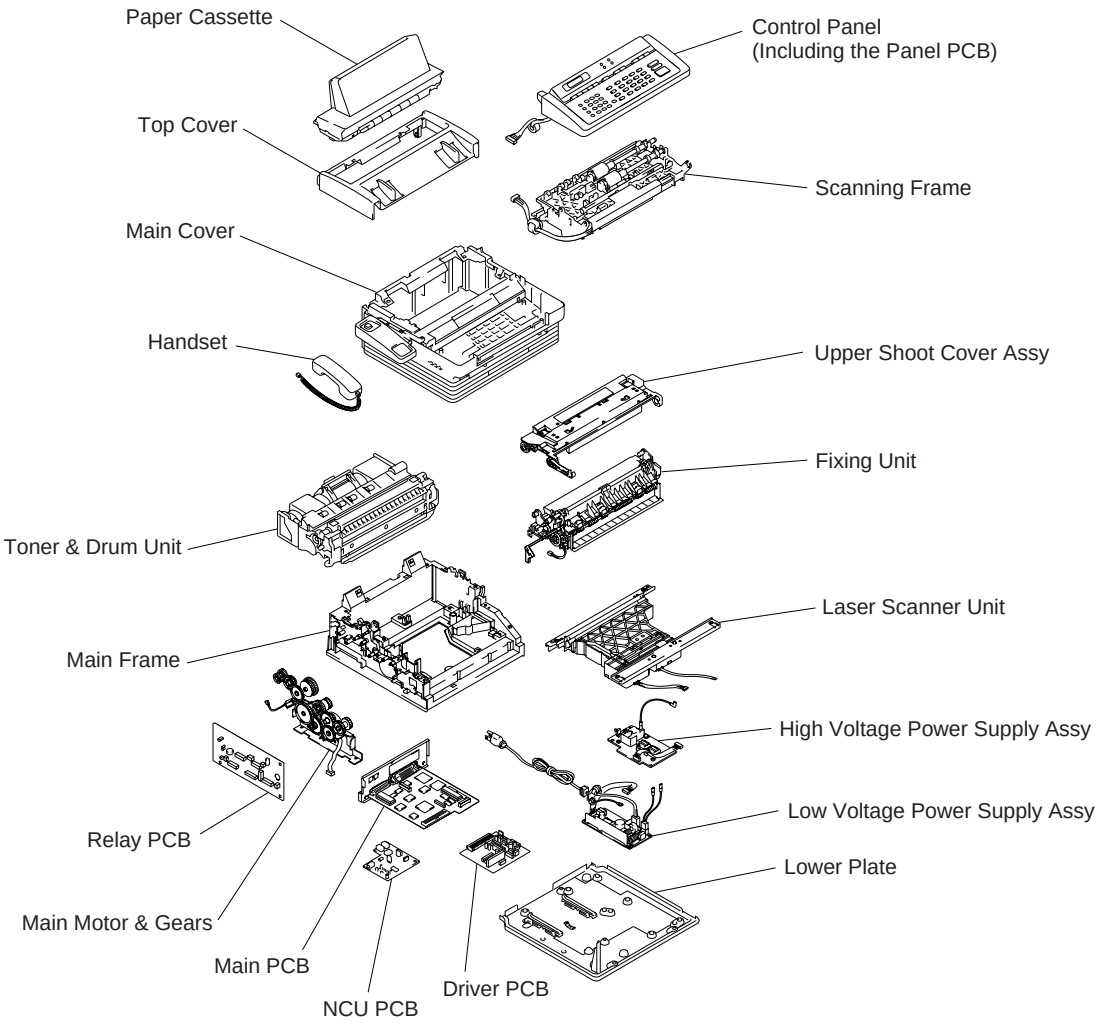
The figure below shows the appearance of the equipment and its approximate dimensions.



Weight: 12.0 kg (excluding the paper cassette, toner cartridge, and drum unit)

1.2 Components

The equipment has the following components:



2. SPECIFICATIONS

2.1 Detail Specification Chart

				1994/DEC/28
MODEL	MFC-3900ML	MFC-4000ML	MFC-4500ML	MFC-5500ML
COLOR	1138	1138	1138	1138
FUNCTION				
Main	FAX & Printer	FAX & Printer	FAX & Printer	FAX & Printer
Secondary	Copy & Scanner	Copy & Scanner	Copy & Scanner	Copy & Scanner
PRINTER	HL-630	HL-630	HL-630	HL-631
Engine	HL-630	HL-630	HL-630	HL-630
PPM	6 PPM	6 PPM	6 PPM	6 PPM
dpi	300	300	300	300
Paper Capacity	200	200	200	200
Standards	Windows GDI	Windows GDI	Windows GDI	Windows GDI
Emulations	PCL4, Epson, Propint	PCL4, Epson, Propint	PCL4, Epson, Propint	PCL4, Epson, Proprint
Memory	0.5MB	0.5MB	0.5MB	1.0MB
Fonts Resident	24bit Map(PCL4 Comp)	24bit Map(PCL4 Comp)	24bit Map(PCL4 Comp)	24bit Map(PCL4 Comp)
Fonts Disk Based	21 True Type	21 True Type?	21 True Type?	21 True Type?
Paper Handling	LTR,LGL,EXE,A4,B5,A5	LTR,LGL,EXE,A4,B5,A5	LTR,LGL,EXE,A4,B5,A5	LTR,LGL,EXE,A4,B5,A5
Multi-Purpose Tray	Custom Size(2.85X5-8X14)	Custom Size(2.85X5-8X14)	Custom Size(2.85X5-8X14)	Custom Size(2.85X5-8X14)
	Envelop(BL/C5/COM10/Monarch)	Envelop(BL/C5/COM10/Monarch)	Envelop(BL/C5/COM10/Monarch)	Envelop(BL/C5/COM10/Monarch)
Printer Driver	Windows 3.1 Driver with Auto-	Windows 3.1 Driver with Auto-	Windows 3.1 Driver with Auto-	Windows 3.1 Driver with Auto-
	Installer Program	Installer Program	Installer Program	Installer Program
	Mac Driver (Optional)	Mac Driver (Optional)	Mac Driver (Optional)	Mac Driver (Optional)
Utility Software	Remote Printer Console(RPC)	Remote Printer Console(RPC)	Remote Printer Console(RPC)	Remote Printer Console(RPC)
	Program for DOS	Program for DOS	Program for DOS	Program for DOS
				Click Book
SCANNER	Option	Option		
Color/Mono	No	No	Mono	Mono
Gray Scale	No	No	64 (Not Analogu)	64 (Not Analogu)
dpi	No	No	203X196	203X196
Emulation	No	No	No	No
ADF	No	No	30	30
Formats	No	No	TIFF/PCX(by M/L)	TIFF/PCX(by M/L)
Removable	No	No	No	No
COPY				
dpi	200	200	200	200
#Copies	1- 99	1- 99	1- 99	1- 99
Sort	No	No	No	Yes
Reduction/Enlarge	50/75/87/93/100/120/125/150%	50/75/87/93/100/120/125/150%	50/75/87/93/100/120/125/150%	50/75/87/93/100/120/125/150%
FAX	2500ML	2500ML	2500ML	3500ML
Modem Speed (bps)	9600 bps (FAX only)	9600 bps (FAX only)	9600 bps (FAX only)	9600 bps (FAX only)
CCITT Group	G3	G3	G3	G3
Coding Method	MH	MH	MH	MH/MR/MMR
Transmit Speed	15 sec.	15 sec.	15 sec.	9 sec.
Input/Output Width	8.5"/8.5"	8.5"/8.5"	8.5"/8.5"	8.5"/8.5"
ADF (pages)	30	30	30	30
LCD Size	16X2	16X2	16X2	16X2
Super Fine	Yes (Send Only)	Yes (Send Only)	Yes (Send Only)	Yes (Send and Receive)
Gray Scale	32	64	64	64
Smoothing	Yes	Yes	Yes	Yes
Handset	Yes	Yes	Yes	Yes
One-touch Dial	12X2	12X2	12X2	12X2
Speed Dial	20	44	100	100
Telephone Index	Yes	Yes	Yes	Yes
Contrast	SL/Auto/SD	SL/Auto/SD	SL/Auto/SD	SL/Auto/SD
Multi Resolution TX	Yes	Yes	Yes	Yes
FAX/TEL Switch	Yes	Yes	Yes	Yes
Distinctive Ringing	Yes	Yes	Yes	Yes
Next Fax-reservation	Yes	Yes	Yes	Yes
Help	Yes	Yes	Yes	Yes
TAD Interface	Yes	Yes	Yes	Yes
Coverpage	Yes-Super	Yes-Super	Yes-Super	Yes-Super
Polling Type	Std/Sec/Del/Seq	Std/Sec/Del/Seq	Std/Sec/Del/Seq	Std/Sec/Del/Seq
Password Check	Yes/Plus	Yes/Plus	Yes/Plus	Yes/Plus
Delayed Timer	Yes-3 Timer	Yes-3 Timer	Yes-3 Timer	Yes-3 Timer
Call Reservation	Yes	Yes	Yes	Yes
Call Back Message	Yes	Yes	Yes	Yes
Page Memory	Yes-256KB	Yes-256KB	Yes-512KB	Yes-1MB
Out-of-paper Receiption	10 pages	10 pages	20 pages	50 pages
Quick Scan	Yes	Yes	Yes	Yes
Super Quick Scan	Yes	Yes	Yes	Yes
Auto Reduction	Yes	Yes	Yes	Yes
ECM	Yes	Yes	Yes	Yes
Broadcasting	Yes	Yes	Yes	Yes
Relay Broadcasting	No	No	No	Yes
Multi Transmission	Yes	Yes	Yes	Yes
Confidential Mail Box	No	No	No	Yes
Message Center	No	No	No	No
TAD Feature	No	No	No	No
OGM	No	No	No	No

FAX Forwarding	Yes	Yes	Yes	Yes
FAX Retrieval	Yes	Yes	Yes	Yes
Paging	Yes	Yes	Yes	Yes
OPTIONAL EXP. MEMORY				
for FAX	No	No	Yes- plus 512KB or 1MB	Yes- plus 512KB or 1MB
for Printer	Yes - 512KB or 1.5MB	Yes - 512KB or 1.5MB	Yes - 512KB or 1.5MB	Yes - 1MB
PC FAX (Send/Receive)	Option	Option	Yes	Yes
	Missing Link Ready	Missing Link Ready	Missing Link Included	Missing Link Included
DATA MODEM	No	No	No	No
INTERFACE				
Printer Interface	Hi Speed Parallel(w/o Cable)	Hi Speed Parallel(w/o Cable)	Hi Speed Parallel(w/o Cable)	Hi Speed Parallel(w/o Cable)
	MAC RS-422A (Option)	MAC RS-422A (Option)	MAC RS-422A (Option)	MAC RS-422A(Option)
PC Interface	RS-232C(8 pin modular)	RS-232C(8 pin modular)	RS-232C(DSUB, w/ Cable)	RS-232C(DSUB, w/ Cable)
Auto Switching	Yes	Yes	Yes	Yes
Note)				
Items marked with "*" are now under studying. So they are not fixed yet.				

3. SAFETY INFORMATION

3.1 Laser Safety (110 - 120V Model only)

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

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

3.2 CDRH Regulations (110 - 120V Model only)

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

MANUFACTURED : K

BROTHER INDUSTRIES, LTD.

15-1, Naeshiro-cho, Mizuho-ku Nagoya 467, Japan.

This product conforms with CDRH radiation

performance standard 21 CFR chapter 1

subchapter J.

3.3 Additional Information

When servicing or adjusting the optical system of the printer, be careful not to place screwdrivers or other reflective objects in the path of the laser beam. Be sure to take off any personal accessories such as watches and rings before working on the printer. A reflected beam, through invisible, can permanently damage the eyes.

3.4 Cautions Relating to Laser Products

(1) CAUTION: When the equipment is operated with the cover open during servicing, the regulations of VBG 93 and the performance instructions for VBG 93 are applicable.

(2) CAUTION: In case of any trouble with the laser unit, please replace the laser unit itself. Do not try to open the enclosure of the laser unit, otherwise you will be directly exposed to the laser beam.

CHAPTER II.
INSTALLATION

CONTENTS

1. DEALER OPTION

1.1 Serial Interface Board

Please refer to the section of the operations manual “15. OPTION”.

1.2 Memory Board

The memory board is installed on the main PCB inside the machine. You can add the optional memory board both performance modes for the fax and the printer.

■ Function

Optional Memory for the Printer

Additional memory is useful and may be necessary if you are downloading many different fonts or are printing a very complex document.

The machine can recognize a maximum of only 2MB of memory. Be careful to purchase the appropriate memory board for your machine.

Model Name	1MB Optional Memory	1.5MB Optional Memory
3900ML/4000ML/4500ML (0.5MB)	Yes (1.5MB)	Yes (2MB)
5500ML (1MB)	Yes (2MB)	N/A

Optional Memory for the Fax

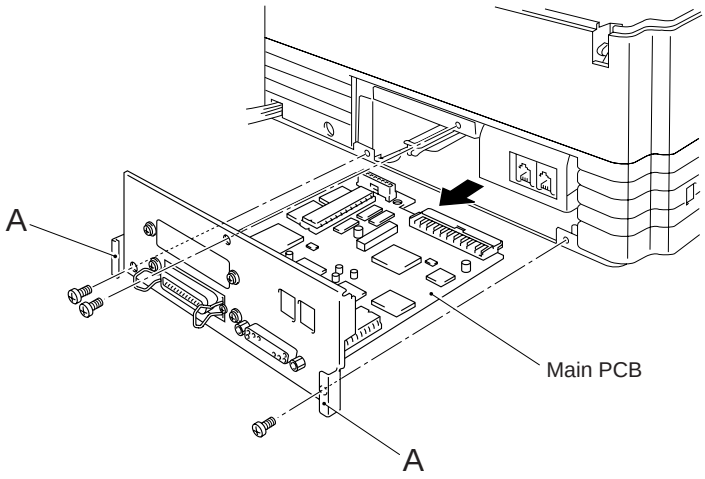
Additional memory is available and useful to expand the memory for sending and receiving faxes.

Model Name	512KB Optional Memory	1MB Optional Memory
3900ML/4000ML (256KB)	N/A	N/A
4500ML (512KB)	Yes (1MB)	Yes (1.5MB)
5500ML (1MB)	Yes (1.5MB)	Yes (2MB)

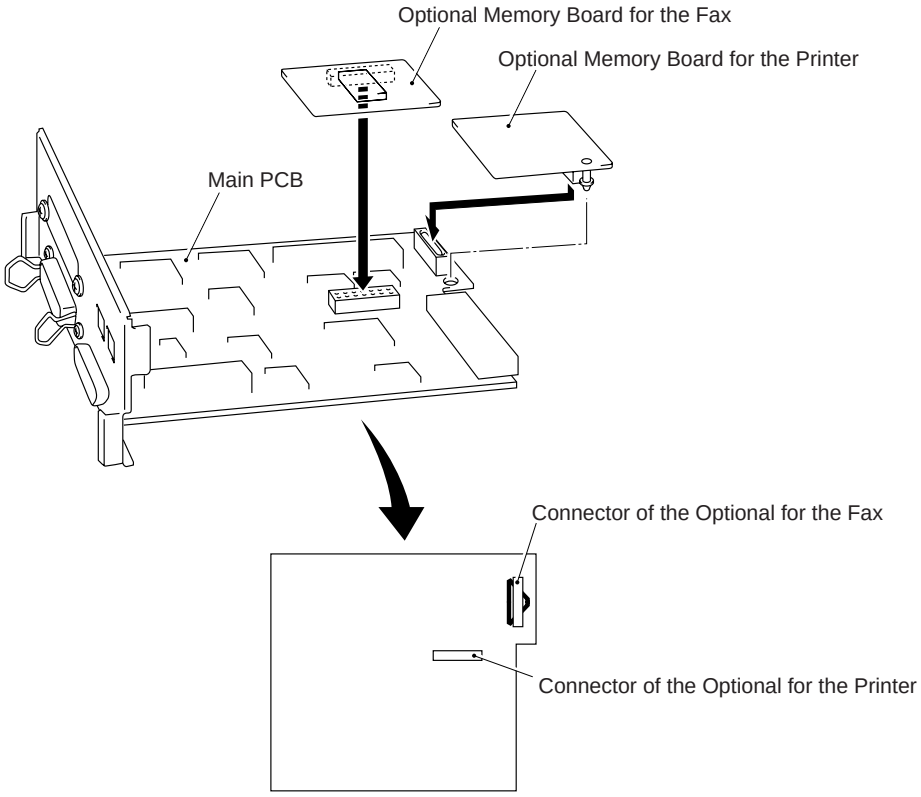
■ Installation

(1) Unplug the power cord from the AC outlet and the interface cable.

(2) Remove the three screws and pull the main PCB toward you while holding it at the parts A.



(3) Install each memory board onto the main PCB by plugging it into the connector.
Make sure that the memory board is securely seated in the main PCB.



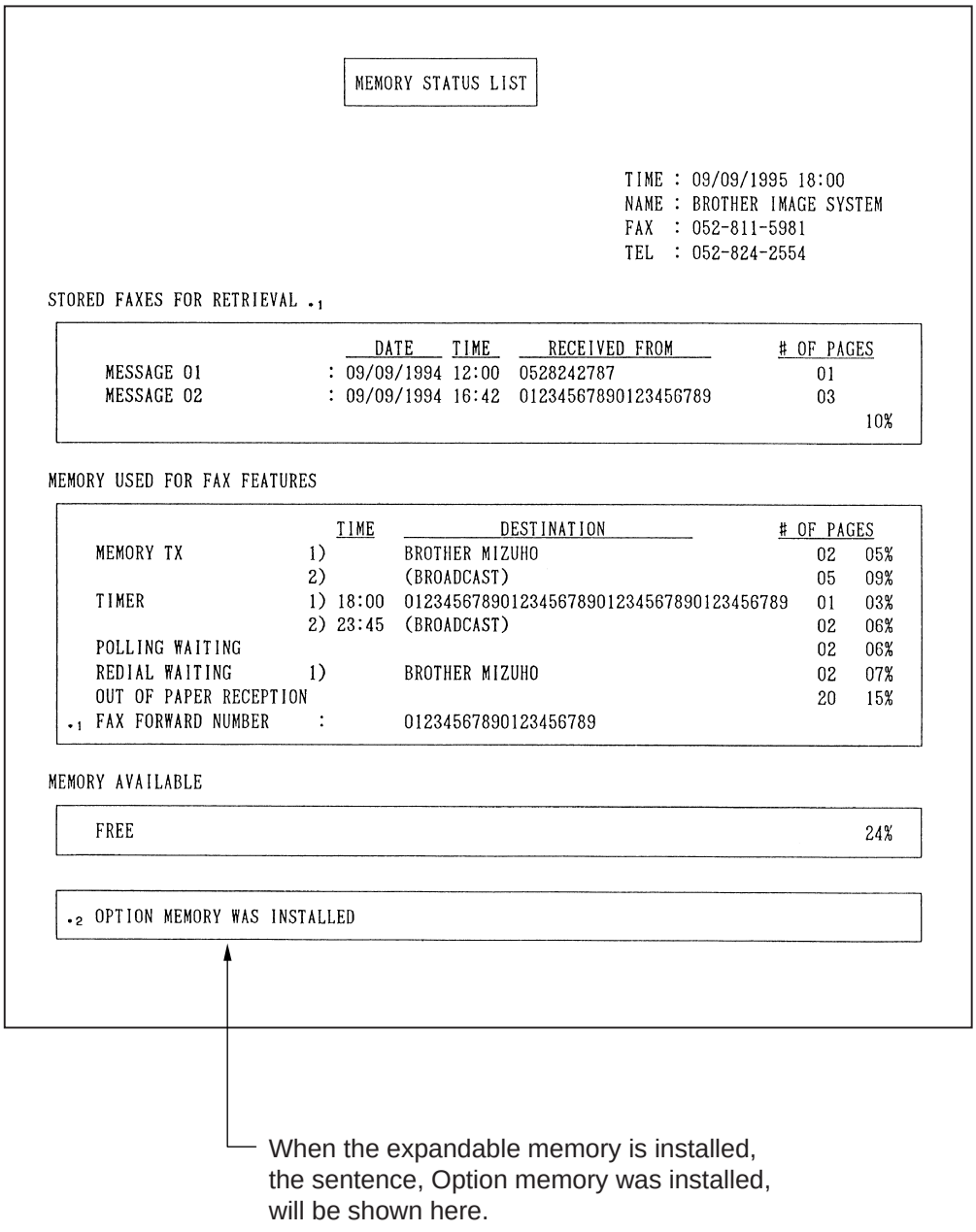
(4) Reinstall the main PCB into the machine by sliding it into the card slot correctly and then secure it with three screws.

(5) Connect the interface cable.

(6) Plug the power cord into the AC outlet.

(7) When the optional memory board for the fax is installed, print out the MEMORY STATUS LIST to confirm whether it was installed correctly.

Operation: Press Function, 1, 3, 8 and START keys in this order.
Then the MEMORY STATUS LIST will be printed out.



MEMORY STATUS LIST

TIME : 09/09/1995 18:00
NAME : BROTHER IMAGE SYSTEM
FAX : 052-811-5981
TEL : 052-824-2554

STORED FAXES FOR RETRIEVAL *1

	DATE	TIME	RECEIVED FROM	# OF PAGES
MESSAGE 01	: 09/09/1994	12:00	0528242787	01
MESSAGE 02	: 09/09/1994	16:42	01234567890123456789	03

10%

MEMORY USED FOR FAX FEATURES

		TIME	DESTINATION	# OF PAGES	
MEMORY TX	1)		BROTHER MIZUHO	02	05%
	2)		(BROADCAST)	05	09%
TIMER	1)	18:00	012345678901234567890123456789012345678901234567890123456789	01	03%
	2)	23:45	(BROADCAST)	02	06%
POLLING WAITING				02	06%
REDIAL WAITING	1)		BROTHER MIZUHO	02	07%
OUT OF PAPER RECEPTION				20	15%
*1 FAX FORWARD NUMBER	:		01234567890123456789		

MEMORY AVAILABLE

FREE	24%

*2 OPTION MEMORY WAS INSTALLED

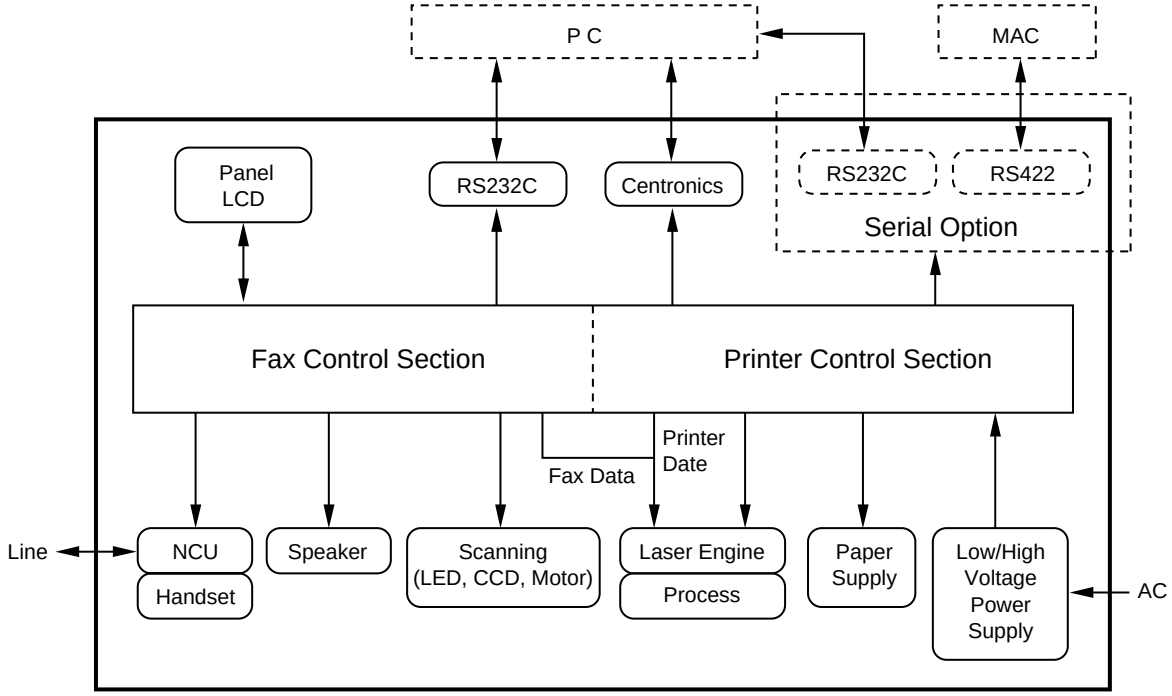
When the expandable memory is installed, the sentence, Option memory was installed, will be shown here.

CHAPTER III.
THEORY OF OPERATION

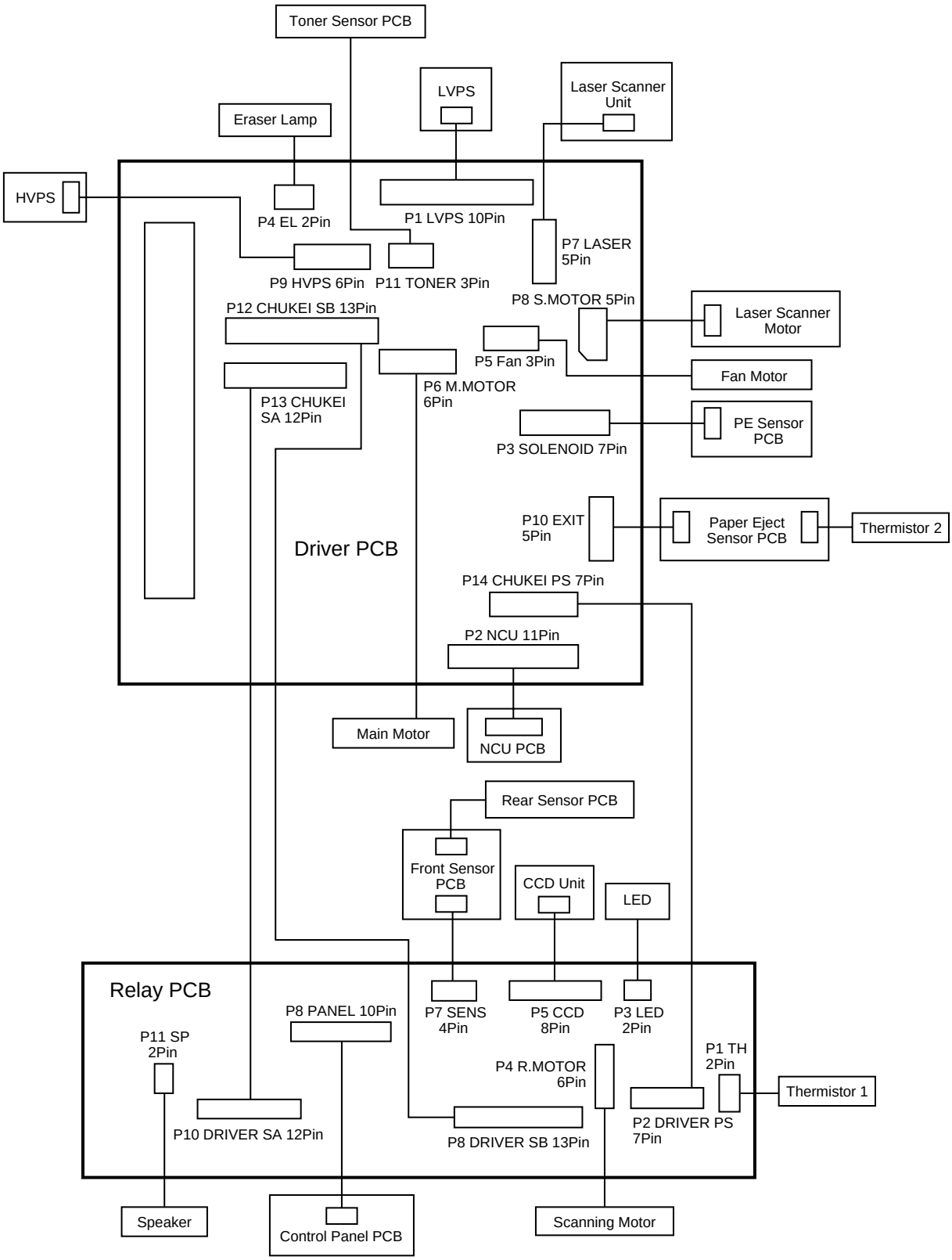
CONTENTS

1. OVERVIEW

1.1 Functional Block Diagram



1.2 Connection Diagram

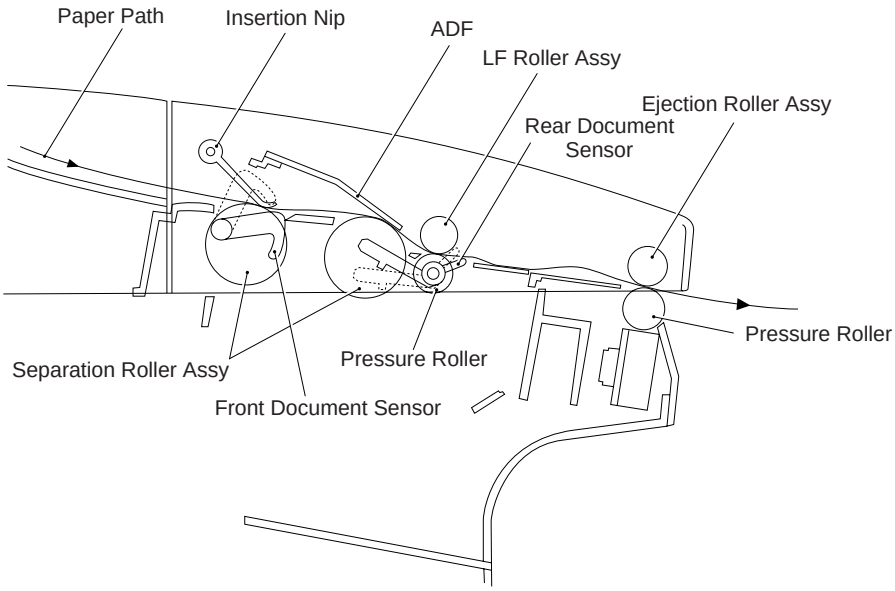


2. MECHANISMS

2.1 Transmitting Mechanism (Scanning and Feeding Documents)

The transmitting mechanism consists of the document stacker, automatic document feeder (ADF), rollers related to document feed, scanner, and document sensors.

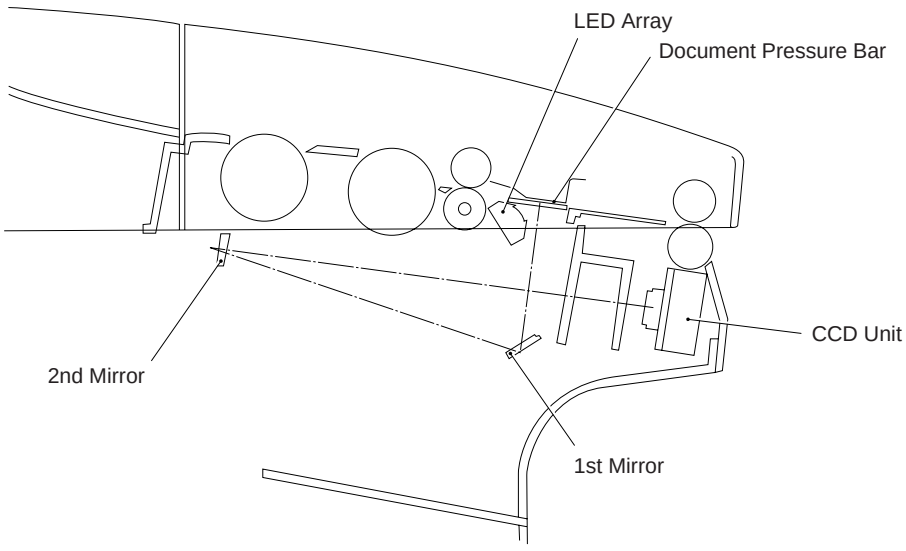
When the operator sets documents on the stacker, the insertion nip and the ADF feed them into the equipment, page by page. Each document in advanced by the LF roller and pressure roller to the scanner, and then is then fed out of the equipment by the ejection rollers.



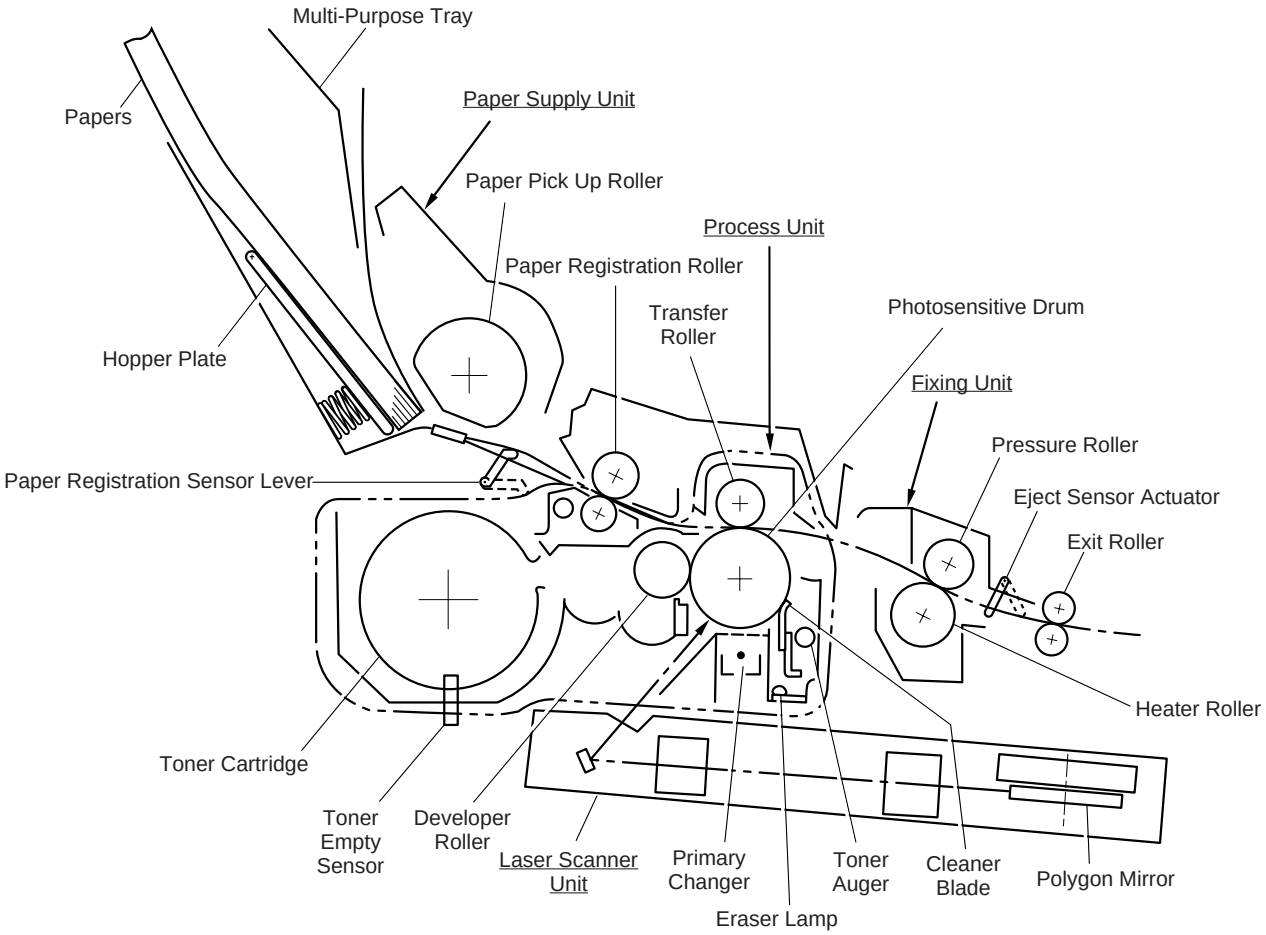
2.1.1 Scanner

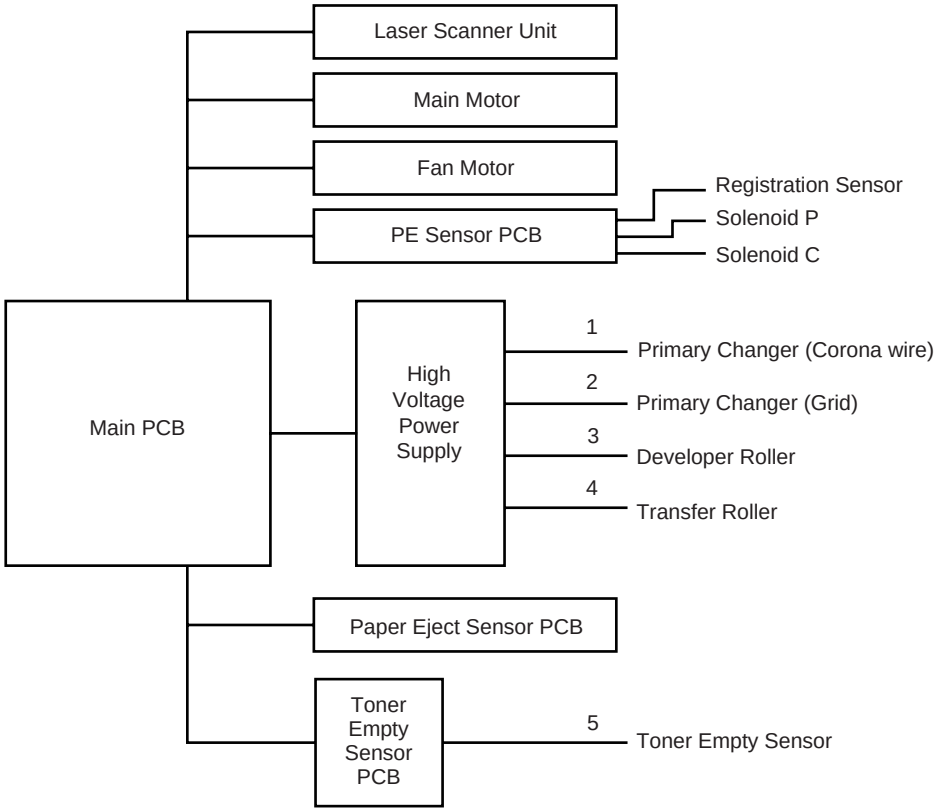
The scanner uses a charge coupled device (CCD) image sensor.

As shown below, the LED array illuminates the document and the reflected light of the scanned image data is transmitted via the mirrors into the lens, which reduces the scanned data so as to form the image on the CCD.



2.2 Overview of Printing Mechanism

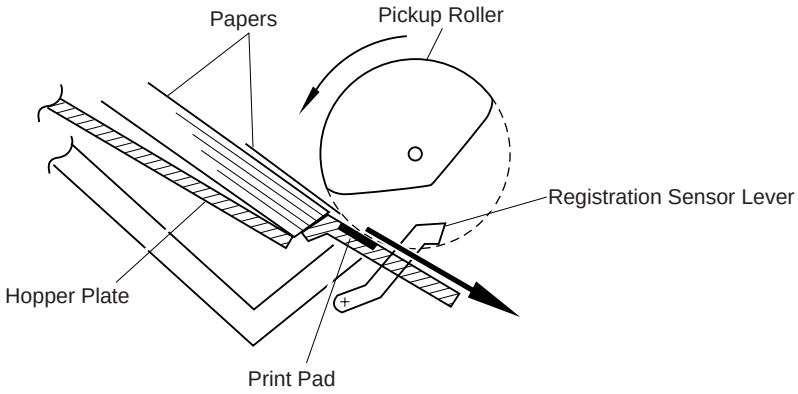




2.3 Paper Transfer

2.3.1 Paper Supply

The pickup roller picks up one sheet of paper from the paper tray with every rotation and feeds the picked up sheets to the registration roller one by one.



The paper is gripped between the pickup roller and the separation pad and separated into individual sheets.

The pickup roller is directly connected to the sector gear, whose rotation is forcibly stopped by the gear stopper; when the pickup solenoid (solenoid C assembly) is activated, the gear stopper is released and the sector gear is driven; when it has completed one full turn its rotation is stopped again by the gear stopper.

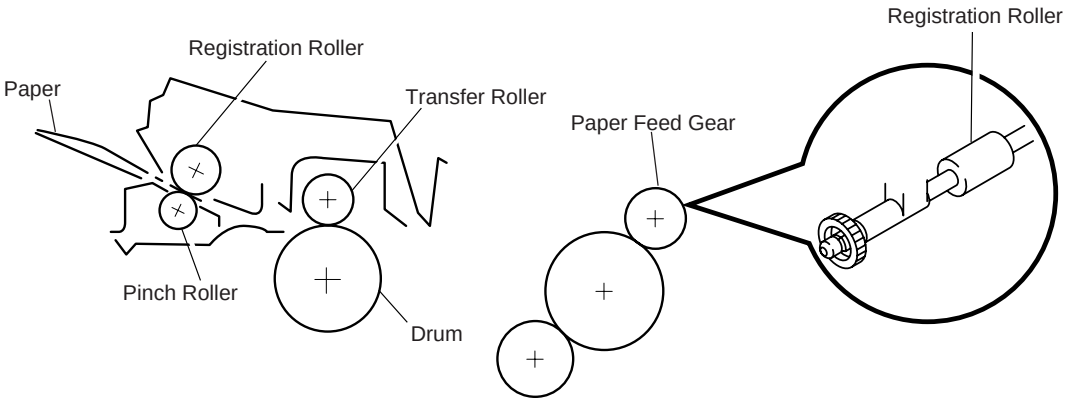
The paper drawn out by the pickup roller presses against the top of form registration sensor lever and the paper top position/absence of paper is detected by sensing the motion of the lever.

2.3.2 Paper Registration

When paper picked up from the multi-paper tray (MPT) presses against the top of form sensor actuator, the registration sensor lever is caused to turn, and the photo sensor detects this motion.

With this signal from the sensor the rotation of the registration roller is stopped temporarily by the clutch. Then paper is fed to the nip point between the registration roller and the pinch roller in the process unit, and the skew of the paper is corrected as the leading edge of the paper contacts the nip point.

When the registration roller recommences rotation due to the motion of the clutch, the paper whose leading edge has been aligned, is fed by the registration roller and is transported to the transfer roller.



Clutch mechanism (engaged/released by the solenoid assembly)

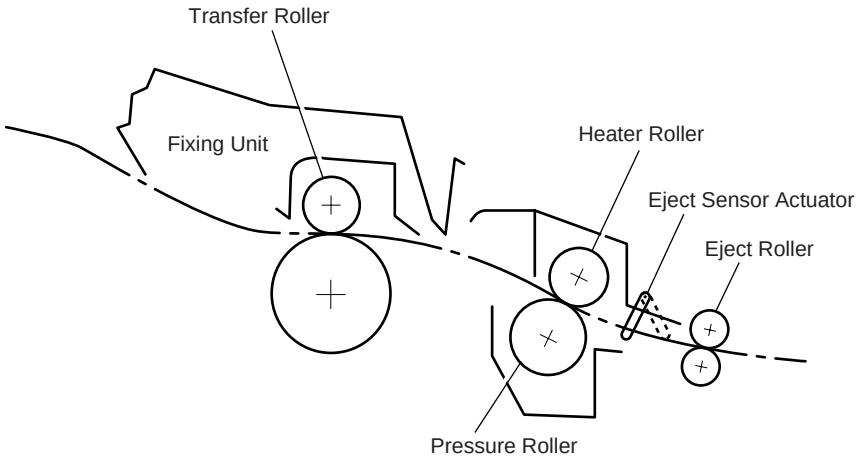
Released when the solenoid is ON and engaged when the solenoid is OFF.

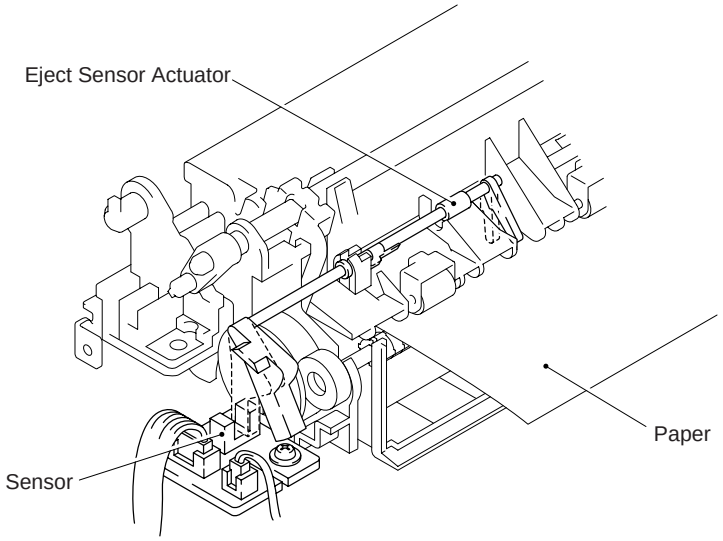
2.3.3 Paper Eject

The completion of paper ejection is detected in the following manner:

(a) When the leading edge of the paper pushes up the eject sensor actuator located in the fixing unit, the photo sensor (photo interrupter) is opened and detects the start of paper eject motion.

(b) After that, when the bottom edge of the paper has passed through the paper eject sensor actuator, the photo sensor is closed and the completion of paper eject motion is recognized.





2.4 Process Unit

2.4.1 Photosensitive Drum

Generates the latent electrostatic image and develops the image on the drum surface.

2.4.2 Primary Charger

Generates a uniform charge on the drum surface.

(1) Corona wire

Generates ions on the drum.

(2) Grid

Spreads the ions evenly over the drum.

2.4.3 Developer Roller

Develops the latent electrostatic image on the drum surface using the toner.

2.4.4 Transfer Roller

Transfers the toner image to the paper from the drum surface.

2.4.5 Cleaner Blade

Remove the toner remaining on the drum surface.

2.4.6 Toner Auger

Transport the waste toner from the cleaner to the developer unit.

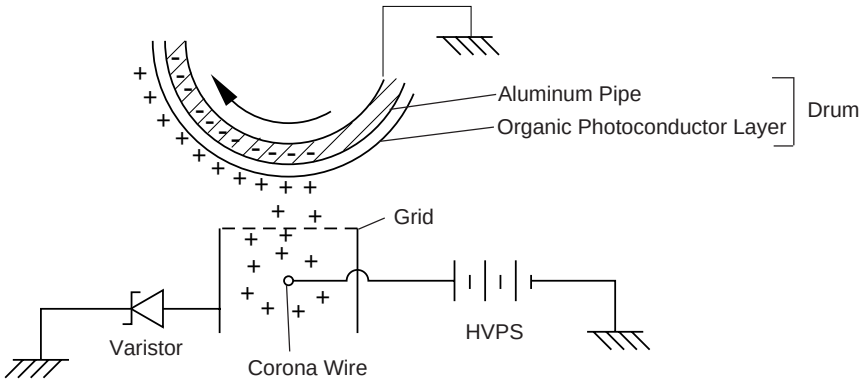
2.4.7 Eraser Lamp

Discharges the electrostatic latent image on the drum.

2.5 Print Process

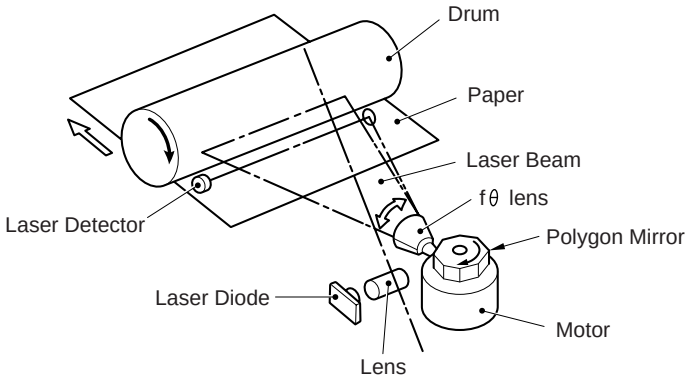
2.5.1 Charging

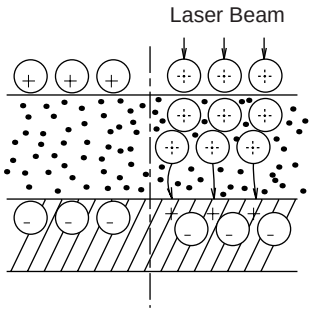
The drum is charged to appox. +700V by ions generated by the primary charger. Ions are generated by ionization of the corona wire on application of the DC bias from the high voltage power supply. The flow of ions is controlled by the grid so that they are distributed evenly on the drum surface. The other end of the grid is grounded to the frame through the varistor.



2.5.2 Exposure Stage

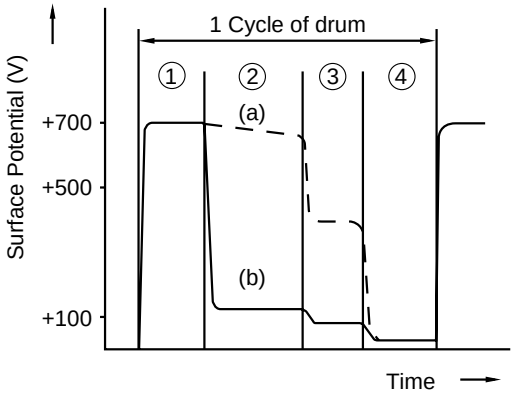
After the drum has been positively charged, it is exposed to the light emitted from the laser unit.





The exposed area is the part to be printed. The surface potential of the exposed area is decreated forming an electrostatic image to be printed.

III



① Primary charging

② Laserbeam exposure and developing
(a) Unexposed area
(Non image area)
(b) Exposed area
(Image area)

③ Transfer the image to paper

④ Erase the residual potential

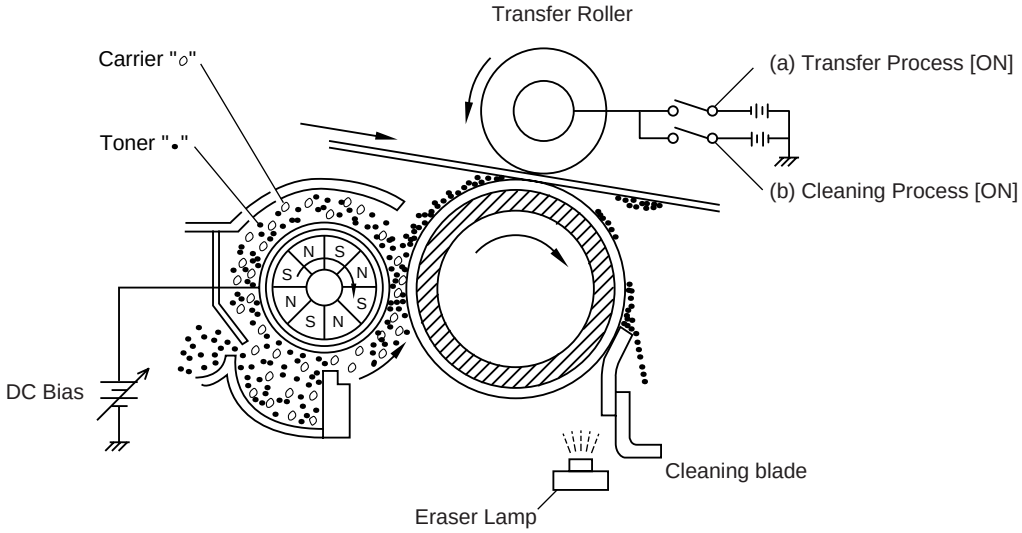
2.5.3 Developing

In the developing process, the toner is attracted to the electrostatic image on the drum so as to transform it into a visible image.

The developer consists of the magnetic carrier and the magnetic toner. The developer makes the magnetic brush on the developer roller which includes the rotatable magnet roller. The magnetic brush softly rubs the drum, and then only the toner developed on the latent electrostatic image.

The carrier particles are attracted to the developer roller.

The toner receives a positive static charge as the toner particles rub against the carrier particles, rotating developer roller, and trimmer blade. The electrostatic field between the drum and the developer roller, which is DC-biased by the high voltage power supply, produces the electrostatic potential to attract toner particles from the developer roller to the drum.



2.5.4 Transfer

(a) Transfer process

After the drum has been charged and exposed, and has received a developed image, the toner image is transferred onto the paper by applying a negative charge from the back of the paper. The negative charge on the paper causes the positively charged toner to leave the drum, and adhere to the paper. As a result, the image is visible on the paper.

(b) Cleaning process of transfer roller

If the toner is not transferred onto the paper perfectly due to jamming etc., it may adhere to the charge transfer roller. The transfer voltage charges to a positive voltage during the non transferring stage.

Therefore the transfer roller is cleaned by returning the positively charged toner that has adhered to the transfer roller onto the photo-conductive drum.

2.5.5 Drum Cleaning Stage

In the image transfer stage, not all the toner on the photosensitive drum is transferred onto the paper; some of it remains on the drum. In the drum cleaning stage, the drum surface is cleaned by the cleaning blade, so that residual toner on the drum surface is removed and collected in the cleaning housing. The toner collected in the cleaning housing is transported to the developer unit by the toner auger. This toner is mixed with new toner and is used again at the developing stage.

2.5.6 Erasing Stage

After the cleaning stage, the drum surface is exposed by the light emitted from the erase lamp (LED lamp). This stage prepares the drum to decrease its surface voltage uniformly, and to receive a uniform charge in the primary charging stage.

2.6 Sensors

(1) Paper Cassette Cover Sensor

Detects opening and closing of the cover of the paper cassette.

When this sensor detects the “open” status, it functions as an interlock switch and cuts off part of the +5V and +24V supplies.

(2) Top Cover Sensor

Detects opening and closing of the top cover.

When this sensor detects the “open” status, it functions as an interlock switch and cuts off part of the +5V and +24V supplies.

(3) Toner Empty Sensor

Detects whether or not there is any toner, and whether or not the toner cartridge is installed.

(4) Paper Empty Sensor

Detects the presence or absence of recording paper. Three actuators are connected.

(5) Paper Registration Sensor

Detects the leading and trailing edges of the recording paper.

(6) Paper Eject Sensor

Detects ejection of the recording paper.

(7) Front Document Sensor

Detects the presence or absence of a document.

(8) Rear Document Sensor

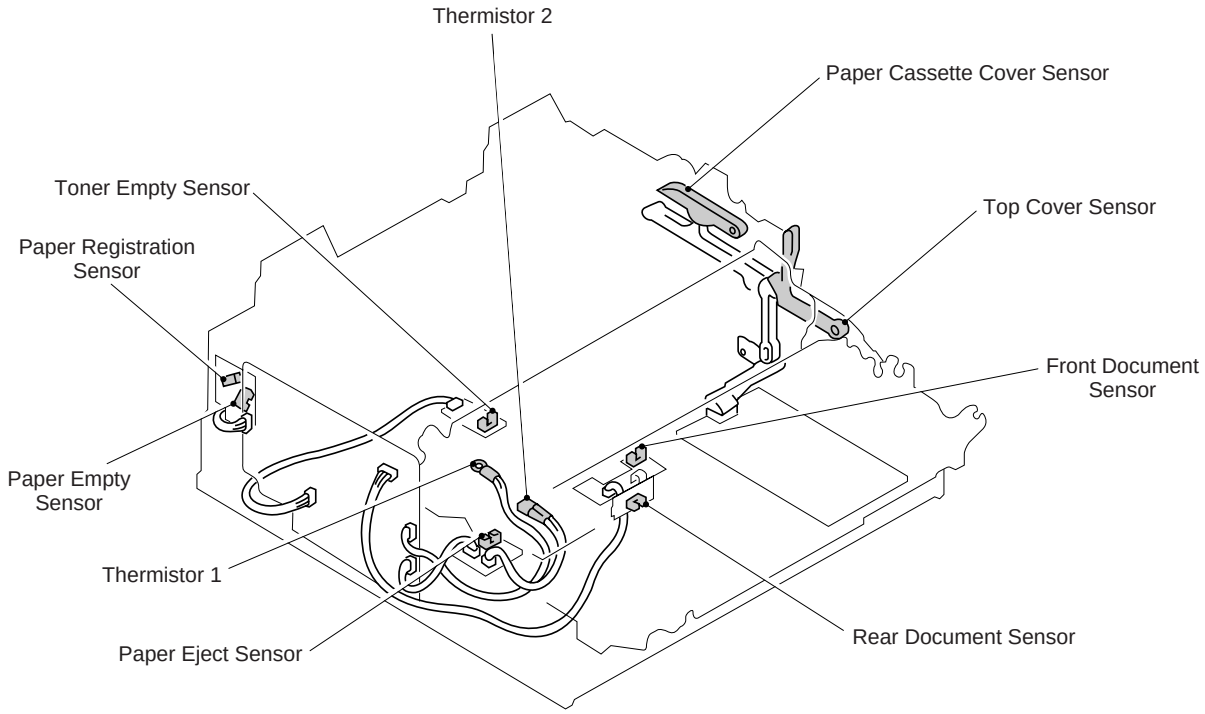
Detects the leading and trailing edges of the document.

(9) Thermistor 1

Detects the temperature inside the unit. When a temperature of 51°C or higher is detected, the warning “CLEAN UP FILTER” appears on the display. The temperature is no longer recorded after a temperature of 60°C is detected. When the temperature has fallen to 54°C it becomes possible to record the temperature again.

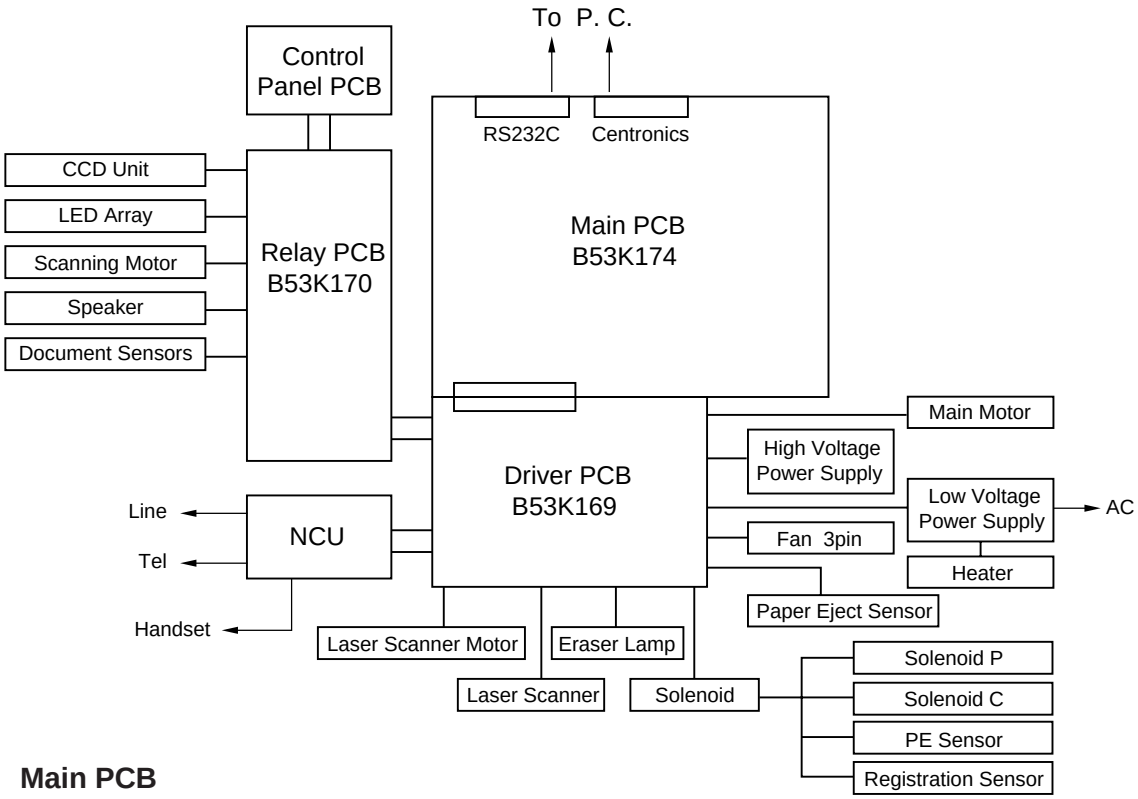
(10) Thermistor 2

Detects the temperature of the Fixing Unit's heater to keep the temperature at 130° during standby and 150° during recording.


Thermistor 2
Paper Cassette Cover Sensor
Toner Empty Sensor
Top Cover Sensor
Paper Registration Sensor
Front Document Sensor
Paper Empty Sensor
Thermistor 1
Rear Document Sensor
Paper Eject Sensor

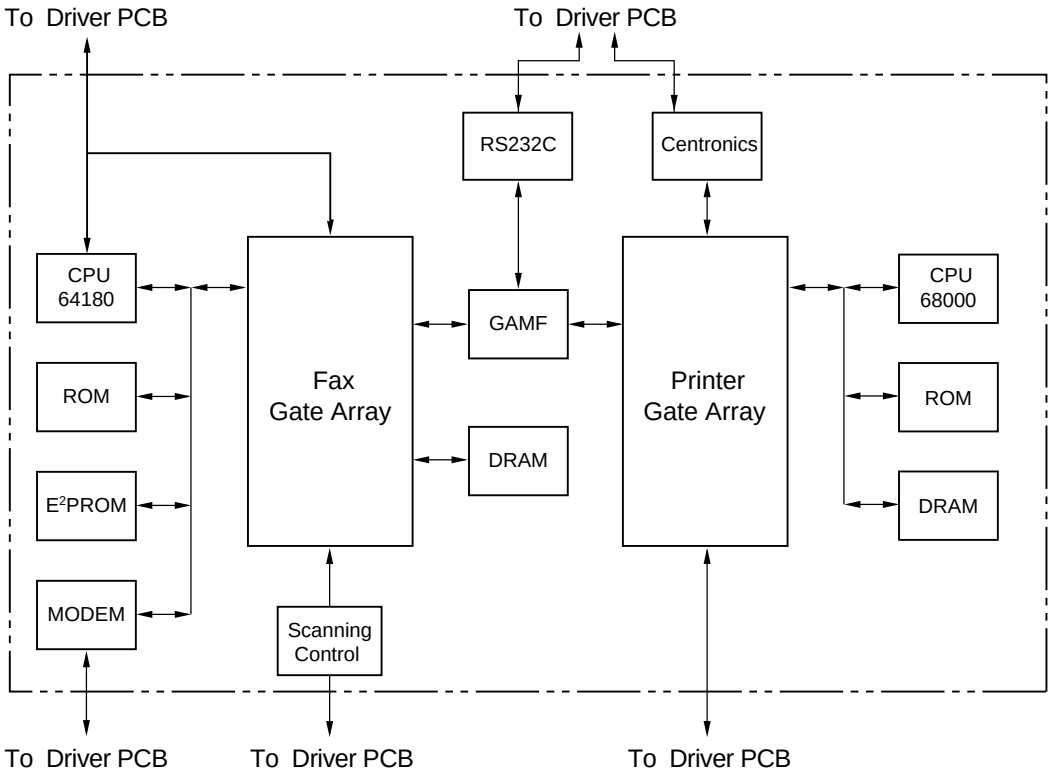
3. CONTROL ELECTRONICS

3.1 Functional Diagram of Control Electronics

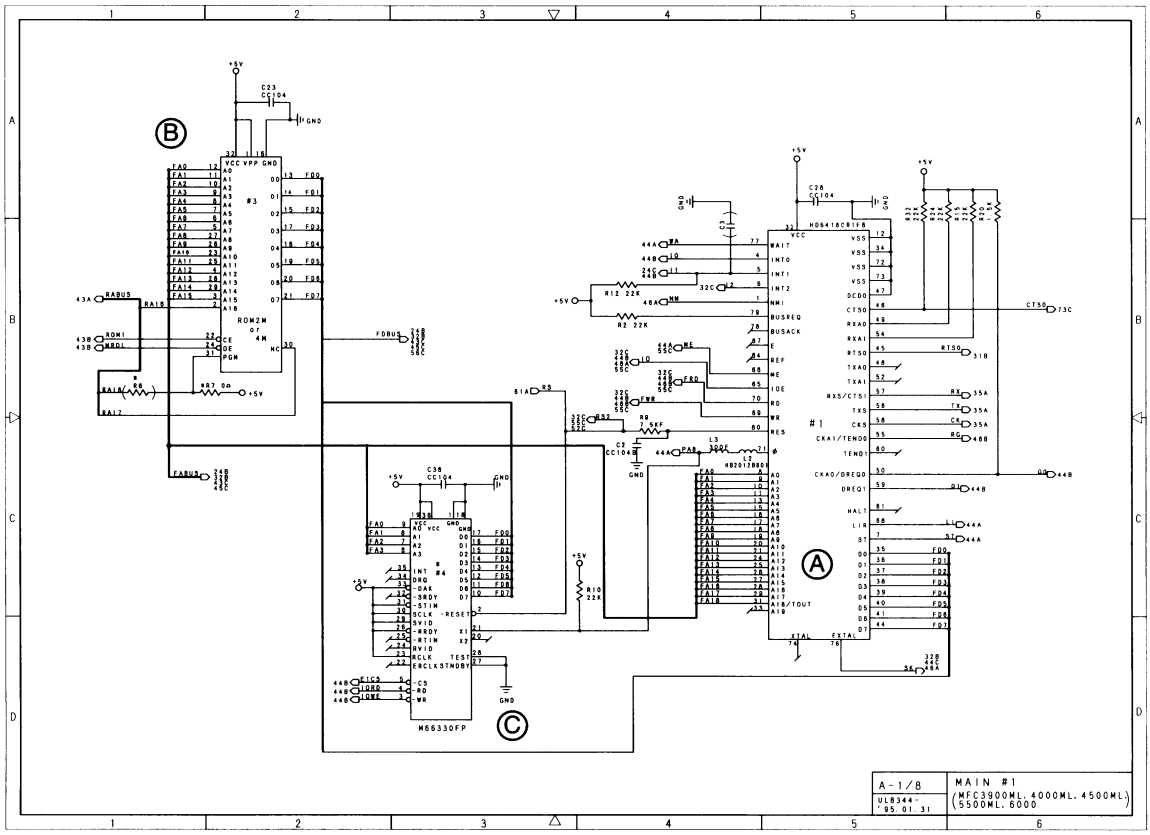


3.2 Main PCB

The main PCB, which is the nucleus controlling all equipment operations, consists of a CPU, memories, gate arrays, a modem, motor drive circuitry, sensor detection circuitry, and analogue circuits for scanning, printing, and power transmission shifting.



Block Diagram of Main PCB

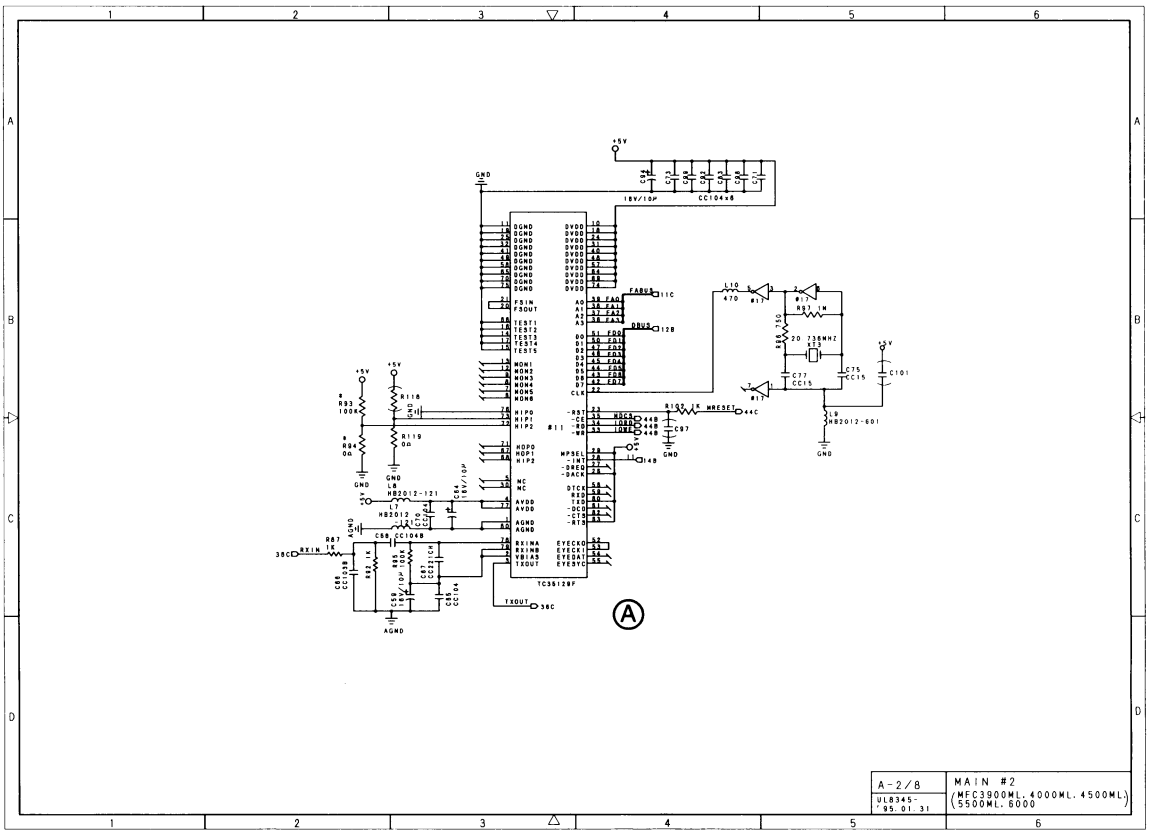


Main PCB Circuit Diagram 1/7

Ⓐ CPU (for fax function)

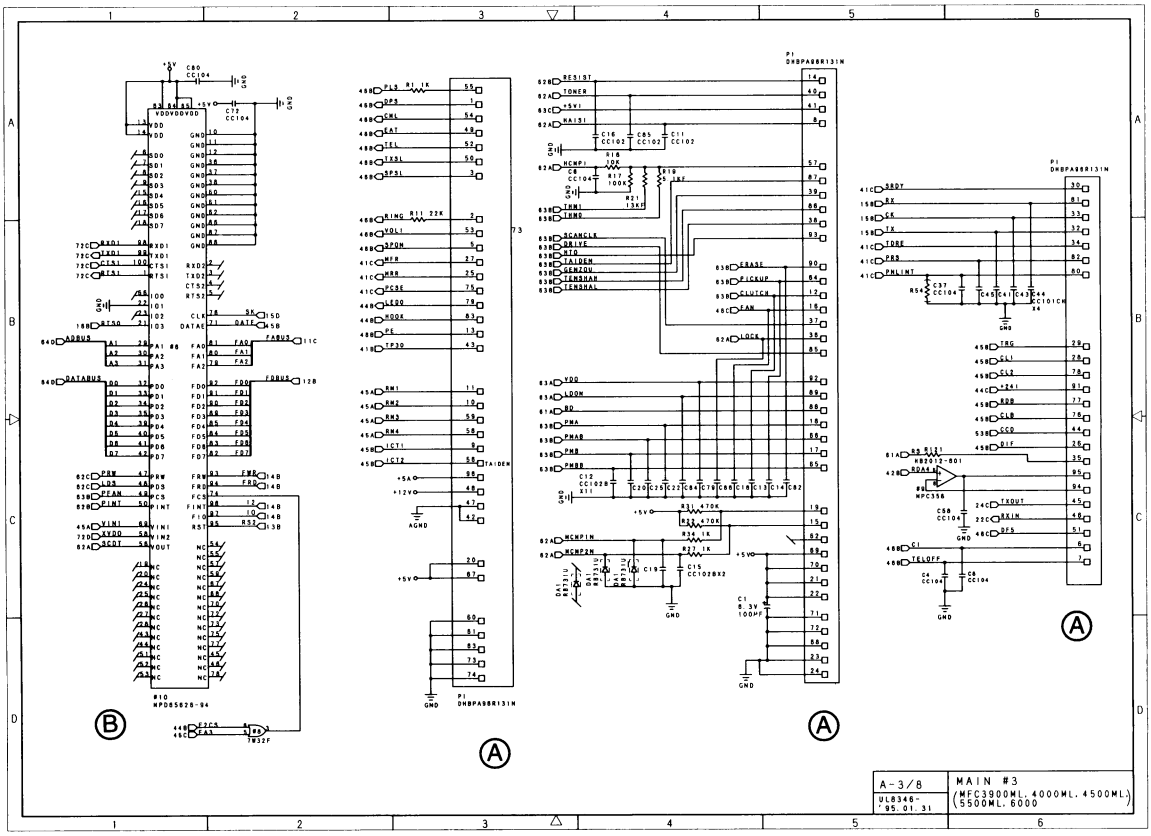
Ⓑ ROM (for fax function)
Regular machine : 2 Mbit
Demo sample machine / F/T OGM version / Multi language version : 4 Mbit

Ⓒ CODEC IC
Used for MFC-5500ML, Swiss, Norway and Swedish version.



Main PCB Circuit Diagram 2/7

Ⓐ MODEM



Main PCB Circuit Diagram 3/7

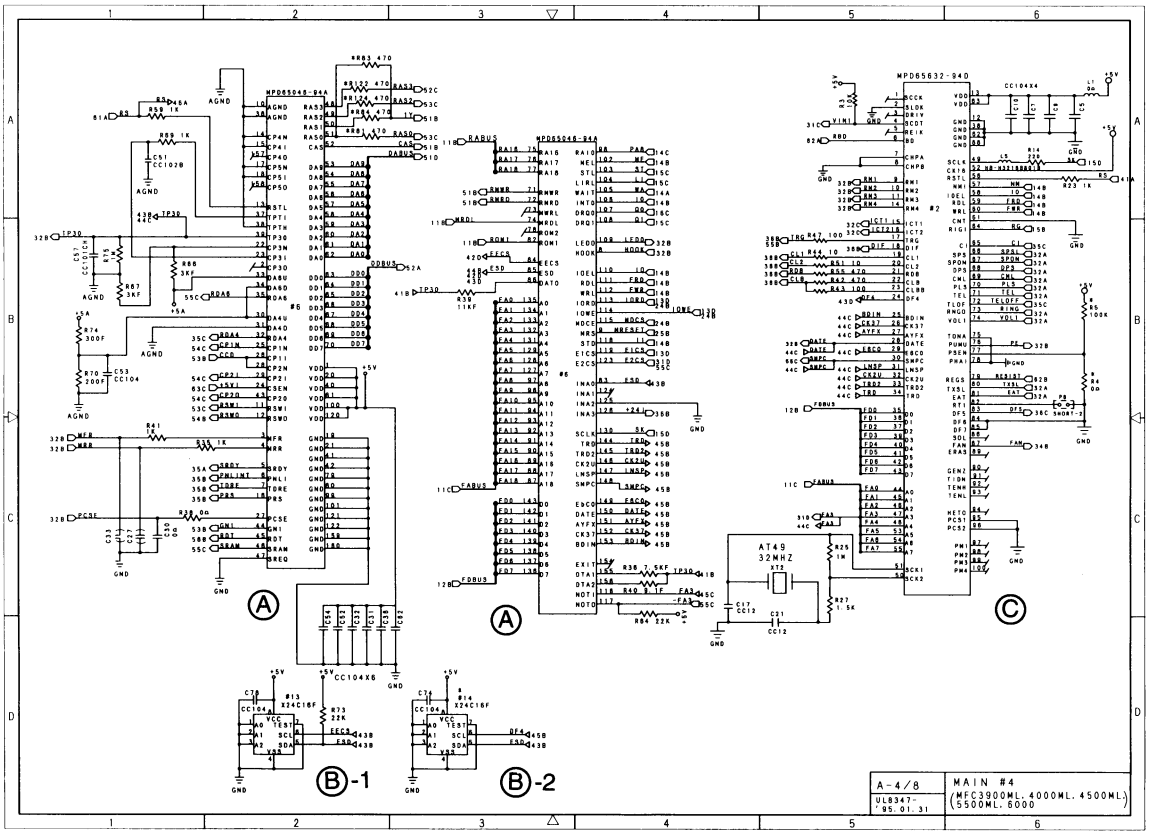
Ⓐ Connector for driver PCB

Ⓑ Gate Array

Has the following functions:

Interface for fax function and printer function

PCI control



Main PCB Circuit Diagram 4/7

Ⓐ Gate Array

Executes analogue data processing, including the following:

Control of memory for fax

Control of scanning data

Control of the temperature of the heater used for printing

Ⓑ E^2PROM

MFC-3900ML : Ⓑ-1 (16 kbyte) = 16 kbyte

MFC-4000ML : Ⓑ-1 (16 kbyte) + Ⓑ-2 (4 kbyte) = 20 kbyte

MFC-4500ML, 5500ML : Ⓑ-1 (32 kbyte) = Ⓑ-1 (16 kbyte) + Ⓑ-2 (16 kbyte)
= 32 kbyte

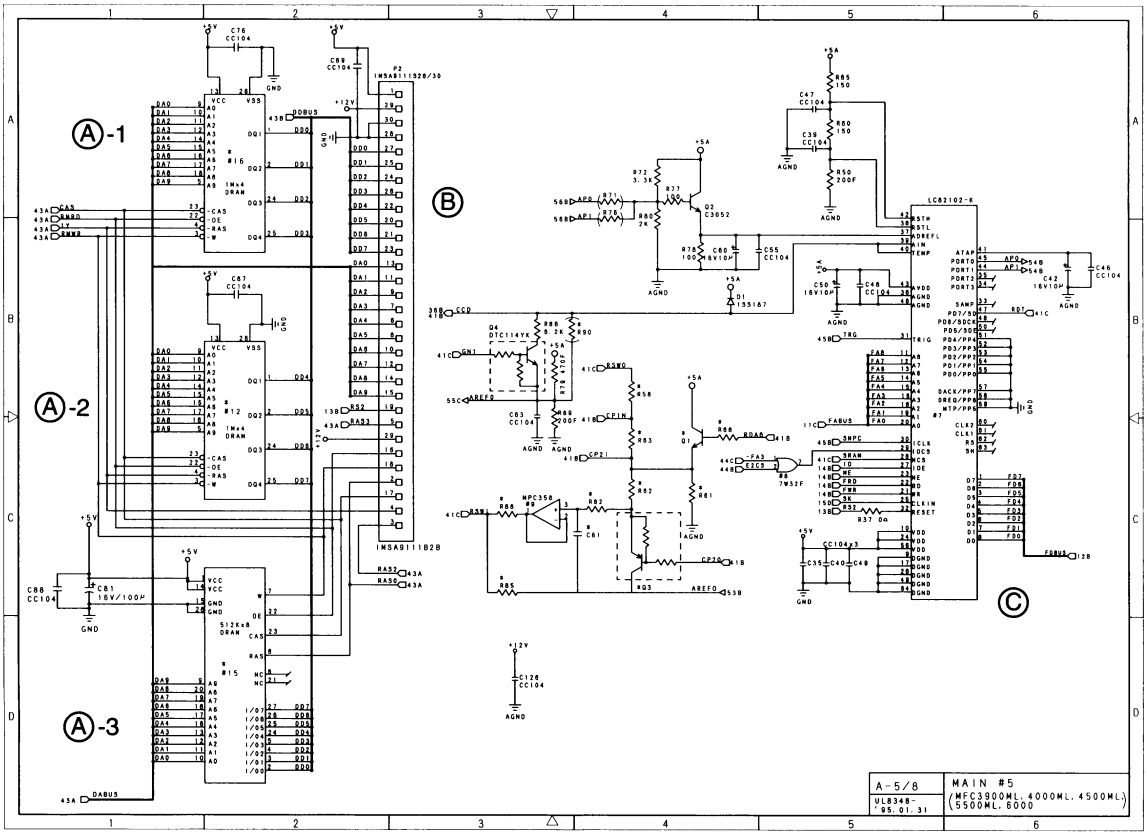
Ⓒ Gate Array

Executes digital data processing, including the following:

Control of the laser scanner motor

Control of I/O signals from the document sensors

Control of the analogue switch used to switch the I/O signals to and from the line

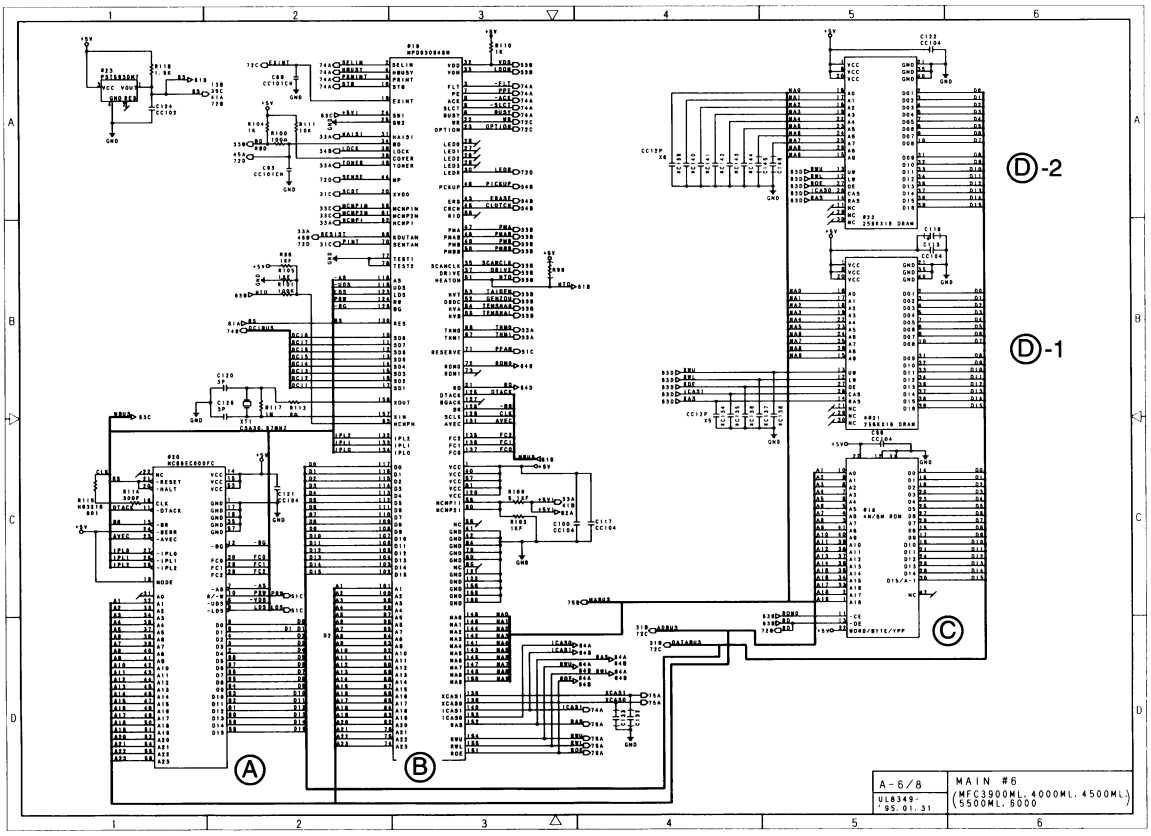


Main PCB Circuit Diagram 5/7

Ⓐ DRAMs for fax function
MFC-3900ML, 4000ML : Ⓐ-1 + Ⓐ-2 (256 kbyte) + Ⓐ-3 (512 kbyte) = 0.75 Mbyte
MFC-4500ML : Ⓐ-1 + Ⓐ-2 = 1 Mbyte
MFC-5500ML : Ⓐ-1 + Ⓐ-2 (1 Mbyte) + Ⓐ-3 (512 kbyte) = 1.5 Mbyte

Ⓑ Connector for optional memory for the fax function
Two types of expansion DRAM are available: 512 kbyte and 1 Mbyte.

Ⓒ IC for scanning data control



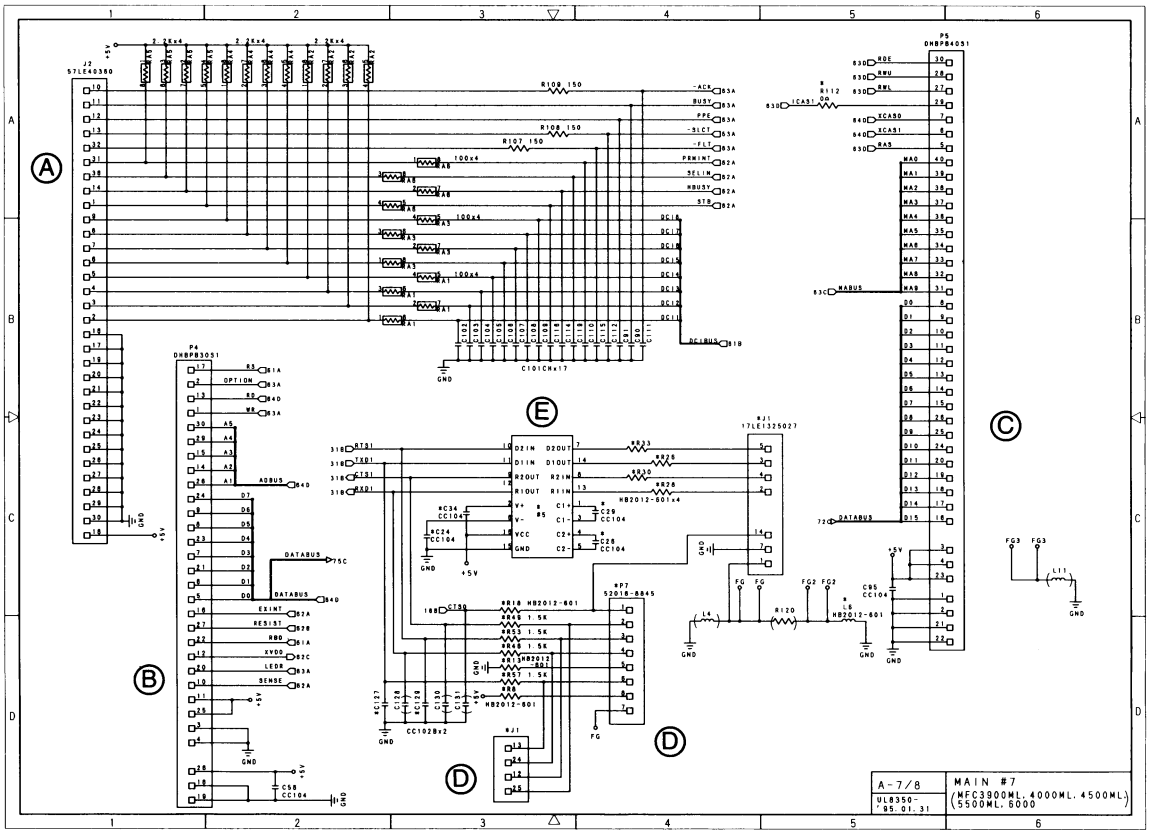
Main PCB Circuit Diagram 6/7

Ⓐ CPU (for printer function)

Ⓑ Gate Array (for printer function)
Used for printer functional control, including the following:
Laser printer engine drive
Centronics control between the printer and PC

Ⓒ ROM (for printer function)
4 Mbit

Ⓓ DRAMs (for printer function)
MFC-3900ML, 4000ML, 4500ML : Ⓓ -1 = 512 kbyte
MFC-5500ML : Ⓓ -1 + Ⓓ -2 = 1 Mbyte



Main PCB Circuit Diagram 7/7

Ⓐ Connector for connecting the centronics cable for the PC

Ⓑ Connector for connecting the optional serial RS422A interface PCB for Macintosh

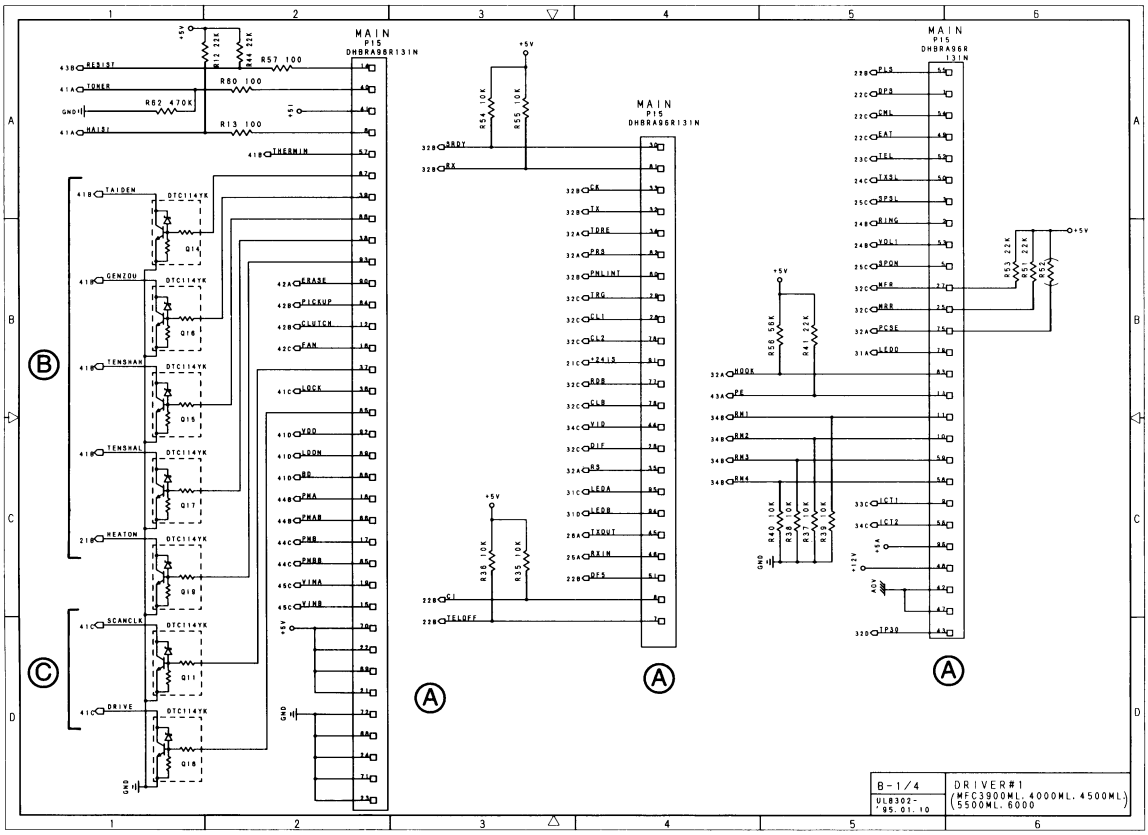
Ⓒ Connector for connecting the optional memory for the printer function
Two types of expansion RAM are available: 1 Mbyte and 1.5 Mbyte.

Ⓓ Connector for connecting the RS232C cable for the PCI

Ⓔ IC for RS232C
Converts 0V ↔ 5V signals to -10V ↔ +10V signals.

3.3 Driver PCB

Incorporates the drivers that drive the scanning motor and main motor. Also has connectors for connection to the main PCB, NCU, power supply, laser scanner unit for printing, main motor, etc., and relays signals between the main PCB and each of these parts.

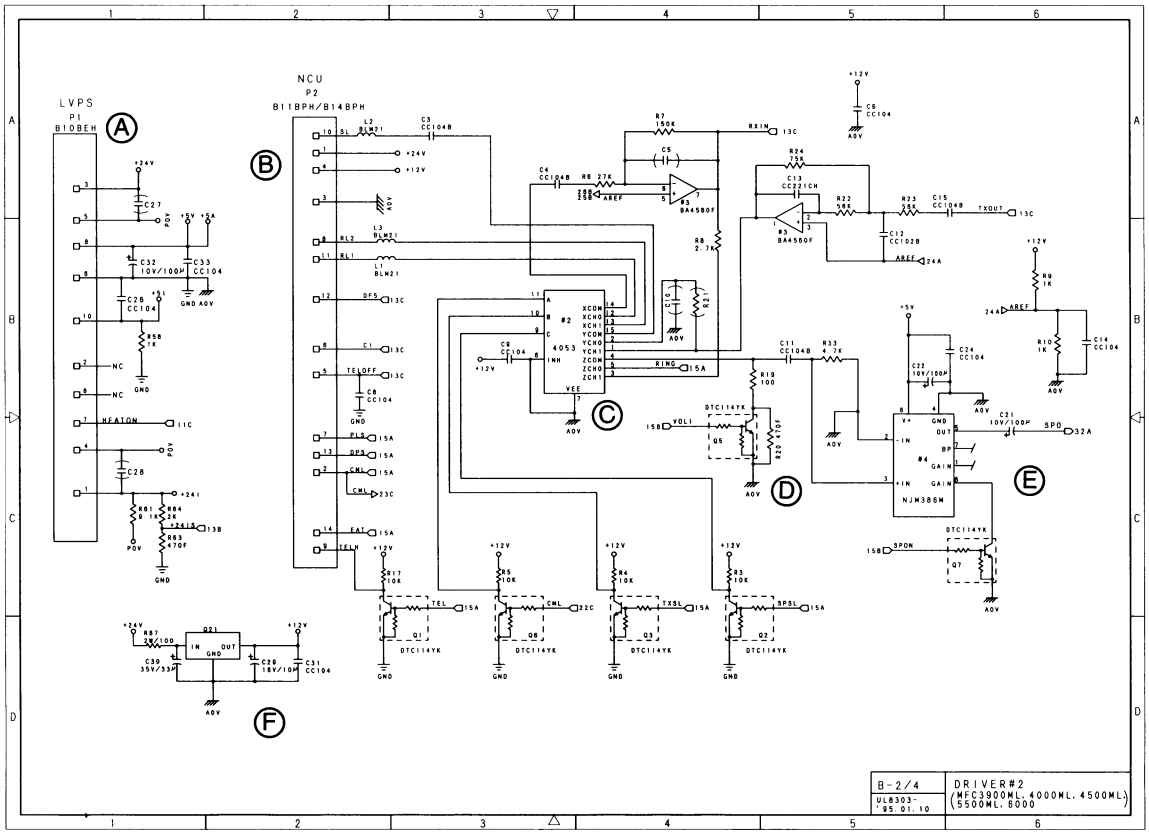


Driver PCB Circuit Diagram 1/4

Ⓐ Connector for main PCB

Ⓑ Main motor driver

Ⓒ Laser scanner driver



Drive PCB Circuit Diagram 2/4

Ⓐ Connector for low voltage power supply

Ⓑ NCU interface & connector

Ⓒ Signal selector

Ⓒ -1: Selects the receive signals input from the communications network through the NCU and feeds them to the MODEM on main PCB.

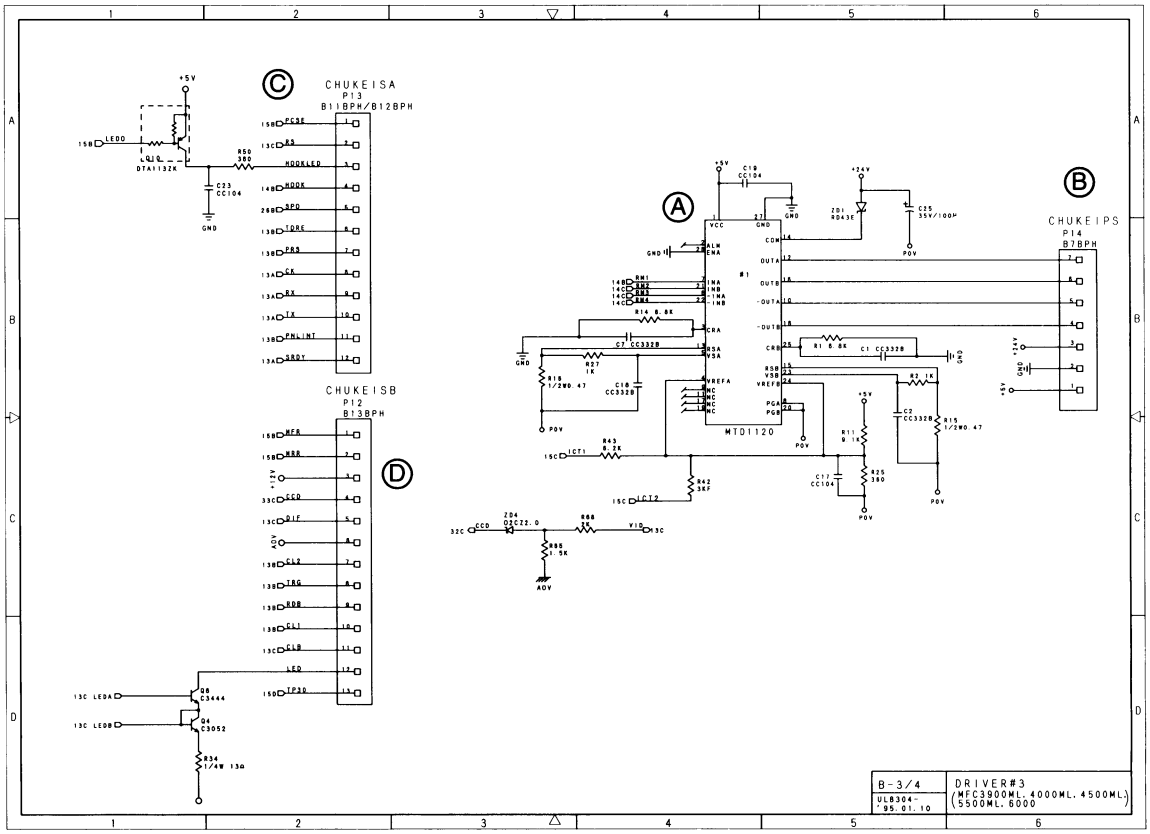
Ⓒ -2: Selects either the receive signals selected by Ⓒ -1 or the sound signals (e.g. alarm beeps, key clinks, and ringer sounds) generated by the CPU, then feeds them to the speaker.

Ⓓ Volume selector switch

Used to adjust the speaker volume.

Ⓔ Speaker amplifier circuit and speaker connector

Ⓕ 12V regulator circuit



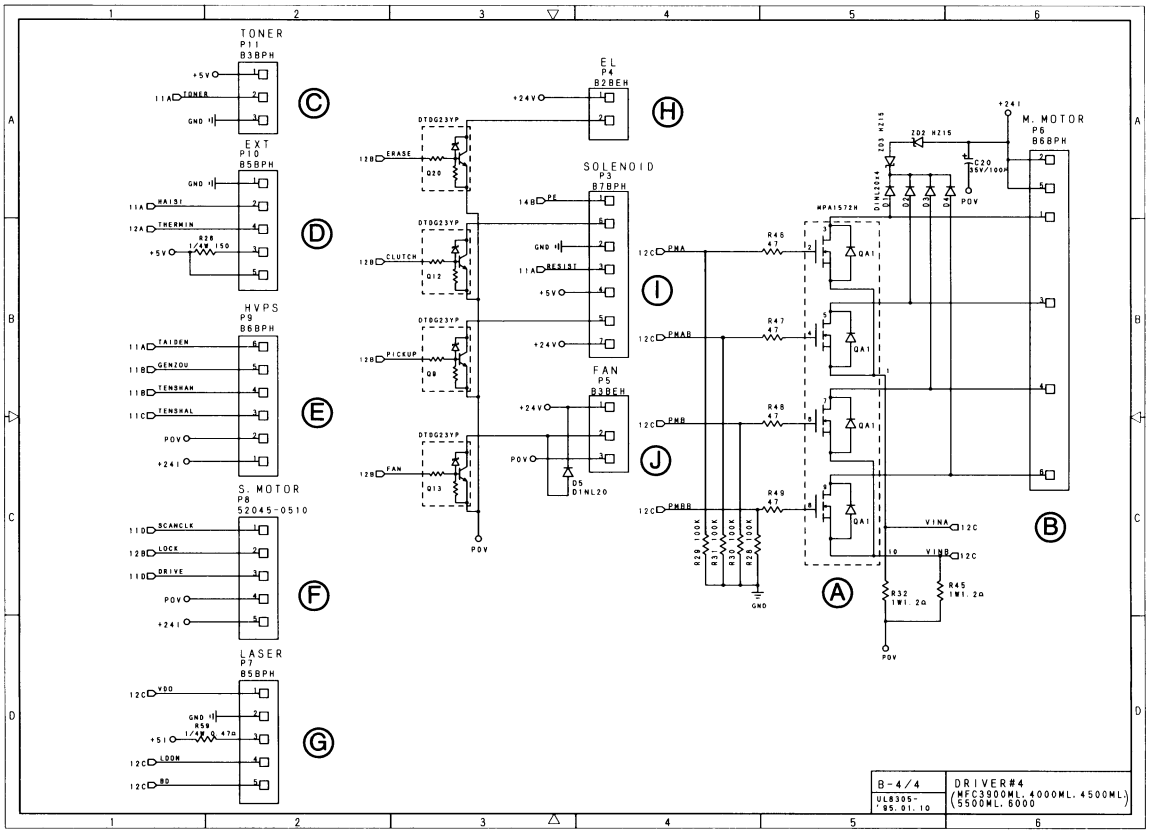
Driver PCB Circuit Diagram 3/4

Ⓐ Scanning motor driver

Ⓑ Connector for relay PCB (PS)

Ⓒ Connector for relay PCB (SA)

Ⓓ Connector for relay PCB (SB)



Driver PCB Circuit Diagram 4/4

Ⓐ Main motor driver

Ⓑ Connector for main motor driver

Ⓒ Connector for toner sensor PCB

Ⓓ Connector for exit sensor PCB

Ⓔ Connector for high voltage power supply

Ⓕ Connector for laser scanner motor

Ⓖ Connector for laser scanner unit

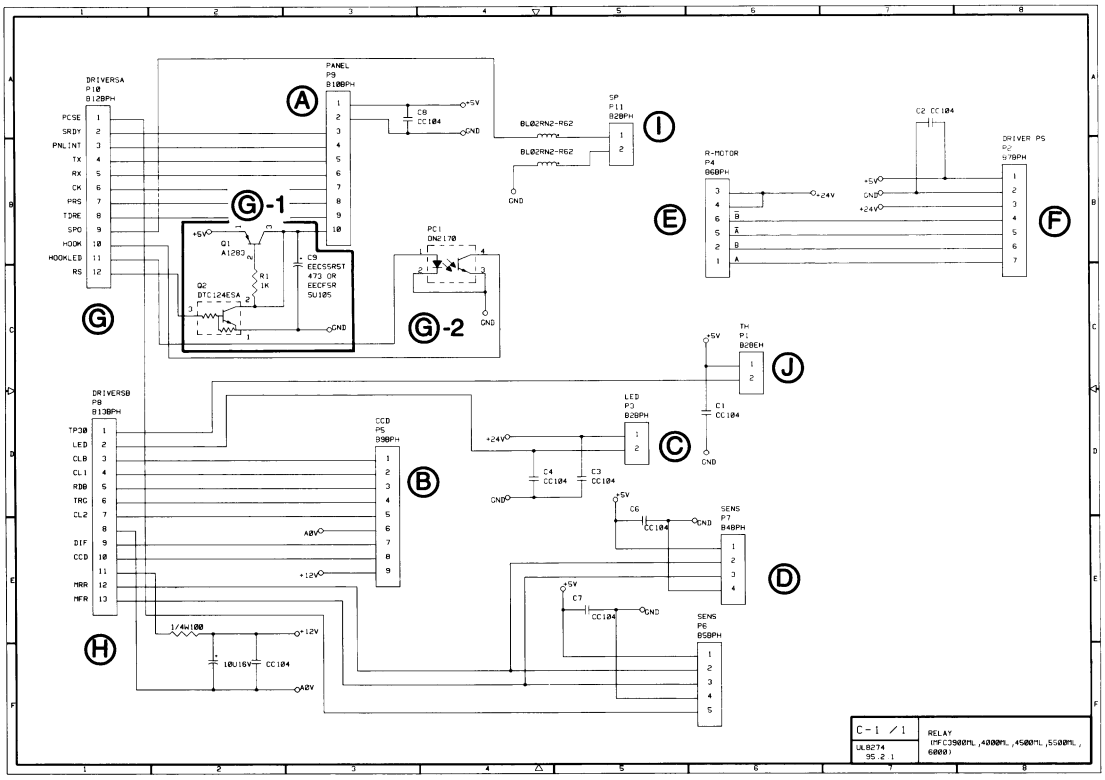
Ⓗ Connector for eraser lamp

Ⓘ Connector for solenoid

Ⓙ Connector for fan motor

3.4 Relay PCB

All the scanning-related harness and harness from the operation panel are connected to this PCB since it relays the signals related to scanning and those from the operation panel to the driver PCB.



Relay PCB Circuit Diagram

Ⓐ Connector for panel harness

Ⓑ Connector for CCD harness

Ⓒ Connector for LED Array for illuminating the document

Ⓓ Connector for document sensors (front and rear sensors)

Ⓔ Connector for laser scanner motor

Ⓕ Connector for driver PCB (PS)
For motor drive power supply and for motor control.

Ⓖ Connector for driver PCB (SA)
Connector for the interface that transmits signals to and from the panel PCB.
Ⓖ-A: Panel backup circuit
Ⓖ-B: Sensor that detects the status of the HOOK SWITCH (photocoupler)

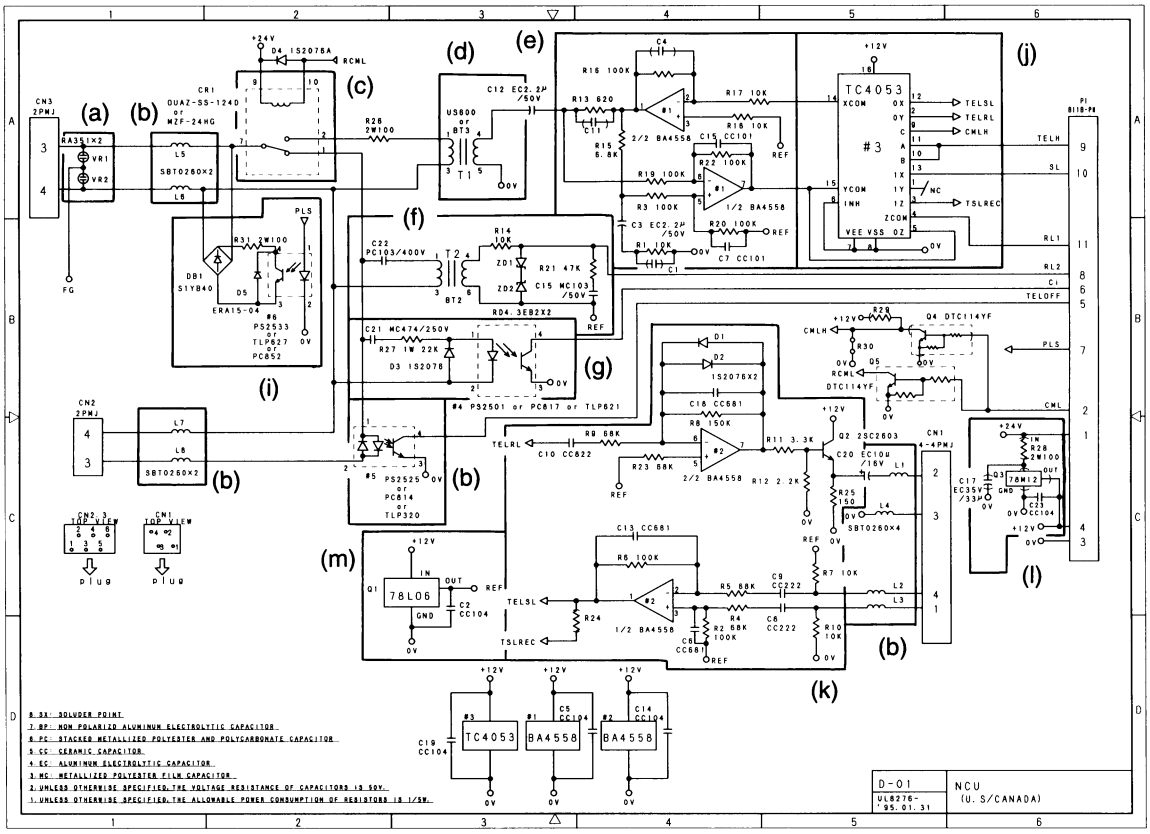
Ⓗ Connector for driver PCB (SB)
Connector for the interface that transmits signals to and from the CCD.

Ⓘ Connector for the speaker

Ⓙ Connector for thermistor 1
Connector for the thermistor that detects the temperature inside the equipment.

3.5 NCU PCB

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



NCU PCB Circuit Diagram

The circuit shown above consists of the following elements:

(a) Surge absorber
(b) Noise filter
(c) Line relay (CML relay)
(d) Line transformer
(e) Circuit related to line transformer
(f) High-impedance transformer circuit
(g) Calling signal detector
(h) Loop current detector
(i) Dial pulse generator
(j) MODEM-telephone switching circuit
(k) Telephone circuit
(l) 12V regulator
(m) 6V regulator

- The primary function of the NCU, which is shared by facsimile and telephone units, is to switch the line to the facsimile unit or to the telephone; switching is carried out by the line relay.
- Since the direct connection of a facsimile equipment to the line is not allowed in order to protect the line, it is essential to insert a line transformer between the line and the facsimile equipment to insulate them from each other in a direct current band.

The above two components, a line relay and a line transformer, are the minimum requirements for the NCU of the facsimile equipment.

- If an external telephone is connected to the facsimile equipment, the NCU should have a loop current detector to identify the on-hook/off-hook state by detecting the loop current.
- If the facsimile equipment has an automatic answering facility, the NCU should be equipped with a calling signal detector which detects calling signals and notifies the CPU.
- The circuit related to a line transformer allows the line transformer to be invariant by selecting the constants of the parts in this circuit so as to conform to the communications regulations or codes of each country.

In addition to the above basic components of the NCU, the following components may also be required depending on the additional functions of the facsimile equipment:

- The dial pulse generator generates dial pulses within the facsimile equipment.
- The surge absorber is a protection circuit which absorbs lightning surges.
- The noise filter eliminates noise, including radiation noise, which would otherwise enter the communications line.
- The high-impedance transformer circuit detects the remote activation, and F/T switching sent from the line in the on-hook state without any interference on the line.
- The MODEM-telephone switching circuit changes the connection of the line transformer to the telephone circuit or to the MODEM. Note that the MODEM always monitors the signals on the line even if the telephone is selected.
- The telephone circuit includes two amplifiers; one for amplifying the output signals of the handset microphone and the other for amplifying the receive signals from the communications lines to generate the handset receiver sound.

3.6 Control Panel PCB

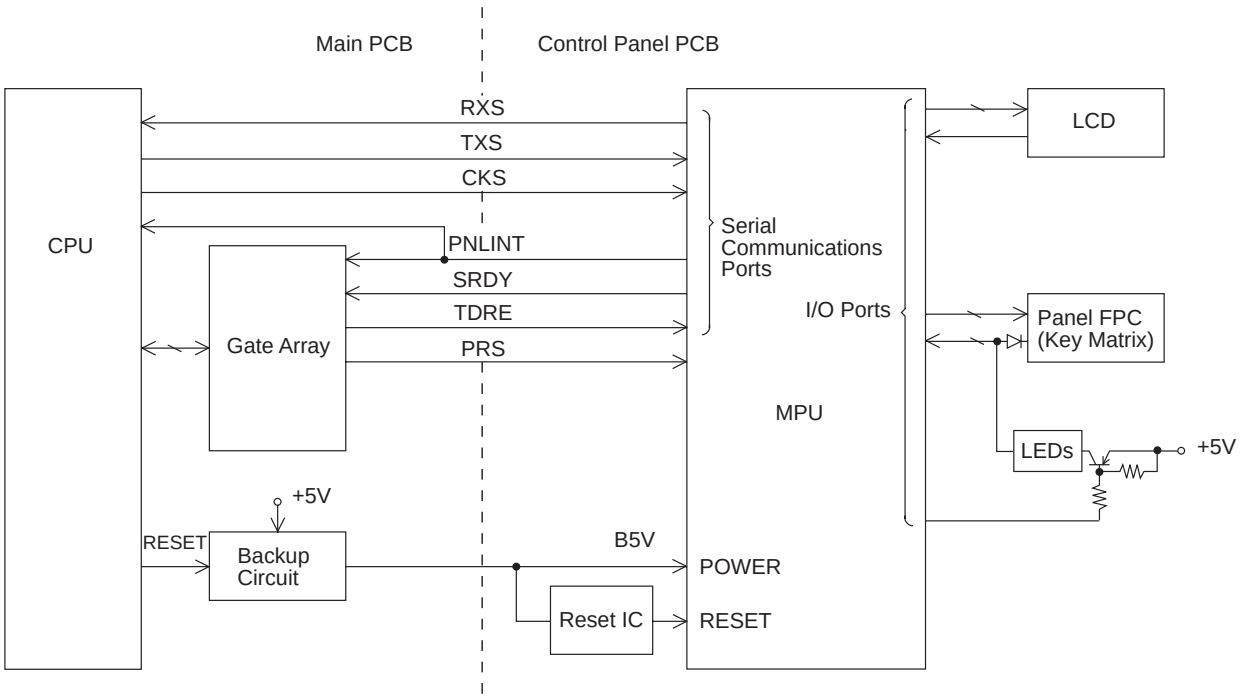
The control panel PCB and the main PCB communicate with each other by serially transmitting commands and data.

The control panel unit consists of a 4-bit panel MPU, an LCD, and LEDs, which are controlled by the MPU according to commands issued from the CPU on the main PCB.

The features include an MPU-integrated clock whose output is directly displayed on the LCD. To assure the clock function even in the event of a power failure, a power source (B5V) backed up by the backup circuit on the relay PCB is fed to the panel unit in addition to the normal +5V power source.

The clock function is assured up to 3V of power level (-2V margin). If B5V falls to less than 3V, the reset IC operates and hardware-resets the MPU.

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

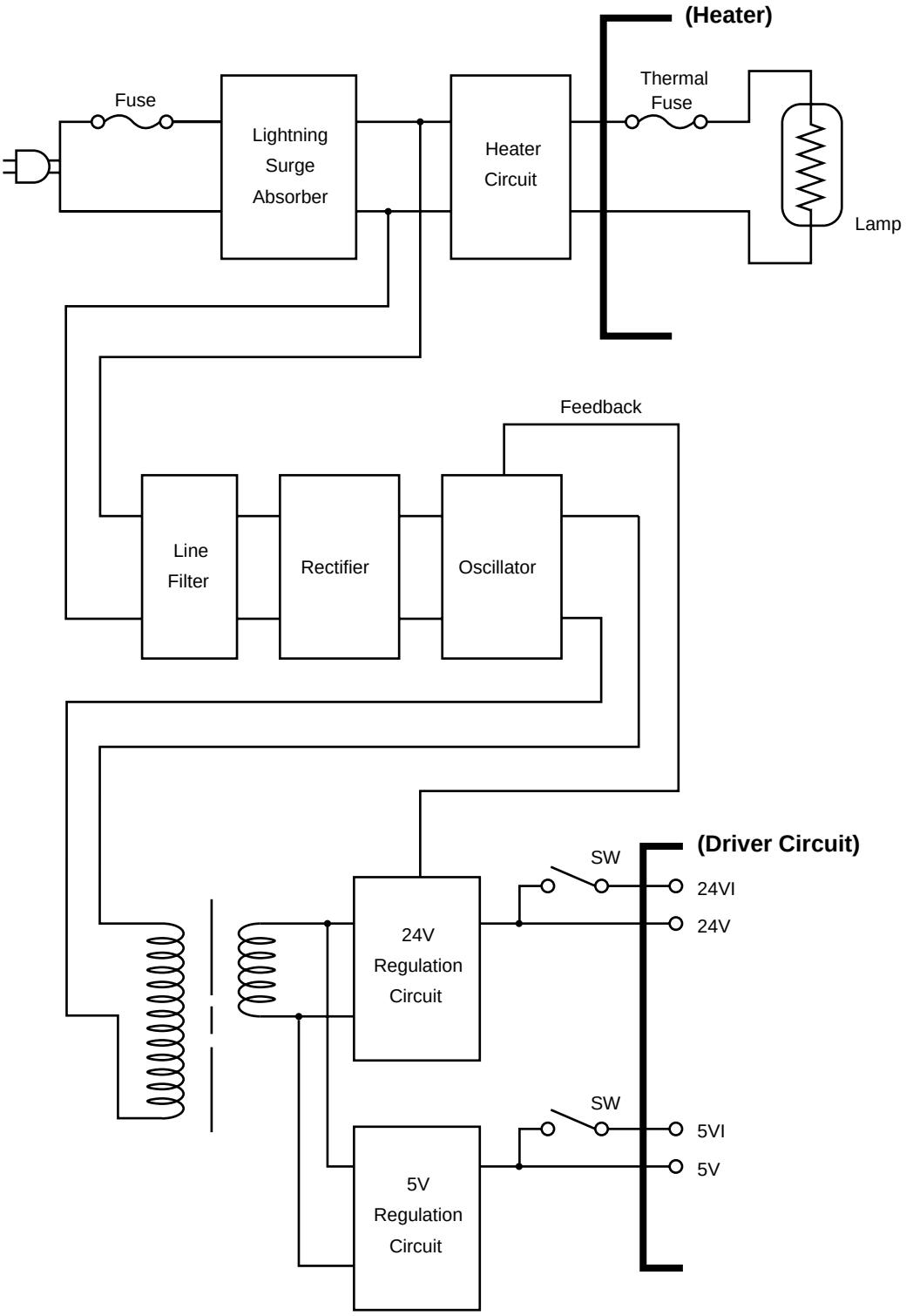


Control Panel PCB and Related Circuit

3.7 Power Supply PCB

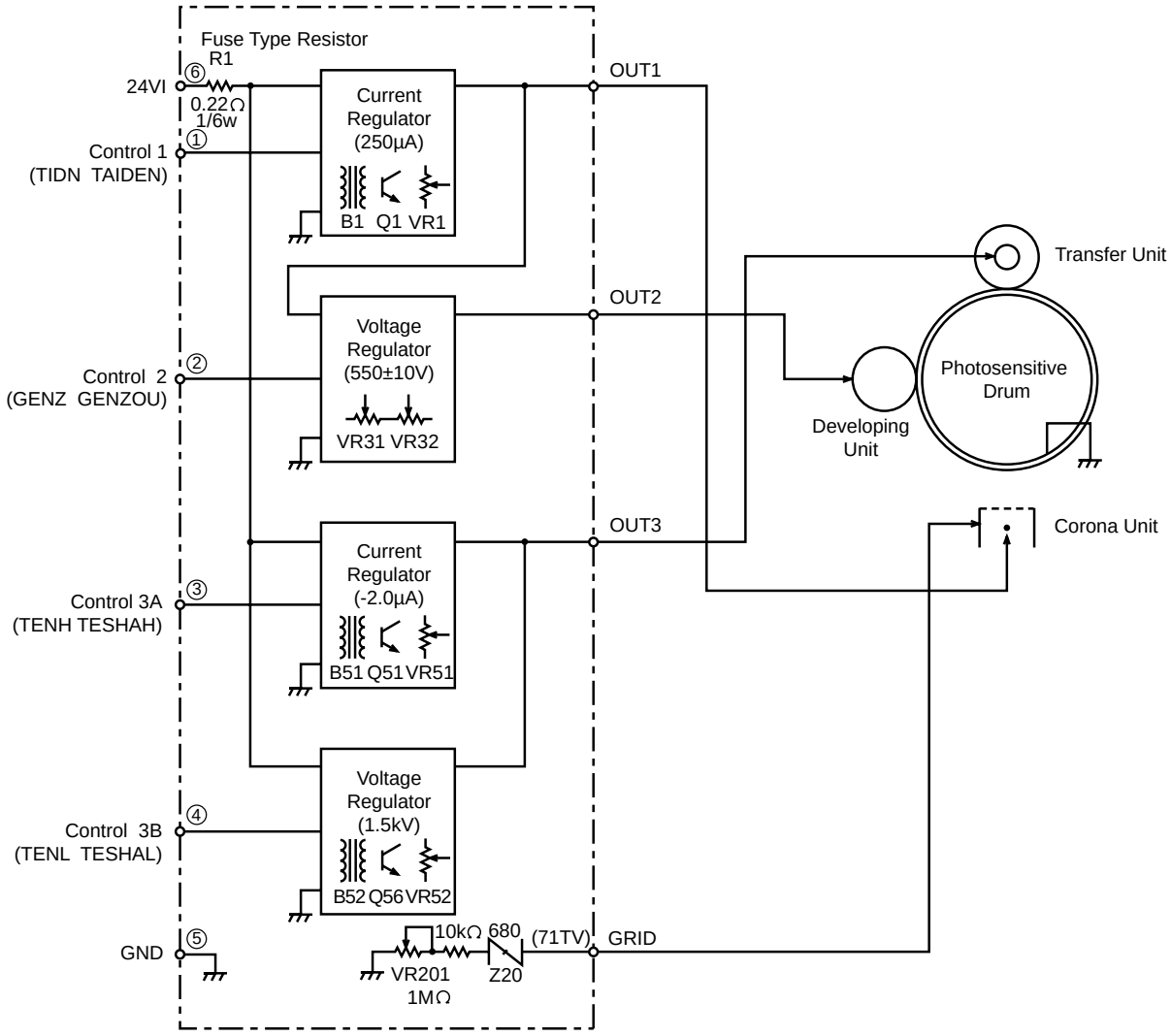
■ Low Voltage Power Supply

The power supply uses the switching regulation system to generate the regulated DC power supplies (+5V and +24V), which are converted from the AC line.



■ High Voltage Power Supply

Generates and outputs the voltages and currents for the charging, development and transfer involved in recording.



4. SIGNAL FUNCTIONS AND FACSIMILE CONTROL PROCEDURE

4.1 Control Signal Functions

Two types of signalling are available for message exchange associated with facsimile transactions: binary coded signalling and tonal signalling.

(1) Binary coded signals

The table below lists the functions of binary coded signals used for controlling the facsimile operations.

Functions of Binary Coded Signals (1)-1

Signal Name	Symbol	Function
Digital Identification Signal	DIS	Characterizes the standard CCITT capabilities of the called apparatus.
Called Subscriber Identification	CSI	This optional signal may be used to provide the specific identify of the called subscriber.
Non-Standard Facilities	NSF	This optional signal may be used to identify specific user requirements.
Digital Transmit Command	DTC	The digital command response to the standard capabilities identified by the DIS signal.
Calling Subscriber Identification	CIG	This optional signal indicates that the following FIF information is an identification of that calling station. (TTI)
Non-Standard Facilitiies Command	NSC	This signal is the digital command response to the information contained in the NSF signal.
Digital Command Signal	DCS	The digital set-up command responding to the standard capabilities identified by the DIS signal.
Non-Standard Facilities Set-up	NSS	This signal is the digital command response to the information contained in the NSC or NSF signal.
Transmitting Subscriber Identification	TSI	This optional signal indicates that the following FIF information is an identification of the transmitting station.
Procedure Interrupt Positive	PIP	This signal indicates that a message has been received. If further documents are to follow, the facsimile procedure shall begin at the beginning of phase B. If no succeeding document exsists, the operation ends normally.
Procedure Interrupt Negative	PIN	This signal indicates that the previous massage has not been satisfactorily received. If further documents are to follow, the facsimile procedure shall begin at the beginning of phase B. If no succeeding document exists, the operation ends normally.
Training Check	TCF	This digital command is sent to verify training and to give a first indication of the acceptability of the channel for this data rate. Format; A series of 0s for 1.5 seconds.
Confirmation to Receive	CFR	A digital response confirming that the message transmission may commence.

(Continued)

Functions of Binary Coded Signals (1)-2

Signal Name	Symbol	Function
Failure to Train	FTT	A digital response rejecting the training signal and requesting a retraining.
End - of - Message	EOM	This signal indicates the end of a page of facsimile information and returns to the beginning of phase B.
Multipage Signal	MPS	This signal indicates the end of a page of facsimile information and further documents to follow, and returns to the beginning of phase C upon receipt of a confirmation.
Procedure Interrupt - - End of Message	PRI - EOM	This signal indicates the same as an EOM command with the additional optional capability of requesting operator intervention.
Procedure Interrupt - - Multipage Signal	PRI - MPS	This signal indicates the same as an MPS command with the additional optional capability of requesting operator intervention.
Procedure Interrupt - - End of Procedures	PRI - EOP	This signal indicates the same as an EOP command with the additional optional capability of requesting operator intervention. This equipment processes the received PRI - EOP command as an EOP command.
End - of - Procedure	EOP	This signal indicates the end of a page of facsimile information and further indicates that no further documents are forthcoming, and proceeds to phase E, upon receipt of a confirmation.
Massage Confirmation	MCF	This signal indicates that a complete message has been received and that additional messages may follow, (This is a positive response to EOM, MPS, or EOP.)
Retrain Positive	RTP	This signal indicates that a complete message has been received and that additional massages may follow after retransmission of training and/or phasing and CFR.
Retrain Negative	RTN	This signal indicates that the previous message has not been satisfactorily received. However, further receptions may be possible, provided training and/or phasing are retransmitted.
Command Repeat	CRP	This command indicates that the provious command was received in error and should be repeated in its entirety.
Disconnect	DCN	This command indicates the initiation of phase E. This command requires no response.

Functions of Binary Coded Signals for ECM (2)-1

Signal Name	Symbol	Function
Partial Page Signal	PPS	This signal indicates the end of a partial page or a complete page of facsimile information and also indicates to return to the beginning of phase B or C upon receipt of MCF.
End of Retransmission	EOR	This signal indicates that the transmitter decides to terminate the retransmission of error frames in the previous partial page.
Receive Ready	RR	This signal is used to ask for the status of the receiver.

(Continued)

Functions of Binary Coded Signals for ECM (2)-2

Partial Page Request	PPR	This signal indicates that the previous message has not been satisfactorily received and that the frames specified in the associated facsimile information field (FIF) are required to be retransmitted.
Response for End of Retransmission	ERR	This signal is the digital response to EOR signal.
Receive Not Ready	RNR	This signal is used to indicate that the receiver is not ready to receive more data.
Continue to Correct	CTC	This signal is indicates that the transmitting station shall continue to correct the previous message. When the transmitter receives PPR four times, the modem speed may fall back or continue the provious transmission speed using CTC command.
Response for Continue to Correct	CTR	This signal is the digital response to CTC signal.

Functions of Tonal Signals

Signal Name	Symbol	Function
Called Station Identification	CED	This signal indicates that a called station is a non - speech terminal. Frequency: 2100 $\pm$ 15 Hz Transmission time; 2.6-4.0 seconds.
Calling Tone	CNG	This signal indicates that a calling station is a non - speech terminal. Frequency: 1100 $\pm$ 38 Hz ON for 0.5 second, OFF for 3 seconds

4.2 Signal Formats

The control signals used in the Group 3 mode have the frame compositions based on a high level data link control (HDLC) format. Each frame is subdivided into a number of fields.

The tables below show the frame compositions of the control signals and the field description, respectively.

Frame Composition of Control Signals

Frame Type	Frame Composition
Frame with information field	F | F | A | C | FCF | FIF | FCS | F
Frame without information field	F | F | A | C | FCF | FCS | F

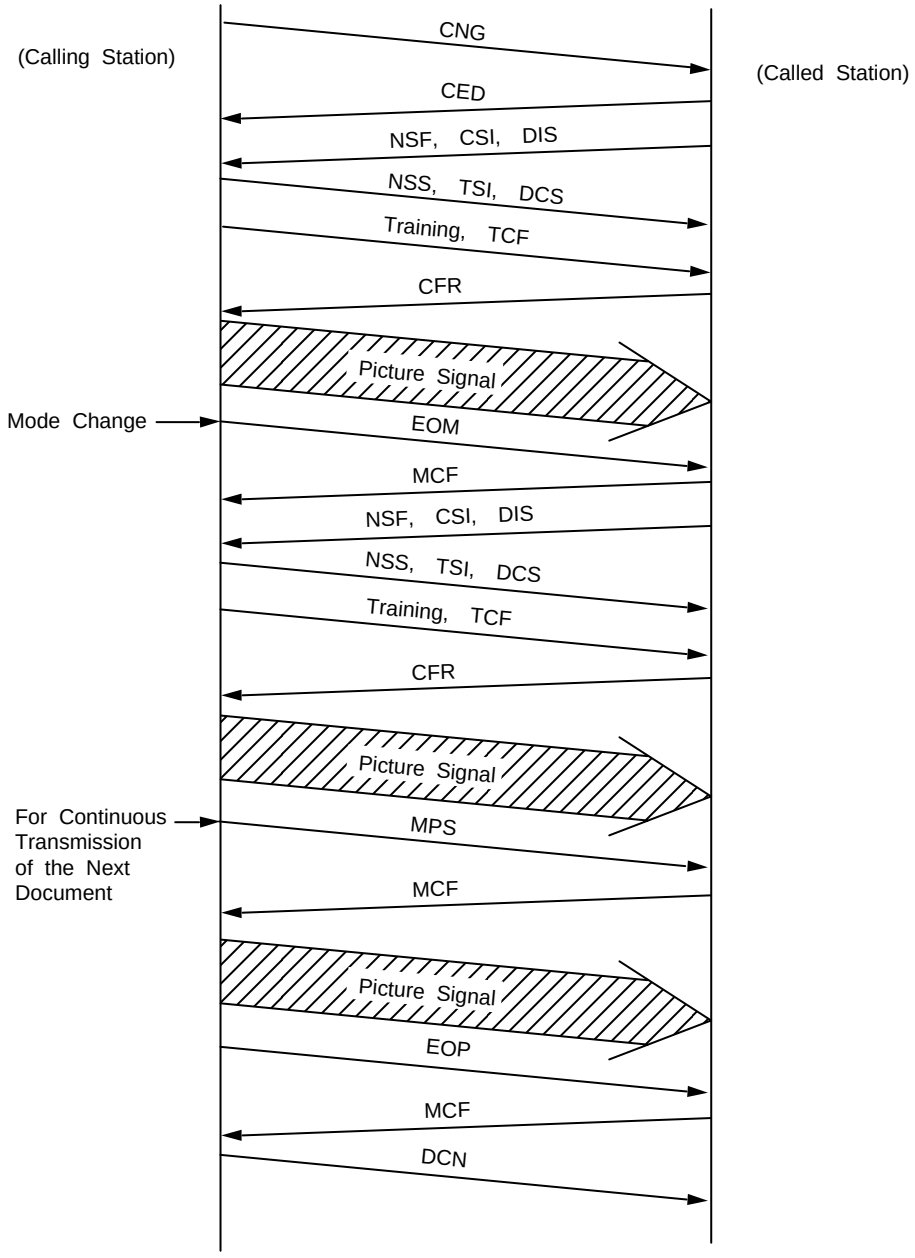
Fields of Frame

Field	Abbrev.	Bit Assignment	Function
Flag sequence	F	01111110	Denotes the beginning and end of the frame. This is used to establish bit and frame synchronization.
Address field	A	11111111	Transmits address information.
Control field	C	11000000	Indicates that it is a non-final frame.
		11001000	Indicates that it is a final frame.
Information field	FCF		Facsimile control field. Identifies the function of the control signal.
	FIF		Facsimile information field. Sends the function and other information of the equipment.
Frame checking sequences	FCS	Preset; 11111111 11111111	Detects the error of data transmitted from address field (A) to facsimile information field (FIF). Generator polynomial: $x^{16}+x^{12}+x^5+1$

4.3 Facsimile Control Procedure

The figure below shows a typical facsimile control procedure between two facsimile equipment in the Group 3 mode.

Facsimile Control Procedure in Group 3 Mode



CHAPTER IV.
DISASSEMBLY AND REASSEMBLY

CONTENTS

1. DISASSEMBLY AND REASSEMBLY

■ Safety Precautions

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

(1) Always turn off the power before replacing parts or units. When carrying out work involving 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) Do not remove gears from the LF roller assy, ejection roller assy, or platen if at all possible. Once removed, they will become unusable and new gears will have to be put back in.

(4) Be sure to apply grease to the teeth of gears and the contact sections between the shafts and main cover.

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

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

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

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

(9) Unless otherwise specified, tighten screws to the torque values listed below.

(10) 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.

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

SCREW NAME	Q'TY	USE FOR	TORQUE (kgf · cm)
TAPTITE, BIND B M3×6	3	ELECTRODE	9.0 ± 1
TAPTITE, CUP B M3×8	2	FAN GUARD	8.0 ± 1
SCREW, PAN (WASHER) M3×6DB	1	MAIN MOTOR	7.0 ± 2
TAPTITE, CUP B M3×8	2	MAIN MOTOR BLACKET	8.0 ± 1
TAPTITE, CUP B M3×6	4	GEAR SHAFT PLATE	8.0 ± 1
SCREW, PAN (WASHER) M3×6DB	1	MAIN MOTOR UNIT	7.0 ± 1
TAPTITE, CUP S M3×6	1	BLACKET WITH GEAR SHAFT PLATE	8.0 ± 1
TAPTITE, CUP B M3×8	1	PAPER EJECTION SENSOR	8.0 ± 1
TAPTITE, CUP B M3×8	1	TONER EMPTY SENSOR	8.0 ± 1
TAPTITE, CUP S M3×6	3	PCB SUPPORT ASSY	8.0 ± 1

SCREW NAME	Q'TY	USE FOR	TORQUE (kgf · cm)
TAPTITE, CUP B M4×10	1	PCB SUPPORT, N3	10.0 ± 1
TAPTITE, CUP B M4×10	1	PCB SUPPORT, N2	10.0 ± 1
TAPTITE, CUP S M3×6	1	GROUND PLATE FOR DRAM-FR	4.5 ± 1
TAPTITE, CUP B M3×8	1	PE SENSOR	8.0 ± 1
TAPTITE, CUP S M3×6	1	GROUND PLATE FOR LOWER PLATE	8.0 ± 1
TAPTITE, CUP S M3×6	5	LOWER PLATE	8.0 ± 1
TAPTITE, BIND B M4×10	7	LOWER PLATE	10.0 ± 1
TAPTITE, CUP B M4×10	2	I/F SHIELD PLATE	10.0 ± 1
TAPTITE, CUP B M3×8	1	PCB SUPPORT, D	8.0 ± 1
SCREW, PAN (WASHER) M3×8DB	1	SCANNING MOTOR	7.0 ± 1
TAPTITE, CUP S M3×6	1	DOCUMENT SENSOR PCB ASSY	7.0 ± 2
TAPTITE, CUP B M3×8	2	DOCUMENT SENSOR PCB ASSY	8.0 ± 2
TAPTITE, CUP B M3×10	2	SCANNING FRAME	5.0 ± 1
TAPTITE, CUP B M3×10	2	PANEL OPEN SPRING	5.0 ± 1
TAPTITE, CUP B M3×10	2	ADF COVER	8.0 ± 1
TAPTITE, BIND B M4×10	4	SCANNER UNIT	10.0 ± 1
TAPTITE, BIND B M4×10	1	GROUND PLATE FOR UPPER SHOOT	10.0 ± 1
TAPTITE, BIND B M4×10	2	LOCK LEVER HOLDER	10.0 ± 1
TAPTITE, CUP S M3×6	1	UPPER SHOOT	8.0 ± 1
TAPTITE, CUP B M3×12	1	THERMISTOR	8.0 ± 1
SCREW, PAN (WASHER) M3×6DB	1	THERMISTOR	4.5 ± 1
TAPTITE, CUP B M4×12	2	FIXING UNIT	10.0 ± 1
TAPTITE, CUP B M4×12	4	MAIN COVER	10.0 ± 1
TAPTITE, CUP B M3×6	1	DOCUMENT GUIDE	3.5 ± 1

SCREW NAME	Q'TY	USE FOR	TORQUE (kgf · cm)
TAPTITE, CUP B M3×10	1	COVER STOPPER	5.0 ± 1
TAPTITE, CUP B M3×10	1	LOWER HANDSET COVER	5.0 ± 1
TAPTITE, CUP B M3×10	2	UPPER HANDSET COVER	5.0 ± 1
TAPTITE, CUP S M3×8	2	PANEL REAR COVER	3.0 ± 1
TAPTITE, CUP S M3×6	4	PCB ANGLE	8.0 ± 1
SCREW, PAN (WASHER) M4×6	3	I/F SHIELD ASSY	8.0 ± 1
TAPTITE, CUP S M3×6	2	BLIND PLATE	8.0 ± 1
TAPTITE, CUP S M3×6	3	NCU PCB ASSY	8.0 ± 1
TAPTITE, BIND B M4×10	1	HIGH-VOLTAGE PS ASSY	10.0 ± 1
TAPTITE, BIND B M4×10	1	FILTER CLAMP	10.0 ± 1
TAPTITE, BIND B M4×10	1	AC CORD CLAMP	10.0 ± 1
SCREW, PAN (WASHER) M4×6	1	GROUNDING WIRE	6.0 ± 1
TAPTITE, BIND B M4×10	2	DRIVER PCB ASSY	10.0 ± 1
TAPTITE, CUP S M3×6	3	RELAY PCB ASSY	8.0 ± 1
TAPTITE, CUP S M3×6	4	BOARD HOLDER	8.0 ± 1
SCREW, PAN (WASHER) M3×8DA	2	RAM SPACER	7.0 ± 1

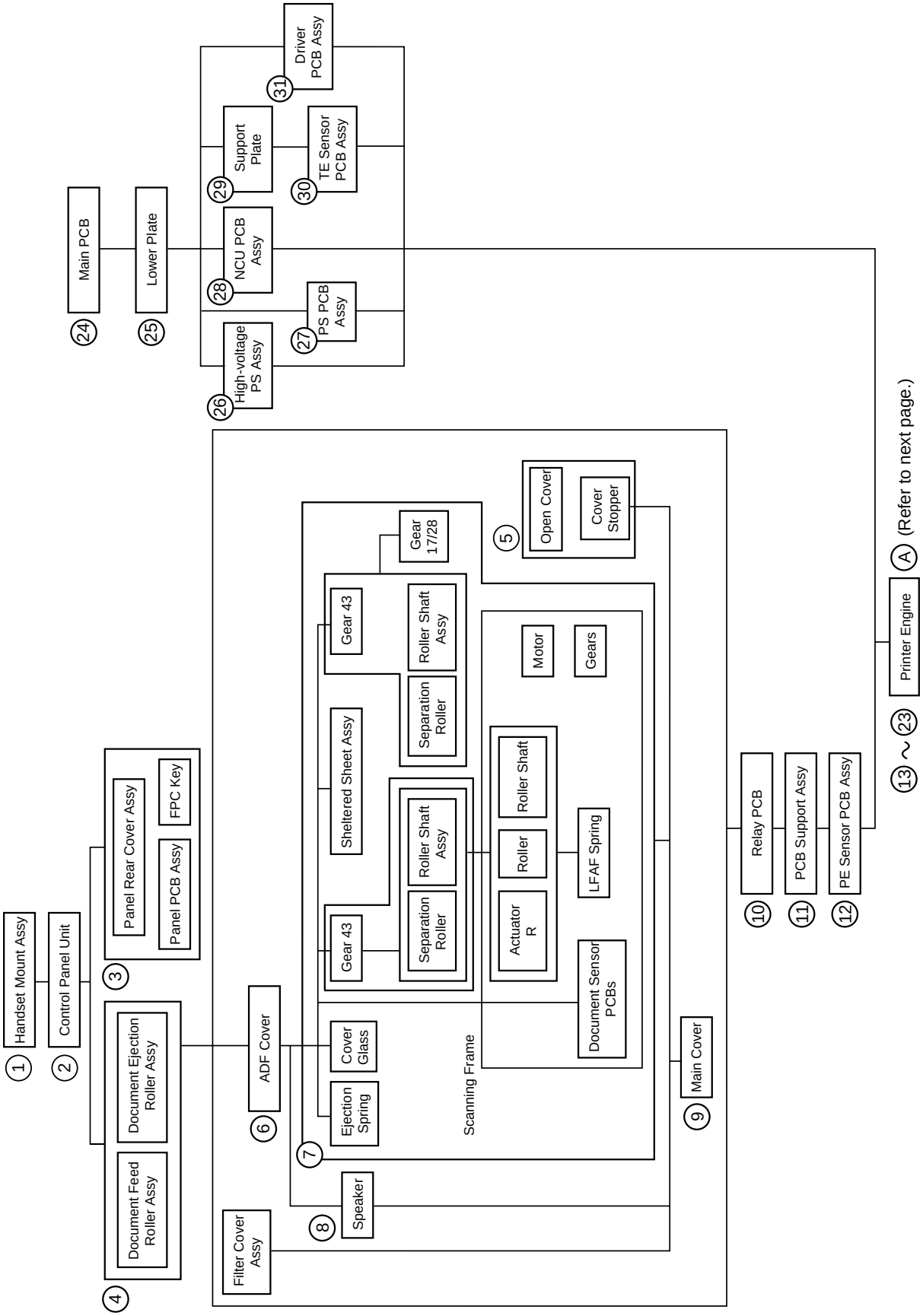
< OTHERS >

SCREW SIZE	TORQUE (kgf · cm)
M 3	8.0 ± 1
M 4	14.0 ± 1

■ Notes

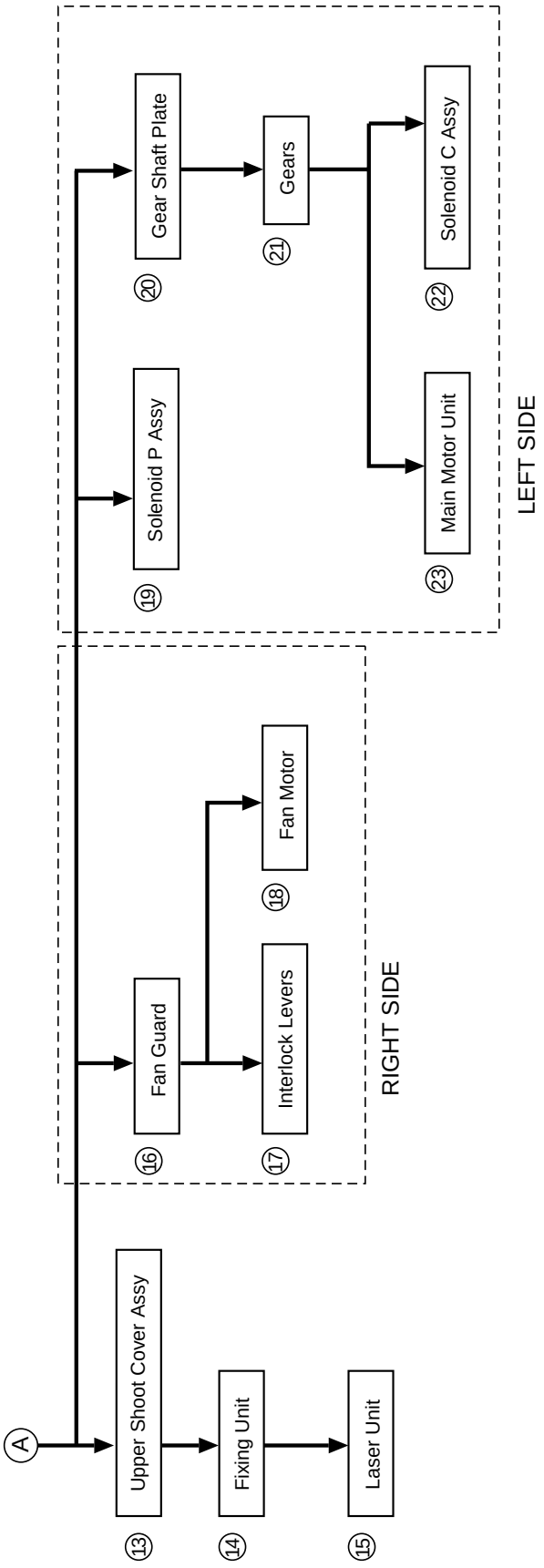
- On the next page is a disassembly order flow which will help you to access specific components. To remove the main cover, for example, first find it on the flow and determine its number (9 in this case). You should remove parts numbered 8 through 1 to access the main cover .
- Unless otherwise specified, the disassembled parts or components should be reassembled by reversing the order of removal.

■ Disassembly Order Flow 1/2



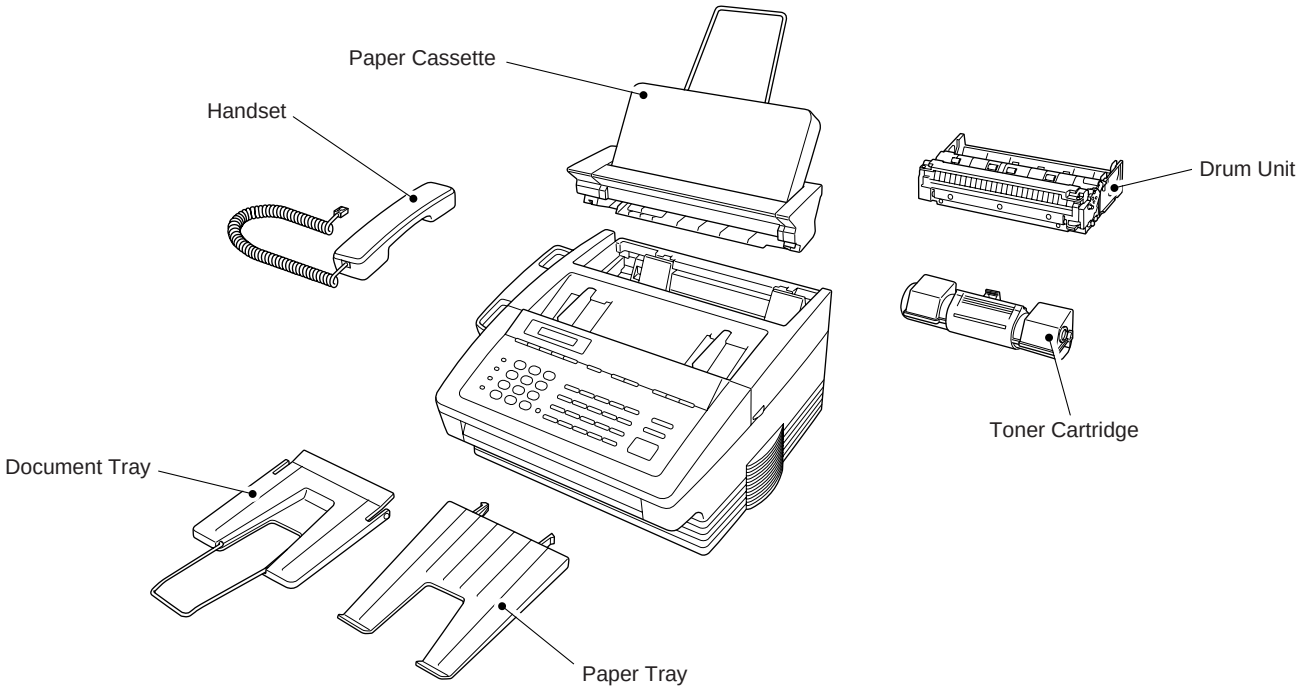
IV

■ Disassembly Order Flow 2/2



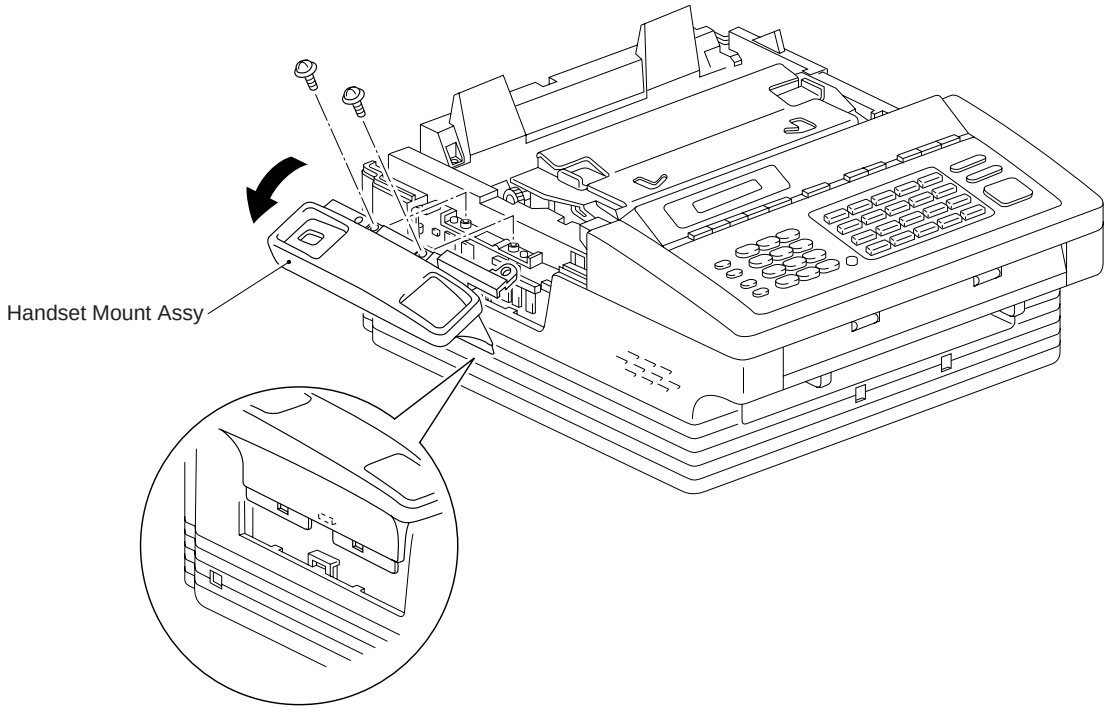
■ Preparation

- Prior to proceeding to the disassembly procedure, remove the document tray, paper tray, paper cassette, handset and process unit (drum unit and toner cartridge).



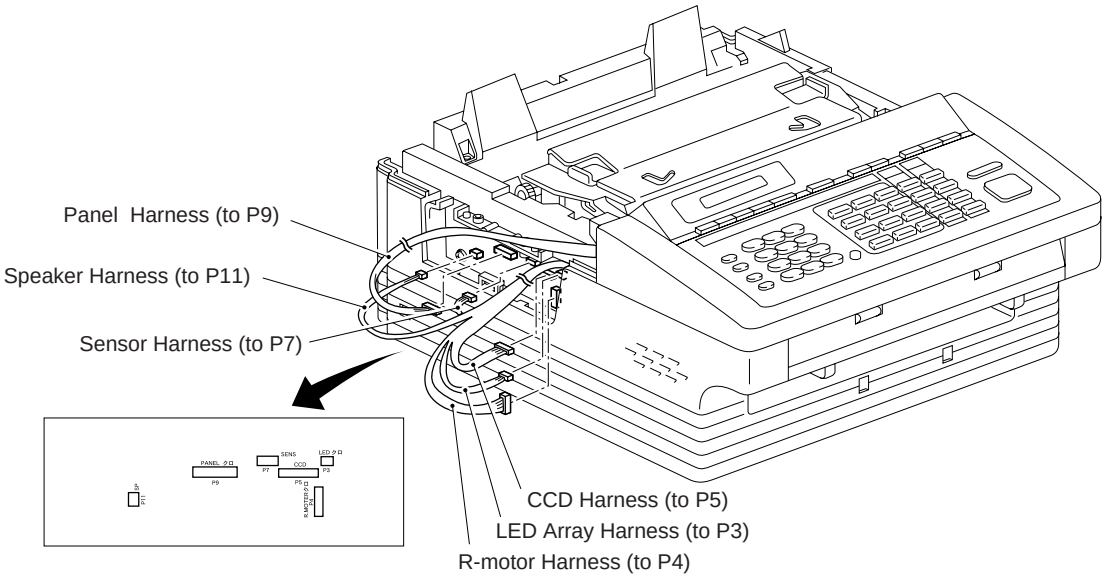
1.1 Handset Mount Assembly

(1) Remove the two screws and the handset mount assembly.



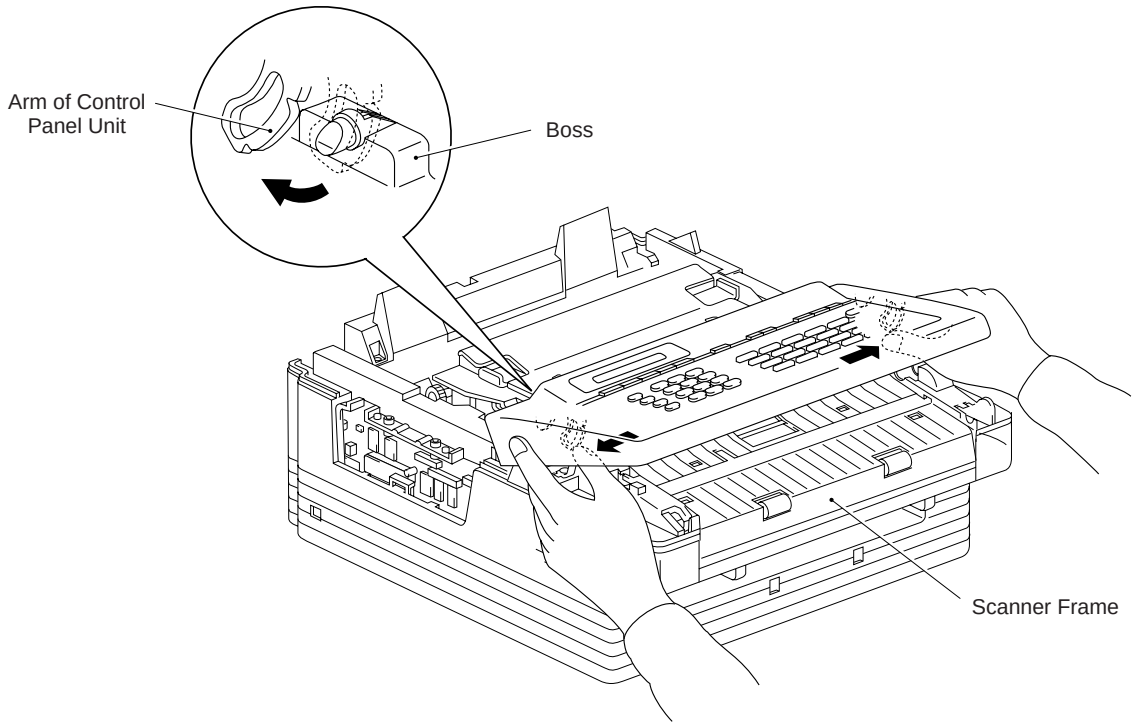
1.2 Control Panel Unit

(1) Disconnect the following harnesses from the main PCB: panel, speaker, CCD, sensor, LED array and R-motor harnesses.



(2) Push the left and right arms of the control panel unit outwards with your thumbs to unhook them from the bosses on the scanner frame.

(3) Remove the control panel unit by sliding it backwards.



1.3 Panel Rear Cover Assembly, Panel PCB Assembly, FPC Key

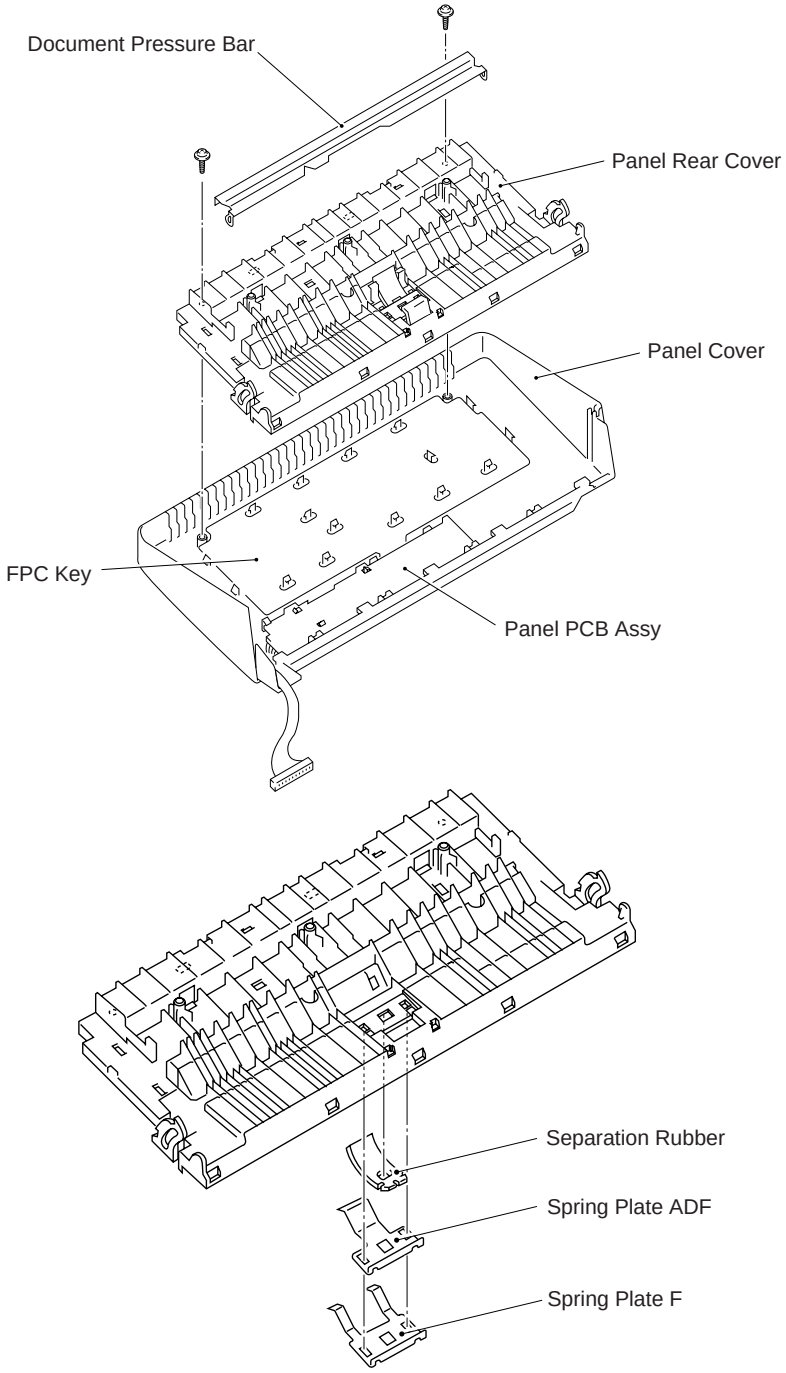
(1) Remove the two screws.

(2) Remove the document pressure bar.

(3) Insert a flat screwdriver from the front between the panel cover and the panel rear cover assembly. Remove the panel rear cover while unhooking the pawls.

(4) Remove the panel PCB with FPC key while unhooking the pawls.

(5) Disconnect FPC key from the panel PCB.

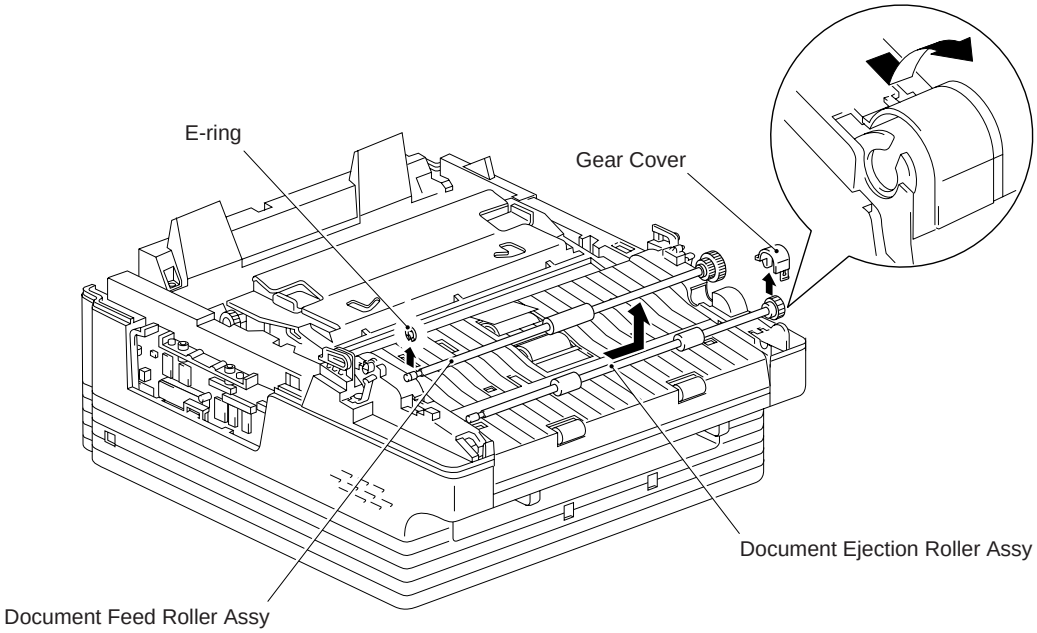


1.4 Document Ejection Roller Assembly, Document Feed Roller Assembly

(1) Remove the E-ring from the left-hand of the document feed roller assembly. Take the roller up while sliding the shaft to the right.

(2) Remove the gear cover.

(3) Lift the document ejection roller assembly up while sliding the shaft to the right.

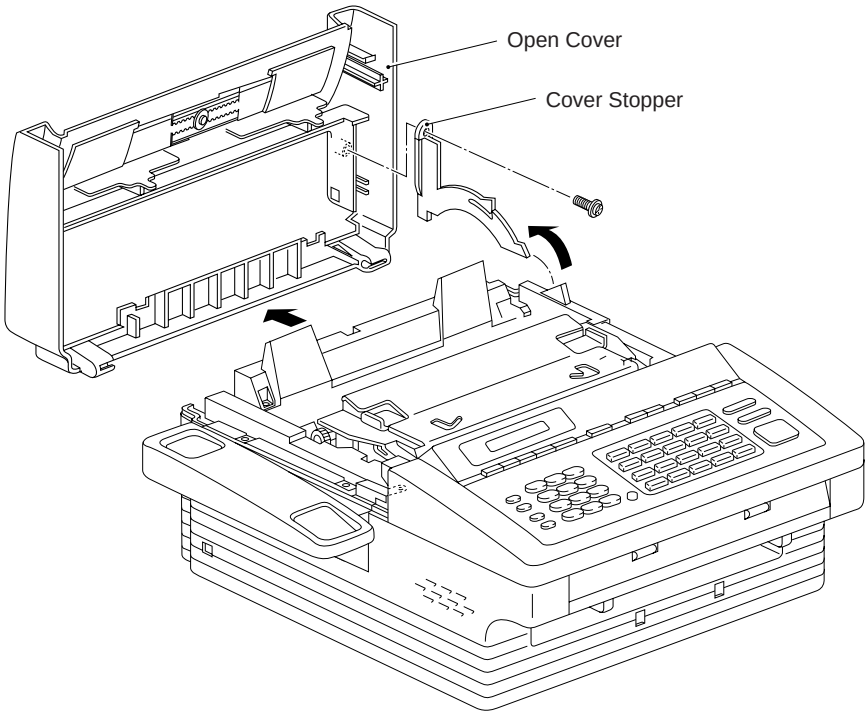


1.5 Open Cover

(1) Open the cover.

(2) Remove the screw and the cover stopper.

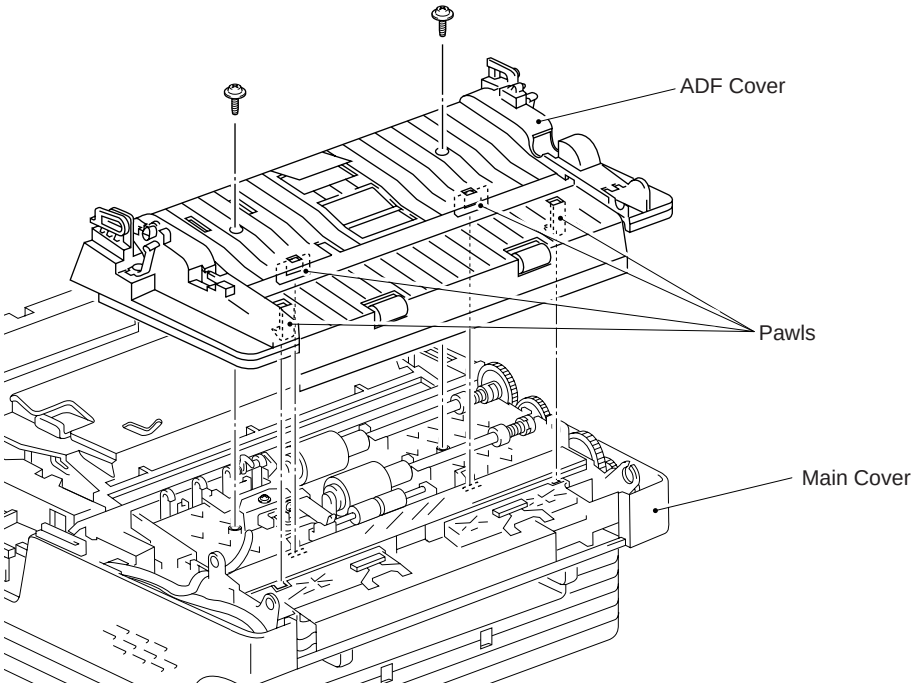
(3) Remove the open cover from the main cover.



1.6 ADF Cover

(1) Remove the two screws.

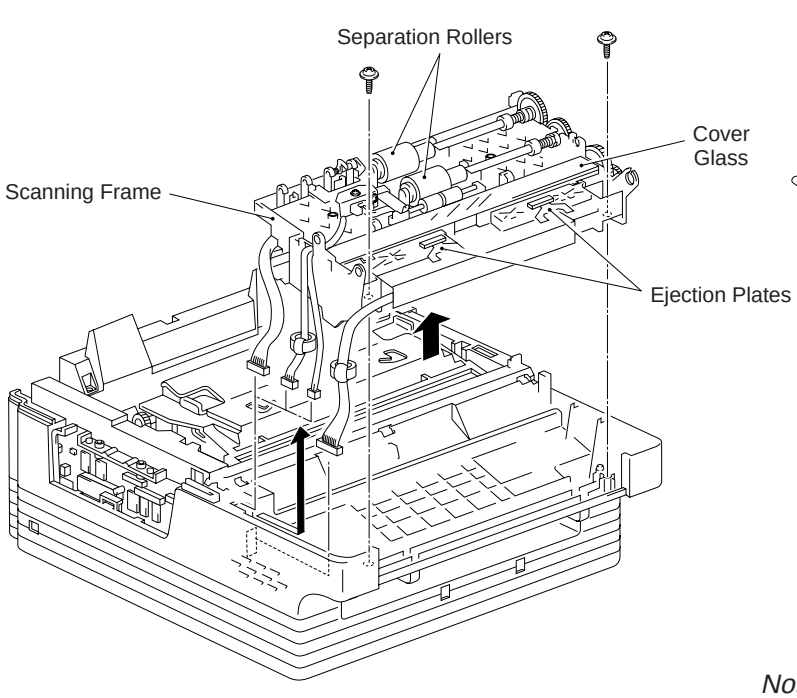
(2) Unhook the four pawls with a flat screwdriver and remove the ADF cover from the main cover.

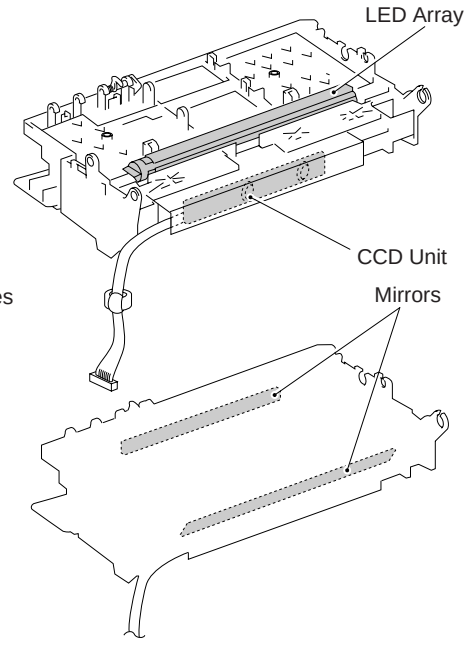


1.7 Scanning Frame

(1) Remove the two screws.

(2) Lift the scanning frame to remove it from the main cover.

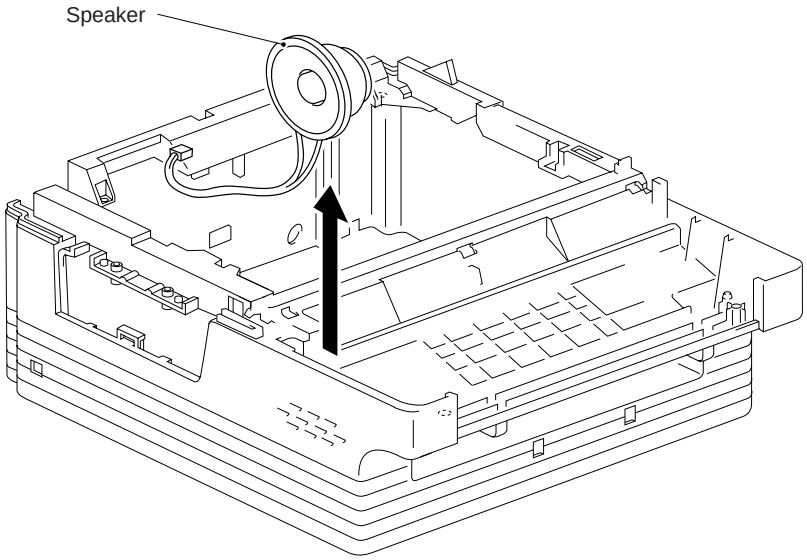




Note: Never remove the CCD unit, LED array or mirrors.

1.8 Speaker

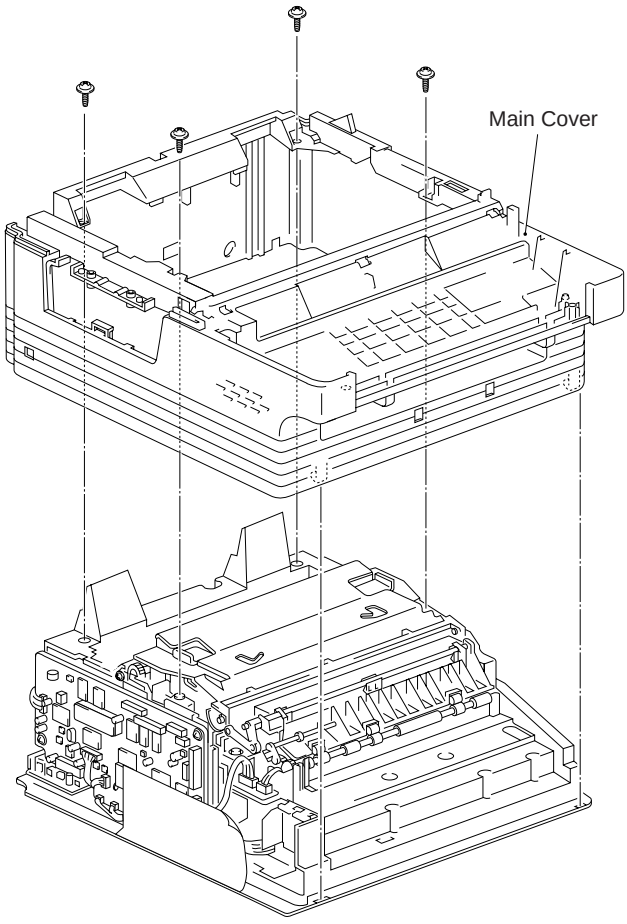
(1) Lift the speaker straight up to remove it.



1.9 Main Cover

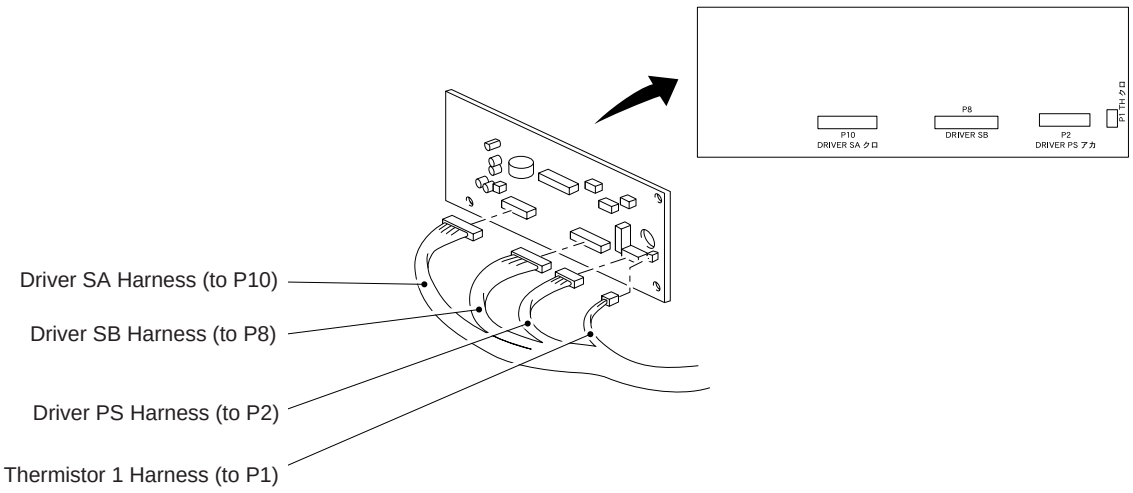
(1) Remove the four screws.

(2) Unhook the two pawls from the bottom.



1.10 Relay PCB

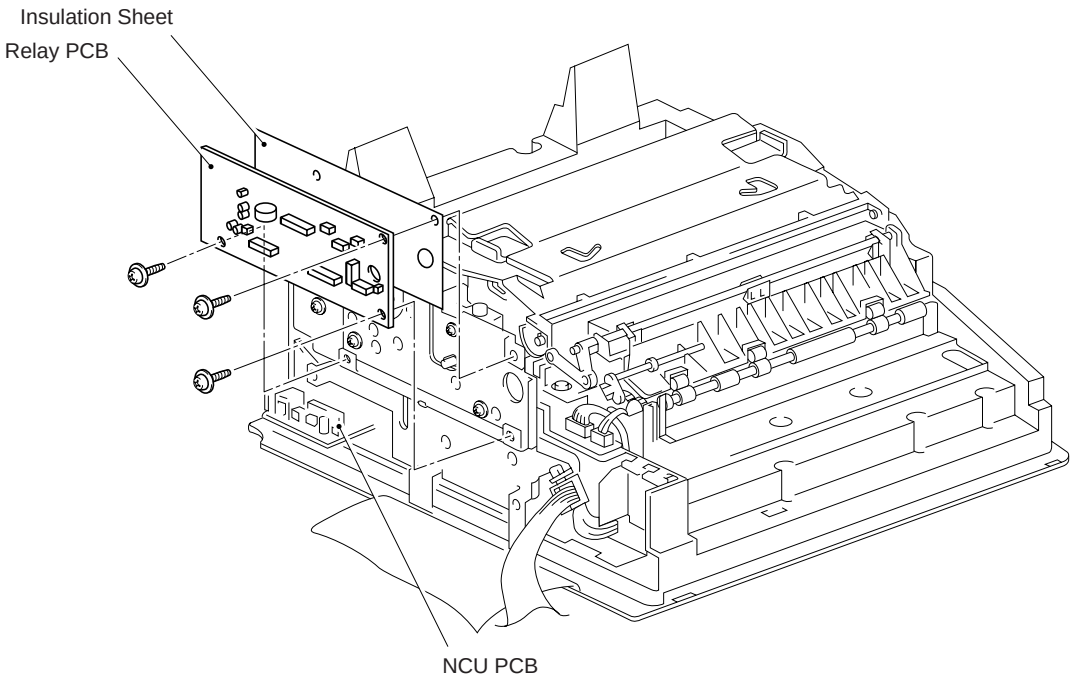
(1) Disconnect the following harnesses from the relay PCB: driver SA, driver SB, driver PS and thermistor 1 harnesses.



(2) Remove the three screws and relay PCB.

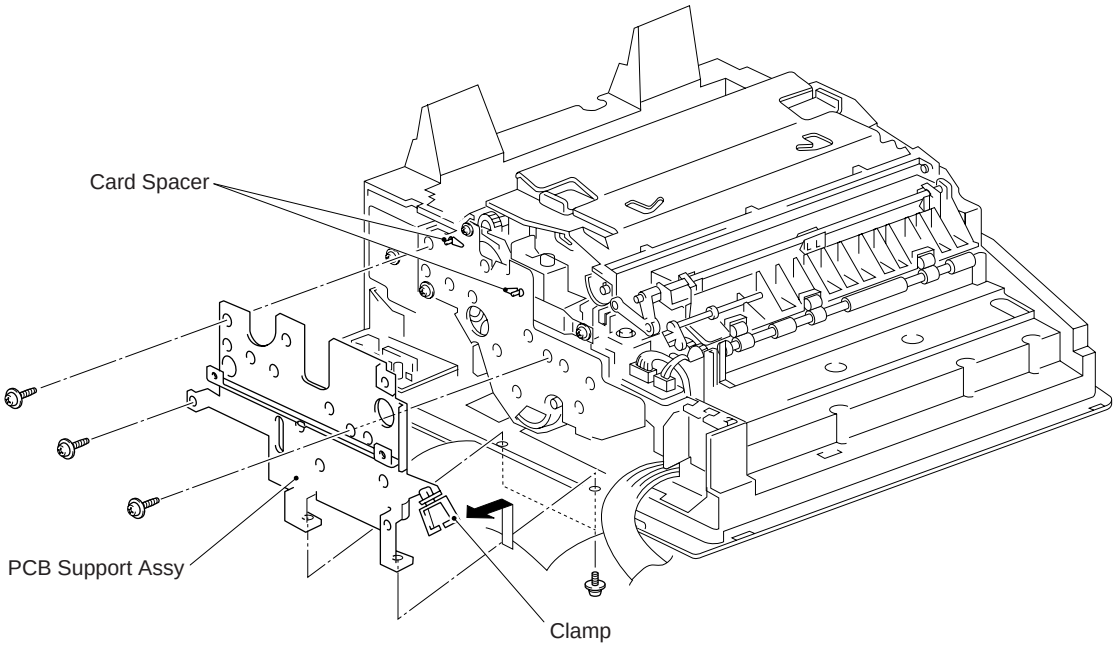
(3) The insulation sheet is removed together with the main PCB.

IV



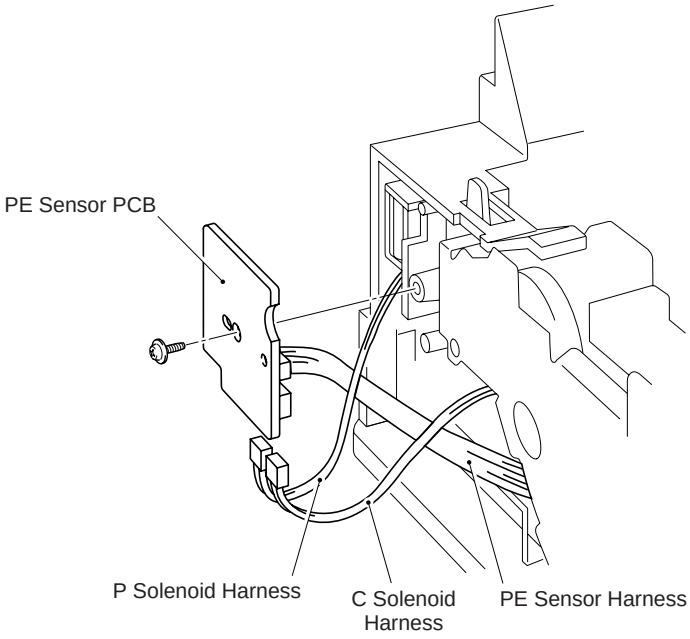
1.11 PCB Support Assembly

(1) Take off the harness from the clamp.
(2) Remove the two screws from the PCB support assembly.
(3) Remove the two screws from the bottom.



1.12 Paper Empty Sensor PCB Assembly

(1) Remove the screw.
(2) Disconnect the PE sensor harness, P solenoid harness and C solenoid harness from the PE sensor PCB.

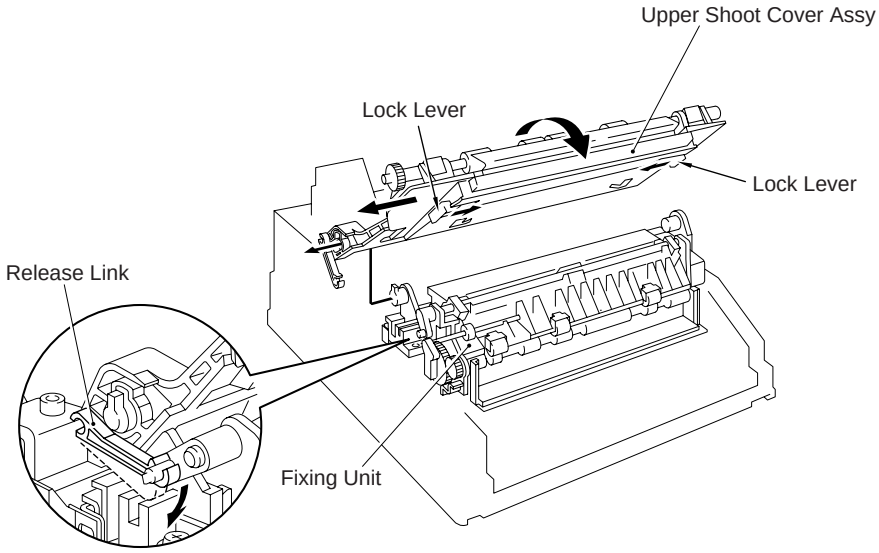


1.13 Upper Shoot Cover Assembly

(1) Push the release link downward to release it from the projection on the fixing unit.

(2) Release the locks on the upper shoot cover assembly to turn up the assembly.

(3) Align the boss of the fixing unit with the cut out provided in the upper shoot cover assembly, then slide the assembly to the left to remove it from the fixing unit.



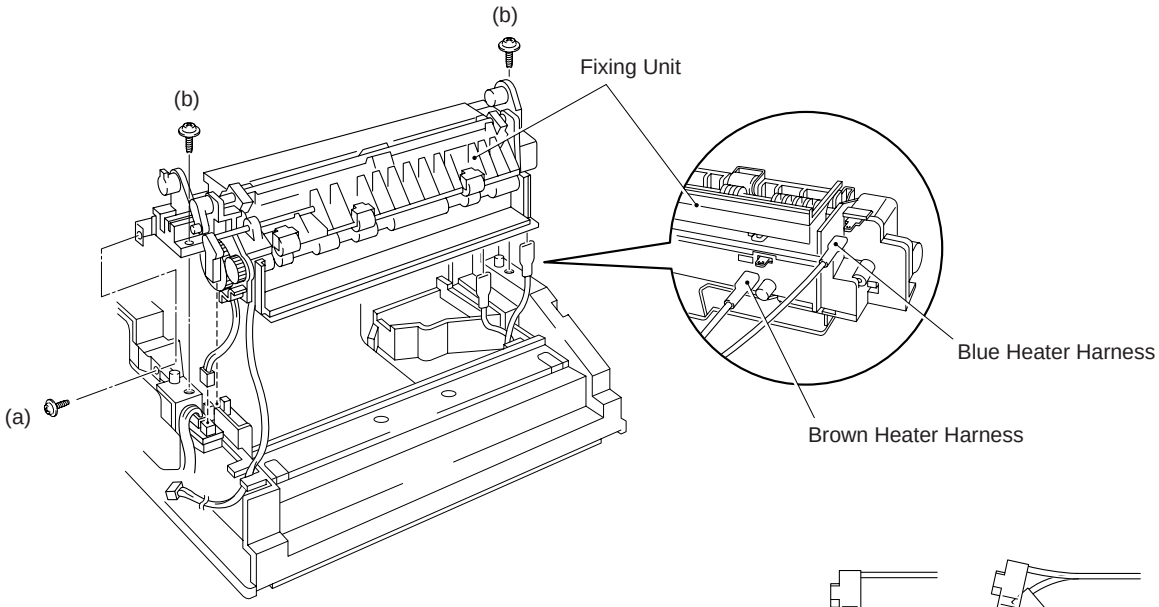
1.14 Fixing Unit

(1) Disconnect the fixing thermistor harness from the paper ejection sensor PCB.

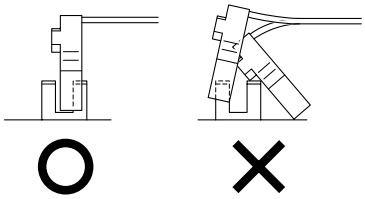
(2) Remove the screw (a) which secures the fixing unit together with the grounding plate.

(3) Remove the two screws (b).

(4) Lift up the fixing unit and disconnect the two heater harnesses.

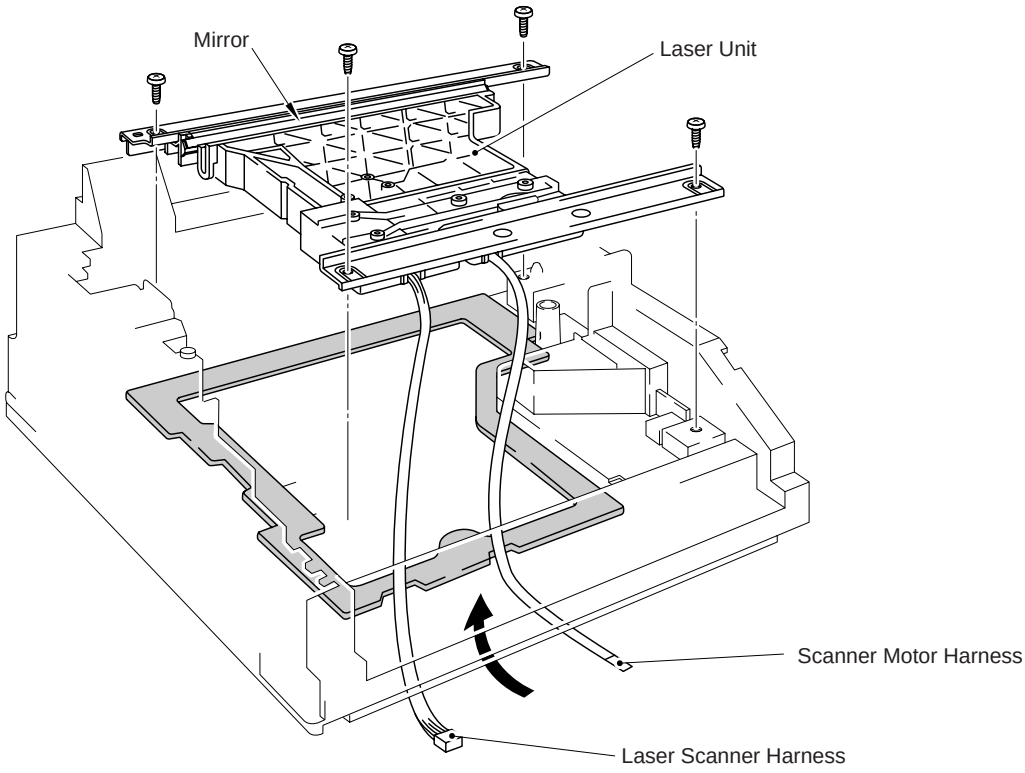


Note: On reassembly, be careful not to damage the paper ejection sensor actuator.



1.15 Laser Unit

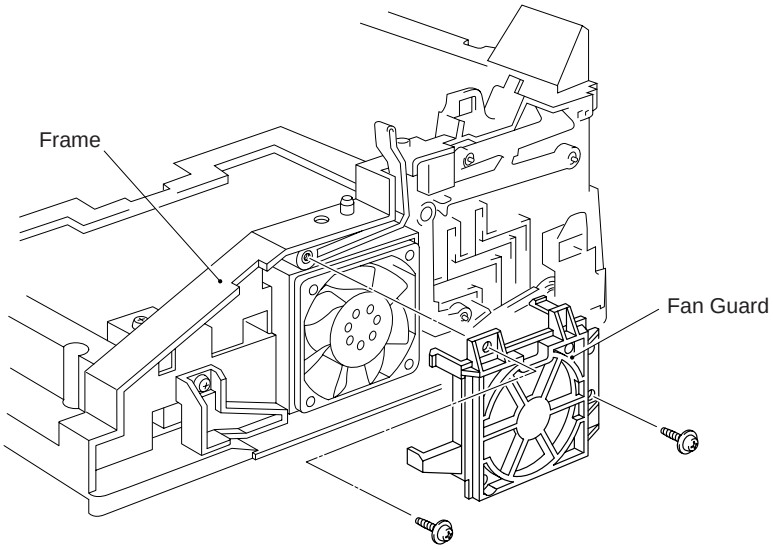
(1) Disconnect the scanner motor harness and laser scanner harness from the main PCB.
(2) Remove the four screws.
(3) Lift out the laser unit.



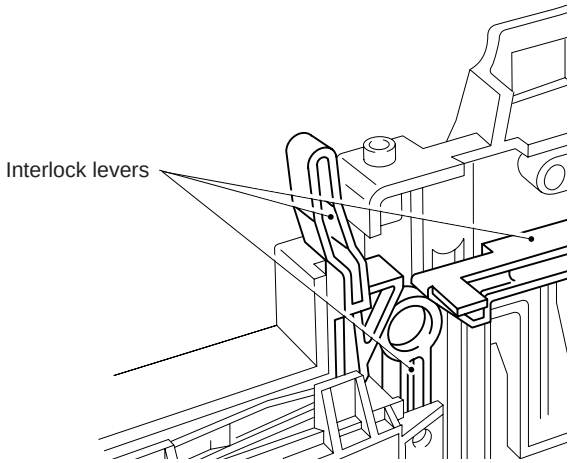
Note: Do not touch the inside of the laser unit or the mirror during disassembly and assembly. If there is any contamination or dust on the mirror, blow it off using air.

1.16 Fan Guard

(1) Remove the two screws.



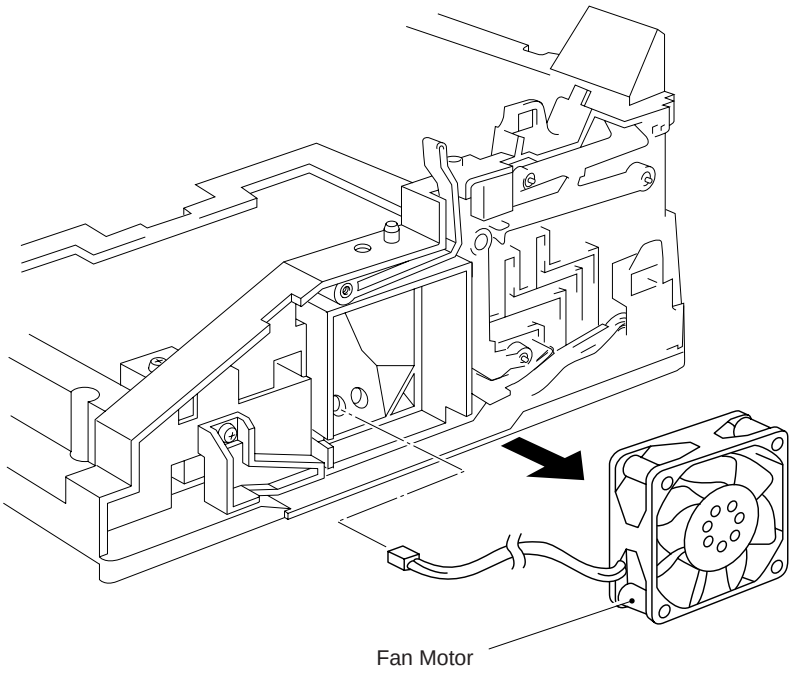
1.17 Interlock Levers



Note: Grease the contacting parts of the levers on assembly. (Refer to Lubrication section.)

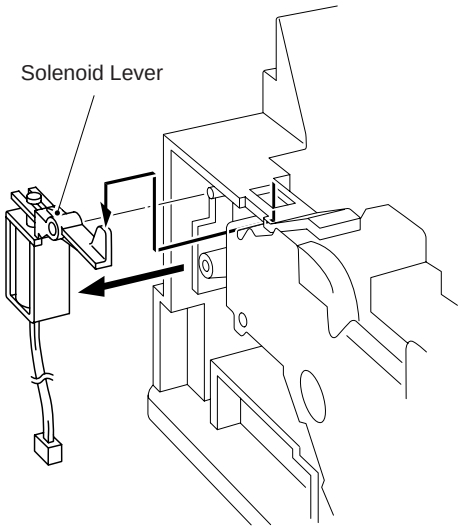
1.18 Fan Motor

(1) Disconnect the connector from the main PCB assembly.



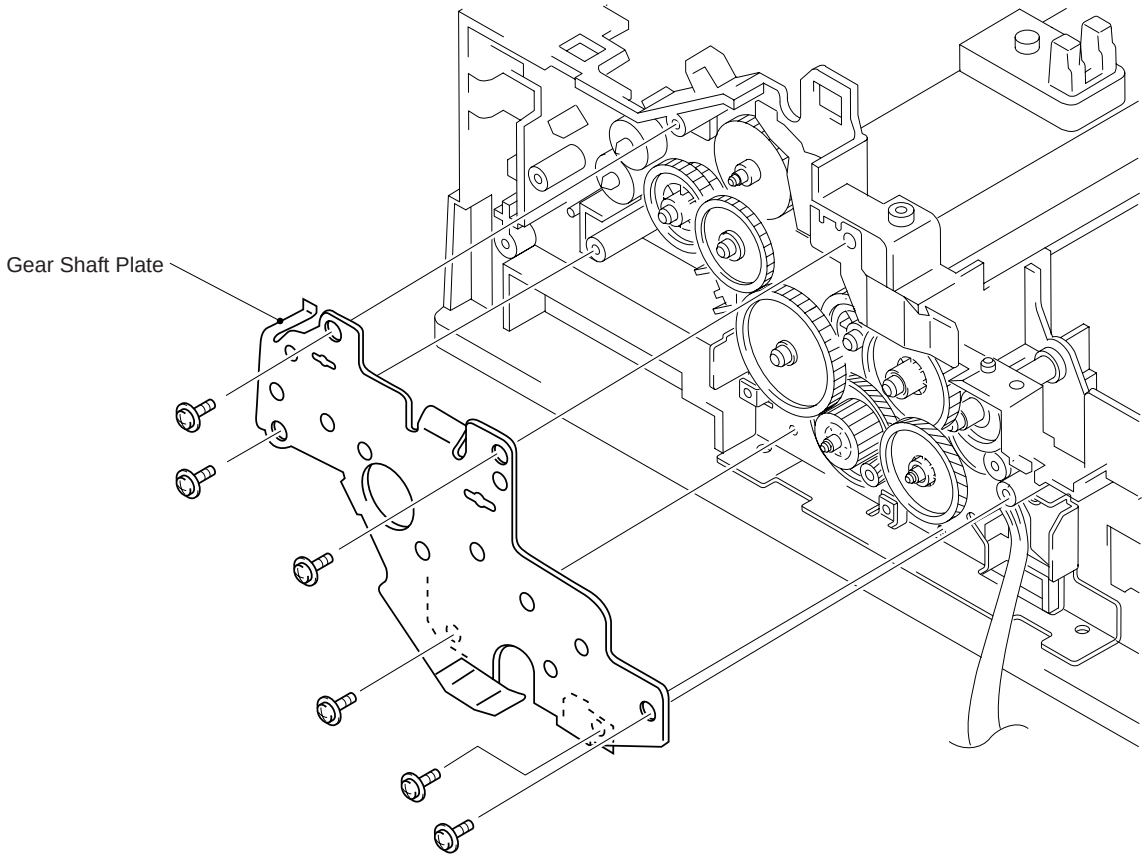
1.19 Solenoid P Assembly

(1) Pull out the solenoid P from the frame by releasing the hook of the solenoid lever.



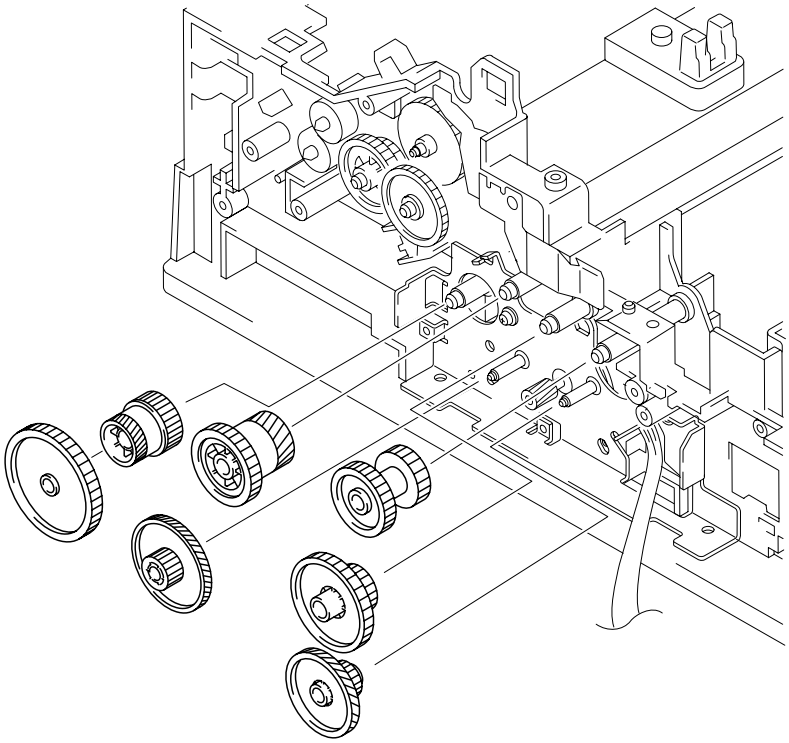
1.20 Gear Shaft Plate

(1) Remove the six screws securing the gear shaft plate.



1.21 Gears

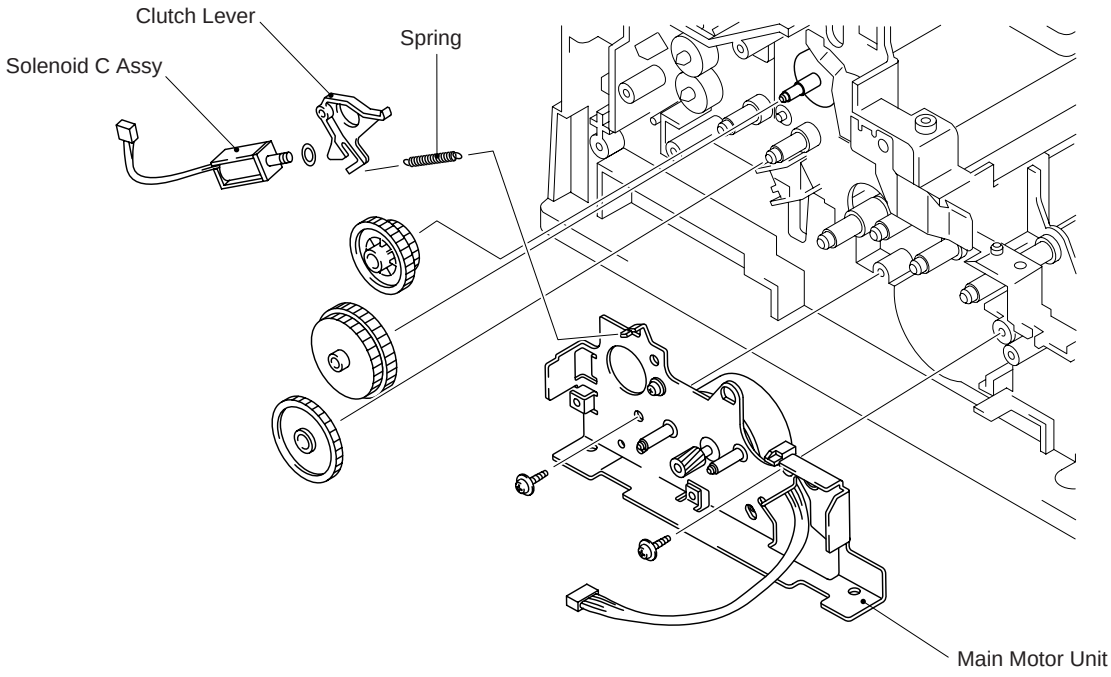
(1) Remove the gears shown below.



Note: Grease the gear shafts and gear surfaces on the specified portion illustrated above when assembling. (Refer to Lubrication section.)

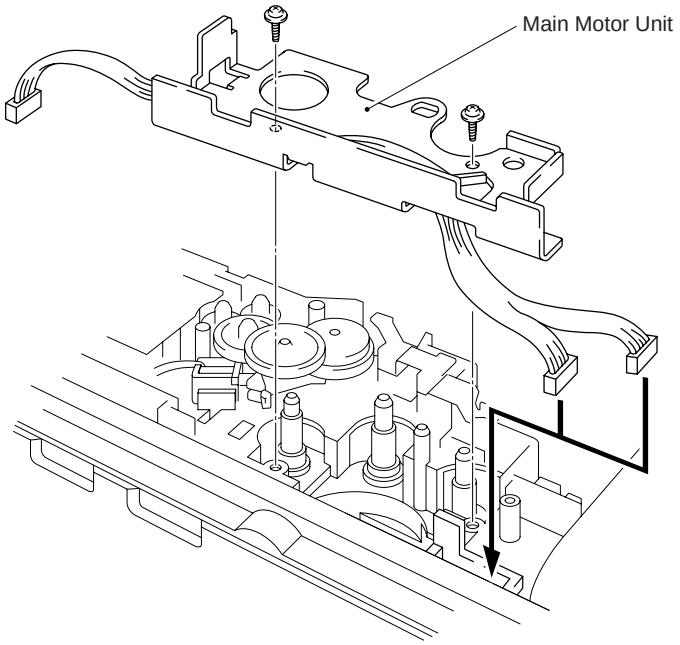
1.22 Solenoid C Assembly

(1) Take off the spring from main motor unit.



1.23 Main Motor Unit

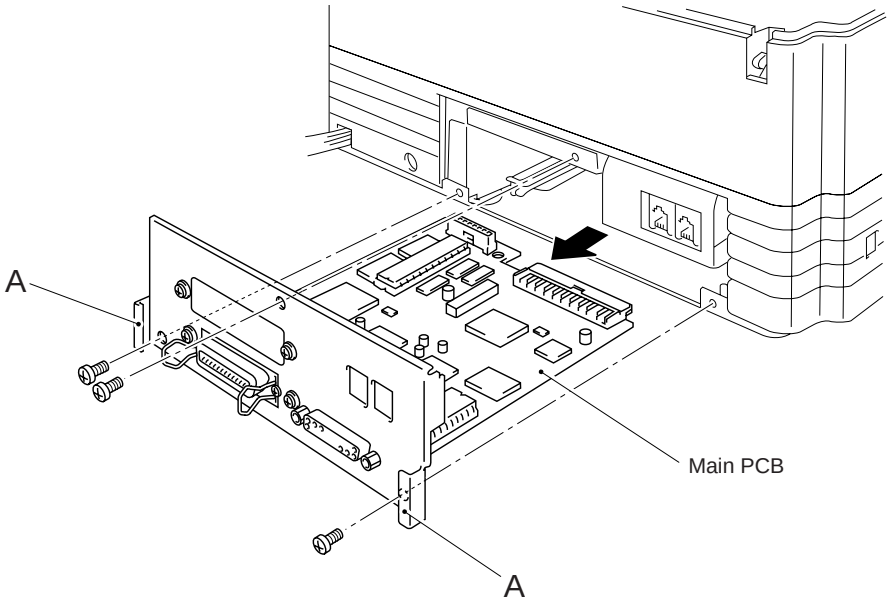
(1) Disconnect the harness from the main PCB.
(2) Remove the two screws.



1.24 Main PCB

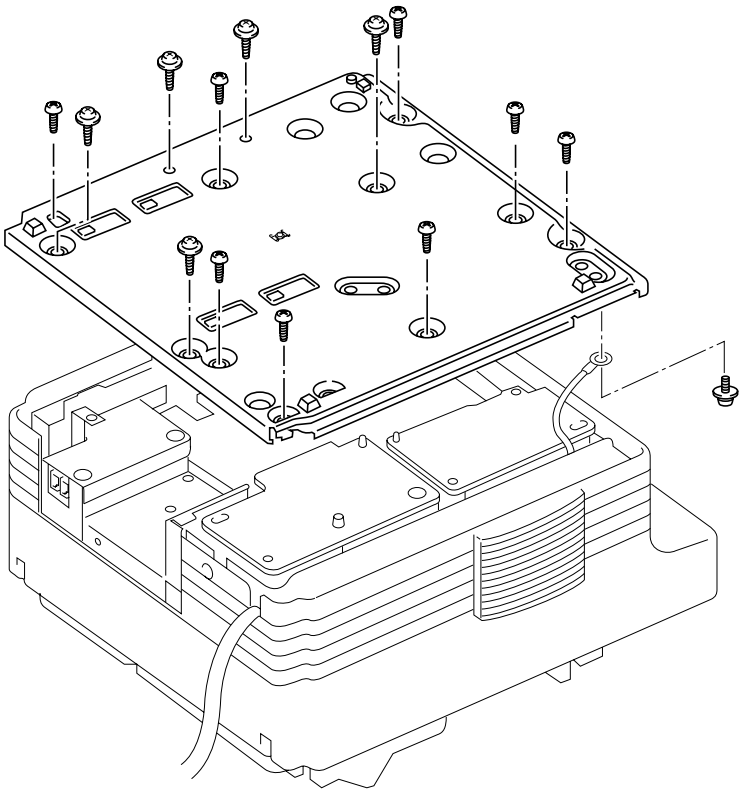
(1) Remove the three screws.
(2) Pull out the PCB toward you while holding it at the parts A.

Note: On assembly, set the PCB in the card slot correctly and push it in straight.



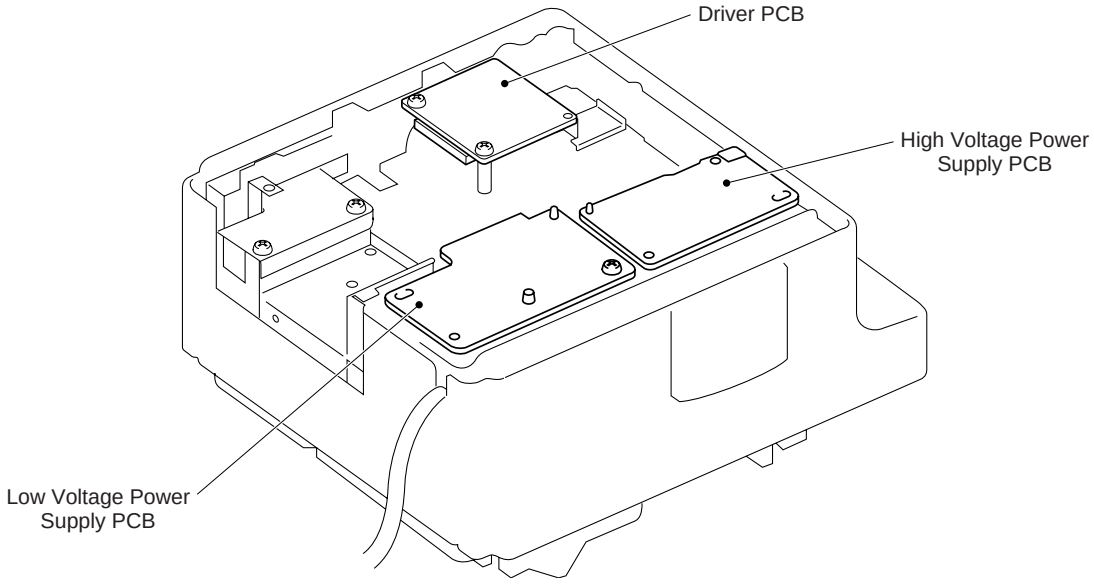
1.25 Lower Plate

(1) Turn the machine upside down.
(2) Remove the ten screws and then lift up the lower plate.
(3) Remove the screw which secures grounding wire to the lower plate.



1.26 PCBs

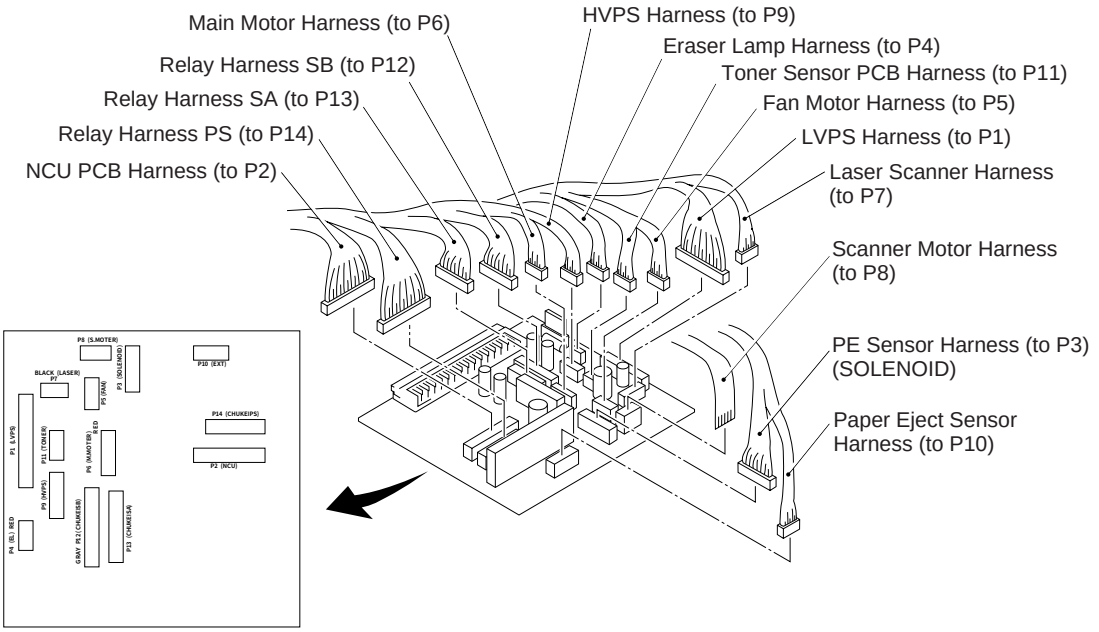
(1) Turn the machine upside down.



Driver PCB

(1) Remove the two screws.

(2) Lift up the driver PCB, then disconnect the NCU PCB harness, relay harness (PS, SA, SB), main motor harness, fan motor harness, scanner motor harness, laser scanner harness, toner sensor PCB harness, eraser lamp harness, LVPS harness, HVPS harness, PE sensor PCB harness, and paper eject sensor harness.

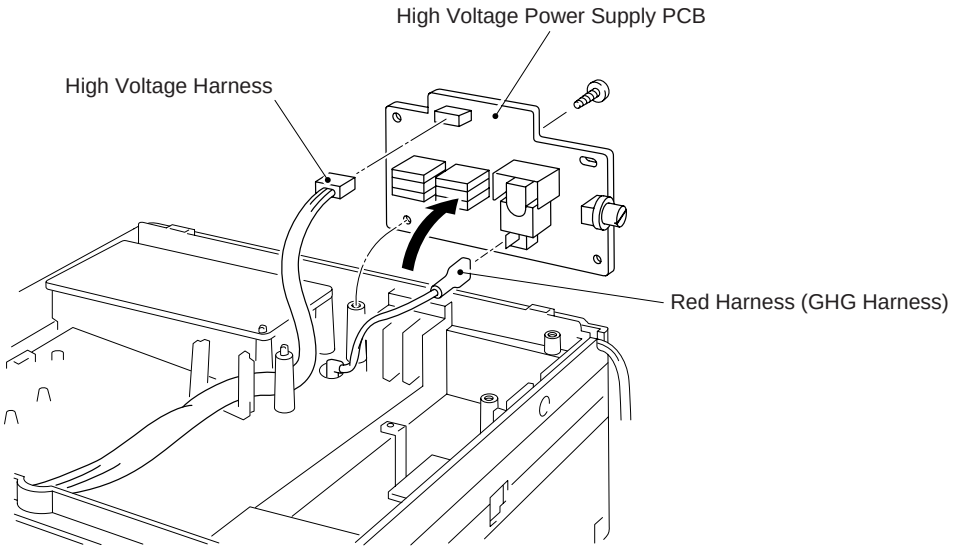


IV

High Voltage Power Supply PCB

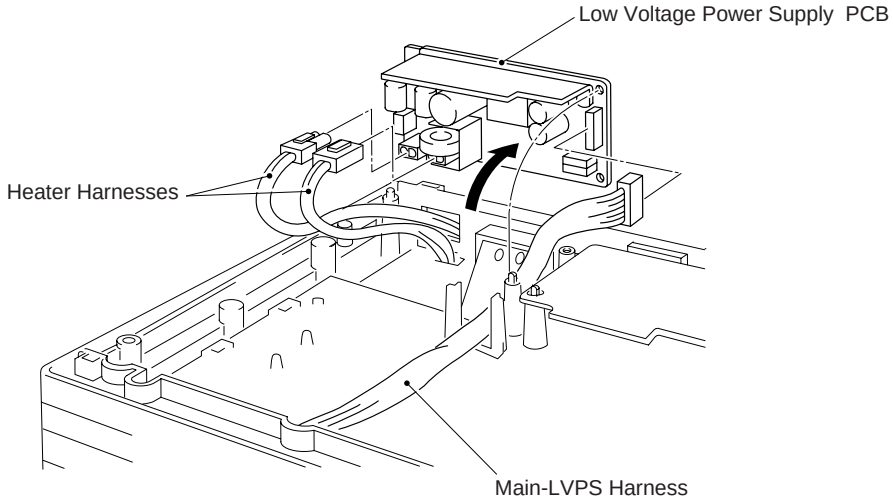
(1) Remove the screw.

(2) Lift up the high voltage power supply PCB, then disconnect the red harness.



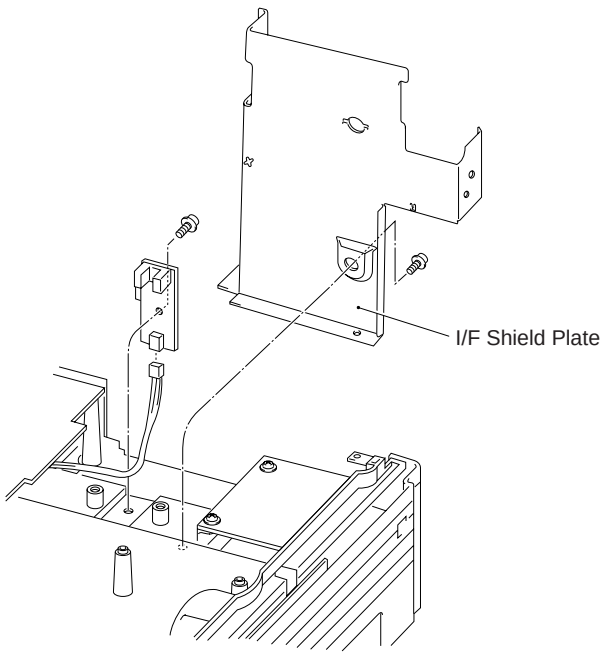
Low Voltage Power Supply PCB

(1) Lift up the low voltage power supply PCB, then disconnect blue and brown heater harnesses and the main-LVPS harness.



TE PCB

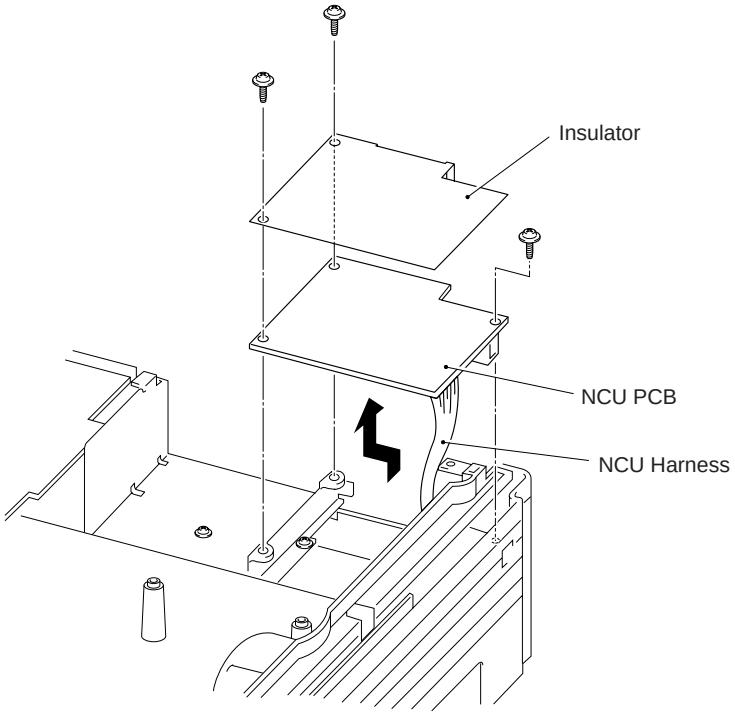
(1) Remove the two screws and the I/F shield plate.
(2) Remove the screw.
(3) Lift up the TE (Toner Empty) PCB, then remove the TE harness.



NCU PCB

(1) Remove the three screws.

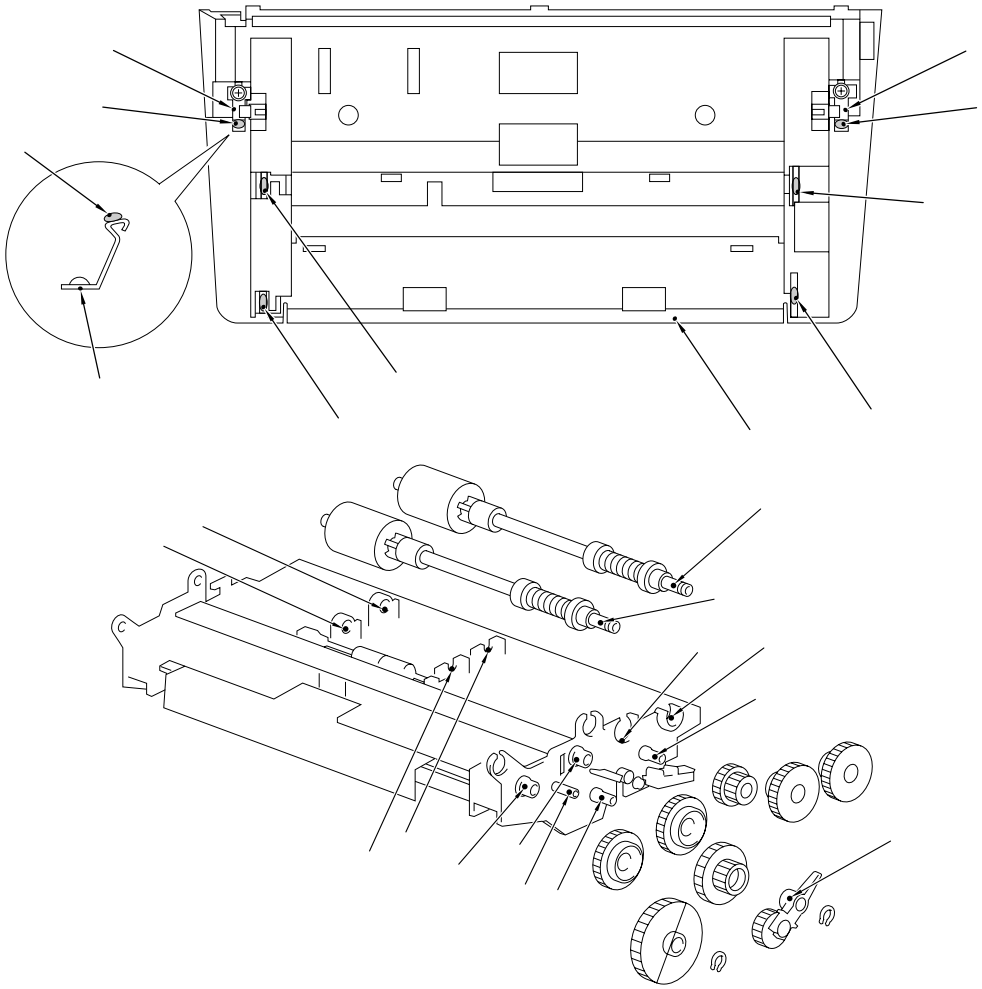
(2) Slide the NCU PCB inwards and lift it up, then remove the NCU harness.



■ Lubrication

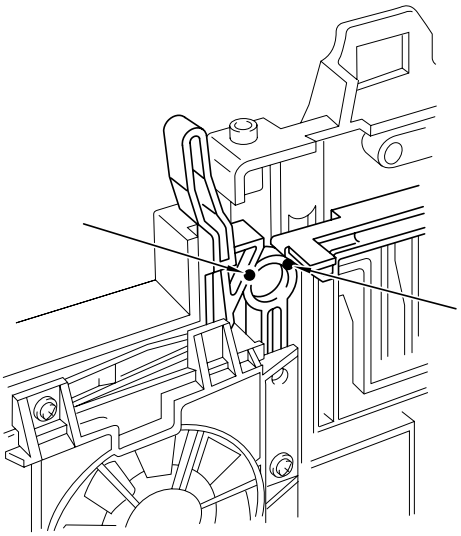
(1) ADF cover

Apply a drop of Moli Coat EM-30L the size of a rice grain to the marked parts.



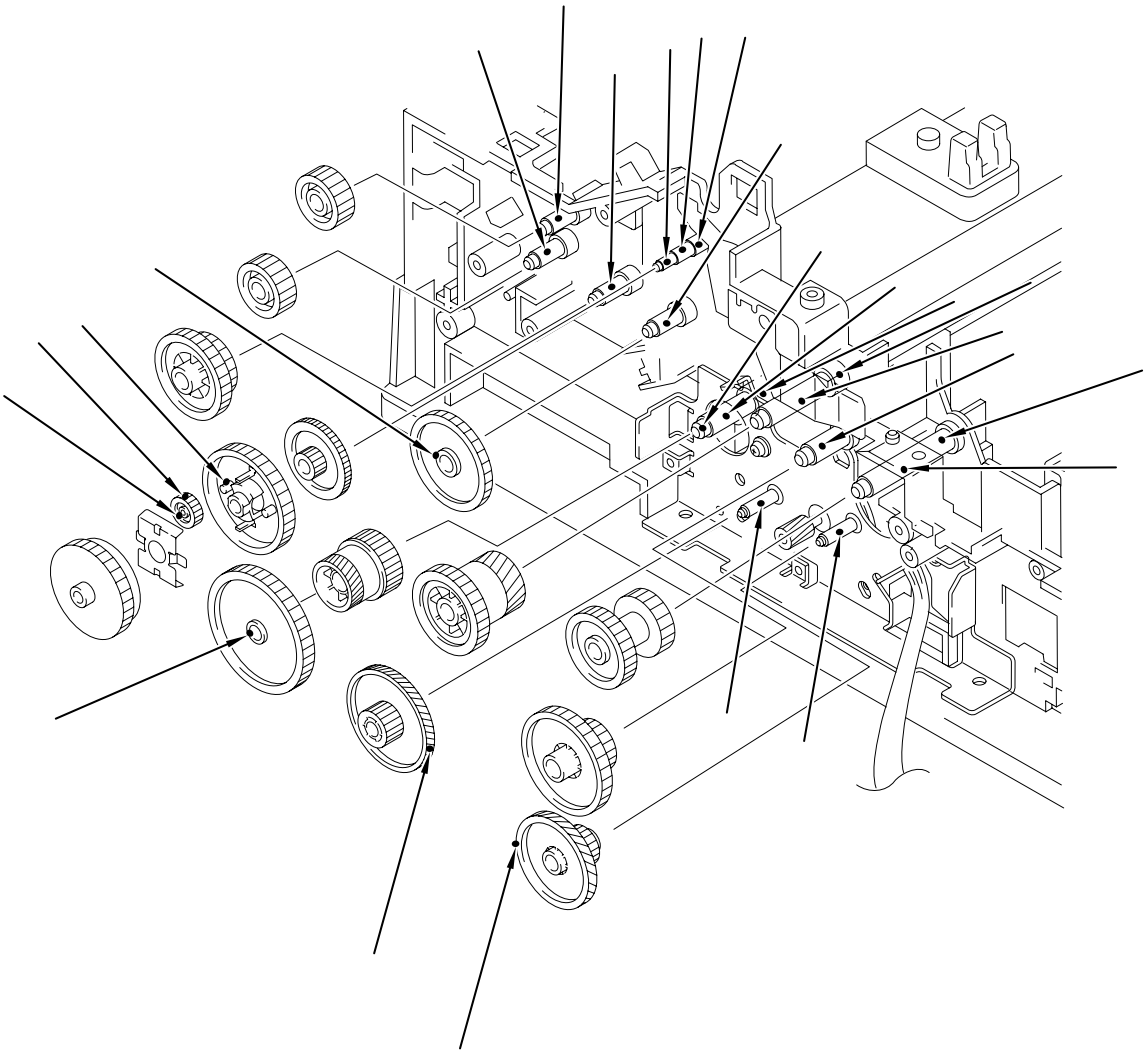
(2) Right side of the main body

Apply a drop of Moli Coat EM-30L the size of a rice grain to the marked parts.



(3) Left side of the main body

Apply a drop of Moli Coat EM-30L the size of a rice grain to the 24 locations indicated in the drawing.



CHAPTER V.
MAINTENANCE MODE

CONTENTS

1. MAINTENANCE MODE

1.1 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. 3 seconds and displays "MAINTENANCE" on the LCD, indicating that it has entered in the initial maintenance mode, a mode in which the equipment is ready to accept entry using the keys.

To select one of the maintenance-mode functions listed in the table below, 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 1.2.)

NOTES:
- Pressing the 9 key twice in the initial maintenance mode or when the power is off restores the equipment to the standby state.
- Pressing the STOP button after entering only one digit restores the equipment to the initial maintenance mode.
- If an invalid function code is entered, the equipment returns to the initial maintenance mode.

Maintenance-mode Functions (1)

Function Code	Function	Reference Subsection (Page)
01	E^2PROM Parameter Initialization	1.2.1 (V-3)
02	Scanning Compensation Data Initialzation	1.2.2 (V-4)
03	————	———
04	————	———
05	Printout of Scanning Compensation Data	1.2.3 (V-4)
06	————	———
07	————	———
08	ADF* Performance Test	1.2.4 (V-5)
09	Test Pattern 1 (Fax)	1.2.5 (V-5)
10	Firmware Switch Setting	1.2.6 (V-7)
11	Printout of Firmware Switch Data	1.2.6 (V-39)
12	————	———
13	Operational Check of Control Panel PCB (Check of Keys and Buttons)	1.2.7 (V-40)
14	————	———
15	————	———
16	Operational Check of Control Panel PCB (Check of LEDs)	1.2.7 (V-41)

* ADF: Automatic document feeder

(Continued on the next page.)

Maintenance-mode Functions (2)

Function Code	Function	Reference Subsection (Page)
32	Sensor Operational Check	1.2.8 (V-41)
38	Printout of Registered Confidential Data	1.2.9 (V-42)
55	CCD Scanner Area Setting	1.2.10 (V-42)
79	Compound Pattern (Printer)	1.2.11 (V-43)
82	Equipment Error Code Indication	1.2.12 (V-43)
84	Communication Error Code Indication	1.2.13 (V-43)
91	E^2PROM Parameter Initialization (except the telephone number storage area)	1.2.1 (V-3)

- **IMPORTANT** -

In principle, the maintenance-mode functions listed above should be accessed by service personnel only. However, you may allow end users to access some of these functions under the guidance of service personnel (e.g. by telephone).

The user-accessible functions (codes 10, 11, 82, and 91) are shaded in the above table. Function code 10 accesses the firmware switches WSW01 to WSW28, each of which has eight selectors. You should not allow end users to access all of these selectors, but you may allow them to access the user-accessible selectors which are shaded in the firmware switch tables in subsection 1.2.6.

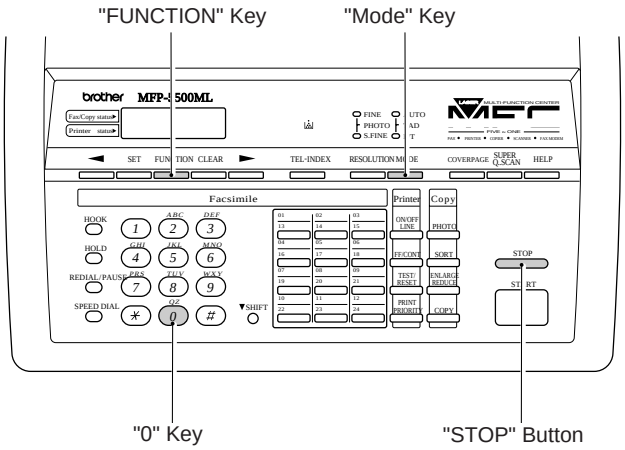
The service personnel should instruct end users to follow the procedure given below.

(1) Press the [FUNCTION] key and the [MODE] key in this order.
The LCD clears the current display.

NOTE: The [MODE] key is inoperable during standby for redialing, timer, paging, and forwarding.

(2) Press the [0] key.

(3) Enter the desired function code (10, 11, 82, or 91) with the numerical keys.
For function code 10, access the desired firmware switch according to the operating procedure described in subsection 1.2.6.



(4) To make the equipment return to the standby state, press the [STOP] button.

- -

1.2 Detailed Description of Maintenance-mode Functions

1.2.1 E^2PROM Parameter Initialization

■ **Function**

The equipment initializes the parameters, user switches, and firmware switches registered in the E^2PROM, to the initial values. Entering the function code 01 initializes all of the E^2PROM areas, but entering 91 does not initialize some areas, as shown below.

Data item	Function code	
	01	91
Maintenance-mode functions User switches Remote activation code Calendar clock Activity report Distinctive Ringing Pattern	Initialized	Initialized
Station ID data Cover page comments Outside line number Telephone function registration One-touch dialing Speed dialing Group dialing		Not initialized

■ **Operating Procedure**

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

The “PARAMETER INIT” will appear on the LCD.

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

1.2.2 Scanning Compensation Data Initialization

■ Function

The equipment scans the white pressure bar, then writes the scanned compensation data to the E^2PROM, which is used 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 maintenance mode.
The "WHITE LEVEL INIT" will appear on the LCD.

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

Note: If any error occurs in the E^2PROM white level data, the "SCANNER ERROR" or "CLEAN UP SCANNER" will appear on the LCD.

1.2.3 Printout of Scanning Compensation Data

■ Function

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

■ Operating Procedure

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

(2) The equipment prints out the scanning compensation data list containing the following items:
   a) White level data (216 data)
   b) Added value of a) above (3 data)
   c) Black level data (1 data)
   d) Black level data for photo mode (1 data)
   e) Reference LED light intensity value for 2-value quantization, and Reference LED light intensity value for photo mode (1 data each)

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

Note: If any data is abnormal, its code will be printed in inline style.

```
5F00 : 25 25 25 25 25 24 25 25  26 26 25 26 26 25 26 24
5F10 : 25 26 25 24 23 24 23 24  23 24 24 24 25 26 26 25
5F20 : 26 25 26 25 26 25 26 27  27 27 27 26 26 27 26 27
5F30 : 25 25 26 25 25 27 26 25  27 25 21 05 05 07 07 06
5F40 : 06 06 05 06 06 05 05 06  06 05 05 05 05 05 04 04
5F50 : 04 05 05 05 06 04 05 04  06 05 05 05 04 05 04 05
5F60 : 05 05 05 06 05 05 05 05  05 04 05 05 05 21 25 26
5F70 : 27 27 28 28 28 26 26 25  24 23 22 24 24 25 25 26
5F80 : 28 29 28 28 26 27 26 25  23 24 25 25 26 26 27 27
5F90 : 27 27 27 27 27 26 25 25  25 26 27 28 28 29 29 29
5FA0 : 28 28 28 26 27 27 28 28  29 2A 2B 2B 2B 2A 2A 29
5FB0 : 29 28 27 28 27 28 29 29  28 2A 28 28 28 27 28 27
5FC0 : 2A 29 2B 2A 29 2A 2A 2B  2A 2B 2A 2C 2B 2C 2B 2B
5FD0 : 2B 2D 2C 2C 2C 2C 2C 2C

5700 : 00 1A 48

5700 : 02

5700 : 03

5700 : 0D 0C
```

Scanning Compensation Data List

1.2.4 ADF Performance Test

■ **Function**

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

■ **Operating Procedure**

(1) Set documents. (Can be set up to the ADF capacity.)
The "DOC. READY" will appear on the LCD.

(2) Press the [0] and [8] keys in this order.
The equipment
i) copies the 1st document and displays "P.01" on the LCD,
ii) feeds in and out the 2nd through 4th documents while counting without copying them as the LCD shows the corresponding count,
iii) copies the 5th document and displays "P.05" on the LCD,
iv) feeds in and out the 6th through 9th documents while counting without copying them as the LCD shows the corresponding count, and
v) copies the 10th document and displays "P.10" on the LCD.

(3) Upon completion of feeding in and out of all of the documents, the final count appears on the LCD.

(4) Press the [STOP] button to return the equipment to the initial maintenance mode.

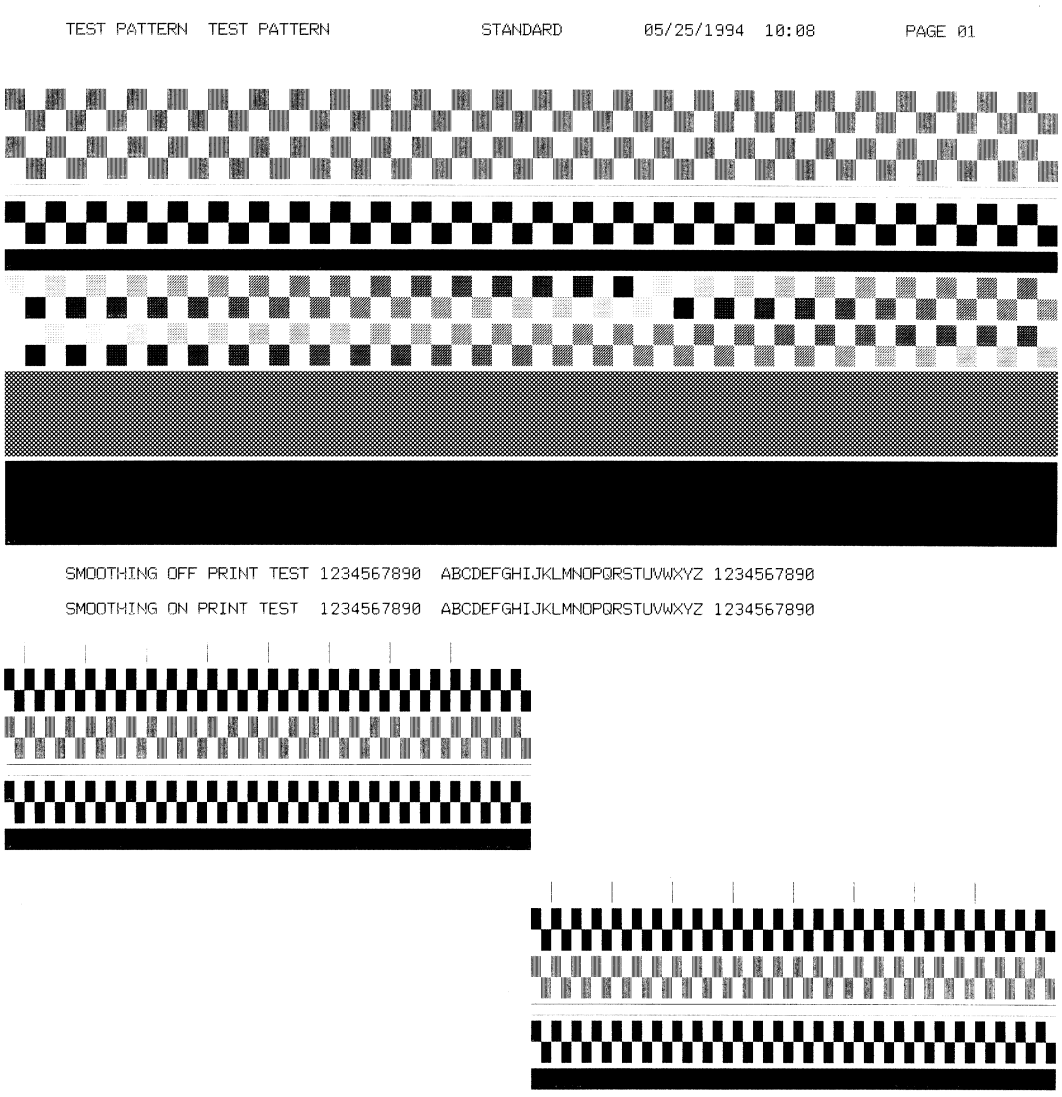
1.2.5 Test Pattern 1 (Fax)

■ **Function**

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

■ **Operating Procedure**

Press the [0] and [9] keys in this order in the initial maintenance mode.
The figure on the next page shows the test pattern 1 (fax).



Test Pattern 1 (Fax)

1.2.6 Firmware Switch Setting and Printout

[A] Firmware switch setting

■ **Function**

The facsimile equipment incorporates the following firmware switch functions (WSW01 through WSW32) which may be activated with 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 change these settings them unless necessary.

Some firmware switches may not be available with some versions. The firmware switch data list indicates “Not used.” for unavailable switches.

Firmware Switches (WSW01 through WSW32)

WSW No.	Function	Reference Page
WSW01	Dial pulse setting	V - 9
WSW02	Tone signal setting	V - 10
WSW03	PABX mode setting	V - 11
WSW04	TRANSFER facility setting	V - 12
WSW05	1st dial tone and busy tone detection	V - 13
WSW06	PAUSE key setting and 2nd dial tone detection	V - 14
WSW07	Dial tone setting 1	V - 16
WSW08	Dial tone setting 2	V - 17
WSW09	ECM and protocol definition 1	V - 18
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	P.P.I. setting	V - 30
WSW23	Communications setting	V - 31
WSW24	TAD setting 2	V - 32
WSW25	TAD setting 3	V - 32
WSW26	Function setting 4	V - 33
WSW27	Function setting 5	V - 34
WSW28	Function setting 6	V - 35
WSW29	Function setting 7	V - 36
WSW30	Function setting 8	V - 36
WSW31	Function setting 9	V - 37
WSW32	Function setting 10	V - 38

■ Operating Procedure

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

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

(2) Enter the desired number from among the firmware switch numbers (01 through 29).

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] or [1] key.

(5) Press the [SET] button. 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] button to return the equipment to the initial maintenance mode.

Notes:

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

■ Note

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

■ Detailed Description of 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 (for 10 PPS) 1 0 : 40 ms (for 16 PPS) 1 1 : 64 ms
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 with the function switch	0: Yes 1: No
8	Default dialing mode, pulse (DP) or tone (PB) dialing	0: PB 1: DP

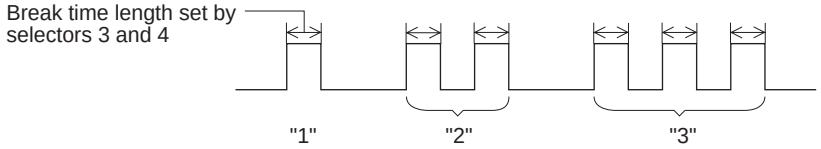
● **Selectors 1 and 2: Dial pulse generation mode**

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.

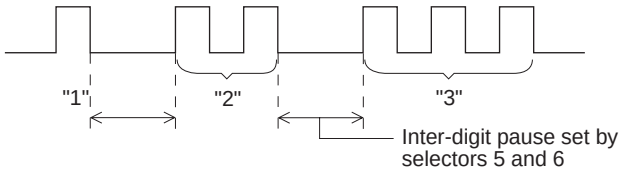
● **Selectors 3 and 4: Break time length in pulse dialing**

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 with 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.

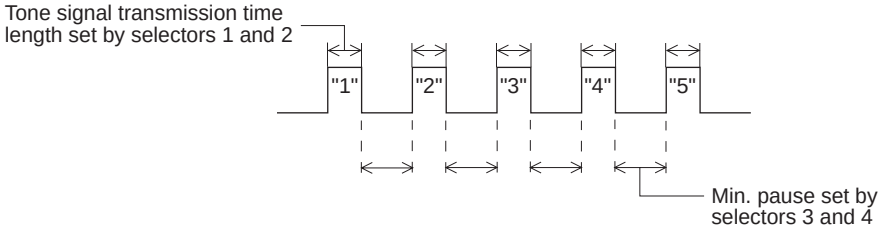
WSW02 (Tone signal setting)

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 6 7 8	Attenuator for pseudo ring back tone to the line (selectable in the range 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 back tone to the line**

  Setting two or more selectors to "1" produces addition of attenuation assigned to each selector.

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

WSW03 (PABX* mode setting)

Selector No.	Function	Setting and Specifications
1	Not used.	
2 3 4	Min. detection time length of PABX dial tone, required for starting dialing	No. 2 3 4 0 0 0 : 50 ms 0 0 1 : 210 ms 0 1 0 : 500 ms 0 1 1 : 800 ms 1 0 0 : 900 ms 1 0 1 : 1.5 sec. 1 1 0 : 2.0 sec. 1 1 1 : 2.5 sec.
5	Not used.	
6 7	Dial tone detection in PABX	No. 6 7 0 0 : No detection (3.5 sec. WAIT) 0 1 : No detection (5 sec. WAIT) 1 0 : No detection (7 sec. WAIT) 1 1 : Detection (Frequency only)
8	"R" key function	0: 1st dial tone detection added 1: No 1st dial tone detection

* PABX: Private automatic branch exchange

Note: WSW03 is not available where PABXs are not supported, e.g. in the U.S.A.

- **Selectors 2 through 4: Min. detection time length of PABX dial tone, required for starting dialing**

  Upon detection of the PABX dial tone for the time length set by these selectors, the equipment starts dialing.

  These selectors are effective only when both selectors 6 and 7 are set to "1" (Detection).

- **Selectors 6 and 7: Dial tone detection in PABX**

  These selectors activate or deactivate the dial tone detection function which detects a dial tone when a line is connected in the PABX.

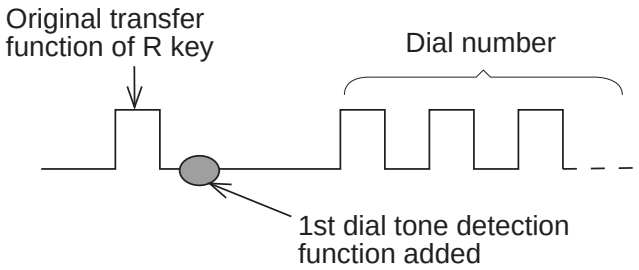
  Setting both of these selectors to "1" activates the dial tone detection function so that the equipment starts dialing upon detection of a dial tone when a line is connected.

  Other setting combinations deactivate the dial tone detection function so that the equipment starts dialing after the specified WAIT (3.5, 5.0, or 7.0 sec.) without detection of a dial tone when a line is connected.

- **Selector 8: "R" key function**

  This selector determines whether or not the 1st dial tone detection function (specified by selectors 1 through 3 of WSW05) is added to the R key.

  If this selector is set to "0", pressing the R key automatically activates the 1st dial tone detection function when PABX and automatic calling are selected by using the function switch. If you press the R key and a dial number in succession, the equipment will automatically carry out the 1st dial tone detection function following the original transfer function as shown below.



WSW04 (TRANSFER facility setting)

Selector No.	Function	Setting and Specifications
1	Earth function in transfer facility	0 : Provided 1 : Not provided
2 I 4	Not used.	
5 6	Earth time length for earth function	No. 5 6 0 0 : 200 ms 0 1 : 300 ms 1 0 : 500 ms 1 1 : 700 ms
7 8	Break time length for flash function	No. 7 8 0 0 : 80 ms 0 1 : 110 ms 1 0 : 250 ms 1 1 : 700 ms

Note: WSW04 is not available where no transfer facility is supported, e.g. in the U.S.A.

- **Selectors 1: Earth function in transfer facility**

  This selector determines whether or not the earth function is added to the transfer setting menu to be accessed by the function switch.

- **Selectors 5 and 6: Earth time length for earth function**

  These selectors set the short-circuiting time of the telephone line (La or Lb) to ground.

  This setting is effective only when the earth function is selected for the R key by using the function switch.

- **Selectors 7 and 8: Break time length for flash function**

  These selectors set the break time length.

  This setting is effective only when the flash function is selected for the R key by using the function switch.

WSW05 (1st dial tone and busy tone detection)

Selector No.	Function	Setting and Specifications
1 2 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	Not used.	

Note: Selectors 5 through 7 are not available where no busy tone detection is supported, e.g. in the 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 no dial tone detection function is supported, e.g. the U.S.A., setting these selectors to "1" causes the equipment to start dialing after a WAIT of 3.5 seconds.) For the 1st dial tone detecting conditions, 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 be effective and cause the equipment 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 the automatic sending mode.

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

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

  Setting both of selectors 5 and 6 to "1" causes the equipment to 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 the automatic receiving mode.

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

Selector No.	Function	Setting and Specifications
1 2 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 5 6	Detection of international tone	No. 4 5 6 0 0 0 : 50 ms 0 0 1 : 210 ms 0 1 0 : 500 ms 0 1 1 : 800 ms 1 0 0 : 900 ms 1 0 1 : 1.5 sec. 1 1 0 : 2.0 sec. 1 1 1 : 2.5 sec.
7	No. of dial tone detection times	0 : Once 1 : Twice
8	2nd dial tone interrupt detecting time	0 : 30 ms 1 : 50 ms

Note: Selectors 4 through 8 are not available where dial tone detection is not supported, e.g. in the 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 a 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 input within the specified time, the equipment disconnects the line in automatic dialing, or it starts transmitting the dial signal if given after the PAUSE key is pressed in hook-up dialing.
1	1	1	

- **Selectors 4 through 6: Detection of international tone**

  Upon detection of the 2nd dial tone for the time length specified by these selectors, the equipment starts dialing.

  This setting is effective only when the 2nd dial tone detection function is activated by selectors 1 through 3 (Setting 1, 1, 0 or 1, 1, 1).

- **Selector 7: No. of dial tone detection times**

  This selector sets the number of times the dial tone must be detected to start dialing.

- **Selector 8: 2nd dial tone interrupt detecting time**

  This selector sets the allowable time length for an interrupt which is not to be interpreted as an interrupt in 2nd dial tone.

WSW07 (Dial tone setting 1)

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	Line current detection	0 : No 1 : Yes
4 5 6	2nd dial tone detection level (Z = 600 Ω)	No. 4 5 6 0 0 0 : - 21 dBm 0 0 1 : -24 dBm 0 1 0 : -27 dBm 0 1 1 : -30 dBm 1 0 0 : -33 dBm 1 0 1 : -36 dBm 1 1 0 : -39 dBm 1 1 1 : -42 dBm
7	1st dial tone interrupt detecting time	0 : 30 ms 1 : 50 ms
8	Not used.	

Note: WSW07 is not available where no dial tone detection is supported, e.g. in the U.S.A.

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

  These selectors set the frequency band for the 1st dial tone and the busy tone (before dialing) to be detected.

  This setting is effective only when selectors 1 through 3 of WSW05 are set to “1, 1, 1.”

- **Selector 3: Line current detection**

  This selector determines whether or not the equipment should detect a line current before starting dialing.

- **Selectors 4 through 6: 2nd dial tone detection level**

  These selectors set the detection level of the 2nd dial tone.

- **Selector 7: 1st dial tone interrupt detecting time**

  This selector sets the allowable time length of an interrupt which is not to be interpreted as an interrupt in the 1st dial tone.

WSW08 (Dial tone setting 2)

Selector No.	Function	Setting and Specifications
1 2 3	1st dial tone detection time length	No. 1 2 3 0 0 0 : 50 ms 0 0 1 : 210 ms 0 1 0 : 500 ms 0 1 1 : 800 ms 1 0 0 : 900 ms 1 0 1 : 1.5 sec. 1 1 0 : 2.0 sec. 1 1 1 : 2.5 sec.
4 5	Time-out length for 1st and 2nd dial tone detection	No. 4 5 0 0 : 10 sec. 0 1 : 20 sec. 1 0 : 6 sec. 1 1 : 30 sec.
6 7 8	Detection level of 1st dial tone and busy tone before dialing (Z = 600 Ω)	No. 6 7 8 0 0 0 : -21 dBm 0 0 1 : -24 dBm 0 1 0 : -27 dBm 0 1 1 : -30 dBm 1 0 0 : -33 dBm 1 0 1 : -36 dBm 1 1 0 : -39 dBm 1 1 1 : -42 dBm

Note: WSW08 is not available where no dial tone detection is supported, e.g. in the U.S.A.

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

  Upon detection of the 1st dial tone for the time length set by these selectors, the equipment starts dialing.

  This setting is effective only when selectors 1 through 3 of WSW05 are set to “1, 1, 1.”

- **Selectors 4 and 5: Time-out length for 1st and 2nd dial tone detection**

  These selectors set the time-out length (10, 20, 30, or 60 sec.) for 1st and 2nd dial tone detection so that the equipment waits the specified length of time for dial tone input and disconnects itself from the line when no dial tone is input.

WSW09 (ECM and protocol definition 1)

Selector No.	Function	Setting and Specifications
1	Frame length selection	0 : 256 octets 1 : 64 octets
2	Not used.	
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 in the event of 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.

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

- **Selector 1: Frame length selection**

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

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

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

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

  If the equipment receives no response (no G III command) from the called station in automatic sending during the time set by this selector, 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" causes automatic DPS switching 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 to when 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 the facsimile and telephone.

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

  These selectors set the number of training retries 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. (Swiss version only)

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: WSW11 is not available where no busy tone detection is supported, e.g. in the 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 the 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 the busy tone to be detected. If more than one selector is set to "1", the ranges become wider. For example, 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 (1000 ms*) 0 1 : 200 ms 1 0 : 250 ms 1 1 : 150 ms
7	Delay	0 : Yes 1 : No
8	Not used.	

* 1000 ms in Chinese and Hong Kong versions.

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

  If the equipment detects the OFF state of the calling signal (Ci) for a time length longer than the value set by selectors 1 and 2 and less 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 that it is being 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 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 before the equipment turns on the CML relay to start the receiving operation.

WSW13 (Modem setting)

Selector No.	Function	Setting and Specifications
1 2	Cable equalizer	No. 1 2 0 0 : 0 km 0 1 : 1.8 km 1 0 : 3.6 km 1 1 : 5.6 km
3 4	Reception level (Z = 600 Ω)	No. 3 4 0 0 : -43 dBm 0 1 : -47 dBm 1 0 : -49 dBm 1 1 : -51 dBm
5 I 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 incorrect due to line loss.

  Setting two or more selectors to “1” produces addition of attenuation assigned to each selector.

  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 : 27 Hz
3 4	Frequency band selection (Upper limit)	No. 3 4 0 0 : 30 Hz 0 1 : 55 Hz 1 0 : 70 Hz 1 1 : 70 Hz
5 6 7 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 the 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 minutes 1 0 : 2 minutes 1 1 : 3 minutes
3 4 5 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.

This setting is effective only when selector 7 is set to “0”.

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	Not used.	
5	STOP button in automatic receiving mode	0 : Inoperative 1 : Operative
6	Exclusive line mode	0 : OFF 1 : ON
7	Max. document length limitation	0 : 400 cm 1 : 90 cm
8	Communications list output	0 : No 1 : Yes

- **Selector 2: CCITT superfine recommendation**

  If this selector is set to "1", the equipment communicates in the CCITT recommended superfine mode (15.4 lines/mm). If it is set to "0", it communicates in the 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 connected in parallel as well as the directly connected external one.

  If any of the following types of trouble occurs frequently, set this selector to "0".

  - Dialing from any of the telephones connected in parallel to the outside line starts the facsimile equipment.
  - Picking up the handset of any of the telephones connected in parallel while the facsimile equipment is in receiving operation disrupts the received image due to the superimposed noise.

- **Selector 5: STOP button in automatic receiving mode**

  Setting this selector to "1" makes the STOP button operative during the time period from the start of the receiving operation up to the reception of the G3 command.

- **Selector 6: Exclusive line mode**

  Setting this selector to "1" connects the equipment to the exclusive line, which enables transmission just by pressing the START button, without a 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: Communications list output**

  Setting this selector to "1" causes a communications list to be printed for every transmission. This selector should be set to "1" for error analysis only and set to "0" during ordinary use by the end user.

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 0 : Always valid 1 X : Valid except when 'call reservation' is selected.
3	Power failure report output	0 : ON 1 : OFF
4	Alternate display	0 : NO 1 : YES
5	Calendar clock type	0 : U.S.A. type 1 : European type
6	Error indication in activity report	0 : NO 1 : YES
7	Non-ring reception	0 : OFF 1 : ON
8	Not used.	

Note: Selector 6 is not available where no busy tone detection is supported, e.g. in the U.S.A.

- **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 off-hook.

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

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

- **Selector 4: 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” (USA), the MM/DD/YY hh:mm format applies; if it is set to “1” (European), 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 6: Error indication in activity report**

  This selector determines whether or not a communications error code is printed in the activity report.

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

  Setting this selector to “1” causes the equipment to receive calls without a ringer sound if the ring delay is set to 0.

WSW18 (Function setting 3)

Selector No.	Function	Setting and Specifications
1 I 3	CCD manufacturer setting	Fixed to 0 0 1.
4	ACS* check sheet output function on/off key	0 : Operative 1 : Inoperative
5	ACS* check sheet output function	0 : ON 1 : OFF
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 0 : All transmission phases both at the calling and called stations

* ACS: Anti-curl system

- **Selectors 1 through 3: CCD manufacturer setting**

  Reserved for future variation of CCD.

- **Selector 4: ACS check sheet output function on/off key**

  If this selector is set to “0” (Operative), the user can toggle the ACS check sheet output function on and off by pressing the right and left arrow keys simultaneously. If it is set to “1” (Inoperative), the user cannot toggle the ACS check sheet output function from the control panel and the setting specified by selector 5 becomes effective.

- **Selector 5: ACS check sheet output function**

  When selector 4 is set to “0”, the setting specified by selector 5 becomes the default state of the ACS check sheet output function. When selector 4 is set to “1”, the setting specified by selector 5 becomes permanently effective.

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

  Setting this selector to “0” permits the registration of the station ID for Austrian and Czech versions. (Refer to chapter II.)

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

  These selectors set the specifications for monitoring the tone sound input from the line.

WSW19 (Transmission speed setting)

Selector No.	Function	Setting and Specifications
1 2 3	Initial transmission speed 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 : 1 0 0 : 1 0 1 : 9,600 bps 1 1 0 : 1 1 1 :
4 5 6	Final transmission speed for fallback	
7 8	Not used.	

- **Selectors 1 through 6: Transmission speed for fallback**

  These selectors are used to select the MODEM speed range for starting and ending fallback.

  If the MODEM always falls back to a low transmission speed, set the initial transmission speed to a lower one in order to deactivate the high-speed MODEM function and reduce the training time for shorter transmission time.

  To ensure that the equipment does not take an excessively long time for document transmission, set the final transmission speed 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	No. 6 7 0 0 : During CNG ON and OFF(A) 0 1 : During CNG OFF only(B) 1 X : No elimination(C)
8	Not used.	

* EP: Echo protection

- **Selector 1: EP tone prefix**

  Setting this selector to "1" causes the equipment to transmit a 1700 Hz echo protection (EP) tone immediately preceding training in the 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. Select the signal specifications, according to the communications error state.

  Setting selector 2 to "1" allows the equipment to use the 1100 Hz CED signal instead of 2100 Hz in a 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 once sent from the called station in a 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, the 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 called models may cause error by receiving a self-output 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	Not used.	
8	Erasure of message stored in the memory after the message transfer.	0 : ON 1 : OFF

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

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

  If the external TAD is connected to the equipment, the total length of the maximum waiting time specified by these selectors and the delay time specified by WSW25 (selectors 1 and 2) should not exceed 40 seconds.

- **Selector 8: Erasure of message**

  Setting this selector to “0” will causes the message stored in the memory to be erased after the document retrieval feature transfers the message.

WSW22 (P.P.I. setting)

Selector No.	Function	Setting and Specifications
1 | 3	Main motor speed	————
4	Copy resolution	0 : Fine 1 : Superfine
5 | 8	Not used.	————

- **Selectors 1 through 3: Main motor speed**

  Do not change the setting of these selectors. These are used only for the factory test.

- **Selector 4: Copy resolution (only for the FAX4500ML/5500ML)**

  This selector determines whether the resolution for single- and multi-copy should be Fine or Superfine. For the FAX-4500ML, it is useful only if the optional memory is set.

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	Transmission of RTN at the occurrence of a pagination error	0 : YES 1 : NO
7	Resolution limit for receiving when sleep mode is reset	0 : YES 1 : NO
8	Limitation of attenuation level	0 : YES 1 : NO

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

  At the training phase of the 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 a first indication of the acceptability of the line.

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

  If it is set to "1", the called station starts gathering zeros upon detection of 10-ms of successive zeros 50 ms after the head of a series of zeros is detected. In this case, if the detection of 10-ms of successive zeros is too late, the data gathering 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 for selector 1) according to the allowable training error rate set by these selectors. If the called station judges the line condition to be acceptable, 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: Transmission 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 7: Resolution limit for receiving when sleep mode is reset**

  If this selector is set to "0", the resolution for possible receiving is lowered by one level when the sleep mode is reset: for example, a resolution setting of FINE changes to NORMAL on reset when it is set to "0".

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

Setting this selector to "0" limits the transmitting level of the modem to up to 10 dB. This setting has priority over the setting selected with WSW13 (selectors 5 through 8).

WSW24 (TAD setting 2)

Selector No.	Function	Setting and Specifications
1 2	Not used.	
3 4	Time length from CML ON to start of pseudo ring backtone transmission	No. 3 4 0 0 : 4 sec. 0 1 : 3 sec. 1 0 : 2 sec. 1 1 : 1 sec.
5 | 8	Not used.	

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

These selectors set the time length after CML comes ON until the start of pseudo ring backtone transmission.

In those versions which have an OGM facility instead of pseudo ring backtone, these selectors set the time length after CML comes ON until the start of OGM transmission.

WSW25 (TAD setting 3)

Selector No.	Function	Setting and Specifications
1 2	Delay time for starting of detection of voice signal	No. 1 2 0 0 : 0 sec. 0 1 : 8 sec. 1 0 : 16 sec. 1 1 : 24 sec.
3 4	Detection level for no voice signal	No. 3 4 0 0 : -43 dB (A) 0 1 : -46 dB (B) 1 0 : -49 dB (C) 1 1 : -51 dB (D)
5 | 7	Pause between paging number and PIN	No. 5 6 7 0 0 0 : 2 seconds 0 0 1 : 4 seconds others : 16 seconds
8	Not used.	

● **Selectors 1 and 2: Delay time for starting detection of voice signal**

These selectors take effect only in the TAD mode (when the external TAD is connected to the equipment). The equipment delays starting detection of the voice signal by the time length specified by these selectors.

The total length of the delay time specified by these selectors and the maximum waiting time specified by WSW21 (selectors 1 trough 5) should not exceed 40 seconds.

- **Selectors 3 and 4: Detection level for no voice signal**

  These selectors set the detection level for no voice signal in the TAD mode (when the external TAD is connected to the equipment).

- **Selectors 5 through 7: Pause between paging number and PIN**

  These selectors set the pause time between the paging telephone number and PIN (Private Identification Number) for the paging feature.

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 TAD mode)	No. 4 5 0 0 : No detection (OFF) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
6 7	No. of CNG cycles to be detected (for the automatic receiving operation in the F/T or TAD mode)	No. 6 7 0 0 : 0.5 (A) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
8	Not used.	

- **Selectors 4 through 7: No. of CNG cycles to be detected**

  When the equipment detects the CNG signal within the number of cycles specified by these selectors, it interprets the CNG as an effective signal.

WSW27 (Function setting 5)

Selector No.	Function	Setting and Specifications
1	Not used.	
2	Ringer OFF setting	0 : Yes 1 : No
3	Not used.	
4	Detection of distinctive ringing pattern	0 : No 1 : Yes
5 | 7	Not used.	
8	Toner save mode	0 : Yes 1 : No

- **Selector 2: Ringer OFF setting**

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

- **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 8: Toner save mode**

  This selector determines whether or not the equipment switches to the toner save mode when the toner is running out.

WSW28 (Function setting 6)

Selector No.	Function	Setting and Specifications
1 2 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 5 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	Resolution definition	0 : Standard resolution statement 1 : Non-standard resolution statement
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.

- **Selector 7: Resolution definition**

  This selector determines whether the equipment issues a standard or non-standard (fine/superfine) resolution statement when the empty space of the memory shared by the receive buffer and recording buffer becomes insufficient to receive data at high resolution.

  If this selector is set to “0”, the equipment issues a standard resolution statement which informs the calling station that the station called can receive data only at the standard resolution.

  If it is set to “1”, the MFC-3900ML/4000ML/4500ML issues a fine resolution statement and the MFC-5500ML issues a superfine resolution statement. However, the empty space of the memory is not enough to record the received data at the specified resolution, so the MFC-3900ML/4000ML/4500ML records the received data every two scans and the MFC-5500ML records it every four scans.

  For only the MFC-4500ML, it has the same specification as the MFC-5500ML when the optional memory is set.

WSW29 (Function setting 7)

Selector No.	Function	Setting and Specifications
1 I 6	Not used.	
7	Resolution switching when the PC interface is connected	0 : Fixed to standard 1 : Standard/fine switchable
8	Not used.	

- **Selector 7: Resolution switching when the PC interface is connected**

  When the PC interface is connected, this selector determines whether or not the standard resolution selected for the 1st page can be switched to the fine resolution for the 2nd and the subsequent pages.

WSW30 (Function setting 8)

Selector No.	Function	Setting and Specifications
1 I 8	Not used.	

WSW31 (Function setting 9)

Selector No.	Function	Setting and Specifications
1	Demo sheet output	0 : Yes 1 : No
2	Print at 100% if automatic reduction not possible	0 : Yes 1 : No
3	Size check of recording paper in activity report	0 : Yes 1 : No
4	Cooling fan during the standby state	0 : 50% 1 : 100%
5 I 8	Not used.	

- **Selector 1: Demo sheet output**

  If this selector is set to “1”, a demo sheet is not output even when using the demo ROM.

- **Selector 2: Print at 100% if automatic reduction not possible**

  If this selector is set to “0”, incoming documents are printed at 100% (actual size) when automatic reduction is not possible; if it is set to “1”, the highest reduction is used.

- **Selector 3: Size check of recording paper in activity report**

  If this selector is set to “0”, the recording paper size is checked in activity report.

- **Selector 4: Cooling fan during the standby state**

  If this selector is set to “0”, the cooling fan operates at 50% of full strength during the standby state.

WSW32 (Function setting 10)

Selector No.	Function	Setting and Specifications
1 2	First reception time-out for PP	No. 1 2 0 0 : OFF 0 1 : 5 min. 1 0 : 10 min. 1 1 : 30 min.
3 4	Reception time-out during PP	No. 3 4 0 0 : OFF 0 1 : 10 sec. 1 0 : 1 min. 1 1 : 5 min.
5 6	Resolution home position	No. 5 6 0 0 : STD 0 1 : FINE 1 0 : S. FINE 1 1 : PHOTO
7 8	Contrast home position	No. 7 8 0 * : AUTO 1 0 : S. LIGHT 1 1 : S. DARK

- **Selectors 1 and 2: First reception time-out for PP**

  Set the time for which printout from the PC is given priority after pressing the PRINT PRIORITY button in the printer priority mode.

- **Selectors 3 and 4: Reception time-out during PP**

  Set the valid length of time between the printout from the first PC and the printout from the next PC in the printer priority mode.

- **Selectors 5 and 6: Resolution home position**

  Set the default for resolution.

- **Selectors 7 and 8: Contrast home position**

  Set the default for contrast.

[B] Printout of firmware switch data

■ Function

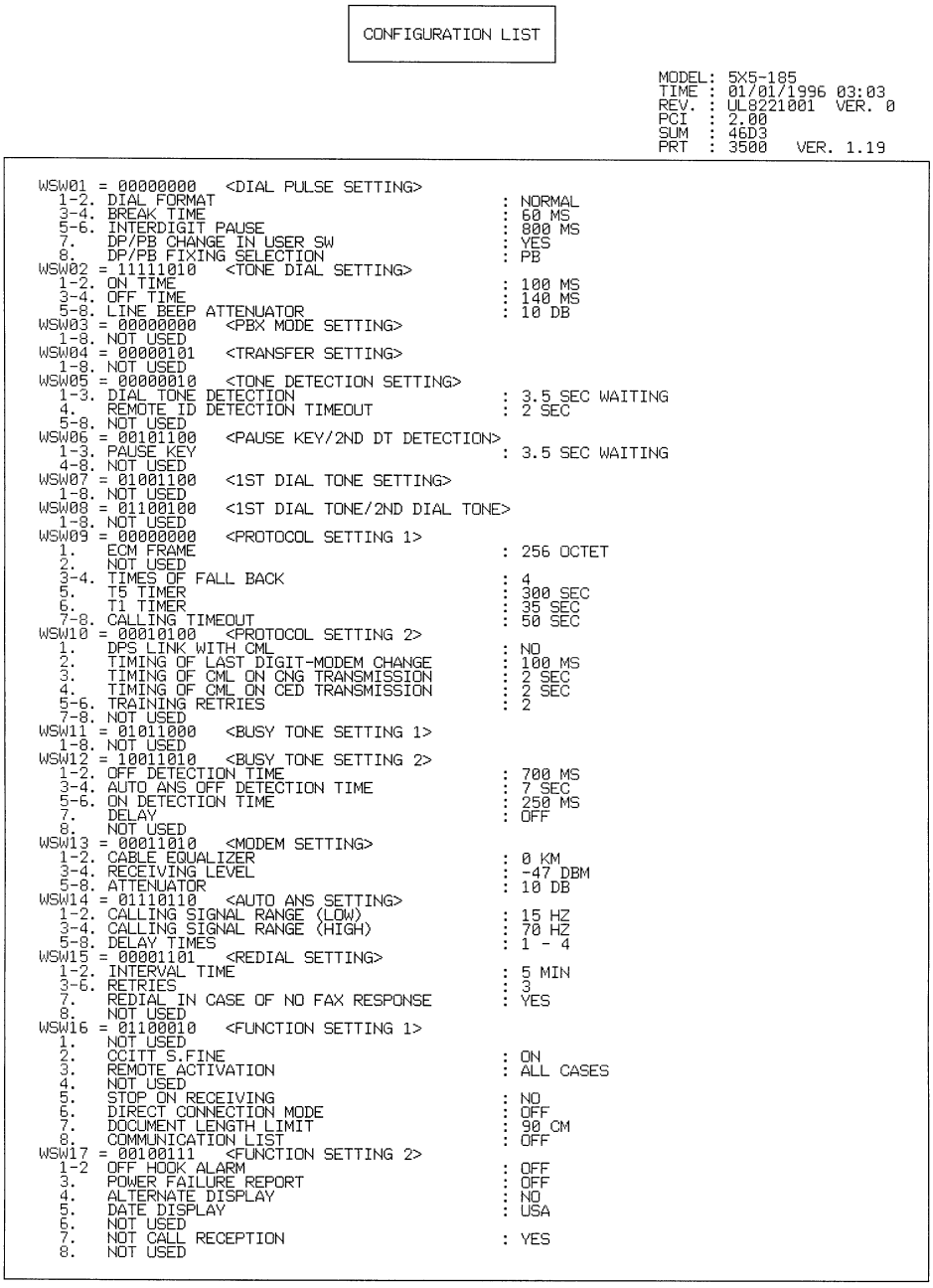
The equipment prints out the setting items and contents specified by the firmware switches.

■ Operating Procedure

(1) Press the [1] key twice in the initial maintenance mode.
The “CONFIG LIST” will appear on the LCD.

(2) The equipment prints out the firmware switch data list as shown in the figure below.

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



CONFIGURATION LIST

MODEL: 5X5-185
TIME : 01/01/1996 03:03
REV. : UL8221001 VER. 0
PCI : 2.00
SUM : 46D3
PRT : 3500 VER. 1.19

```
WSW01 = 00000000   <DIAL PULSE SETTING>
  1-2. DIAL FORMAT                          : NORMAL
  3-4. BREAK TIME                           : 60 MS
  5-6. INTERDIGIT PAUSE                     : 800 MS
  7.   DP/PB CHANGE IN USER SW              : YES
  8.   DP/PB FIXING SELECTION                : PB
WSW02 = 11111010   <TONE DIAL SETTING>
  1-2. ON TIME                              : 100 MS
  3-4. OFF TIME                             : 140 MS
  5-8. LINE BEEP ATTENUATOR                 : 10 DB
WSW03 = 00000000   <PBX MODE SETTING>
  1-8. NOT USED
WSW04 = 00000101   <TRANSFER SETTING>
  1-8. NOT USED
WSW05 = 00000010   <TONE DETECTION SETTING>
  1-3. DIAL TONE DETECTION                  : 3.5 SEC WAITING
  4.   REMOTE ID DETECTION TIMEOUT          : 2 SEC
  5-8. NOT USED
WSW06 = 00101100   <PAUSE KEY/2ND DT DETECTION>
  1-3. PAUSE KEY                            : 3.5 SEC WAITING
  4-8. NOT USED
WSW07 = 01001100   <1ST DIAL TONE SETTING>
  1-8. NOT USED
WSW08 = 01100100   <1ST DIAL TONE/2ND DIAL TONE>
  1-8. NOT USED
WSW09 = 00000000   <PROTOCOL SETTING 1>
  1.   ECM FRAME                            : 256 OCTET
  2.   NOT USED
  3-4. TIMES OF FALL BACK                   : 4
  5.   T5 TIMER                             : 300 SEC
  6.   T1 TIMER                             : 35 SEC
  7-8. CALLING TIMEOUT                      : 50 SEC
WSW10 = 00010100   <PROTOCOL SETTING 2>
  1.   DPS LINK WITH CML                     : NO
  2.   TIMING OF LAST DIGIT-MODEM CHANGE     : 100 MS
  3.   TIMING OF CML ON CNG TRANSMISSION     : 2 SEC
  4.   TIMING OF CML ON CED TRANSMISSION     : 2 SEC
  5-6. TRAINING RETRIES                     : 2
  7-8. NOT USED
WSW11 = 01011000   <BUSY TONE SETTING 1>
  1-8. NOT USED
WSW12 = 10011010   <BUSY TONE SETTING 2>
  1-2. OFF DETECTION TIME                   : 700 MS
  3-4. AUTO ANS OFF DETECTION TIME          : 7 SEC
  5-6. ON DETECTION TIME                    : 250 MS
  7.   DELAY                                : OFF
  8.   NOT USED
WSW13 = 00011010   <MODEM SETTING>
  1-2. CABLE EQUALIZER                      : 0 KM
  3-4. RECEIVING LEVEL                      : -47 DBM
  5-8. ATTENUATOR                           : 10 DB
WSW14 = 01110110   <AUTO ANS SETTING>
  1-2. CALLING SIGNAL RANGE (LOW)           : 15 HZ
  3-4. CALLING SIGNAL RANGE (HIGH)          : 70 HZ
  5-8. DELAY TIMES                          : 1 - 4
WSW15 = 00001101   <REDIAL SETTING>
  1-2. INTERVAL TIME                        : 5 MIN
  3-6. RETRIES                              : 3
  7.   REDIAL IN CASE OF NO FAX RESPONSE    : YES
  8.   NOT USED
WSW16 = 01100010   <FUNCTION SETTING 1>
  1.   NOT USED
  2.   CCITT S.FINE                         : ON
  3.   REMOTE ACTIVATION                    : ALL CASES
  4.   NOT USED
  5.   STOP ON RECEIVING                    : NO
  6.   DIRECT CONNECTION MODE               : OFF
  7.   DOCUMENT LENGTH LIMIT                : 90 CM
  8.   COMMUNICATION LIST                   : OFF
WSW17 = 00100111   <FUNCTION SETTING 2>
  1-2  OFF HOOK ALARM                       : OFF
  3.   POWER FAILURE REPORT                 : OFF
  4.   ALTERNATE DISPLAY                    : NO
  5.   DATE DISPLAY                         : USA
  6.   NOT USED
  7.   NOT CALL RECEPTION                   : YES
  8.   NOT USED
```

Configuration List

1.2.7 Operational Check of Control Panel PCB

■ Function

This function checks the control panel PCB for normal operation. Two types of check modes are available: Key & button operation check mode and LED operation check mode.

■ Operating Procedure

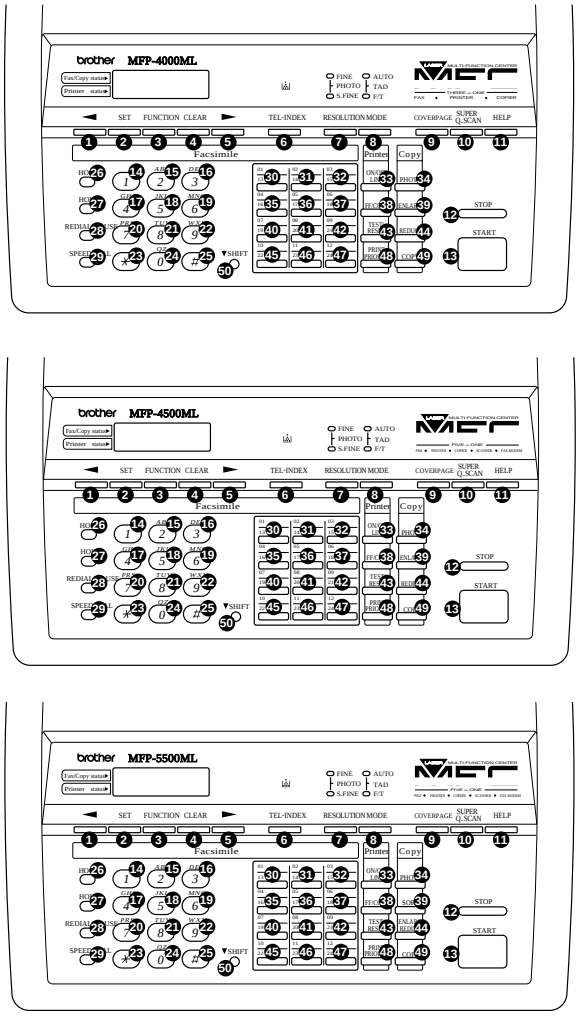
[a] Key & button operation check mode

(1) Press the [1] and [3] keys in this order in the initial 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 return to the status ready to accept key & button entry for operational check, press the [STOP] button.

(3) After the last number key or button is pressed, the equipment beeps for 1 second.

(4) To terminate this operation, press the [STOP] button. The equipment returns to the initial maintenance mode.



Key & Button Entry Order

[b] LED operation check mode

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

All of the LEDs will come on and go off, then each LED will light for 0.5 second in the following order:

FINE ⟶ S.FINE ⟶ AUTO ⟶ F/T

(2) To terminate this operation, press the [STOP] button. The equipment returns to the initial maintenance mode.

1.2.8 Sensor Operational Check

■ **Function**

This function allows you to check that the six sensors (front document sensor, rear document sensor, cover sensor, paper empty sensor, and cutter sensor, registration sensor, paper feed sensor, toner sensor) operate correctly.

The LCD shows the “FRRECVPERGHSTN” when

- the front document sensor detect no paper (FR),
- the rear document sensor detect no paper (RE),
- the control panel assy is correctly closed (CV),
- the paper empty sensor detects no paper (PE),
- the registration sensor detects no paper (RG),
- the recording paper eject sensor detects no paper (HS) and
- the toner empty sensor detects toner (TN).

■ **Operating Procedure**

(1) Press the [3] and [2] keys in this order in the initial maintenance mode.

The LCD should show “FRE RC JM PE CH” if the detecting conditions of the six sensors are as defined above.

(2) Change the detecting conditions (e.g. insert paper through the document sensors, open the control panel ASSY, jam the recording paper, remove the recording paper, or shift the upper blade of the automatic cutter from its home position), and then check that the indication on the LCD changes according to the sensor states.

(3) To stop this operation and return the equipment to the initial maintenance mode, press the [STOP] button.

1.2.9 Printout of Registered Confidential Data

■ Function

The equipment prints out names, retrieval IDs, and confidential IDs registered in the confidential box.

■ Operating Procedure

(1) Press the [3] and [8] keys in this order in the initial maintenance mode.

The "CONF. MAIL BOX" will appear on the LCD.

(2) The equipment prints out the registered confidential data.

The figure on the below shows CONFIDENTIAL MAIL BOX.

(3) To stop this operation and return the equipment to the initial maintenance mode, press the [STOP] button.

```
CONFIDENTIAL MAIL BOX

     BOX1  NAME                    : BROTHER
           RETRIEVAL ID            : 9996
           CONFIDENTIAL ID         : 1234

     BOX2  NAME                    :
           RETRIEVAL ID            :
           CONFIDENTIAL ID         :

     BOX3  NAME                    :
           RETRIEVAL ID            :
           CONFIDENTIAL ID         :
```

Confidential Mail Box

1.2.10 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 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 maintenance mode.

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

1.2.11 Compound Pattern (Printer)

■ **Function**

This function checks the printing quality of the data output from the PC.

■ **Operating Procedure**

(1) Press the [7] and [9] keys in this order in the initial maintenance mode.
The figure on the next page shows compound pattern.

1.2.12 Equipment Error Code Indication

■ **Function**

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

■ **Operating Procedure**

(1) Press the [8] and [2] keys in this order in the initial maintenance mode.
The LCD shows “MACHINE ERROR xx”.

(2) To stop this operation and return the equipment to the initial maintenance mode, press the [STOP] button.

1.2.13 Communication Error Code Indication

■ **Function**

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

■ **Operating Procedure**

(1) Press the [8] and [4] keys in this order in the initial maintenance mode.
The LCD shows “COM. ERROR xx yy”.

(2) To stop this operation and return the equipment to the initial maintenance mode, press the [STOP] button.

CHAPTER VI.
TROUBLESHOOTING

CONTENTS

1. TROUBLESHOOTING

Introduction

This chapter gives the service personnel some of the troubleshooting procedures to be followed if an error or malfunction occurs when using the facsimile equipment. It is impossible to anticipate all of the possible types of trouble which may occur in the future and determine the troubleshooting procedures, so this chapter covers only some types of trouble as examples. However, these examples will help service personnel pinpoint and repair other defective elements if they analyze and examine them well.

Precautions

Be sure to observe the following points to prevent secondary trouble:

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

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

(3)
- Before handling the PCBs, touch a metal portion of the machine to discharge the static electricity in your body.
- When repairing the PCBs, handle them with extra care.

After repairing the defective section, be sure to check again if this section works correctly. Also record the troubleshooting procedure so that it can be used in the event of future trouble occurrences.

Checking prior to troubleshooting

Prior to proceeding to the troubleshooting flowcharts, check that:

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

(2) All cables and harnesses are firmly connected.

(3) None of the fuses are blown.

1.1 Troubleshooting Malfunctions

When implementing the countermeasures for malfunctions described in this section, check connectors for faulty contact before measuring the voltage at the specified connector pins.

■ Control panel related

Trouble	Action to be taken
(1) LCD shows nothing.	• Check the harness between the relay PCB and the control panel. • Check the harness between the relay PCB and the driver PCB. • Check the connection between the driver PCB and the main PCB. • Check the control panel PCB. • Check the relay PCB. • Check the driver PCB. • Check the main PCB. • Check the low voltage power supply.
(2) Control panel inoperative.	• Check the harness between the relay PCB and the control panel. • Check the harness between the relay PCB and the driver PCB. • Check the connection between the driver PCB and the main PCB. • Check the control panel PCB. • Check the main PCB. • Check the relay PCB. • Check the driver PCB. • Check the NCU PCB. • Check the FPC key.

■ Telephone related

Trouble	Action to be taken
(1) Phone calls cannot be made.	• Check the FPC key. • Check the control panel PCB. • Check the NCU PCB. • Check the main PCB. • Check the relay PCB. • Check the driver PCB.
(2) Speed dialing or one-touch dialing will not work.	• Check wheher the ordinary dialing function (i.e., not speed or one-touch dialing) works correctly. - If it does, check the main PCB. - If it does not, refer to item (1) above.

Trouble	Action to be taken
(3) Speaker silent during on-hook dialing.	• Check whether the ordinary dialing function (other than the on-hook dialing with the hook key) works correctly. - If it does, proceed to the following checks. - If it does not, refer to item (1). • Check the speaker.
(4) Dialing mode cannot be switched between tone and pulse.	• Check the main PCB.
(5) Telephone does not ring.	• Check the speaker. • Check the NCU PCB. • Check the main PCB.

■ Communications related

Trouble	Action to be taken
(1) No tone is transmitted.	• Check the main PCB. • Check the NCU PCB.

■ Paper feed related

Trouble	Action to be taken
(1) Neither the "COPY: PRESS COPY" nor "FAX: NO. & START" message appears although documents are set.	• Check the sensors using maintenance-mode 32. Refer to chapter V, subsection 1.2.8 (V-41). • Check the document sensors. • Check the main PCB.
(2) Document not fed.	• Check the document motor and its harness. • Check the document feed rollers. • Check the document feed rollers and their related gears. • Check the main PCB.
(3) Recording paper not fed.	• Check the ADF and related sections. • Check the main motor and its harness. • Check the solenoids. • Check the recording paper feed rollers. • Check the recording paper feed rollers and related gears. • Check the main PCB. • Check the driver PCB.
(4) Double feeding	• Check the separation pads.

■ Others

Trouble	Action to be taken
(1) Fixing heater temperature not adjusted	• Check the thermistor 2 and its harness. • Check the fixing unit.
(2) BD failure	• Check the laser scanner harness. • Check the main PCB. • Check the driver PCB. • Check the laser scanner unit.

■ Image related

If there is any trouble with the received or sent image, first make a copy with the facsimile equipment.

If the copied image is normal, the remote terminal is defective. If it is abnormal, refer to the troubleshooting table below:

Trouble	Action to be taken
(1) All white images. [At scanning side]	• Check the harness between the main PCB and the driver PCB. • Check the harness between the driver PCB and CCD. • Check the driver PCB. • Check the main PCB. • Check the scanning frame assy.
[At recording side]	• Check the harness between the recording head and the NCU PCB. • Check the main PCB. • Refer to section 1.2.
(2) Image has white vertical streaks. [At scanning side]	• Check the scanning frame assy.
[At recording side]	• Refer to section 1.2.
(3) All black images. [At scanning side]	• Check the harness between the main PCB and the driver PCB • Check the harness between the driver PCB and the CCD. • Check the LED harnesses. • Check the scanning frame assy. • Check the main PCB. • Check the driver PCB.
[At recording side]	• Check the main PCB. • Refer to section 1.2.
(4) Image has black vertical streaks. [At scanning side]	• Check the scanning frame assy.
[At recording side]	• Refer to section 1.2.

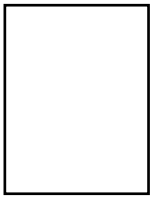
Trouble	Action to be taken
(5) Faint/dark image. [At scanning side]	• Check the scanning frame assy. • Check the main PCB.
[At recording side]	• Refer to section 1.2.
(6) Improper image alignment. [In communications]	• Check the displayed error code. Refer to section 2 (VI-16~). • Check the connection between the driver PCB and the NCU PCB.
[At scanning side]	• Check the harness between the driver PCB and the CCD.
[At recording side]	• Check the laser scanner unit. • Refer to section 1.2.
(7) Stretched-out image or compressed image. [In communications]	• Check the displayed error code. Refer to section 2 (VI-16~).
[At scanning side]	• Check the separator and related sections. • Check the document feed rollers. • Check the document feed rollers and related gears. • Check the document motor and its harness.
[At recording side]	• Refer to section 1.2.

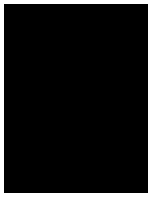
1.2 Printing Image Defects

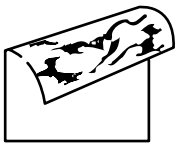
1.2.1 Image Defect Examples

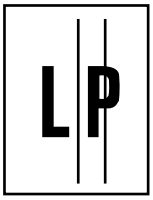

I-1 Light


I-2 Dark


I-3 Completely blank


I-4 All black

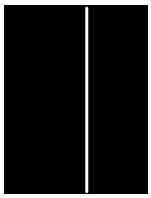

I-5 Dirt back of paper


I-6 Black vertical streaks

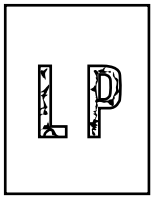

I-6 Black and blurred vertical stripes

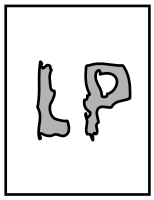

I-7 Black and blurred horizontal stripes

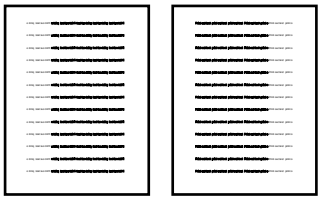

I-8 Dropout


I-9 White vertical streaks


I-10 Faulty registration


I-11 Poor fixing


I-12 Image distortion


I-13 Blurred at either side

1.2.2 Troubleshooting Image Defects

Procedures to be followed in the event of specific image defects.

I-1	Light

Possible cause	Step	Check	Result	Remedy
Poor contrast	1	Is the contrast adjustment dial in the center of the click position?	No	Set it to the center click position or reasonable position.
Toner sensing failure (toner cartridge side)	2	Is the problem solved when 4 or 5 pages are printed after the cartridge is replaced with a full one?	Yes	The wiper of the toner cartridge is defective. Replace the toner cartridge.
Toner sensing failure (printer side)	3	Can printing be started with the toner cartridge removed?	Yes	Toner sensor failure. Check if the toner sensor needs cleaning and check the toner sensor connection.
Drum GND connection failure	4	Is the drum shaft grounded when the drum unit is installed?	No	Clean contact electrodes between the body and the drum shaft of drum unit .
Transfer electrode contact failure	5	Is there continuity between the transfer roller shaft and the transfer electrode on the external drum unit?	Yes	Replace the drum unit.
Transfer failure	6	Is the problem solved when the transfer roller is replaced?	Yes	Replace the drum unit.
Developing bias contact failure	7	Are the developing bias contacts between the printer body and the drum unit soiled?	Yes	Clean the terminals at both sides.
High-voltage power supply failure	8	Remove the main cover and measure the voltage at the electrode plate at the right side face while printing with the interlocks defeated. Is the voltage correct?	No	Check the harness connection between the high-voltage power supply and the main PCB. If the connection is normal, replace the high-voltage power supply PCB.
Main PCB failure	9	Perform the same check as in step 8 above.	No	Replace the main PCB.

I-2	Dark

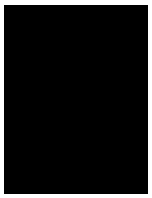
LP

Possible cause	Step	Check	Result	Remedy
Contrast failure	1	Is the contrast adjustment dial at the center click position?	No	Set it to the center click position or reasonable position.
Corona failure (soiled wire)	2	Is the corona wire soiled?	Yes	Clean the corona wire.
Corona failure (contact failure)	3	Are the corona electrodes between the printer body (bottom plate spring) and drum unit soiled? Is the bottom plate spring normal?	No	Clean both electrodes. If the spring is abnormal, replace it.
Drum unit failure	4	Is the problem solved when the drum unit is replaced?	Yes	Replace the drum unit with a new one.

I-3	Completely blank

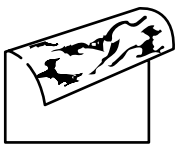
Possible cause	Step	Check	Result	Remedy
Developing bias contact failure	1	Are the developing bias contacts between the printer body and drum unit soiled ?	Yes	Clean the terminals at both sides.
Laser scanner harness connection failure	2	Is the scanner LD control harness connected normally? Is there any play in the connection?	Yes	Connect the connector correctly.
Main PCB connection failure	3	Are printing signals being input to the scanner?	No	Replace the main PCB.

I-4	All black



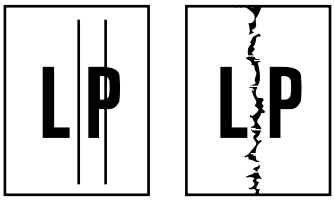
Possible cause	Step	Check	Result	Remedy
Corona failure	1	Is the drum unit corona wire broken?	Yes	Replace the drum unit.
Ditto	2	Are the charging terminal spring at the printer body side and the electrode on the bottom face of the drum unit dirty?	Yes	Clean the charging wire at the both sides.
Ditto	3	When printing is performed with the interlocks defeated, is the specified voltage measured at the charging spring at the body side ?	No	Check the connection of the harness between the high-voltage power supply and the main PCB.
Ditto	4	Perform the same check as in step 3.	No	Replace the main PCB.

I-5	Dirt back of paper



Possible cause	Step	Check	Result	Remedy
Soiled fixing unit	1(A)	Is the area of about 50mm from the top on the back of paper soiled?	Yes	Replace the drum unit.
	1(B)	Is other area rather than the above soiled?	Yes	Replace the fixing unit.
Soiling of the transfer roller	2	Is the transfer roller soiled?	Yes	Replace the drum unit.
Fogging	3	Is the back of the paper fogged?	Yes	See item I-2.

I-6	Black vertical streaks	Black and blurred vertical stripes

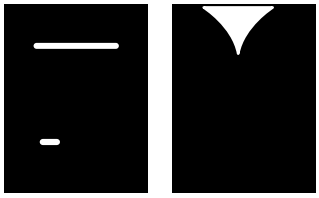


Possible cause	Step	Check	Result	Remedy
Drum unit failure	1	Are the vertical streaks about 1 ~ 5 length at 94mm intervals?	Yes	Replace the drum unit.
Soiling of the paper feed system	2	Is the paper tray or feed system on the drum unit soiled with toner?	Yes	Clean the toner off.
Corona failure	3	Has the corona wire cleaner failed to return to its home position? Are areas extending to about 10mm from the each side of paper soiled with faint black streaks?	Yes	Return the wire cleaner to its home position.
Corona failure	4	Is the corona wire soiled?	Yes	Clean the corona wire.
Scratch on the drum	5	Is the surface of the drum scratched?	Yes	Replace the drum unit.
Cleaning failure	6	Is the drum surface soiled in streaks?	Yes	Replace the drum unit.
Scratch on the fixing unit	7	Is the drum surface still soiled in streaks even after replacing the drum unit?	Yes	Replace the fixing unit.

I-7	Black and blurred horizontal stripes

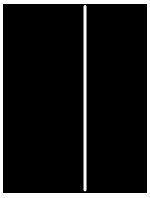
Possible cause	Step	Check	Result	Remedy
Scratch on the drum	1	Are the horizontal stripes at 94 mm intervals?	Yes	Replace the drum unit
Toner stuck on the sleeve	2	Are the horizontal stripes at 45 mm intervals?	Yes	Print several sheets and see what happens. The problem will disappear after a while.
Scratch on the fixing roller	3	Are the horizontal streaks at 64 mm intervals?	Yes	Replace the fixing unit.

I-8	Dropout



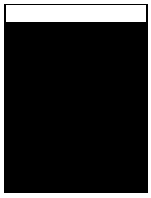
Possible cause	Step	Check	Result	Remedy
Transfer failure	1	Has the pressure spring of the upper shoot cover come off?	Yes	Re-fit the spring.
Transfer failure	2		Yes	Replace the drum unit.
High-voltage power supply failure	3	Remove the main cover and measure the voltage at the transfer electrode plate at the right side while printing with the interlocks defeated. Is the voltage correct?	Yes	Check the harness connection between the high-voltage power supply and the driver PCB. If the connection is correct, replace the high-voltage power supply PCB.

I-9	White vertical streaks



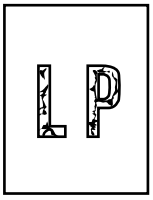
Possible cause	Step	Check	Result	Remedy
Laser scanner soiling	1	Is the window of the laser scanner soiled?	Yes	Clean the window with a dry cloth.
Transfer failure	2		Yes	Replace the drum unit.

I-10	Faulty registration



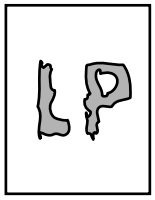
Possible cause	Step	Check	Result	Remedy
Excessive paper load	1	Is the amount of paper loaded to the paper tray more than 22mm thick?	Yes	Instruct the user to keep paper loads below 22 mm in thickness.
Print paper	2	Is the specified weight of the recommended paper being used?	No	Instruct the user to use the recommended types of paper.
Top of form sensor position failure	3	Is the position of the top of form sensor correct?	No	Reposition the sensor to the correct position.

I-11	Poor fixing



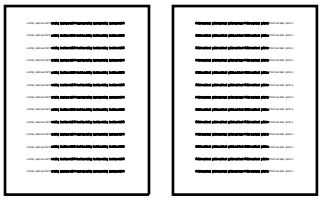
Possible cause	Step	Check	Result	Remedy
Printing paper	1	Is paper with a thickness of greater than 36 lb. being used?	Yes	Instruct the user to use paper of the recommended thickness.
Toner sensing failure	2	Is the problem solved by replacing the drum unit or the toner cartridge? (When printing is faint.)	Yes	The carrier of the developer is leaking. As toner sensing is defective, clean the toner sensor. If the wiper of the toner cartridge is broken, replace the toner cartridge with a new one.
Fixing unit nip failure	3	Is the nip width in the fixing unit insufficient? Is the nip release arm (joined to the top cover) connected?	Yes	Correct the condition of the nip release arm.
Thermistor failure	4	Measure the temperature of the heater surface during printing. Is the temperature correct (150 ° C) ?	No	Replace the fixing unit.

I-12	Image distortion



Possible cause	Step	Check	Result	Remedy
Laser scanner	1	Is the scanner unit secured to the frame correctly? Is there any play?	Yes	Secure the unit correctly with the screws.
Laser scanner LD emission failure laser scanner motor rotation failure	2	Is laser motion or the laser scanner motor defective?	Yes	Replace the laser scanner unit.
Scanner connection failure	3	Is the scanner harness connected correctly? Is it coming loose?	Yes	Connect the harness tightly.

I-13	Blurred at either side



Possible cause	Step	Check	Result	Remedy
Leaning of the printer	1	Is the printer horizontal?	No	Place the printer on a flat table.
Drum unit	2	Has the problem happened immediately after replacing the drum unit with a new one?	Yes	Remove the drum unit, hold it horizontally and tap it against a flat table 3-4 times.

2. INDICATION OF ERRORS

2.1 Equipment Errors

If an equipment error occurs, the facsimile equipment emits an audible alarm (continuous beep) for approximately 4 seconds and shows the error message on the LCD. For details on error messages, see subsection 2.1.1. One of the error messages, "MACHINE ERROR xx" includes an error code which indicates the detailed error causes listed in subsection 2.1.2. To display the error code of the latest error message, set the equipment to the maintenance mode and press keys [8] and [2] (for details, refer to chapter V, subsection 1.2.12).

2.1.1 Error Messages on the LCD

Messages on the LCD	Probable Cause
PAPER EMPTY	The paper empty sensor detects that no recording paper is loaded.
COVER OPEN	The cover sensor detects that the open cover or the paper cassette cover is not closed, or the drum unit is not installed.
DOCUMENT JAM	■ Document jam (1) The document length exceeds the limitation (400 or 90 cm) registered with firmware switch WSW16. (Refer to chapter V, subsection 1.2.6.) (Both the front and rear document sensors stay ON after a document length equivalent to the registered limitation has been fed.) (2) The rear document sensor does not detect the trailing edge of the document it has been fed 400 cm. (The rear document sensor stays ON even after the document has been fed when the front and rear document sensors were OFF and ON respectively.) ■ Document loading error (1) The rear document sensor does not detect the leading edge of a document within 10 seconds from the start of document loading operation. (The rear document sensor stays OFF even after the document has been fed when the front document sensor is ON.) (2) The loaded document is too short. (Since the document is shorter than the distance between the front and rear document sensors, the front document sensor is turned OFF before the rear document sensor is turned ON.)
SCANNER ERROR	50% or greater white level data error detected
CLEAN UP SCANNER	Less than 50% white level data error detected

Messages on the LCD	Probable Cause
CHANGE TONER TONER EMPTY	The toner empty sensor has detected that there is no toner. When this message is displayed, recording is not possible.
CHANGE TONER	The toner empty sensor has detected that there is not enough toner.
SET CARTRIDGE	It has been detected that no toner cartridge is installed.
CLEAN UP FILTER PRESS STOP KEY	If the thermistor in the unit (thermistor 1) detects a temperature of 60° C, recording becomes impossible. This message is displayed at 57° C, but recording is still possible at that temperature.
MACHINE ERROR xx	"xx" indicates an error code (Refer to subsection 2.1.2.)

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

2.1.2 Error Codes Shown in the "MACHINE ERROR xx" Message

Error Code xx (Hex.)	Error factor
71	Laser scanner motor does not lock.
72	Cannot detect Beam Detect signal
73	No toner box
74	Toner empty
75	Unit internal temperature error
76	Fixing heater disconnected
77	Fixing heater temperature detection thermistor 2 shorts
78	Fixing heater temperature detection thermistor 2 disconnected
79	Unit internal temperature detection thermistor disconnected
80	Recording paper size setting error
82	Paper supply error
83	Paper jam (Paper front sensor fails to return.)
84	Paper jam (Paper eject sensor fails to return.)
87	Failure to complete the recording operation sequence
88	Recording paper jam (The paper eject sensor failed to come on after the paper front sensor came ON.)
8B	Overheating error (Thermistor heat error)
(A1	Open cover assembly opened)
(A2	Document too long to scan)
(A3	Document not detected by the rear document sensor)
(A4	50% or greater faulty white level data)

Error Code xx (Hex.)	Error factor
A5	Faulty operation of DMA0 during scanning
A6	Faulty operation of DMA1 during scanning
A7	One-line feeding time-out error
A8	One-line scanning time-out error
AB	Document feed-in amount measuring error
AC	Less than 50% white level data error
B1	CODEC LSI error
B9	Light emission intensity error of the LED array
BA	Scanning error: The left-hand black reference line which is marked on the document pressure bar for scanning width setting is not detected.
BB	Scanning error: The right-hand black reference line which is marked on the document pressure bar for scanning width setting is not detected.
BC	Scanning error: Reduction miss
BD	Scanning error: Enlargement miss
D1	The MODEM setup bit sticks to High.
D2	CTS stays OFF or ON if the MODEM RTS is turned ON or OFF, respectively.
D3	Bit B1A of the MODEM stays OFF.
D4	Bit RX of the MODEM stays OFF.
D5	The MODEM fails to complete the command transmission sequence.
D6	No MODEM interrupt for 60 seconds
E1	Microprocessor (MPU) error on the control panel PCB
(E4	Out of recording paper)
(E5	Recording paper set error)
E6	Writer error in E^2 PROM
E8	Data scanning error during transmission
(EA	Document removed at phase B)
F4	Peripheral CNG detection adjustment error
F5	EOL not detected when sending with the memory
FF	Interface error of page memory command

Error codes in parentheses do not appear in the “MACHINE ERROR xx” message, since these errors are displayed as the messages described in subsection 2.1.1. These error codes appear in the communications list if an equipment error occurs during communications. Refer to <Error Codes> (VI-20).

2.2 Communications Errors

If a communications error occurs, the facsimile equipment

(1) emits an audible alarm (intermittent beeping) for approximately 4 seconds,

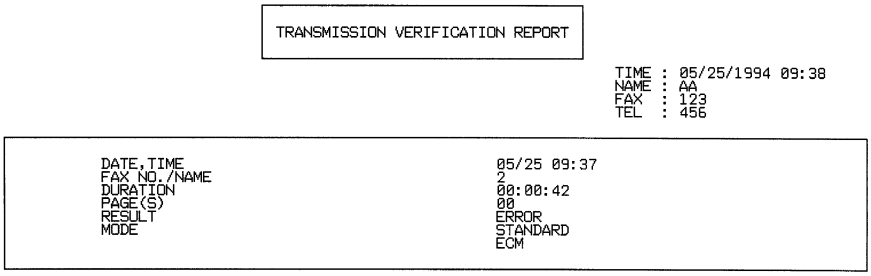
(2) displays one of the error messages on the LCD, and

(3) prints out a transmission verification report if the equipment is excuting a sending operation.

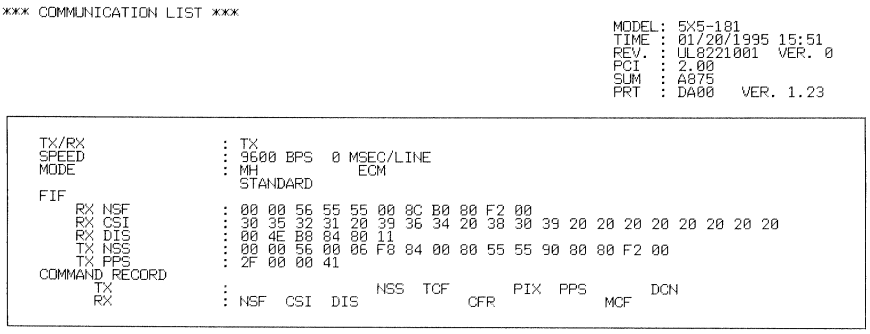
Setting WSW16 SW8 (refer to V-25) to "1" causes "COMMUNICATION ERROR LIST" to be printed when the communication error has occured.

The communication error codes for communication errors that occur can be viewed on the LCD by operation in "MAINTENANCE MODE 84". Refer to chapter V, subsection 1.2.13 (V-43).

Note: Reset WSW16 SW8 to "0", after the "COMMUNICATION ERROR LIST" has been finished printing in setting it to "1", .



Example Transmission Verification Report



Example Communications List

<Error Codes>

(1) Calling

Code 1	Code 2	Causes
10	08	Wrong number called.
11	01	No dial tone detected.
11	02	Busy tone detected before dialing.
11	03	2nd dial tone not detected.
11	05	No loop current detected.
11	06	Busy tone detected after dialing.
11	10	Tone not detected (After dialing).
11	07	No response from the called station. (Tx)
17	07	No response from the called station (Rx).

(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 answer back.
20	07	Undefined command received.
20	08	Invalid command received.
20	09	Command ignored once for document setting.
20	0A	T5 time-out error.
20	0B	Remote terminal incapable of detecting a command correctly.
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.
40	12	Retrieval attempted when not ready for retrieval.
40	13	Polled by another station while waiting for secure polling.
40	17	Illegal resolution specified.

(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 coincident.
63	04	Entered confidential mail box ID not coincident with the mail box ID.
63	05	Relay broadcasting ID not coincident.
63	06	Entered retrieval ID not coincident 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	PSS with wrong page count or block count received.

(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.
A0	12	Receive buffer or memory full.
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.
A0	18	Receive buffer full on memory reception.
A8	01	RTN, PIN, or ERR received at the calling terminal.*
A9	01	RTN, PIN, or ERR received at the called terminal.*

* Available in Germany and Austria only.

(11) General communications-related

Code 1	Code 2	Causes
B0	02	Unable to receive the next-page data.
B0	03	Turn-around communication in progress but polling not possible due to request for conversation.
B0	04	PCI 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 command from RS232C in burn-in operation.

(13) Equipment error

Code 1	Code 2	Causes
FF	xx	Equipment error (For xx, refer to subsection 2.1.2.)

MFC-3900ML/4000ML/4500ML/5500ML
APPENDICES

U.S. and Canadian Versions

Circuit Diagrams

- **A. Main PCB**
- **B. Driver PCB**
- **C. Relay PCB**
- **D. Network Control Unit (NCU) PCB**
- **E. Control Panel PCB**
- **F. Power Supply PCB**

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