brother

FACSIMILE EQUIPMENT
SERVICE MANUAL

MODEL: MFC4820C/MFC4420C

PREFACE

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

To perform appropriate maintenance so that the facsimile equipment is always in best condition for the customer, the service personnel must adequately understand and apply this manual.

This manual is made up of eight chapters and appendices.

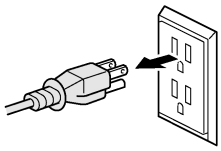
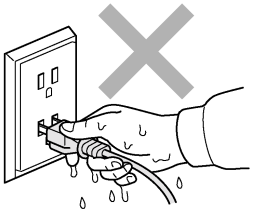
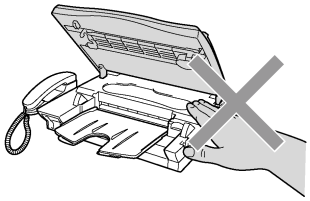
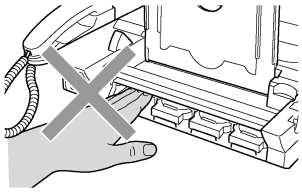
This manual describes the models and their versions to be destined for major countries. The specifications and functions are subject to change depending upon each destination.

SAFETY PRECAUTIONS

To Use the Machine Safely

Save these instructions for later reference.

WARNING

⚠	There are high voltage electrodes inside the machine. Before you clean the machine or clear a paper jam, make sure you have unplugged the power cord from the power outlet. 	⚠	Do not handle the plug with wet hands. Doing this might cause an electrical shock. 
⊘	To prevent injuries, be careful not to put your hands on the edge of the machine under the scanner cover. 	⊘	To prevent injuries, be careful not to put your fingers in the area shown in the illustration. 

WARNING

- Use caution when installing or modifying telephone lines. Never touch telephone wires or terminals that are not insulated unless the telephone line has been disconnected at the wall jack. Never install telephone wiring during a lightning storm. Never install a telephone jack in a wet location unless the jack is specifically designed for a wet location.
- Install equipment with a power cord near a socket-outlet that is easily accessible.
- To reduce the risk of shock or fire, use only a No. 26 AWG or larger telecommunication line cord.
- Do not use a telephone in the vicinity of gas leak to report leak.

Caution

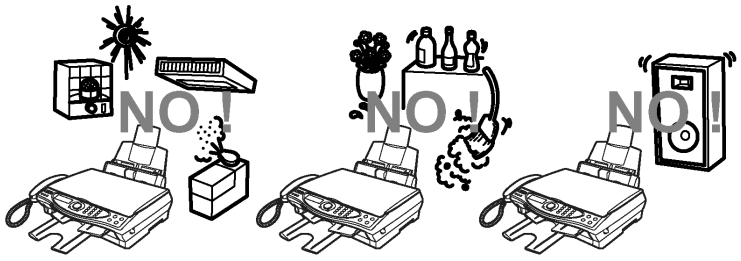
- Lightning and power surges can damage this product! We recommend that you use a quality surge protection device on the AC power line and on the telephone line, or unplug the lines during a lightning storm.
- Do not use this product near appliances that use water, in a wet basement or near a swimming pool.
- Avoid using a telephone other than a cordless type during an electrical storm. There may be a remote risk of electric shock from lightning.

Choosing a Location

Place your machine on a flat, stable surface that is free of vibration and shocks, such as a desk. Put the machine near a telephone jack and a standard, grounded power outlet. Choose a location where the temperature remains between 50°F and 95°F (10° and 35°C).

Caution

- Avoid placing your machine in a high-traffic area.
- Do not place near heaters, air conditioners, water, chemicals, or refrigerators.
- Do not expose the machine to direct sunlight, excessive heat, moisture, or dust.
- Do not connect your machine to electrical outlets controlled by wall switches or automatic timers.
- Disruption of power can wipe out information in the machine's memory.
- Do not connect your machine to electrical outlets on the same circuit as large appliances or other Equipment that might disrupt the power supply.
- Avoid interference sources, such as speakers or the base units of cordless phones.



CHAPTER 1

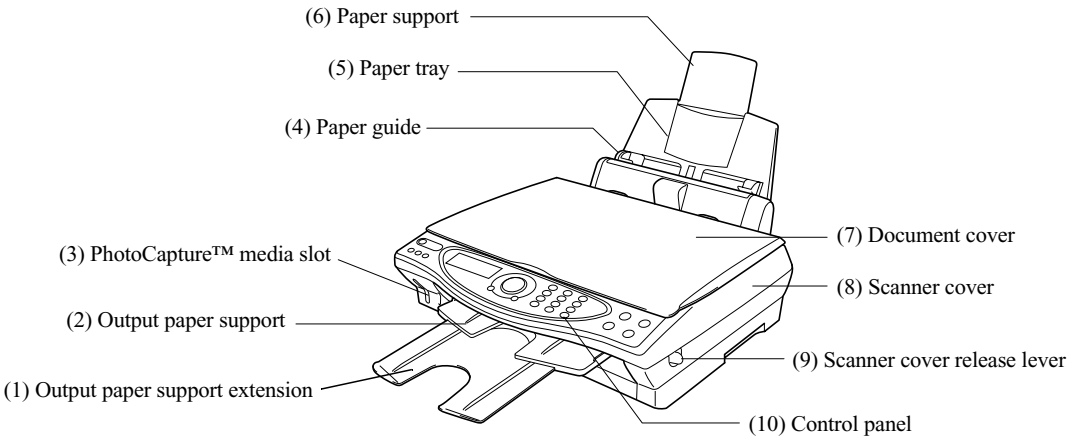
PARTS NAMES & FUNCTIONS

CHAPTER 1 PARTS NAMES & FUNCTIONS

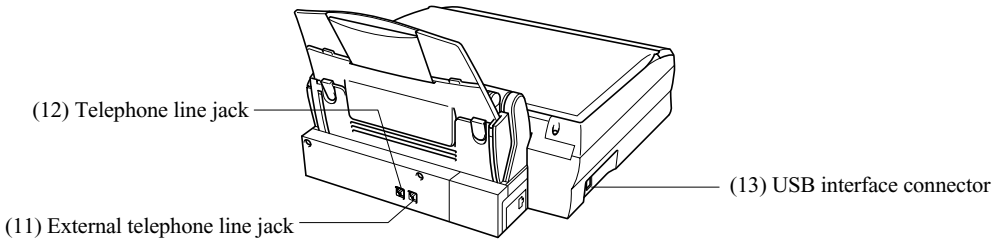
CONTENTS

1.1 EQUIPMENT OUTLINE

Front view

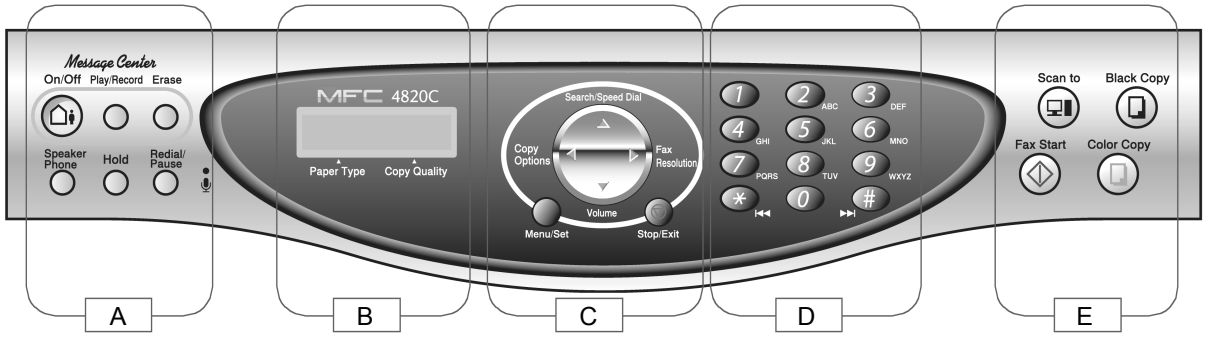


Rear view



No.	Name	Description
(1)	Output paper support extension	Pull it out to prevent the printed paper from falling.
(2)	Output paper support	Printed paper comes out here.
(3)	PhotoCapture™ media slot	Insert your media card into the appropriate slot to print a digital photo.
(4)	Paper guide	Press and slide it to fit the paper width.
(5)	Paper tray	Load paper here.
(6)	Paper support	Unfold to support paper.
(7)	Document cover	Open to place the original on the scanner glass.
(8)	Scanner cover	Open to install an ink cartridge or to remove jammed paper.
(9)	Scanner cover release lever	Pull to open the scanner cover.
(10)	Control panel	Use the keys and display to control the machine.
(11)	External telephone line jack	Plug in the modular plug on the external telephone line here.
(12)	Telephone line jack	Plug in the modular plug on the telephone line here.
(13)	USB interface connector	Connect the USB cable here.

1.2 CONTROL PANEL



A. Telephone and Message Center keys

On/Off

Let's you activate the Message Center and blinks if you did not play your voice messages.

Play/Record

Lets you listen to voice messages stored in memory. Also, it lets you record telephone calls.

Erase

Lets you delete voice messages, all fax messages or all messages.

Speaker Phone

Lets you dial telephone and fax numbers and speak to another party without lifting the handset.

Hold

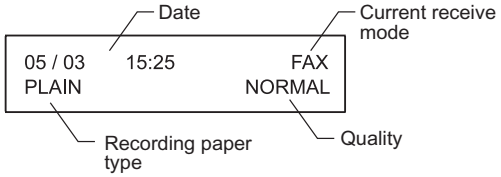
Lets you place calls on hold.

Redial/Pause

Redials the last number you called. It also inserts a pause in auto dial numbers.

B. Liquid Crystal Display (LCD)

Displays messages on the screen to help you set up and use your machine.



C. Navigation keys

Copy Options

Copy Options

You can quickly and easily select temporary settings for copying.

Photo Capture

Let's you access PhotoCapture™ Center mode by inserting your media card. After inserting your digital camera's card, press the Copy Options to print the thumbnails or digital photos or to temporarily change the settings for digital direct printing.

Fax Resolution

You can temporarily change the resolution when you send a fax.

Search/Speed dial

Lets you look up numbers that are stored in the dialing memory. It also lets you dial stored numbers by pressing # and a two-digit number.

Volume

When using the speaker or listening to the ring, you can press this key to adjust the volume.

Menu/Set

Lets you access the Menu to program and store your settings in the machine.

Press to scroll forward or backward to a menu selection.

Press to scroll through the menus and options.

Stop/Exit

Stops a fax, cancels an operation or exits from the menu.

D. Dial Pad

Use these keys to dial telephone and fax numbers and as a keyboard for entering information into the machine.

The # key lets you temporarily switch the dialing mode during a telephone call from Pulse to Tone.

E. Scan, Fax and Copy keys

Scan key:

Scan to

Lets you scan the next original and select the destination in your computer (such as a word processing, graphics or E-mail application, a Media card or a folder on your computer.)

Copy keys:

Black Copy

Makes a black-and-white copy.

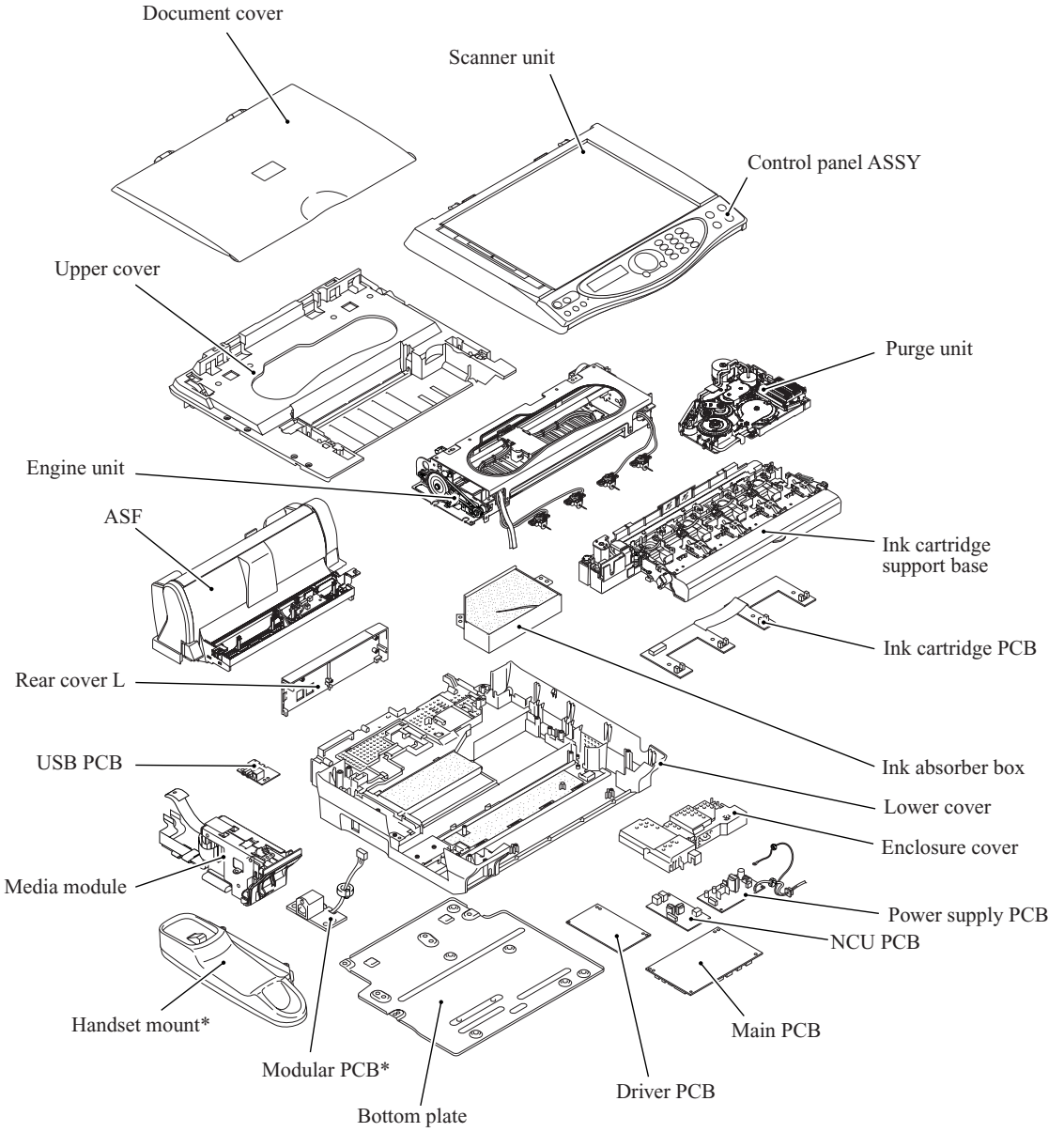
Color Copy

Makes a full-color copy.

Fax Start

Starts an operation, such as sending a fax.

1.3 COMPONENTS



* Provided on the MFC4820C.

CHAPTER 2

SPECIFICATIONS

CHAPTER 2 SPECIFICATIONS

CONTENTS

2.1 GENERAL

2.1.1 General Specifications

Memory Capacity	16MB
Auto Sheet Feeder (ASF)	Up to 100 sheets (20 lb.)
Printer Type	Ink Jet
Print Method	Piezo with 75 x 4 nozzles
Liquid Crystal Display (LCD)	16 characters x 2 lines, backlight
Operating Environment	50 to 95ºF (10 to 35ºC)
Best Print Quality	68 to 91ºF (20 to 33ºC)
Power Source	120 VAC, 50/60 Hz (U.S.A. and Canadian version only)
Power Consumption	Standby: under 9.7 watts Operating: under 50 watts
Dimensions	18.2 x 18.5 x 10.1 (inches) 462 x 469.7 x 255.5 (mm)
Weight	18.3 lb./8.3 kg (with components)

2.1.2 Paper Specifications

Recommended paper

Plain Paper:	Xerox 4200
Inkjet Paper:	KODAK® Premium Inkjet Paper (Matte)
Glossy Paper:	JETPRINT PHOTO® Professional Photo Paper
Transparencies:	3M Transparency Film (CG3410)

Paper Capacity of the Paper Tray

Paper Type	Paper Size	Number of Sheets
Plain Paper (Cut Sheet)	Letter, Executive, A4, A5	100 of 20 lb. (80 g/m^2) Up to 0.39 in. (10 mm)
	Legal	50 of 20 lb. (80 g/m^2)
Inkjet Paper	Letter	20
Glossy Paper	Letter	20
Transparencies	Letter	10
Envelopes	DL, COM 10, C5, Monarch	10
Postcard	4" x 6"	30
Index Card	5" x 8"	30

Paper Specifications for the Paper Tray

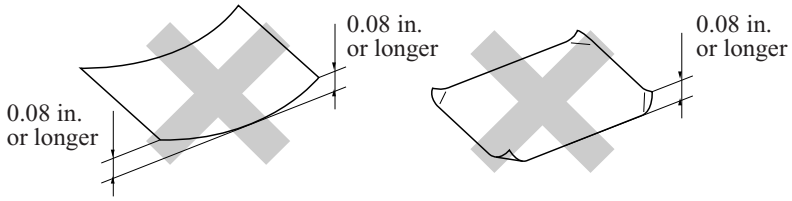
Cut Sheet Paper Weight	Plain paper / Inkjet paper: 17 to 32 lb. (64 to 120 g/m^2) Glossy paper: Up to 40 lb. (150 g/m^2) Post card: Up to 45 lb. (170 g/m^2) Index card: Up to 32 lb. (120 g/m^2)
Thickness	Plain paper/Inkjet paper: 0.003 to 0.006 in. (0.08 to 0.15 mm) Glossy paper: Up to 0.007 in. (0.18 mm) Envelopes: Up to 0.02 in. (0.52 mm) Post card: Up to 0.009 in. (0.23 mm) Index card: Up to 0.006 in. (0.15 mm)

Paper Capacity of the Output Paper Support

Output Paper Support	Up to 30 sheets of 20 lb. (80 g/m^2) (Transparencies and glossy paper must be picked up from the output paper support one page at a time to avoid smudging.)

Do not use paper or envelopes:

- that are damaged, curled, wrinkled, or irregularly shaped



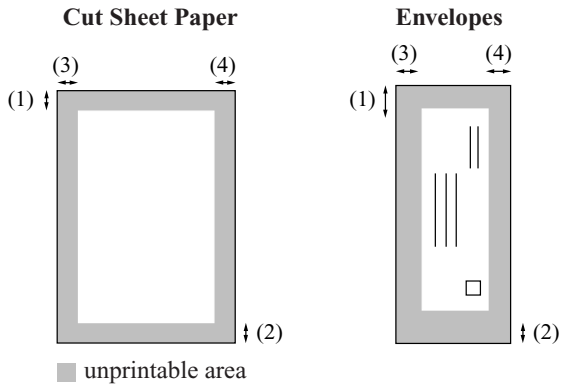
- that are extremely shiny or highly textured
- that were previously printed by a laser printer
- that cannot be arranged uniformly when stacked
- that are made with a short grain

Do not use envelopes:

- that are of a baggy construction
- that are embossed (have raised writing on them)
- that have clasps on them
- that are not sharply creased
- that are preprinted on the inside

2.1.3 Printable Area

The printable area depends on the settings in the application you are using. The figures below show the unprintable areas on cut sheet paper and envelopes.



Paper	Paper Size		(1) Top	(2) Bottom	(3) Left	(4) Right
Cut sheet	Letter, A4	Fax	0.12	0.12	0.12	0.12
		Printer	0.12 (0.02)*	0.12 (0.02)*	0.12 (0.02)*	0.12 (0.02)*
		Copy	0.12	0.12	0.12	0.12
	Executive, Legal	Printer	0.12	0.12	0.12	0.12
	A5	Copy	0.12	0.12	0.12	0.12
		Printer	0.12	0.12	0.12	0.12
Post card	4" x 6"	Printer	0.12	0.47 (0.12)*	0.12	0.12
Index card	5" x 8"	Printer	0.12 (0.02)*	0.12 (0.02)*	0.12 (0.02)*	0.12 (0.02)*
Envelopes	DL, COM 10, C5, Monarch	Printer	0.67	0.67	0.12	0.12

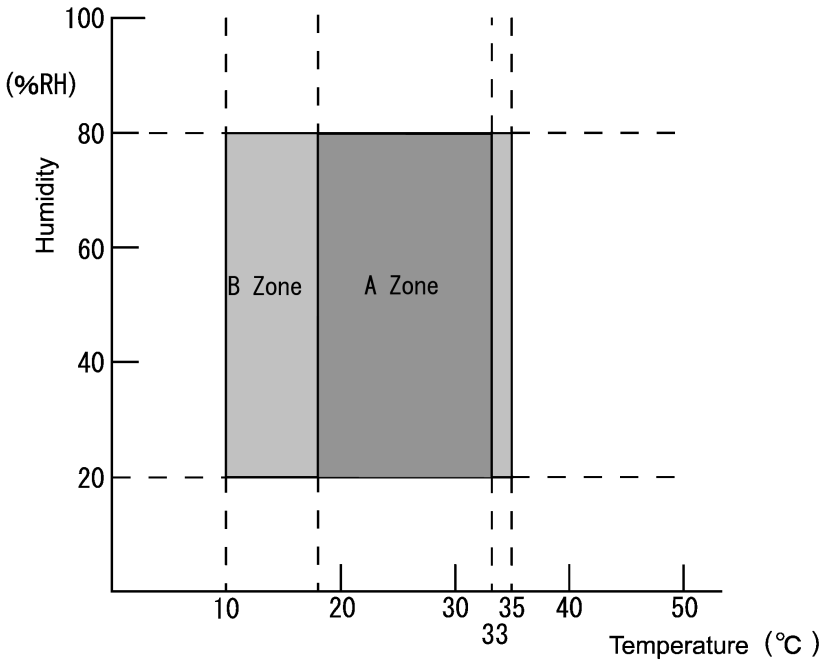
* When you set the Near-Edge printing feature to ON.

Printer depends on the Printer driver.

The figures above are approximate and the printable area may vary depending on the type of cut sheet paper you are using.

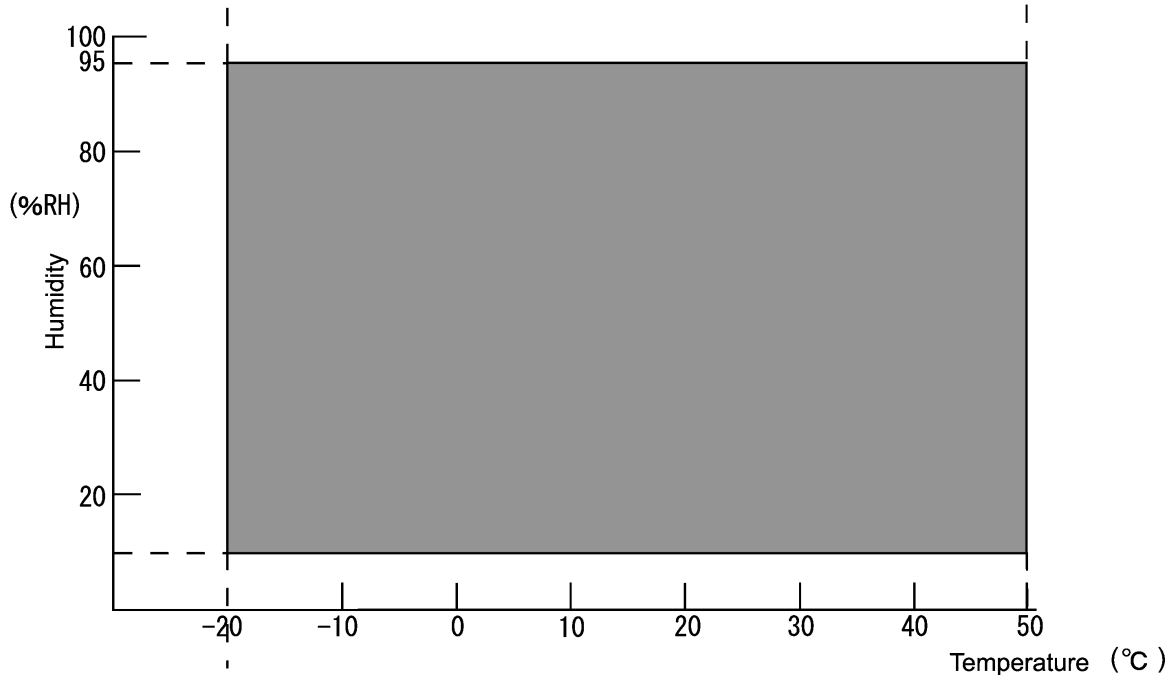
2.1.4 Environmental Conditions

Under operational conditions : 10°C to 35°C/20% to 80%



A Zone : Recommended condition
B Zone : Operation Area

Under non operational conditions : -20°C to 50°C/10% to 95%



2.2 OTHERS

Model Name	MFC-4420C	MFC-4820C
GENERAL		
Print Engine	2 head BH: 75 nozzles/color	2 head BH: 75 nozzles/color
Technology	Inkjet	Inkjet
Scanning Method	CIS	CIS
CPU Speed	RISC-100MHz	RISC-100MHz
Back up Clock	Yes (1 hour)	Yes (1 hour)
Operating Environment Temperature	10 - 35 (20-33) degrees Centigrade	10 - 35 (20-33) degrees Centigrade
Humidity	20 - 80 % (without condensation)	20 - 80 % (without condensation)
On/Off Switch	Yes	N/A
Demo Model	Yes	N/A
Simultaneous Operation*6	Yes	Yes
Demo Print	Yes	N/A
Test Sheet	Yes (in Menu Table)	Yes (in Menu Table)
Min. Input of ADF (Width/Height)	-	-
Max. Input of ADF (Width/Height)	-	-
Max. Input of Glass (Width/Height)	8.5"/11.7", 216/297mm	8.5"/11.7", 216/297mm
Min. Output of Auto Cut sheet Feeder	3.5"/5.0", 89/127mm	3.5"/5.0", 89/127mm
Max. Output of Auto Cut sheet Feeder	8.5"/14.0", 216/356mm	8.5"/14.0", 216/356mm
Min. Output of Manual Feed Slot (Width/Height)	-	-
Max. Output of Manual Feed Slot (Width/Height)	-	-
Min. Output of Multi-Purpose Tray (Width/Height)	-	-
Max. Output of Multi-Purpose Tray	-	-
Sheet Weight (Paper tray)	64 - 120 g/m^2 (17 - 32 lb.)	64 - 120 g/m^2 (17 - 32 lb.)
Sheet Weight (ADF)	-	-
Sheet Weight (Manual Feed Slot)	-	-
Sheet Weight (MP Tray)	-	-
ADF (pages)	-	-
Paper Capacity (sheets)	100 (80 gsm)	100 (80 gsm)
Output Paper Capacity (sheets)	30	30
Optional Paper Tray (sheets)	-	-
Cassette Control Function	-	-
Recommended Paper (Plain/Inkjet/Glossy/ Transparency)	INK JET/JETPRINT Photo proofing paper GLOSSY/JETPRINT Professional Photo Paper	INK JET/JETPRINT Photo proofing paper GLOSSY/JETPRINT Professional Photo Paper
LCD Size	(Standard size) 16 characters x 2 lines	(Standard size) 16 characters x 2 lines
LCD Back Light	N/A	Yes
On-Screen Programming	Yes	Yes
LCD Language	English	English
Memory Capacity (physical: Mbytes)	16 Mbytes (RAM)	16 Mbytes (RAM)
Memory Backup (with battery)	N/A	Yes
Back Up Print:ON/OFF Feature	N/A	N/A
Optional Memory	N/A	N/A
Memory Security	N/A	N/A
Transmission Lock	N/A	N/A
Dimensions w/Carton (WxDxH)	20.5"x19.2"x10.0"	21.4"x20.5"x10.0"
Dimensions w/o Carton (WxDxH)	15.7"x16.9"x6.4"	18.2"x16.9"x6.4"
Weight w/Carton	10.1kg	10.8kg
Weight w/o Carton	8.0kg	8.7kg
Body Color	Panel : Blue FB cover : Silver Emblem : Blue metallic Tray : Smoke Gray	Panel : Black FB cover : Silver Emblem : Black metallic Tray : Smoke Gray
Power Source	120 VAC 50/60Hz	120 VAC 50/60Hz
Power Consumption(Power OFF/Power Save (CPU Sleep)/Standby/Peak)	N/A/N/A/9.2Wh/21Wh	N/A/N/A/9.7Wh/22Wh
Energy Star Compliant (USA Only)	Yes	Yes
Machine Noise (Standby/Peak ex. In printing)	35dBA/45dBA	35dBA/45dBA
Total print pages (Internal counter)	Yes (In Maintenance)	Yes (In Maintenance)
Copy pages (Internal counter)	Yes (In Maintenance)	Yes (In Maintenance)
PC print pages (Internal counter)	Yes (In Maintenance)	Yes (In Maintenance)
Fax RX pages (Internal counter)	Yes (In Maintenance)	Yes (In Maintenance)
Ink Gauge Indication	Yes (in Menu Table/Remote Setup)	Yes (in Menu Table/Remote Setup)

Model Name	MFC-4420C	MFC-4820C
LIST/REPORT		
Activity Report/Journal Report	Yes (up to 200)	Yes (up to 200)
Transmission Verification Report	Yes (in Menu Table)	Yes (in Menu Table)
Cover page	N/A	N/A
Help List	Yes (in Menu Table)	Yes (in Menu Table)
Call Back Message	N/A	N/A
Caller ID List	N/A	N/A
Quick Dial List	N/A	N/A
Quick Dial List (New) *5	Yes (in Menu Table)	Yes (in Menu Table)
Tel Index List	N/A	N/A
Memory Status List	N/A	N/A
System Setup (User Setting) List	Yes (in Menu Table)	Yes (in Menu Table)
Order Form	N/A	N/A
INTERFACE		
External TAD Interface	Yes	Yes
Host Interface	USB	USB
Host Interface Auto Switching	N/A	N/A
Cable included	N/A	N/A
Acceptable Media Card Slot	SmartMedia, CompactFlash, MemoryStick	SmartMedia, CompactFlash, MemoryStick
SUPPLIES/OPTIONS		
Starter Toner	-	-
Toner/Drum Life/Yield	-	-
Starter Ribbon	-	-
Ribbon Life/Yield (size x meters) of cartridge	-	-
Starter Ink	N/A	N/A
Ink Cartridge Life/Yield	BK:480pages (Draft 5%)	BK:480pages (Draft 5%)
	C/M/Y:400pages (Draft 5%)	C/M/Y:400pages (Draft 5%)
Options	-	-
SERVICE INFORMATION		
Monthly Volume	2500 pages/month	2500 pages/month
Machine Life (year)	30,000 pages or 5 years	30,000 pages or 5 years
Periodical Replacement Parts for Laser;	-	-
Fixing Unit	-	-
Separation Pad Assy	-	-
Paper Pick-up Roller Assy	-	-
Scanner Unit	-	-
MTBF (Mean Time Between Failures)	More than 2000 Hrs	More than 2000 Hrs
Ozone Emission;	-	-
Printer	-	-
TELEPHONE		
Handset	-	Yes
Hook	Yes	Yes
Off Hook Alarm	N/A	N/A
Speaker Phone	N/A	Yes (Duplex)
Power Failure Phone	N/A	N/A
Power Failure Dialing	N/A	N/A
Chain Dialing	Yes	Yes
Automatic Redial	Yes (1time/5min)	Yes (1time/5min)
PBX Feature (EUROPE)	-	-
Handset Volume	-	Yes (2 steps + AMPLIFY)
Speaker Volume	Yes (3 steps + OFF)	Yes (3 steps + OFF)
Ring Volume	Yes (3 steps + OFF)	Yes (3 steps + OFF)
Hold/Mute Key	-	Yes (Hook/Hold key)
Music on Hold	-	N/A
Monitoring the Line on Hold with Music	-	N/A

Model Name	MFC-4420C	MFC-4820C
One-Touch Dial	N/A	N/A
Speed Dial	80	80
Figures of One-Touch & Speed Dial	20 digits	20 digits
Resisterable Number Of Characters	15 characters	15 characters
Group Dial (Up to X groups)	Yes (6)	Yes (6)
Telephone Index	Yes (with Search/Speed dial key)	Yes (with Search/Speed dial key)
Pre-registered for FAX BACK SYSTEM (USA)	Yes	Yes
Caller ID	Yes	Yes
Call Waiting Caller ID	No	No
Call waiting Ready (Only for USA)	No	Yes (by Hook switch by handset)
Distinctive Ringing	Yes	Yes
COLOR FAX		
Modem Speed (bps)	14,400 (Fax)	14,400 (Fax)
Transmission Speed (sec.)	Approx.6 (Brother#1,MMR)	Approx.6 (Brother#1,MMR)
ITU-T Group	G3	G3
Coding Method	Mono:MH/MR/MMR, Color:JPEG	Mono:MH/MR/MMR, Color:JPEG
Fax/Tel Switch	Yes (Hook key)	Yes
Super Fine	Yes (TX & RX:B&W only)	Yes (TX & RX:B&W only)
Gray Scale	256	256
Contrast	Yes (Auto/S.Light/S.Dark)	Yes (Auto/S.Light/S.Dark)
Smoothing	-	-
Dual Access	Yes (B&W only)	Yes (B&W only)
Enhanced Remote Activate	Yes	Yes
Station ID	Yes (20 digits/20 characters)	Yes (20 digits/20 characters)
Remote Maintenance	Yes	Yes
RX Mode Indication	LCD	LCD
Resolution Indication	LCD	LCD
Paper Handling Size	LTR, LEGAL, A4	LTR, LEGAL, A4
Delayed Timer	Yes (up to 50:B&W only)	Yes (up to 50:B&W only)
Polled Sending (type)	Yes (Std/Seq:B&W only)	Yes (Std/Seq:B&W only)
Multi Transmission	N/A	N/A
Multi Resolution Transmission	N/A	N/A
Next-Fax Reservation	Yes (Dual Access)	Yes (Dual Access)
Batch Transmission	Yes (B&W only)	Yes (B&W only)
Call Reservation Over Auto TX	N/A	N/A
Call Reservation Over Manual TX	N/A	N/A
Quick-Scan(Memory transmission)	Approx. 6 sec./page (A4 standard)	Approx. 6 sec./page (A4 standard)
Memory Transmission (ITU-T Test Chart #1)	Up to 400 Pages (MMR)	Up to 400 Pages (MMR)
Memory Transmission (Brother Chart)	UP to480 Pages (MMR)	UP to480 Pages (MMR)
ECM (Error Correction Mode)	Yes	Yes
Error Re-Transmission	N/A	N/A
Broadcasting	Yes (130 locations)	Yes (130 locations)
Manual Broadcasting	Yes (50 locations)	Yes (50 locations)
Easy Receive/Fax Detect	Yes	Yes
Polling Receiving (type)	Yes (Std/Seq:B&W only)	Yes (Std/Seq:B&W only)
Auto Reduction	Yes	Yes
Out-of-Paper Reception (ITU-T Test Chart #1)	Up to 400 Pages (MMR)	Up to 400 Pages (MMR)
Out-of-Paper Reception (Brother Chart)	UP to 480 Pages (MMR)	UP to 480 Pages (MMR)
Remote Access	Yes	Yes
Fax Retrieval	Yes (B&W only)	Yes (B&W only)
Fax Forwarding	Yes (B&W only)	Yes (B&W only)
Paging	Yes	Yes (FAX & VOICE)
Color FAX (Document Send/Receive)	Yes/Yes	Yes/Yes
Color FAX (Memory Send/Receive)	No/Yes	No/Yes

Model Name	MFC-4420C	MFC-4820C
COLOR PRINTER		
Color/Mono	Color	Color
Engine Type	CIS	CIS
Resolution (dpi)	up to 2400x1200 dpi	up to 2400x1200 dpi
Speed (ppm) Simple	13/11ppm (Mono/Color: 600x150 dpi)	13/11ppm (Mono/Color: 600x150dpi)
Speed (ppm) Duplex	-	-
First print out time (from READY mode *4)	-	-
Warm up Time (from SLEEP mode)	0 seconds	0 seconds
Emulation	N/A	N/A
Resident Fonts	N/A	N/A
Fonts Disk Based	Yes (35 TrueType)	Yes (35 TrueType)
Paper Handling Size (Paper Tray)	A4, LTR, LGL, EXE, A5, Postcard, Indexcard, C5 Envelope, Com-10, DL Envelope, Monarch	A4, LTR, LGL, EXE, A5, Postcard, Indexcard, C5 Envelope, Com-10, DL Envelope, Monarch
Paper Handling Size (Manual Slots)	-	-
Paper Handling Size (MP)	-	-
Media Type (Paper Tray)	Plain, Inkjet, Glossy, Transparency	Plain, Inkjet, Glossy, Transparency
Media Type (Manual Slots)	-	-
Media Type (MP Tray)	-	-
Print Paper Margin (upper, lower, left, right)	0.12, 0.12, 0.12, 0,12" (@A4/LTR/4x6 PostCard/A6/5x8 Index card/ Regal/A5/B5/Executive/Custom) Approximately 0.02, 0.02, 0.02, 0.02"margin (Near Edge ON @A4/LTR/4x6 PostCard/A6/5x8 Index card) Envelops: 0.67,0.67,0.12,0.12"	0.12, 0.12, 0.12, 0,12" (@A4/LTR/4x6 PostCard/A6/5x8 Index card/ Regal/A5/B5/Executive/Custom) Approximately 0.02, 0.02, 0.02, 0.02"margin (Near Edge ON @A4/LTR/4x6 PostCard/A6/5x8 Index card) Envelops: 0.67,0.67,0.12,0.12"
Variable Dot Print	Yes (3 sizes)	Yes (3 sizes)
Minimum Droplet Size	5 pl	5 pl
Shingling Print	N/A	N/A
Color Enhancement	Yes	Yes
COLOR COPY		
Color/Mono	Color	Color
Speed (cpm) *time calculated excluding paper	10/6ppm (Mono/Color: 600x150 dpi)	10/6ppm (Mono/Color: 600x150 dpi)
First copy out time (from READY mode *4)	-	-
Warm up Time (from SLEEP mode)	0 seconds	0 seconds
Multi Copy (Stack)	Yes (Up to 99)	Yes (Up to 99)
Multi Copy (Sort)	N/A	N/A
Reduction/Enlargement (%)	25 -- 400 in 1% increments	25 -- 400 in 1% increments
Resolution (dpi)	Print: Max. 1200x1200 dpi Scan: Max. 600x600 dpi	Print: Max. 1200x1200 dpi Scan: Max. 600x600 dpi
N in 1	2in1, 4in1/Color: A4, LTR only	2in1, 4in1/Color: A4, LTR only
Poster	Yes (3x3)	Yes (3x3)
Image Enhancement	N/A	N/A
Paper Handling Size (Paper Tray)	LTR, LGL, A4, Postcard (4Wx6H)	LTR, LGL, A4, Postcard (4Wx6H)
Paper Handling Size (Manual Slots)	-	-
Paper Handling Size (MP)	-	-
Media Type (Paper Tray)	Plain, Inkjet, Glossy, Transparency	Plain, Inkjet, Glossy, Transparency
Media Type (Manual Slots)	-	-
Media Type (MP Tray)	-	-
Print Paper Margin (upper, lower, left, right)	0.12, 0.12, 0.12, 0,12" (@LTR) 3.0, 3.0, 3.0, 3.0 mm (@A4 size)	0.12, 0.12, 0.12, 0,12" (@LTR) 3.0, 3.0, 3.0, 3.0 mm (@A4 size)
Duplex Copy	N/A	N/A
Resolution Indication	LCD	LCD
COLOR SCANNER		
Color/Mono	Color	Color
Optical Resolution (dpi)	600x2400 dpi	600x2400 dpi
Interpolated Resolution (dpi)	up to 9600x9600 dpi	up to 9600x9600 dpi
Warm up Time (from Scanner Lamp OFF)	-	-
Warm up Time (from Scanner Lamp OFF: Color)	-	-
Gray Scale	256	256
Scan Image	Yes (Scan to key)	Yes (Scan to key)
Scan/OCR	Yes (Scan to key)	Yes (Scan to key)

Model Name	MFC-4420C	MFC-4820C
Scan to E-mail	Yes (Scan to key)	Yes (Scan to key)
Scan to Card	Yes (Scan to key)	Yes (Scan to key)
Scan speed (Color/Mono) *@100dpi	LETTER up to 11/3 sec. A4 up to 12/3 sec.	LETTER up to 11/3 sec. A4 up to 12/3 sec.
Scanner Lamp Switch	-	-
Color Depth (Input/Output)	36 bit color processing/24 bit	36 bit color processing/24 bit
MESSAGE CENTER/MESSAGE MANAGER		
TAD	N/A	Yes
ICM Recording Time	N/A	30/60/120/180 3mins x 99 Max.
Toll Saver	N/A	Yes
Memo/Recording Conversation	N/A	Yes
OGM (MC/TAD,F/T)	N/A	Yes
User Recording OGM (MC/TAD, F/T)	N/A	Yes 20 sec.
PC FAX		
Supplier	Brother	Brother
Color/Mono	Mono	Mono
Sending	Yes	Yes
Receiving	N/A	N/A
Protocol Compliance	N/A	N/A
Broadcasting	up to 50	up to 50
Support OS Version (For Windows)		
Printer Driver	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Scanner Driver	Brother TWAIN: Win98(SE)/Me/2000 Windows WIA: Windows XP	Brother TWAIN: Win98(SE)/Me/2000 Windows WIA: Windows XP
PC Fax Sending Driver	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
PhotoCapture Center (Media Drive function)	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Remote Setup	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Bundled software: PaperPort 8.0 (Scan Viewer)	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Bundled software: Pop Up Menu (Brother Control Center)	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Bundled software: Scan to feature	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Bundled software: PhotoPrinter4.0 (Editor software)	Win98(SE)/Me/2000/XP with Auto Installer Program	Win98(SE)/Me/2000/XP with Auto Installer Program
Bundled software: Auto E-mail Printing	N/A	N/A
Bundled software: BRAdmin Professional	-	-
Bundled software: Network Print Software (LPR)	-	-
Bundled software: Network Print Software	-	-
BUNDLED SOFTWARE (For MAC)		
Printer Driver * 10.2.0 users need to update OS	Mac OS 8.6 - 9.2, 10.1,10.2.1 or greater	Mac OS 8.6 - 9.2, 10.1,10.2.1 or greater
Scanner Driver *not available for OS 10.1	Brother TWAN: Mac OS 8.6 - 9.2,10.2.1 or greater	Brother TWAN: Mac OS 8.6 - 9.2,10.2.1 or greater
PC Fax Sending Driver * 10.2.0 users need to	Mac OS 8.6 - 9.2 **	Mac OS 8.6 - 9.2, 10.1,10.2.1 or greater
PhotoCapture Center (Media Drive function)	Mac OS 9.0 - 9.2, 10.1,10.2.1 or greater	Mac OS 9.0 - 9.2, 10.1,10.2.1 or greater
Remote Setup	Mac 10.1,10.2.1 or greater	Mac 10.1,10.2.1 or greater
Bundled software: PaperPort 8.0 (Scan Viewer)	Mac 8.6	Mac 8.6
Bundled software: Pop Up Menu (Brother Control	N/A	N/A
Bundled software: Scan to feature	N/A	N/A
Bundled software: PhotoPrinter4.0 (Editor	Mac OS 8.6 - 9.2, 10.1,10.2.1 or greater	Mac OS 8.6 - 9.2, 10.1,10.2.1 or greater
Bundled software: BRAdmin Professional	-	-
Bundled software: Network Print Software (LPR)	-	-
Bundled software: Network Print Software	-	-

Model Name	MFC-4420C	MFC-4820C
PHOTO CAPTURE CENTER		
Acceptable Media	Smart Media (3.3V) Compact Flash (Type-1/2, excl. Micro-Drive) Memory Stick	Smart Media (3.3V) Compact Flash (Type-1/2, excl. Micro-Drive) Memory Stick
Paper Handling Size (Paper Tray)	LTR, LGL, A4, Postcard (4Wx6H)	LTR, LGL, A4, Postcard (4Wx6H)
Paper Handling Size (Manual Slots)	-	-
Paper Handling Size (MP)	-	-
Media Type (Paper Tray)	Plain, Inkjet, Glossy, Transparency	Plain, Inkjet, Glossy, Transparency
Media Type (Manual Slots)	-	-
Media Type (MP Tray)	-	-
Fit to Page	Yes	Yes
	@Postcard (4Wx6H)	@Postcard (4Wx6H)
Direct Print Size	5.0x3.5"/6.0x4.0"/7.0x5.0"/8.0"x10.0"	5.0x3.5"/6.0x4.0"/7.0x5.0"/8.0"x10.0"
Media Format	DPOF, Exif, DCF	DPOF, Exif, DCF
Image Format	Photo Print: JPEG Scan to Card: JPEG/PDF (Color), TIFF (B&W)	Photo Print: JPEG Scan to Card: JPEG/PDF (Color), TIFF (B&W)
Color Enhancement	Yes (True2Life)	Yes (True2Life)
Media Drive	Yes	Yes
Scan to Card	Yes	Yes
Data Management with Network board	-	-
NETWORK		
Standard/Option(User Option or Dealer Option)	-	-
Model Name	-	-
Share Printer	-	-
Share Scanner	-	-
Share PC FAX	-	-
Internet FAX	-	-
ITU SUB Addressing	-	-
Support OS version	-	-
Support OS version	-	-
Support OS version	-	-
Network connection	-	-
Support Protocols	-	-
TCP/IP Protocols	-	-
TCP/IP Protocols	-	-
TCP/IP Protocols	-	-
TCP/IP Protocols	-	-
Network Management	-	-
Network Management	-	-
Network Management	-	-
Format (Scan to LAN)	-	-

***1: Xerox 4200 20lb paper under Office Condition (Temperature/Humidity)**
***2: Email address can be stored up to 100 locations; from 01-100.**
***4: At Read mode condition during MFC is idling with Scanner lamp is ON.**
***5: New LIST in which empty box is not printed out.**
***6: See the detail simultaneous operation**

CHAPTER 3

SETTING UP OF THE MACHINE

CHAPTER 3 SETTING UP OF THE MACHINE

CONTENTS

3.1 CONDITIONS REQUIRED FOR INSTALLATION

Any machine is likely to be influenced by the environment of the set-up location. If the machine is set-up in an inappropriate location, the machine may not perform as expected. Therefore, the following factors should be taken into consideration before deciding where to set-up the machine.

3.1.1 Environmental Conditions

The machine should not be set up in the locations referred to in the following items (a) through (d) which specify inappropriate locations for set-up.

(a) Where it is likely to receive direct sunlight or similar light. (For example, next to a window)

(b) Where it is likely to suffer a big difference in temperature and humidity between the maximum and minimum levels. (Normal operation environment is within 10 ˚C to 35 ˚C, 20 to 80%RH and without any condensation.)

(c) Where it is likely to be in a draft of cold air from an air-conditioner or warm air from a heater, or to receive direct radiant heat.

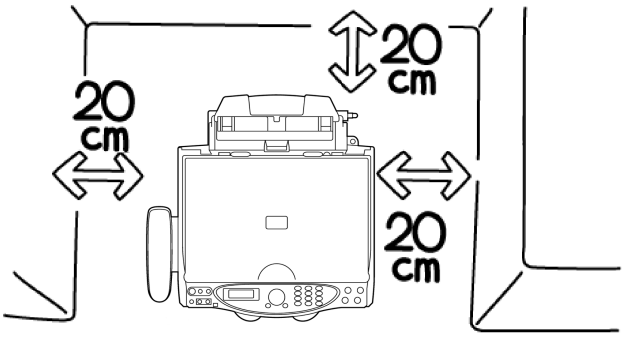
(d) Where it is likely to be excessively dusty or be subject to corrosive gases such as ammonia.

(e) Users should select a location with good ventilation and set the machine on a flat surface.

(f) Users should check that the maximum angle of the set-up location is horizontal to within 1 ˚ .

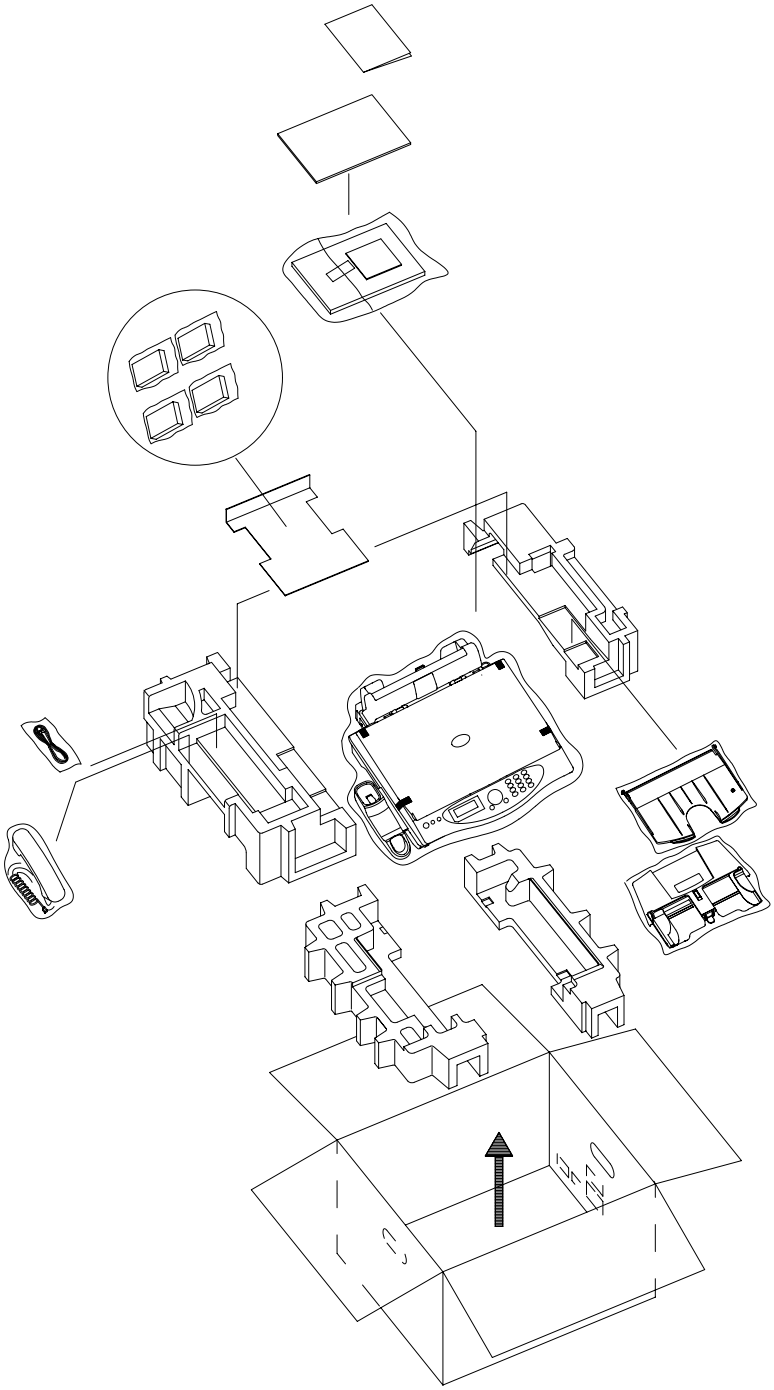
3.1.2 Basic Layout of Machine Set-up Location

Shows the basic layout of the machine set-up location that is suitable for smooth.



3.2 UNPACKING THE MACHINE

The equipment consists of the following major components:

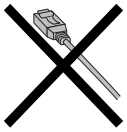


3.3 INSTALLATION WORK

3.3.1 Removing the Protective Parts

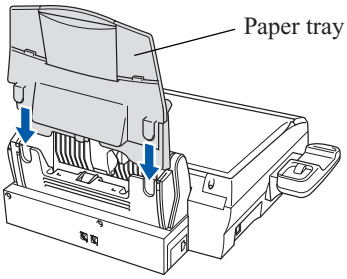
(1) Remove the protective tape.

Do NOT connect the USB cable. Connecting the USB cable is done when installing the driver.



3.3.2 Attaching the Paper Tray

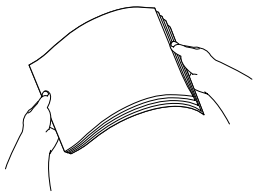
(1) Insert the paper tray from above into the back of the machine.



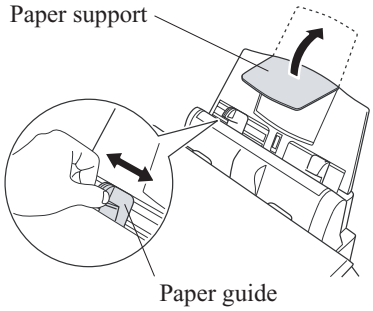
3.3.3 Loading Paper

NOTE: You can load up to 100 sheets of 20 lb (75 g/m^2) paper.

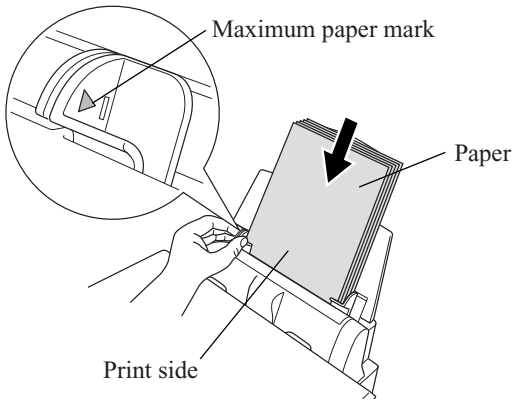
(1) Fan the stack of paper well to avoid paper jams and mis-feeds.



(2) Unfold the paper support and then press and slide the paper guide to fit the paper width.

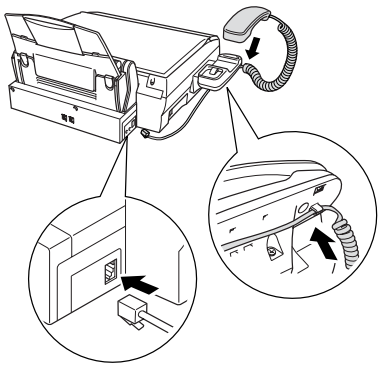


(3) Gently insert paper. Make sure the print side is towards you and the paper is below the maximum paper mark.



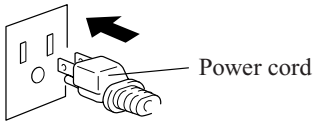
3.3.4 Setting the Handset

(1) Connect the curled handset cord to the machine and the other end to the handset.

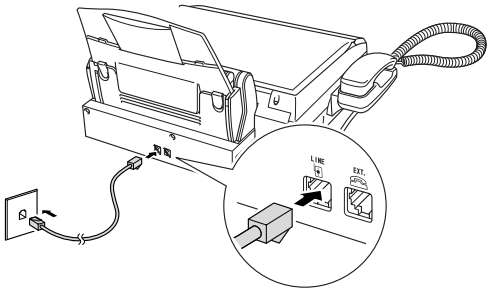


3.3.5 Connecting the Telephone Line Cord and Power Cord

(1) Connect the power cord.



(2) Connect the telephone line cord. Connect one end of the telephone line cord to the jack on the machine marked **LINE** and the other end to a modular wall jack.

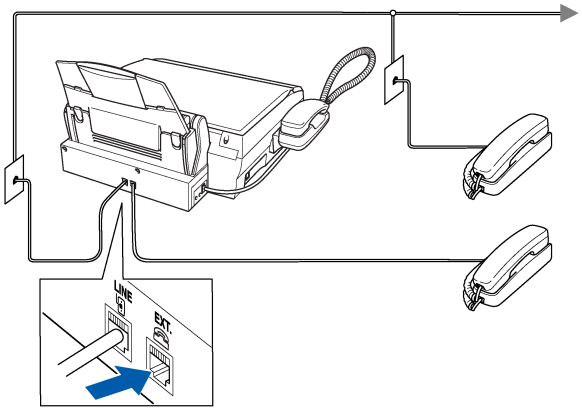


Do not connect the USB cable yet.

⚠ WARNING

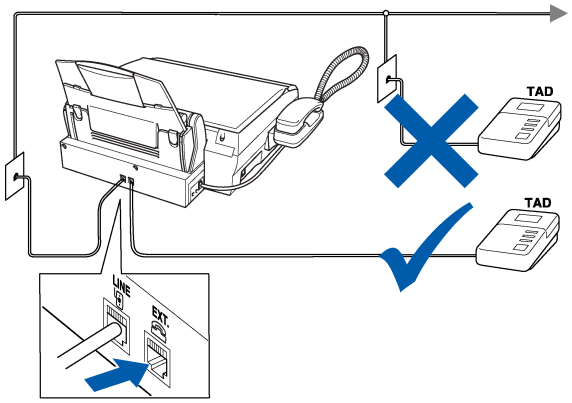
- The machine must be grounded using a 3-prong plug.
- Since the machine is grounded through the power outlet, you can protect yourself from potentially hazardous electrical conditions on the telephone network by keeping the power to your machine on when you connect it to a telephone line. Similarly, you can protect yourself when you want to move your machine by disconnecting the telephone line first and then the power cord.

NOTE: If you are sharing one phone line with an external telephone, connect it as shown below.



NOTE: If you are sharing one phone line with an external telephone answering machine, connect it as shown below.

Please select Receive Mode to MANUAL if you have an external answering machine.

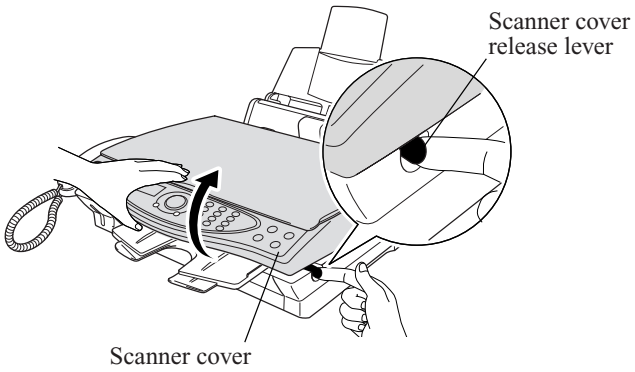


3.3.6 Installing the Ink Cartridges

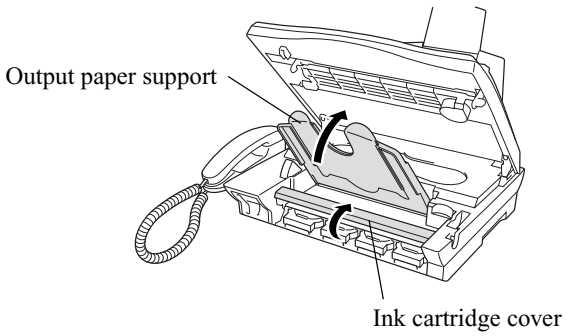
(1) Make sure that the power is turned on. The LCD shows;

```
CHECK CARTRIDGE
Open cover, then...
```

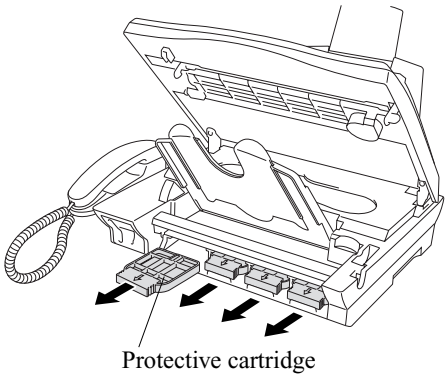
(2) Pull the scanner cover release lever to open the scanner cover and lift it to the opening position.



(3) Lift the output paper support and ink cartridge cover.

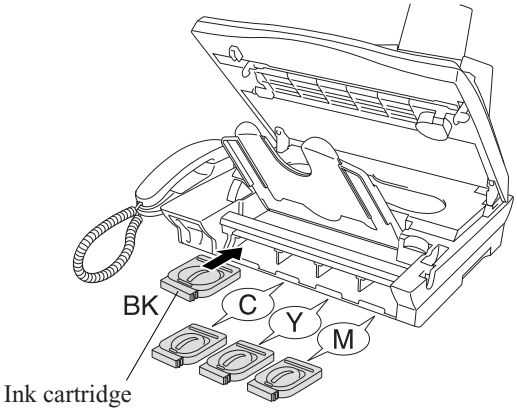


(4) Remove the yellow plastic protective cartridges.

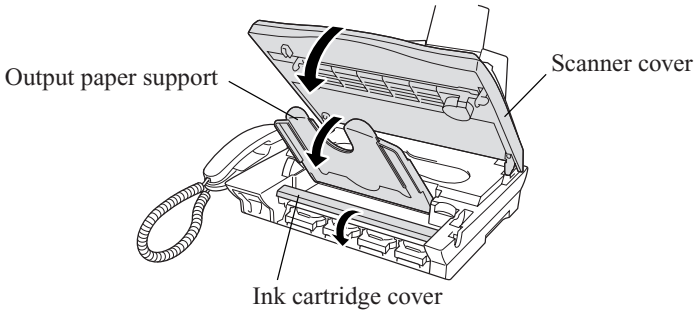


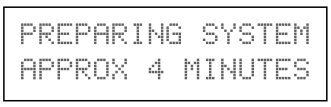
NOTE: Do not throw away the yellow plastic protective cartridges. You will need them in the future to transport the machine.

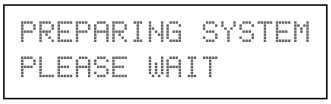
(5) Insert the ink cartridges into the slot for each color until it clicks.



(6) Close the ink cartridge cover, the output paper support and the scanner cover. When the machine is setup for the first time, the machine will prepare the Brother unique ink tube system for use for the first time. This process will occur only once, the first time ink cartridges are installed. The preparation process will last up to four minutes.







- DO NOT remove ink cartridges if you do not need to replace them. If you do so, it may reduce the ink quantity and the machine will not know the quantity of ink left in the cartridge.
- DO NOT shake the ink cartridges. If ink stains your body or clothing, wash with soap or detergent immediately.

- Brother strongly recommends that you do not refill the ink cartridges provided with your machine. We also strongly recommend that you continue to use only Genuine Brother Brand replacement ink cartridges. Using or attempting to use potentially incompatible inks and/or cartridges in your machine may cause damage to the machine itself and/or it may result in unsatisfactory print quality. Our warranty coverage does not apply to any problem that was caused by the use of unauthorized third party ink and/ or cartridges. To protect your investment and guarantee your print quality please continue to replace consumed ink cartridges with only Genuine Brother Branded Supplies.
- DO NOT insert and remove the cartridges repeatedly. If you do so, the ink may seep out of the cartridge.
- DO NOT peel a film off the cartridge.

NOTE: If you mix the colors by installing an ink cartridge in the wrong position, you must clean the print head by running several cleaning cycles after correcting the cartridge installation.

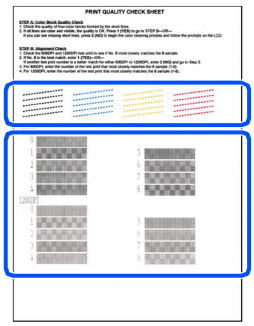
3.3.7 Color Block Quality and Alignment Checks

(1) After the cleaning cycle is finished, the LCD shows;

```
SET PAPER AND
PRESS FAX START
```

(2) Make sure the paper is loaded in the paper tray. Press the **Fax Start** key.

(3) The machine starts printing the PRINT QUALITY CHECK SHEET (only during initial ink cartridge installation).



Check in **Step A**

Check in **Step B**

Step A: Color Block Quality Check

(1) The LCD shows:

```
IS STEP "A" OK?
1.YES 2.NO
```

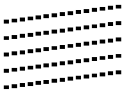
Check the quality of the four color blocks formed by the short lines printed on the sheet. (BLACK/CYAN/YELLOW/MAGENTA)

(2) If all lines are clear and visible, press the **1** key on the dial pad to skip to STEP B: Alignment Check.

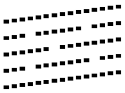
---OR---

If you can see missing short lines, press the **2** key on the dial pad and proceed to (3).

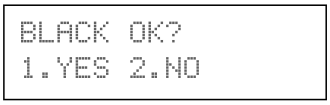
OK



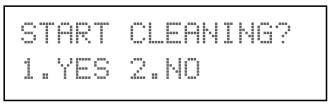
Poor



(3) The LCD asks you if the print quality is OK for each color. Press the **1** or **2** key on the dial pad.



When you have finished selecting the **1** key (YES) or the **2** key (NO) for each color, the LCD shows:



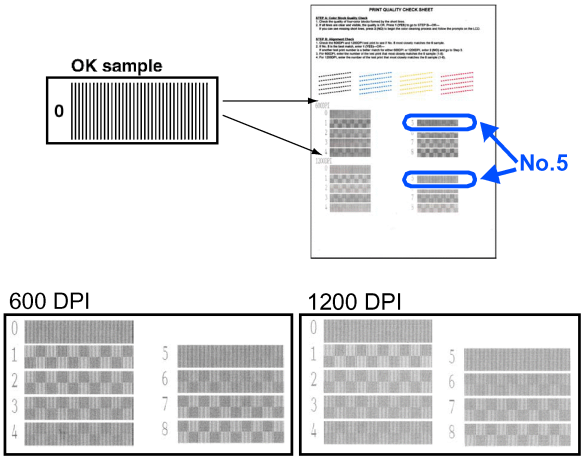
Press the **1** key (YES), and then machine starts cleaning the colors. After cleaning is finished, press the **Fax Start** key. The machine starts printing the PRINT QUALITY CHECK SHEET again and goes back to the first step of STEP A.

Step B: Alignment Check

(1) The LCD shows:

```
IS STEP "B" OK?
1.YES 2.NO
```

Check the 600 DPI and 1200 DPI test print to see if No.5 most closely matches the OK sample (No.0). Press the **1** key if No.5 matches it.



If another test print number is a better match for either 600 DPI or 1200 DPI, press the **2** key to select NO and go to (2).

(2) For 600 DPI, select the number from 1 to 8 that most closely matches the No.0 sample and enter it using the dial pad.

```
600DPI ADJUST
SELECT BEST #
```

(3) For 1200 DPI, enter the number from 1 to 8 that most closely matches the No.0 sample.

```
1200DPI ADJUST
SELECT BEST #
```

The Quality check is now complete.

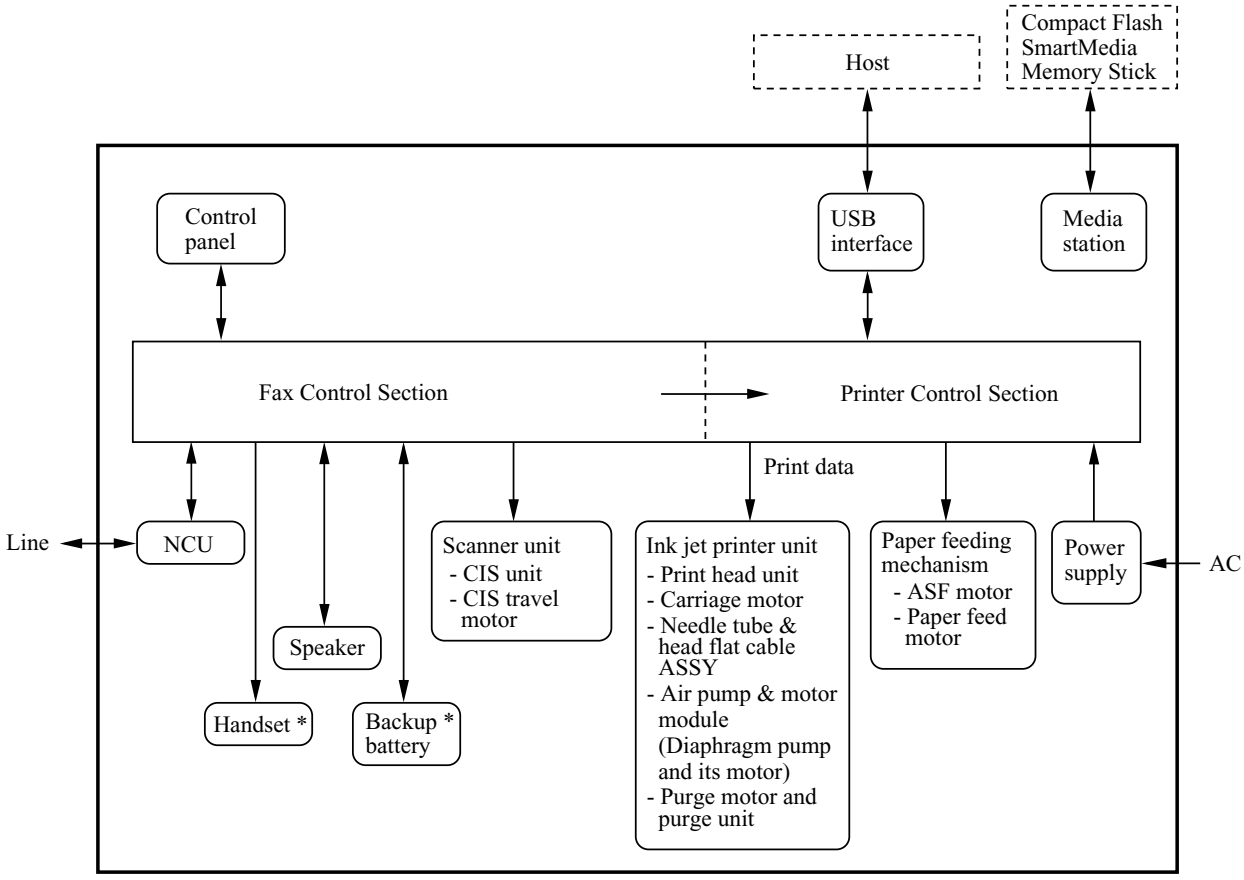
CHAPTER 4

THEORY OF OPERATION

CHAPTER 4 THEORY OF OPERATION

CONTENTS

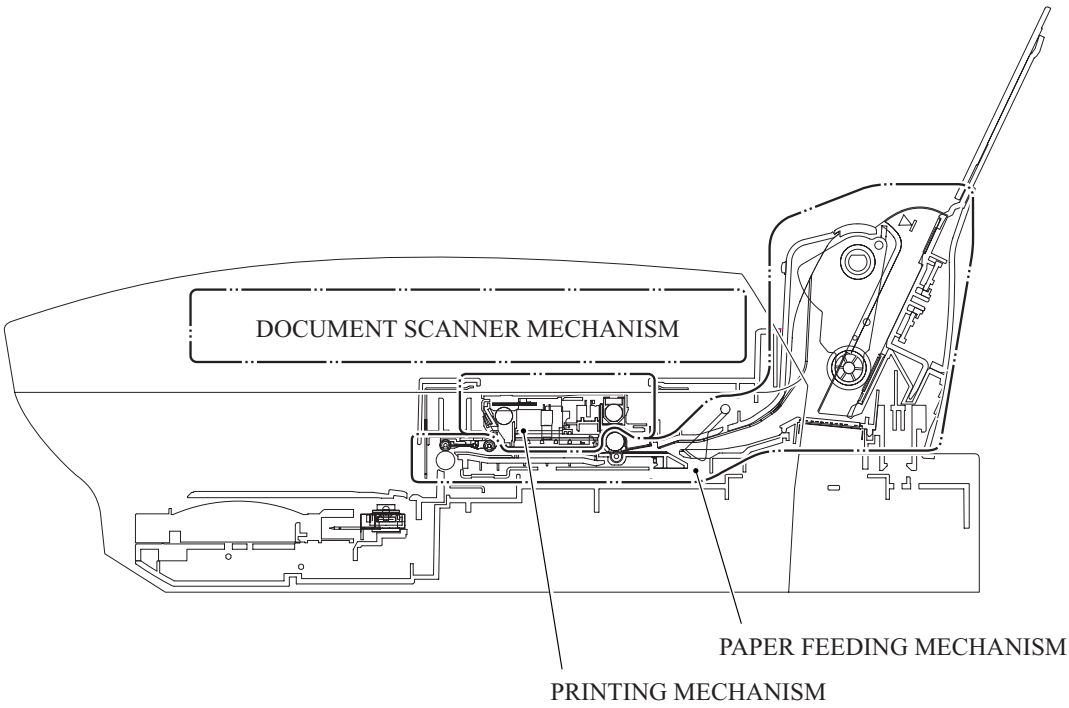
4.1 OVERVIEW



*Not provided on the MFC4420C.

4.2 MECHANISMS

This facsimile machine consists of the following mechanisms and uses six motors, encoders, sensors and thermistors.



(As viewed from the right)

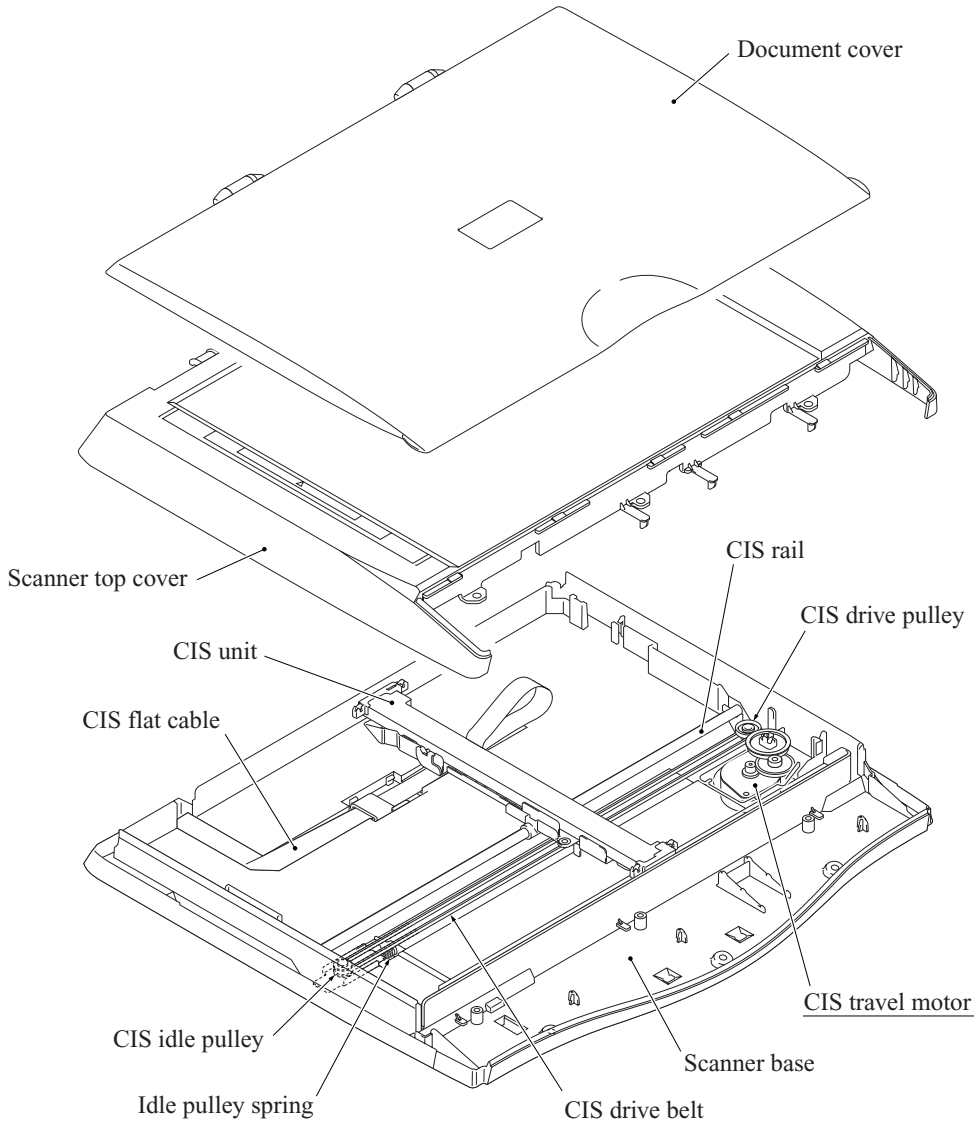
■ Document scanner mechanism		CIS travel motor
■ Paper feeding mechanism	- Auto Sheet Feeder (ASF), registration, paper feeding, and ejection mechanisms	ASF motor (stepping motor) Paper feed motor (DC motor)
■ Printing mechanism	- Ink supply and ink jet mechanism (consisting of air pump & motor module, print head unit, ink cartridges, and needle tube & head flat cable ASSY)	Air pump motor (DC motor)
	- Head capping mechanism	Purge motor (stepping motor)
	- Purge mechanism (consisting of carriage lock, purge unit, ink draining, head wiper, and air vent unit & vent rod unit)	Air pump motor (DC motor)
	- Carriage drive mechanism	Carriage motor (DC motor)

■ Encoders	- Carriage motor (CR) encoder - Paper feed motor (PF) encoder - Air pump motor encoder
■ Sensors	- Scanner/ink slot cover open sensor - ASF switch - Registration sensor - Paper width sensor (Media sensor) - Ink cartridge sensors - Purge cam HP switch - Hook switch (provided on the MFC4820C)
■ Thermistors	- Head thermistor - Casing internal temperature thermistor

4.2.1 Document Scanner Mechanism

This mechanism consists of the document cover ASSY and scanner unit. The scanner unit consists of a scanner top cover, CIS unit, CIS drive mechanism, and scanner base.

For details on the sensors, refer to Section 4.2.4.



If you open the document cover ASSY, place a sheet of a document (or a book opened to the desired page) face down on the glass of the scanner top cover, close the document cover, and start the scanning operation, the CIS drive mechanism will start up. This causes the CIS travel motor to rotate and its rotational torque to be subsequently transmitted via the gear train to the CIS drive belt.

The CIS unit, which is supported and guided by the CIS rail, is secured to the CIS drive belt. Clockwise and counterclockwise rotation of the CIS travel motor moves the CIS unit to the left and right, respectively.

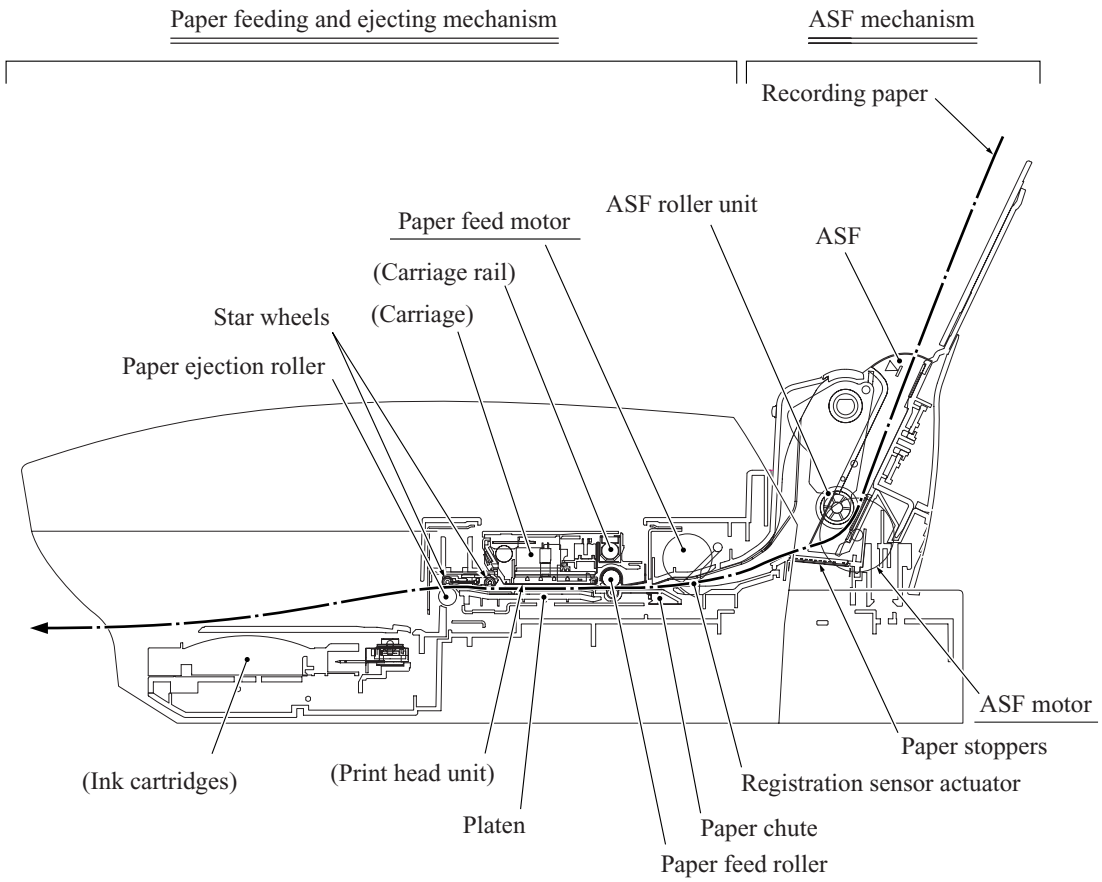
The CIS unit uses a built-in Contact Image Sensor (CIS) unit which consists of an LED array for illuminating documents, a self-focus lens array for collecting the reflected light from the scanned image data, a CIS PCB for performing photoelectric conversion to output picture element data, and a glass cover.

4.2.2 Paper Feeding Mechanism

The paper feeding mechanism consists of the auto sheet feeder (ASF) mechanism and paper feeding and ejection mechanism. The former is driven by the ASF motor and pulls in the paper; while the latter is driven by the paper feed motor and registers the leading edge of the pulled-in paper and feeds and ejects the paper.

The ASF mechanism and the paper feeding and ejection mechanism use an ASF switch and registration sensor, respectively. For details on these sensors, refer to Section 4.2.4.

Given below is a sectional view of the right side of the machine that shows the path of the paper as it is fed through the machine.



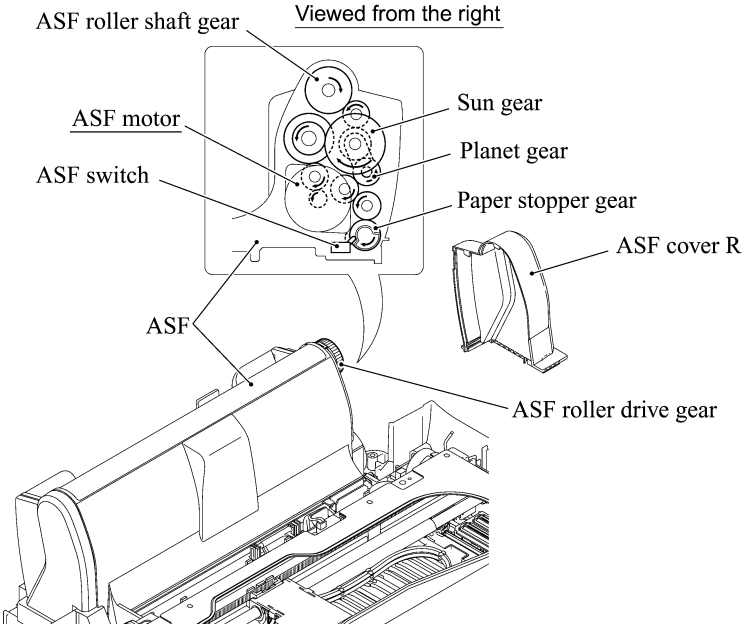
4.2.2.1 Auto Sheet Feeder (ASF) mechanism

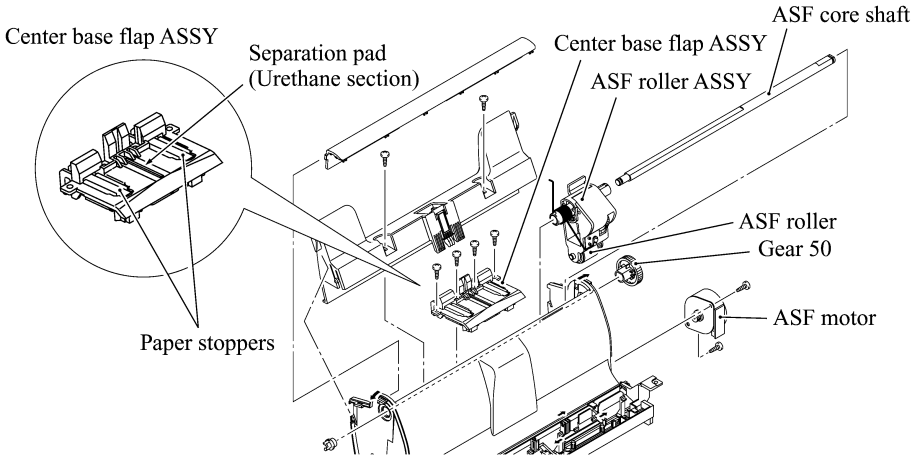
The ASF mechanism, which is driven by the ASF motor (stepping motor), pulls in paper set in the paper tray into the printer unit, sheet by sheet. When the machine is not in printing, the mechanism holds* the paper in the tray to prevent it from slipping into the printer unit.

Paper feed – step 1

*At the bottom of the paper tray is a center base flap ASSY which has built-in paper stoppers. When you place paper in the tray, the mechanism lifts the paper stoppers up so that the paper is held in position with their grooved surfaces.

When the machine starts a printing operation, the ASF motor rotates clockwise (as viewed from the output shaft) and its rotational torque is transmitted via the planet gear to the paper stopper gear as illustrated below. (At the same time, the ASF roller shaft gear also rotates; however, its torque will not be transmitted to the ASF roller because of the planetary gear system in the ASF roller ASSY.) The paper stopper shaft (engaged with the paper stopper gear) and its related parts will lower the paper stoppers to below the surface of the center base flap ASSY so that the paper stoppers will not interfere with the paper feed.





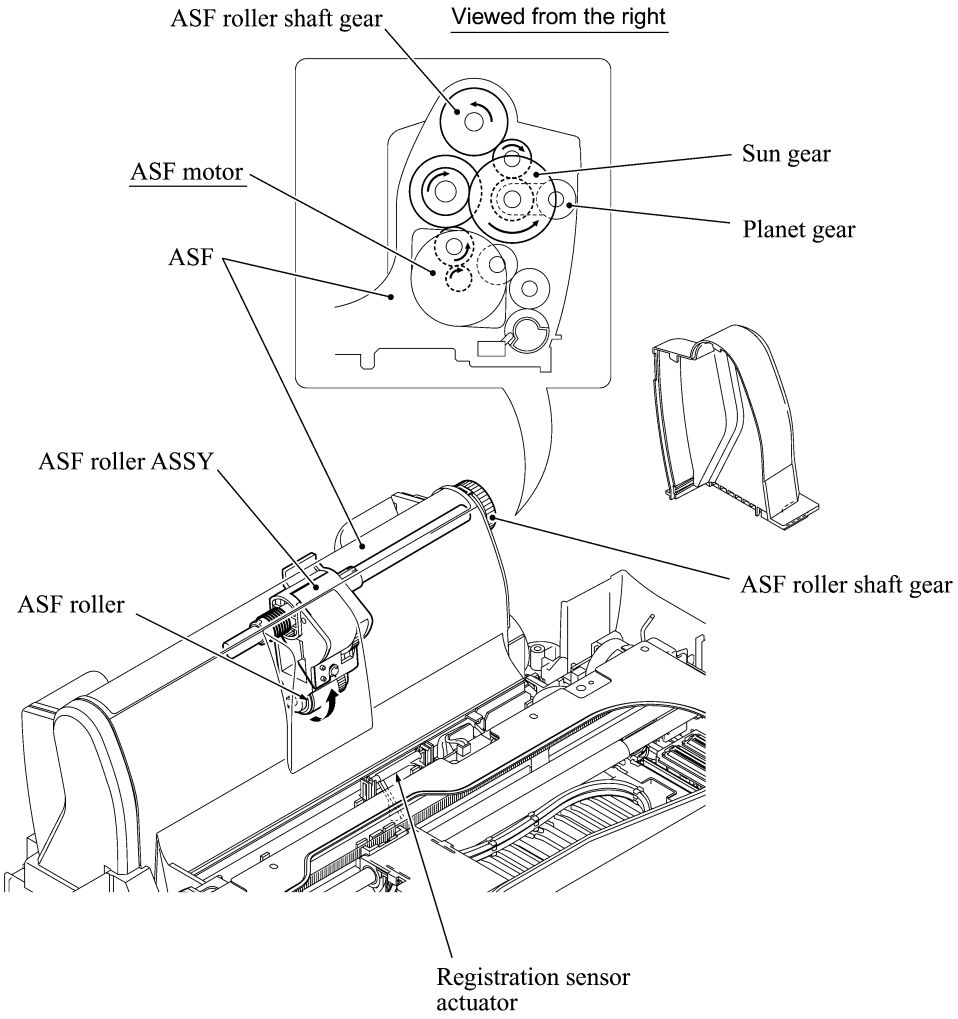
Whether the paper stoppers are lifted up or down is signaled to the controller by the ASF switch.

Paper feed – step 2

Next, the ASF motor rotates counterclockwise (as viewed from the output shaft). Its rotational torque is transmitted to the ASF roller shaft gear, but the direction of gear rotation is the opposite of that in step 1. The ASF roller rotates to feed paper to the paper feed roller, during which the separation pad (shown on the previous page) protruding through the center slit in the center base flap ASSY assists in feeding the paper, sheet by sheet.

Between the ASF roller and the paper feed roller is a registration sensor actuator that detects the leading edge of paper and the presence/absence of paper.

When the ASF roller is feeding paper, the paper feed roller rotates backwards to register the leading edge of the paper being pulled in. After registration, the paper feed roller rotates forwards to feed the paper. At the same time, the ASF motor reverses the direction of its rotation to clockwise to lift up the paper stoppers and thereby prevent other sheets from slipping into the machine.



4.2.2.2 Paper feeding and ejection mechanism

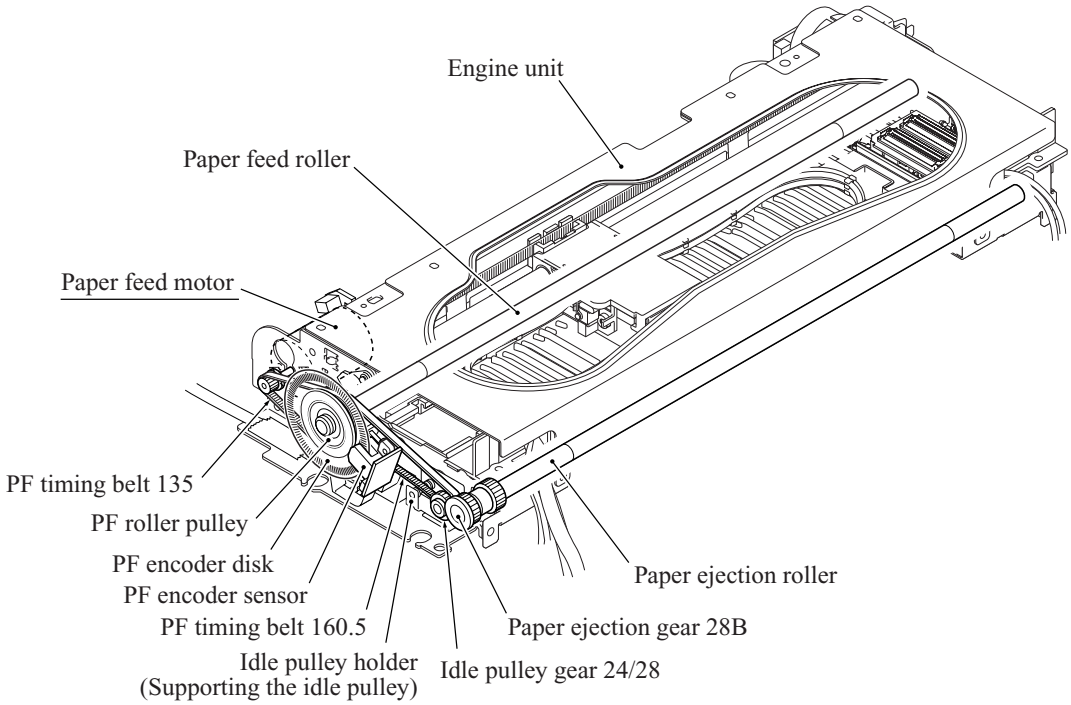
The paper feeding and ejection mechanism is driven by the paper feed motor (DC motor), located on the rear left side of the engine unit, through the two PF timing belts and a gear train.

The rotational torque of the paper feed motor is transmitted via PF timing belt 135 to the PF roller pulley. Engaged with the pulley, the paper feed roller rotates. In step 2 of paper feeding (as described on the previous page), the paper feed roller rotates backwards to register the leading edge of the paper being pulled in. Next, it reverses the direction of its rotation to feed the paper.

The rotation of the PF roller pulley is also transmitted via PF timing belt 160.5 to idle pulley gear 24/28. Engaged with the idle pulley gear, paper ejection gear 28B rotates so that the paper ejection roller (urethane-coated) ejects the printed paper.

The idle pulley holder is spring-structured. The idle pulley applies tension to PF timing belt 160.5 and prevents the belt from deviating from its designated path.

On the outer side of the PF roller pulley is a PF encoder disk with a resolution of 300 dpi (0.084 mm pitch). Using this disk, the PF encoder sensor detects the rotational angle or speed of the paper feed roller so that the controller can control the paper feeding position and speed. The PF encoder sensor can output signals of two different phases, so the resolution can be a maximum of four times 300 dpi.



Controlling the paper stop position

To make the paper feed motor (DC motor) stop paper with precision during printing, the controller controls the motor using PID control (Proportional, Integral and Differential control) using the PF encoder. The controller sets parameters suitable for the paper feed amount, enabling the motor to stop in position with high precision in a short space of time.

If the paper stop position is out of position, the controller compensates the error in the next paper feeding operation by adjusting the encoder count so that errors will not accumulate. For example, if the paper stop position is shorter than the specified stop position by a single encoder slit, then the controller feeds the next sheet of paper by the specified encoder count plus 1.

Feeding paper at a constant speed

The controller controls the paper feed roller to rotate it at a constant speed even if the load to the drive mechanism fluctuates. This control is mostly applied when paper is fed into and ejected from the printer unit after printing; that is, when a highly precise stop position is not required.

Control according to property data

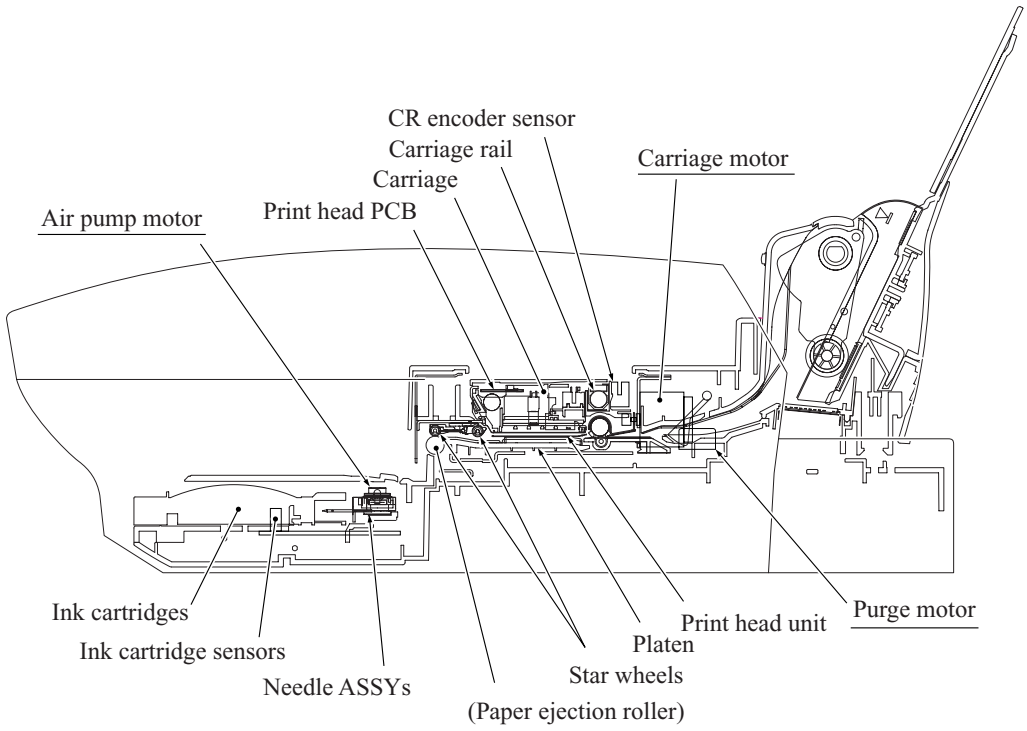
The outside diameters of individual paper feed and ejection rollers and the nozzle length of individual print head units (for black ink) are measured beforehand. When these parts are installed in the machine, their property data are stored in the EEPROM of the driver PCB. The controller adjusts the paper feed amount according to the algorithm based on the information

Property data is managed using a two-dimensional code and printed on a property label attached to the lower cover of the machine.

4.2.3 Printing mechanism

The printing mechanism consists of the "ink supply and ink jet mechanism," "head capping mechanism," "purge mechanism" and "carriage drive mechanism." The former two are driven by the air pump motor and purge motor and the latter two by the carriage motor.

The ink supply and ink jet mechanism uses ink cartridge sensors. The purge mechanism uses a purge cam HP switch. For details on these sensors, refer to Section 4.2.4.



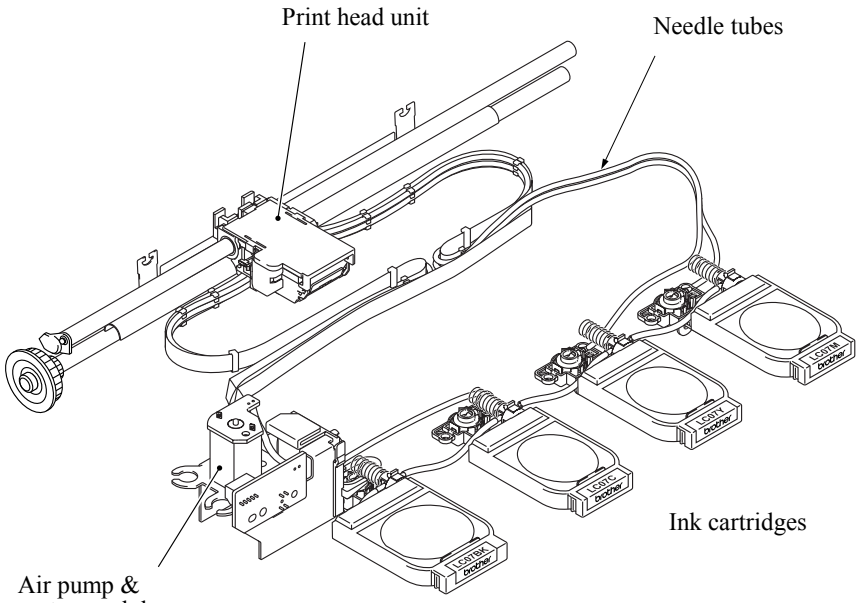
4.2.3.1 Ink supply and ink jet mechanism

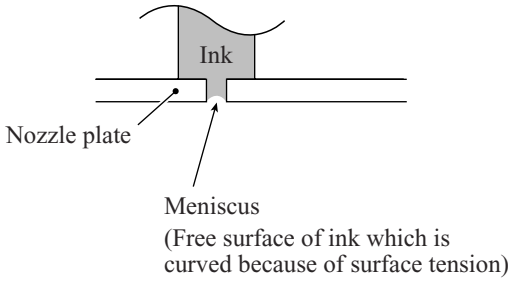
The ink supply and ink jet mechanism is illustrated below. When the machine is first turned on after shipment, it will carry out an initial purge in which the air pump & motor module and the purge unit supply the print head unit with ink from the four ink cartridges (black, cyan, magenta, and yellow) via the needle tubes.

When the machine is on standby, a constant negative pressure (which is produced according to the difference in height between the print head unit and ink cartridges) is applied to the rear of the print head unit. This is to keep the meniscus of ink (see the illustration below) in the head nozzles (shown on page 4-14), thus preventing ink from leaking out of those nozzles. During an initial purge or reset purge (refer to Section 4.2.3.3), however, the air pump & motor module applies a positive pressure to the rear of the print head unit. Such pressure control is called "back-pressure control."

NOTE: Since the negative pressure prevents the ink from leaking out of the print head unit, be sure to place the machine in a horizontal position. If you place the machine upright or inclined backwards with the print heads uncapped, ink may leak out of the nozzles.

Ink supplied to the print head unit will be jetted out through the head nozzles by the piezoelectric ceramic actuators (refer to "[2] Structure of the print head unit" further on in this section). The ink drops produced will be output as small dots on the paper.

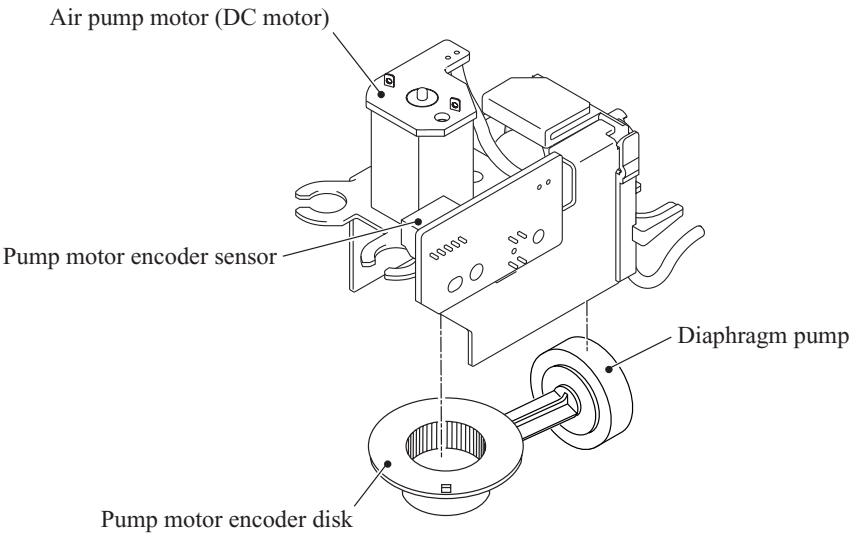




[1] Structure of the air pump & motor module

The air pump & motor module consists of an air pump motor (DC motor), diaphragm pump, and encoder. In a purging operation (initial purge or reset purge), the air pump motor will be driven together with the purge motor. It causes the pump to feed air into the ink cartridges, thereby changing the pressure in the print head unit from negative to positive to improve the ink output reliability. The air pump motor is feedback-controlled.

For details on the purging operation, refer to Section 4.2.3.3, "Purging mechanism."

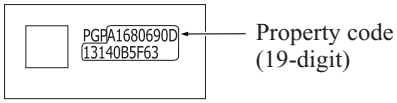


Each air pump & motor module has its own individual properties. When a particular module is installed in the machine, its property data are stored in the EEPROM of the driver PCB. The controller manages the motor rpm to generate the positive pressure suitable for that module according to its property data. To do this, the controller monitors the motor rpm with the air pump motor encoder and accelerates/decelerates the motor according to the speed change using PWM control.

A property label, on which a property code is printed, is attached to the air pump & motor module itself as well as on the rear left side of the machine (with the battery cover* or rear cover S** removed).

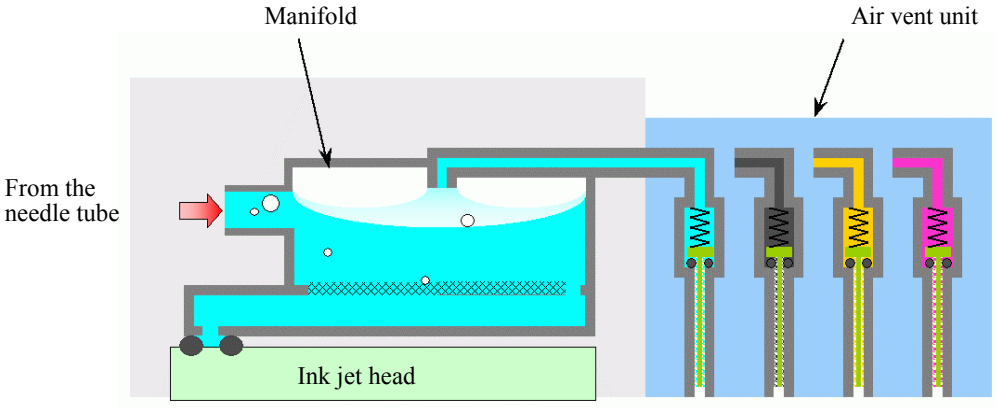
(*For the MFC4820C, **For the MFC4420C.)

If you replace the module with a new one, you need to enter a property code (19-digit) into the EEPROM in the maintenance mode (Function code 68) and replace the property label with the one that comes with the new module.



[2] Structure of the print head unit

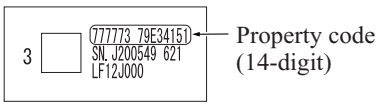
The print head unit consists of an ink jet head, manifold and air vent unit.



Print Head Unit

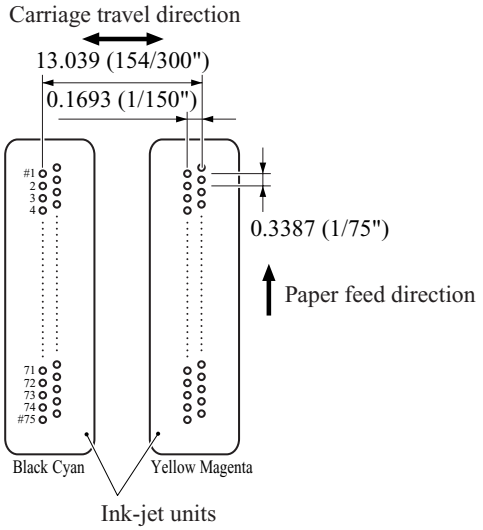
Print head units also have their own individual properties. When a unit is installed in the machine, its property data is stored in the EEPROM on the driver PCB.

A property label, on which a property code is printed, is attached to the print head unit itself as well as on the rear left side of the machine. If you replace the print head unit with a new one, you need to enter a property code (14-digit) into the EEPROM in the maintenance mode (Function code 68) and replace the property label with the one that comes with the new unit.



(1) Print head unit

This machine uses drop-on-demand ink jet printing. The print head has two ink-jet units for the four colors of ink. Each of these units consists of 75 nozzles, 75 channels coated with piezoelectric ceramic (PZT), a manifold and a filter. As illustrated below, each pair of nozzle columns is staggered.

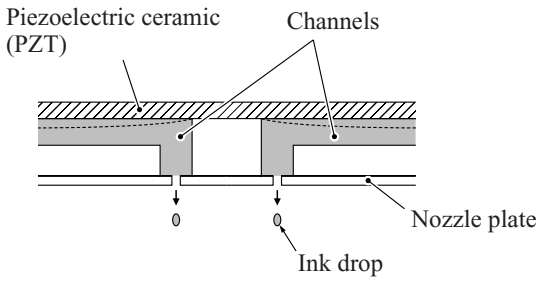


Nozzle Layout (as viewed from the bottom)

If the controller issues a print command, a biased voltage will be applied to all electrodes on the surface of the piezoelectric ceramic so that each ceramic actuator will be distorted, as shown with the broken lines in the figure below.

If the electrodes on a target channel are deenergized in response to drive signals, then the associated piezoelectric ceramic actuator returns to the previous form so that the ink in the manifold will be sucked out to the channel.

If voltage is applied again, the piezoelectric ceramic actuator will distort again and apply pressure to the ink in the channel, causing the ink to jet out through the nozzle. The ink drops produced will be output as small dots on the paper held in place by the platen.



As the carriage holding the print head unit travels at the printing speed, the controller sends print command pulses to the piezoelectric actuator driver circuit embedded in the print head unit.

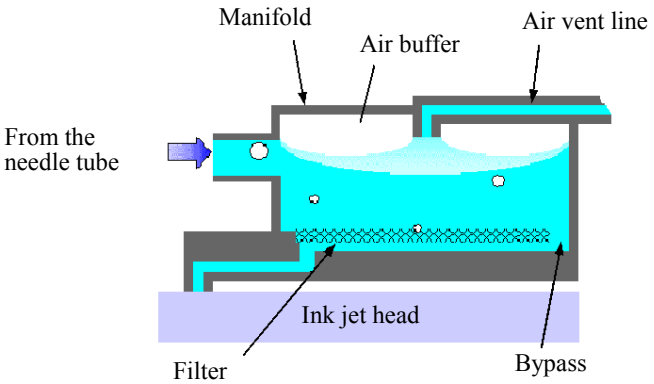
(2) Manifold

Role as an air buffer

There are fine air bubbles in liquid ink. These bubbles may gradually increase in diameter as the pressure applied to the ink changes.

In the channels of the ink jet head (see the illustration above), the pressure will change as the piezoelectric ceramic actuator operates. To prevent bubbles in the channels from increasing in size and affecting print performance, it is essential to remove bubbles to the furthest extent possible before the ink reaches the ink jet head. The solution for this is a manifold.

As illustrated below, ink supplied from the needle tube will be initially stored in the manifold. The air in the upper section of the manifold will work as a buffer into which bubbles in the supplied ink will be absorbed due to their buoyancy. The manifold is designed so that excessive air will be expelled through the air vent line and no air reaches the ink jet head.



Role as an air damper

The air in the upper section of the manifold also functions as an air damper that dampens the dynamic pressure of ink in the needle tubes produced by the moment of inertia when the carriage travels.

Without the air damper, the dynamic pressure of ink will directly affect the volume of ink output from the ink jet head, resulting in lowered print quality.

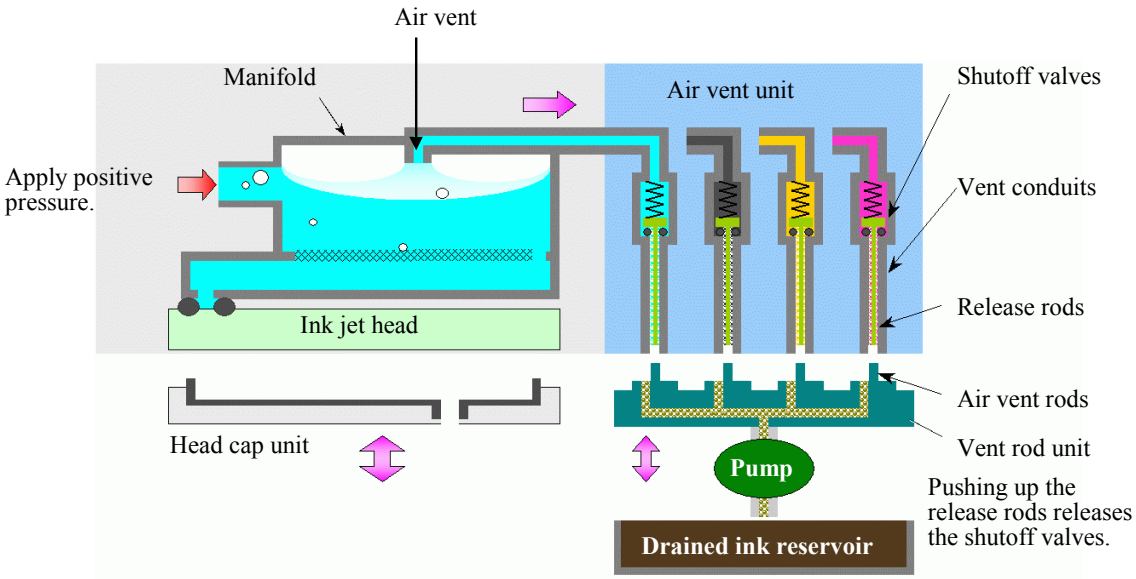
(3) Air vent unit

When ink is supplied to the print head unit, air bubbles may be produced or air that was in the tubes during an initial purge may have become bubbles in the ink. Such air bubbles may be expelled through the air vent unit together with the surplus ink when positive pressure is applied.

The structure of the air vent unit is shown below. When the carriage reaches the purge position, the four vent rods in the purge unit will pop up to push up the corresponding release rods in the air vent unit which in turn will release the four shutoff valves.

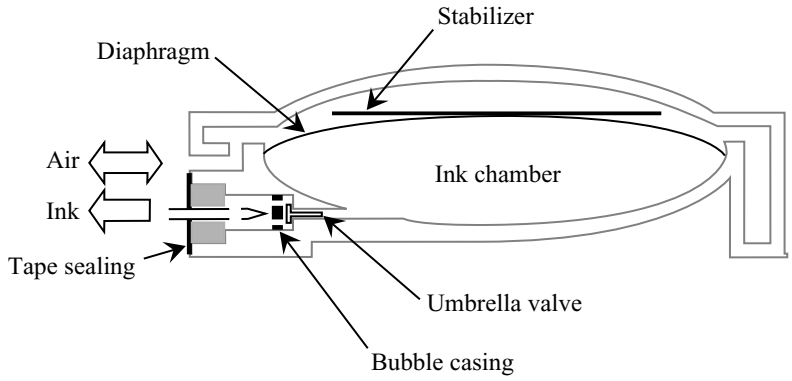
The air vent is located slightly lower than the top of the manifold so that the correct amount of damper air will be left. (For details on driving the vent rods in the purge unit, refer to Section 4.2.3.3, "Purge mechanism.")

The vented air and ink will be expelled into the drained ink reservoir by the pump in the purge unit.



[3] Structure of an ink cartridge

The illustration below is the sectional view of an ink cartridge. The ink cartridge is a one-use type that cannot be refilled, as described later. It is, therefore, made of flammable materials that will produce no noxious materials and contains no metal so that the effects on the environment are minimized.

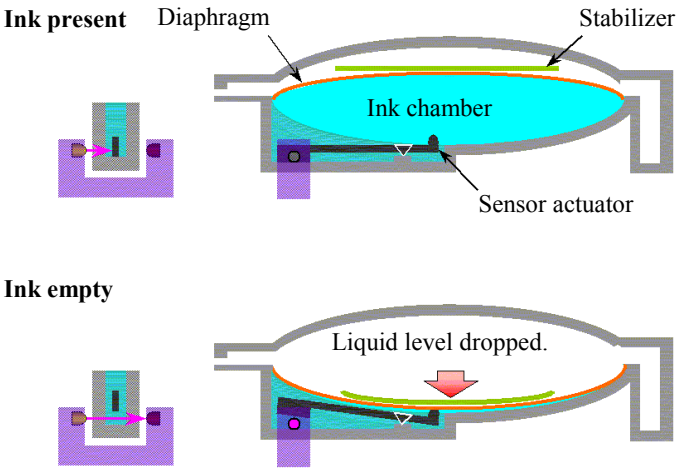


Ink empty detection mechanism

Shown below is the ink empty detection mechanism. It consists of four ink cartridge sensors (transparent type) on the ink cartridge sensor PCB and sensor actuators built into the ink cartridges.

If you insert an ink cartridge filled with ink into the ink slot, the built-in sensor actuator will interrupt the optical path of the ink cartridge sensor. This state will be interpreted as "ink present."

As ink remaining in the chamber decreases, the diaphragm will also lower. If the diaphragm drops to a certain level so as to push down the end of the sensor actuator, then the opposite end will pop up above the optical path of the ink cartridge sensor. This state will be interpreted as "ink empty." When there is no ink cartridge loaded, it will be also interpreted as "ink empty."

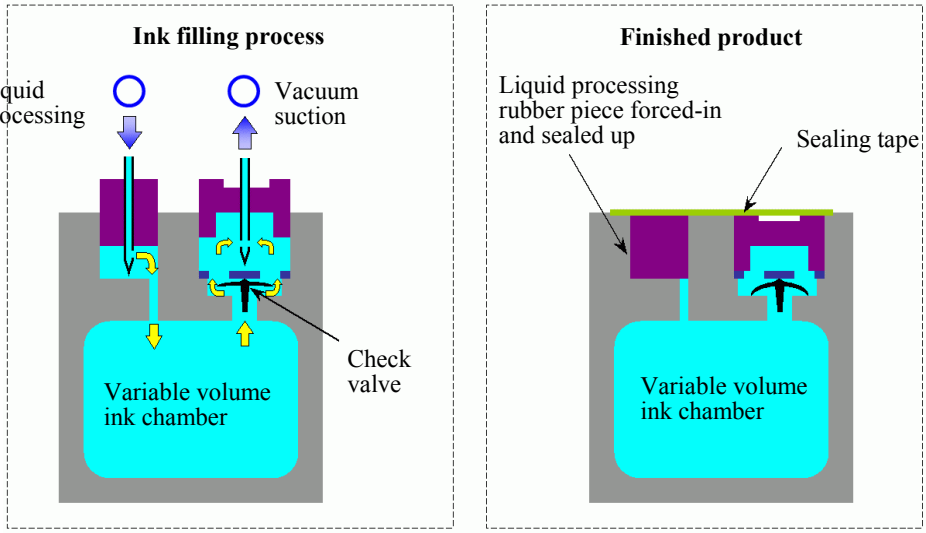


If the controller detects an ink empty state, it will stop the subsequent printing operation and prompt the user to replace the ink cartridge.

The ink empty signaling system designed for this machine is: first the software counter (that counts the droplets jetted out from each of the ink cartridges after replacement) indicates "near empty" and then the ink empty sensor detects "ink empty." (NOTE: In previous models, the sensor first detects "near empty" and then the software counter detects "ink empty.")

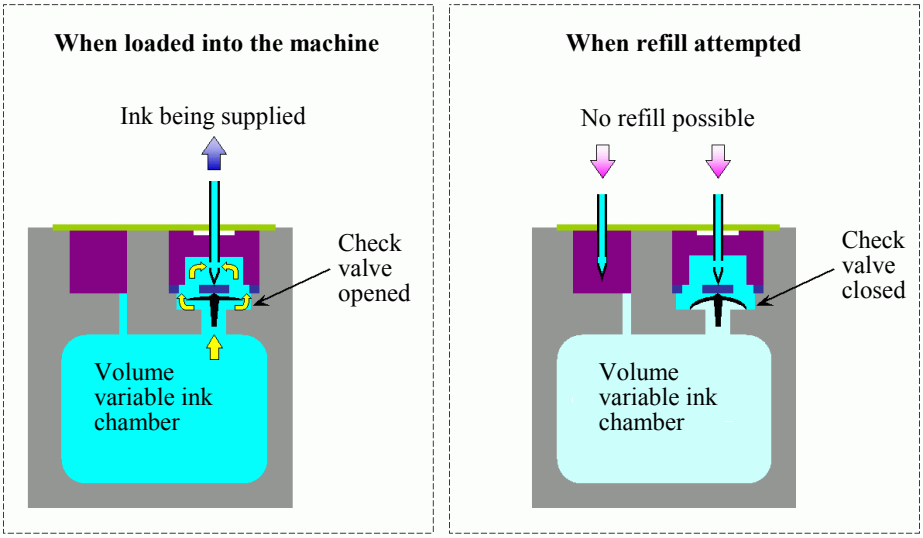
Ink cartridge refill-protect mechanism

As shown below at left, in the production process of the ink cartridges used with this machine, an ink cartridge will be filled with ink by vacuum suction and liquid processing. Once the cartridge has been filled, two rubber pieces will be forced into the cartridge and sealed up with tape, as illustrated below at right.



If an ink cartridge is loaded into the machine, the needle of the ink supply tube will be inserted into the vacuum suction rubber piece as shown below at left. After the replacement of each ink cartridge, the air pump & motor module will be automatically activated so that the positive air pressure will be applied to the ink cartridge to press the diaphragm (refer to page 4-17). Accordingly, the check valve will be opened, allowing the ink to be supplied.

As shown below at right, even if you insert the needle tip of the liquid processor into either of the two rubber pieces, it cannot reach the ink chamber. This prevents the ink cartridges from being refilled.

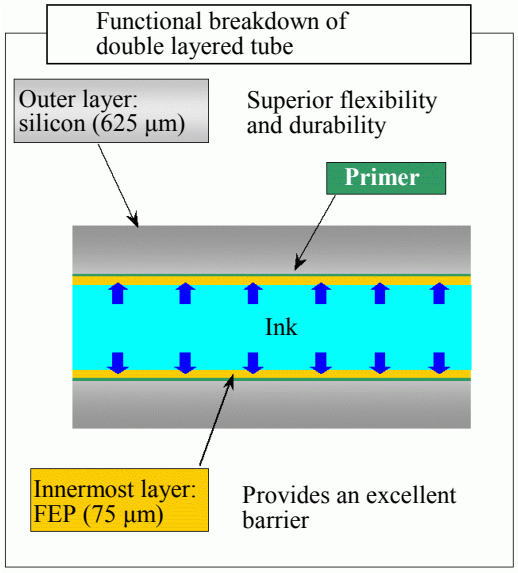


NOTE: If the seal on the rubber pieces is broken or has been removed, it is possible that the cartridge has been refilled with non-genuine ink. The machine will not be covered by the warranty if such cartridges are used.

[4] Structure of the needle tubes

The structure of a needle tube is shown below. The innermost layer utilizes FEP tubing, which provides an excellent and long-term barrier against air getting into the tubes and against ink evaporation. The outer layer utilizes silicon tubing which features superior flexibility and durability to the degree necessary to withstand the high-speed movement of the print head unit as well as long-term constant and extreme bending.

Both types of tubing are adhered with primer to protect against chemical and physical damage and to ensure that characteristics necessary to these types of tubing are not compromised.



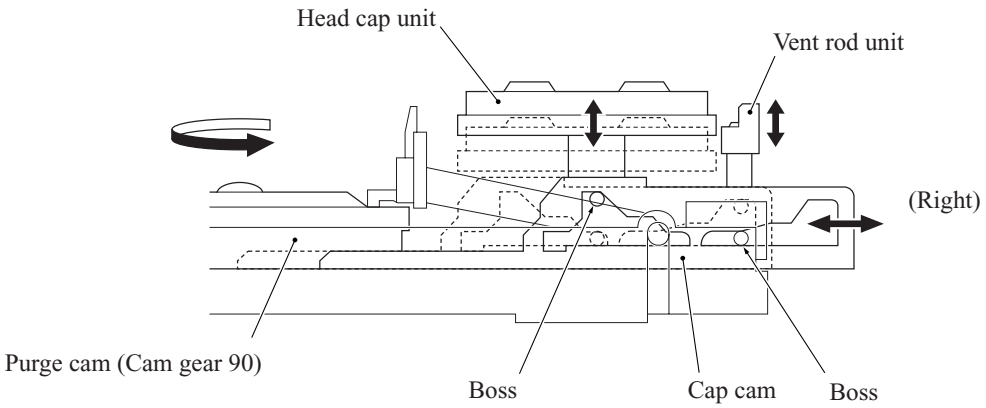
4.2.3.2 Head cap mechanism

Shown below is a head cap mechanism that covers the print heads tightly to prevent the head nozzle meniscuses (shown on page 4-12) from drying up when they are not in use.

This mechanism further prevents those meniscuses from breaking up as a result of changes in pressure inside the head caps due to changes in the operating environment. To achieve this, the pump switching unit keeps the pressure inside the head caps at normal atmospheric pressure so that the ink remaining inside the head cap forms a sealed area.

The head cap mechanism is driven by the purge motor in the purge unit. The rotational torque of the purge motor is transmitted to the purge cam (cam gear 90) via a gear train including the planet gears. (For details, refer to Section 4.2.3.3.) The cam on the bottom plane of the purge cam is engaged with the cap cam so that the rotational torque of the purge cam is converted to a straight slide motion. The head cap unit is thereby lifted up and down by the movement of the cap cam.

When the machine is turned off or not performing a printing operation, the head cap unit is pressed firmly up against the surface of the head nozzles, thereby serving as a cap for the head nozzles.



4.2.3.3 Purging mechanism

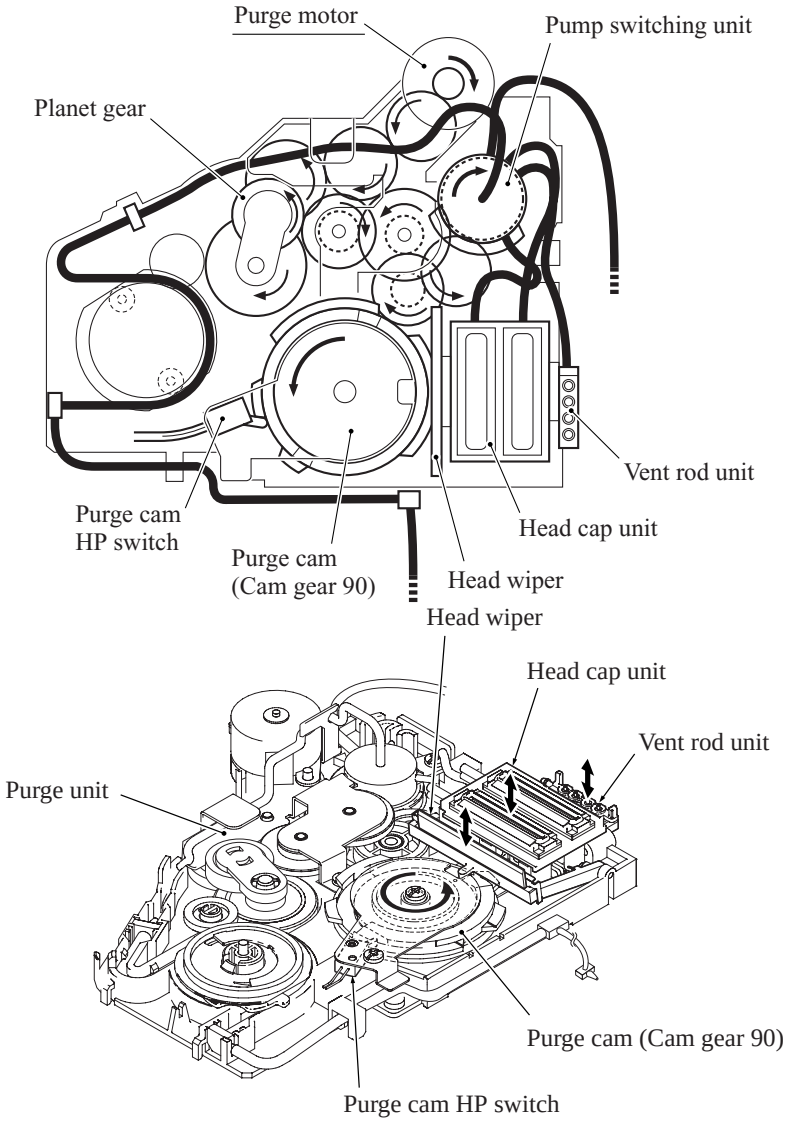
[1] Overview of the purge drive

The purge mechanism is driven by the purge motor (stepping motor) in the purge unit, and restores the machine's ability to jet out ink by sucking up ink deteriorated in quality from the head nozzles.

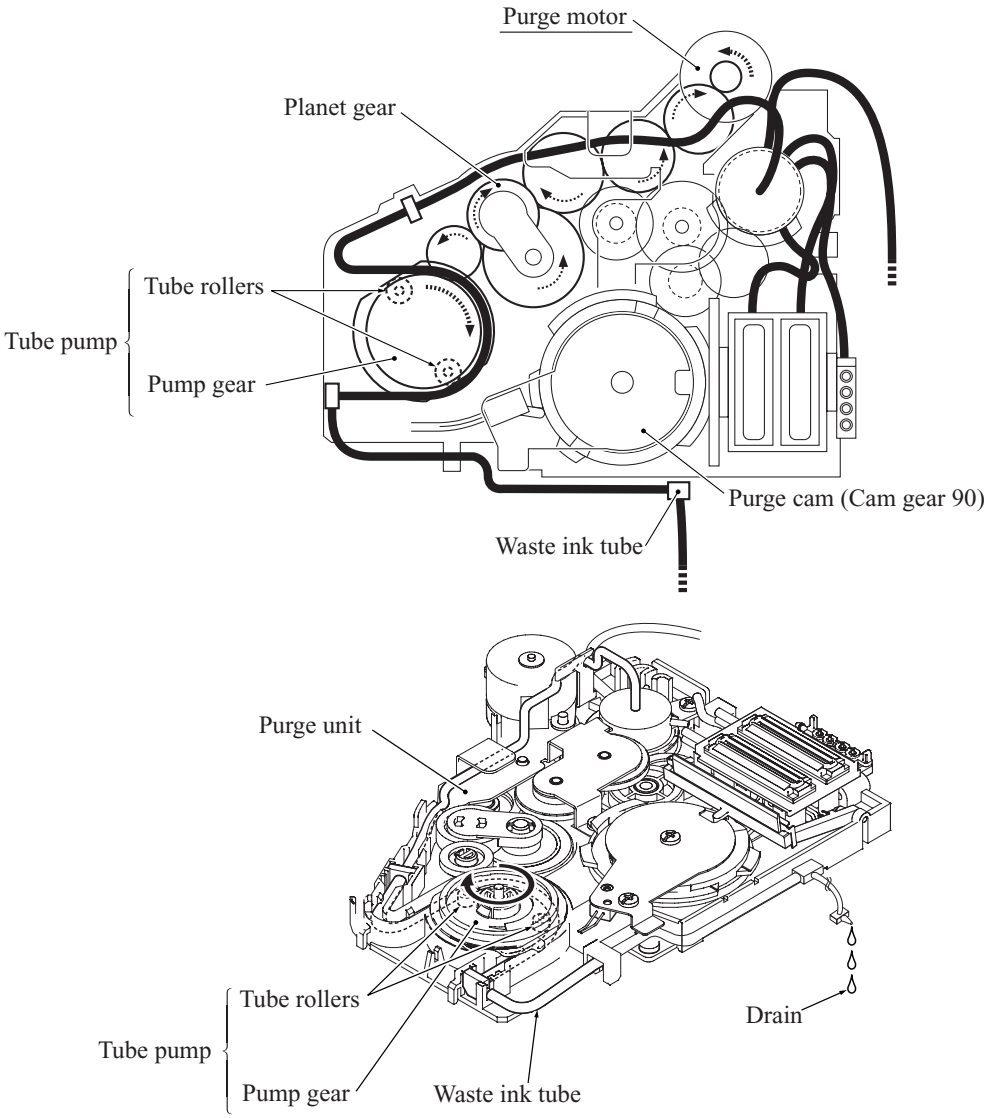
The purge motor also pushes up the vent rods in the purge unit and, as described in Section 4.2.3.1, [2], (3), expels the air trapped in the print head unit manifold.

The main components of the purge mechanism include the purge motor, drive gears, planet gears, pump switching unit, purge cam (cam gear 90), head wiper, head cap unit (see Section 4.2.3.2), vent rod unit, purge cam HP switch and the tube pump.

When the purge motor rotates counterclockwise (as seen from the motor output shaft), the rotational torque is transmitted to the purge cam (cam gear 90) via the planet gear, as shown in the figure below. The rotation of the purge cam in turn drives the head wiper, head cap unit and vent rod unit.



When the purge motor rotates clockwise (as seen from the motor output shaft), the rotary torque is transmitted to the tube pump via the planet gear, as shown in the figure below. Ink that has been sucked up is delivered by the tube pump to the ink absorber box.



■ Role of the purge cam (cam gear 90)

- The purge cam controls the stopping position of each of the purge functions according to the ON/OFF of the purge cam HP switch.
- The cam on the bottom plane of the purge cam is engaged with the cap cam (see the figure in Section 4.2.3.2), so the rotational torque of the purge cam is converted to the movement of the straight slide to lift the head cap unit and vent rod unit up and down.
- The cam on the top plane of the purge cam moves the head wiper to clean the surface of the head nozzles.

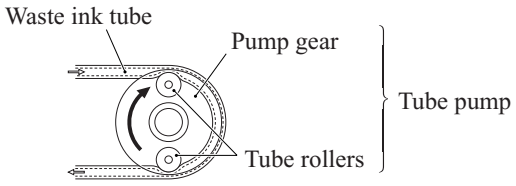
■ Role of the pump switching unit

- Interlocked with the purge cam, the pump switching unit switches application of the pump's negative pressure between the black/cyan head nozzles, yellow/magenta head nozzles, vent rod unit and opening to the atmospheric air.

  When the purge cam is in the home position (that is, the print heads are capped), the head caps are opened to the atmospheric air inside the pump switching unit. This protects the head nozzle meniscuses by preventing the air pressure in the head caps from increasing.
- The flange on the pump switching unit drives the carriage lock mechanism. (Refer to the next page.)

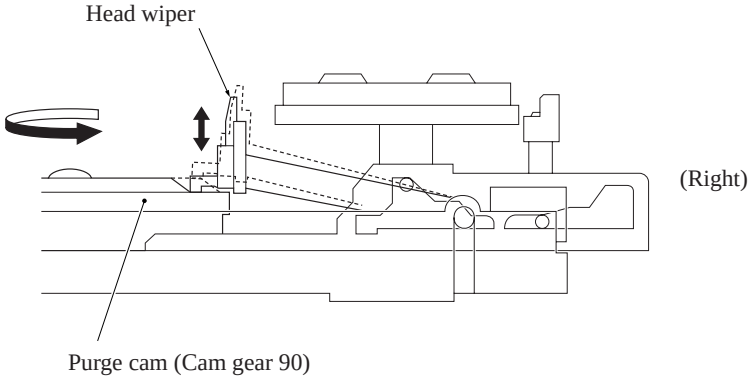
■ Role of the tube pump

- The tube pump consists of a pump gear and two tube rollers. If the pump gear rotates, the two tube rollers push out the waste ink tube routed around the pump gear to feed the contents of the tube towards the ink absorber box, thereby producing negative pressure.



■ Role of the head wiper

- After a purging operation, the cam on the top plane of the purge cam causes the head wiper to pop up above the head caps. At the same time, the carriage moves from the right to the left so as to clean of any ink remaining on the head nozzles.



■ Role of the head cap unit

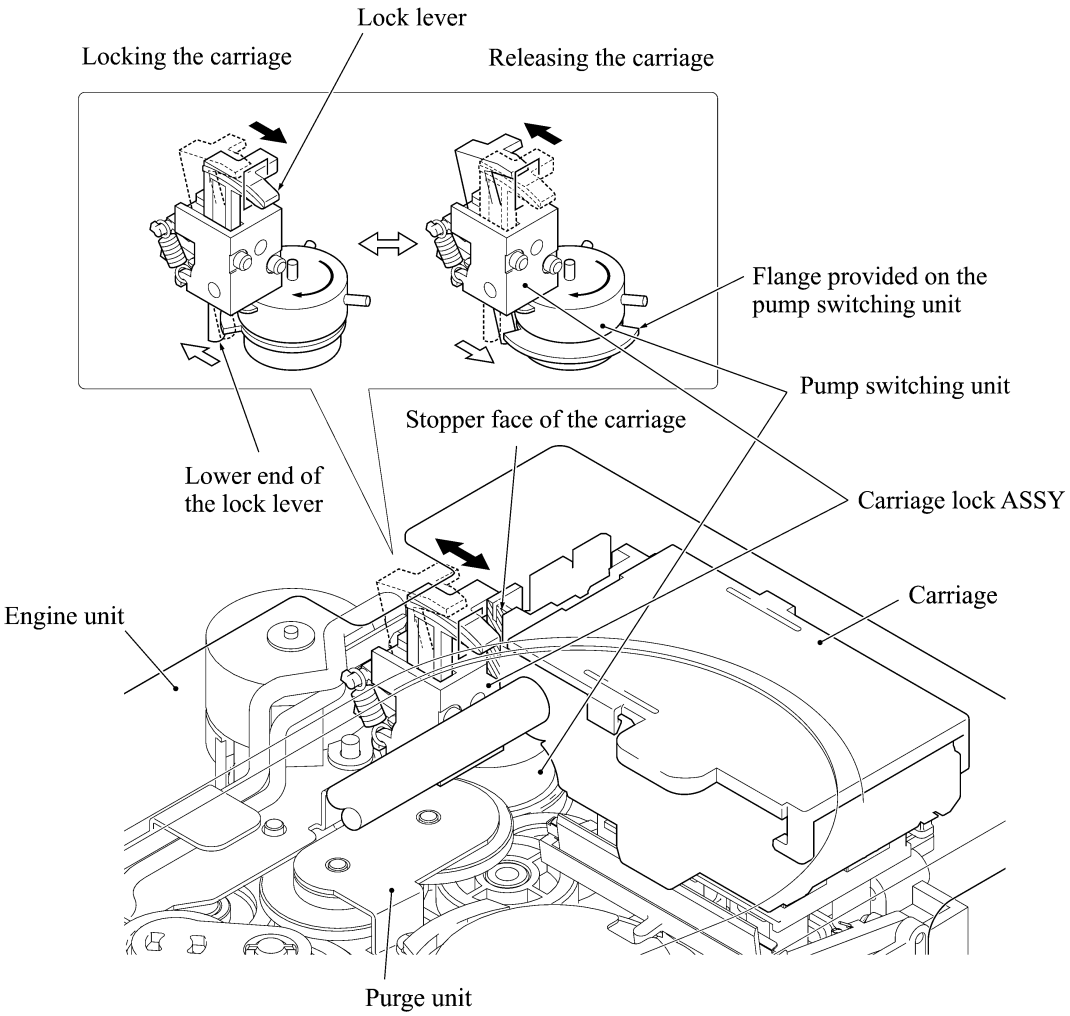
- When the machine is turned off or not performing a printing operation, the head cap unit caps the head nozzles tightly. (Refer to Section 4.2.3.2.)

■ Role of the vent rod unit

- The vent rod unit is driven by the cap cam in the same way as the head cap unit (refer to Section 4.2.3.2). Its four vent rods pop up to push up the corresponding release rods in the air vent unit of the print head unit. This releases the four shutoff valves and air bubbles may be expelled when positive pressure is applied by the air pump & motor module. (Refer to Section 4.2.3.1, [2], (3).)

■ Role of the carriage lock

- As shown below, when the flange on the pump switching cam pushes the bottom end of the lock lever to the rear, the top end comes to the front and locks the carriage.



[2] Purge types, time required and amount of ink used

Purge type	Contents	Time required	Amount of ink used	To perform the purge in maintenance mode:
Initial purge	This purge is performed automatically when the power is first applied by the user after shipment. It fills the ink supply tubes and print head unit with ink.	2.5 to 4.0 min	3.21 cc	Press the **4** key with maintenance code 76.
Normal purge	This purge is performed in order to remove any dried up ink that has accumulated around the head nozzles. A normal purge is performed in the following situations: - When the user selects a normal purge using the function menu (provided that there has been at least one purge performed after the power was switched on) - After a test print (if there has been at least one purge performed after the power was switched on) - After an ink cartridge is replaced - Every 15 days or so (this period varies, depending on the ambient temperature)	Approx. 1 min 20 sec	0.25 cc	Press the **1** key with maintenance code 76.
Reset purge	This purge is performed to remove any bubbles that have accumulated in the ink supply tubes. A reset purge is performed in the following situations: - When the user selects a reset purge using the function menu (provided that there has been no purge performed after the power was switched on) - After a test print (provided that there has been no purge performed after the power was switched on OR that the test print results in an NG (failure) 2 times in succession) - After an ink cartridge is replaced - Every 30 days or so (this period varies, depending on the ambient temperature)	Approx. 2 min	0.45 cc	Press the **5** key in maintenance code 76.
Cyan substitute purge	This purge is performed to substitute ink in the black ink tube with cyan ink. It is to prevent ink in the black ink tube from developing air bubbles during long-term storage of the machine. (Black ink deteriorates more easily than cyan ink.)	Approx. 2 min	3.90 cc	Press the **0** key in maintenance code 76.
Reset purge + suction	This purge is performed when test printing continuously results in an NG.	Approx. 2 min	0.90 cc	------

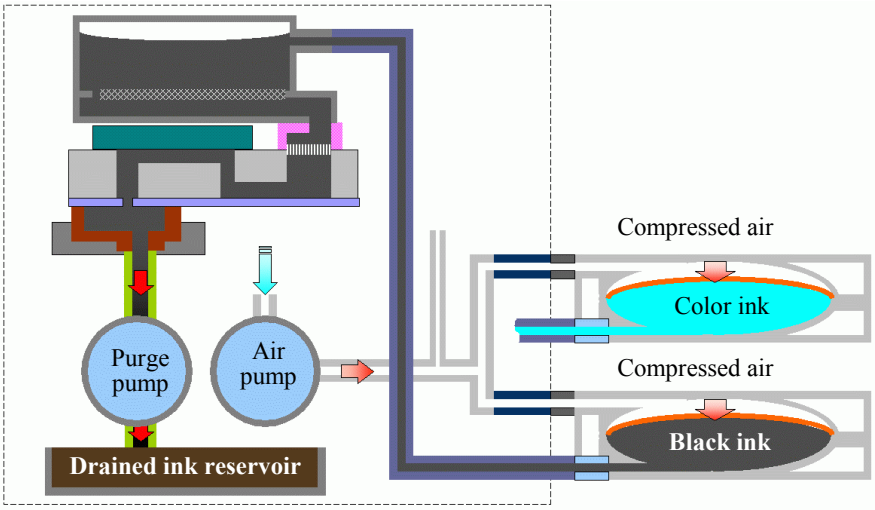
Purge type / Purge timing	Initial purge	Normal purge	Reset purge	Cyan substitute purge	Reset purge + suction
First automatic cleaning after purchase	√				
Cleaning initiated using the function panel		√	√	√	
Cleaning after test printing		√	√		√
After ink cartridge replacement		√			
Periodical automatic cleaning		√	√		

[3] Volume of ink in the ink cartridges

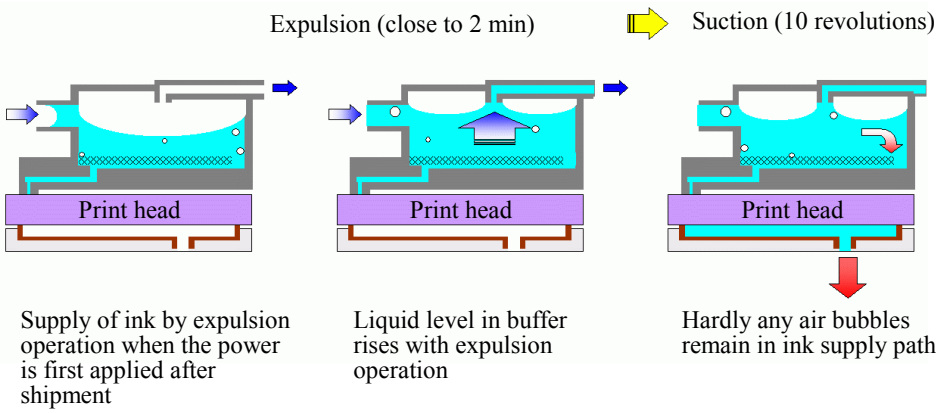
Type	Capacity	Usable ink volume
Black ink cartridge	16 cc	13.5 cc
Color ink cartridge	15 cc	12.5 cc

[4] Positive pressure control purge system

To prevent air from flowing back into the head nozzles after a purge operation, the air pump powered by the purge motor operates simultaneous to the purge being performed. This also serves to improve ink jet-out reliability.



When the facsimile machine leaves the factory, both the ink supply tubes and print heads are filled with ink. If the machine is stored for a long period without being used, the air in the ink will develop into bubbles. To expel these air bubbles, when ink cartridges are set in place and the power is turned on for the first time after shipment, an initial purge starts automatically. In the initial purge, when the air pump & motor module supplies ink from the ink cartridges via the tubes, the purge motor simultaneously performs an expulsion operation, causing the air bubbles in the manifold in turn to be expelled.



Ink supply when power is applied for the first time

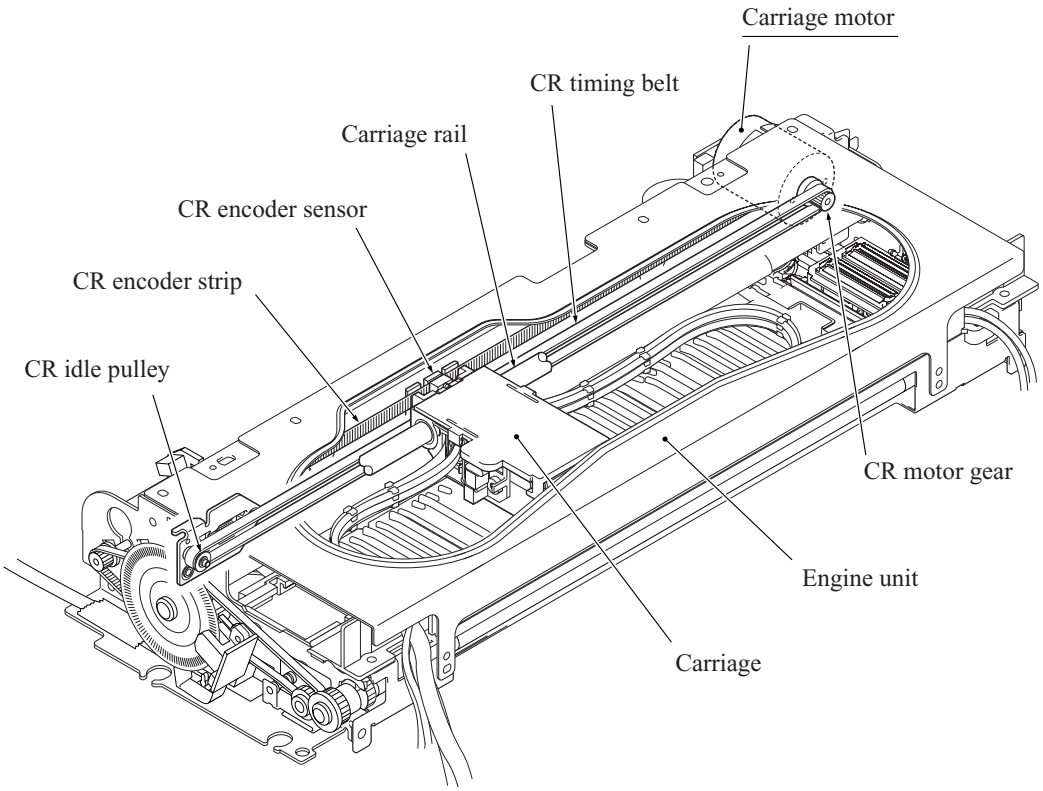
4.2.3.4 Carriage drive mechanism

The carriage, on which the print head unit and the ink supply section of the needle tube ASSY are mounted, travels to the right and left when driven by the carriage motor (DC motor).

The motor rotation is transmitted to the CR timing belt (1/24 inch pitch). The carriage, which is supported and guided by the carriage rail, is secured to the CR timing belt. Clockwise and counterclockwise rotations of the carriage motor move the carriage to the right and left, respectively.

On the back of the carriage is a CR encoder sensor which tells the control circuitry the current carriage position based on the carriage home position by using the encoder strip (1/150 dpi pitch) attached to the lower chassis of the engine unit.

The carriage travel speed is 30, 15 or 7.5 ips according to the print resolution. The controller controls it using PD control.



Aging

The initial adjustment of the PWM value can be achieved with Function code 69 in the maintenance mode. It automatically selects CR drive parameters that minimize speed variation and that are suitable for the current carriage drive mechanism by aging the carriage. If cogging or uneven carriage movement is noted, performing this aging may solve such problems. (For details on Function code 69, refer to Chapter 7, Section 7.5.16.)

Print head skew compensation by adjusting the carriage in the direction of Zθ

The carriage, on which the print head unit is mounted, is secured onto the carriage rail via the eccentric bushing. Print head units are classified into five ranks depending upon the skew of the head nozzles. Rotating the eccentric bushing according to the rank adjusts the skew of the head nozzles in the direction of Xθ. (For the adjustment procedure, refer to Chapter 6, Section 6.1.2.)

Fine adjustment of print head skew in the maintenance mode

In the maintenance mode, you can print out the head skew check pattern and make fine adjustment of the eccentric bushing with Function code 65 (alignment of vertical print lines in monochrome and in two colors and adjustment of head skew). (For details on Function code 65, refer to Chapter 7, Section 7.5.13.)

4.2.4 Sensors and Actuators

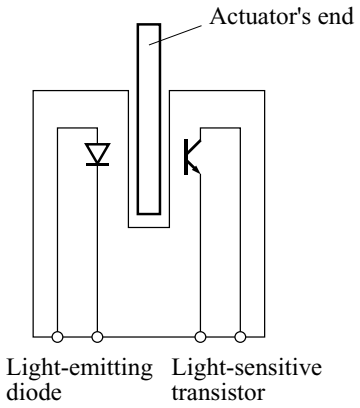
This machine has the following sensors and thermistors.

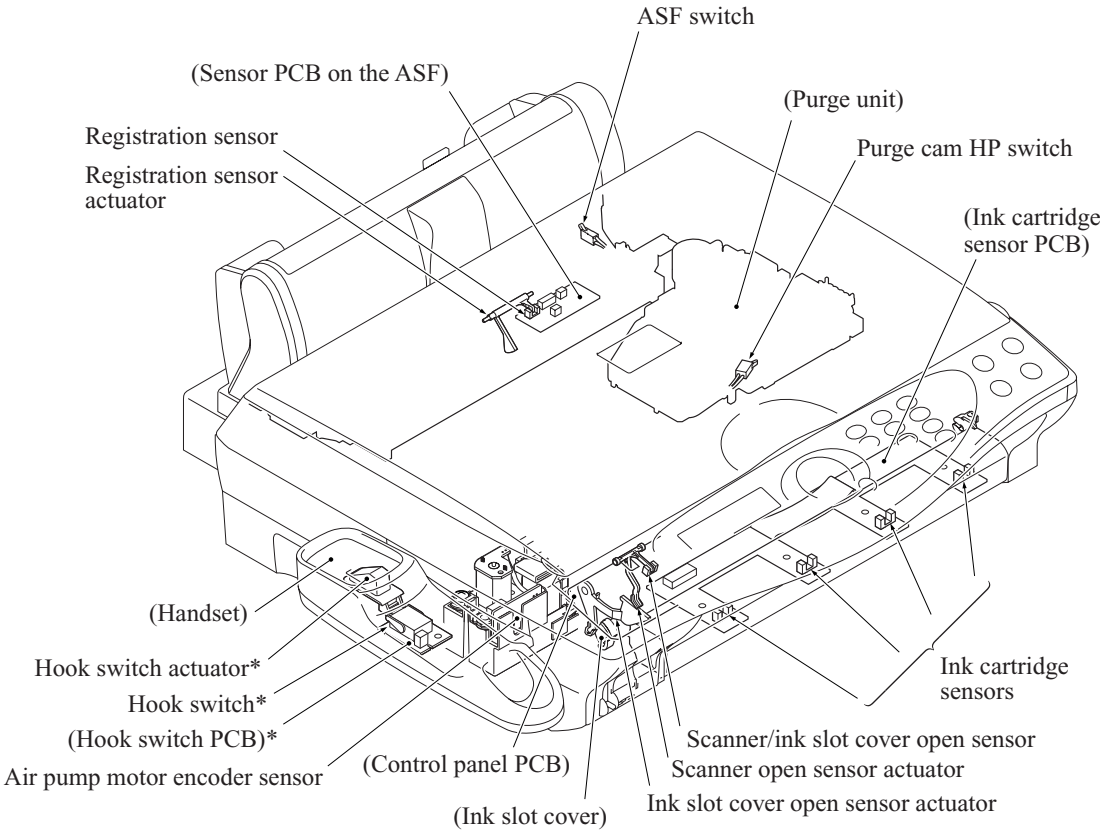
Sensor name	Type	Location
Scanner/ink slot cover open sensor	Photosensor	Control panel PCB
Registration sensor	Photosensor	ASF
ASF switch	Mechanical switch	
Paper width sensor (Media sensor)	Photosensor	Head flat cable of the needle tube ASSY (set in the print head unit)
Purge cam HP switch	Mechanical switch	Purge unit
Ink cartridge sensors (x 4)	Photosensor	Ink cartridge sensor PCB
Hook switch (on the MFC4820C)	Mechanical switch	Hook switch PCB in the handset
Air pump motor encoder sensor	Photosensor	Air pump & motor module
Carriage motor (CR) encoder sensor	Photosensor	Head flat cable of the needle tube ASSY (set in the carriage)
Paper feed motor (PF) encoder sensor	Photosensor	PF encoder PCB on the left side of the engine unit
Casing internal temperature thermistor	Thermistor	
Head thermistor	Thermistor	Print head unit

- The scanner/ink slot cover open sensor detects whether the scanner unit and/or the ink slot cover are closed.
- The registration sensor detects the leading and trailing edges of the paper, which allows the controller to determine the registration timing and to check for paper jams.
- The ASF switch detects the switching timing of the forward/reverse direction of the ASF motor rotation. If the ASF motor rotates in the forward direction, the paper stoppers lower to guide the paper to the paper slot. If it rotates in the reverse direction, the ASF roller rotates to pull in paper.
- The paper width sensor detects whether the paper width is "A4-size or wider" or "narrower than A4-size."
- The purge cam HP switch detects whether the purge cam is in the home position or not.
- There are four ink cartridge sensors for four colors, each of which detects whether the corresponding ink cartridge is ink-empty. When the optical path of the sensor is interrupted by the sensor actuator built in the ink cartridge, the controller interprets it as ink present. As ink remaining in the cartridge decreases, the sensor actuator comes out of the optical path and the controller interprets it as ink empty. These sensors detect also whether ink cartridges are loaded.
- The hook switch detects whether the handset is on the hook.
- The air pump motor encoder sensor monitors the rpm of the air pump motor (DC motor), allowing the controller to accelerate or decelerate the motor using PWM control to produce optimal positive pressure.

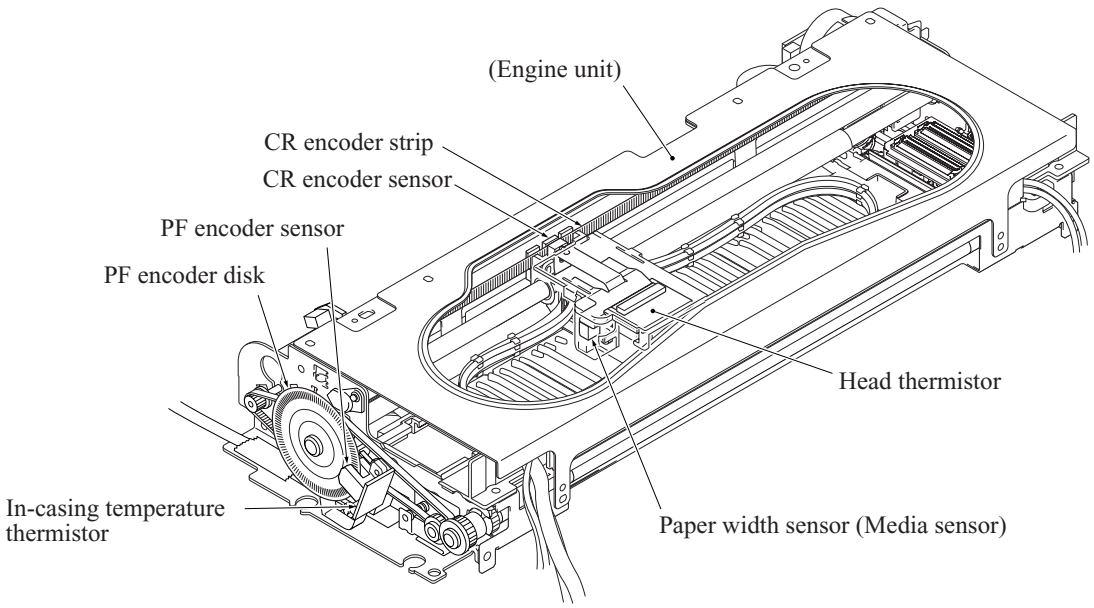
- The carriage motor (CR) encoder sensor monitors the current carriage position and carriage travel speed. If the carriage travel speed varies abnormally, the controller regards it as a paper jam.
- The paper feed motor (PF) encoder sensor monitors the rotation angle and speed of the PF motor (DC motor), allowing the controller to optimize the paper feed amount and speed.
- The casing internal temperature thermistor monitors the temperature inside the machine.
- The head thermistor enables the controller to control the temperature of the print heads. According to the change of the thermistor's internal resistance that is monitored, the control circuitry regulates the drive voltage applied to the piezoelectric ceramic actuators on each print head as the viscosity of the ink varies depending upon the temperature.

All the photosensors (except the paper width sensor that is a reflection type) listed above are photointerrupters consisting of a light-emitting diode and a light-sensitive transistor. Each of them has an actuator located as shown on the next page.





* Not provided on the MFC100.

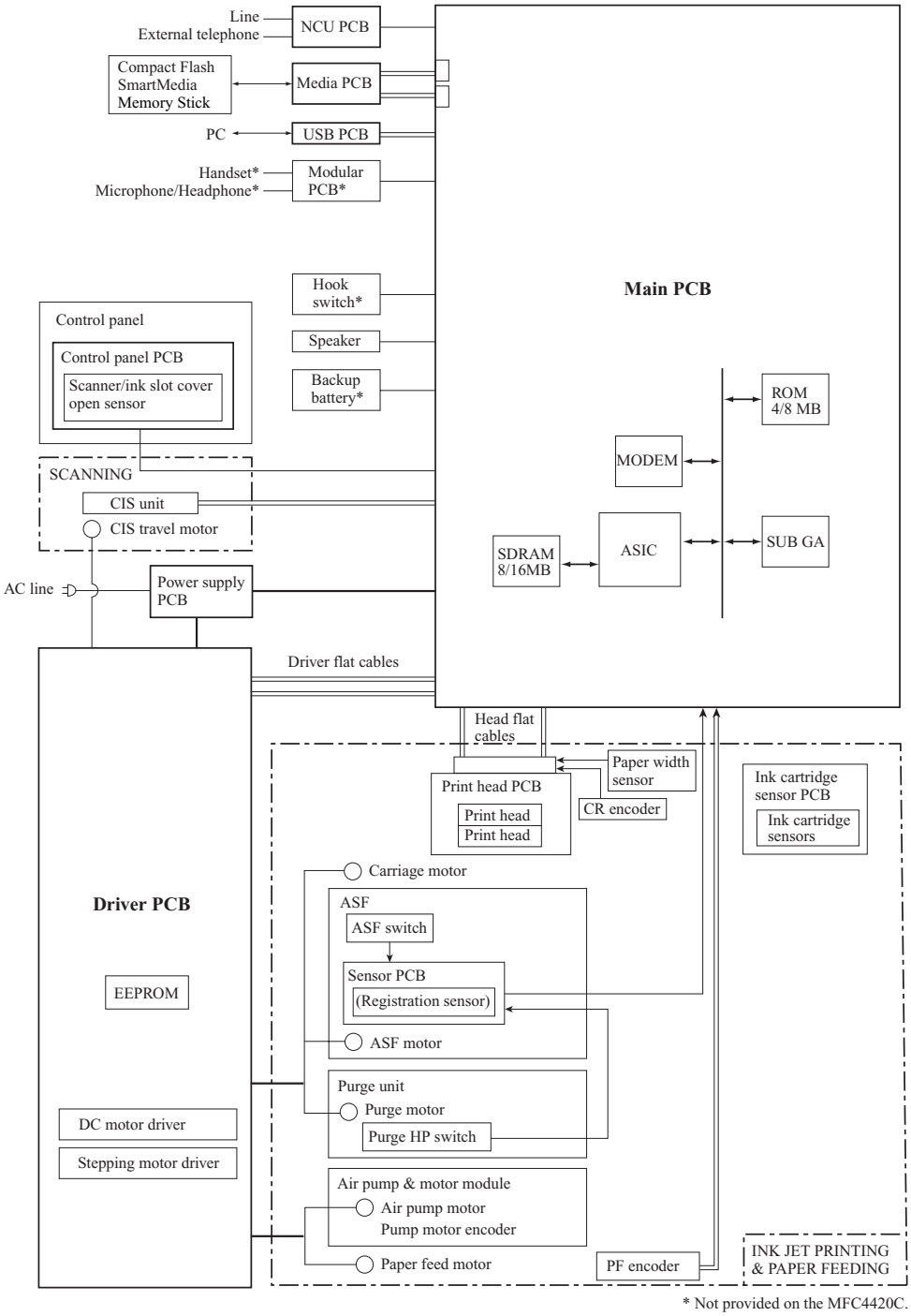


Location of Sensors and Actuators

4.3 CONTROL ELECTRONICS

4.3.1 Configuration

The hardware configuration of the facsimile machine is shown below. The wiring diagram is given in Appendix 6.



* Not provided on the MFC4420C.

Configuration of Facsimile Machine

CHAPTER 5

ROUTINE MAINTENANCE

CHAPTER 5 ROUTINE MAINTENANCE

CONTENTS

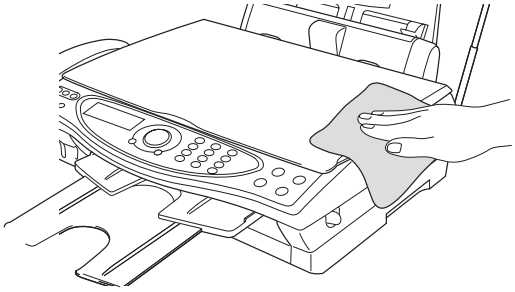
5.1 CLEANING

If the machine is stained or soiled, clean it as described below.

5.1.1 Cleaning the Exterior of the Machine

Gently wipe off the machine with a dry, soft cloth.

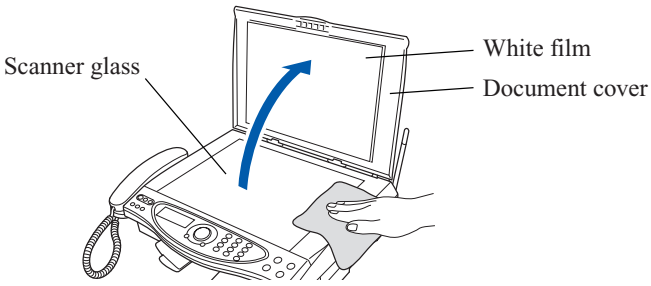
NOTE: Never use benzene, thinner, or other organic solvents. Do not use alcohol or a cloth dampened with alcohol. The letters printed on the control panel might fade or vanish



5.1.2 Cleaning the Scanner Glass

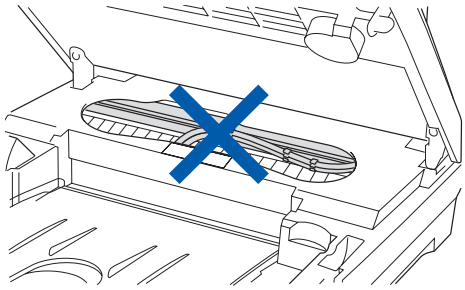
If the scanner glass is stained or clouded, the print quality of fax document sent or copied will lower. To keep the quality print, clean the scanner glass.

Open the document cover. Clean the scanner glass and the white film with isopropyl alcohol on a soft lint-free cloth.



⚠ WARNING

Do not clean the printing unit (engine unit). Never touch the shaded section as shown below. Doing so may stain your hands with ink or break the ink tubes.



5.1.3 Cleaning the Purge Unit

(1) Unplug the power cord from the wall socket.

(2) Plug the power cord again. After you hear the carriage moving out of the home position for initialization, unplug the power cord again. The carriage will stop at the middle of the rail.

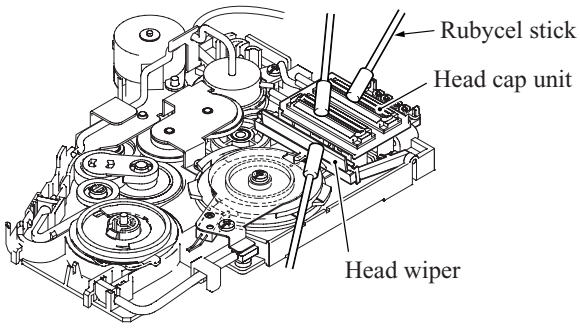
(3) Open the scanner unit.

(4) Clean the two head caps and wiper of the purge unit with a "Rubycel" stick that is a head cleaner stick provided as a spare part.

NOTE: Do not use a cotton swab that may leave lint on the cleaned sections. Lint left on the purge unit will affect the print performance.

NOTE: Use a new Rubycel stick and do not use the used one for any other purge units.

NOTE: During the cleaning jobs, take care not to touch the head caps or wiper directly by hand or scratch their surfaces. Do not remove them from the head cap holder.



5.1.4 Cleaning the Print Head Unit

(1) Remove the print head unit from the carriage.

(2) Soak a Rubycel stick in "Glycerol cleaner."

(3) Clean the printing surface of the print head unit by rolling the Rubycel stick lightly on the printing surface.

NOTE: Do not use a cotton swab that may leave lint on the cleaned sections. Lint left on the purge unit will affect the print performance.

NOTE: Use a new Rubycel stick and do not use the used one for any other print heads.

NOTE: During the cleaning jobs, take care not to scratch the surface of the print head.

5.2 REPLACING THE INK CARTRIDGES

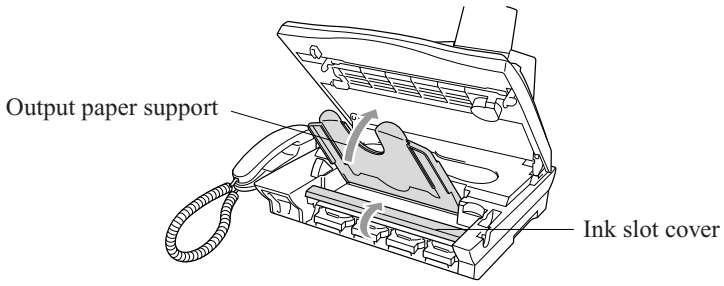
Your machine is equipped with an ink dot counter that automatically monitors the ink level in each color cartridge. When the counter detects an ink cartridge is out of ink, the machine will notify you with a message "`INK EMPTY`" on the LCD.

5.2.1 Replacing the Ink Cartridge

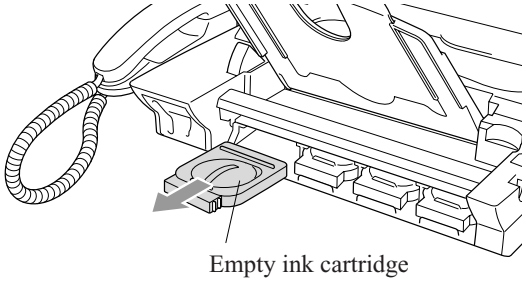
The LCD shows you which color cartridges are empty. Be sure to follow the LCD prompts so you replace the color cartridges in the appropriate order.

(1) Pull the scanner cover release lever and lift the scanner cover.

(2) Lift the output paper support and open the ink slot cover.



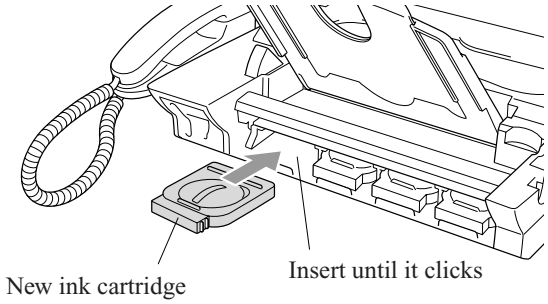
(3) Remove the ink cartridges that are shown on the LCD.



If one or more ink cartridges are empty, for example Black, the LCD shows "`INK EMPTY BLACK`" and "`PLS OPEN COVER`."

(4) Open the new ink cartridge bag for the color shown on the LCD, and then take out the ink cartridge.

(5) Each color has its own correct position. Insert the new ink cartridge into its carriage by pressing until it clicks.



(6) After installing the ink cartridges, close the ink cartridge cover, output paper support and scanner cover.

(7) If you replaced an ink cartridge while "NEAR EMPTY XXXX" was displayed on the LCD, the LCD will ask you to verify that it was a brand new one. Example: "DID YOU CHANGE BLCK? 1.YES 2.NO." For each new cartridge you installed, press **1** on the dial pad to automatically reset the ink dot counter for that color. If the ink cartridge you installed is not a brand new one, please be sure to select **2**.

NOTE: If you wait until the "INK EMPTY XXXX" message is displayed on the LCD, the machine will automatically reset the ink dot counter.

CAUTION: If ink gets in your eyes, irrigate them with water immediately and call a doctor if you are concerned.

⚠ CAUTION

- DO NOT remove ink cartridges if you do not need to replace them. If you do so, it may reduce the ink quantity and the printer will not know the quantity of ink left in the cartridge.
- DO NOT shake the ink cartridges, because the ink may spill when you take off the sealing tape.
- If ink stains your body or clothing, wash with soap or detergent immediately.
- If you install an ink cartridge in the wrong color position, you must clean the print head several times before you start printing (after correcting the cartridge installation) because the colors were mixed.
- Once you open an ink cartridge, install it in the machine and use it up within six months of installation. Use unopened ink cartridges by the expiration date written on the cartridge package.
- Brother strongly recommends that you do not refill the ink cartridges provided with your machine. We also strongly recommend that you continue to use only Genuine Brother Brand replacement ink cartridges. Using or attempting to use potentially incompatible inks and/or cartridges in your machine may cause damage to the machine itself and/or it may result in unsatisfactory print quality. Our warranty coverage does not apply to any problem that was caused by the use of unauthorized third party ink and/or cartridges. To protect your investment and guarantee your print quality please continue to replace consumed ink cartridges with only Genuine Brother Branded Supplies.

  NOTE: If the `INK EMPTY` message is on the display after you have installed ink cartridges, check that the ink cartridges are installed correctly.

5.2.2 Checking the Ink Volume

You can check the ink that is left in the cartridge.

(1) Press **Menu/Set**, **5**, **3**.

(2) Press ◄► to select the color you want to check.

```
INK VOLUME
BLACK
```

Press **Menu/Set**.

The LCD shows the ink volume.

```
BLACK
 -■■■■■□□+
```

(3) Press **Stop/Exit**.

CHAPTER 6

DISASSEMBLY/REASSEMBLY

CHAPTER 6 DISASSEMBLY/REASSEMBLY

CONTENTS

6.1 DISASSEMBLY/REASSEMBLY

■ Safety Precautions

To prevent the creation of secondary problems through mishandling, observe the following precautions for maintenance work.

(1) Unplug the power cord from the power outlet before replacing parts or units. When accessing to the power-related sections, be sure to unplug the power cord from the power outlet.

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

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

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

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

(6) If any of the self-tapping (Taptite) screws are removed, be sure to reinsert them correctly.

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

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

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

(10) The print head unit will start head locking operation five seconds after the printing is finished. Head locking operation takes from 5 to 10 seconds. NEVER unplug the power cord before the print head unit completes the head locking operation; doing so will render the print head unit unusable, and therefore require replacement.

When you receive the machine from the user or when you pack it to send it back to the user, check the head locking state.

Tightening Torques

Location of screw	Screw type	Q'ty	Tightening torque N•m (kgf•cm)
Sensor support	Taptite, bind B M2x6	1	0.15 ±0.05 (1.6 ±0.5)
Bottom plate	Taptite, cup B M3x10	10	0.49 ±0.1 (5 ±1)
	Screw, cup M3x5	4	0.49 ±0.1 (5 ±1)
EMC spring plate	Taptite, cup B M3x10	1	0.49 ±0.1 (5 ±1)
Rear cover L	Taptite, cup B M3x10	2	0.39 ±0.1 (4 ±1)
Enclosure cover	Taptite, cup B M3x10	1	0.49 ±0.1 (5 ±1)
USB PCB	Screw, pan M3x6	1	0.29 ±0.1 (3 ±1)
Main PCB	Taptite, cup B M3x10	4	0.49 ±0.1 (5 ±1)
Driver PCB	Taptite, cup B M3x10	4	0.49 ±0.1 (5 ±1)
Modular cover*	Taptite, cup B M3x10	1	0.49 ±0.1 (5 ±1)
Left sub cover**	Taptite, cup B M3x10	1	0.49 ±0.1 (5 ±1)
Stopper links	Taptite, cup B M3x10	2	0.49 ±0.1 (5 ±1)
Control panel ASSY	Taptite, bind B M3x8	6	0.39 ±0.1 (4 ±1)
Control panel PCB	Taptite, cup B M3x6	7	0.39 ±0.1 (4 ±1)
LCD	Taptite, cup B M3x6	1	0.39 ±0.1 (4 ±1)
Upper cover	Taptite, bind M4x12	8	0.98 ±0.2 (10 ±2)
Media module (for grounding wire)	Screw, pan (plain washer) M4x6	2	0.49 ±0.1 (5 ±1)
Auto Sheet Feeder (ASF)	Taptite, bind B M4x12	4	0.98 ±0.2 (10 ±2)
	Screw, bind M2.6x4	2	0.39 ±0.1 (4 ±1)
Paper tray base ASSY	Taptite, bind B M2.6x8	2	0.39 ±0.1 (4 ±1)
Center base flap ASSY	Taptite, bind B M2.6x8	4	0.39 ±0.1 (4 ±1)
Engine unit	Shoulder screw 4x10	4	0.98 ±0.2 (10 ±2)
	Screw, cup M3x5	2	0.69 ±0.1 (7 ±1)
Needle tube & head flat cable ASSY	Taptite, bind B M3x8	8	0.39 ±0.1 (4 ±1)
Paper feed motor	Screw, bind M3x3	2	0.39 ±0.1 (4 ±1)
PF encoder sensor	Taptite, bind B M2.6x5	1	0.29 ±0.1 (3 ±1)
Purge plate	Screw, bind M2.6x4	3	0.39 ±0.1 (4 ±1)
Purge unit	Taptite, bind B M2.6x5	2	0.39 ±0.1 (4 ±1)
	Screw, pan (s/p washer) M2.6x16	1	0.39 ±0.1 (4 ±1)
Engine upper frame	Screw, bind M2.6x4	6	0.39 ±0.1 (4 ±1)
Encoder strip spring	Screw, bind M2.6x4	1	0.39 ±0.1 (4 ±1)
Ink cartridge support base	Taptite, cup B M3x10	4	0.49 ±0.1 (5 ±1)
Ink absorber case	Taptite, cup B M3x10	2	0.49 ±0.1 (5 ±1)
Air pump & motor module	Shoulder screw, 4x10	2	0.98 ±0.2 (10 ±2)
Grounding terminal	Taptite, cup B M3x10	1	0.49 ±0.1 (5 ±1)

*For the MFC4820C.
**For the MFC4420C.

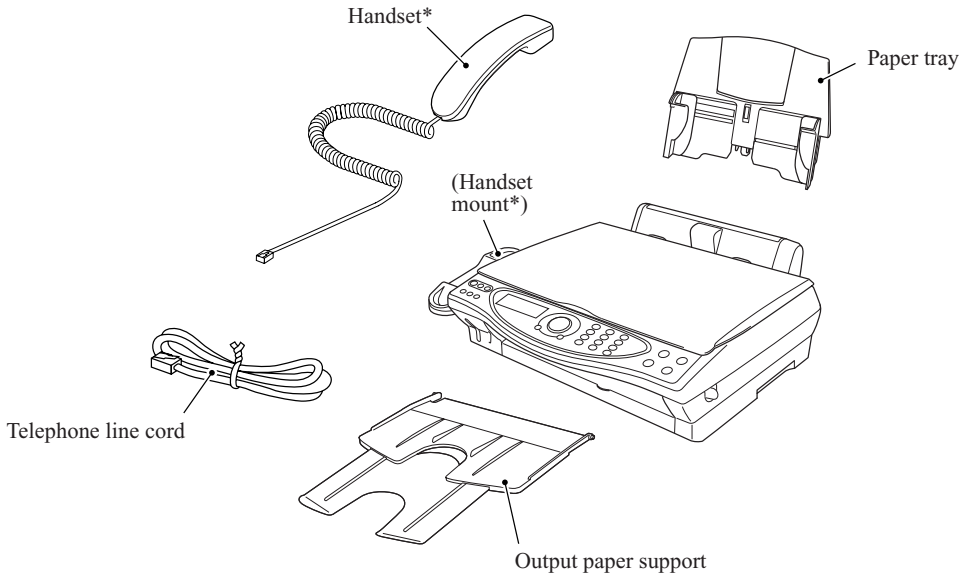
■ Preparation

Prior to proceeding with the disassembly procedure,

(1) Unplug
- the modular jack of the telephone line,
- the modular jack of the handset* (and remove the handset),
- the USB cable, if connected (not shown below), and
- the modular jack of the external telephone set if connected (not shown below).

(2) Remove
- the paper tray and
- the output paper support.

*Not provided on the MFC4420C.



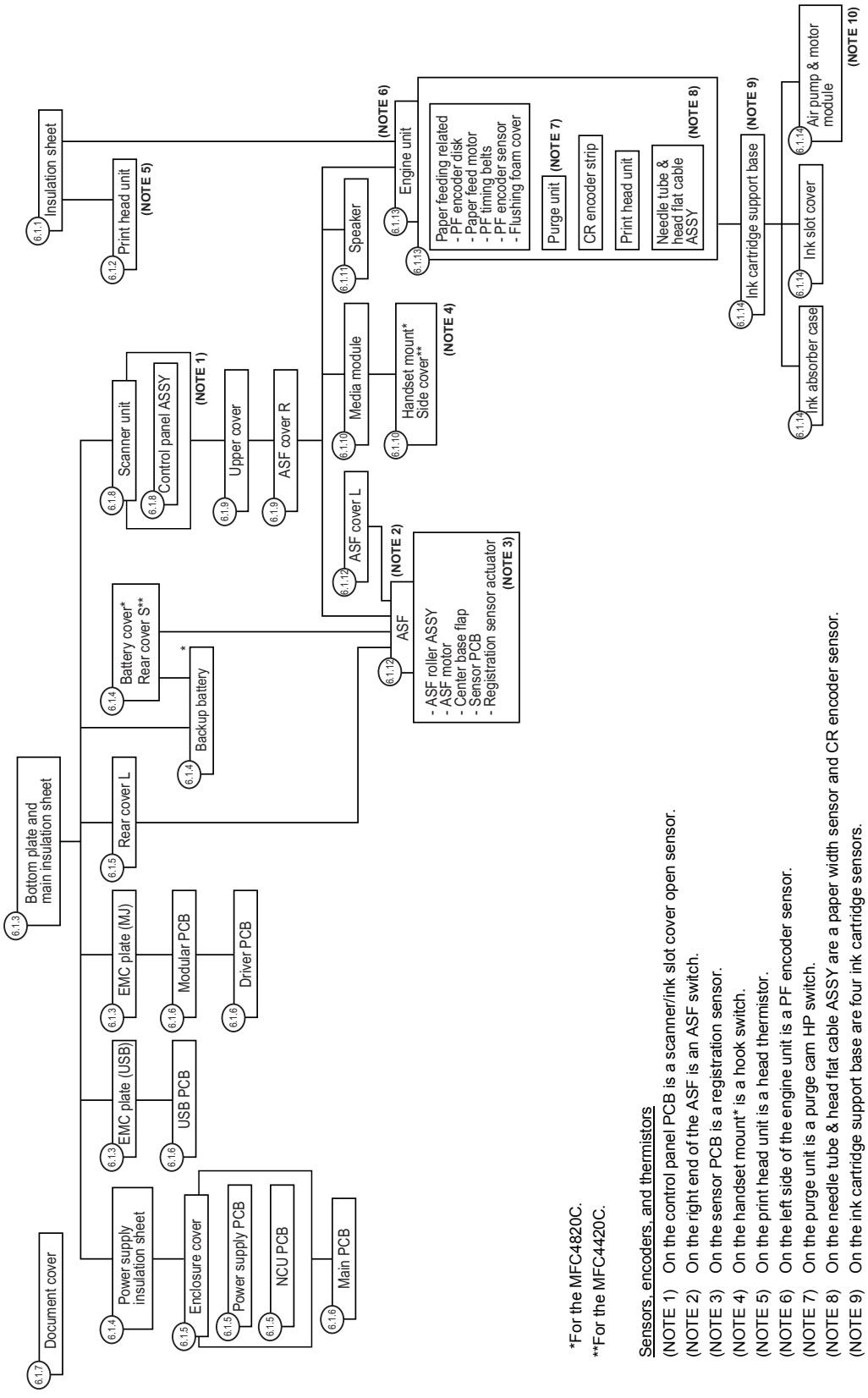
During disassembly jobs except when removing the engine unit (including the purge unit and the needle tube & head flat cable ASSY), leave the print head unit and all four ink cartridges in the machine.

When removing the print head unit or engine unit, you need to remove the ink cartridges and drain the ink from the needle tubes beforehand.

■ How to Access the Object Component

- On the next page is a disassembly flowchart which helps you access the object components. To remove the purge unit, for example, first find it on the flowchart and note its number (6.1.14 in this case). To access it, you need to remove all the parts above the purge unit on the flowchart (6.1.1, 6.1.3, 6.1.9, and 6.1.10 in this case) before the unit itself can be removed.
- Unless otherwise specified, all parts should be replaced in the opposite order to which they were removed to reassemble the machine.

■ Disassembly Flowchart



*For the MFC4820C.
**For the MFC4420C.

Sensors, encoders, and thermistors

(NOTE 1) On the control panel PCB is a scanner/ink slot cover open sensor.
(NOTE 2) On the right end of the ASF is an ASF switch.
(NOTE 3) On the sensor PCB is a registration sensor.
(NOTE 4) On the handset mount* is a hook switch.
(NOTE 5) On the print head unit is a head thermistor.
(NOTE 6) On the left side of the engine unit is a PF encoder sensor.
(NOTE 7) On the purge unit is a purge cam HP switch.
(NOTE 8) On the needle tube & head flat cable ASSY are a paper width sensor and CR encoder sensor.
(NOTE 9) On the ink cartridge support base are four ink cartridge sensors.
(NOTE 10) On the air pump & motor module is an air pump motor encoder sensor.

6.1.1 Draining the Ink from the Ink Tubes

--This must be performed before removing the print head unit or engine unit--

(1) Plug the power cord into the outlet.

(2) Make the machine enter the maintenance mode by pressing:

Menu/Set, *****, **2**, **8**, **6** and **4** keys in this sequence.

← Within 2 seconds →

(3) Pull the release lever towards you and open the scanner unit. On the underside of the scanner unit, turn the scanner open sensor actuator towards you and keep it depressed with adhesive tape.

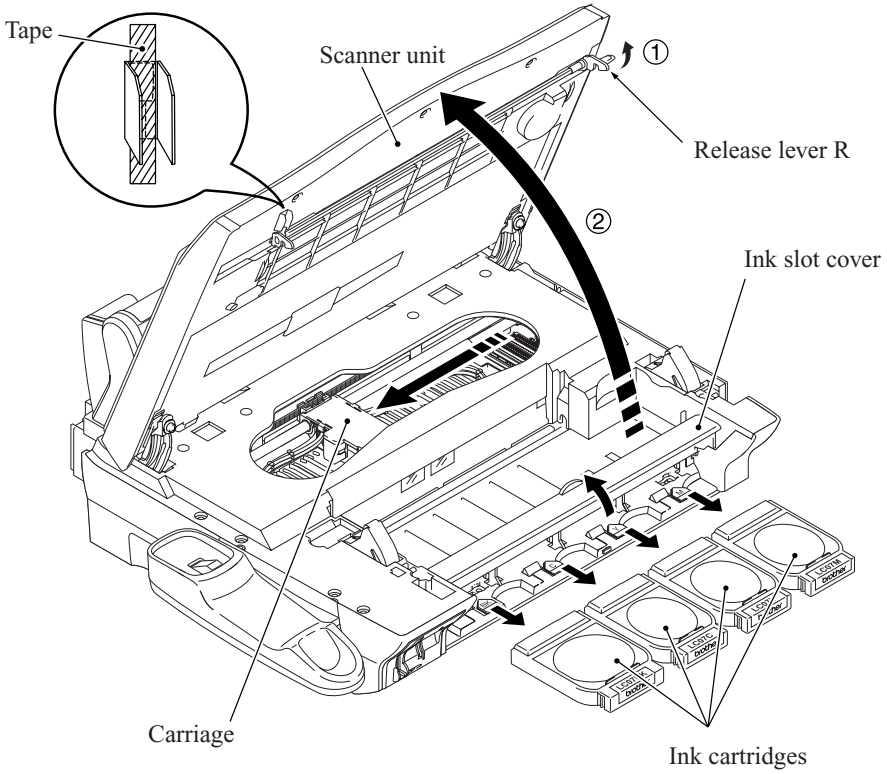
This prevents the machine from detecting that the cover is open.

(4) Open the ink slot cover and pull out all four ink cartridges.

NOTE: Be sure to perform steps (3) and (4) in that order. Performing step (4) before step (3) will cause Function code 76 not to be enabled in step (5).

(5) Carry out initial purge with Function code 76 + 9 key + FAX Start button.

For details, refer to Chapter 7, Section 7.5.18 "Purge Operation."



6.1.2 Print Head Unit

During disassembly jobs, except when removing the engine unit (including the purge unit and the needle tube & head flat cable ASSY), leave the print head unit and all four ink cartridges in the machine.

When removing the print head unit or engine unit, you need to remove the ink cartridges and drain the ink from the needle tubes beforehand. (Refer to Section 6.1.1.)

NOTE: To replace the print head unit, you need to turn the machine on and make the carriage travel to the head replacement position with Function code 63 + * in the maintenance mode. Do not move the carriage by hand when the machine is turned off.

NOTE: If you replace the print head unit, also replace the ink cartridges with new ones.

Removing the ink cartridges and draining the ink from the ink tubes

(1) Make sure that all four ink cartridges have been removed and that the ink in the ink tubes has been drained. (Refer to Section 6.1.1.)

Removing the print head unit

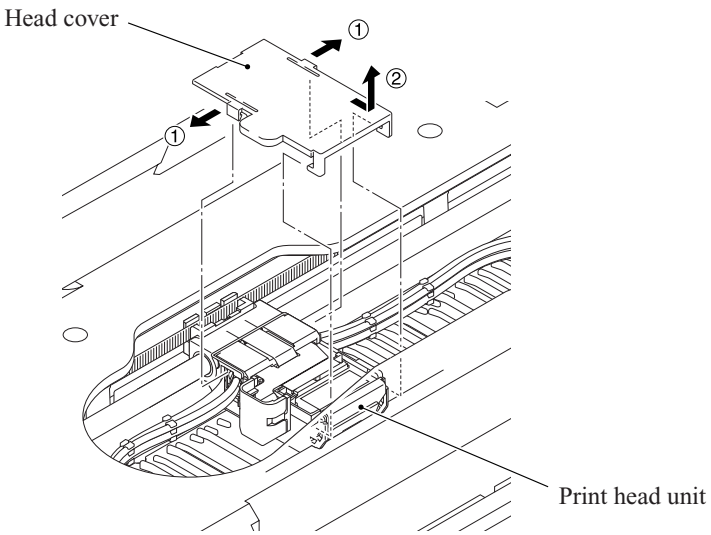
(2) Plug the power cord into an outlet, make the machine enter the maintenance mode (**Menu/Set**, *****, **2864**), and make the carriage travel to the head replacement position using Function code 63 + *.

Refer to Chapter 7, Section 7.5.12 "Carriage Travel and Initial Setup Mode."

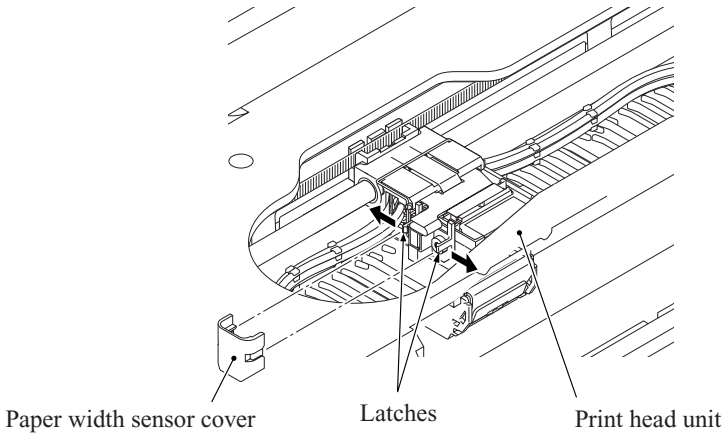
(3) Unplug the power cord from the outlet.

(4) Fully open the scanner unit.

(5) Unlatch the head cover (① below) and pull it slightly to the front and up (②).

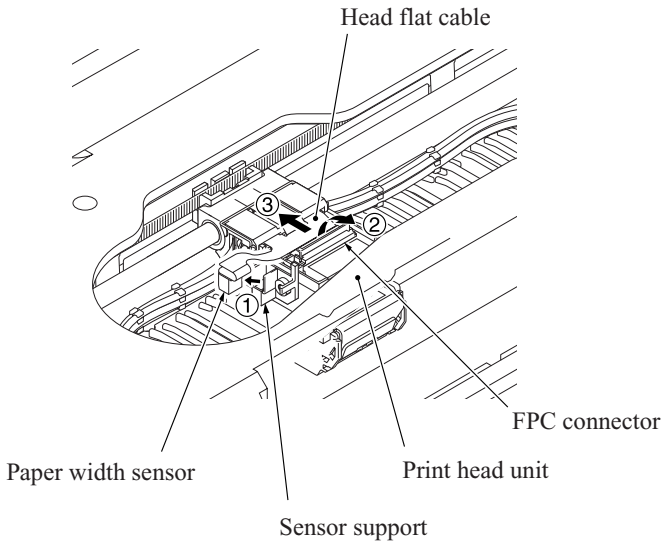


(6) Pull the latches on the left end of the print head unit outwards and remove the paper width sensor cover.



(7) Take the paper width sensor out of its support in the print head unit (① below).

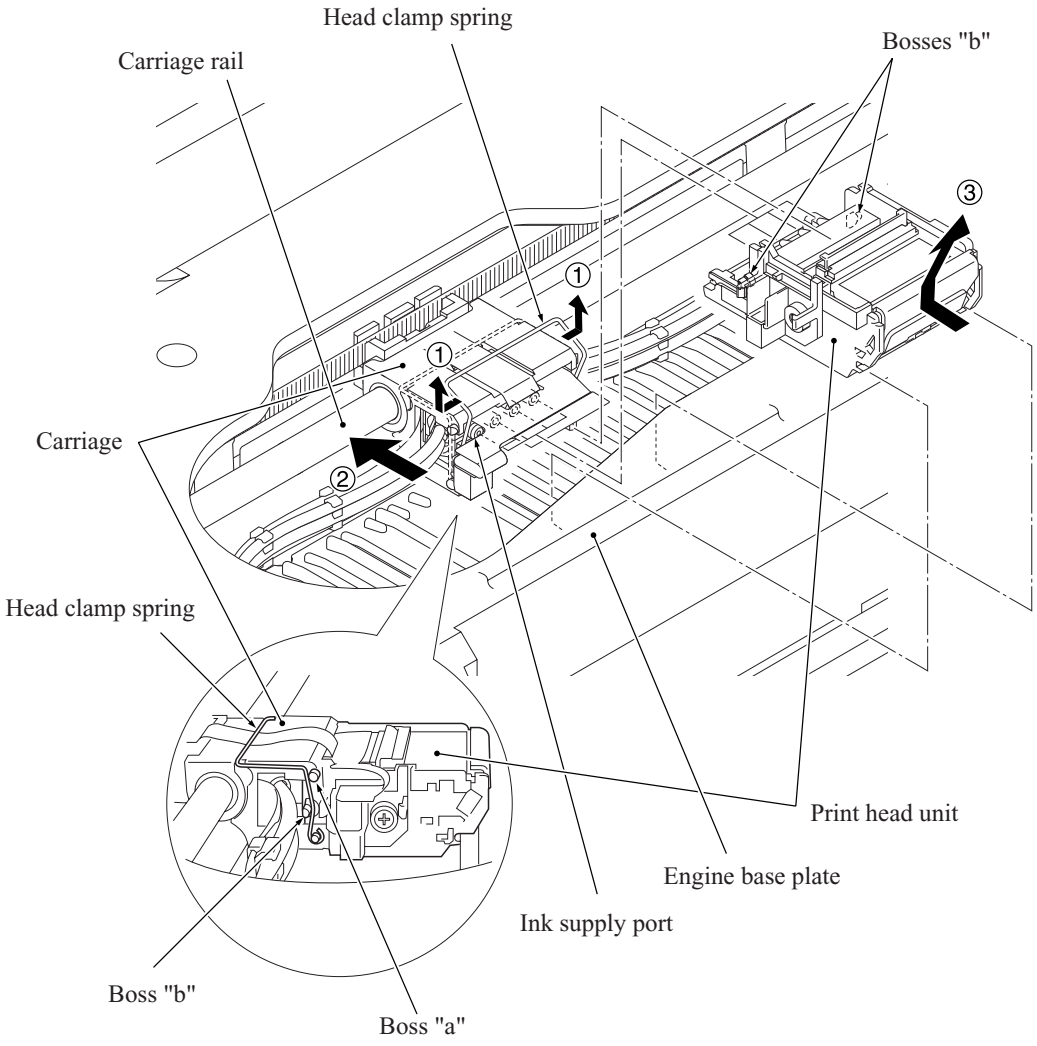
(8) Unlock the FPC connector (②) and disconnect the head flat cable from the print head unit (③).



(9) While pulling the head clamp spring outwards (①), turn it towards you to release bosses "b" on the print head unit.

(10) Press the carriage rail towards the rear (②) near the print head unit and lift the front end of the print head unit up and off the engine base plate.

Lift the print head unit up and towards you (③).

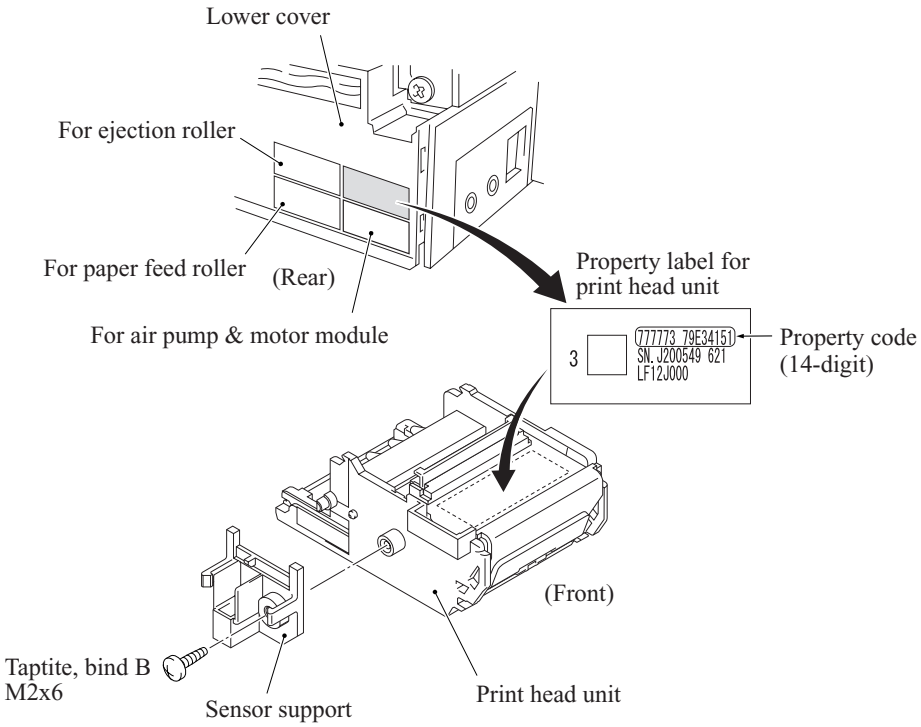


NOTE: Do not touch the print nozzles (the printing ends) or ink supply ports (to which ink supply tubes are connected) of the print head unit; doing so will not only stain your hands with ink but also damage the nozzles and/or supply ports. If you do touch them though, clean them with a special-purpose cleaning stick and liquid.

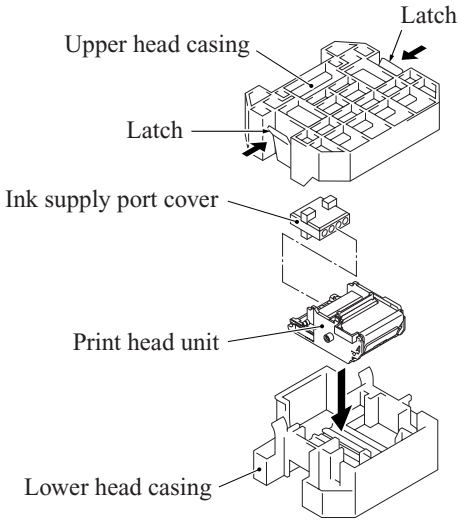
(11) Each print head unit is assigned a property code that represents the properties unique to that head unit. A property label, on which the property code is printed, is attached to the head unit itself and the rear left side of the machine (with the battery cover* or rear cover S** removed). (*For the MFC4820C, **For the MFC4420C. Refer to Section 6.1.4.)

If you remove the print head unit and store it separately from the machine, remove the property label from the machine and store it together with the print head unit.

If you replace the print head unit with a new one, attach the property label that comes with the new print head unit to the rear left side of the machine. Be sure to remove the sensor support from the removed print head unit and attach it to the new one.



NOTE: Be sure to put an ink supply port cover on the print head unit and store the unit in the head casing, as shown below. Leaving the print head unit out of the casing will cause the print nozzles and ink supply ports to dry up, resulting in a damaged head.



Installing the print head unit

(12) When installing a new print head unit, make sure that you attach the property label that comes with it to the rear left side of the machine as described in step (11).

(13) When installing a print head unit that was previously removed, take it out of the upper and lower head casing and remove the ink supply port cover.

(14) Lift up the front end of the carriage slightly, tilt the print head unit to the rear and insert it into the carriage while aligning the ink supply ports of the print head unit with those of the carriage. Push the carriage rail to the rear and fit the front end of the print head unit over the engine base plate. (See the illustration on page 6-8.)

(15) Pull the head clamp spring out and rotate it to the rear so that the spring will be hooked over bosses "a" and "b" (shown on page 6-8) and the print head unit clamped in place.

(16) Make sure that the FPC connector is unlocked. Connect the head flat cable to the print head unit and then lock the connector. (See the illustration on page 6-7.)

(17) Place the paper width sensor in the sensor support of the print head unit.

(18) Snap the paper width sensor cover into place. (See the illustration on page 6-7.)

(19) Set the head cover back into place. (See the illustration on page 6-6.)

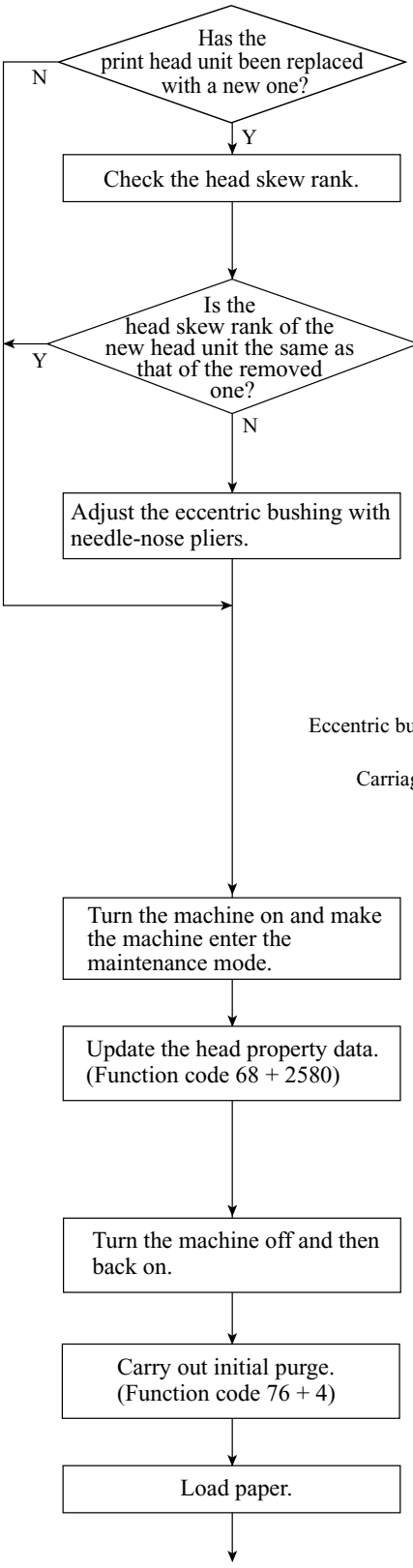
(20) Close the scanner unit.

(21) Set ink cartridges.

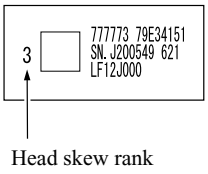
(22) Plug the power cord into an outlet.

The carriage will automatically move to the right end of the rail (to the home position).

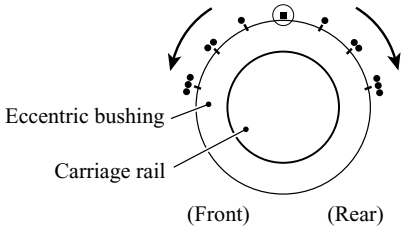
Adjusting the print head unit



Check the head skew rank code (1 to 5) next to the 2-dimensional code on the head property label (shown on page 6-9) attached to the print head unit or the rear left side of the machine (with the battery cover or rear cover S removed). Refer to Section 6.1.4.



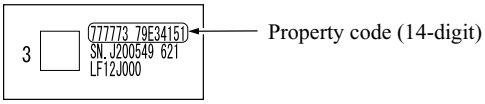
If the head skew rank code (e.g., 2) of the new head unit is less than that (e.g., 3) of the removed one, rotate the eccentric bushing to the front by the amount of the difference.



Head skew rank	Rotate the eccentric bushing:
1	to the front by 2 position markers
2	to the front by 1 position marker
3	(No change)
4	to the rear by 1 position marker
5	to the rear by 2 position markers

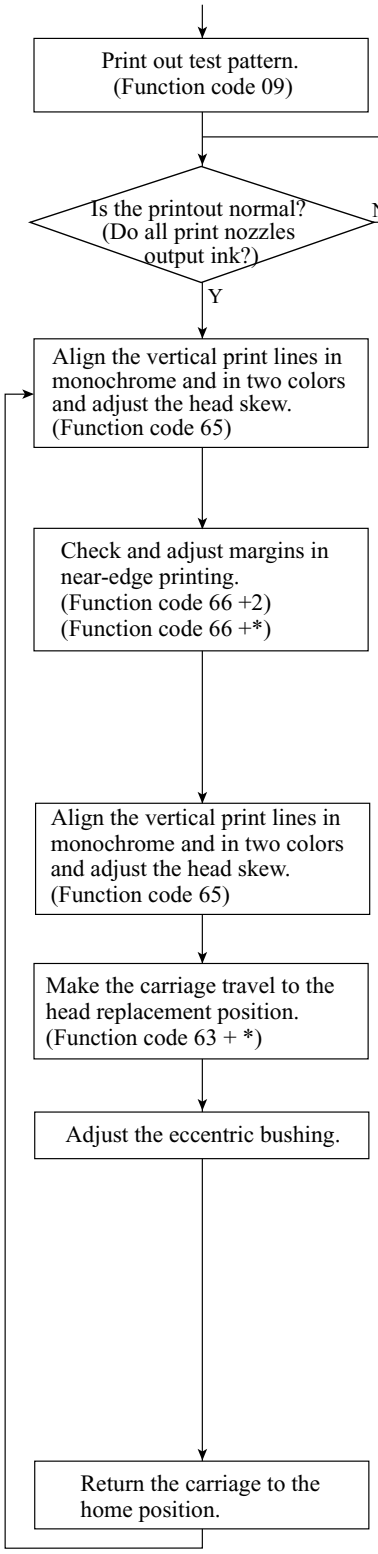
Press **Menu/Set, ***, **2**, **8**, **6**, and **4**. (Refer to Chapter 7 for details.)

Press **6** and **8** in this sequence in the initial stage of the maintenance mode. Next press **2**, **5**, **8**, and **0** and then enter the 14-digit property code of the new head unit. (Refer to Chapter 7, Section 7.5.15 for details.)



Press **7** and **6** in this sequence in the initial stage of the maintenance mode. Next press **4** and **Fax Start**.
(Refer to Chapter 7, Section 7.5.18 for details.)

Set the paper tray and output paper support and then load paper.



Press **0** and **9** in this sequence in the initial stage of the maintenance mode to print a test pattern. (Refer to Chapter 7, Section 7.5.3 for details.)

Press **7** and **6** in this sequence. Next press **1**, select the color that shows an ink output failure, and press **Fax Start**.

Press **6** and **5** in this sequence to print out two sheets of check patterns. Check the printed 600 dpi vertical alignment patterns (#1 through #9) and find which number block shows full alignment. Enter that block number. Also do the same for the 1200 dpi.
Next, check the color-printed vertical alignment patterns (#1 through #3) and find which number block shows full alignment. Enter that block number. (Refer to Chapter 7, Section 7.5.13 for details.)

Press **6** twice. Next press **2** to print out margin check patterns in near-edge printing. Measure the top, bottom, left, and right margins on the printout. If any of them are out of the range from 1.8 through 2.2 mm, make the machine enter the maintenance mode and press **6** twice again. Next press * to make the machine ready for data entry. Enter the measured values (in units of 0.1 mm) multiplied by 10. After each entry, press **Menu/Set**.
Make the machine enter the maintenance mode and press **6** twice again. Next press **2** to print out margin check patterns for checking that those margins are within the specified range. (Refer to Chapter 7, Section 7.5.14.)

Press **6** and **5** in this sequence to print out two pages of check patterns. Check the alignment of printed vertical lines in monochrome and in two colors.

Press **6** and **3** in this sequence. Next press * to make the carriage travel to the head replacement position. (Refer to Chapter 7, Section 7.5.12 for details.)

Check the head skew check patterns (-2/1200 through 2/1200) on the 2nd sheet printed by Function code 65. Find which number block shows the most aligned print. Rotate the eccentric bushing as listed below.
(Refer to Chapter 7, Section 7.5.13 for details.)

If the most aligned print is:	Rotate the eccentric bushing:
-2/1200	to the rear by 2 position markers
-1/1200	(No change)
0/1200	(No change)
1/1200	(No change)
2/1200	to the front by 2 position markers

Press **Stop/Exit**.

TIP: Adjustment of Print Head Unit Skew through Adjustment of the Carriage in the Direction of Zθ

The carriage is set on the carriage rail with an eccentric bushing. Print head units are classified into five ranks (1 through 5) depending upon the skew of head nozzles. According to the head rank, you may adjust the skew of head nozzles in the direction of Xθ by rotating the eccentric bushing.

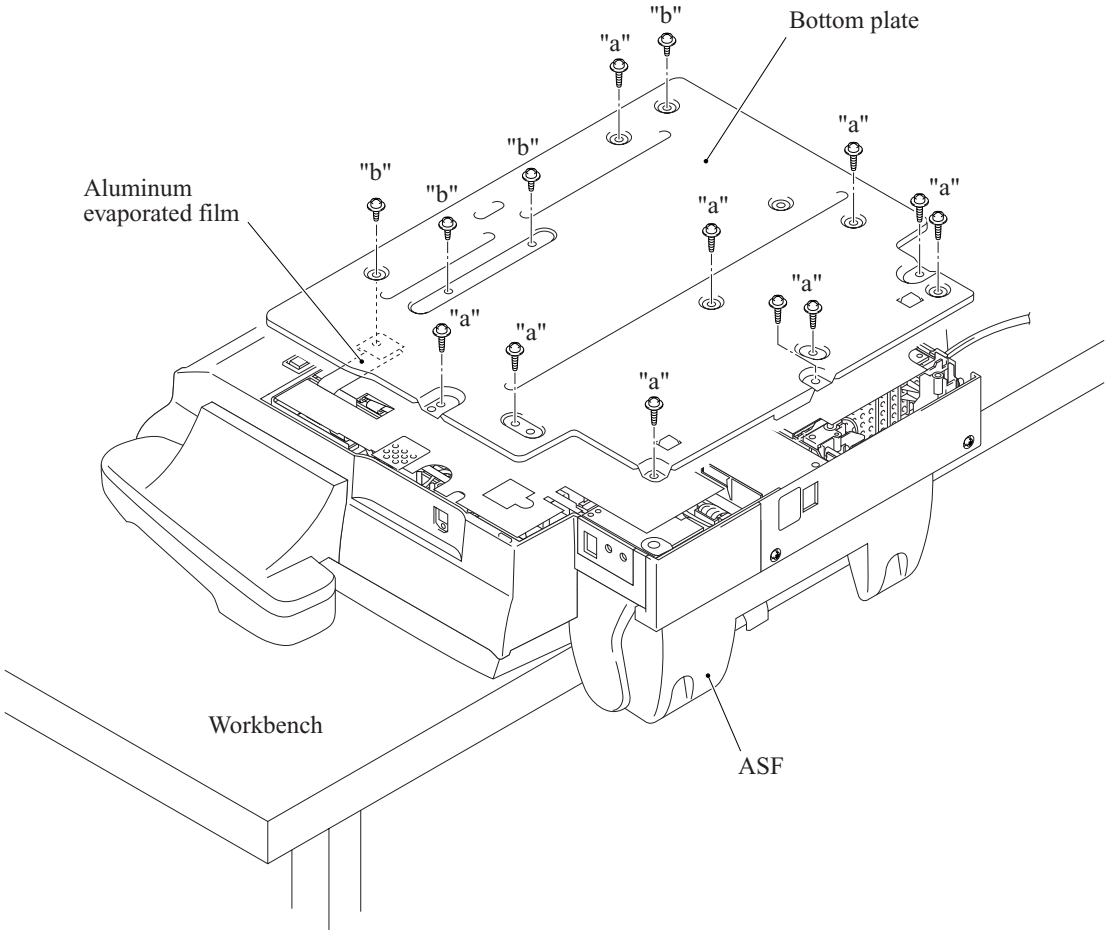
6.1.3 Bottom Plate, Main Insulation Sheet, and EMC Plates (USB and MJ)

(1) Turn the machine upside down.

NOTE: When turning the machine upside down, be sure to place it on the workbench as illustrated below so that the ASF will not come into contact with the top of the workbench.

(2) Remove 14 screws (ten "a" screws and four "b" screws) from the bottom plate and lift off the plate.

NOTE: Remove the four "b" screws first.



"a": Taptite, cup B M3x10
"b": Screw, cup M3x5

(3) Pull out the EMC plate (USB) and remove the main insulation sheet. (See the next page.)

(4) Disconnect the following flat cables from the main PCB (see the next page):

- Driver flat cables 1 and 2
- Head flat cables 1 and 2 (Also remove the flat cores.)
- Media flat cables 1 and 2 (Also remove the flat cores.)
- PF encoder flat cable
- CIS flat cable (Also remove the flat core.)

(5) Detach the aluminum evaporated film (adhesive) that comes out of the opening provided in the lower cover together with the media flat cables.

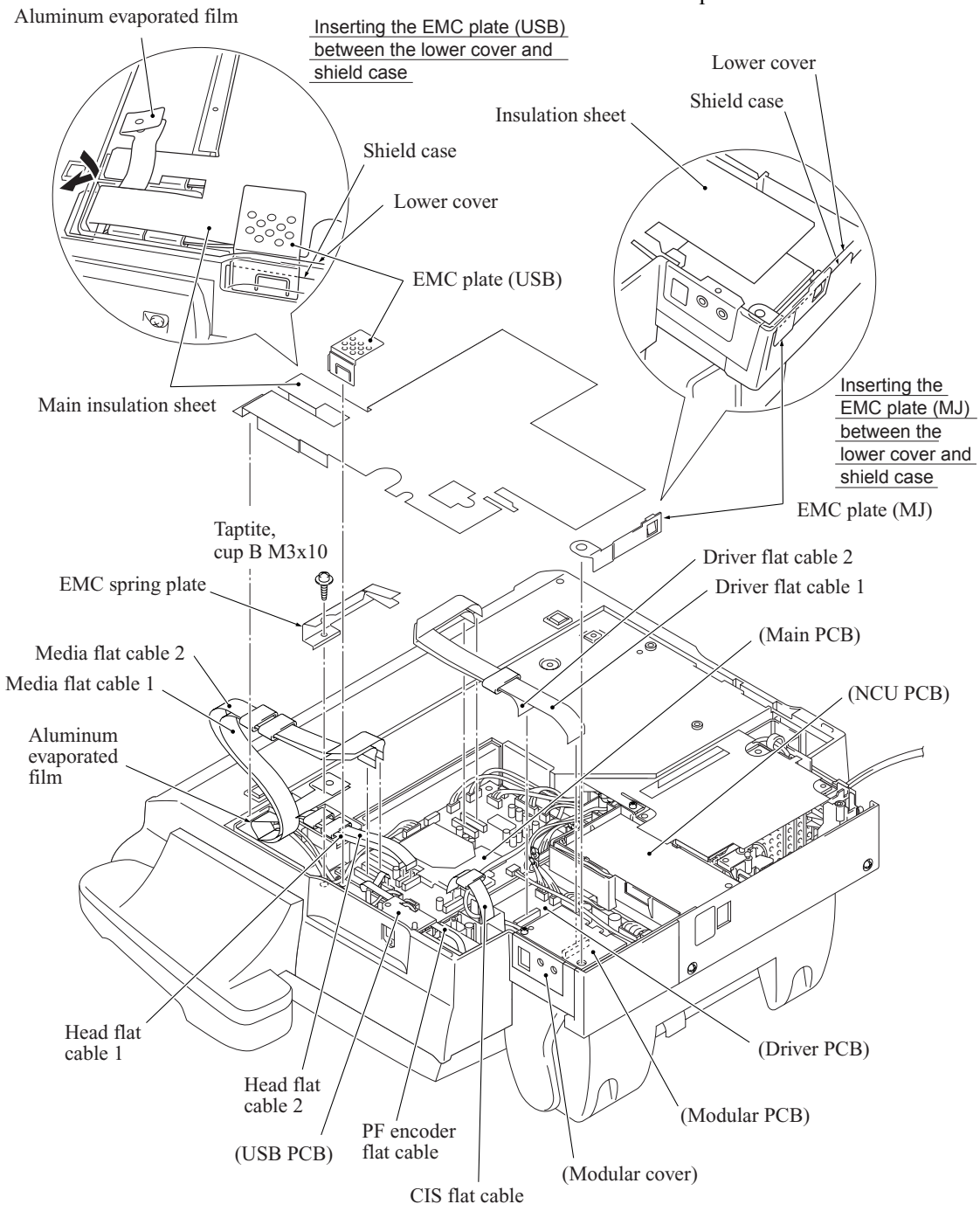
(6) Remove the screw from the EMC spring plate and then take out the plate itself.

(7) Pull out the EMC plate (MJ).

(8) Disconnect driver flat cables 1 and 2, and take them out.

TIP: To make it easier to disconnect driver flat cable 1, remove the modular PCB* and its cover beforehand. (See the illustration on page 6-20.)

*Not provided on the MFC4420C.



■ Reassembling Notes

- For the routing of harnesses and flat cables after removal of the bottom plate, refer to Section 6.1.15, "Routing of the Harnesses and Flat Cables A and B."
- As shown on the previous page, route the aluminum evaporated film and pass it through the slit provided in the rear left corner of the main insulation sheet.
- As shown on the previous page, insert the EMC plates (USB) and (MJ) between the lower cover and the shield case.

6.1.4 Power Supply Insulation Sheet, Battery Cover (Rear Cover S), and Backup Battery

The battery cover and backup battery are for the MFC4820C, and the rear cover S for the MFC4420C.

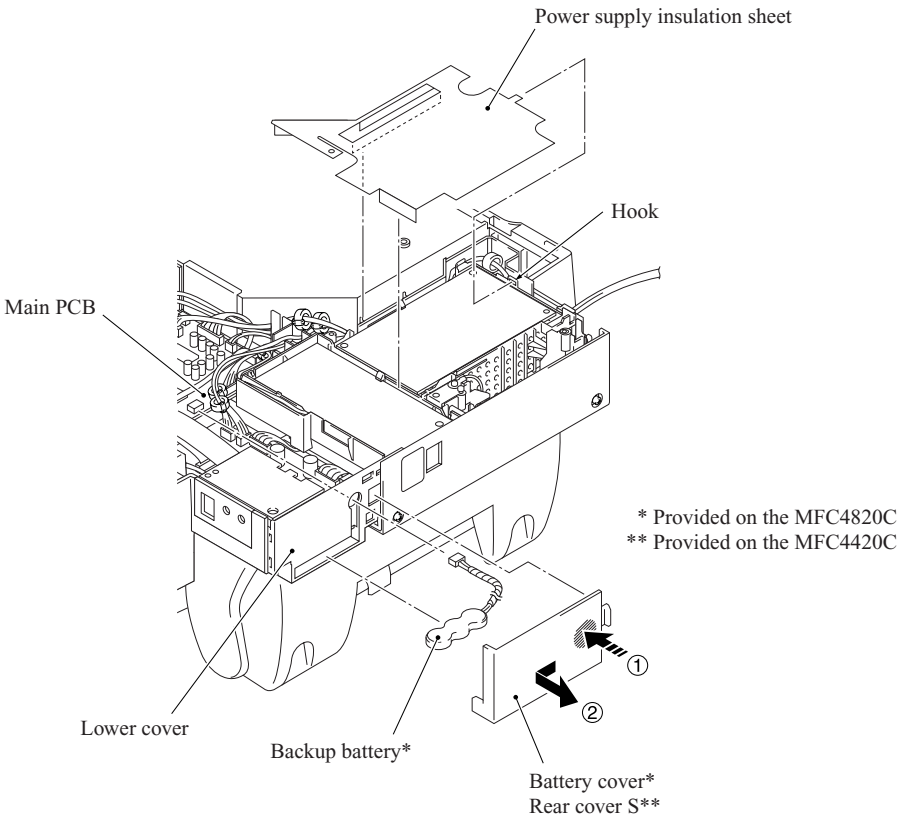
(1) Remove the power supply insulation sheet.

(2) While pressing the battery cover (rear cover S) in the direction of arrow ①, slide it to the left and rear in the direction of arrow ②.

(3) MFC4820C: To replace the backup battery, plug the power cord into an outlet, disconnect the battery harness from the main PCB, and remove the backup battery. Connect a new backup battery to the main PCB and then unplug the power cord.

NOTE: If you disconnect the battery harness with the power cord unplugged, you will lose the settings (e.g., calendar clock, voice messages, and received FAX data) stored in the RAM on the main PCB.

If you need to remove the main PCB (without replacing it with a new one) in the following disassembly jobs, take the backup battery out of the machine once and connect the battery harness to the main PCB without routing it through the opening provided in the lower cover.



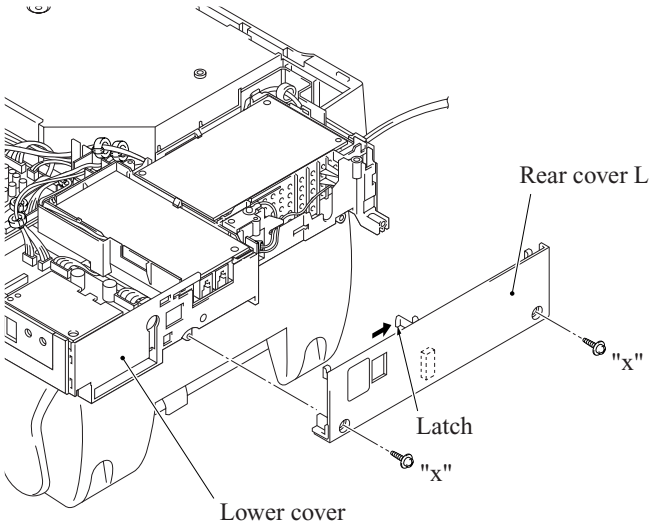
■ Reassembling Notes

- When connecting the battery harness to the main PCB, pass it above other harnesses so that you may disconnect it easily by pulling it from the outside of the machine. Refer to Section 6.1.15 "Routing of the Harnesses and Flat Cables A."

6.1.5 Rear Cover L, Enclosure Cover, Power Supply PCB, and NCU PCB

(1) Remove two screws "x" from the rear cover.

(2) Unlatch the rear cover from the lower cover.



"x": Taptite, cup B M3x10

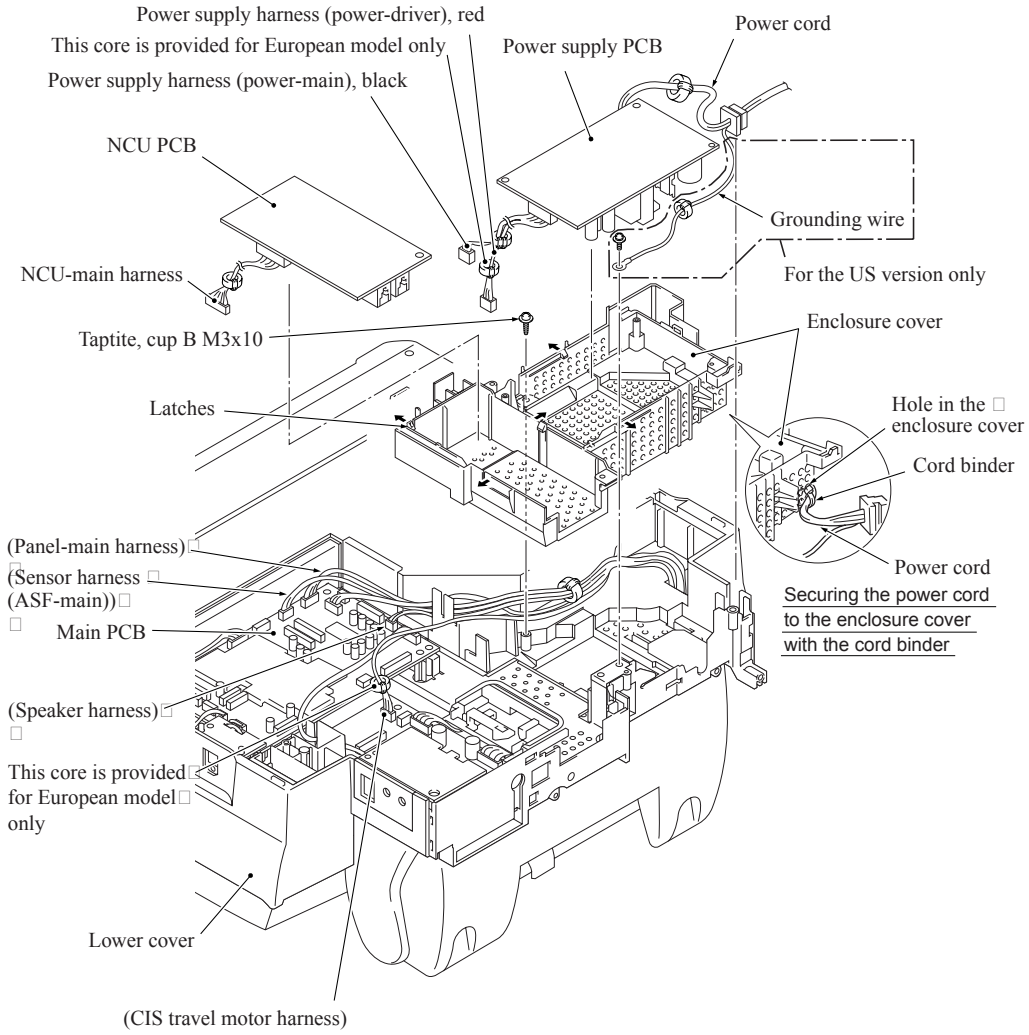
(3) Disconnect the following harnesses from the main PCB (see the illustration on the next page):
- Power supply harness (power-main) (black)
- NCU-main harness (white)

(4) Disconnect the power supply harness (power-driver) (red) from the driver PCB.

(5) Remove the screw from the enclosure cover and lift it up and out of the machine together with the power supply PCB and NCU PCB.

(6) Pull the latches of the enclosure cover outwards and take out the power supply PCB.

(7) Pull the latches of the enclosure cover outwards and take out the NCU PCB.



■ Reassembling Notes

- When setting the power supply PCB into the enclosure cover, secure the power cord to the enclosure cover with a cord binder by passing the binder through holes provided in the enclosure cover.
- For the routing of the NCU-main harness and power supply harness (power-main), refer to "Routing A" in Section 6.1.15 "Routing of the Harnesses and Flat Cables."

6.1.6 USB PCB, Main PCB, Modular PCB*, and Driver PCB

*Not provided on the MFC4420C.

(1) Remove screw "g" (shown on the next page) from the USB PCB, lift up the PCB, and disconnect the USB-main harness from the main PCB.

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

- Hook switch harness (white)*
- Ink cartridge-main harness (white)
- Sensor harness (ASF-main) (white)
- Panel-main harness (red)
- Speaker harness (black/red)
- Modular harness (blue)*
- Battery harness (black/red) (If this harness has not been disconnected in Section 6.1.4, disconnect it here. If it is necessary to prevent the settings stored in the RAM from being lost, refer to the instructions given in Section 6.1.4.)

(3) Remove four screws "h" from the main PCB and lift it up and off.

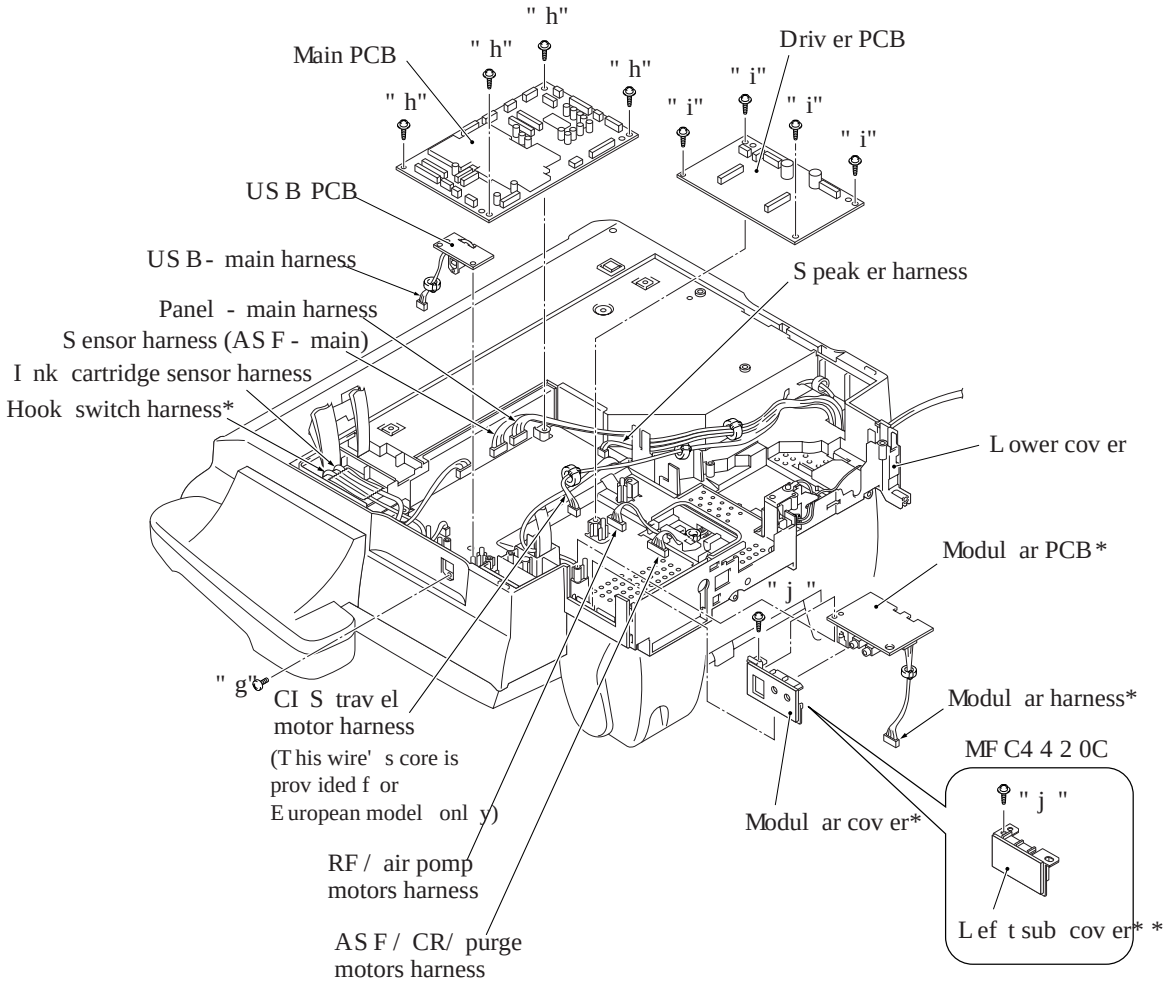
(4) MFC4820C: Remove screw "j" from the modular cover and take it off together with the modular PCB. (If the modular harness has not been disconnected from the main PCB, disconnect it from the modular PCB.)

MFC4420C: Remove screw "j" from the left sub cover and take it off.

(5) Disconnect the following harnesses from the driver PCB:

- CIS travel motor harness (white)
- PF/air pump motors harness (red)
- ASF/CR/purge motors harness (white, black, and brown)

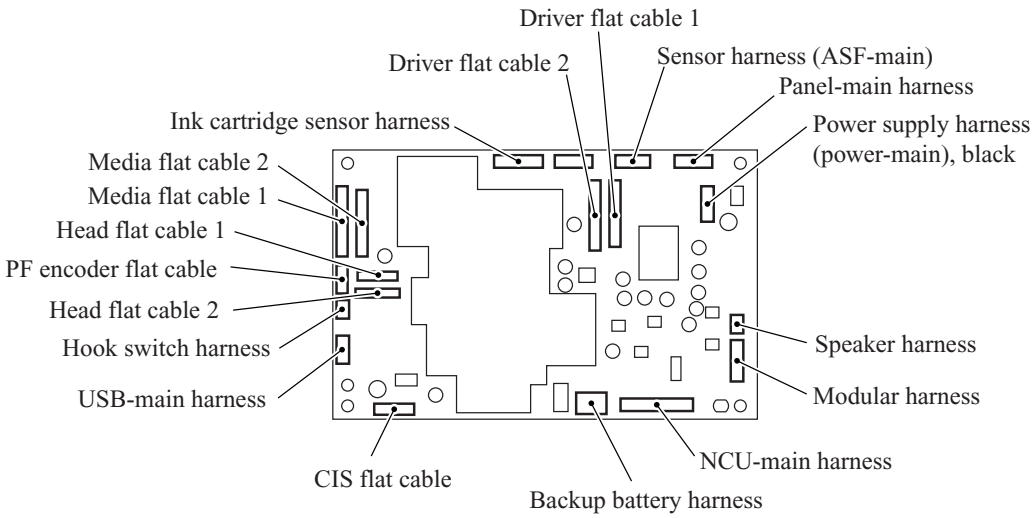
(6) Remove four screws "i" from the driver PCB and lift it up and off.



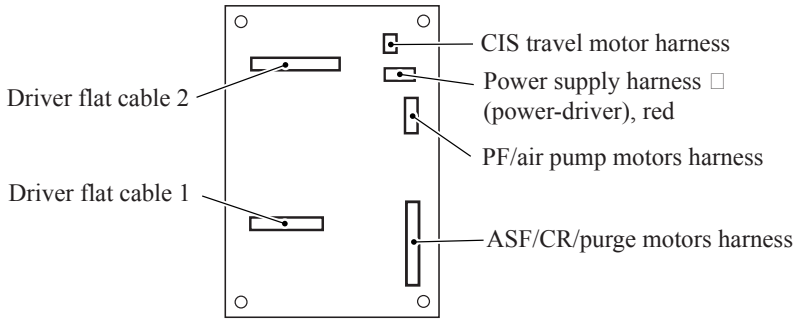
"g": Screw, pan M3x6
"h," "i," and "j": Taptite, cup B M3x10

* For the MFC4820C
** For the MFC4420C

Main PCB



Driver PCB



■ Reassembling Notes

- For routing of the harnesses, refer to "Routing A, B, C, and D" in Section 6.1.15, "Routing of the Harnesses and Flat Cables."
- After replacing the driver PCB, be sure to follow steps in the flowchart given on the next page.
- When you replace the driver PCB with a new one, also replace the ink absorber box assy with a new one.

Setting up the driver PCB after replacement

- Important -

NOTE: Before starting the first step in the flowchart, make sure that the print head unit is installed.

Make the machine enter the maintenance mode.	**Menu/Set**, *****, **2**, **8**, **6**, **4** (For details, refer to Chapter 7.)
Initialize the EEPROM. (This is required when the driver PCB has been replaced with one that was used in another machine.)	Function code 01
Customize the EEPROM.	Function code 74
Update the property data.	Function code 68
Align the vertical print lines in monochrome and in two colors and adjust the head skew. *	Function code 65
Print a test pattern.	Function code 09
Adjust margins in near-edge printing. *	Function code 66
Set the CIS scanner area.	Function code 55
Check the sensor operation.	Function code 32
Check the operation of the control panel PCB.	Function code 13
Check the LCD operation.	Function code 12
Turn the machine off and then back on.	
Exit the machine from maintenance mode to restore it to the standby state.	Press the **9** key twice in the initial stage of the maintenance mode to restore the machine to the standby state. (If you turn the machine off without pressing the **9** key twice, the next powering-on will restore the machine to maintenance mode where a purging operation will be initiated automatically.)
Set an ID code.	Set an ID code into the machine. (Refer to Appendix A2.2.)
Make a color copy.	Make a color copy to check the color print.

* If any printed check pattern is blurred, carry out a purge with Function code 76. Refer to Chapter 7, Section 7.5.18 for details.

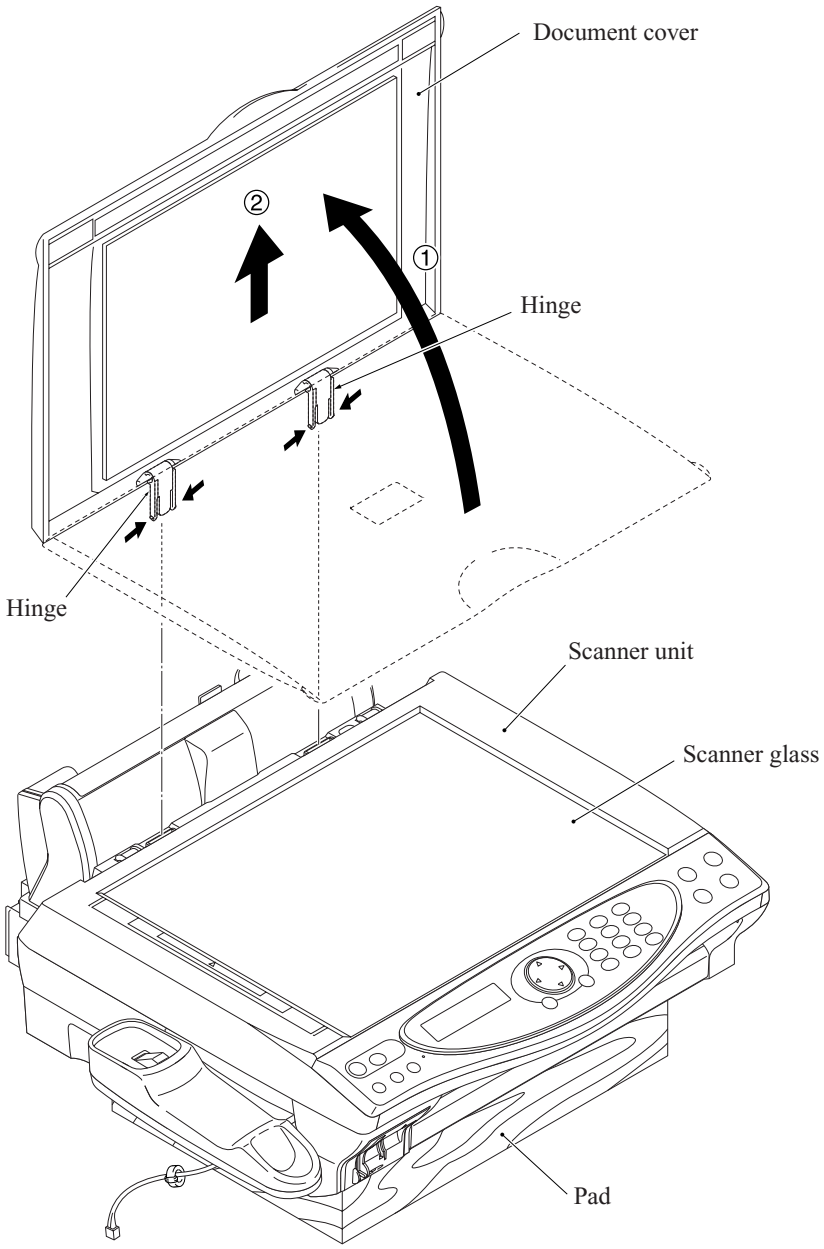
6.1.7 Document Cover

Do not remove the document cover in the disassembly jobs except when replacing it with a new one. Performing disassembly jobs with the document cover being set prevents the scanner glass from getting scratched or damaged.

(1) Return the machine to the original position.

NOTE: When placing a machine from which the bottom plate has been removed, put an appropriate pad (about A4-sized) under the machine to prevent the flat cables and harnesses from getting crushed.

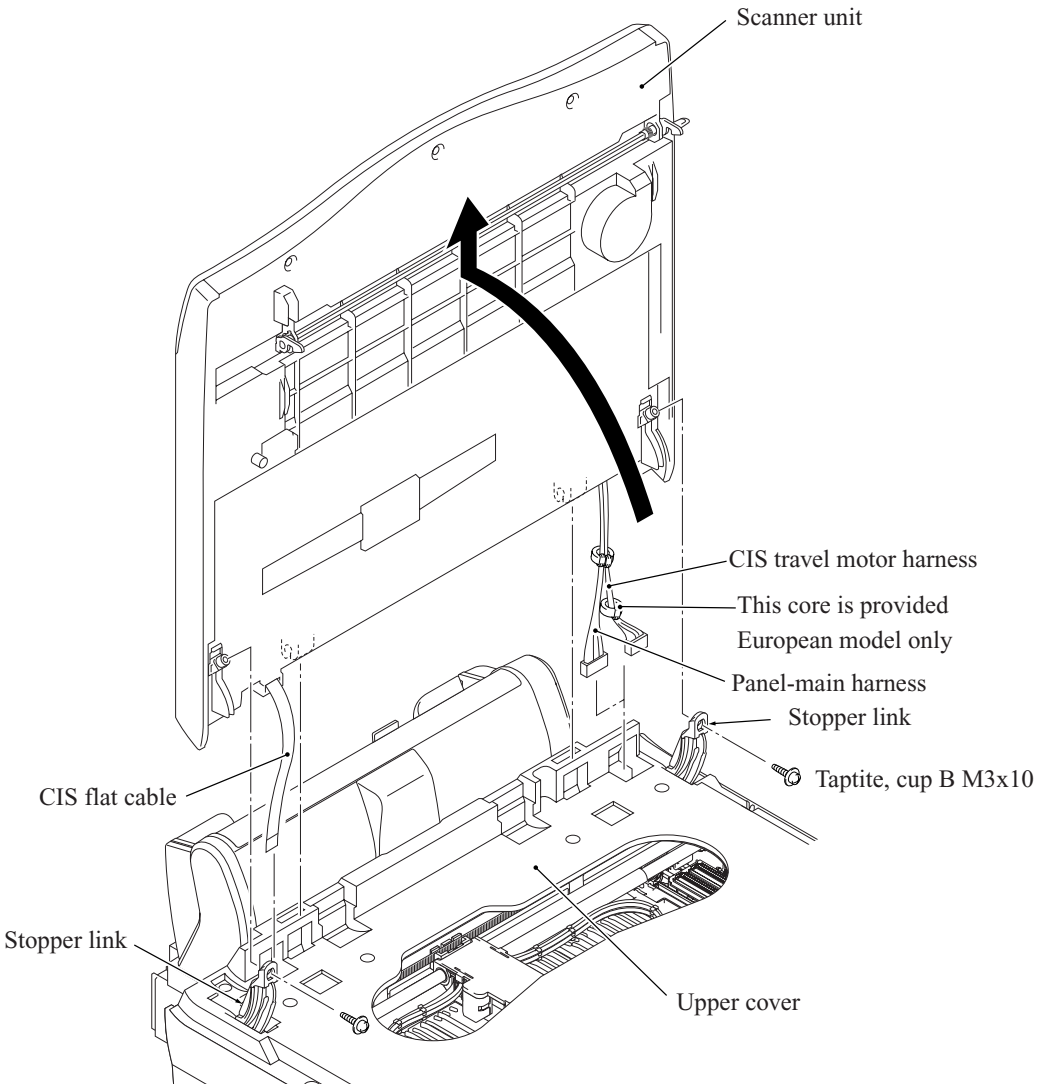
(2) Turn the document cover upright and lift it up and off.



6.1.8 Scanner Unit and Control Panel

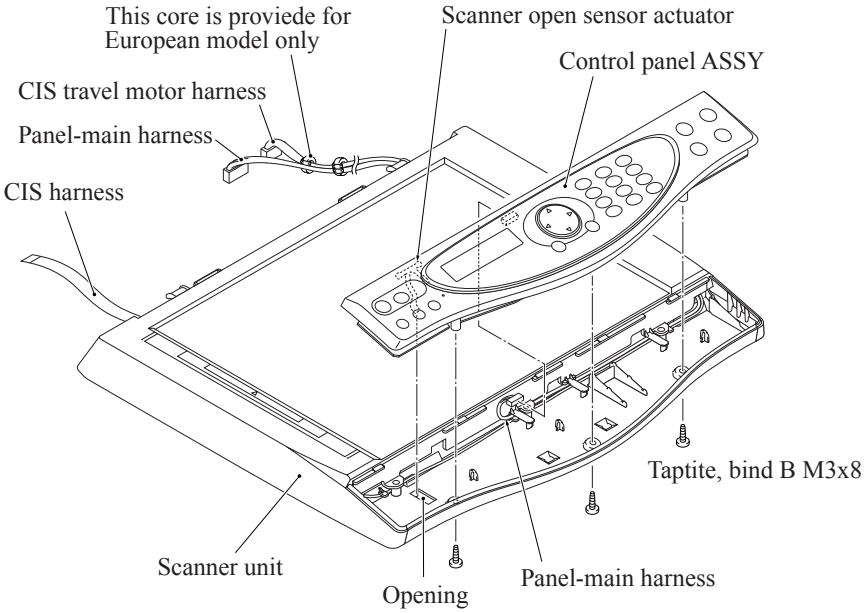
(1) Pull the release lever towards you and open the scanner unit fully.

(2) Remove the screw from each of the right and left stopper links, then lift up the scanner unit and pull the CIS flat cable, CIS travel motor harness, and panel-main harness out of the machine.



(3) Remove the six screws from the underside of the scanner unit.

(4) Lift up the control panel ASSY and disconnect the panel-main harness from the control panel PCB.



Disassembly of the control panel ASSY

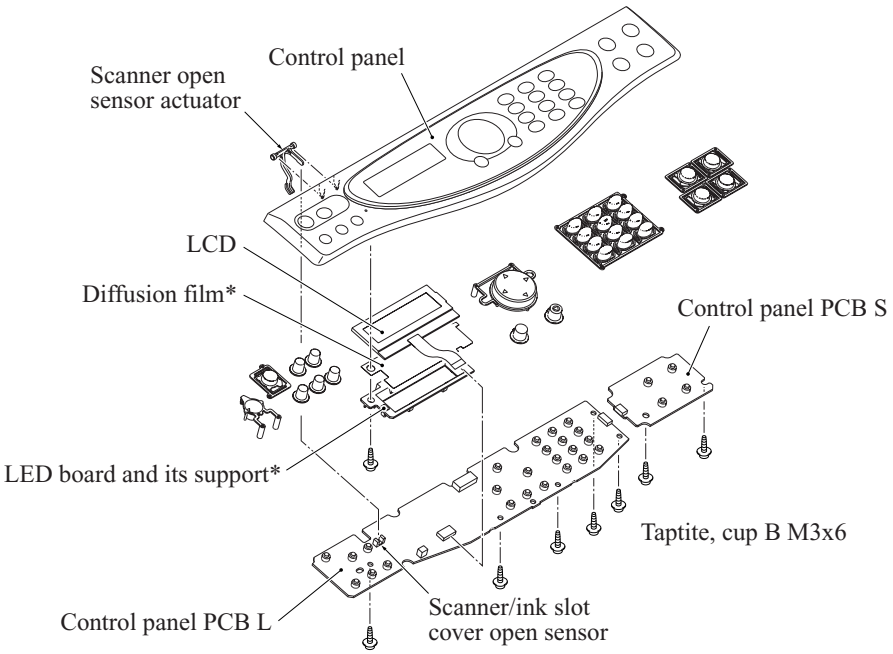
(5) Remove the seven screws from the control panel PCB.

(6) Turn the scanner open sensor actuator and remove it from the control panel.

(7) Remove the screw from the LED board support and separate the LED board* and diffusion film* from the LCD.

(8) Unlock the LCD connector on the control panel PCB and disconnect the LCD flat cable.

*Not provided on the MFC4420C.

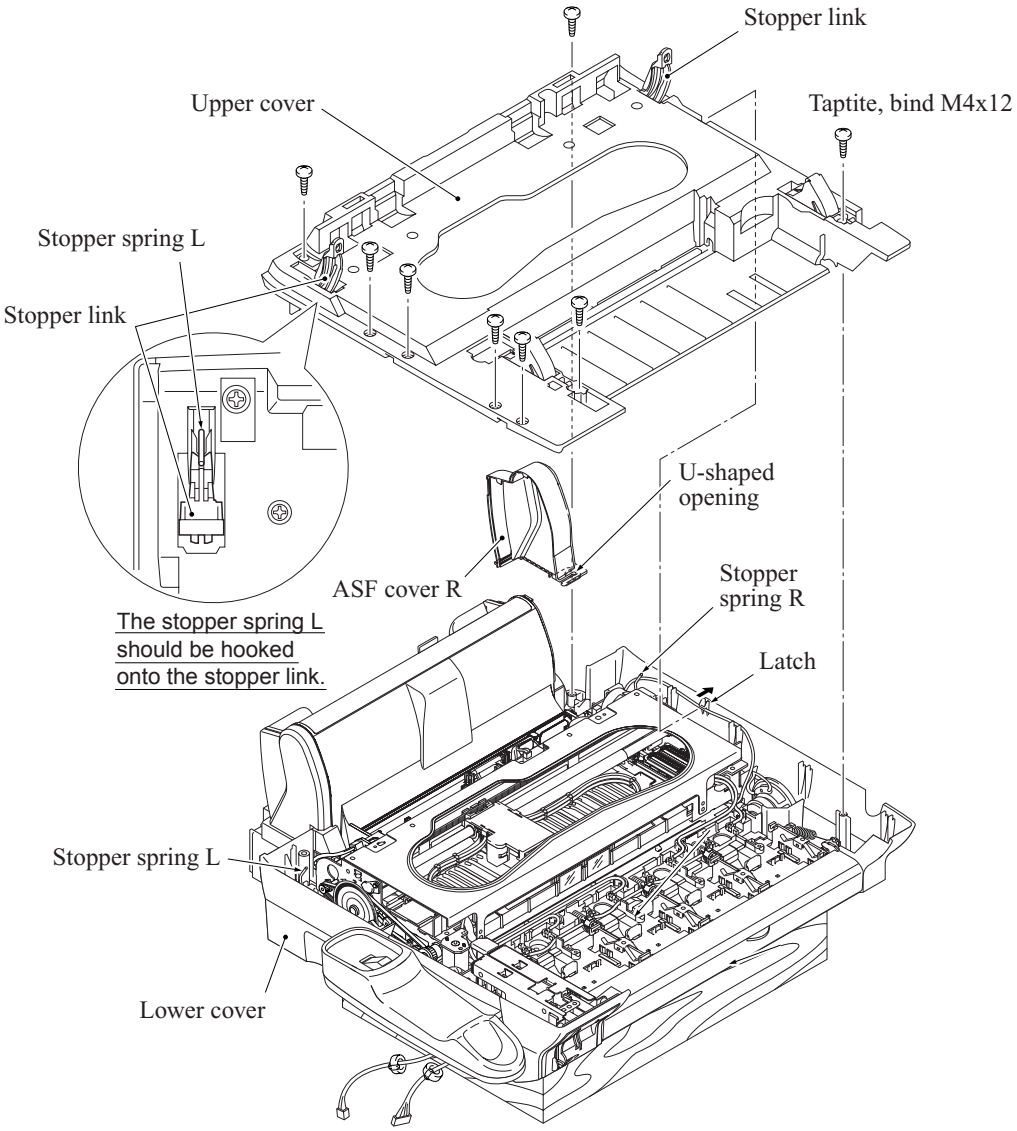


6.1.9 Upper Cover and ASF Cover R

(1) Remove the eight screws from the upper cover.

(2) Insert the tip of a flat screwdriver into the slot provided on the latch on the inside right of the lower cover, warp the lower cover outwards, and then lift up the front end of the upper cover.

(3) Remove the ASF cover R.



■ Reassembling Notes

- When attaching the upper cover to the lower cover, first turn the stopper links to the front and hold the upper cover above the lower cover. Looking into the opening provided in the rear right corner of the upper cover, move the upper cover to the rear so that the slit (in the opening) will be fitted over the top end of the stopper spring R.

  Next, at the rear left corner, fit the slit over the top end of the stopper spring L. Turn the stopper links to the rear, push down the upper cover, and press it towards the rear.

  Take care not to pinch any harnesses between the upper and lower covers.

  Make sure that the top ends of the stopper springs R and L are fitted into their stopper links, as illustrated on the previous page.

  If you push the upper cover down straight, the stopper springs R and L will be under the upper cover and will not work correctly.

- When setting the ASF cover R into place, route the four harnesses--sensor harness (ASF-main), ASF switch harness, purge cam HP switch harness, and carriage motor harness--through the U-shaped opening provided in the ASF cover R. This is to protect those harnesses from the heat generated by the purge motor.

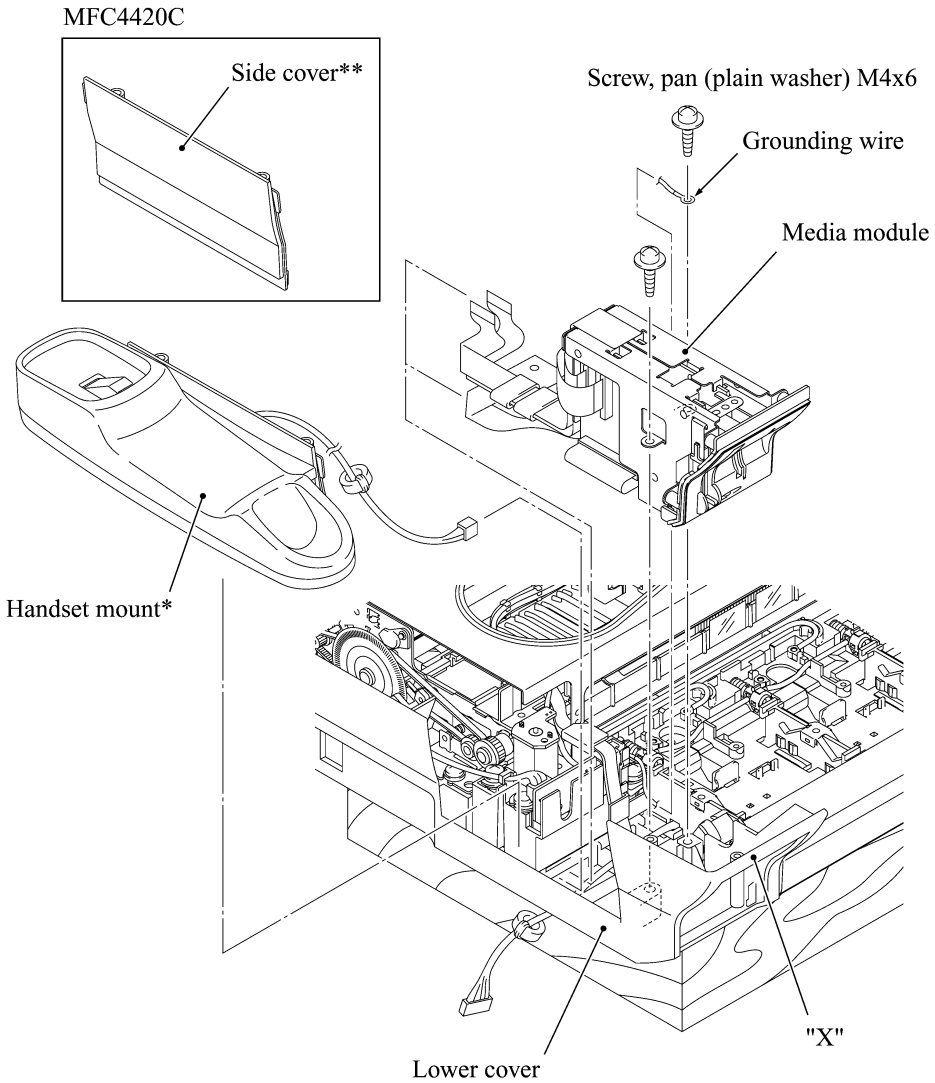
6.1.10 Media Module and Handset Mount (Side Cover)

The handset mount is for the MFC4820C, and the side cover for the MFC4420C.

(1) Remove the two screws (the inner one also secures the grounding wire) from the media module and take the media module out of the machine while lightly pulling section X to the front.

(2) MFC4820C: Lift up the handset mount*.

MFC4420C: Lift up the side cover**.



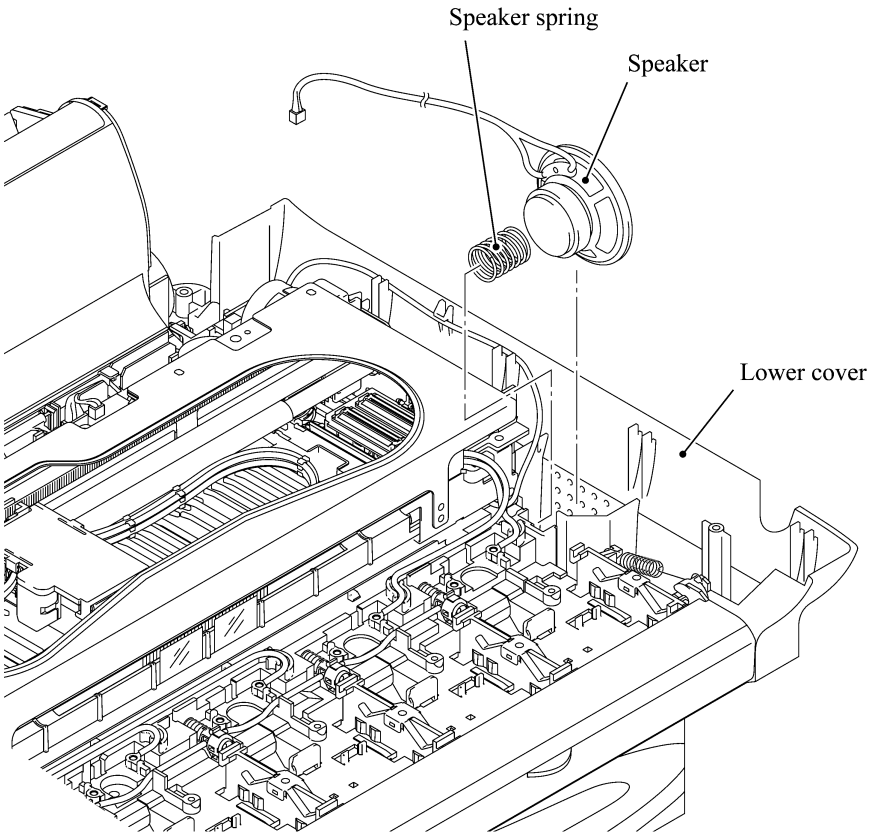
*For the MFC4820C
**For the MFC4420C

■ **Reassembling Notes**

- The hook switch harness* is secured to the inside face of the handset mount with adhesive tape as shown in "Routing F" in Section 6.1.15 "Routing of the Harnesses and Flat Cables."

6.1.11 Speaker

(1) Pull the speaker and its spring out of the lower cover.



6.1.12 Auto Sheet Feeder (ASF)

(1) Remove two screws "a" (as can be seen when viewed from the rear, the right-hand one also secures the ASF cover L) from the rear of the ASF.

(2) Remove the ASF cover L.

(3) Remove two screws "b" that secure the ASF to the lower cover.

(4) Remove two screws "c" that secure the ASF to the engine unit.

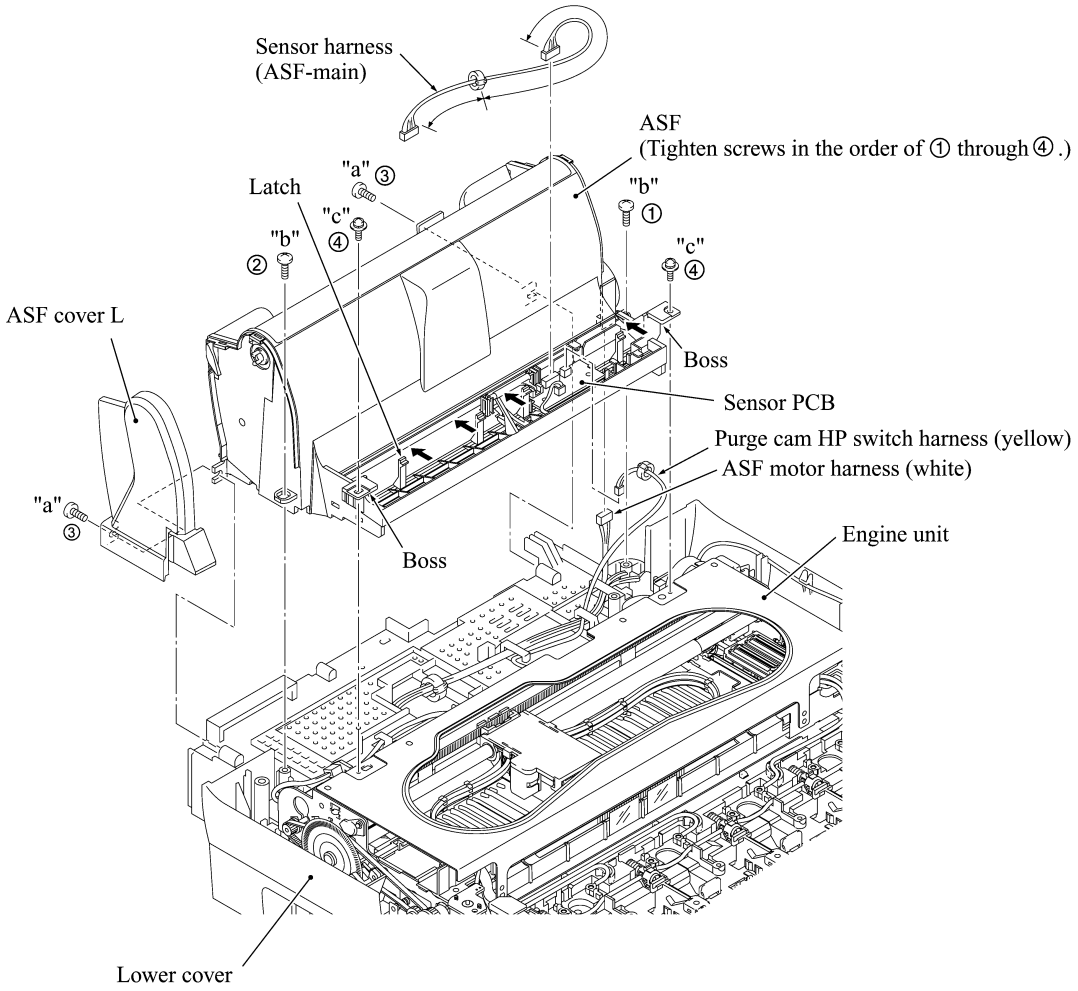
(5) Slightly lift up the rear end of the ASF, unhook the four latches and remove the two bosses from the engine unit, and then lift the ASF up and out of the machine.

(6) Disconnect the ASF motor harness from the ASF motor located at the right end of the ASF.

(7) Disconnect the sensor harness (ASF-main) and purge cam HP switch harness from the sensor PCB located on the ASF.

Then the ASF can now be completely separated from the machine.

The sensor harness (ASF-main) can be removed from the machine.



"a" and "b": Taptite, bind B M4x12
"c": Screw, bind M2.6x4

Disassembly of the ASF

(8) Pull the lock arm outwards and remove the registration sensor actuator and its spring.

(9) Remove the ASF switch from the latch on the right end of the ASF, then disconnect its harness from the sensor PCB and take it out of the harness guide.

(10) Unlatch the sensor PCB.

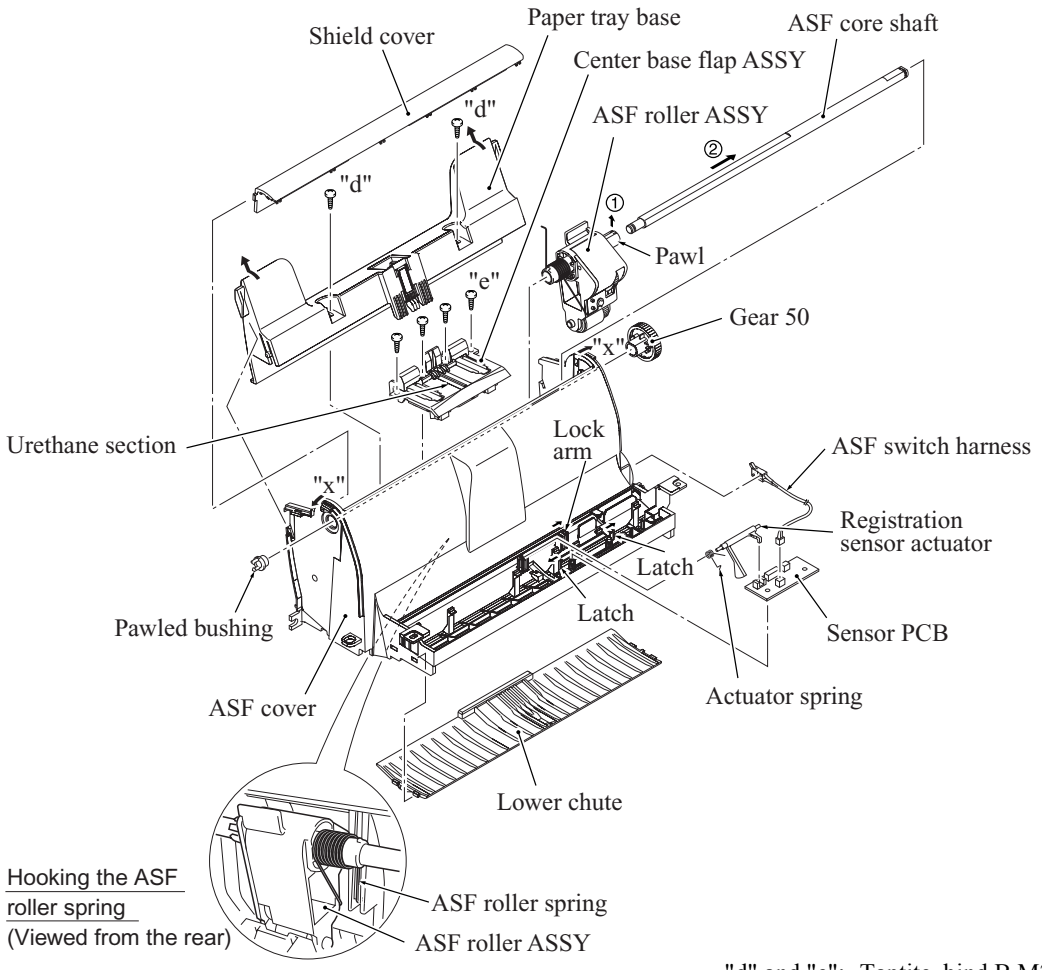
(11) Warp either of the "x" locks on the ASF cover outwards and remove the shield cover.

(12) Remove the pawled bushing from the left end of the ASF core shaft by pulling its pawls outwards. Pull the pawl of the ASF roller ASSY outwards (in the direction of arrow ①) and pull the ASF core shaft out to the right (②). The ASF roller ASSY will come off.

(13) Remove two screws "d" from the paper tray base and pull it up and to the rear.

(14) Warp the center of the lower chute and disengage the locking tabs on both ends of the lower chute from the ASF frame.

(15) Remove four screws "e" from the center base flap ASSY. Lightly push the ASSY up from the bottom and release the two hooks on the rear end of the ASSY.



"d" and "e": Taptite, bind B M2.6x8

■ Reassembling Notes

- When handling the center base flap ASSY, take care not to touch the urethane section sticking out of the center slit on the ASSY by hand as the dirt or oil on your hands can easily affect paper feeding performance.

  If the urethane section has been touched, lightly wipe it with a cloth dampened with alcohol.

- When handling the ASF roller ASSY, take care not to touch the rubber rollers by hand as the dirt or oil on your hands can easily affect paper feeding performance.

  If the rubber rollers have been touched, lightly wipe them with a cloth dampened with alcohol.

  When setting the ASF roller ASSY back into place, fit the free end of the ASF roller spring in the groove provided in the ASF frame, as shown on the previous page.

- Take care with the direction of the sensor harness (ASF-main). Join the connector housing that is farther from the ferrite core to the sensor PCB. (See the illustration on page 6-30.)

- Before securing the ASF, loosen four shoulder screws "g" and two grounding screws "h" on the engine unit (see page 6-34). This is to make the ASF and engine unit parallel with each other.

  When installing the ASF, first fit bosses provided on the underside of the front right and left ends of the ASF into the engine unit and then set the rear end. Next, push down the ASF to engage the four front latches with the engine unit.

  When securing the ASF with screws, observe the tightening order shown on page 6-30: screw "b" (right-hand) → screw "b" (left-hand) → two screws "a" → two screws "c."

  After that, tighten four shoulder screws "g" and two grounding screws "h" on the engine unit.

6.1.13 Engine Unit and Purge Unit

During disassembly jobs, except when removing the engine unit (including the purge unit and the needle tube & head flat cable ASSY), leave the print head unit and all four ink cartridges in the machine.

When removing the print head unit or engine unit, you need to remove the ink cartridges and drain the ink from the needle tubes beforehand.

Removing the ink cartridges and draining the ink from the ink tubes

(1) Make sure that all four ink cartridges have been removed and ink in the ink tubes has been drained. (Refer to Section 6.1.1.)

Removing the engine unit (Refer to the illustration on the next page.)

(2) Remove six screws (four "g" screws and two "h" screws) from the engine unit.

(3) Disconnect the harnesses from the carriage motor, purge motor, air pump motor, and paper feed motor.

(4) Remove two screws "i" from each of the needle sections of the needle tube & head flat cable ASSY.

(5) Take out each of ink tubes that are routed between the tube guides on the ink cartridge support base.

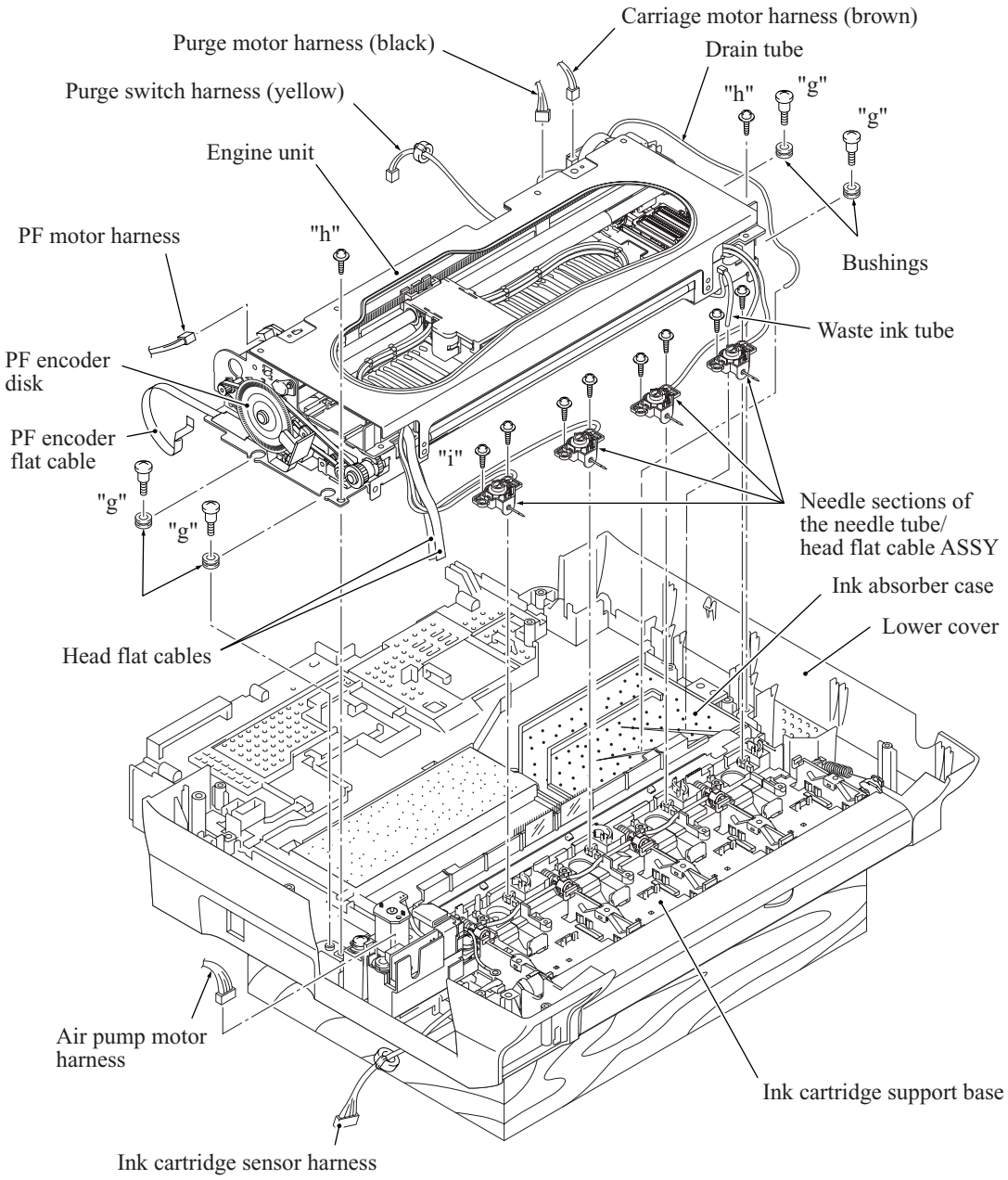
(6) Lift the engine unit up and out of the lower cover.

NOTE: When handling the engine unit, take care not to touch the PF encoder disk.

NOTE: Pinch the end of the drain tube with a clip to prevent drained ink from leaking and the machine from getting stained with leaked ink.

NOTE: Wrap the end of the waste ink tube with a tissue to prevent drained ink from leaking and the machine from getting stained with leaked ink.

NOTE: The initial production set does not have the waste ink tube. And ink absorber box of the initial production set have only one slit.



"g": Shoulder screw, 4x10
"h": Screw, cup M3x5
"i": Taptite, bind B M3x8

Removing parts related to the paper feed

(7) Remove the PF encoder disk.

NOTE: Once removed, the PF encoder disk will become unusable and a new disk will have to be put back in.

NOTE: Remove any adhesive remaining left on the PF roller pulley.

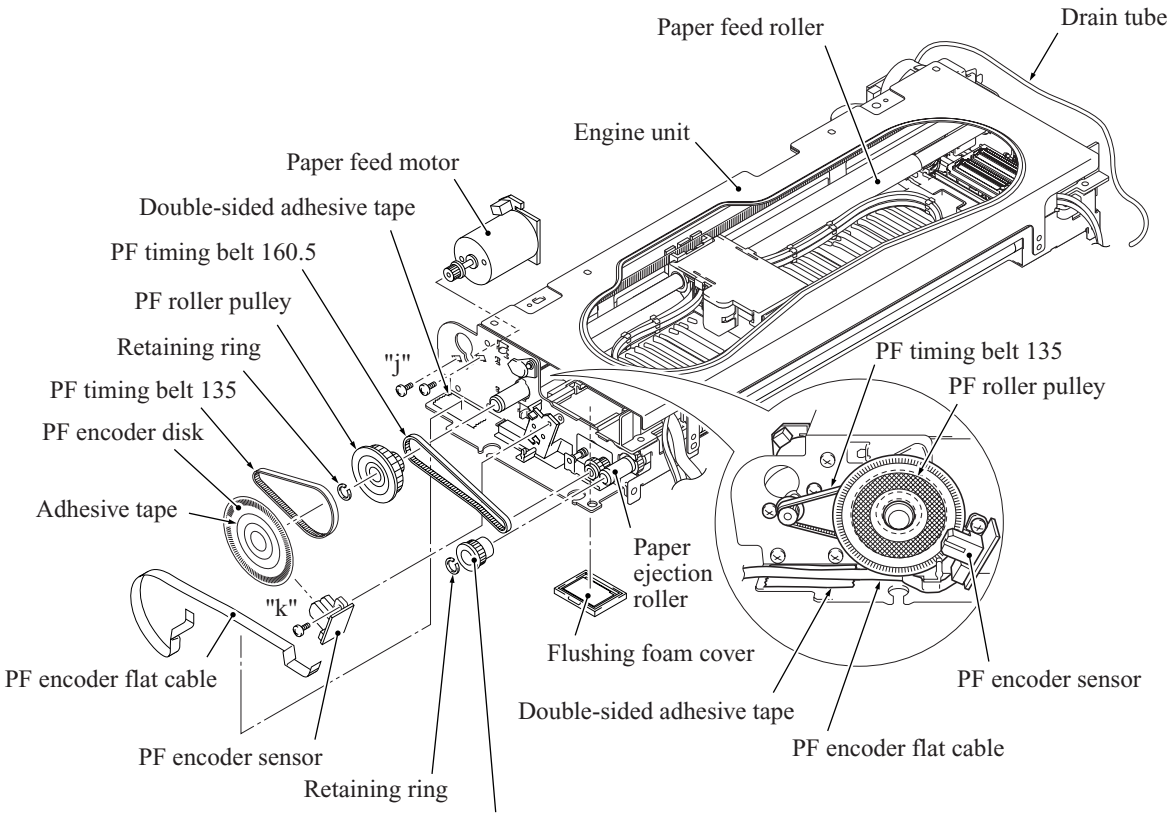
(8) Remove two screws "j" from the paper feed motor and remove the motor from the engine unit.

(9) Remove PF timing belt 135.

(10) Remove screw "k" followed by the PF encoder sensor. Disconnect the PF encoder flat cable from the sensor PCB.

(11) Remove the retaining ring from the left end of the paper feed roller and then take off the PF roller pulley.

(12) Remove the retaining ring from the left end of the paper ejection roller and then remove the paper ejection gear. The PF timing belt 160.5 can be removed from the machine.



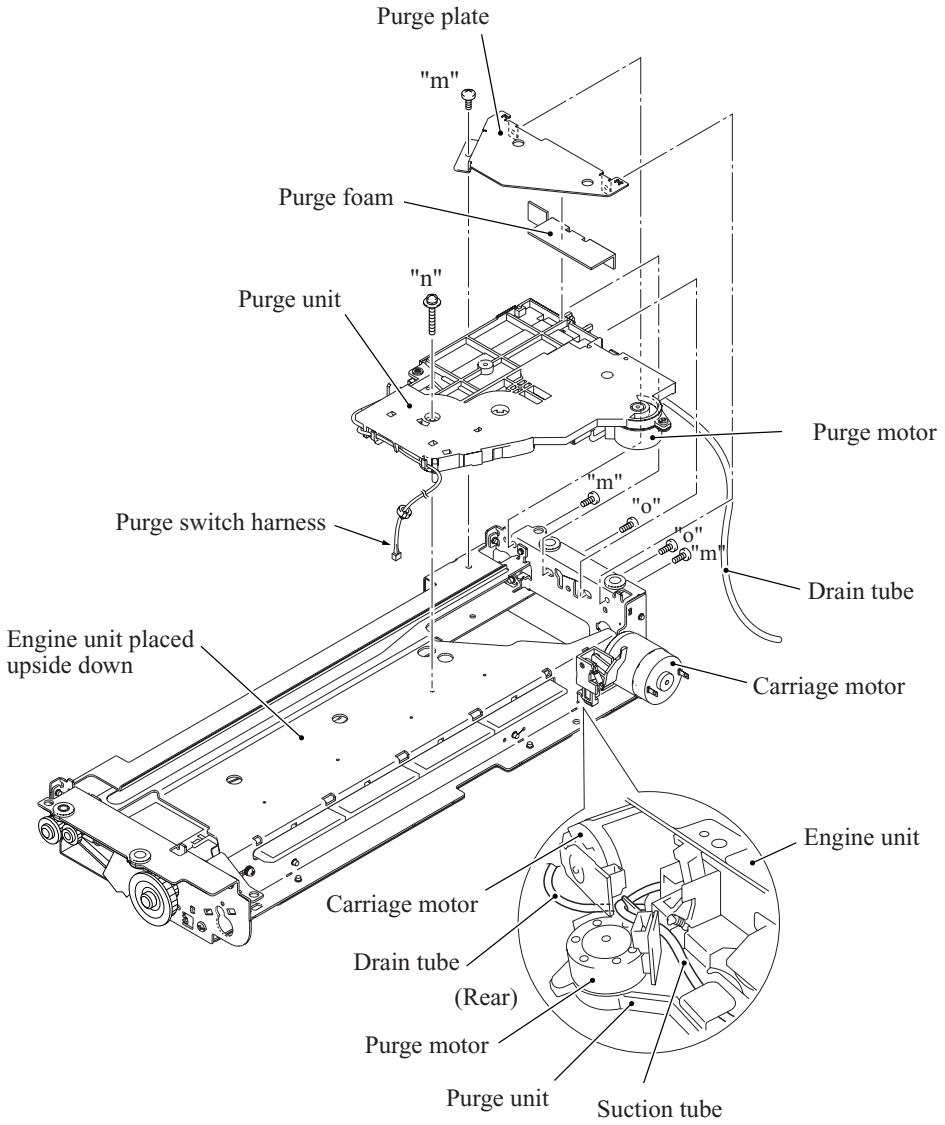
"j": Screw, bind M3x3
"k": Taptite, bind B M2.6x5

Removing the purge unit

(13) Turn the engine unit upside down.

(14) Remove three screws "m" (one from the top and two from the side) from the purge plate and take it off.

(15) Remove three screws (one "n" screw from the top and two "o" screws from the side) from the purge unit, then remove the purge unit itself..



"m": Screw, bind M2.6x4
"n": Screw, pan (s/p washer) M2.6x16
"o": Taptite, bind B M2.6x5

This and the following pages in this section describe the disassembly of the engine unit. Avoid disassembling the engine unit if all possible.

During disassembly, be sure to put the engine unit on a flat surface.

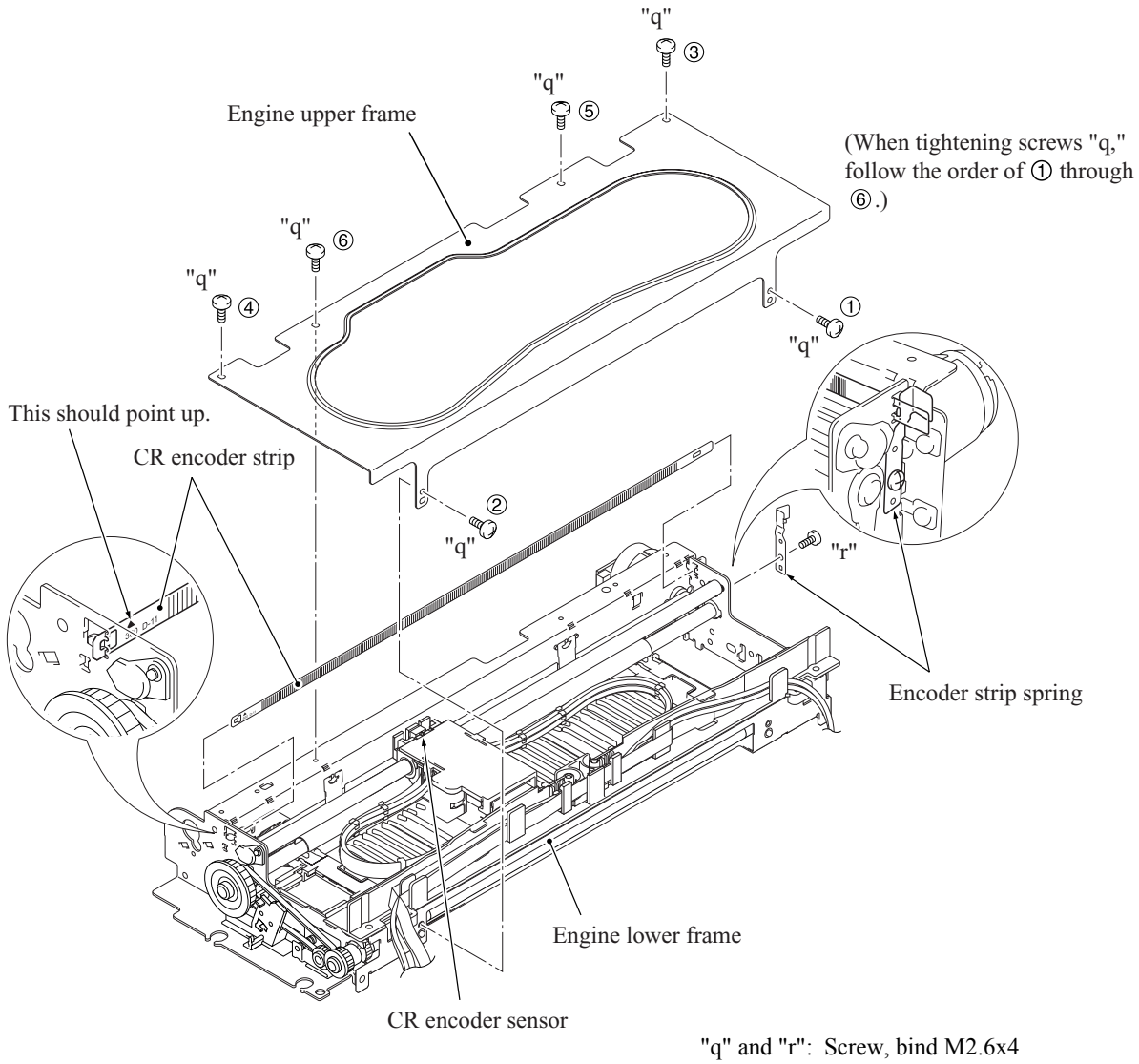
Removing the CR encoder strip

(16) Remove six screws "q" from the engine upper frame and lift it up and off.

NOTE: After the removal of the engine upper frame, handle it with care so as not to subject it to any excessive force as it warps easily once it is removed.

(17) Remove screw "r" (that secures the encoder strip spring) at the right end of the engine unit. Then remove the encoder strip spring from the engine lower frame.

NOTE: Take care not to scratch or damage the encoder strip. If it becomes dirty, wipe it with a soft, dry cloth. If it is stained with ink, replace it with a new one.



"q" and "r": Screw, bind M2.6x4

Removing the print head unit (See the illustration on the next page.)

Refer to the illustrations given in Section 6.1.2, steps (5) through (11) for the following procedure.

(18) Remove the head cover and paper width sensor cover from the print head unit.

(19) Take the paper width sensor out of the sensor support of the print head unit.

(20) Unlock the FPC connector and disconnect the head flat cable from the print head unit.

(21) While pulling the head clamp spring outwards, turn it towards you to release the bosses on the print head unit.

(22) Press the carriage rail towards the rear near the print head unit and lift the front end of the print head unit up and off the engine base plate.

Pull the print head unit up and towards you at an angle.

NOTE: Do not touch the print nozzles (the printing ends) or ink supply ports of the print head unit; doing so will not only stain your hands with ink but also damage the nozzles and/or supply ports. If you do touch them though, clean them with a special-purpose cleaning stick and liquid.

(23) Each print head unit is assigned a property code that represents the properties unique to that head unit. A property label, on which the property code is printed, is attached to the head unit itself and the rear left side of the machine (with the battery cover* or rear cover S** removed). (*For the MFC4820C, **For the MFC4420C. Refer to Section 6.1.4.)

If you remove the print head unit and store it separately from the machine, remove the property label from the machine and store it together with the print head unit.

If you replace the print head unit with a new one, attach the property label that comes with the new print head unit to the rear left side of the machine. Be sure to remove the sensor support from the removed print head unit and attach it to the new one.

NOTE: Be sure to put an ink supply port cover on the print head unit and store the unit in the head casing, as shown below. Leaving the print head unit out of the casing will cause the print nozzles and ink supply ports to dry up, resulting in a damaged head.

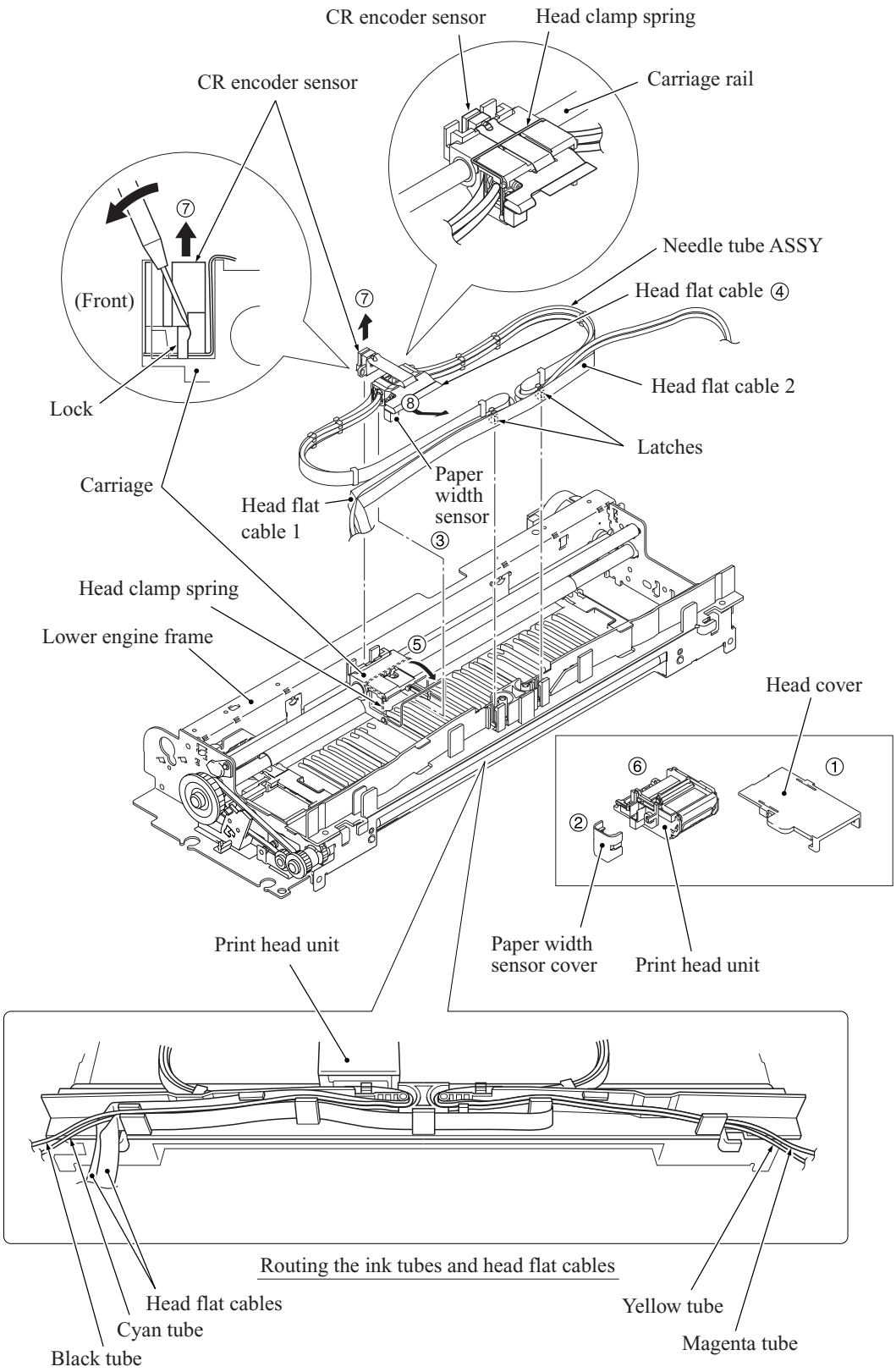
Removing the needle tube & head flat cable ASSY (Refer to the illustration on the next page.)

(24) Remove the CR encoder sensor from the engine lower frame while lightly pressing the lock with the tip of a flat screwdriver.

NOTE: Take care not to scratch or damage the head flat cable.

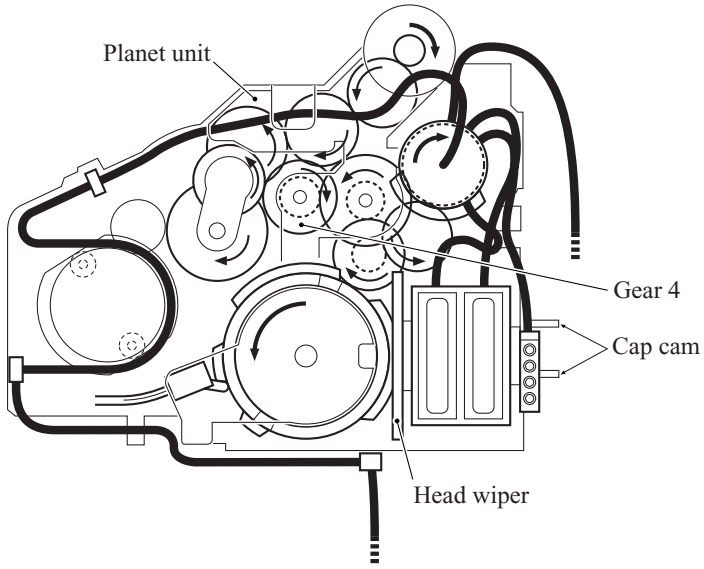
NOTE: Do not press too hard on the screwdriver as the lock is easily breakable.

(25) Take out the ink tubes that are routed along the guides and the latches on the engine lower frame.



■ Reassembling Notes

- Route the ink tubes and head flat cables of the needle tube & head flat cable ASSY on the engine lower frame as shown on the previous page. For routing them on the ink cartridge support base, refer to "Routing F" in Section 6.1.15 "Routing of the Harnesses and Flat Cables."
- Pass the CR encoder strip through the CR encoder sensor located at the back of the carriage so that the ▲-marked end is to the left and the ▲ mark points upwards, as shown on page 6-37. Hook the ▲-marked end on the left end of the engine lower frame. Next, hook the right end of the encoder strip on the encoder strip spring and secure the spring to the right end of the engine lower frame with screw "r."
- When setting the purge unit back onto the engine unit, keep the head wiper and cap cam in the most retracted position. If the wiper protrudes, turn gear 4 clockwise to retract it. If you set the purge unit with the wiper protruding, the top edge of the wiper may be bent by the bottom of the engine unit. After turning the machine to the normal position, pull up the top edge of the wiper with tweezers or similar, taking care not to damage it.



- For the installation procedure of the print head unit, refer to page 6-10. After it has been removed once, the print head unit will require adjustments after it is reinstalled. For details, refer to Section 6.1.2, "Adjusting the print head unit" on pages 6-11 and 6-12.
- When securing the engine upper frame with screws, put the machine on a flat surface. Tighten six screws "q" in the order of ① through ⑥ shown on page 6-37.
- Install the paper feed motor with the connector facing up.
- When attaching the PF encoder disk to the PF roller pulley, put on clean gloves to protect the disk surface from dust or fingerprints.
- When installing the engine unit, temporarily tighten six screws ("g" and "h," as shown on page 6-34), secure the ASF (this is to position the engine unit based on the position of the ASF), and then tighten the same six screws (four "g" screws first and then two "h" screws) firmly.
- If the old Ink Absorber Case(LF0573001) is attached to the set when the purge unit is replaced, please replace for the new Ink Absorber Case(LF0927001).

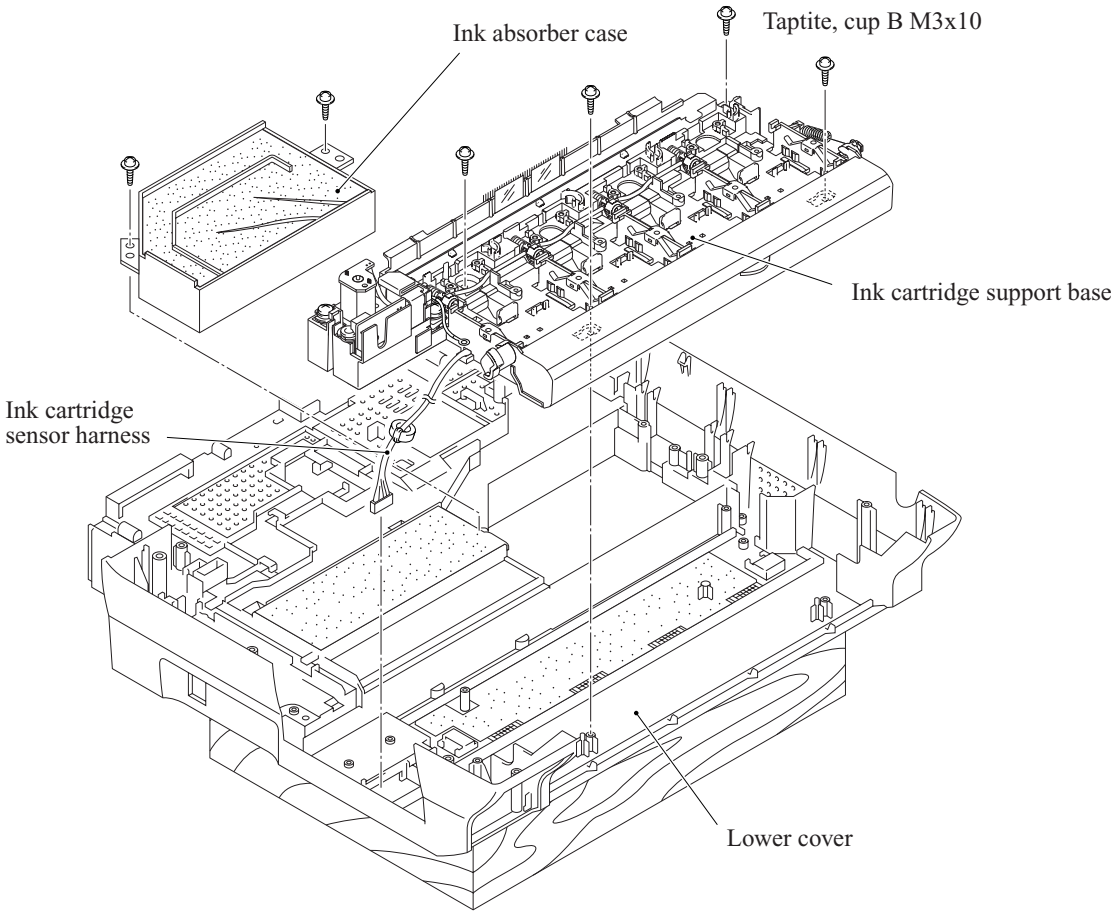
6.1.14 Ink Cartridge Support Base, Ink Absorber Case, Ink Slot Cover, and Air Pump & Motor Module

(1) Remove the four screws from the ink cartridge support base and lift it off the lower cover.

(2) Remove the two screws from the ink absorber case and take it out of the lower cover.

NOTE: Do not remove the ink absorber case unless it needs to be replaced. When replacing it, set a new one immediately to prevent the machine from getting stained with drained ink.

NOTE: If the ink absorber case or its surroundings are stained with ink, wipe it off with a cloth.

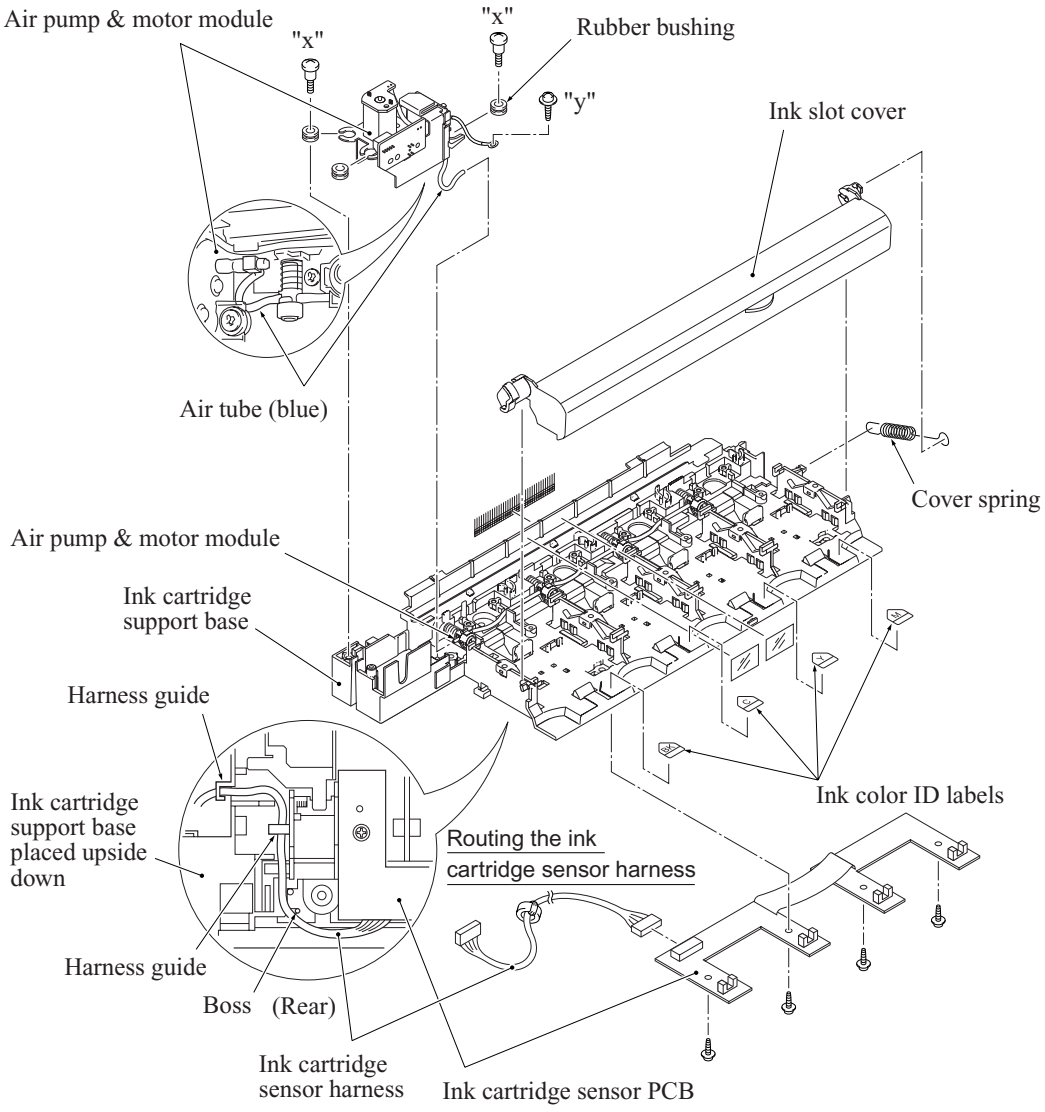


(3) Unhook the cover spring from the ink slot cover. Open the ink slot cover fully and lift it up.

NOTE: Be careful with the setting direction of the cover spring.

(4) Remove three screws (two "x" screws and the one "y" screw that secures the grounding wire) from the air pump & motor module. Lift the module up and out of the ink cartridge support base.

NOTE: Removing the air tube joined to the module will render it unusable and a new tube will have to be put back in.



"x": Shoulder screw 4x10
"y": Taptite, cup B M3x10

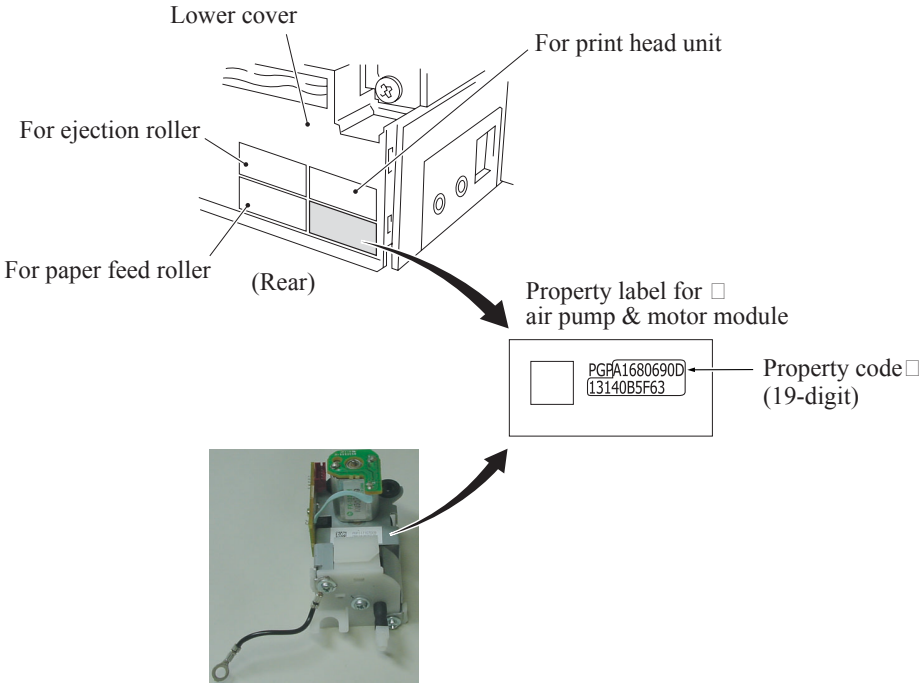
■ Reassembling Notes

- When placing the air pump & motor module onto the ink cartridge support base, make sure that the air tube (blue) is not bent.
- When setting the cover spring into place, take care not to pull it out of shape by extending it too much.
- Like the print head unit, each air pump & motor module is assigned a property code that represents the properties unique to that module. A property label, on which a property code is printed, is attached to the module itself and to the rear left side of the machine (with the battery cover* or rear cover S** removed). (*For the MFC4820C, **For the MFC4420C. Refer to Section 6.1.4.)

  If you remove the air pump & motor module and store it separately from the machine, remove the property label from the machine and store it together with the module.

  If you replace the module with a new one, attach the property label that comes with the new module to the rear left side of the machine.

  If the module is replaced with a new one, you will need to update the property data stored in the EEPROM on the driver PCB. Make the machine enter the maintenance mode (Function code 68 + 0789) and enter the 19 digits of the property code of the newly installed module. (For details, refer to Chapter 7, Section 7.5.15.)

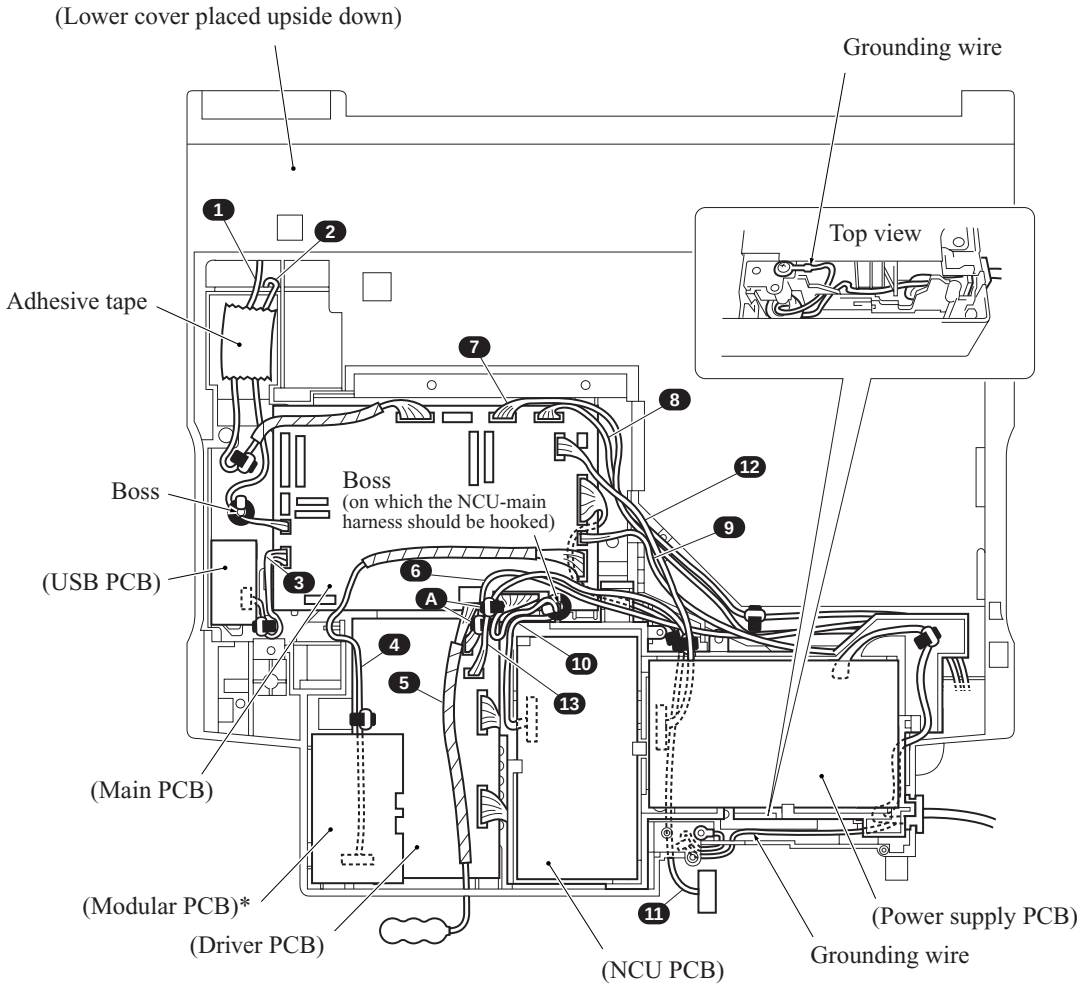


- When you replace the ink absober box with out replaceing the driver PCB, reset the purge count according to the following procedure.

  1) Press the [Menu], [2],[8],[6]and [4] keys in this order to make the machine enter the maintenance mode.
  2) Press the [8] and [0] keys in this order. to show the equipment's log information on LCD.
  3) Press the [Fax Start] button nine times. to show the purge count on LCD.
  4) Press the [2],[7],[8] and [3] keys. to reset the purge count.
  5) Press the [9] key twice in the initial stage of the maintenance mode to restore the machine to the standby state.

6.1.15 Routing of the Harnesses and Flat Cables

Routing A: Harnesses on the bottom of the lower cover (with the bottom plate removed)

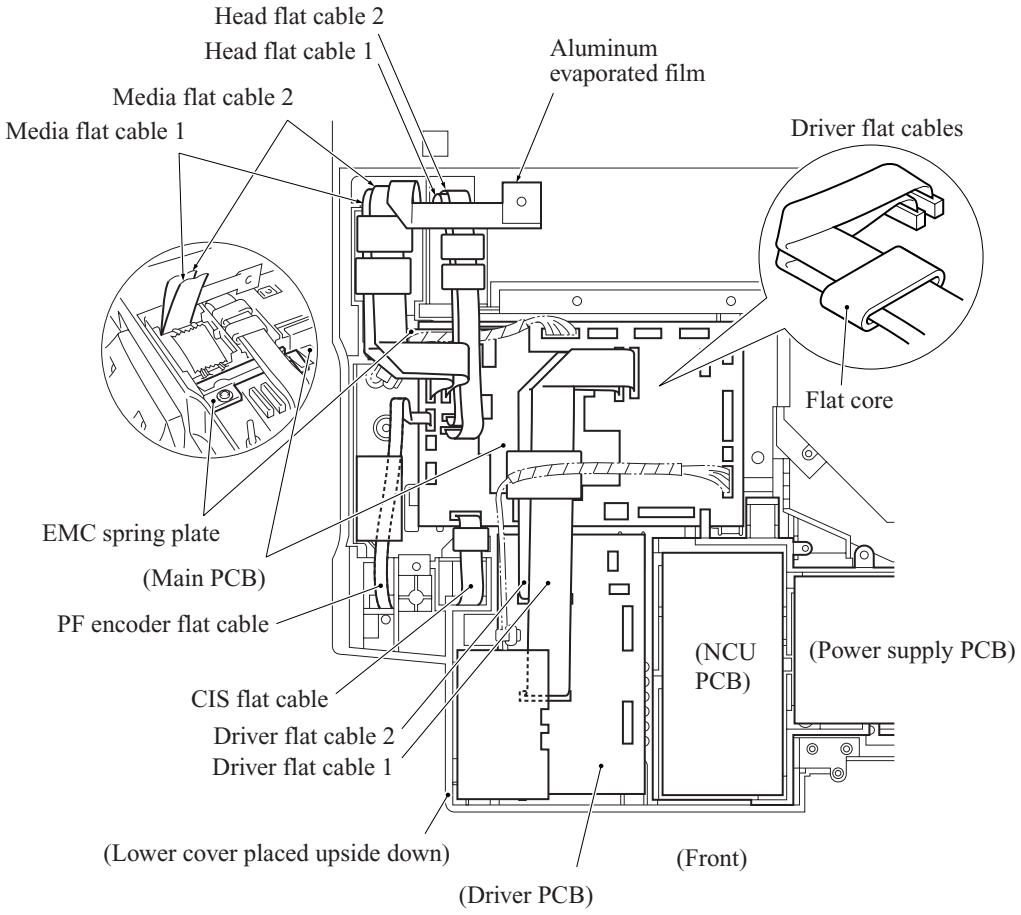


1. Ink cartridge sensor harness (white, 7-pin)
2. Hook switch harness (white, 2-pin)*
3. USB-main harness (white, 4-pin)
4. Modular harness (blue, 7-pin)*
5. Battery harness (red/black, 2-pin)*
6. CIS travel motor harness (white, 4-pin)
7. Sensor harness (ASF-main) (white, 5-pin)
8. Panel-main harness (red, 6-pin)
9. Speaker harness (red/black, 2-pin)
10. NCU-main harness (white, 12-pin)
11. CL-main harness (white, 11-pin)*
12. Power supply harness (power-main) (black, 6-pin)
13. Power supply harness (power-driver) (white, 5-pin)

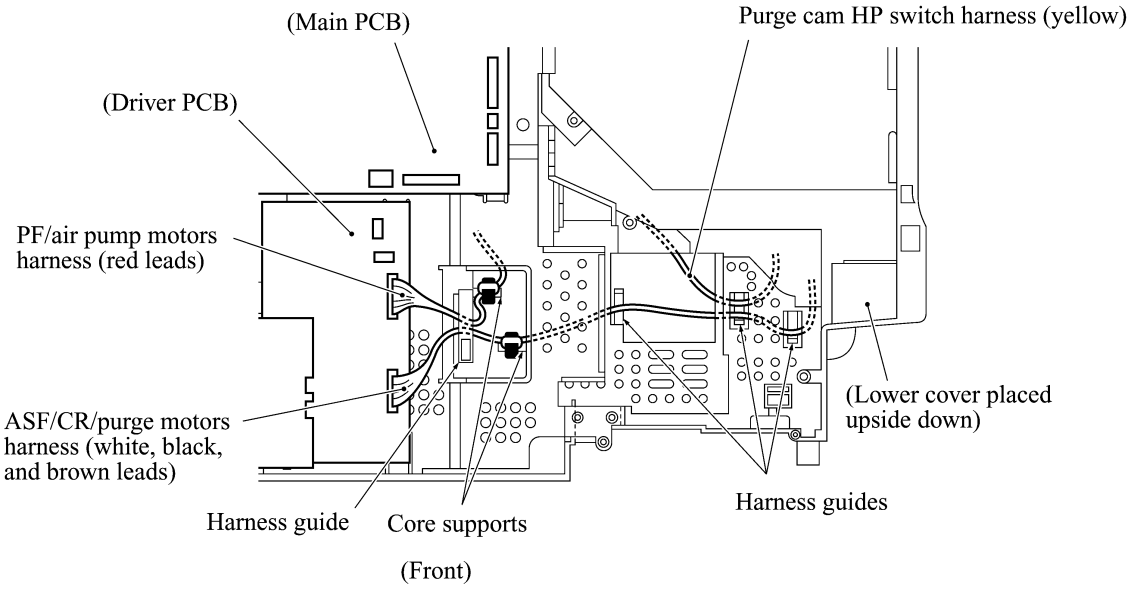
A. This core is provided European model only

*Not provided on the MFC4420C.

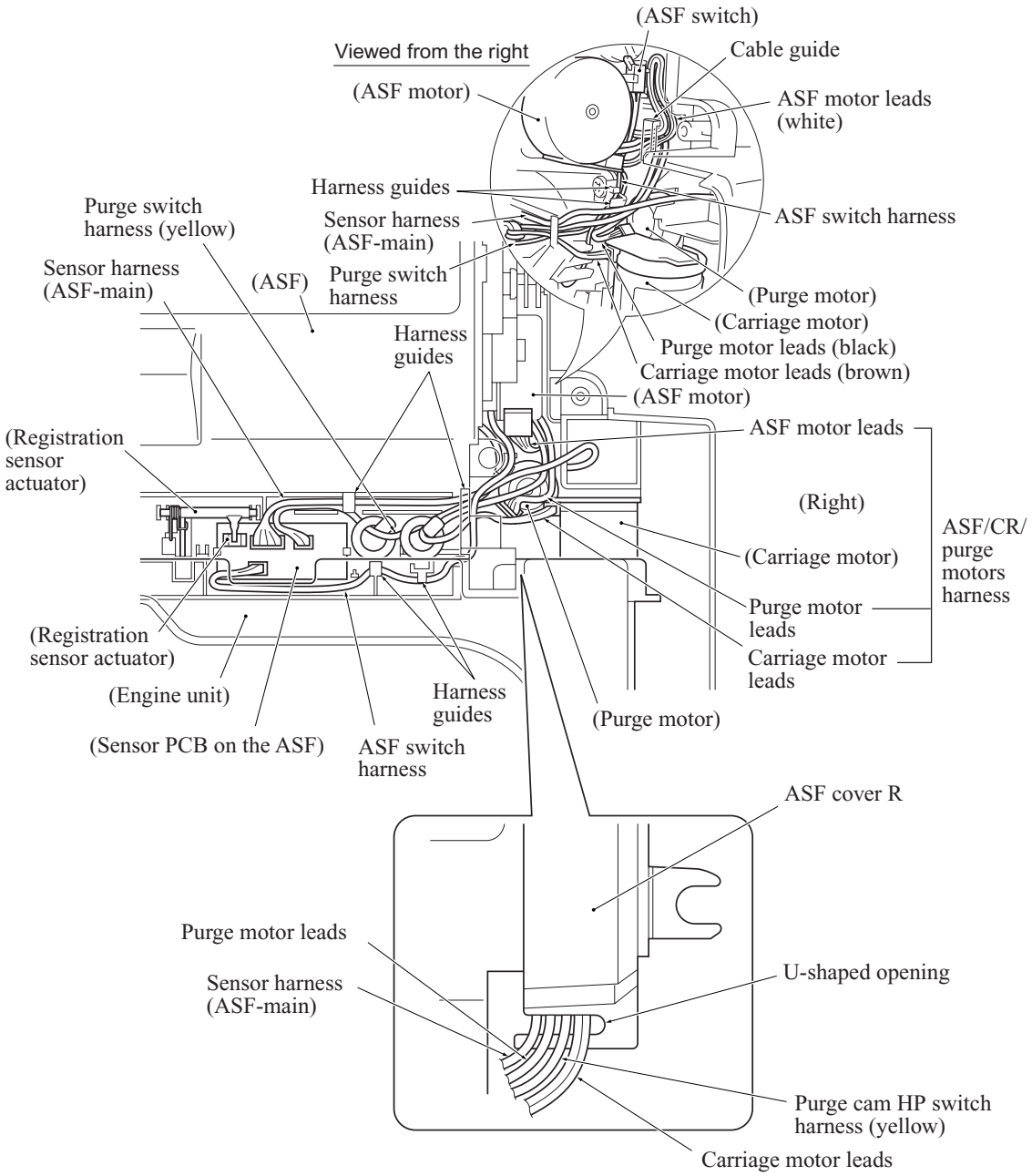
Routing B: Flat cables on the bottom of the lower cover (with the bottom plate removed)



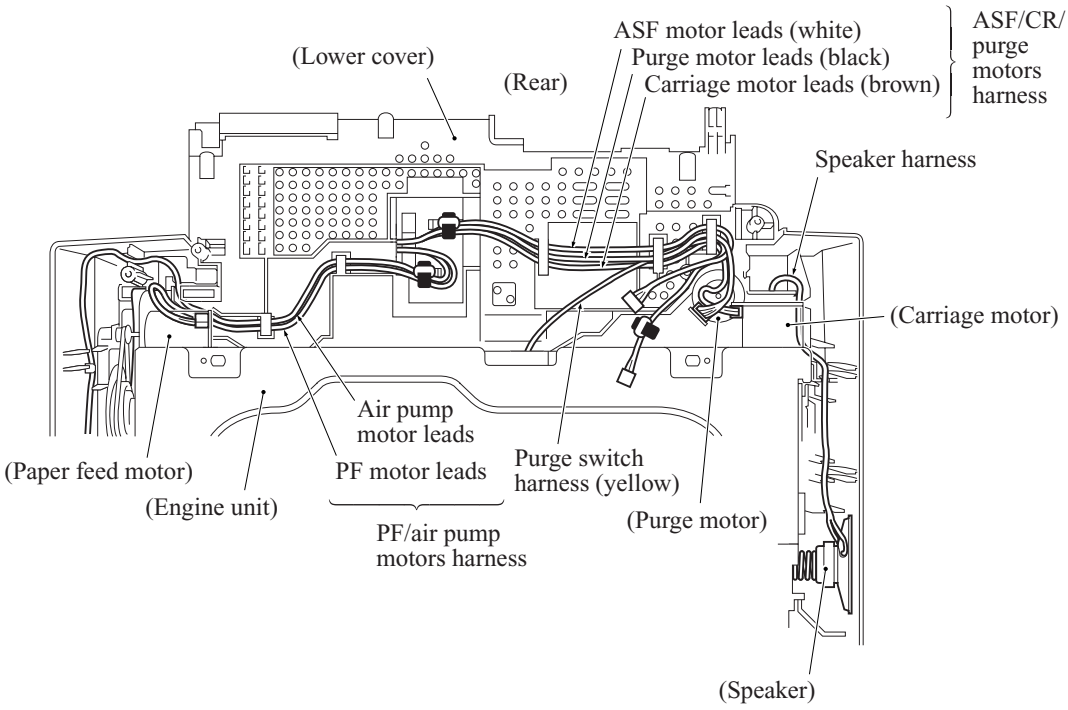
Routing C: Harnesses on the bottom of the lower cover (with the enclosure cover removed together with the NCU PCB and power supply PCB)



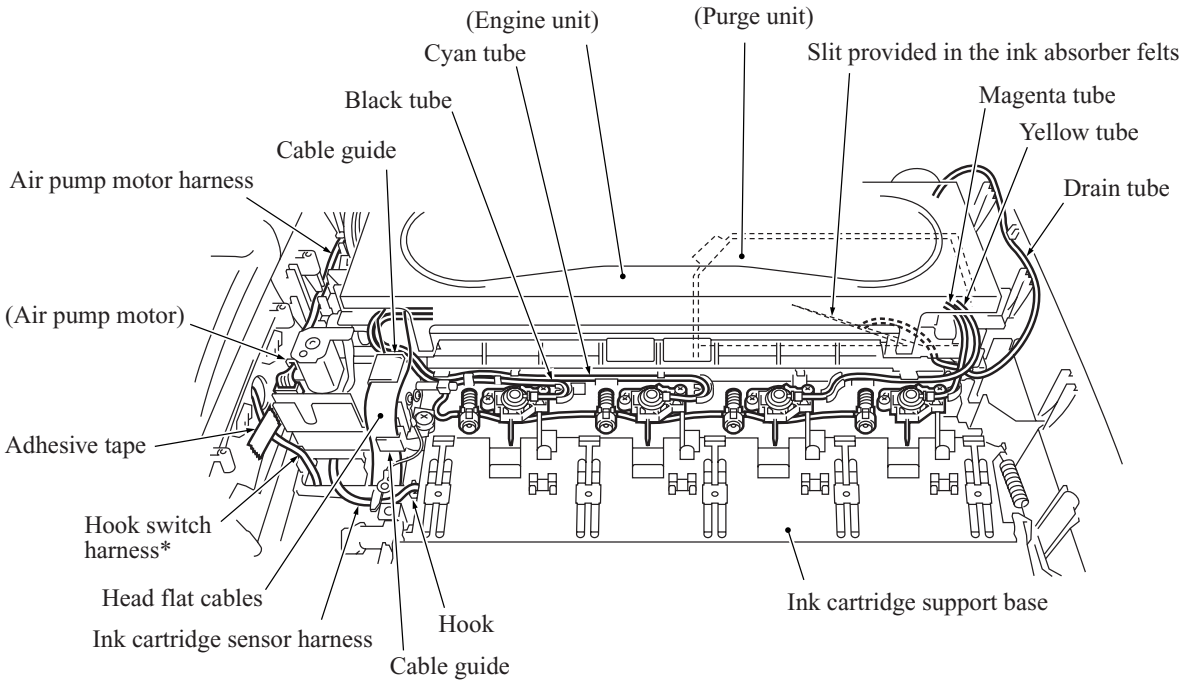
Routing D: ASF-related harnesses (with the upper cover removed)



Routing E: Harnesses on the upper cover (with of the ASF removed)



Routing F: Ink tubes on the ink cartridge support base



*Not provided on the MFC4420C.

6.2 LONG-PERIOD STORAGE

If the machine will be stored for a long period, substitute cyan ink for black ink in the black ink tube according to the procedure given below.

This is because black ink is more volatile than color ink so that air bubbles are likely to collect in black ink.

(1) Have two new cyan ink cartridges on hand.

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

(3) Make the machine enter the maintenance mode by pressing:

Menu/Set, *****, **2**, **8**, **6** and **4** keys in this sequence.

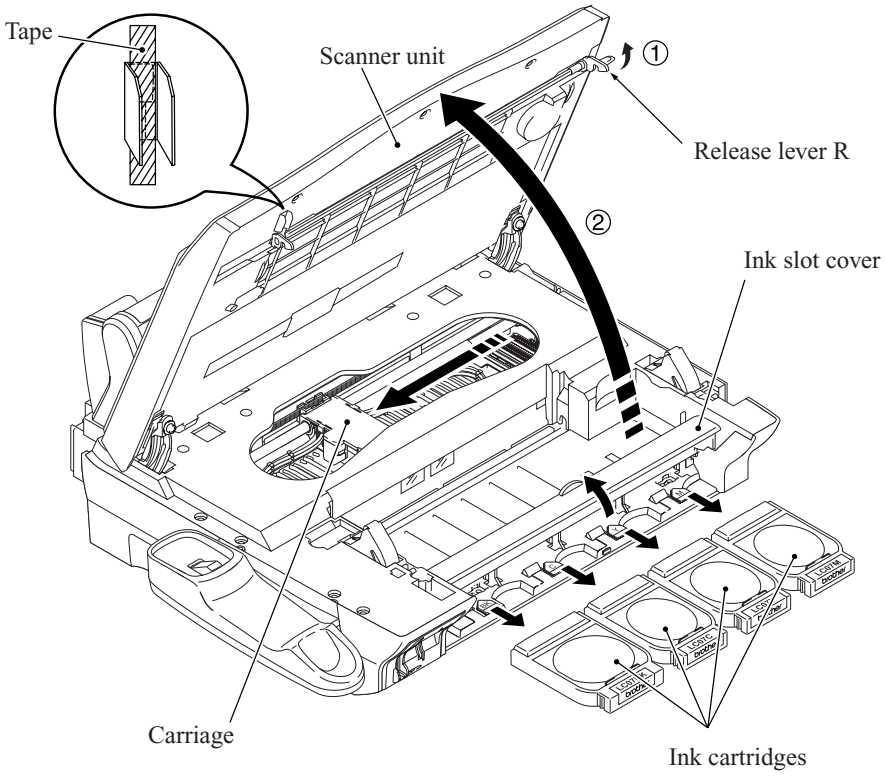
← Within 2 seconds →

(4) Pull the release lever towards you and open the scanner unit. Turn the scanner open sensor actuator on the underside of the scanner unit towards you and keep it depressed with adhesive tape.

This prevents the machine from detecting that the cover is open.

(5) Open the ink slot cover.

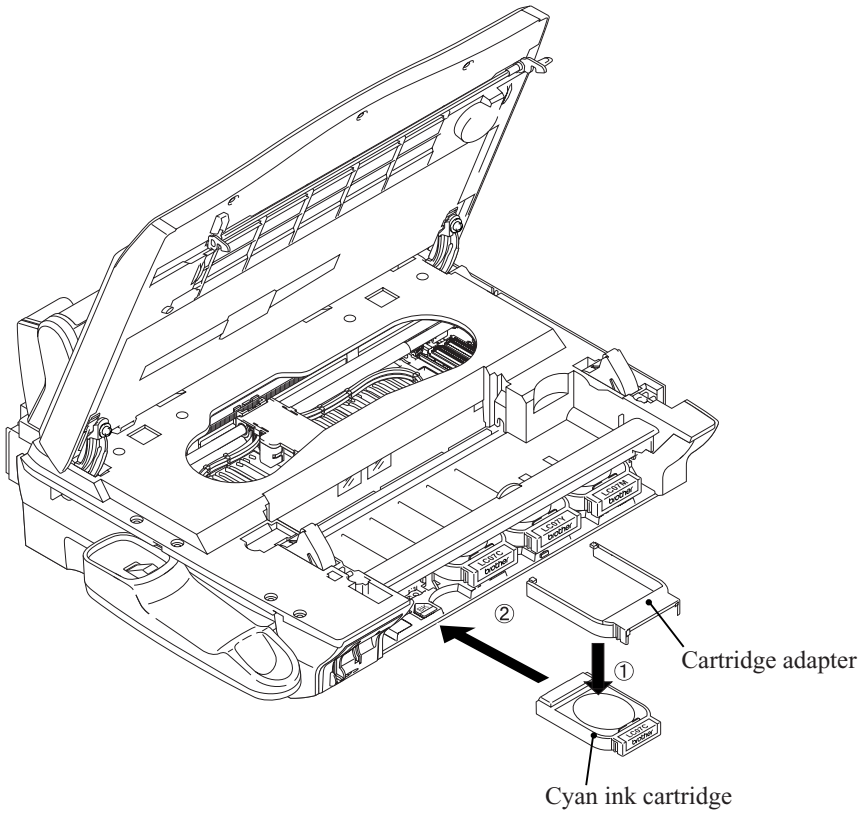
NOTE: Be sure to perform steps (4) and (5) in that order. Performing step (5) before step (4) will cause Function code 76 not to be enabled in step (9).



(6) Pull the black and cyan ink cartridges out of the ink slots.

(7) Insert one of the new cyan ink cartridges into the cyan ink slot.

(8) Fit the cartridge adapter (part code: LF0565001) over another cartridge (①) and then insert the assembly into the black ink slot (②).



(9) Perform a cyan substitute purge (Function code 76 + 0).

That is, press the **7** and **6** keys to enter the purge mode.

When "CLEANING ALL" appears on the LCD, press the **0** key.

(10) When "C REFILL ALL" appears, press the **Fax Start** key.

The machine displays "CLEANING PLEASE WAIT" and starts a cyan substitute purge.

(11) When the purge is completed, the machine returns to the initial stage of the maintenance mode. Press the **9** key twice to exit the maintenance mode.

(12) Unplug the AC power cord from the wall socket.

(13) Remove the adhesive tape that is keeping the scanner open sensor actuator depressed (see step (4).

(14) Pull all ink cartridges out of the ink slots.

(15) Insert protective cartridges into all ink slots.

(16) Close the ink slot cover.

(17) Close the scanner unit.

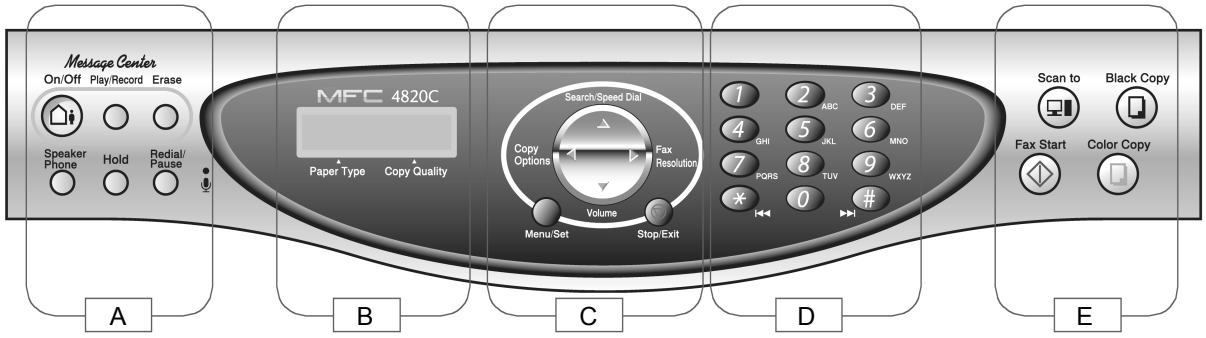
CHAPTER 7

MAINTENANCE MODE

CHAPTER 7 MAINTENANCE MODE

CONTENTS

7.1 CONTROL PANEL



A. Telephone and Message Center keys

On/Off

Let's you activate the Message Center and blinks if you did not play your voice messages.

Play/Record

Lets you listen to voice messages stored in memory. Also, this key lets you record telephone calls.

Erase

Lets you delete voice messages, all fax messages or all messages.

Speaker Phone

Lets you dial telephone and fax numbers and speak to another party without lifting the handset.

Hold

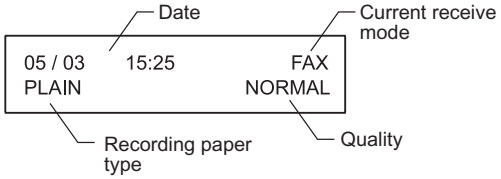
Lets you place calls on hold.

Redial/Pause

Redials the last number you called. It also inserts a pause in auto dial numbers.

B. Liquid Crystal Display (LCD)

Displays messages on the screen to help you to set up and use your machine.



C. Navigation keys

Copy Options

You can quickly and easily select temporary settings for copying.

Photo Capture

Let's you access PhotoCapture™.

Center mode by inserting your media card. After inserting your digital camera's card, press the Copy Options to print the thumbnails or digital photos or to temporarily change the settings for digital direct printing.

Fax Resolution

You can temporarily change the resolution when you send a fax.

Search/Speed dial

Lets you look up numbers that are stored in the dialing memory. It also lets you dial stored numbers by pressing # and a two-digit number.

Volume

When using the speaker or listening to the ring, you can press this key to adjust the volume.

Menu/Set

Lets you access the Menu to program and store your settings in the machine.

Press to scroll forward or backward to a menu selection.

Press to scroll through the menus and options.

Stop/Exit

Stops a fax, cancels an operation or exits from the menu.

D. Dial Pad

Use these keys to dial telephone and fax numbers and as a keyboard for entering information into the machine.

The # key lets you temporarily switch the dialing mode during a telephone call from Pulse to Tone.

E. Scan, Fax and Copy keys

Scan key:

Scan to

Lets you scan the next original and select the destination in your computer (such as a word processing, graphics or E-mail application, a Media card or a folder on your computer.)

Copy keys:

Black Copy

Makes a black-and-white copy.

Color Copy

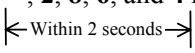
Makes a full-color copy.

Fax Start

Starts an operation, such as sending a fax.

7.2 ENTRY INTO THE MAINTENANCE MODE
(Menu/Set, *, 2, 8, 6, 4)

To make the facsimile equipment enter the maintenance mode, press the **Menu/Set**, *****, **2**, **8**, **6**, and **4** keys in this order.



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

To select one of the maintenance-mode functions listed in Section 7.3, 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 7.5.)

NOTES:
- Pressing the **9** key twice in the initial stage of the maintenance mode makes the equipment exit from the maintenance mode, restoring it to the standby state.
- Pressing the **Stop/Exit** key after entering only one digit restores the equipment to the initial stage of the maintenance mode.
- If an invalid function code is entered, the equipment resumes the initial stage of the maintenance mode.

7.3 LIST OF MAINTENANCE-MODE FUNCTIONS

Maintenance-mode Functions

Function Code	Function	Reference Section (Page)
01	EEPROM Parameter Initialization	7.5.1 (7-6)
05	Printout of Scanning Compensation Data	7.5.2 (7-7)
09	Test Pattern	7.5.3 (7-9)
10	Firmware Switch Setting	7.5.4 (7-10)
11	Printout of Firmware Switch Data	7.5.4 (7-12)
12	Operational Check of LCD	7.5.5 (7-13)
13	Operational Check of Control Panel PCB (Check of Keys and Buttons)	7.5.6 (7-14)
32	Sensor Operational Check	7.5.7 (7-15)
53	Transfer of Received Data	7.5.8 (7-17)
54	Fine Adjustment of Scanning Start/End Position	7.5.9 (7-19)
55	Acquisition of White Level Data and CIS Scanner Area Setting	7.5.10 (7-20)
59	Output of Scanning Clock	7.5.11 (7-20)
63	Carriage Travel and Initial Setup Mode	7.5.12 (7-21)
65	Alignment of Vertical Print Lines in Monochrome and in Two Colors and Adjustment of Head Skew	7.5.13 (7-22)
66	Margin Adjustment in Near-edge Printing	7.5.14 (7-24)
68	Updating of Property Data	7.5.15 (7-26)
69	Initial Adjustment of PWM Value (Aging of the carriage)	7.5.16 (7-27)
74	EEPROM Customizing	7.5.17 (7-28)
76	Purging Operation	7.5.18 (7-29)
80	Display of the Equipment's Log	7.5.19 (7-30)
82	Equipment Error Code Indication	7.5.20 (7-31)
87	Output of Transmission Log to the Telephone Line	7.5.21 (7-31)
91	EEPROM Parameter Initialization (except the telephone number storage area)	7.5.1 (7-6)
99	Exit from the Maintenance Mode	----- (7-3)
(**Menu/Set** + #, **2**, **7**, **9**, **0**, **0**)	Cancellation of the Pin TX Lock Mode (Not applicable to the American models)	7.5.22 (7-32)

* ADF: Automatic document feeder

7.4 USER-ACCESS TO THE MAINTENANCE MODE

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

The user-accessible functions (codes 10, 11, 12, 53, 54, 65, 66, 76, 80, 82, 87, and 91) are *shaded* in the table given on the previous page. Function code 10 accesses the firmware switches, each of which has eight selectors. You should not allow end users to access all of those selectors, but you may allow them to access user-accessible selectors which are *shaded* in the firmware switch tables in Appendix 4.

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

(1) Press the **Menu/Set** and **Redial/Pause** keys in this order.

The LCD clears the current display.

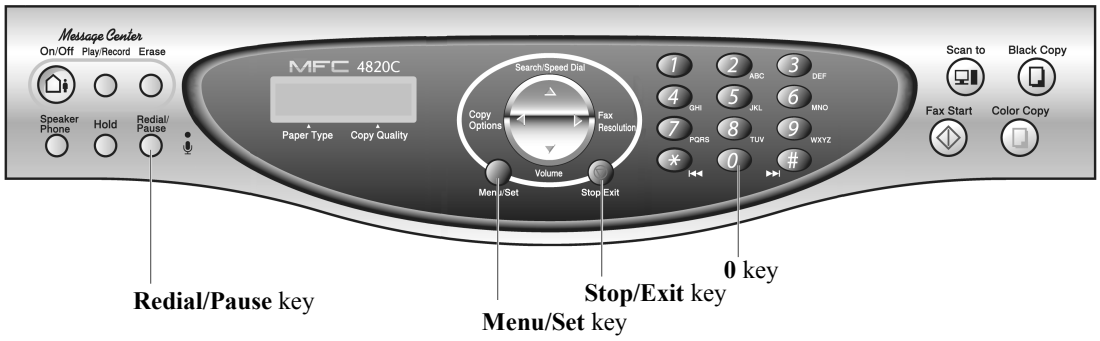
NOTE: The **Redial/Pause** key is disabled during standby for redialing and timer.

(2) Press the **0** key.

(3) Enter the desired function code (10, 11, 12, 53, 54, 65, 66, 76, 80, 82, 87, or 91) with the numerical keys.

For function code 10, access the desired firmware switch according to the operating procedure described in Appendix 4.

(4) To make the equipment return to the standby state, press the **Stop/Exit** key.



7.5 DETAILED DESCRIPTION OF MAINTENANCE-MODE FUNCTIONS

7.5.1 EEPROM Parameter Initialization (Function code 01, 91)

■ Function

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

<table>
<tr><th>Data item \ Function code</th><th>01</th><th>91</th></tr>
<tr><td>Maintenance-mode functions
User switches
Firmware switches
Remote activation code</td><td rowspan="2">All of these will be initialized</td><td>These will be initialized</td></tr>
<tr><td>Activity report
Station ID data
Outside line number
Telephone function registration
One-touch dialing
Speed dialing
Group dialing</td><td>These will <u>not</u> be initialized</td></tr>
<tr><td>EEPROM customizing code (4-digit)</td><td colspan="2">This will <u>not</u> be initialized.
(Note that the first digit of the 4-digit code will be initialized to "0." If the code is <u>1</u>001, for example, it will be initialized to <u>0</u>001.)</td></tr>
</table>

NOTE: If you replace the driver PCB with one used for any other facsimile equipment, carry out this procedure and then customize the EEPROM (maintenance-mode function code 74 in Section 7.5.17).

■ Operating Procedure

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

The "PARAMETER INIT" will appear on the LCD.

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

7.5.2 **Printout of Scanning Compensation Data** (Function code 05)

■ Function

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

■ Operating Procedure

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

(1) Press the **0** and **5** keys in this order in the initial stage of the maintenance mode.

The "WHITE LEVEL 1" will appear on the LCD.

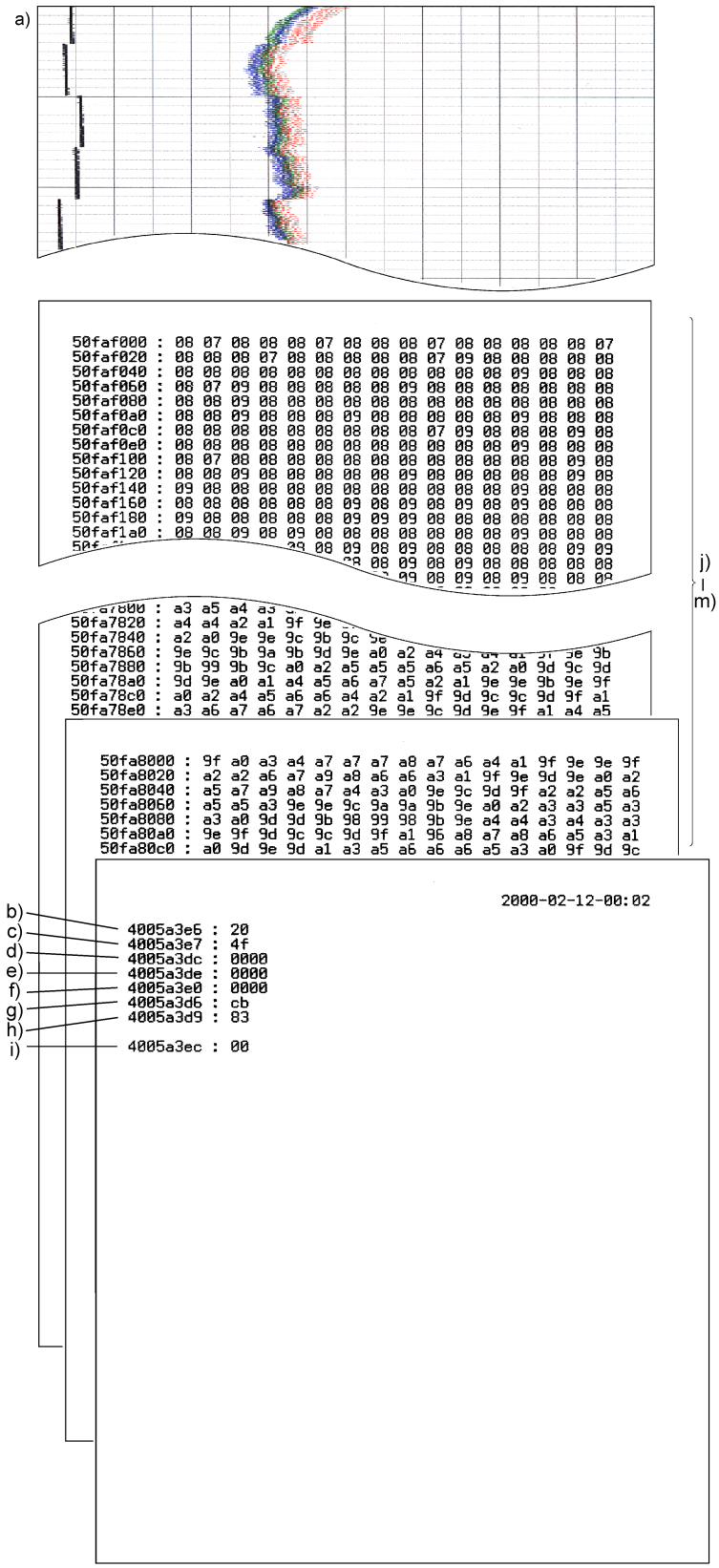
(2) The equipment prints out the scanning compensation data list containing the following:

a) Black/white data graph
b) LED PWM data for color image (1 byte)
c) LED PWM data for monochrome image (1 byte)
d) LED light intensity pulse data for green image (2 bytes)
e) LED light intensity pulse data for blue image (2 bytes)
f) LED light intensity pulse data for red image (2 bytes)
g) A/D converter reference level for high value, (1 byte)
h) A/D converter reference level for low value (1 byte)
i) Compensation data for background color (1 byte)
j) Black level data (4962 bytes)
k) White level data for red image (4962 bytes)
l) White level data for green image (4962 bytes)
m) White level data for blue image (4962 bytes)

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

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

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



Scanning Compensation Data List

7.5.3 **Test Pattern** (Function code 09)

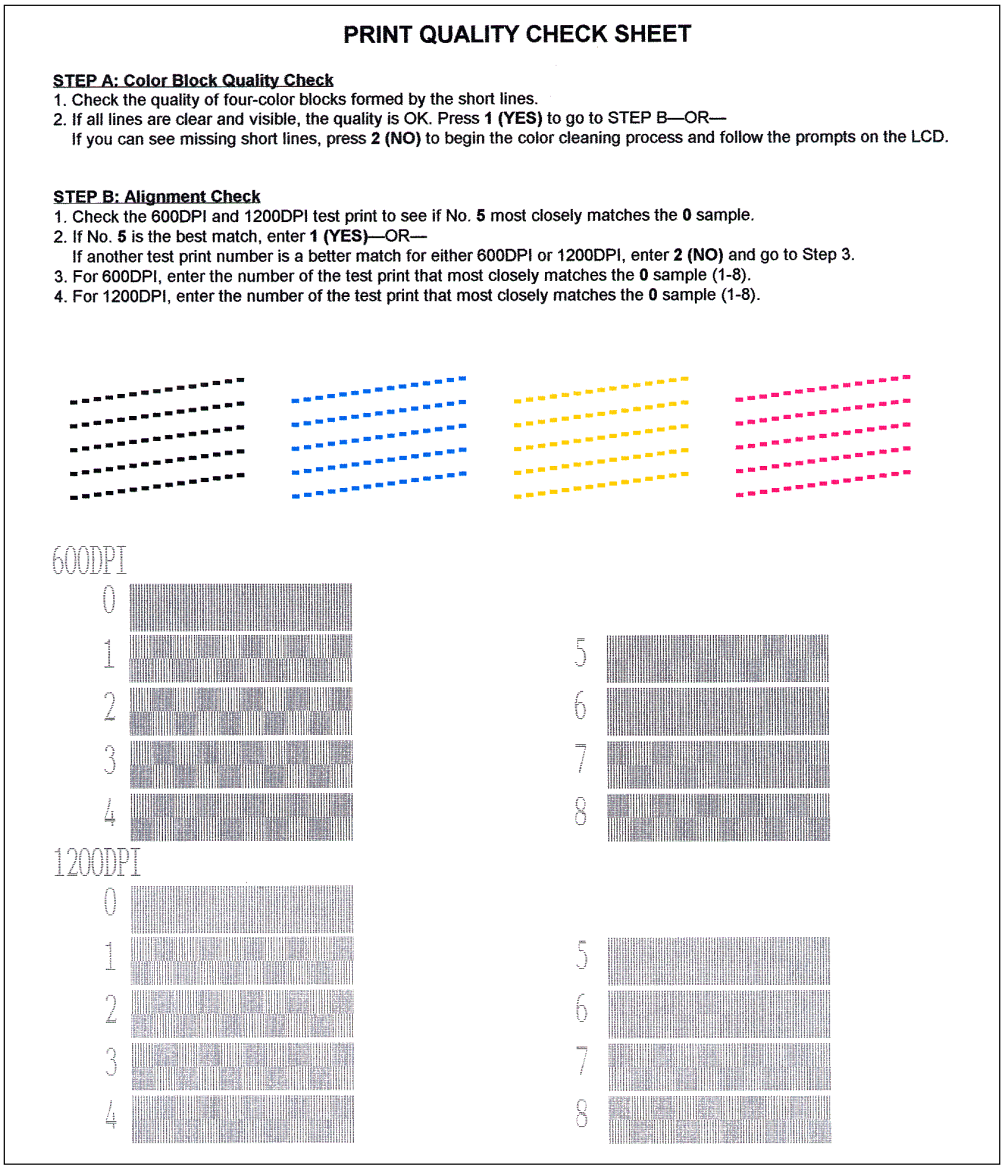
■ Function

This function, much like the copying function, prints out a test pattern (PRINT QUALITY CHECK SHEET) to allow the service personnel to check for print quality or alignment.

■ Operating Procedure

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

The figure below shows a test pattern which is printed on the PRINT QUALITY CHECK SHEET. According to the instructions printed on the sheet, you may check or correct the print quality and alignment.



Test Pattern

7.5.4 Firmware Switch Setting and Printout (Function codes 10 and 11)

[A] Firmware switch setting

■ **Function**

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

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

Firmware Switches (WSW01 through WSW50)

WSW No.	Function
WSW01	Dial pulse setting
WSW02	Tone signal setting
WSW03	PABX mode setting
WSW04	TRANSFER facility setting
WSW05	1st dial tone and busy tone detection
WSW06	**Pause** key setting and 2nd dial tone detection
WSW07	Dial tone setting 1
WSW08	Dial tone setting 2
WSW09	Protocol definition 1
WSW10	Protocol definition 2
WSW11	Busy tone setting
WSW12	Signal detection condition setting
WSW13	Modem setting
WSW14	AUTO ANS facility setting
WSW15	REDIAL facility setting
WSW16	Function setting 1
WSW17	Function setting 2
WSW18	Function setting 3
WSW19	Transmission speed setting
WSW20	Overseas communications mode setting
WSW21	TAD setting 1
WSW22	ECM and copy resolution setting
WSW23	Communications setting
WSW24	TAD setting 2
WSW25	TAD setting 3
WSW26	Function setting 4
WSW27	Function setting 5
WSW28	Function setting 6
WSW29	Function setting 7
WSW30	Function setting 8
WSW31	Function setting 9
WSW32	Function setting 10
WSW33	Function setting 11

Firmware Switches (WSW01 through WSW50) *Continued*

WSW No.	Function
WSW34	Function setting 12
WSW35	Function setting 13
WSW36	Function setting 14
WSW37	Function setting 15
WSW38	Not used.
WSW39	Not used.
WSW40	Not used.
WSW41	Not used.
WSW42	Not used.
WSW43	Function setting 21
WSW44	Speeding up scanning-1
WSW45	Not used.
WSW46	Not used.
WSW47	Paper handling for a feed error and delay of FAX line disconnection
WSW48	Not used.
WSW49	Not used.
WSW50	Not used.

■ Operating Procedure

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

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

(2) Enter the desired number from the firmware switch numbers (01 through 50).

The following appears on the LCD:

Selector 1 ↓ Selector 8 ↓

WSWXX = 0 0 0 0 0 0 0 0

(3) Use the right and left arrow keys to move the cursor to the selector position to be modified.

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

(5) Press the **Set** key. This operation saves the newly entered selector values onto the EEPROM 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 **Menu/Set** or **Stop/Exit** key to return the equipment to the initial stage of the maintenance mode.

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

■ Details of Firmware Switches

The details of the firmware switches are described in Appendix 4 in which the user-accessible selectors of the firmware switches are *shaded*.

[B] Printout of firmware switch data

■ Function

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

■ Operating Procedure

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

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

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

Configuration List

7.5.5 **Operational Check of LCD** (Function code 12)

■ Function

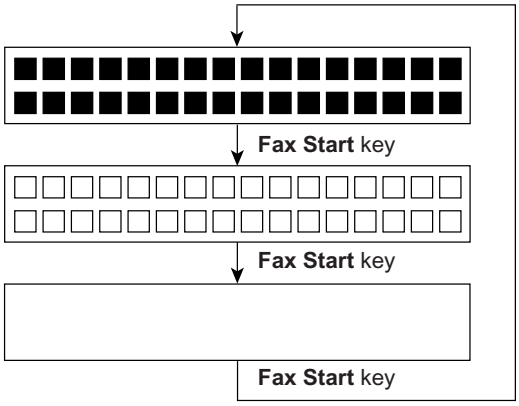
This function allows you to check whether the LCD on the control panel works normally.

■ Operating Procedure

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

The LCD shows the screen given at right.

(2) Press the **Fax Start** key. Each time you press the **Fax Start** key, the LCD cycles through the displays shown at right.



(3) Press the **Stop/Exit** key in any process of the above display cycle. The equipment beeps for one second and returns to the initial stage of the maintenance mode.

7.5.6 **Operational Check of Control Panel PCB** (Function code 13)

■ Function

This function allows you to check the control panel PCB for normal operation.

■ Operating Procedure

(1) Press the **1** and **3** keys in this order in the initial stage of the maintenance mode.

The "00 " will appear on the LCD.

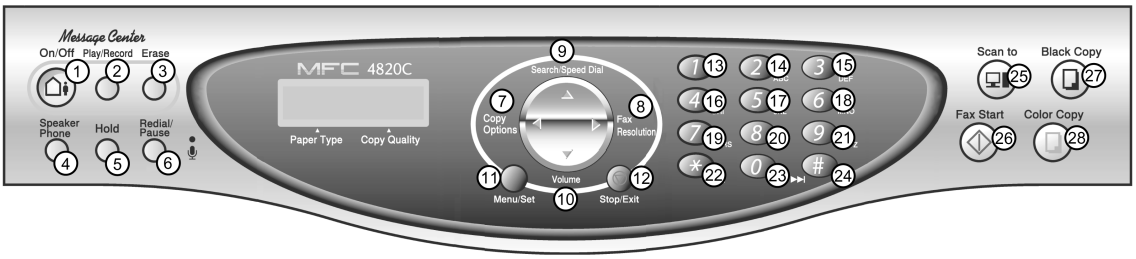
(2) Press the keys and buttons in the order designated in the illustration shown below.

The LCD shows the corresponding number in decimal notation each time a key or button is pressed. Check that the displayed number is correct by referring to the illustration below.

If a key or button is pressed out of order, the equipment beeps and displays the "INVALID OPERATE" on the LCD. To return to the status ready to accept key & button entry for operational check, press the **Stop/Exit** key.

(3) After the last number key or button is pressed, the equipment beeps and returns to the initial stage of the maintenance mode.

To terminate this operation, press the **Stop/Exit** key. The equipment returns to the initial stage of the maintenance mode.



Key & Button Entry Order

7.5.7 **Sensor Operational Check** (Function code 32)

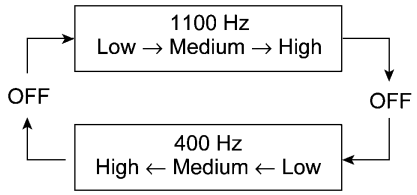
■ Function

This function allows you to check the following:

- Scanner/ink slot cover open sensor
- Registration sensor
- Paper width sensor (media sensor)
- Purge cam HP switch
- ASF switch
- Head proper data (preset or not)
- Black ink cartridge sensor
- Yellow ink cartridge sensor
- Cyan ink cartridge sensor
- Magenta ink cartridge sensor
- Head driver chip temperature sensors
- Hook switch (for the MFC4820C only)

■ Operating Procedure

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



NOTE: To stop beeping, press the **Menu/Set** key.

If the sensing status are as listed below, the LCD will show "CVRSPWP1P2HD" and "IKICIYIMVTHK," which can be switched by pressing the **Black Copy** key. (The MFC4420C has no hook switch, but the "HK" in the latter character string always appears.)

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

LCD	Sensors	Sensing status
CV	Scanner/ink slot cover open sensor	Scanner unit closed.
RS	Registration sensor	No recording paper detected.
PW	Paper width sensor	No paper detected.
P1	Purge cam HP switch	Purge cam placed in the home position.
P2	ASF switch	ASF's paper stopper placed in the home position.
HD	Head property data	Stored in the EEPROM on the driver PCB.
IK	Black ink cartridge sensor	Black ink cartridge loaded (Black ink present).
IY	Yellow ink cartridge sensor	Yellow ink cartridge loaded (Yellow ink present).
IC	Cyan ink cartridge sensor	Cyan ink cartridge loaded (Cyan ink present).
IM	Magenta ink cartridge sensor	Magenta ink cartridge loaded (Magenta ink present).
VT	Head driver chip temperature sensors	Driver chip temperature within the allowable range.
HK	Hook switch (for the MFC4820C)	Handset on hook.

(2) Change the detecting conditions (e.g., open the scanner unit or ink slot cover, insert paper through the registration sensor or paper width sensor, or remove the ink cartridges), 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 stage of the maintenance mode, press the **Stop/Exit** key.

7.5.8 **Transfer of Received Data** (Function code 53)

■ Function

This function transfers received data to another facsimile equipment. It is useful when the facsimile equipment cannot print received data due to the printing mechanism defective.

NOTE: The number of files that can be transferred at a time is 99. To transfer 100 files or more, carry out the following procedure more than one time.

TIP: If there are both color and monochrome data in a file to be transferred, the monochrome data will be transferred first. If the receiver equipment does not support the color function, the sender equipment cannot transfer color data, resulting in an error.

■ Operating Procedure

(1) Press the **5** and **3** keys in this order in the initial stage of the maintenance mode.

The "FAX TRANSFER" appears on the LCD.

(2) To check the number of received files, press the **1** key.

The "1.NO. OF JOBS" appears on the LCD.

Press the **Menu/Set** key, and the number of received files appears, just as "NO. OF. JOBS: 10."

(3) To transfer the activity report only, press the **2** key.

The "2.ACTIVITY" appears.

To transfer received files (together with the activity report), press the **3** key.

The "3.DOCUMENTS" appears. Note that if there is no received file, the "NO DOCUMENTS" appears.

(4) With the "2.ACTIVITY" or "3.DOCUMENTS" being displayed, press the **Menu/Set** key.

The "ENTER NO. &SET" appears.

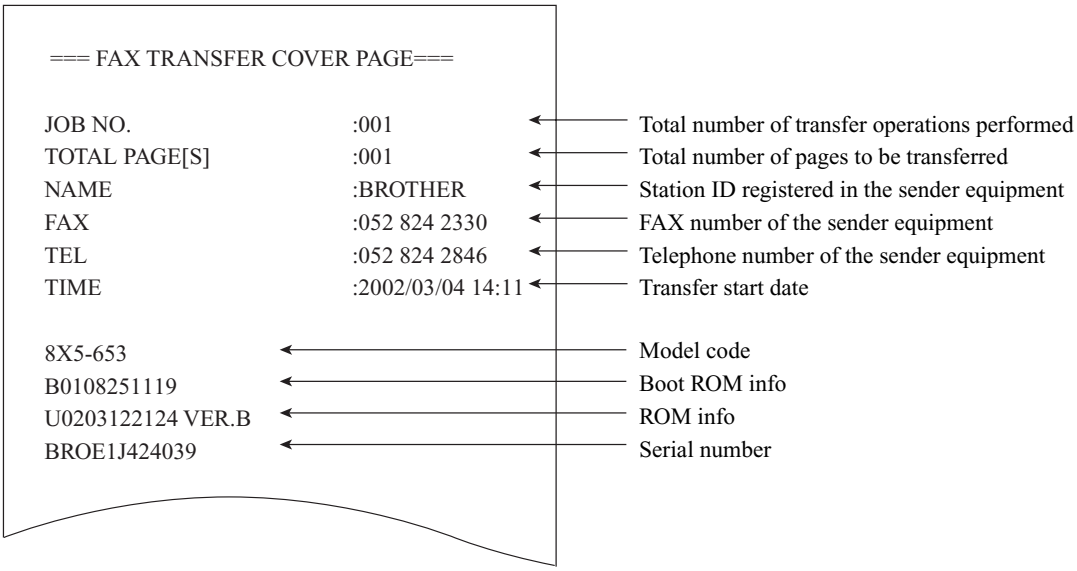
(5) Enter the telephone number of the receiver equipment and press the **Menu/Set** key again.

NOTE: Be sure to type the telephone number with the numerical keys. No one-touch dialing is allowed in this procedure.

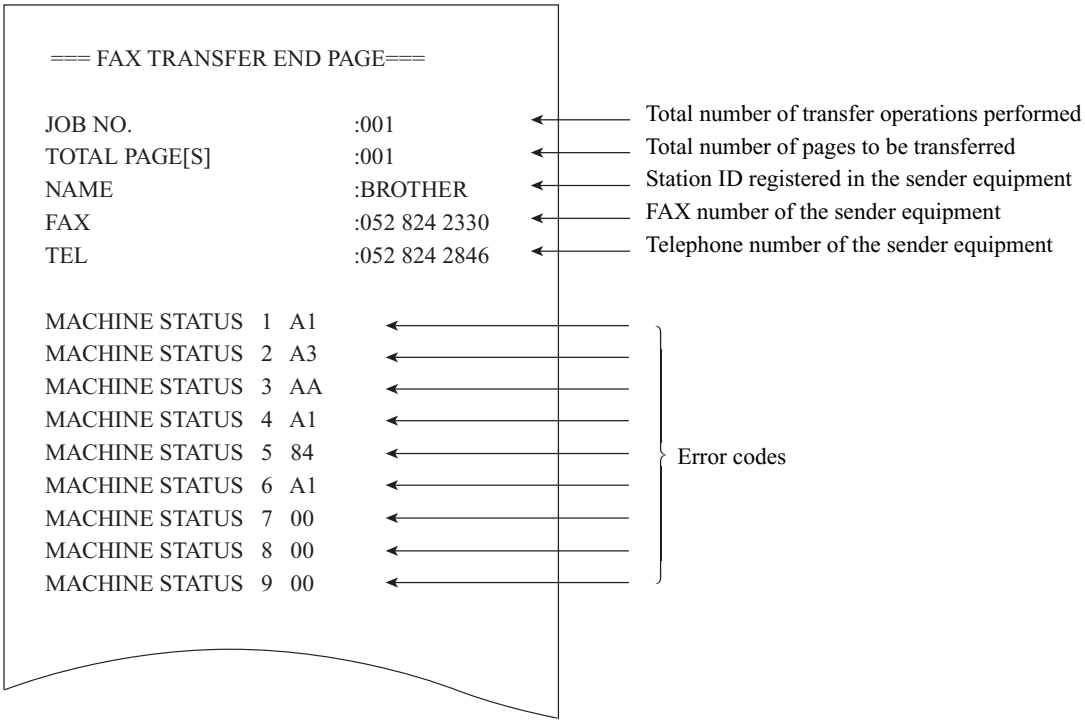
The machine displays the "ACCEPTED" for approx. two seconds and starts dialing to transfer data.

No station ID will be attached. A cover page and end page as shown on the next page will be automatically attached, instead.

Cover page sample



End page sample



7.5.9 **Fine Adjustment of Scanning Start/End Position** (Function code 54)

■ Function

This function allows you to adjust the scanning start/end position.

■ Operating Procedure

(1) Press the **5** and **4** keys in this order in the initial stage of the maintenance mode.

The "SCAN START ADJ." appears on the LCD.

(2) Press the **Fax Start** key, and the current scanning position correction value appears.

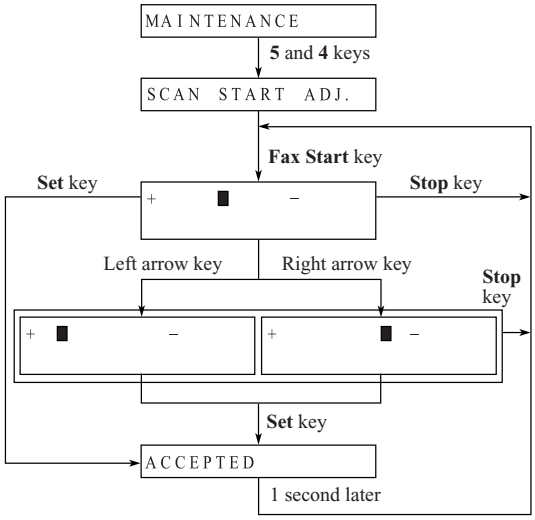
You may adjust the correction value to 11 levels from +5 to -5 (mm).

(3) To increase the correction value, press the left arrow key; to decrease it, press the right arrow key.

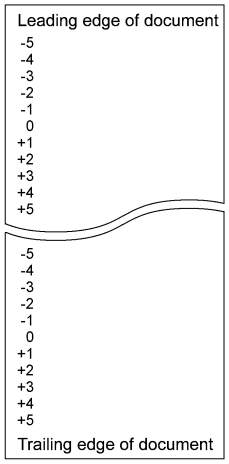
If you press the **Stop/Exit** key, the equipment returns to the initial stage of the maintenance mode without making change of the correction value.

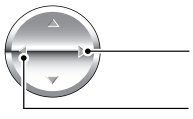
(4) Press the **Menu/Set** key.

The "ACCEPTED" appears on the LCD. After one second, the equipment returns to the initial stage of the maintenance mode.



NOTE: The relationship between the scanning start/end positions and their correction values is shown below.





7.5.10 Acquisition of White Level Data and CIS Scanner Area Setting (Function code 55)

■ Function

This function allows the equipment to obtain white level data for the CIS scanner and save it together with the CIS scanner area into the EEPROM on the driver PCB.

■ Operating Procedure

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

The "WHITE LEVEL1" will appear on the LCD.

The equipment automatically obtains white level data.

(2) If this operation completes normally, the equipment returns to the initial stage of the maintenance mode.

If any error is noted, the "SCANNER ERROR" appears on the LCD. To return the equipment to the initial stage of the maintenance mode, press the **Stop/Exit** key.

7.5.11 Output of Scanning Clock (Function code 59)

■ Function

This function is designed for debugging at the factory. Do not disturb it in maintenance.

7.5.12 **Carriage Travel and Initial Setup Mode** (Function code 63)

■ Function

This function makes the carriage travel to the head replacement position, with Function code 63 + *.

It may also enable or disable the initial setup mode when the power is applied at the next time, with Function code 63 + 1 or Function code 63 +3, respectively.

■ Operating Procedure

(1) Press the **6** and **3** keys in this order in the initial stage of the maintenance mode.

The "MAINTENANCE 63" will appear on the LCD.

(2) To make the carriage travel to the head replacement position, press the ***** key.

After completion of head replacement or adjustment jobs, press the **Stop/Exit** key. The carriage will return to the home position where the print head unit will be locked.

(3) To enable or disable the initial setup mode when the power is applied at the next time, press the **1** or **3** key, respectively.

If you enable the initial setup mode, wait until the "INIT" appears on the LCD and the print head unit becomes locked. When the "HEAD LOCKED" appears, turn the power off.

NOTE: Enabling the initial setup mode resets all counts which can be displayed with Function code 80 (described in Section 7.5.19 "Display of the Equipment's Log") to zero.

If you disable the initial setup mode, the equipment displays the "NOT INIT" on the LCD and returns to the initial stage of the maintenance mode.

7.5.13 Alignment of Vertical Print Lines in Monochrome and in Two Colors and Adjustment of Head Skew (Function code 65)

■ Function

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

If the print head unit or driver PCB is replaced with a new one, you need to make the adjustment given in this section.

NOTE: If the print head unit is replaced with a new one, you need to make other adjustments in addition. Refer to Chapter 6, Section 6.1.2, "Adjusting the print head unit" flowchart.

■ Operating Procedure

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

The equipment displays the "MAINTENANCE 65" on the LCD and prints two sheets of check patterns as shown on the next page.

On the 1st sheet, two sets of vertical alignment check patterns in monochrome are printed for 500 dpi and 1200 dpi, each of which consists of #1 through #9 blocks. If the vertical alignment is ON, #5 block (each in the 600 dpi and 1200 dpi printouts) shows vertically aligned lines.

On the 2nd sheet, a set of vertical alignment check patterns in two colors is printed, which consists of #1 through #3 blocks. Also a set of head skew check patterns (-2/1200 through 2/1200) is printed.

The "600DPI NO. (1-9)" appears on the LCD.

(2) On the 1st sheet, check the printed vertical alignment check patterns for 600 dpi in monochrome and find which number block shows full alignment. If the block is other than #5, enter that block number by using the numerical keys.

The "1200DPI NO.(1-9)" appears on the LCD.

(3) For 1200 dpi, perform the same operation as in step (2).

The "KC-YM ADJ[1-3]" appears on the LCD.

(4) On the 2nd sheet, check a set of printed vertical alignment check patterns (#1 through #3) in two colors and find which number block shows full alignment. Enter that block number by using the numerical keys.

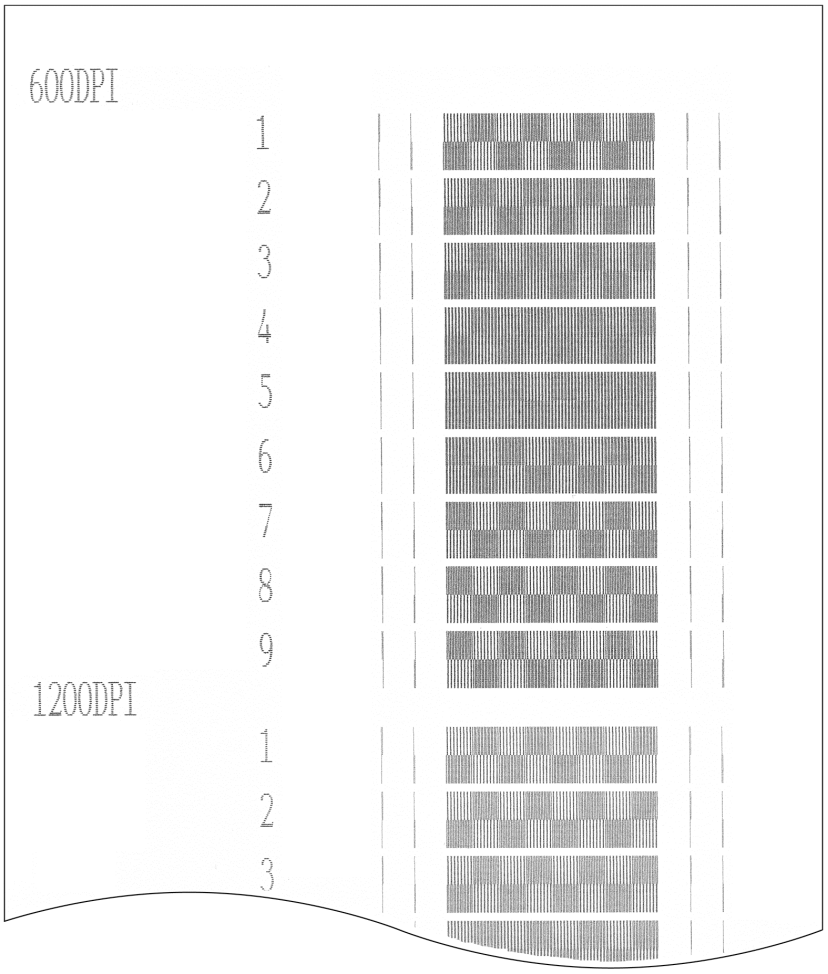
(5) Check a set of head skew check patterns (-2/1200 through 2/1200) and find which number block shows full alignment. According to the block number, adjust the eccentric bushing (white part which supports the print head unit on the carriage rail) as follows:

If the most aligned print is:	Rotate the eccentric bushing:
-2/1200	to the rear by 2 position markers
-1/1200	(No change)
0/1200	(No change)
1/1200	(No change)
2/1200	to the front by 2 position markers

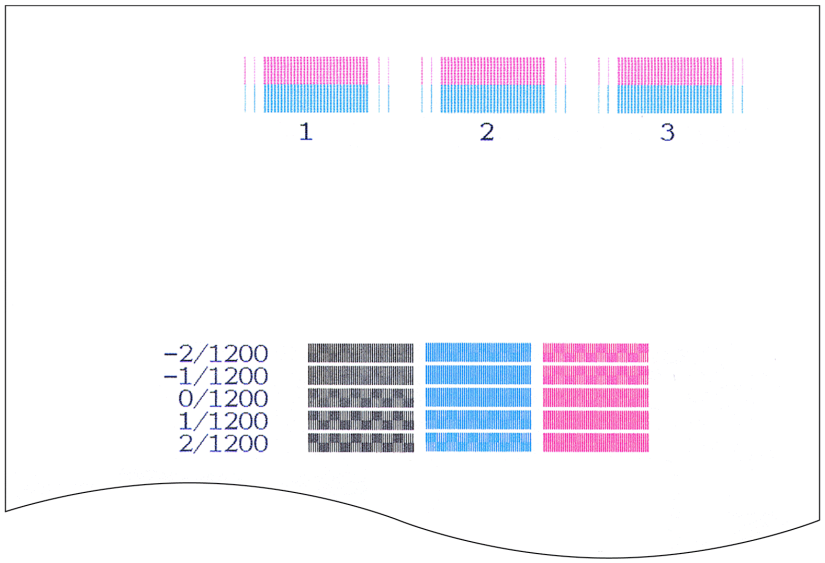
The equipment automatically returns to the initial stage of the maintenance mode.

NOTE: If #1 or #9 block is fully aligned so that you press the **1** or **9** key in the above procedure, then go back to step (1) to confirm that #5 block becomes aligned.

1st sheet



2nd sheet



Vertical Alignment Check Patterns and Head Skew Check Pattern

7.5.14 **Margin Adjustment in Near-edge Printing** (Function code 66)

■ Function

This function allows you to adjust the top, bottom, left and right margins for near-edge printing. You print out a set of margin check patterns, measure the margins, and enter the correction values.

■ Operating Procedure

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

The "MEDIA SENSOR ADJ" appears on the LCD. (NOTE: The MEDIA SENSOR refers to the paper width sensor.)

(2) Set A4-sized paper into the ASF.

(3) Press the **1** key.

The equipment displays the "PRINTING" on the LCD and prints out the margin check pattern as shown on the next page.

Upon completion of printing, the equipment automatically returns to the initial stage of the maintenance mode.

(4) Measure the top, bottom, left and right margins on the printout.

If all margins are within the range from 1.8 to 2.2 mm, no adjustment is required.

(Example) Top: 2.3 mm, Bottom: 1.7 mm, Left: 1.8 mm, Right: 2.3 mm

(5) If any of the margins is out of the specified range, press the **6** key twice again.

The "MEDIA SENSOR ADJ" appears again.

(6) Press the ***** key to make the equipment ready for data entry..

(7) Enter the measured value (in units of 0.1 mm) multiplied by 10. After each entry, press the **Menu/Set** key.

(Example) Top: 23, Bottom: 17, Left: 18, Right: 23

In this example, press **2**, **3**, **Menu/Set**, **1**, **7**, **Menu/Set**, **1**, **8**, **Menu/Set**, **2**, and **3** keys.

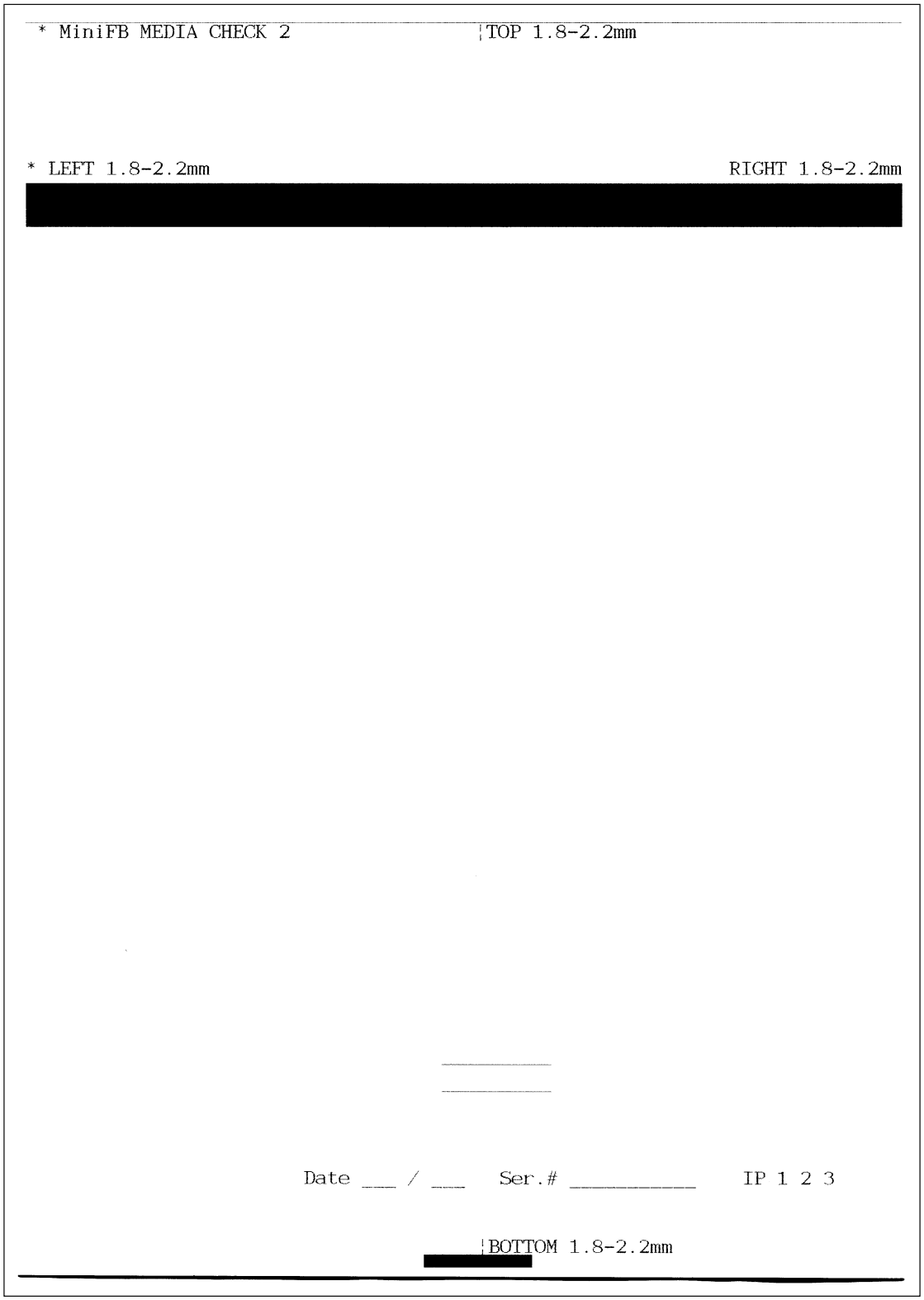
(8) Go back to step (1) and print out the margin check pattern again.

Upon completion of printing, the equipment automatically returns to the initial stage of the maintenance mode.

(9) Measure the top, bottom, left and right margins on the printout.

If all margins are within the range from 1.8 to 2.2 mm, the adjustment is completed.

TIP: To reset the newly entered values to defaults, press the **Fax Start** key.



Margin Check Patterns

7.5.15 Updating of Property Data (Function code 68)

■ Function

To keep the print quality, the controller optimizes the drive conditions of individual print head units, paper feed rollers, paper ejection rollers, and air pump & motor modules according to their property data. In the case of the print head unit, for instance, the controller optimizes the head drive strength, ink jet-out timing and other drive conditions according to the electromechanical properties unique to individual print heads and ambient temperature.

Those property data is stored in the EEPROM on the driver PCB and their property codes are printed on their property labels which are attached to the rear left side of the machine (with the battery cover* or rear cover S** removed). *For the MFC4820C **For the MFC4420C

If you replace any of the print head unit, paper feed roller, paper ejection roller, or air pump & motor module with a new spare part, then you need to enter its property code printed on the property label (that comes with the new spare part) and replace the old property label on the rear left side of the machine with the new one. If the old part may be used in future, store the old property label also with the old part.

■ Operating Procedure

(1) Press the **6** and **8** keys in this order in the initial stage of the maintenance mode.

(2) For the print head unit, press the **2**, **5**, **8**, **0** keys in this order.
For the paper feed roller, press the **0**, **1**, **2**, **3** keys in this order.
For the paper ejection roller, press the **0**, **4**, **5**, **6** keys in this order.
For the air pump & motor module, press the **0**, **7**, **8**, **9** keys in this order.

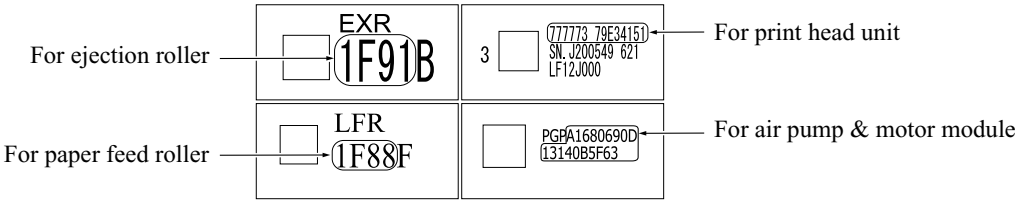
The current property data stored in the EEPROM appears on the LCD and the equipment is ready for entry.

(3) Check the property label that comes with a new spare part (print head unit, paper feed roller, paper ejection roller, or air pump & motor module) and then enter the property code.

The code to be entered is: 14 digits for the print head unit, 4 digits for the paper feed roller and ejection roller, and 19 digits for the air pump & motor module.

If you enter 4 digits for the paper feed roller or ejection roller, the 5th character automatically appears. Check that the displayed 5th character is the same as that on the property label. If it is not, enter the 4 digits again.

For the air pump & motor module, enter the 9 digits, press the **Fax Start** key, and then enter the remaining 10 digits.



NOTE: To enter letters "A" through "F," press the **1** through **6** keys while holding down the # key, respectively.

(4) Press the **Menu/Set** key.

The equipment beeps, shows the "INPUT ACCEPTED" on the LCD, and writes the entered property code into the EEPROM. Then it returns to the initial stage of the maintenance mode.

NOTE: If the entered data contains any checksum error, the equipment beeps, shows the "INPUT ERROR," and then returns to the ready-to-enter state. Go back to step (3).

7.5.16 Initial Adjustment of PWM Value (Aging of the Carriage) (Function code 69)

■ Function

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

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

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

■ Operating Procedure

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

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

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

If any error occurs, the equipment beeps and shows some message, e.g., "OK30 NG15 NG07" on the LCD. This sample message indicates that the speed variation is within the allowable range when the carriage travels at high speed of 30 inches/sec.;however, it is out of the range at medium or low speed of 15 inches/sec. or 7 inches/sec.

To return to the initial stage of the maintenance mode, press the **Stop/Exit** key.

7.5.17 **EEPROM Customizing** (Function code 74)

■ Function

This function allows you to customize the EEPROM according to language, function settings, and firmware switch settings. The customizing codes list is given in Appendix 3.

NOTE: If you replace the driver PCB, be sure to carry out this procedure.

■ Operating Procedure

(1) Press the **7** and **4** keys in this order in the initial stage of the maintenance mode.

The current customizing code (e.g., 1102 in the case of MF4820C U.S.A. version) appears.

(2) Enter the desired customizing code (e.g., 0002 in the case of MFC4420C Canadian version).

NOTE: To enter letters "A" through "F," press the **1** through **6** keys while holding down the **#** key, respectively.

The newly entered code appears.

NOTE: *If a wrong 4-digit code is entered, the equipment will malfunction.*

(3) Press the **Fax Start** key.

The equipment saves the setting and returns to the initial stage of the maintenance mode.

If you press the **Stop/Exit** key or no keys are pressed for one minute in the above procedure, the equipment stops the procedure and returns to the initial stage of the maintenance mode.

7.5.18 **Purging Operation** (Function code 76)

■ Function

The equipment may carry out several types of purging operations--normal purge, initial purge, and reset purge. This function allows you to select the desired purge type and carry it out.

TIP: The purge types and their details are described in Chapter 4, Section 4.2.3.3.

■ Operating Procedure

(1) Press the **7** and **6** keys in this order in the initial stage of the maintenance mode.
The equipment displays the "CLEANING ALL" on the LCD and enters the purge mode.
You may select the color of ink to be purged with the navigation key.

(2) To carry out normal purge, initial purge, reset purge, Cyan substitute purge, or draining the Ink press the **1**, **4**, **5, 0, or 9** key, respectively.
Upon completion of purging, the equipment automatically returns to the initial stage of the maintenance mode.

Purge type	Contents	Time required	Amount of ink used	To perform the purge in maintenance mode:
Normal purge	This purge is performed in order to remove any dried up ink that has accumulated around the head nozzles.	Approx. 1 min 20 sec	0.25 cc	Press the **1** key
Continuation suction	Please do not perform.	-	-	Press the **2** key
Wiping	Please do not perform.	-	-	Press the **3** key
Initial purge	This purge is performed automatically when the power is first applied by the user after shipment. It fills the ink supply tubes and print head unit with ink.	2.5 to 4.0 min	3.21 cc	Press the **4** key
Reset purge	This purge is performed to remove any bubbles that have accumulated in the ink supply tubes.	Approx. 2 min	0.45 cc	Press the **5** key
Initial purge (in factory)	Please do not perform.	-	-	Press the **6** key
Replace the cartridge	Please do not perform.	-	-	Press the **7** key
Exhaust gas	Please do not perform.	-	-	Press the **8** key
draining the Ink	The ink in a tube is drained and it is made for ink not to scatter when you repair this machine.	Approx. 4 min	-	Press the **9** key
Cyan substitute purge	This purge is performed to substitute ink in the black ink tube with cyan ink. It is to prevent ink in the black ink tube from developing air bubbles during long-term storage of the machine. (Black ink deteriorates more easily than cyan ink.)	Approx. 2 min	3.90 cc	Press the **0** key

NOTES: The user-accessible functions are shaded in the table. Please never push 2,3,6,7 and 8 keys. These keys can use only a factory.

7.5.19 **Display of the Equipment's Log** (Function code 80)

■ Function

The equipment may display its log information on the LCD.

■ Operating Procedure

(1) Press the **8** and **0** keys in this order in the initial stage of the maintenance mode.

The USB serial number appears on the LCD.

(2) Press the **Fax Start** key. Each time the **Fax Start** key is pressed, one of the following log information items appears on the LCD in the order given below.

1) Ink drop count, indicating how many droplets have been jetted out from each of the ink cartridges*[1]
2) Ink drop count after near-empty (Not used in facsimile models covered by this manual.)
3) Total ink drop count, indicating how many droplets the equipment has been jetted out from each of the ink cartridges*[1] since produced
4) Jam count, indicating how many times a paper jam has been occurred
5) Total page count, indicating how many pages have been printed since the equipment was produced
6) PC print page count, indicating how many pages the equipment has been printed as an output device of the connected PC
7) Copy page count, indicating how many copies have been made
8) FAX page count, indicating how many received FAX pages have been printed
9) Purge count, indicating how many times the purge operation has been carried out*[2]
10) Wiper count, indicating how many times the wiper operation has been carried out
11) Ink cartridge change count, indicating how many times ink cartridge replacement has been made for each color*[1]
12) Error code of the most recent machine error*[3]
13) Error code of the most recent communications error*[4]
14) Flat-bed page count, indicating how many documents have been scanned

If you press the **Fax Start** key, the screen goes back to the USB serial number indication in step (1) above.

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

*[1] To check each of the four ink cartridges, press the **Menu/Set** key. Pressing the key cycles through black, yellow, cyan, and magenta.

*[2] The purge count is as listed below (Count "1" for 0.4 cc of ink).
Initial purge: "512" for 4 colors
Normal purge: "20" for 2 colors and "40" for 4 colors
Reset purge: "52" for 2 colors and "72" for 4 colors
Reset purge + suction: "88" for 2 colors and "144" for 4 colors

*[3] When a machine error code is displayed, pressing the **Menu/Set** key cycles through recent nine errors that have occurred.

*[4] When a communications error code is displayed, pressing the **Menu/Set** key cycles through the latest error, 2nd latest error, and 3rd latest error.

7.5.20 **Equipment Error Code Indication** (Function code 82)

■ Function

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

■ Operating Procedure

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

The LCD shows the "MACHINE ERROR X X."

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

7.5.21 **Output of Transmission Log to the Telephone Line** (Function code 87)

■ Function

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

■ Operating Procedure

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

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

1) Press the **Menu/Set**, **Redial/Pause**, and **0** keys in this order.
2) Press the **8** and **7** keys in this order.

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

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

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

7.5.22 Cancellation of the Pin TX Lock Mode (Not applicable to American models)

■ Function

This procedure can cancel the Pin TX lock mode. Use this procedure if the user forgets his/her password entered when setting the Pin TX lock mode so as not to exit from the mode.

NOTE: Carrying out this procedure will lose passwords previously entered but retain FAX messages received in the Pin TX lock mode.

■ Operating Procedure

(1) When the PIN TX LOCK is displayed on the LCD, press the **Menu/Set** and **#** keys *at the same time*. Within two seconds, start to press the **2**, **7**, **9**, **0**, and **0** keys.

The Pin TX lock mode will be canceled and the equipment returns to the calendar clock screen.

CHAPTER 8

ERROR INDICATION AND TROUBLESHOOTING

CHAPTER 8 ERROR INDICATION AND TROUBLESHOOTING

CONTENTS

8.1 ERROR INDICATION

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

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

8.1.1 Equipment Errors

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

To display detailed error information, use the maintenance-mode function code 82 described in Chapter 7, Section 7.5.20 (that is, make the equipment enter the maintenance mode and then press the **8** and **2** keys). Following the MACHINE ERROR, one of the error codes listed in [2] will appear on the LCD.

[1] Error messages on the LCD

Messages on the LCD	Probable Cause
CHECK PAPER Reload paper, then press FAX START. (These messages appear alternately.)	The registration sensor detects no recording paper loaded in the auto sheet feeder (ASF).
COVER OPEN PLS CLOSE COVER (These messages appear alternately.)	The scanner/ink slot cover open sensor detects that the scanner unit and/or ink slot cover is not closed.
HIGH TEMPERATURE COOL DOWN ROOM (These messages appear alternately.)	The temperature inside the machine is too high. This message will appear if the ambient temperature exceeds 47°C.
INK EMPTY CYAN INK EMPTY MAGENT INK EMPTY YELLOW INK EMPTY BLACK PLS OPEN COVER (These messages appear alternately.)	The ink cartridge sensor detects that the ink (cyan, magenta, yellow, or black) has run out. Once any of these messages is displayed, color printing is no longer possible.

Messages on the LCD	Probable Cause
LOW TEMPERATURE Room temperature is below spec. (These messages appear alternately.)	The temperature inside the machine is too low.
NEAR EMPTY CYAN NEAR EMPTY MGENT NEAR EMPTY YELLW NEAR EMPTY BLACK	The ink dot counter (for the indicated color) in the EEPROM on the driver PCB has counted up the specified number of dots, meaning that the ink cartridge is near empty. Even if any of these messages is displayed, color printing is still possible.
PAPER JAM Open cover, then remove jammed paper. (These messages appear alternately.)	The registration sensor detects that a paper jam has occurred.
PC BUSY OR FAIL	After connected with the host computer, the equipment has received no response from the computer. (A communications error has occurred.)
PLS OPEN COVER	To display the relating detailed error code, use maintenance-mode function code 82. (Refer to Chapter 7, Section 7.5.20.) If this message appears, open and close the scanner unit. The message may disappear if opening/closing the scanner unit removes the error. If the error persists, the "MACHINE ERROR X X" will appear instead of this message.
SCANNER ERROR	In the scanning compensation data list printed by the maintenance-mode function code 05 (refer to Chapter 7, Section 7.5.2), fifty percent or more of the white level data is faulty. (This message may appear only in the maintenance mode)

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

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

If the LCD shows the "PLS OPEN COVER" message, you can display the detailed error code following the MACHINE ERROR, by using the maintenance-mode function code 82 described in Chapter 7, Section 7.5.20.

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

NOTE: To check sensors, use the maintenance-mode function code 32 described in Chapter 7, Section 7.5.7 (that is, press the **3** and **2** keys in the maintenance mode).

Error Code (Hex)	Error factor	Check:
25	Ink cartridges had already been loaded when the power was first applied.	Reload ink cartridges, referring to the Owner's Manual.
26	The black ink has run out.	• Ink cartridges • Ink cartridge sensor PCB • Needle tube & head flat cable ASSY • Main PCB
27	The yellow ink has run out.	
28	The cyan ink has run out.	
29	The magenta ink has run out.	
3*	Carriage travel error	• Any obstacle to the travel of the carriage in the machine? • Recording paper jammed? • Carriage ASSY • CR encoder strip (Any stains or scratches? Hooked correctly?) • Carriage motor • Main PCB • Power supply PCB • Purge unit • Engine lower frame
41	The head drive voltage has not been turned from Low to High within the specified time.	• Carriage ASSY • Main PCB • Print head unit • Power supply PCB
42	The head drive voltage has not been turned from High to Low within the specified time.	
43	Head thermistor broken.	• Print head unit • Carriage ASSY • Main PCB
44	Head thermistor short-circuited.	
45	Flushing operation abnormally ended. (The head temperature has arisen abnormally.)	• Print head unit

Error Code (Hex)	Error factor	Check:
46	The number of performed purge sequences has reached the limit.	• Ink absorber box • Driver PCB
47	Head parameters stored in the EEPROM are invalid. (This code may appear only in the maintenance mode.)	• Print head unit • Driver PCB • Power supply PCB
48	Weak connection of the head flat cables.	• Main PCB • Print head unit
4E	Out of the allowable range of the head drive voltage designed for individual print head properties. (This code may appear only in the maintenance mode.)	• Main PCB • Driver PCB • Print head unit
50	The purge cam HP switch does not come ON even after the purge cam has been driven by the specified number of pulses.	• Purge unit • Engine lower frame • Paper feed motor • Main PCB
51	The purge cam HP switch does not go OFF even after the purge cam has been driven by the specified number of pulses.	
52	The purge cam HP switch does not detect the origin point.	
54	The air pump motor does not rotate.	• Air pump & motor module • Driver PCB
55	The air pump motor rotates abnormally. (This code may appear only in the maintenance mode.)	
60	Paper width sensor (media sensor) error.	• Replace the needle tube & head flat cable ASSY
61		
62		
63		
7E	No head parameters stored in the EEPROM. (This code may appear only in the maintenance mode.)	• Print head unit • Driver PCB • Main PCB
80	At the start of recording operation, the controller detects that paper is smaller than A4 size in length or width.	• Paper width sensor • Paper size
83	Recording paper jam. (At the retry of paper pulling-in operation, the registration sensor is not OFF.)	• Registration sensor actuator • Main PCB

Error Code (Hex)	Error factor	Check:
84	Recording paper jam. (The paper width sensor and/or registration sensor has detected a paper jam.)	• Registration sensor actuator • If the paper width sensor is defective, replace the needle tube & head flat cable ASSY. • Main PCB
88	Recording paper jam. (Even after paper pulling-in operation, the registration sensor is still OFF.)	
8A	The paper feed motor does not rotate.	• Paper feed motor • PF encoder sensor • Driver PCB • Main PCB
8B	The paper feed motor stops suddenly.	
8D	The paper feed motor rotates in the reverse direction.	
8E	Max. speed error in the paper feed motor.	
A1	Scanner unit or ink slot cover opened.	• Scanner open sensor actuator • Ink slot cover open sensor actuator • Control panel PCB
A4	50% or more faulty of white level data.	• CIS unit • Driver PCB • Main PCB
AC	Less than 50% faulty of white level data.	• CIS unit • Driver PCB • Main PCB
AF	CIS positioning error.	• CIS unit • CIS flat cable • Driver PCB • Main PCB
B1	Dark level offset data level error for scanning.	• CIS unit • Main PCB
B2	Gain control data level error for scanning.	
B3	Scan area left edge detection error.	• CIS unit • Main PCB • Black markings on the white-level reference film inside the scanner top cover
B4	Scan area right edge detection error.	
B5	Horizontal scanning edge reduction detection error in scanning area setting	
B6	Horizontal scanning edge enlargement detection error in scanning area setting	

Error Code (Hex)	Error factor	Check:
BB	White level data error.	• CIS unit • CIS flat cable • Driver PCB
BD	Black level data error.	• CIS unit • Main PCB
BE	Scan starting edge detection error.	• CIS unit • CIS flat cable • Driver PCB • Black markings on the white-level reference film inside the scanner top cover
D*	Modem error.	• Main PCB
E4	Out of recording paper.	• ASF • Registration sensor actuator • Main PCB
E6	Write error in EEPROM.	• Driver PCB
E8	Data scanning error during transmission.	• CIS unit • Main PCB
EA	Document removed at phase B.	
F3 F5	Internal software error.	• Replace the main PCB if this error occurs frequently.
F6	PC interface error.	• Interface cable • Main PCB
F7	Media module connection error.	• Main PCB • Media module
F8	Backup battery not loaded correctly. (For the MFC4820C.)	• Reinsert the battery connector. • Replace the battery.
F9	Weak connection of media flat cables.	• Media flat cables • Media PCB
FF	Memory management error.	• Replace the main PCB if this error occurs frequently.

8.1.2 Communications Errors

If a communications error occurs, the facsimile equipment

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

② displays the corresponding error message, and

③ prints out the transmission verification report if the equipment is in sending operation.

■ Definition of Error Codes on the Communications List

(1) Calling

Code 1	Code 2	Causes
10	08	Telephone number of the remote station deleted before calling.
11	01	No dial tone detected before start of dialing.
11	02	Busy tone detected before dialing.
11	03	2nd dial tone not detected.
11	05	No loop current detected.*
11	06	Busy tone detected after dialing or called.
11	07	No response from the remote station in sending.
11	10	After dialing, continuous tone detected, meaning that the telephone number was invalid.
17	07	No response from the calling station in receiving.

*Available in German versions only.

(2) Command reception

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

(3) Compatibility [checking the NSF and DIS]

Code 1	Code 2	Causes
32	01	Remote terminal only with V.29 capability in 2400 or 4800 bps transmission.
32	02	Remote terminal not ready for polling.
32	18	Remote terminal not equipped with color function.

(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	17	Invalid resolution selected.
40	20	Invalid full-color mode requested.

(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) DCN reception

Code 1	Code 2	Causes
74		DCN received.

(7) TCF transmission/reception

Code 1	Code 2	Causes
80	01	Fallback impossible.

(8) Signal isolation

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

(9) Video signal reception

Code 1	Code 2	Causes
A0	03	Error correction sequence not terminated even at the final transmission speed for fallback.
A0	11	Receive buffer empty. (5-second time-out)
A0	12	Receive buffer full during operation except receiving into memory.
A0	13	Decoding error continued on 500 lines.
A0	14	Decoding error continued for 10 seconds.
A0	15	Time-out: 5 seconds or more for one-line transmission.
A0	16	RTC not found and carrier OFF signal detected for 6 seconds.
A0	17	RTC found but no command detected for 60 seconds.
A0	18	Receive buffer full during receiving into memory.
A0	19	No video data to be sent
A0	20	Unable to continue to receive color FAX (Remaining ink insufficient)
A8	01	RTN, PIN, or ERR received at the calling terminal.*
A9	01	RTN, PIN, or ERR received at the called terminal.*

* Available in German versions only

(10) General communications-related

Code 1	Code 2	Causes
B0	02	Unable to receive the next-page data.
B0	04	PC interface error.
BF	01	Transmission canceled with the **Stop/Exit** key before the communication link is established.
BF	02	Transmission canceled with the **Stop/Exit** key after the communication link is established.

(11) 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.

(12) Equipment error

Code 1	Code 2	Causes
FF	X X	Equipment error (For X X, refer to Section 8.1.1 [2].)

8.2 TROUBLESHOOTING

8.2.1 Introduction

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

8.2.2 Precautions

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

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

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

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

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

8.2.3 Checking prior to Troubleshooting

Prior to proceeding to the troubleshooting procedures given in Section 8.2.4, make the following initial checks:

Environmental conditions

Check that:

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

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

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

Power requirements

Check that:

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

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

(3) All cables and harnesses are firmly connected.

(4) None of the fuses are blown.

Recording paper

Check that:

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

(2) The recording paper is not dampened.

Ink cartridges

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

Print head

(1) Check that the print head is installed on the carriage correctly.

(2) Repeat the head purging operation several times.

(3) Clean the print surface of the print head unit. (Refer to page 8-22.)

8.2.4 Troubleshooting Procedures

[1] Control panel related

Trouble	Check:
(1) LCD shows nothing.	• Panel-main harness • Control panel PCB • Power supply PCB • Main PCB
(2) Control panel inoperative.	• Panel-main harness • Control panel PCB • Main PCB

[2] Telephone related

Trouble	Check:
(1) No phone call can be made.	• Control panel PCB • NCU PCB • Main PCB
(2) Speed dialing or one-touch dialing will not work.	• Ordinary dialing function (other than the speed and one-touch dialing) If it works normally, check the driver PCB; if not, refer to item (1) above.
(3) Dial does not switch between tone and pulse.	• Main PCB
(4) Telephone does not ring.	• Speaker • NCU PCB • Main PCB

[3] Communications related

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

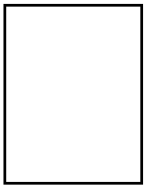
[4] Paper feeding related

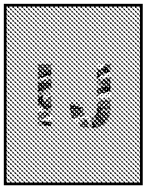
Trouble	Check:
(1) Recording paper not fed.	• ASF- and PF-related gears • Main PCB • Driver PCB
(2) Recording paper jam	• Paper feeding mechanism • Check that the print head unit is installed to the carriage correctly.

[5] Print-image related

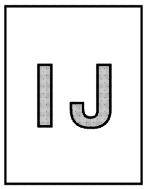
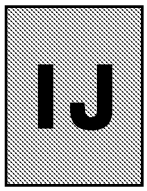
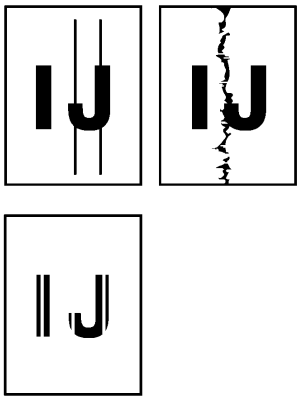
If the received or sent image has any problem, first make a copy with the facsimile equipment.

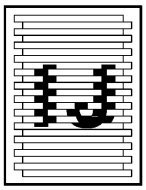
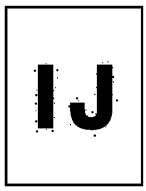
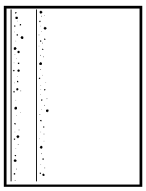
If the copied image is normal, the problem may be due to the remote terminal; if it is abnormal, proceed to the following checks:

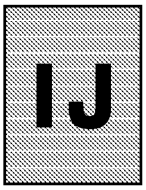
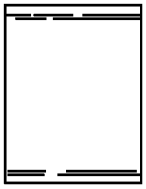
<table>
<tr><th>Trouble</th><th>Action to be taken</th></tr>
<tr><td>(1) Completely blank
  </td><td rowspan="2"><u>At the scanner</u>
Check the following components:
- CIS flat cable
- Main PCB
- CIS unit

<u>At the printer</u>
• Check the ink cartridges. If any cartridges have run out of ink, replace them.
• Check the connection of the head flat cables on the main PCB and print head PCB.
• Replace the needle tube & head flat cable ASSY.
• Replace the main PCB.
• Clean the head caps and wiper of the purge unit with a Rubycel stick. For the cleaning procedure, refer to "Cleaning the purge unit" given on page 8-22.</td></tr>
<tr><td>(2) Random color
  </td></tr>
<tr><td>(3) All black
  </td><td><u>At the scanner</u>
Check the following components:
- CIS flat cable
- CIS unit
- Main PCB

<u>At the printer</u>
Check the following components:
- Print head unit
- Main PCB
- Carriage ASSY</td></tr>
</table>

Trouble	Action to be taken
(4) Light 	At the scanner Check the following components: - CIS unit - Main PCB At the printer Check the following components: - Ink cartridges - Print head unit - Main PCB - Power supply PCB - Print head parameters stored in the EEPROM on the driver PCB (Refer to Chapter 7, Section 7.5.15 "Updating of Property Data.")
(5) Dark 	At the scanner Check the following components: - CIS unit - Main PCB At the printer side • For each of the four ink colors, perform the head purging operation several times to remove dust or air bubbles from its nozzles. If the problem persists, replace the print head unit. • Check the paper feed-related rollers. • Replace the main PCB and power supply PCB.
(6) Black or blurred vertical stripes 	At the scanner Check the following components: - CIS unit - Scanner glass At the printer side • Check whether paper is in abnormal contact with any other components during ejecting. • Check the CR encoder strip for stains or scratches. (If the CR encoder strip is not hooked properly, correct it.)

Trouble	Action to be taken
(7) Print edges not aligned 	<u>At the printer</u> • Check the alignment of vertical print lines in monochrome and in two colors and the head skew, by using the maintenance-mode function code 65. (Refer to Chapter 7, Section 7.5.13). • Check the print head unit. • Check the CR encoder strip for stains or scratches. (If the CR encoder strip is not hooked properly, correct it.) • If you replace the print head unit, make the necessary adjustments. (Refer to Chapter 6, Section 6.1.2.)
(8) Ink splash  	<u>At the printer</u> • For each of the four ink colors, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Check the ink cartridges. If any of them has run out of ink or the ink viscosity has been increased, replace it. • Replace the print head unit. • Replace the main PCB. • Replace the power supply PCB. • Check that the print head unit is installed to the carriage correctly.
(9) Random missing dots 	<u>At the printer</u> • For each of the four ink colors, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Check the ink cartridges. If any cartridges have run out of ink, replace them. • Replace the print head unit. (If the problem persists, replace the carriage ASSY.) • Check the connection of the head flat cables on the main PCB and print head PCB. (If either of the head flat cables is broken or damaged, replace the needle tube & head flat cable ASSY.) • Replace the main PCB. • Clean the head caps and wiper of the purge unit with a Rubycel stick. For the cleaning procedure, refer to "Cleaning the purge unit" given on page 8-22.

Trouble	Action to be taken
(10) White horizontal streaks  	• For each of the four ink colors, perform the head purging operation several times to remove dust or air bubbles from its nozzles. • Replace the print head unit. • Check the paper feed-related rollers. • Clean the head caps and wiper of the purge unit with a Rubycel stick. For the cleaning procedure, refer to "Cleaning the purge unit" given on page 8-22.
(11) Stained leading edge of recording paper 	At the printer • Clean the nozzle ends of the ink-jet units. • Check that the print head unit is installed to the carriage correctly.

[6] PC-driven printing

Trouble	Action to be taken
(1) PC-driven printing is impossible.	• Interface with the host computer • Main PCB • USB interface

[7] SmartMedia, Compact Flash, or Memory Stick driven printing

Trouble	Action to be taken
(1) No image data can be read.	• Insertion direction of SmartMedia, Compact Flash, or Memory Stick card - Insert a SmartMedia or Memory Stick card with the cutout corner leading and facing up. - Insert a Compact Flash card with the label side facing towards the left. • SmartMedia, Compact Flash, or Memory Stick - Formatted? - Any data in the media? - Images stored in the media are in EXIF2.0-compliant JPEG file format (having extension .JPG)? • Media PCB • Media flat cables • Main PCB
(2) More than one media card cannot be recognized.	• The machine can recognize only a single media card at a time even if it has two cards in the two slots. Only the first inserted one can be recognized. If only a single media card is inserted, refer to item (1) above.
(3) Media printing is impossible.	• Check whether the memory is full.
(4) No Memory Stick can be recognized.	• Check whether you inserted a Memory Stick pro card that cannot be used in this machine.

[8] Others

Trouble	Action to be taken
(1) When the power is turned on (when the power cord is plugged into an outlet), the scanner makes a grating noise.	Check the following components: - CIS flat cable - CIS unit - Main PCB

Cleaning the purge unit

(1) Unplug the machine's power cord from the wall socket.

(2) Plug the power cord again. When you hear the carriage moving out of the home position for initialization, then unplug the power cord again. The carriage will stop at the middle of the rail.

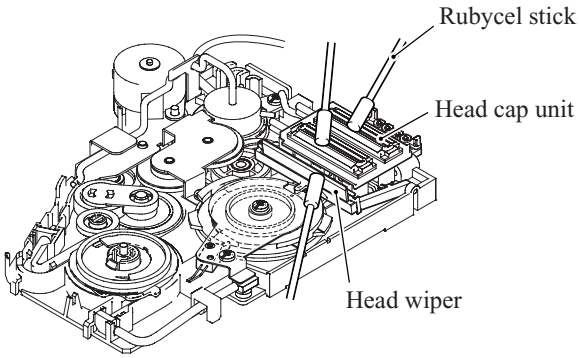
(3) Open the scanner unit.

(4) Clean the two head caps and wiper of the purge unit with a "Rubycel" stick that is a head cleaner stick provided as a spare part.

NOTE: Do not use a cotton swab that may leave lint on the cleaned sections. Lint left on the purge unit will affect the print performance.

NOTE: Use a new Rubycel stick and do not use the used one for any other purge units.

NOTE: During the cleaning jobs, take care not to touch the head caps or wiper directly by hand or scratch their surfaces. Do not remove them from the head cap holder.



Cleaning the print head unit

(1) Remove the print head unit from the carriage. (Refer to Chapter 6, Sections 6.1.1 and 6.1.2.)

(2) Soak a Rubycel stick in "Glycerol cleaner."

(3) Clean the printing surface of the print head unit by rolling the Rubycel stick lightly on the printing surface.

NOTE: Do not use a cotton swab that may leave lint on the cleaned sections. Lint left on the purge unit will affect the print performance.

NOTE: Use a new Rubycel stick and do not use the used one for any other print heads.

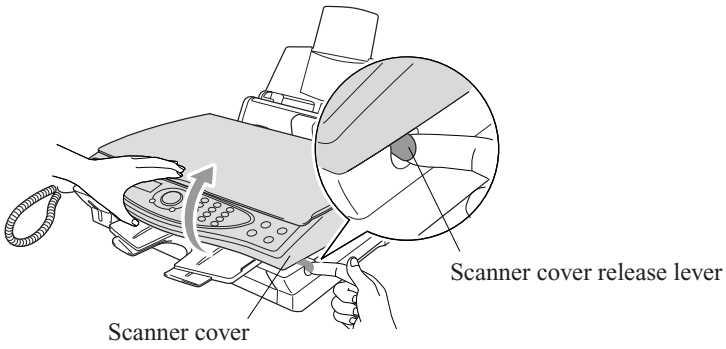
NOTE: During the cleaning jobs, take care not to scratch the surface of the print head.

8.3 JAMS

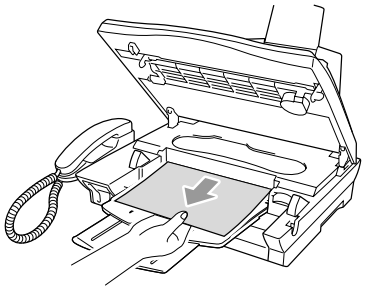
Remove the jammed paper depending on where it is jammed in the machine.

8.3.1 Paper is Jammed inside the Machine

(1) Open the scanner cover by releasing the scanner cover release lever and lifting the scanner cover.

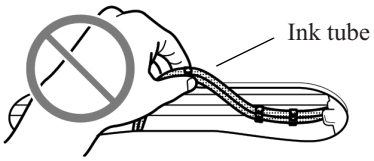


(2) Remove the jammed paper.



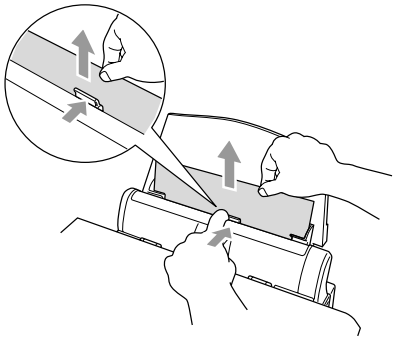
(3) Close the scanner cover.

⃠ Do not touch the ink tube because it can cause damage to the machine itself.



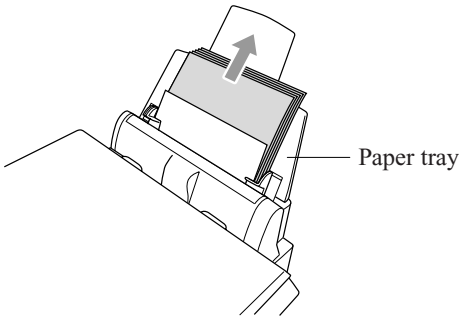
8.3.2 Paper is Jammed in the Paper Tray

(1) Push the lever as shown below, and remove the jammed paper.

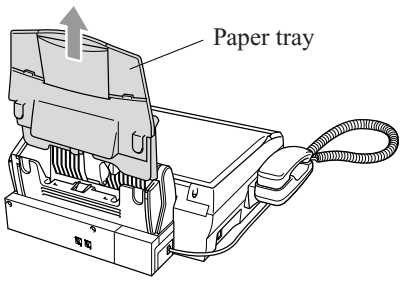


8.3.3 Paper is Jammed inside the Paper Tray

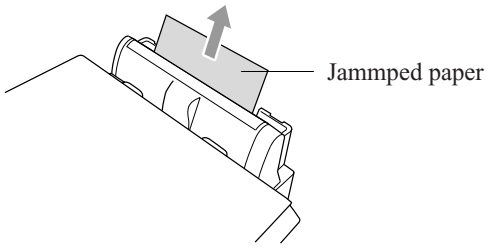
(1) Remove any paper from the paper tray that is not jammed.



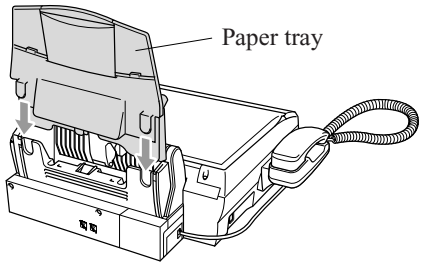
(2) Pull the paper tray out of the machine.



(3) Pull up the jammed paper to remove it.



(4) Reinstall the paper tray.



MFC4820C/MFC4420C

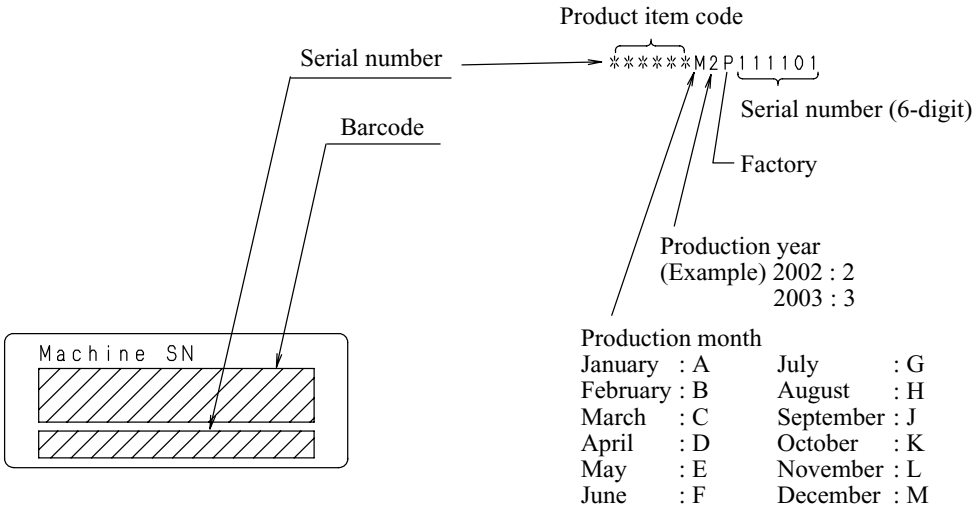
Appendix 1. Serial No. Descriptions

SERIAL NO. DESCRIPTIONS

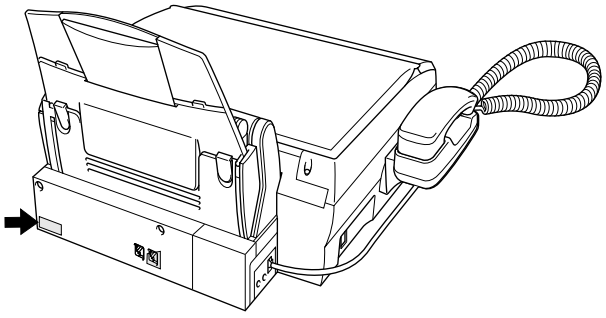
The machine has a serial number label for the machine itself and four property labels for the print head unit, air pump & motor module, paper feed roller and paper ejection roller.

This section gives coding information of those serial numbers and property codes.

(1) Serial number label for the machine itself

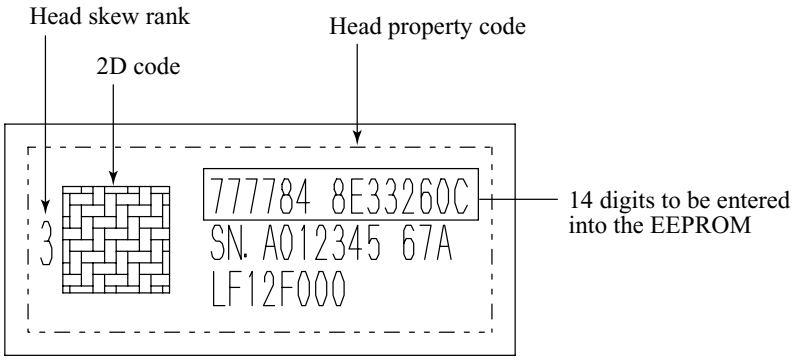


Location

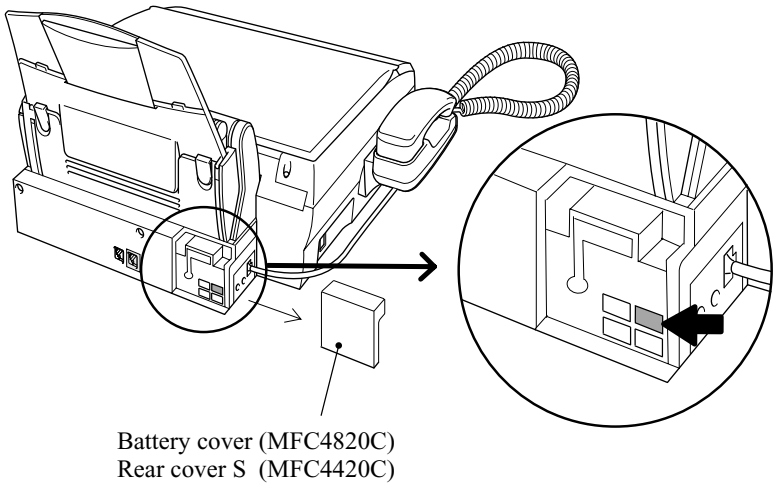


(2) Property labels

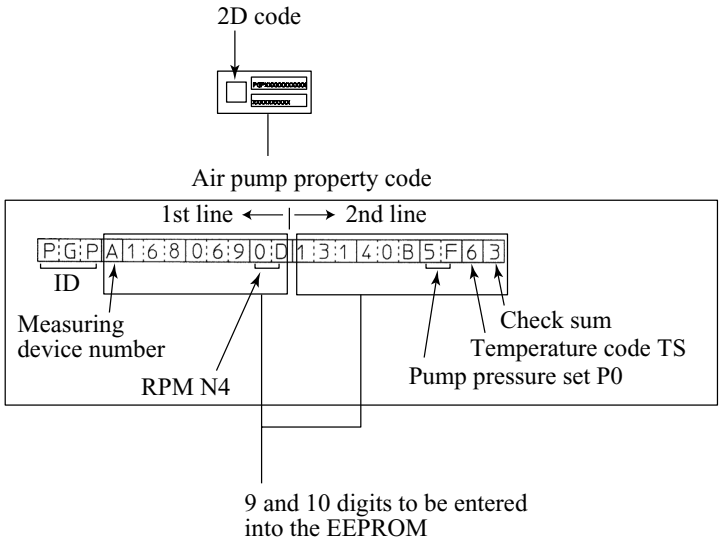
■ Property label for the print head unit



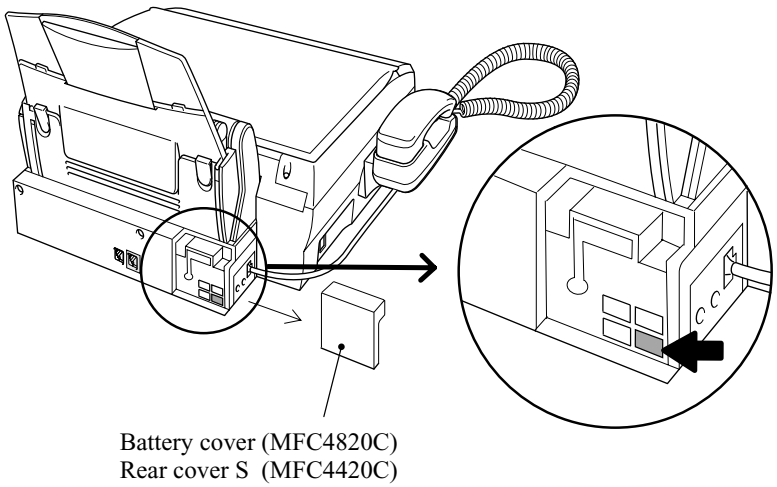
Location



■ Property label for the air pump & motor module



Location



MFC4820C/MFC4420C

Appendix 2. Software Installation

A2.1 Installing the Update Data to the Facsimile Machine

If you want to update the current program stored in the flash ROM of the main PCB to the newer version or after you replace the main PCB, install the update program onto the flash ROM.

The program installation requires a PC/AT-compatible computer equipped with USB interface and running USB-support OS.

Please check the printer driver of MFC4420C or MFC4820C is installed in a host computer before working. When not installed, please install a printer driver in a host computer before working.

Installing the update data to the flash ROM of the facsimile machine

(1) Make sure that your PC is turned off.

(2) Make sure that the power cord of the facsimile machine is unplugged from a wall socket.

(3) While holding down the **5** key on the control panel of the facsimile machine, plug the power cord into a wall socket.

(4) Check to see that the following pattern appears on the LCD. If it does not appear, go back to step (2) above.

(5) Switch on your PC.

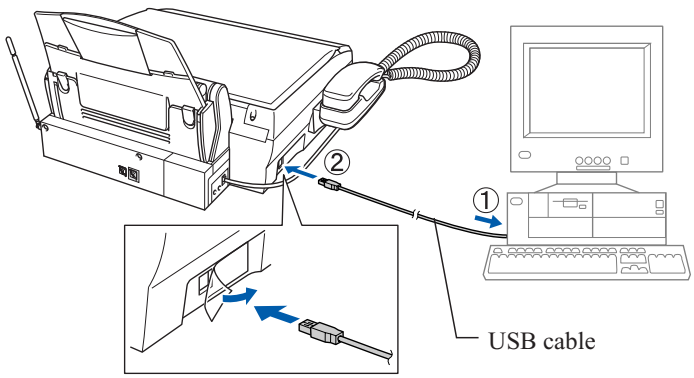
(6) Install the Downloader driver (Usb_bootloader_W2K for Window 2000/XP and Usb_bootloader_W98 for Windows 98/Me) and firmware (FILEDG32.EXE) from the Notes to an arbitrary folder in your PC.

NOTE: Once the driver has been downloaded to your PC, the PC requires no driver installation.

For details on the installation procedure, refer to the following pages.

(7) Connect the USB cable to the USB interface port on the left side of the facsimile machine.

(8) Connect the other end of the USB cable to the USB port of your PC.

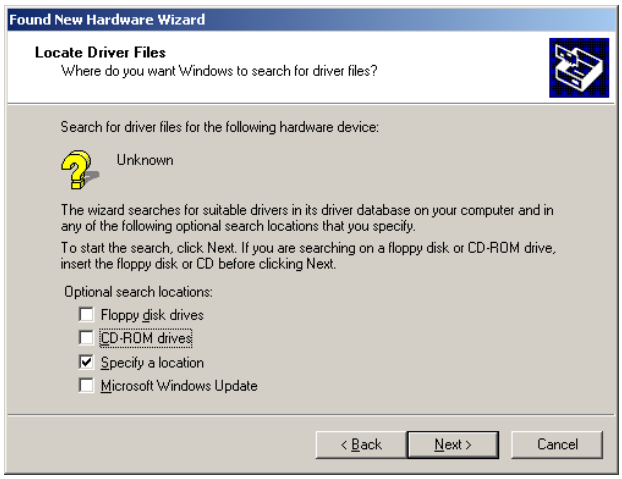


■ **Installing the Downloader driver**

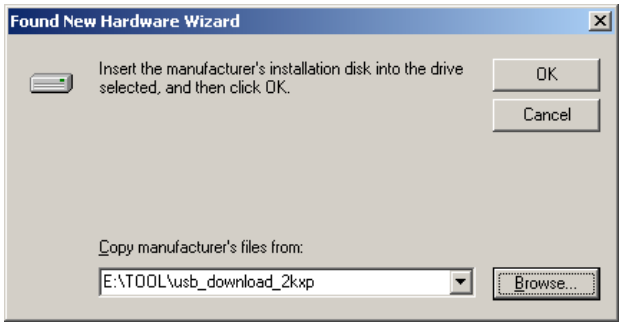
(This procedure is not necessary if you have once downloaded the driver to your PC.)

Click **Next**.

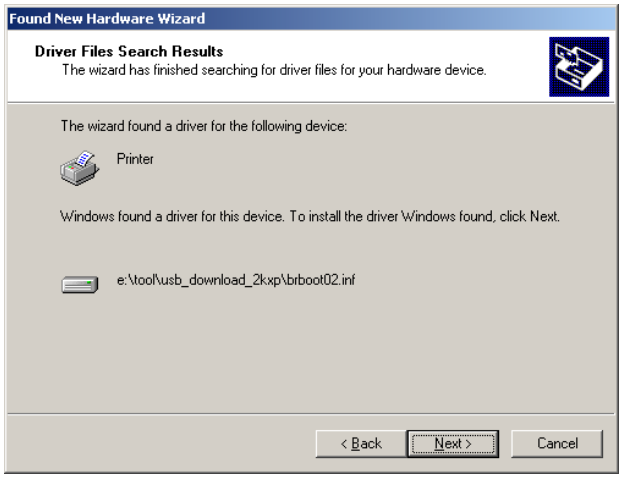
Select "Search for a suitable driver for my device (recommended)" and click **Next**.



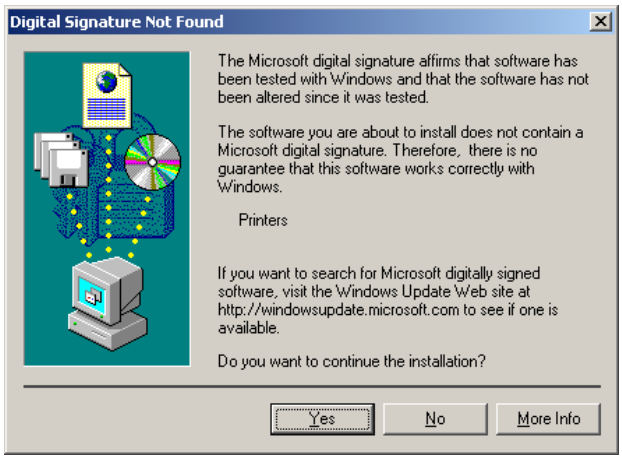
Select "Specify a location" and click **Next**.



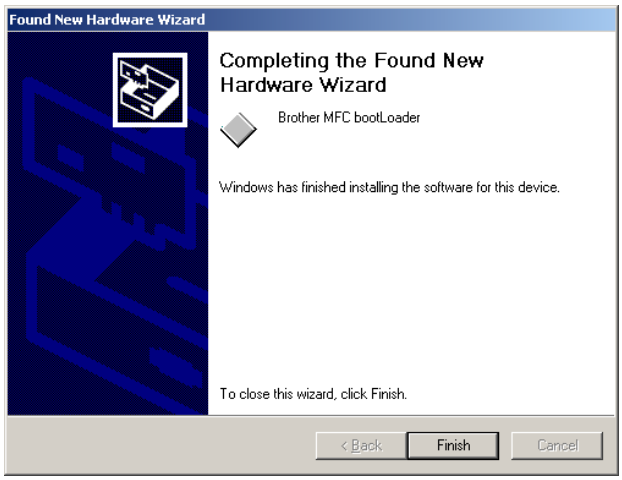
Select the folder where the Downloader driver is located, then click **OK**.



Click **Next**.



Click **Yes**.



Click **Finish** to return to Windows.

■ Downloading firmware

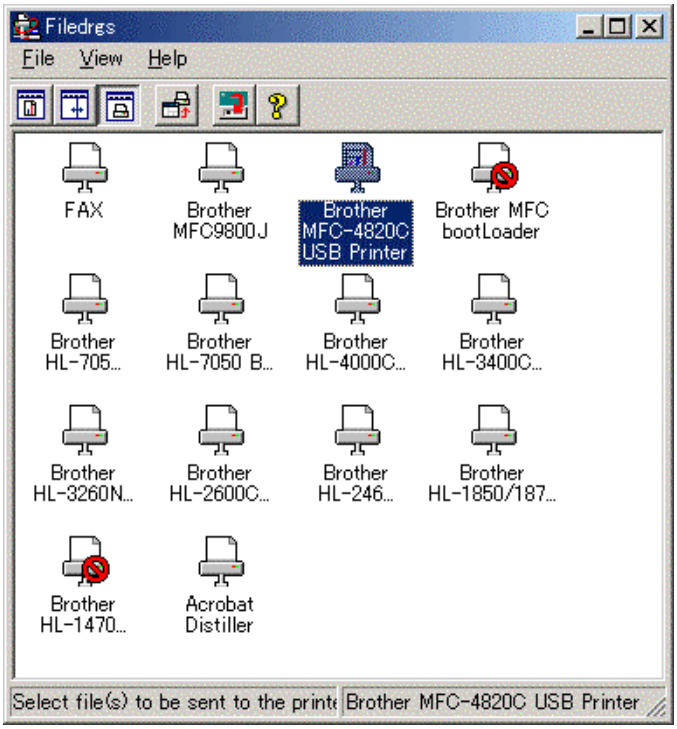
After the installation procedure of the Downloader driver, proceed to the firmware download.

If the driver has been installed so that you start from downloading firmware, turn off the facsimile machine and then turn it on while holding down the **5** key. (The machine should show the black and white pattern on the LCD.)

NOTE: Never unplug the power cables of the facsimile machine and your PC or the USB cable during downloading.

(1) Run "Filedg32.exe."

The Filedrgs window will appear as shown below.



(2) Drag and drop the firmware (e.g., LZ0023_T.upd) onto the "Brother MFC-4820C USB Printer" icon in the Filedrgs window.

NOTE: Use the de-compressed firmware file. The compressed file is in auto de-compression format, so run the EXE file to de-compress.

During downloading, the machine sounds pip-pip *intermittently*. It will take approx. 2 to 5 minutes to complete downloading.

Upon completion of the downloading, the facsimile machine automatically reboots and returns to the standby state.

(3) Press the * and # keys at the same time when the machine is on standby. The firmware version appears on the LCD.

In this example, if "T0211252244:457C" appears, it means that the downloading has been successfully finished.

(4) If downloading finishes abnormally, turn the facsimile machine off and on. The machine automatically enters the download mode and issues large pip-pip sound. Perform the downloading procedure above again.

A2.2 Setting ID Codes to Facsimile Machines

Brother facsimile machines are assigned unique ID codes (character strings) at the factory. If you replace the driver PCB of the machine, the machine will lose its assigned ID code so that it will not be identified by the connected PC*.

You need to assign a unique ID code (character string) to the machine according to the procedure given here. For models covered by this manual, set serial numbers given to individual machines as ID codes.

Please check the printer driver of MFC4420C or MFC4820C is installed in a host computer before working. When not installed, please install a printer driver in a host computer before working.

(*ID codes are essential when more than one machine is connected to a single PC via USB.)

Setting up the facsimile machine and your PC

(1) Make sure that your PC is turned off.

(2) Make sure that the power cord of the facsimile machine is unplugged from a wall socket.

(3) While holding down the **Menu/Set** key on the machine's control panel, plug the power cord of the facsimile machine into a wall socket.

(4) Turn on your PC.

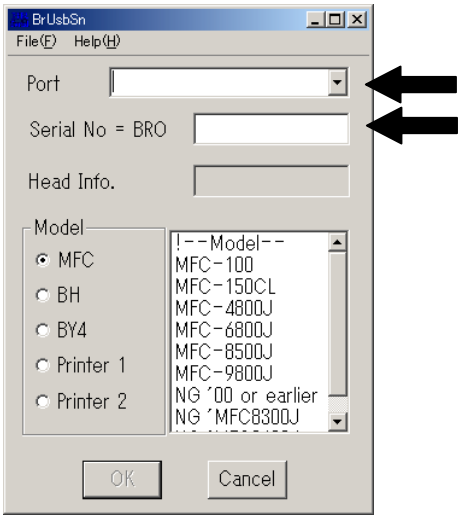
(5) Install the Downloader driver according to the same procedure as given in Appendix A2.1. (If the Downloader driver has been installed, skip this step.)

(6) Connect the USB cable to the USB interface port on the left side of the facsimile machine.

(7) Connect the other end of the USB cable to the USB port of your PC.

Running the setup utility

(1) On your PC, run the ID setup utility (BRUSBSN.EXE). The following window will appear.



(2) On the **Model** menu, click **MFC**.

In **Port**, make sure that the USB port of the driver is selected.

When not select, please click button and select the USB port of MFC4420C or MFC4820C.

In the **Serial No = BRO** box, type the 9-digit serial number (e.g., M2J012345) printed on the nameplate labeled to the rear side of the facsimile machine as an ID code. Then press the **Enter** key.

The setup utility will transmit the ID code data from your PC to the facsimile machine and then it will terminate.

The facsimile machine will automatically return to the standby mode.

(3) To check whether the entered character string (ID code) is correct, make the machine enter the maintenance mode (refer to Chapter 7, Section 7.2) and then press the **1** key twice (Section 7.5.4).

The facsimile machine will print out a Configuration List. At the right top of the list, "SER.#: BROXXXXXXXXX" is printed.

(4) Check that the character string entered in step (2) is printed in "XXXXXXXXX."

If it is OK, press the **9** key twice to exit from the maintenance mode.

If something other than that is printed in XXXXXXXXX, check the connection between the PC and facsimile machine and go back to step (1).

MFC4820C/MFC4420C

Appendix 3. EEPROM Customizing Codes

EEPROM CUSTOMIZING CODES

This function allows you to customize the EEPROM according to language, function settings, and firmware switch settings.

■ Operating Procedure

|← Within 2 seconds →|

(1) Press the **Menu**, *****, **2**, **8**, **6**, and **4** keys in this order to make the facsimile equipment enter the maintenance mode.

The equipment beeps for approx. one second and displays "▮▮ MAINTENANCE ▮▮▮" on the LCD.

(2) Press the **7** and **4** keys in this order in the initial stage of the maintenance mode.

The current customizing code (e.g., 1102 in the case of MFC4820C U.S.A. version) appears.

(3) Enter the desired customizing code (e.g., 0002 in the case of MFC4420C Canadian version).

NOTE: To enter letters "A" through "F," press the **1** through **6** keys while holding down the **#** key, respectively.

The newly entered code appears.

NOTE: *If a wrong 4-digit code is entered, the equipment will malfunction.*

(4) Press the **Fax Start** key.

The equipment saves the setting and returns to the initial stage of the maintenance mode.

If you press the **Stop** key or no keys are pressed for one minute in the above procedure, the equipment stops the procedure and returns to the initial stage of the maintenance mode.

■ EEPROM Customizing Codes List

Versions	Model		
	MFC4820C	MFC4420C	DCP4020C
U.S.A.	1102	1001	---
CANADA	0102	0002	---
GERMANY	0103	---	0003
U.K.	0104	---	0004
FRANCE	0105	---	0005
BELGIUM	0108	---	0008
NETHERLANDS	0109	---	0009
SWITZERLAND	0110	---	0010
AUSTRIA	0103	---	---
ITALY	0116	---	0016
ASIA	---	---	0004
GENERAL	0154	---	0054
PAN NORDIC	0157	---	0057
IBERIA	0115	---	0015

MFC4820C/MFC4420C

Appendix 4. Firmware Switches (WSW)

WSW No.	Function	Reference Page
WSW01	Dial pulse setting	App. 4-2
WSW02	Tone signal setting	App. 4-3
WSW03	PABX mode setting	App. 4-4
WSW04	TRANSFER facility setting	App. 4-5
WSW05	1st dial tone and busy tone detection	App. 4-6
WSW06	**Pause** key setting and 2nd dial tone detection	App. 4-8
WSW07	Dial tone setting 1	App. 4-10
WSW08	Dial tone setting 2	App. 4-11
WSW09	Protocol definition 1	App. 4-12
WSW10	Protocol definition 2	App. 4-13
WSW11	Busy tone setting	App. 4-14
WSW12	Signal detection condition setting	App. 4-15
WSW13	Modem setting	App. 4-16
WSW14	AUTO ANS facility setting	App. 4-17
WSW15	REDIAL facility setting	App. 4-18
WSW16	Function setting 1	App. 4-19
WSW17	Function setting 2	App. 4-20
WSW18	Function setting 3	App. 4-21
WSW19	Transmission speed setting	App. 4-22
WSW20	Overseas communications mode setting	App. 4-23
WSW21	TAD setting 1	App. 4-24
WSW22	ECM and copy resolution setting	App. 4-25
WSW23	Communications setting	App. 4-26
WSW24	TAD setting 2	App. 4-27
WSW25	TAD setting 3	App. 4-27
WSW26	Function setting 4	App. 4-28
WSW27	Function setting 5	App. 4-29
WSW28	Function setting 6	App. 4-30
WSW29	Function setting 7	App. 4-31
WSW30	Function setting 8	App. 4-31
WSW31	Function setting 9	App. 4-32
WSW32	Function setting 10	App. 4-33
WSW33	Function setting 11	App. 4-34
WSW34	Function setting 12	App. 4-35
WSW35	Function setting 13	App. 4-35
WSW36	Function setting 14	App. 4-36
WSW37	Function setting 15	App. 4-37
WSW38	Not used.	App. 4-37
WSW39	Not used.	App. 4-37
WSW40	Not used.	App. 4-37
WSW41	Not used.	App. 4-37
WSW42	Not used.	App. 4-37
WSW43	Function setting 21	App. 4-38
WSW44	Speeding up scanning-1	App. 4-38
WSW45	Not used.	App. 4-39
WSW46	Not used.	App. 4-39
WSW47	Paper handling for a feed error and delay of FAX line disconnection	App. 4-39
WSW48	Not used.	App. 4-40
WSW49	Not used.	App. 4-40
WSW50	Not used.	App. 4-40

WSW01 (Dial pulse setting)

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

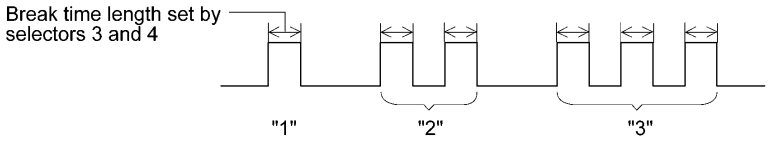
- **Selectors 1 and 2: Dial pulse generation mode**

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

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

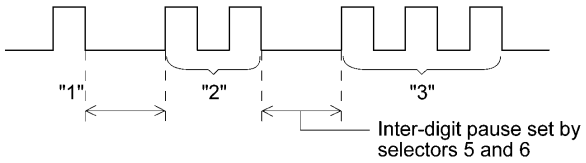
- **Selectors 3 and 4: Break time length in pulse dialing**

  These selectors set the break time length in pulse dialing.
  (Example: If "1," "2," and "3" are dialed 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 dialed when N is set by selectors 1 and 2.)



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

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

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

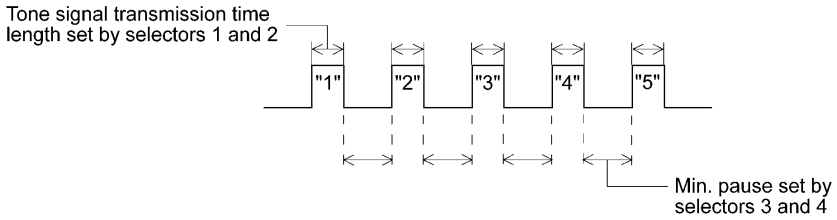
  This selector sets the default dialing mode (pulse dialing or tone dialing) which may be changed by the function switch. If the user switches it with the function switch when selector 7 is set to "0," the setting specified by this selector will also be switched automatically.

WSW02 (Tone signal setting)

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



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

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

  The larger the value specified by these selectors, the greater the attenuation.

  In Japan, only the setting exceeding 9 dB takes effect.

WSW03 (PABX* mode setting)

Selector No.	Function	Setting and Specifications
1	CNG detection when sharing a modular wall socket with a telephone	0: A 1: B
2 | 4	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	CNG detection when sharing a modular wall socket with a telephone	0: A 1: B
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	Not used.	

* PABX: Private automatic branch exchange

NOTE: Selectors 2 through 4, 6 and 7 are not applicable where no PABX is installed.

- **Selectors 1 and 5: CNG detection when sharing a modular wall socket with a telephone**

  These selectors determine whether or not the equipment detects a CNG signal when a line is connected to a telephone sharing a modular wall socket with the equipment. Upon detection of CNG signals by the number of cycles specified by these selectors, the equipment interprets CNG as an effective signal and then starts FAX reception.

Selector No. 1	Selector No. 5	Cycle
0 (A)	0 (A)	0.5 cycle
0 (A)	1 (B)	1.0 cycle
1 (B)	0 (A)	1.5 cycles
1 (B)	1 (B)	2.0 cycles

- **Selectors 2 through 4: 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 to 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.

WSW04 (TRANSFER facility setting)

Selector No.	Function	Setting and Specifications
1	Earth function in transfer facility	0: Provided 1: Not provided
2 | 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 : 500 ms

NOTE: Selectors 1 and 5 through 8 are not applicable in those countries where no transfer facility is supported.

- **Selector 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 length of the telephone line (La or Lb) to ground.

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

  These selectors set the break time length.

WSW05 (1st dial tone and busy tone detection)

Selector No.	Function	Setting and Specifications
1 | 3	1st dial tone detection	No. 1 2 3 0 0 0 : 3.5 sec. WAIT 0 0 1 : 7.0 sec. WAIT 0 1 0 : 10.5 sec. WAIT 0 1 1 : 14.0 sec. WAIT 1 0 0 : 17.5 sec. WAIT 1 0 1 : 21.0 sec. WAIT 1 1 0 : 24.5 sec. WAIT 1 1 1 : Detection (Without WAIT)
4	Max. pause time allowable for remote ID code detection	0 : 2 seconds 1: 1 second
5 6	Busy tone detection in automatic sending mode	No. 5 6 0 0 : No detection 0 1 : Detection only after dialing 1 0 : No detection 1 1 : Detection before and after dialing
7	Busy tone detection in automatic receiving mode	0 : Yes 1: No
8	Not used.	

NOTE: Selectors 5 through 7 are not applicable in those countries where no busy tone detection is supported.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Selector No.	Function	Setting and Specifications
1 | 3	**Pause** key setting and 2nd dial tone detection	No. 1 2 3 0 0 0 : No pause 0 0 1 : 3.5 sec. WAIT 0 1 0 : 7 sec. WAIT 0 1 1 : 10.5 sec. WAIT 1 0 0 : 14 sec. WAIT 1 1 0 : 2nd dial tone detection only in pulse dialing (DP) system 1 0 1 : 1 1 1 : } 2nd dial tone detection both in DP and push-button (PB) dialing system
4 | 6	Detection of 2nd dial 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 2nd dial tone detection cycles	0: 1 cycle 1: 2 cycles
8	Allowable instantaneous interrupt during reception of 2nd dial tone	0: 30 ms 1: 50 ms

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

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

Selectors 1	2	3	
0	0	0	No WAIT is inserted even if the **Pause** key is pressed.
0	0	1	If you press the **Pause** key during dialing, the facsimile equipment will insert WAIT as defined in the above table. If the **Pause** key is pressed repeatedly, the equipment inserts the specified WAIT multiplied by the number of depressions. It applies also in hook-up dialing.
0	1	0	
0	1	1	
1	0	0	
1	0	1	When these selectors are set to "1, 0, 1": Each time you press the **Pause** key in dialing, the equipment will wait for the 2nd dial tone to be sent via the communications line regardless of pulse dialing or tone dialing. When these selectors are set to "1, 1, 0": If you press the **Pause** key in pulse dialing, the equipment will first wait for the 2nd dial tone to be sent via the communications line. After that, pressing the **Pause** key will cause the equipment to insert a WAIT of 3.5 seconds. In tone dialing, the equipment will insert a WAIT of 3.5 seconds. When these selectors are set to "1, 1, 1": If you press the **Pause** key, the equipment will first wait for the 2nd dial tone to be sent via the communications line regardless of pulse dialing or tone dialing. After that, pressing the **Pause** key will cause the equipment to insert a WAIT of 3.5 seconds. (In those countries where no dial tone detection function is supported, setting these selectors to "1, 0, 1," "1, 1, 0," or "1, 1, 1" inserts a WAIT of 3.5 seconds.)
1	1	0	
1	1	1	

- **Selectors 4 through 6: Detection of 2nd dial 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 101, 110, or 111).

  This function does not apply in those countries where no dial tone detection function is supported.

- **Selector 7: No. of 2nd dial tone detection cycles**

  This selector sets the number of dial tone detection cycles required for starting dialing.

- **Selector 8: Allowable instantaneous interrupt during reception of 2nd dial tone**

  This selector sets the allowable instantaneous interrupt period that should be ignored during reception of the 2nd dial tone.

WSW07 (Dial tone setting 1)

Selector No.	Function	Setting and Specifications
1 2	Dial tone frequency band control	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 | 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	Allowable instantaneous interrupt during reception of 1st dial tone	0: 30 ms 1: 50 ms
8	Not used.	

NOTE: Selectors 1, 2, 4 through 7 are not applicable in those countries where no dial tone or line current detection is supported, e.g., U.S.A.

NOTE: Selector 3 is not applicable to those models having no loop current detection function.

- **Selectors 1 and 2: Dial tone frequency band control**

  These selectors set the frequency band for the 1st dial tone and 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: Allowable instantaneous interrupt during reception of 1st dial tone**

  This selector sets the allowable instantaneous interrupt period that should be ignored during reception of the 1st dial tone.

WSW08 (Dial tone setting 2)

Selector No.	Function	Setting and Specifications
1 | 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 : 15 sec. 1 1 : 30 sec.
6 | 8	Detection level of 1st dial tone and busy tone before dialing	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: The WSW08 is not applicable in those countries where no dial tone detection is supported, e.g., 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 for the 1st and 2nd dial tone detection so that the equipment waits dial tone input for the specified time length and disconnects itself from the line when no dial tone is inputted.

WSW09 (Protocol definition 1)

Selector No.	Function	Setting and Specifications
1	Frame length selection	0: 256 octets 1: 64 octets
2	Use of non-standard commands	0: Allowed 1: Prohibited
3 4	No. of retries	No. 3 4 0 0 : 4 times 0 1 : 3 times 1 0 : 2 times 1 1 : 1 time
5	T5 timer	0: 300 sec. 1: 60 sec.
6	T1 timer	0: 35 sec. 1: 40 sec.
7 8	Timeout for response from the called station in automatic sending mode	No. 7 8 0 0 : 55 sec. (in U.S.A. and Canadian versions) 60 sec. (in other versions) 0 1 : 140 sec. 1 0 : 90 sec. 1 1 : 35 sec.

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

- **Selector 1: Frame length selection**

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

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

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

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

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

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

- **Selector 5: T5 timer**

  This selector sets the time length for the T5 timer.

- **Selector 6: T1 timer**

  This selector sets the time length for the T1 timer.

- **Selectors 7 and 8: Timeout for response from the called station in automatic sending mode**

  If the equipment (calling station) receives no response (no G3 command) from the called terminal in automatic sending mode for the period specified by these selectors, it disconnects the line.

WSW10 (Protocol definition 2)

Selector No.	Function		Setting and Specifications
1	Not used.		
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 2: Time length from transmission of the last dial digit to CML ON**

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

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

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

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

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

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

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

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

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

WSW11 (Busy tone setting)

U.S.A. and Canadian versions

Selector No.	Function	Setting and Specifications
1 2	Busy tone frequency band control	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 for busy tone (More than one setting allowed)	1: 400-600/400-600 ms
5		1: 175-440/175-440 ms
6		1: 100-1000 ms/17-660 ms
7		1: 110-410/320-550 ms
8		1: 100-660/100-660 ms

Other versions

Selector No.	Function	Setting and Specifications
1 2	Busy tone frequency band control	No. 1 2 0 0 : Narrows by 10 Hz 0 1 : Initial value 1 x : Widens by 10 Hz
3	ON/OFF time length ranges for busy tone (More than one setting allowed)	1: 250-750/250-750 ms
4		1: 400-600/400-600 ms
5		1: 175-440/175-440 ms
6		1: 100-1000 ms/17-660 ms
7		1: 110-410/320-550 ms
8		1: 100-660/100-660 ms

NOTE: WSW11 is not applicable in those countries where no busy tone detection is supported.

NOTE: 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: Busy tone frequency band control**

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

- **Selectors 4 through 8**
  Selectors 3 through 8: ON/OFF time length ranges for busy tone

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

WSW12 (Signal detection condition setting)

Selector No.	Function	Setting and Specifications
1 2	Min. detection period required for interpreting incoming calling signal (CI) as OFF	No. 1 2 0 0 : 1500 ms 0 1 : 500 ms (450 ms in Japan) 1 0 : 700 ms 1 1 : 900 ms
3 4	Max. detection period for incoming calling signal (CI) being OFF	No. 3 4 0 0 : 6 sec. 0 1 : 7 sec. 1 0 : 9 sec. 1 1 : 11 sec.
5 6	Min. detection period required for acknowledging incoming calling signal (CI) as ON	No. 5 6 0 0 : 800 ms (1000 ms in Japan/China) 0 1 : 200 ms (800 ms in Japan) 1 0 : 250 ms (600 ms in Japan) 1 1 : 150 ms (400 ms in Japan)
7 8	Not used.	

- **Selectors 1 through 4: Min. detection period required for interpreting incoming calling signal (CI) as OFF**
  Max. detection period for incoming calling signal (CI) being OFF

  If the equipment detects the OFF state of a CI signal for the period greater than the value set by selectors 1 and 2 and less than the value set by selectors 3 and 4, it interprets the CI signal as OFF.

- **Selectors 5 and 6: Min. detection period required for acknowledging incoming calling signal (CI) as ON**

  These selectors set the period required to make the equipment acknowledge itself to be called. That is, if the equipment continuously detects a CI signal with the frequency set by selectors 1 through 4 of WSW14 during the period set by these selectors 5 and 6, then it acknowledges the call.

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	No. 3 4 0 0 : -43 dBm 0 1 : -47 dBm 1 0 : -49 dBm 1 1 : -51 dBm
5 | 8	Modem attenuator	0: 0 dB 1: 8 dB 0: 0 dB 1: 4 dB 0: 0 dB 1: 2 dB 0: 0 dB 1: 1 dB

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

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

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

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

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

  These selectors set the optimum receive signal level.

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

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

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

  If selector 8 of WSW23 is set to "0," this setting is so limited that 10 dB (1 dB in France) or higher setting only is effective. Note that in Japan and China, 9 dB or higher and 2 dB or higher settings only are effective, respectively, regardless of whether selector of WSW23 is set to "0."

WSW14 (AUTO ANS facility setting)

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

- **Selectors 1 through 4: Frequency band selection for incoming calling signal (CI)**

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

  In the French versions, if the user sets the PBX to OFF from the control panel, the setting made by selectors 1 and 2 will take no effect and the frequency's lower limit will be fixed to 32 Hz. (Even if the setting made by these selectors does not apply, it will be printed on the configuration list.)

- **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	Redial interval	No. 1 2 0 0 : 5 minutes 0 1 : 1 minute 1 0 : 2 minutes 1 1 : 3 minutes
3 | 6	No. of redialings	No. 3 4 5 6 0 0 0 0 : 16 times 0 0 0 1 : 1 times 0 0 1 0 : 2 times 0 0 1 1 : 3 times | | 1 1 1 1 : 15 times
7	Redialing for no response sent from the called terminal	0: Redialing 1: No redialing
8	CRP option	0: Disable 1: Enable

- **Selectors 1 through 6: 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.

- **Selector 7: Redialing for no response sent from the called terminal**

  This selector determines whether or not the equipment redials if no G3 command response comes from the called station after dialing within the time length set by selectors 7 and 8 of WSW09.

- **Selector 8: CRP option**

  If a command error occurs in the equipment (calling station), the equipment usually waits for three seconds and then makes a retry three times. This CRP option is a request command that can be sent from the called station for requesting the calling station to retry the failed command immediately.

WSW16 (Function setting 1)

Selector No.	Function	Setting and Specifications
1	Not used.	
2	ITU-T (CCITT) superfine recommendation	0: OFF 1: ON
3 | 7	Not used.	
8	**Stop** key pressed during reception	0: Disable 1: Enable

- **Selector 2: ITU-T (CCITT) superfine recommendation**

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

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

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

WSW17 (Function setting 2)

Selector No.	Function	Setting and Specifications
1 2	Off-hook alarm	No. 1 2 0 0 : No alarm 0 1 : Always valid 1 X : Valid except when "call reservation" is selected.
3 4	Not used.	
5	Calendar clock type	0: U.S.A. type 1: European type
6	Not used.	
7	Non-ring reception	0: OFF 1: ON
8	Not used.	

NOTE: Selector 4 is not applicable to those models having a 2-row LCD.

NOTE: Selector 5 is not applicable in Japan.

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

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

- **Selector 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" (Europe), the DD/MM/YY hh:mm format applies: DD is the day, MM is the month, YY is the last two digits of the year, hh is the hour, and mm is the minute.

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

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

WSW18 (Function setting 3)

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

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

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

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

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

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

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

WSW19 (Transmission speed setting)

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

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

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

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

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

WSW20 (Overseas communications mode setting)

Selector No.	Function	Setting and Specifications
1	EP* tone prefix	0: OFF 1: ON
2	Overseas communications mode (Reception)	0: 2100 Hz 1: 1100 Hz
3	Overseas communications mode (Transmission)	0: OFF 1: Ignores DIS once.
4 5	Min. time length from reception of CFR to start of transmission of video signals	No. 4 5 0 0 : 100 ms 0 1 : 200 ms 1 0 : 300 ms 1 1 : 400 ms
6 7	Not used.	
8	Limitation on CNG detection	0: No 1: Yes

* EP: Echo protection

- **Selector 1: EP tone prefix**

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

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

  The setting made by this selector takes effect only when the Overseas Mode is set to ON.

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

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

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

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

  The setting made by selector 3 takes effect only when the Overseas Communications Mode is set to ON. (The setting made by selector 2 is always effective.)

- **Selectors 8: Limitation on CNG detection**

  If this selector is set to "1," the equipment detects a CNG signal according to the condition preset by selectors 2 and 3 of WSW18 after a line is connected. If it is set to "0," the equipment detects a CNG signal as long as the line is connected.

WSW21 (TAD setting 1)

Selector No.	Function	Setting and Specifications
1 | 5	Max. detection period of "no tone" during recording of ICM	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: Yes 1: No

NOTE: Selectors 1 through 5 are applicable to models equipped with the ICM recording function.

- **Selectors 1 and 5: Max. detection period of "no tone" during recording of ICM**

  If the equipment detects "no tone" for the period specified by these selectors during recording of ICM, it stops recording and disconnects the line. (The "no tone" refers to none of tones exceeding the dBm level specified by selectors 1 through 3 of WSW33.)

- **Selector 8: Erasure of message stored in the memory after the message transfer**

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

WSW22 (ECM and copy resolution setting)

Selector No.	Function	Setting and Specifications	
1	ECM* in sending	0: ON	1: OFF
2	ECM* in receiving	0: ON	1: OFF
3	Call Waiting Caller ID	0: ON	1: OFF
4	Not used.		
5	Acceptable TCF bit error rate (%) (Only at 4800 bps)	0: 0%	1: 8%
6		0: 0%	1: 4%
7		0: 0%	1: 2%
8		0: 0%	1: 1%

* ECM: Error correction mode

NOTE: Selector 3 is applicable to the American versions only.

NOTE: Selectors 5 through 8 are applicable to the Chinese, Taiwanese and Asian versions only.

- **Selector 3: Call Waiting Caller ID**

  Setting this selector to "0" allows the user to decide whether or not to interrupt the current call when a new call comes in. If Call Waiting Caller ID service is available in the area and the user subscribes to it, he/she can see information about his/her incoming call on the LCD.

- **Selectors 5 through 8: Acceptable TCF bit error rate (%)**

  Setting two or more selectors to "1" produces addition of percent assigned to each selector. If you set selectors 7 and 8 to "1," the acceptable TCF bit error rate will be 3%.

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 7	Not used.	
8	Limitation of attenuation level	0: Yes 1: No

NOTE: Selector 8 is not applicable to the French versions.

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

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

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

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

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

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

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

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

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

  Setting this selector to "0" limits the transmission level of the modem to at least 10 dB (1 dB in France).

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

WSW24 (TAD setting 2)

Selector No.	Function	Setting and Specifications
1 2	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 length of time from CML-ON up to the start of pseudo ring backtone transmission.

  In those versions which have an OGM facility, the settings made by these selectors also apply to the length of time from CML-ON up to the start of OGM transmission.

WSW25 (TAD setting 3)

Selector No.	Function	Setting and Specifications
1 | 4	Not used.	
5 | 7	Pause between paging number and PIN	No. 5 6 7 0 0 0 : 2 sec. 0 0 1 : 4 sec. 0 1 0 : 6 sec. 0 1 1 : 8 sec. 1 0 0 : 10 sec. 1 0 1 : 12 sec. 1 1 0 : 14 sec. 1 1 1 : 16 sec.
8	Not used.	

NOTE: Selectors 5 through 7 are applicable only to the U.S.A. versions.

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

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

WSW26 (Function setting 4)

Selector No.	Function	Setting and Specifications
1 2	Not used.	
3	Dialing during document reading into the temporary memory in in-memory message transmission	0: Disabled 1: Enabled
4 5	No. of CNG cycles to be detected (when the line is connected via the external telephone except in the external TAD mode or via the built-in telephone)	No. 4 5 0 0 : 0.5 (A) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
6 7	No. of CNG cycles to be detected (when the line is connected via the external telephone in the external TAD mode, via the built-in telephone in the TAD mode, or via the facsimile equipment in the automatic reception of the F/T mode)	No. 6 7 0 0 : 0.5 (A) 0 1 : 1 (B) 1 0 : 1.5 (C) 1 1 : 2 (D)
8	Not used.	

- **Selector 3: Dialing during document reading into the temporary memory in in-memory message transmission**

  If this selector is set to "0," the facsimile equipment waits for document reading into the memory to complete and then starts dialing. This enables the equipment to list the total number of pages in the header of the facsimile message.

- **Selectors 4 and 5: No. of CNG cycles to be detected (when the line is connected via the external telephone except in the external TAD mode or via the built-in telephone)**

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

- **Selectors 6 and 7: No. of CNG cycles to be detected (when the line is connected via the external telephone in the external TAD mode, via the built-in telephone in the TAD mode, or via the facsimile equipment in the automatic reception of the F/T mode)**

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

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: Yes 1: No
5 | 8	Not used.	

NOTE: Selector 4 is applicable only to the U.S.A. versions.

- **Selector 2: Ringer OFF setting**

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

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

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

WSW28 (Function setting 6)

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

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

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

WSW29 (Function setting 7)

Selector No.	Function	Setting and Specifications
1 | 6	Not used.	
7	Impedance switching control in pulse dialing	0: OFF 1: ON
8	Prompt beep when the memory area for the activity report becomes full	0: No 1: Yes

NOTE: Selectors 7 and 8 are applicable only to the European versions.

- **Selector 8: Prompt beep for activity report**

  This selector determines whether or not the equipment will beep if the memory area for the activity report becomes full, for prompting you to print out the report. (Printing it out will clear the memory area.)

WSW30 (Function setting 8)

Selector No.	Function	Setting and Specifications
1 | 3	Dial tone/busy tone detection level during recording of ICM	No. 1 2 3 0 0 0 : -38.0 dBm (A) 0 0 1 : -39.5 dBm (B) 0 1 0 : -41.0 dBm (C) 0 1 1 : -42.5 dBm (D) 1 0 0 : -44.0 dBm (E) 1 0 1 : -45.5 dBm (F) 1 1 0 : -47.0 dBm (G) 1 1 1 : -48.5 dBm (H)
4 | 8	Not used.	

NOTE: Selectors 1 through 3 are applicable to models equipped with an internal TAD.

- **Selectors 1 through 3: Dial tone/busy tone detection level during recording of ICM**

  If the equipment (called station) detects dial tone (400 Hz continuously) or busy tone (400 Hz intermittently) exceeding the detection level specified by these selectors for the period specified by selectors 1 through 4 of WSW35, then it interprets the calling station as being disconnected. The equipment stops TAD recording and disconnects the line.

WSW31 (Function setting 9)

Selector No.	Function	Setting and Specifications
1	Not used.	
2	Default reduction rate for failure of automatic reduction during recording	0: 100% 1: 70%
3	Not used.	
4	Ink empty sensor	0: Yes 1: No
5	Minimum ON and OFF duration of ringer signals effective in distinctive ringing	0: 130 ms 1: 50 ms
6 | 8	Not used.	

NOTE: Selector 5 is applicable only to the U.S.A. versions.

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

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

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

- **Selector 5 Minimum ON and OFF duration of ringer signals effective in distinctive ringing**

  The ringer pattern consists of short and long rings, e.g., short-short-long rings. This selector sets the minimum ON and OFF duration of ringer signals that are required for the equipment to interpret ringer signals as being ON or OFF. This is to prevent components of a ringer pattern from being misinterpreted due to chattering in distinctive ringing.

  The equipment monitors ringer signals at 10-ms intervals. If the signal is ON, the equipment counts +1; if it is OFF, it counts -1. If the counter increments up to +5 or +13 when this selector is set to "1" (50 ms) or "0" (130 ms), respectively, the equipment interprets the current signal as being ON.

  If the counter returns to zero, the equipment interprets the signal as being OFF.

  If the Distinctive Ring is set to OFF, this selector is not effective.

WSW32 (Function setting 10)

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

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

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

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

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

WSW33 (Function setting 11)

Selector No.	Function	Setting and Specifications
1 — 3	Detection threshold level of "no tone" during recording of ICM	No. 1 2 3 0 0 0 : -42.5 dBm (A) 0 0 1 : -44.0 dBm (B) 0 1 0 : -45.5 dBm (C) 0 1 1 : -47.0 dBm (D) 1 0 0 : -48.5 dBm (E) 1 0 1 : -50.0 dBm (F) 1 1 0 : -51.5 dBm (G) 1 1 1 : -53.0 dBm (H)
4 5	FAX receiving speed to be kept within the transmission speed limit to the PC	No. 4 5 0 0 : 14,400 bps 0 1 : 12,000 bps 1 0 : 9,600 bps 1 1 : 7,200 bps
6	Report output of polled transmission requests	0: Yes 1: No
7 8	Not used.	

NOTE: Selectors 1 through 3 are applicable to models equipped with an internal TAD.

- **Selectors 1 through 3: Detection threshold level of "no tone" during recording of ICM**

  If the tone level during recording of ICM is less than the threshold setting made by these selectors, the tone is interpreted as "no tone." When the "no tone" state is kept for the period specified by selectors 1 through 5 of WSW21, the equipment disconnects the line.

- **Selectors 4 and 5: FAX receiving speed to be kept within the transmission speed limit to the PC**

  To transmit FAX data being received from other facsimile equipment to the connected PC, you may need to keep the FAX receiving speed within the transmission speed limit specified for the PC. In an initial negotiation sequence for transmission, the equipment responds to the calling station with the allowable FAX receiving speed specified by these selectors.

WSW34 (Function setting 12)

Selector No.	Function	Setting and Specifications
1 | 5	Not used.	
6 7	Number of DTMF tone signals for inhibiting the detection of CNG during external TAD operation	No. 6 7 0 0 : 3 0 1 : 2 1 0 : 1 1 1 : OFF
8	Not used.	

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

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

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

WSW35 (Function setting 13)

Selector No.	Function	Setting and Specifications
1 | 4	Max. detection period of dial tone/busy tone during recording of ICM	No. 1 2 3 4 0 0 0 0 : No detection 0 0 0 1 : 1 sec. 0 0 1 0 : 2 sec. 0 1 0 0 : 4 sec. | | 1 1 1 1 : 15 sec.
5 | 8	Not used.	

NOTE: Selectors 1 through 4 are applicable to models equipped with an internal TAD.

- **Selectors 1 through 4: Max. detection period of dial tone/busy tone during recording of ICM**

  If the equipment (called station) detects dial tone or busy tone exceeding the detection level specified by selectors 1 through 3 of WSW30 for the period specified by these selectors, then it disconnects the line.

WSW36 (Function setting 14)

Selector No.	Function	Setting and Specifications
1 | 4	Not used.	
5	Escape from phase C	0: Yes 1: No
6 | 8	Extension of incoming calling signal (CI) frequency band specified by selectors 1 through 4 of WSW14	No. 6 7 8 0 0 0 : 0 (Not ignored) 0 0 1 : 4 (448 Hz) 0 1 0 : 8 (244 Hz) 0 1 1 : 12 (162 Hz) 1 0 0 : 16 (122 Hz) 1 0 1 : 20 (97 Hz) 1 1 0 : 24 (81 Hz) 1 1 1 : 28 (69 Hz)

*ECP (Enhanced Capabilities Port)

- **Selector 5: Escape from phase C**

  This selector determines whether or not the equipment escapes from phase C when it detects an RTC (Return to Control) in non-ECM mode or an RCP (Return to Control Partial page) in ECM mode.

- **Selectors 6 through 8: Extension of incoming calling signal (CI) frequency band specified by selectors 1 through 4 of WSW14**

  At the start of reception, if the equipment detects the frequency of a CI signal specified by selectors 1 through 4 of WSW14, it starts the ringer sounding. However, the equipment may fail to detect the CI signal normally due to noise superimposed at the time of reception. To prevent it, use selectors 6 through 8 of WSW36.

  If the equipment detects higher frequencies than the setting made here, it regards them as noise and interprets the detecting state as being normal, allowing the ringer to keep sounding according to the preset number of ringers (until it starts automatic reception of FAX data in the FAX mode or enters the TAD mode in the TEL mode).

WSW37 (Function setting 15)

Selector No.	Function	Setting and Specifications
1	Printout of the stored image data of an unsent document onto an error report	0: No 1: Yes
2	Erasure of the stored image data of an unsent document at the time of the subsequent in-memory message transmission	0: No 1: Yes
3 | 8	Not used.	

- **Selector 1: Printout of the stored image data of an unsent document onto an error report**

  This selector determines whether or not the 1st-page image data of a document will be printed out onto the error report if the document image data stored in the temporary memory cannot be transmitted normally.

- **Selector 2: Erasure of the stored image data of an unsent document at the time of the subsequent in-memory message transmission**

  If in-memory message transmission fails repeatedly when selector 1 is set to "1," the temporary memory will be occupied with image data. Setting selector 2 to "1" will automatically erase the stored 1st-page image data of an unsent document at the time of the subsequent in-memory message transmission only when recording paper or toner runs out.

WSW38 to WSW42

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

WSW43 (Function setting 21)

Selector No.	Function	Setting and Specifications
1	Not used.	
2 3	Wait time for PC-Fax reception (Class 2) and FPTS command transmission	No. 2 3 0 0 : 50 ms 0 1 : 100 ms 1 0 : 150 ms 1 1 : 0 ms
4 | 6	Not used.	
7	Automatic start of remote maintenance	0: No 1: Yes
8	JPEG coding	0: Disabled 1: Enabled

- **Selector 8: JPEG coding**

  Setting this selector to "0" disables the equipment from sending/receiving JPEG color images and from receiving JPEG monochrome images.

WSW44 (Speeding up scanning-1)

Selector No.	Function	Setting and Specifications
1 | 5	Not used.	
6 | 8	Effective time length of the white level compensation data obtained beforehand	No. 6 7 8 0 0 0 : Obtained compensation data ineffective 0 0 1 : 1 min. 0 1 0 : 3 min. 0 1 1 : 5 min. 1 0 0 : 10 min. 1 0 1 : 15 min. 1 1 0 : 20 min. 1 1 1 : 30 min.

NOTE: WSW44 is applicable only to models equipped with a flat-bed scanner.

WSW45 and WSW46

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

WSW47 (Paper handling for a feed error and delay of FAX line disconnection)

Selector No.	Function	Setting and Specifications
1	Handling paper at the occurrence of a paper feed timing error	0: Eject paper w/o print 1: Print on the current paper
2	Not used.	
3 4	Delay of FAX line disconnection when switching to the pseudo-ringing external telephone	No. 3 4 0 0 : 200 ms 0 1 : 400 ms 1 0 : 700 ms 1 1 : 1000 ms
5	Disable the ringer of external telephone at non-ring reception	0: No 1: Yes
6	Not used.	
7	Disable the ringer of external telephone with CAR signal when caller ID service is available	0: No 1: Yes
8	Not used.	

NOTE: Selector 1 is applicable only to models equipped with a flat-bed scanner.
NOTE: Selectors 3 and 4 are applicable only to models supporting pseudo-ringing of a connected external telephone.

- **Selector 1: Handling paper at the occurrence of a paper feed timing error**

  When feeding paper to the print start position, the equipment might cause a feed timing error so that the registration sensor goes ON signaling the presence of paper. This selector determines whether the equipment will print on the current paper or eject the current paper without printing and print on the next paper.

- **Selectors 3 and 4: Delay of FAX line disconnection when switching to the pseudo-ringing external telephone**

  When the equipment receives a phone call, it can make the connected external telephone ring (so called pseudo-ringing). During pseudo-ringing, if you pick up the handset of the external telephone, the line might be disconnected due to cut-off of the line current.

  To hold the line, the equipment may supply line current by making use of the pulse generator circuit that forms a parallel loop. This way the FAX line disconnection may be delayed. These selectors determine the delay period.

WSW48 to WSW50

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

MFC4820C/MFC4420C

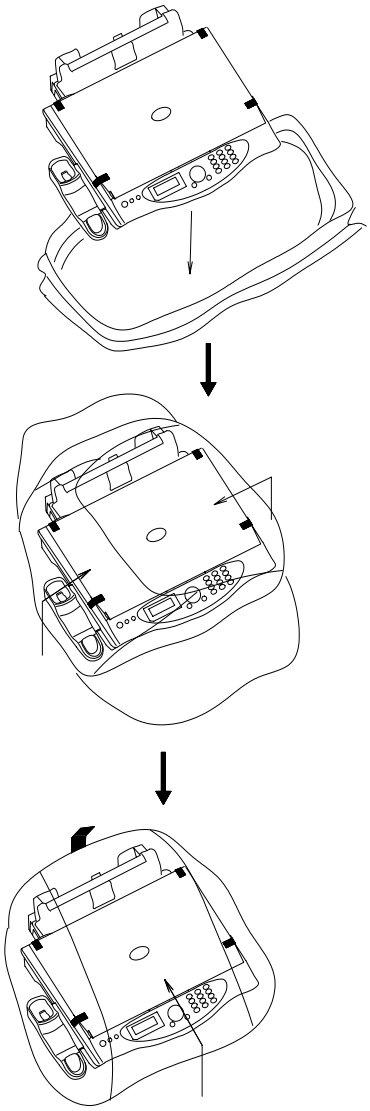
Appendix 5. Re-Packing Instructions

RE-PACKING INSTRUCTIONS

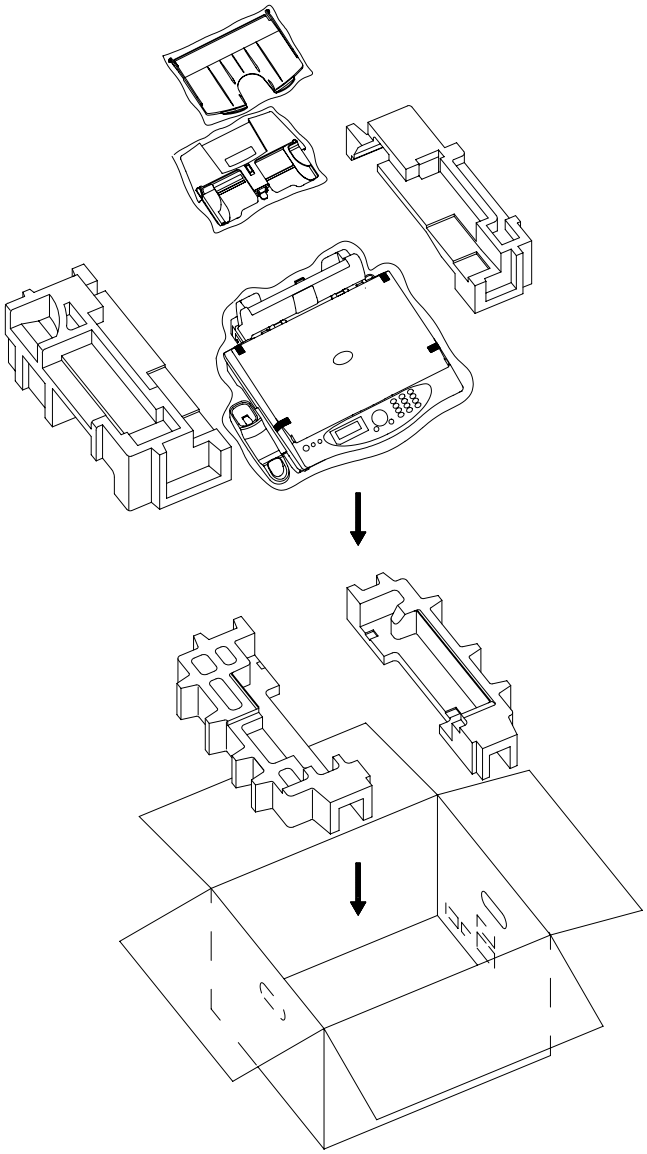
⚠ WARNING

Do NOT unplug the machine after a print job until you hear the final click.

(1) Wrap the machine in the plastic bag.



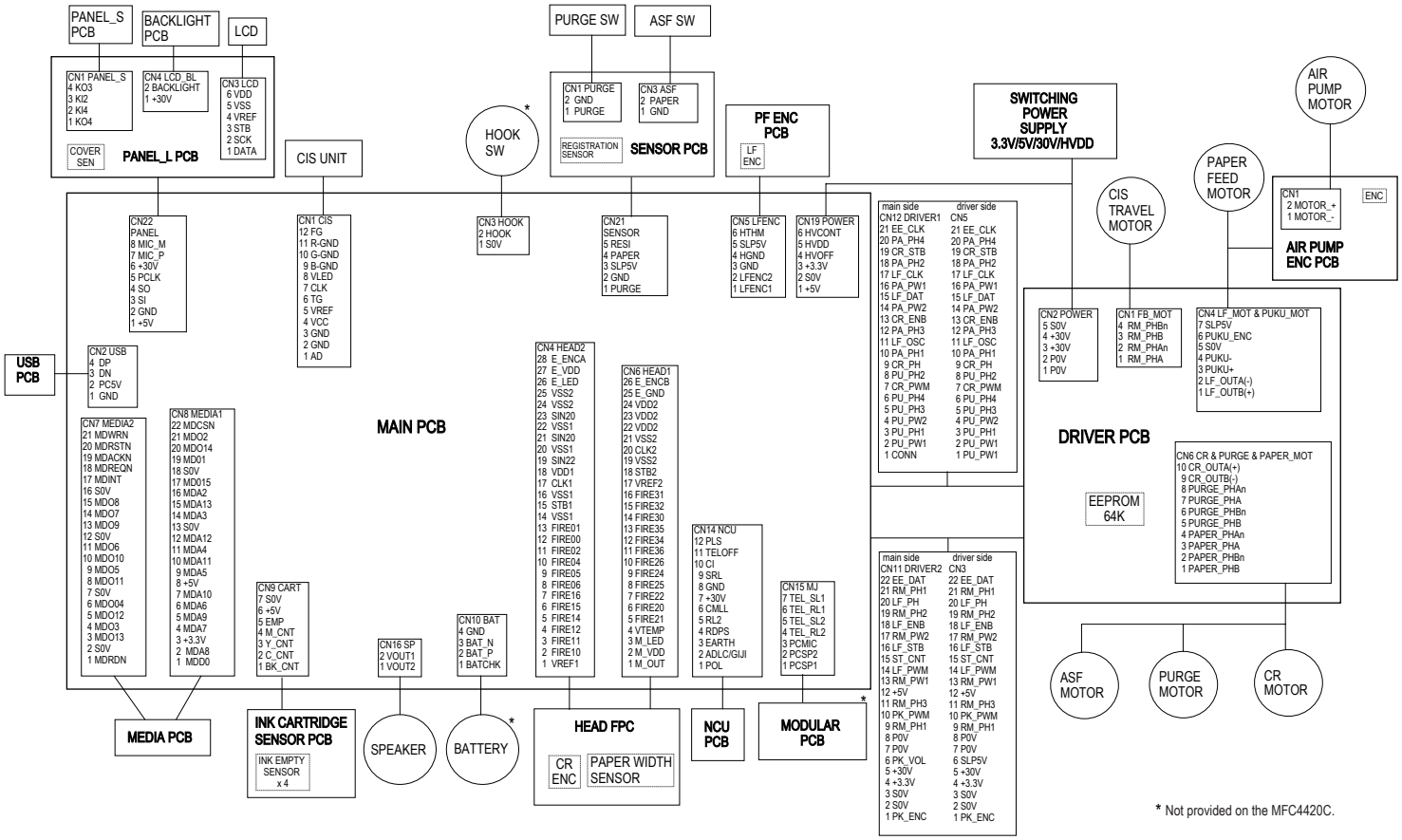
(2) Place the machine in the original box with the original packaging material.



MFC4820C/MFC4420C

Appendix 6. Wiring Diagram

MFC4820C/MFC4420C
WIRING DIAGRAM



* Not provided on the MFC4420C.

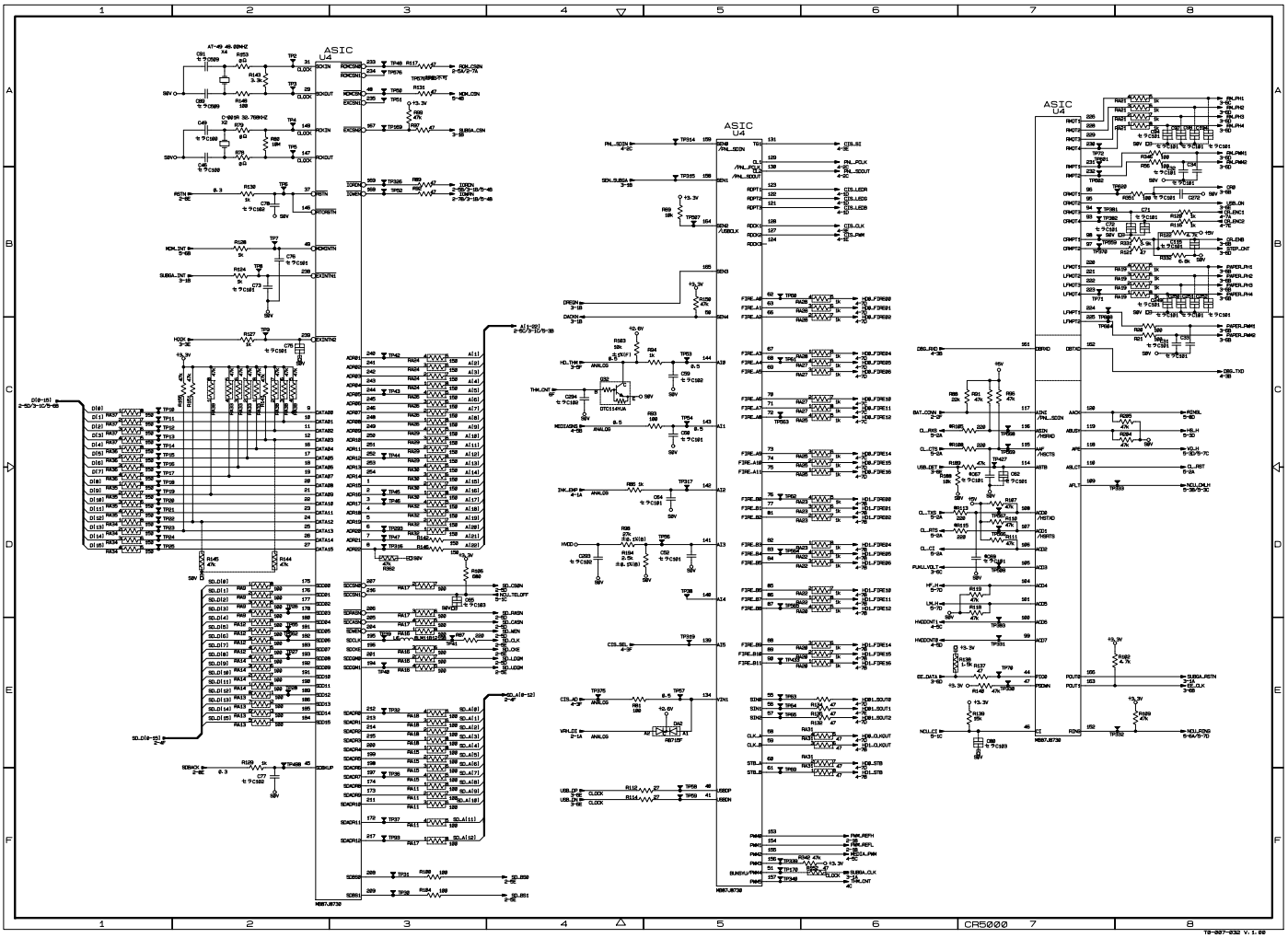
MFC4820C/MFC4420C

Appendix 7. Circuit Diagrams

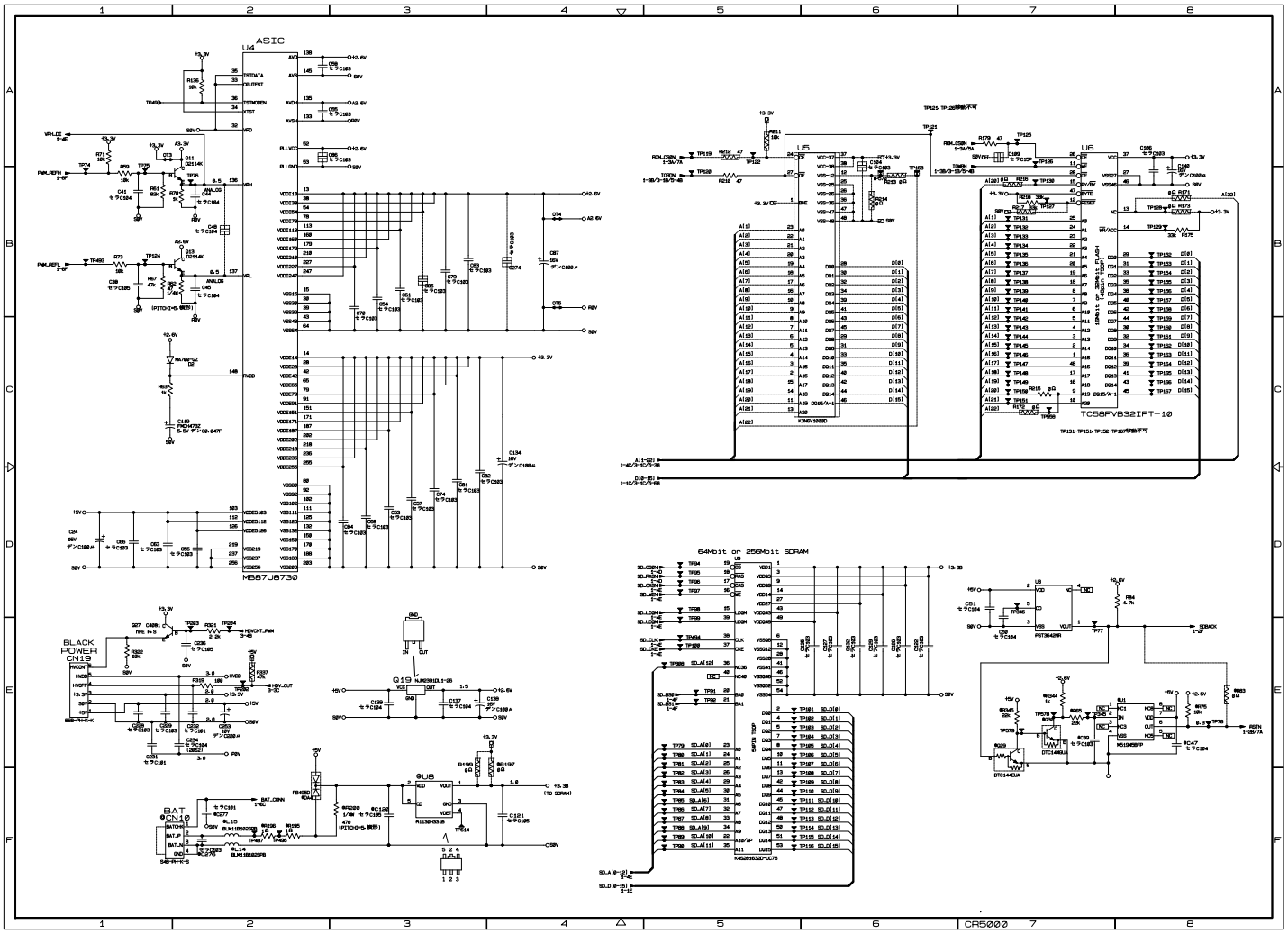
Terms in circuit diagrams

セラC: Ceramic capacitor
デンC: Chemical capacitor

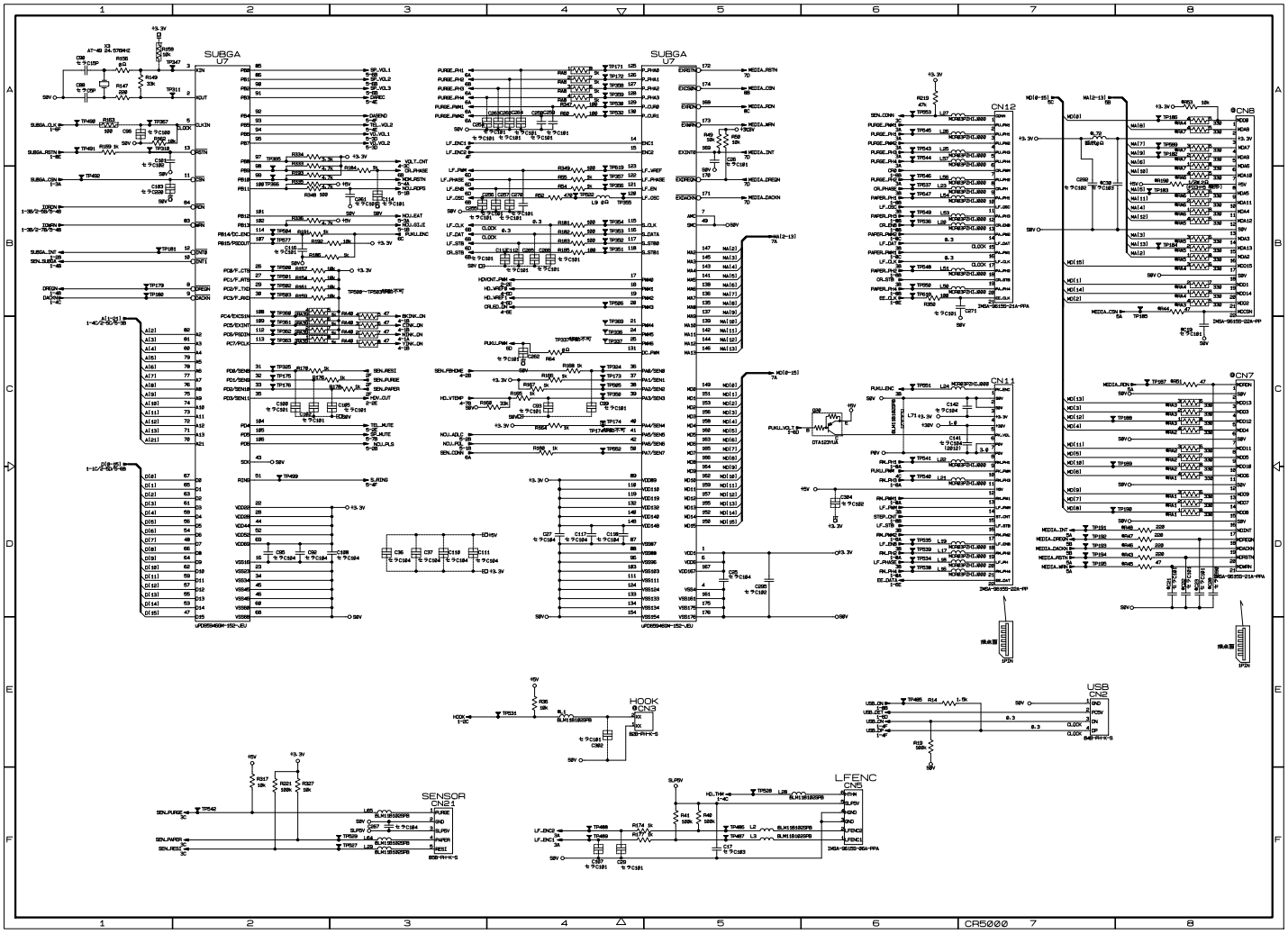
A. Main PCB (1/5)



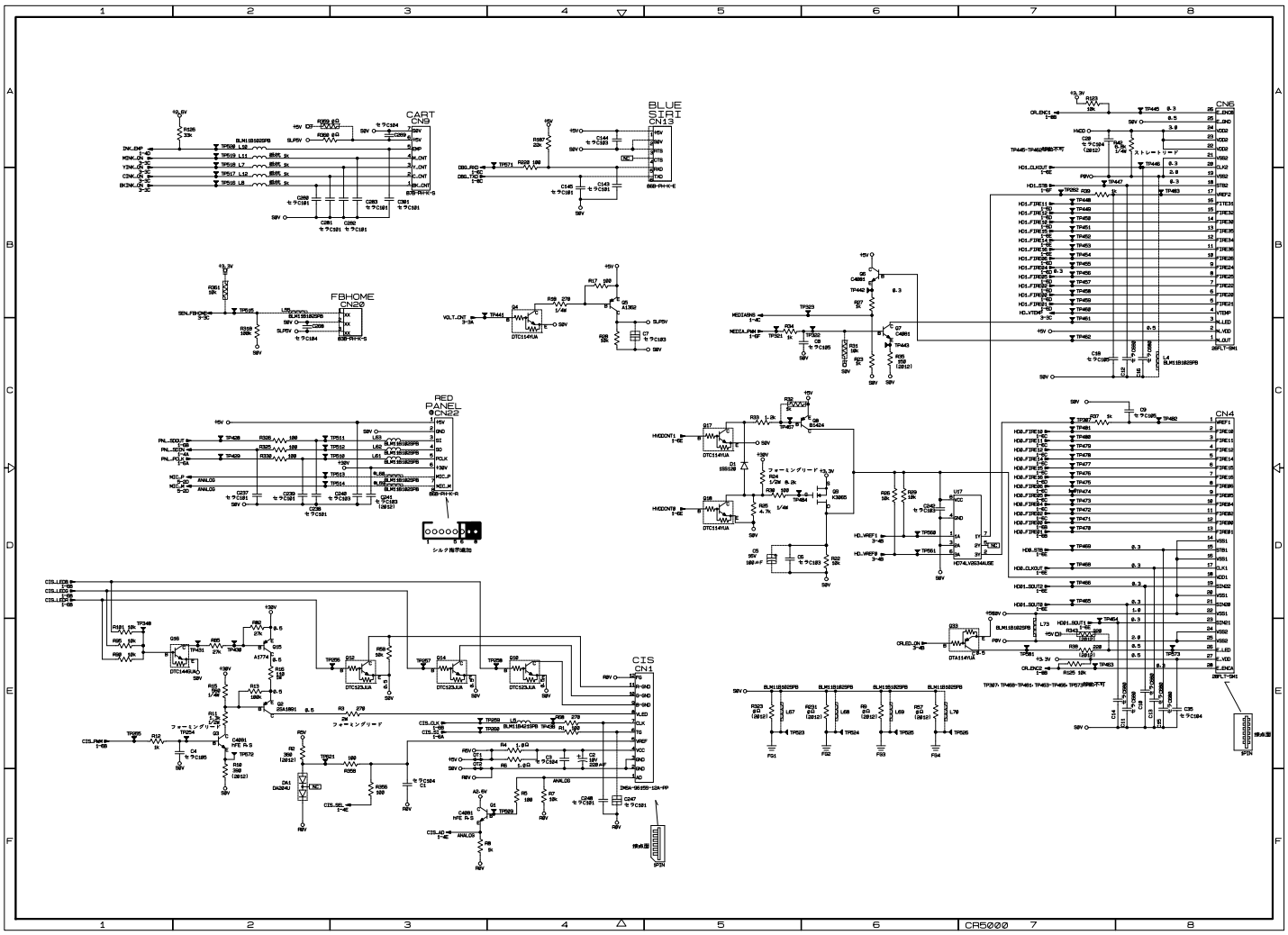
A. Main PCB (2/5)



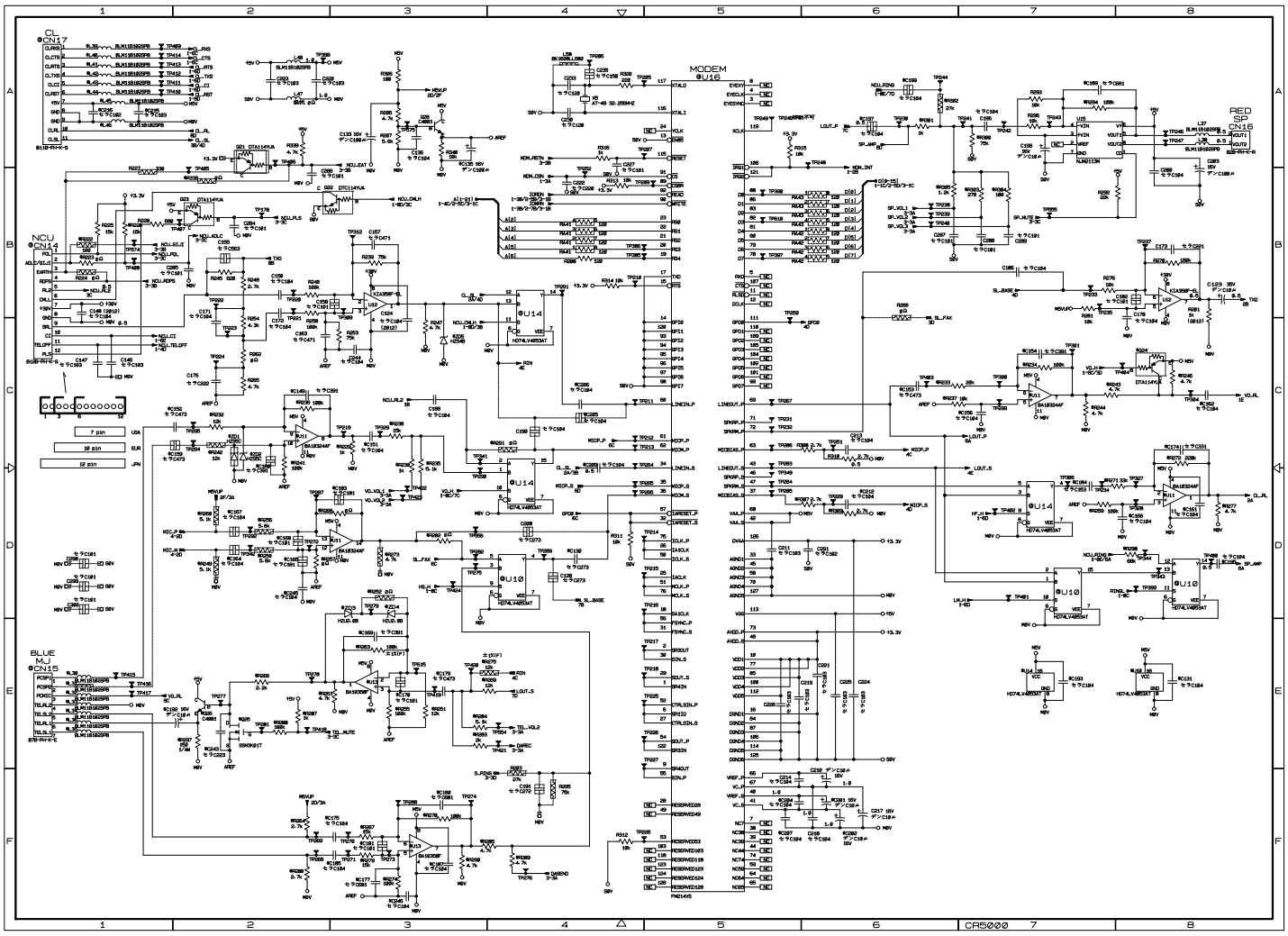
A. Main PCB (3/5)



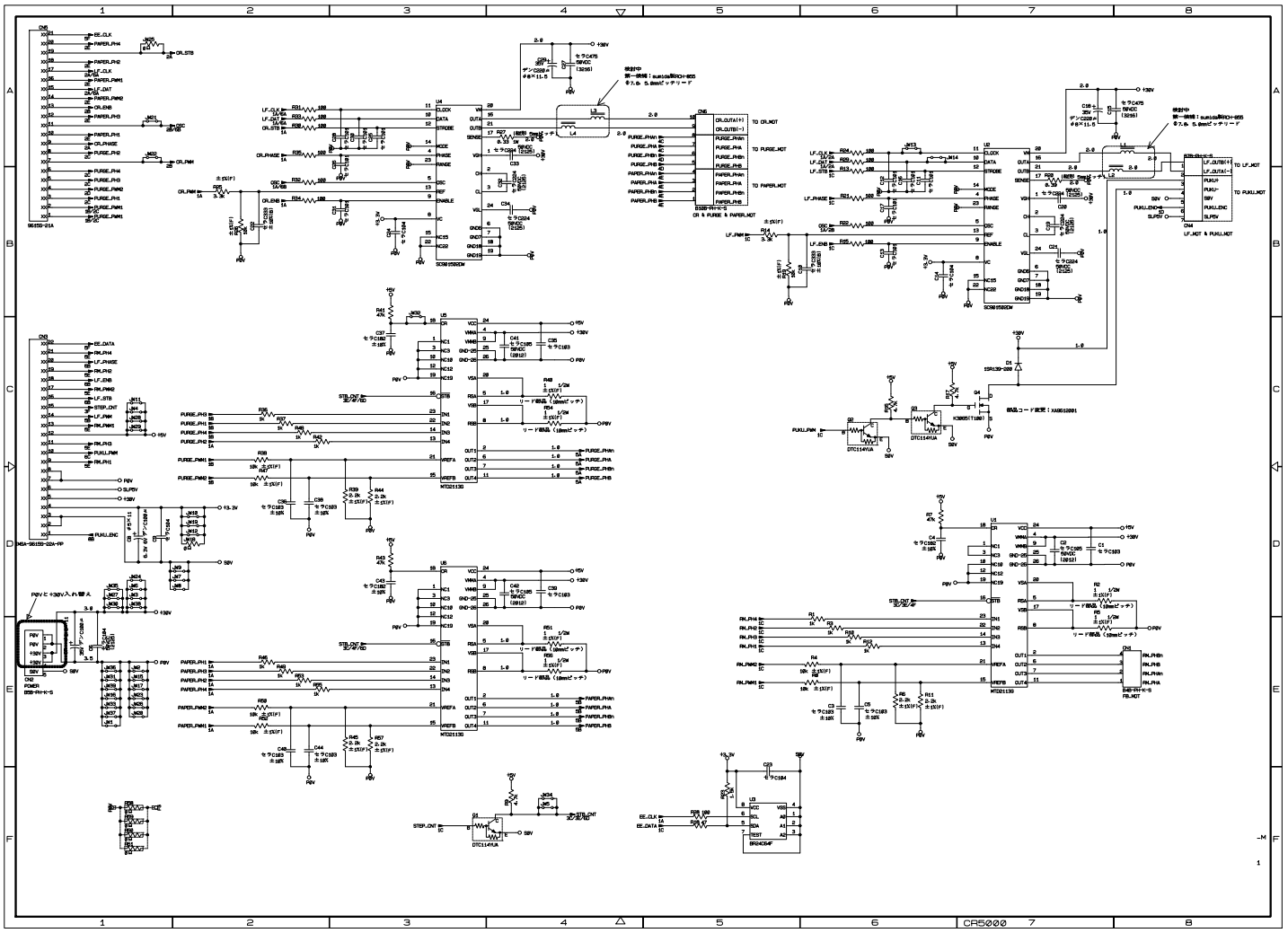
A. Main PCB (4/5)



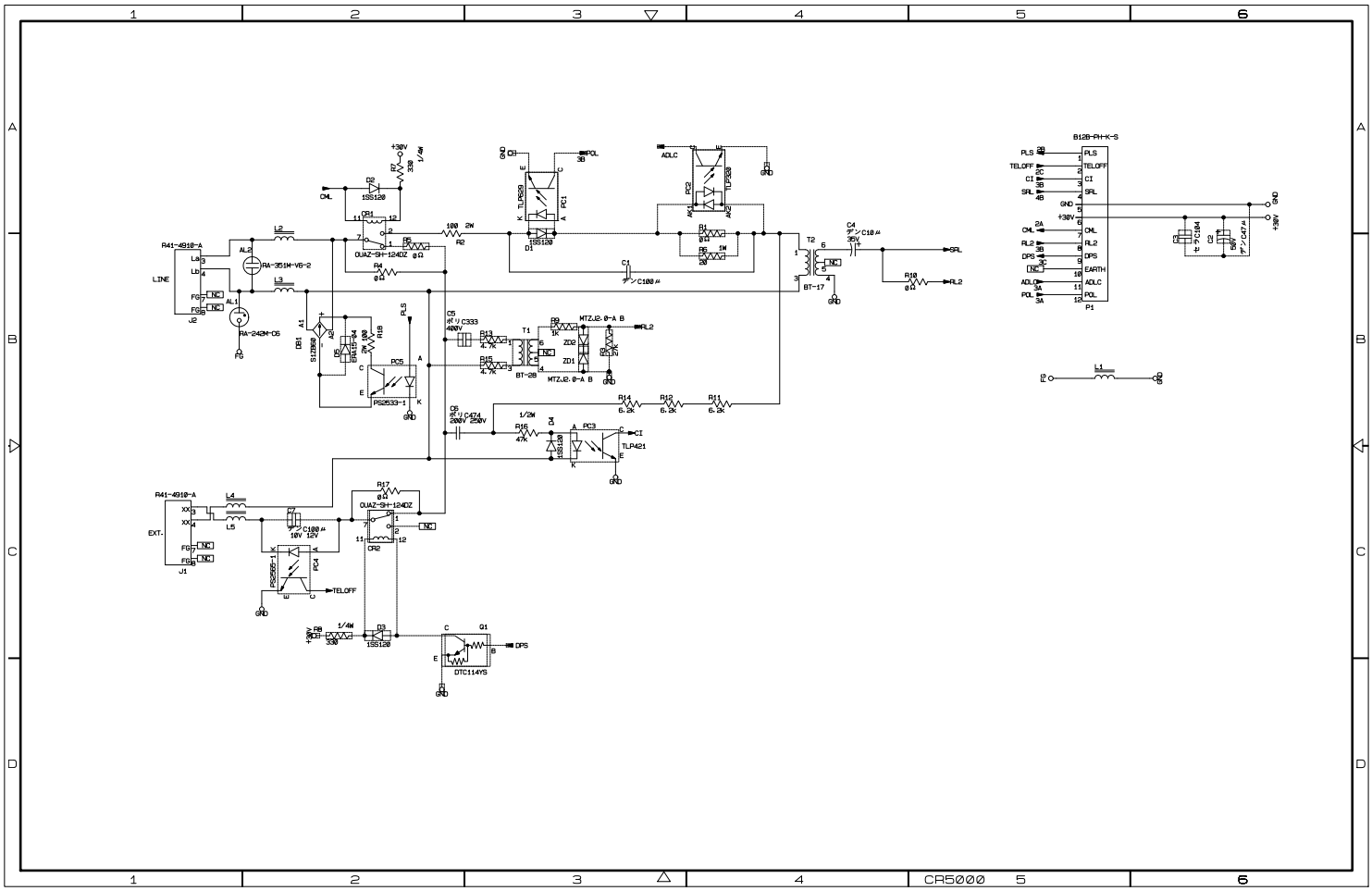
A. Main PCB (5/5)



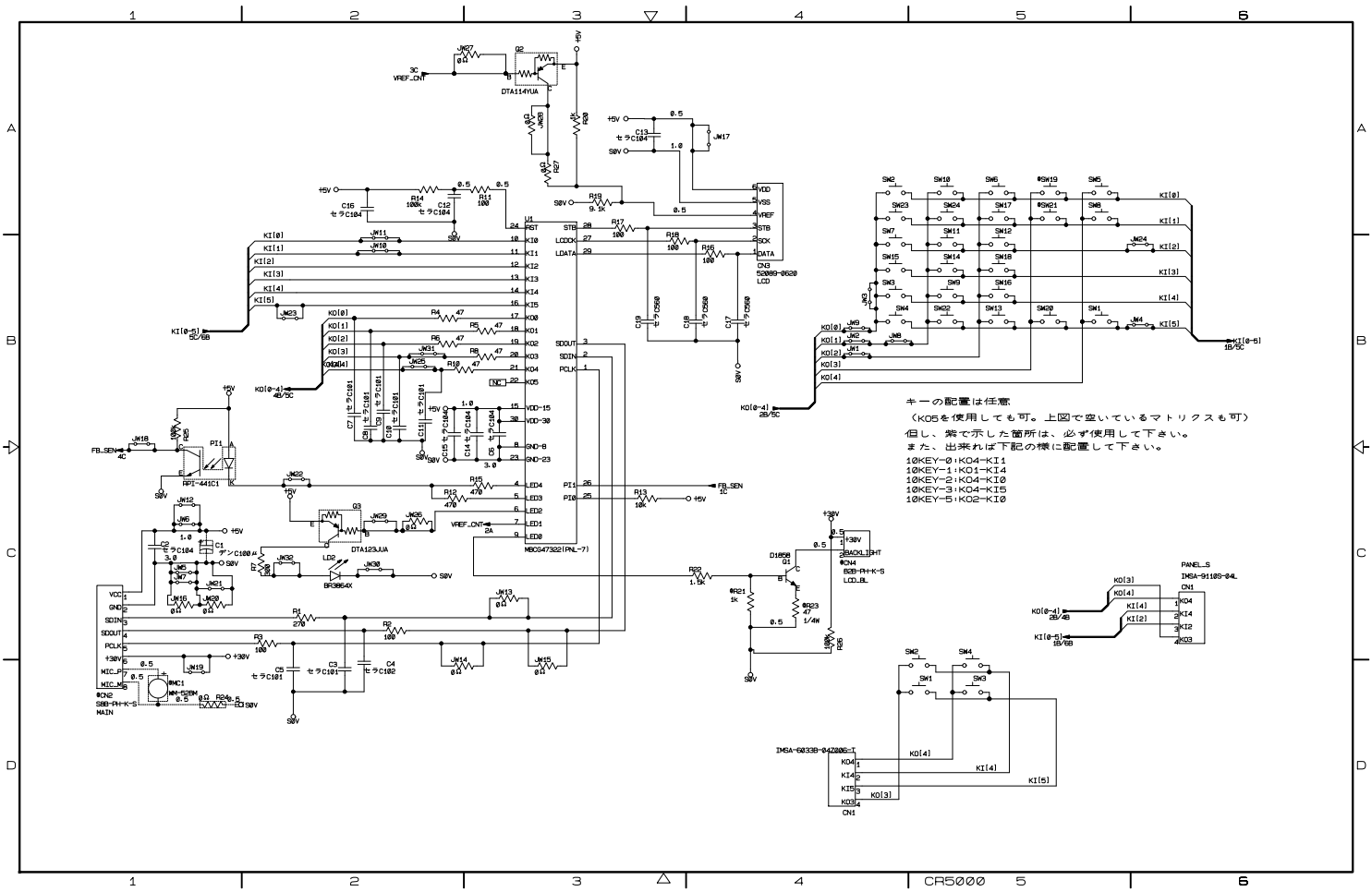
B. Driver PCB



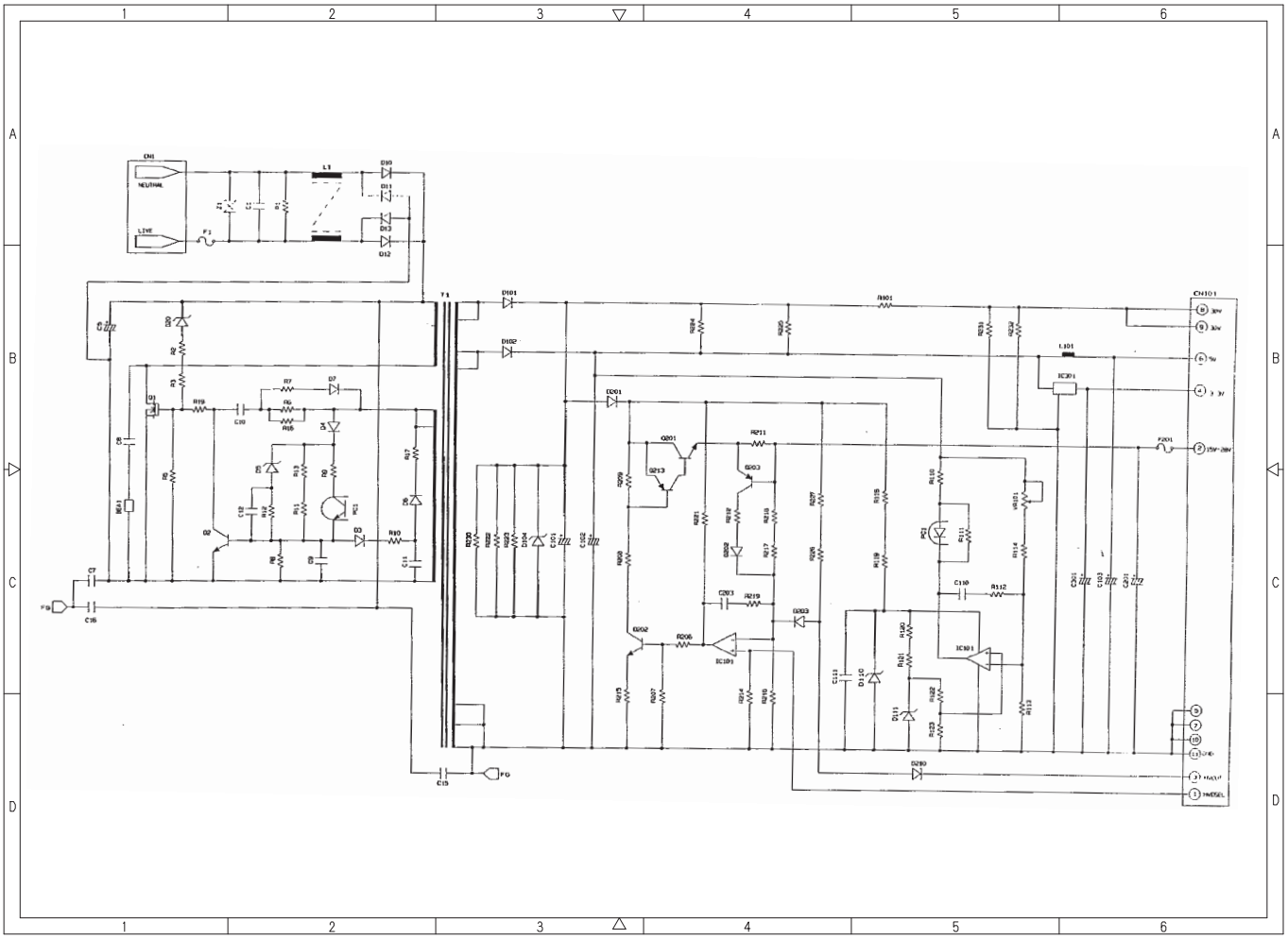
C. NCU PCB



D. Control Panel PCB



E. Power Supply PCB



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