brother

Laser Multi-Function Center

SERVICE REFERENCE MANUAL

MODEL:

DCP-7030/7040/7045N
MFC-7320/7340/7440N/7450/
7840N/7840W

Read this manual thoroughly before maintenance work.
Keep this manual in a convenient place for quick and easy reference at all times.

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PREFACE

This service reference manual contains basic information required for after-sales service of the laser printer (hereinafter referred to as “the machine”). This information is vital to the service personnel to maintain the high printing quality and performance of the machine.

This service manual covers the **DCP 7030/7040/7045N, MFC 7320/7340/7440N/7450/7840N/7840W machines**.

This manual consists of the following chapters:

REFERENCE 1 SPECIFICATIONS

Provides specifications of each model, which enables you to make a comparison of the different models.

REFERENCE 2 THEORY OF OPERATION

Gives an overview of the printing mechanisms as well as the sensors, actuators, and control electronics. It aids in understanding the basic principles of operations as well as locating defects for troubleshooting.

APPENDIX 1 TONER CARTRIDGE WEIGHT INFORMATION

APPENDIX 2 GLOSSARY

APPENDIX 3 REFERENCES

Information in this manual is subject to change due to improvement or redesign of the product. All relevant information in such cases will be supplied in service information bulletins (Technical Information).

A thorough understanding of this machine, based on information in this service reference manual and service information bulletins, is required for maintaining the print quality performance and for improving the practical ability to find the cause of any problems.

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REFERENCE 1 SPECIFICATIONS

1. COMPONENTS

■ Printer part

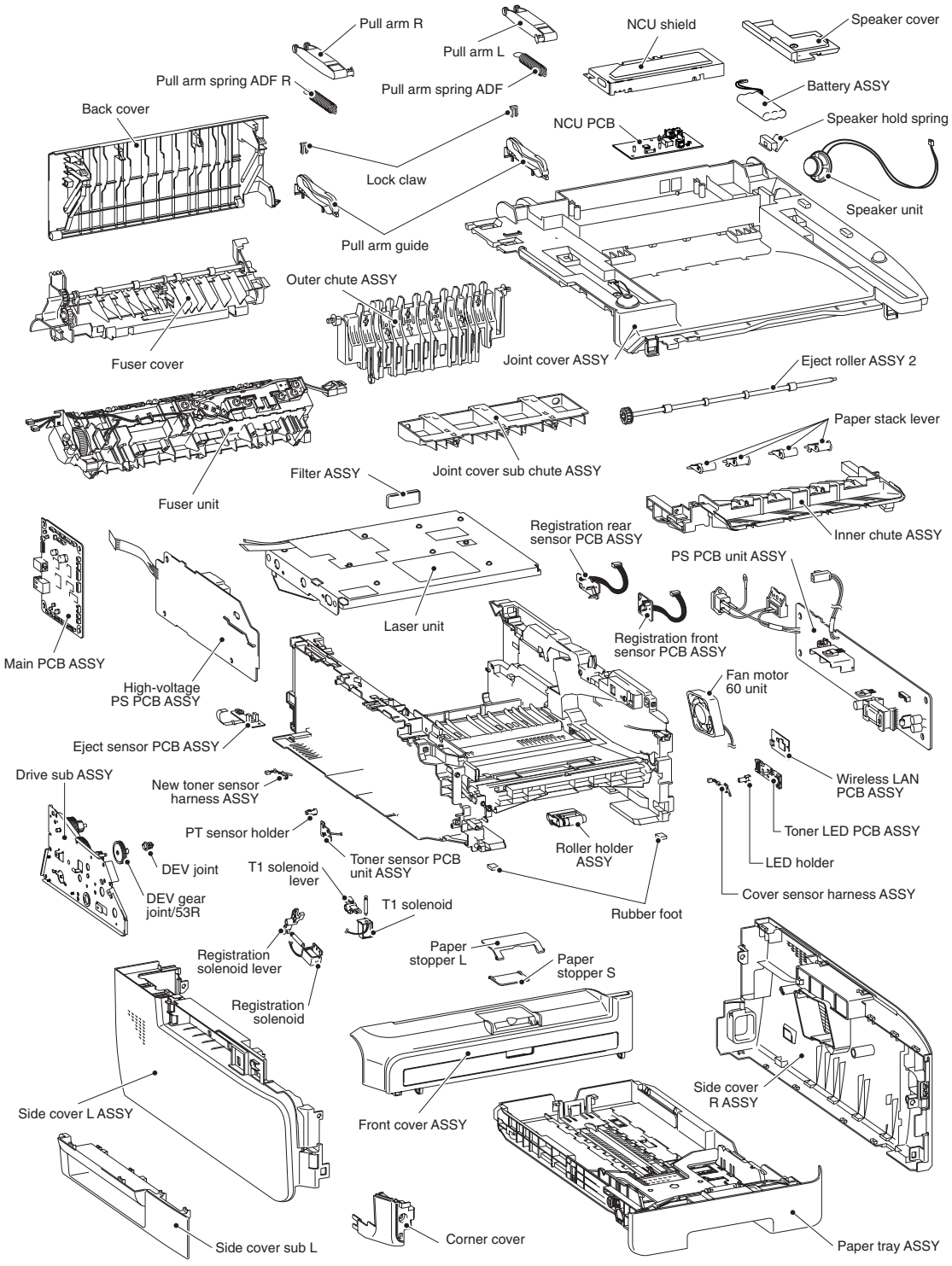

Fig. Ref. 1-1

■ ADF / FB part

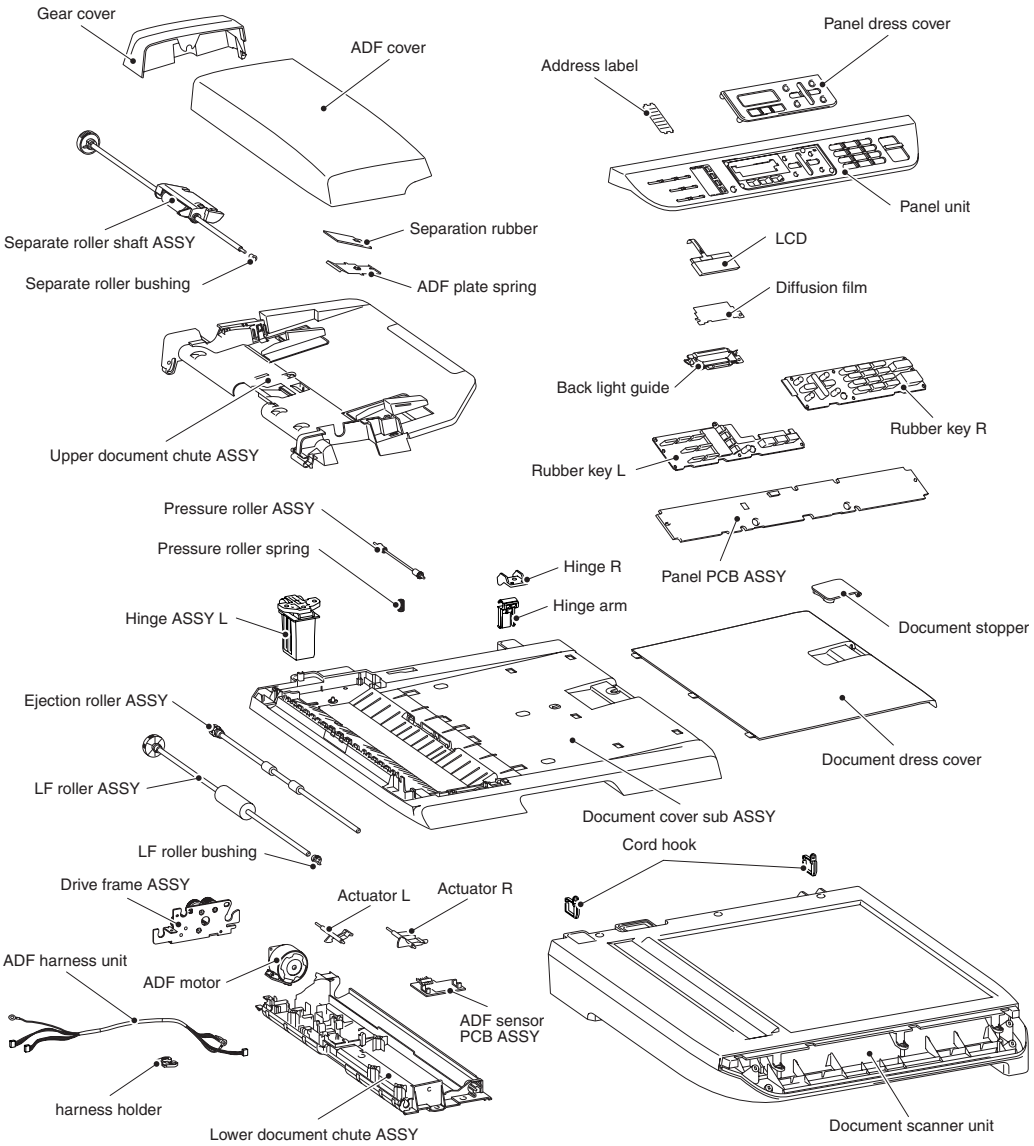

Fig. Ref. 1-2

2. SPECIFICATIONS LIST

2.1 Printing

Model			DCP 7030	DCP 7040	DCP 7045N
Print method			Electrophotography by semiconductor laser beam scanning		
Laser			Method: 1 polygon motor, 1 laser beam Wavelength: 780nm~800nm Output: 10mW (Maximum)		
Resolution	HQ1200		Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater		
	600dpi		Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater, Linux, Dos		
	300dpi		Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater, Linux		
Print mode			Normal printing mode Economy printing mode (Toner saving mode)		
Print Speed *1	Standard		Up to 22 ppm (A4 size)*2, Up to 23 ppm (Letter size)*2		
Warm-up time			Less than 18seconds at 23°C(73.4°F)		
First print out time			Less than 10seconds		
Consumables	Toner cartridge		Life expectancy: Starter: 1,000pages/ cartridge Standard: 1,500pages/ cartridge High-capacity: 2,600pages/ cartridge * When printing A4/ Letter-size paper in accordance with ISO/IEC 19752. Shelf life: 2years (6months after opening)		
	Inbox Toner	U.S.A./ Canada	Starter		
		Europe (including Russia)	Starter		Standard
		Asia/ Pacific	Standard		
		China	Standard		
	Drum unit		Life expectancy: 12,000pages/ drum unit (1page/job) Shelf life: 2years		
	The shelf life mentioned above is guaranteed under the normal condition as below; (Temperature) Normal condition: 0 to 40°C * Storage condition at the temperature of 40 to 50°C: Up to 5days * Storage condition at the temperature of -20 to 0°C: Up to 5days (Humidity) Normal condition: 35 to 85% * Storage condition at the humidity of 85 to 95%: Up to 5days * Storage condition at the humidity of 10 to 35%: Up to 5days				

*1 The printing speed may change depending on the type of document you print.
*2 From standard paper tray.

Note:

Print speed varies depending on the paper size or media type. For details, refer to "2.8 Print Speeds with Various Settings" in this Chapter.

<table>
<tr><th colspan="3">Model</th><th>MFC 7320</th><th>MFC 7340</th><th>MFC 7440N</th><th>MFC 7840W</th></tr>
<tr><td colspan="3">Print method</td><td colspan="4">Electrophotography by semiconductor laser beam scanning</td></tr>
<tr><td colspan="3">Laser</td><td colspan="4">Method: 1 polygon motor, 1 laser beam
Wavelength: 780nm~800nm
Output: 10mW (Maximum)</td></tr>
<tr><td rowspan="3">Resolution</td><td colspan="2">HQ1200</td><td colspan="4">Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater</td></tr>
<tr><td colspan="2">600dpi</td><td colspan="4">Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater, Linux, DOS</td></tr>
<tr><td colspan="2">300dpi</td><td colspan="4">Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003 / Windows Server® 2003 x64 Edition, Mac OS® X 10.2.4 or greater, Linux</td></tr>
<tr><td colspan="3">Print mode</td><td colspan="4">Normal printing mode
Economy printing mode (Toner saving mode)</td></tr>
<tr><td>Print Speed *1, *2</td><td colspan="2">Standard</td><td>Up to 18 ppm (A4)
Up to 19 ppm (Letter)</td><td>Up to 20 ppm (A4)
Up to 21 ppm (Letter)</td><td colspan="2">Up to 22 ppm (A4)
Up to 23 ppm (Letter)</td></tr>
<tr><td colspan="3">Warm-up time</td><td colspan="4">Less than 18seconds at 23°C(73.4°F)</td></tr>
<tr><td colspan="3">First print out time</td><td colspan="4">Less than 10seconds</td></tr>
<tr><td rowspan="7">Consumables</td><td colspan="2">Toner cartridge</td><td colspan="4">Life expectancy:
Starter: 1,000pages/ cartridge
Standard: 1,500pages/ cartridge
High-capacity: 2,600pages/ cartridge
* When printing A4/ Letter-size paper in accordance with ISO/IEC 19752. Shelf life: 2years (6months after opening)</td></tr>
<tr><td rowspan="4">Inbox Toner</td><td>U.S.A./ Canada</td><td colspan="4">Starter</td></tr>
<tr><td>Europe (including Russia)</td><td>Starter</td><td colspan="3">Standard</td></tr>
<tr><td>Asia/ Pacific</td><td colspan="4">Standard</td></tr>
<tr><td>China</td><td colspan="4">Standard</td></tr>
<tr><td colspan="2">Drum unit</td><td colspan="4">Life expectancy: 12,000pages/ drum unit (1page/job)
Shelf life: 2years</td></tr>
<tr><td colspan="6">The shelf life mentioned above is guaranteed under the normal condition as below;
(Temperature)
Normal condition: 0 to 40°C
* Storage condition at the temperature of 40 to 50°C: Up to 5days
* Storage condition at the temperature of -20 to 0°C: Up to 5days
(Humidity)
Normal condition: 35 to 85%
* Storage condition at the humidity of 85 to 95%: Up to 5days
* Storage condition at the humidity of 10 to 35%: Up to 5days</td></tr>
</table>

*1 The printing speed may change depending on the type of document you print.

*2 Print speed may be slower when the printer is connected by wireless LAN (MFC7840W only).

Note:

Print speed varies depending on the paper size or media type. For details, refer to "2.8 Print Speeds with Various Settings" in this Chapter.

2.2 Functions

<Controller>

Model		DCP 7030	DCP 7040	DCP 7045N
CPU		192MHz		
Memory		16 MB		32 MB
Interface		Full-Speed USB 2.0, External TAD		Full-Speed USB 2.0, 10BASE-T/100BASE-TX Ethernet, External TAD
Emulation		N/A		PCL6, PS3 (Br-Script 3)
Network Connectivity	Protocols	N/A		TCP/IP (Standard 10/100BASE-TX Ethernet) *1
	Management tool	N/A		BRAdmin Light *2, BRAdmin Professional *3, Web BRAdmin *4, Web Based Management *5
Resident fonts	PCL	N/A		66 scalable fonts, Letter Gothic 16.66 Bit map fonts, OCR-A, OCR-B, 13 bar codes

*1 See the Network User's Guide locator on the CD-ROM for details on the supported network protocols.

*2 Brother original Windows® and Macintosh® utility for printer and print server management. Install from the supplied CD-ROM.

*3 Brother original Windows® utility for printer and print server management. It has more functions than BRAdmin Light. Download from http://solutions.brother.com.

*4 Server based management utility. Download from http://solutions.brother.com.

*5 Printer and print server management through Web Based Management (Web browser).

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
CPU		192MHz			
Memory		16 MB		32 MB	
Interface		Full-Speed USB 2.0, External TAD		Full-Speed USB 2.0, 10BASE-T/100BASE-TX Ethernet, External TAD	Full-Speed USB 2.0, 10BASE-T/100BASE-TX Ethernet, Wireless LAN IEEE 802.11b/g, External TAD
Emulation		N/A			PCL6, PS3 (Br-Script 3)
Network Connectivity	Protocols	N/A		TCP/IP (Standard 10/100BASE-TX Ethernet) *1	
	Management tool	N/A		BRAdmin Light *2, BRAdmin Professional *3, Web BRAdmin *4, Web Based Management *5	
Resident fonts	PCL	N/A			66 scalable fonts, Letter Gothic 16.66 Bit map fonts, OCR-A, OCR-B, 13 bar codes

*1 See the Network User's Guide locator on the CD-ROM for details on the supported network protocols.

*2 Brother original Windows® and Macintosh® utility for printer and print server management. Install from the supplied CD-ROM.

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*4 Server based management utility. Download from http://solutions.brother.com.

*5 Printer and print server management through Web Based Management (Web browser).

<Software>

Model		DCP 7030	DCP 7040	DCP 7045N
Printer driver	Windows®	Host-Based for windows® 2000 Professional, XP Home Edition, XP Professional, XP Professional x64 Edition, Vista®, Windows Server® 2003 (print only via network)		Br-Script 3 (PPD file for windows® 2000 Professional, XP Home Edition, XP Professional, XP Professional x64 Edition, Vista®, Windows Server® 2003 (print only via network))
	Macintosh®	Macintosh printer driver for Mac OS® X 10.2.4 or greater		Br-Script 3 (PPD file for Mac OS® X 10.2.4 or greater)
	Linux	Linux driver for CUPS printing system (x86, x64 environment) *1 *2		
		Linux driver for LPD/LPRng printing system (x86, x64 environment) *1 *2		

*1 Download the printer driver for Linux from http://solutions.brother.com.

*2 Depending on Linux distributions, the driver may not be available.

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Printer driver	Windows®	Host-Based for windows® 2000 Professional, XP Home Edition, XP Professional, XP Professional x64 Edition, Vista®, Windows Server® 2003 (print only via network)			Br-Script 3 (PPD file for windows® 2000 Professional, XP Professional, XP Professional x64 Edition, XP Home Edition, Vista®, Windows Server® 2003 (print only via network))
	Macintosh®	Macintosh printer driver for Mac OS® X 10.2.4 or greater			Br-Script 3 (PPD file for Mac OS® X 10.2.4 or greater)
	Linux	Linux driver for CUPS printing system (x86, x64 environment) *1 *2			
		Linux driver for LPD/LPRng printing system (x86, x64 environment) *1 *2			

*1 Download the printer driver for Linux from http://solutions.brother.com.

*2 Depending on Linux distributions, the driver may not be available.

<System requirements>

Computer Platform & Operating System Version		Processor Minimum Speed	Minimum RAM	Recommended RAM	Available Hard Disk Space
Windows®	2000 Professional	Intel® Pentium® II or equivalent	64MB	256MB	50MB
	XP Home Edition		128MB		
	XP Professional				
	XP Professional x64 Edition	64-bit (Intel® 64 or AMD64) supported CPU	256MB	512MB	
	Vista®	Intel® Pentium® 4 or equivalent 64-bit (Intel® 64 or AMD64) supported CPU	512MB	1GB	
	Server® 2003	Intel® Pentium® III or equivalent	256MB	512MB	
	Server® 2003 x64 Edition	64-bit (Intel® 64 or AMD64) supported CPU			
Apple® Macintosh® *1	OS® X 10.2.4 - 10.4.3	PowerPC G4/G5, PowerPC G3 350MHz	128MB	256MB	80MB
	OS® X 10.4.4 or greater	PowerPC G4/G5, Intel® Core™ Processor	512MB	1GB	

*1 Third party USB ports are not supported.

Computer Platform & Operating System Version		Processor Minimum Speed	Minimum RAM	Recommended RAM	Available Hard Disk Space
Windows®	2000 Professional	Intel® Pentium® II or equivalent	64MB	256MB	50MB
	XP Home Edition		128MB		
	XP Professional				
	XP Professional x64 Edition	64-bit (Intel® 64 or AMD64) supported CPU	256MB	512MB	
	Vista®	Intel® Pentium® 4 or equivalent 64-bit (Intel® 64 or AMD64) supported CPU	512MB	1GB	
	Server® 2003	Intel® Pentium® III or equivalent	256MB	512MB	
	Server® 2003 x64 Edition	64-bit (Intel® 64 or AMD64) supported CPU			
Apple® Macintosh® *1	OS® X 10.2.4 - 10.4.3	PowerPC G4/G5, PowerPC G3 350MHz	128MB	256MB	80MB
	OS® X 10.4.4 or greater	PowerPC G4/G5, Intel® Core™ Processor	512MB	1GB	

*1 Third party USB ports are not supported.

2.3 Electronics and Mechanics

Model		DCP 7030	DCP 7040	DCP 7045N
Power consumption	Copying	Average 320W at 25°C (77°F)		
	Standby	Average 75W at 25°C (77°F)		
	Sleep	Average 10W at 25°C (77°F)		
Noise level	Sound Pressure	Printing: 50dB(A) Standby: 30dB(A)		
	Sound power	Printing: LWAd = 6.4Bell(A) Standby: LWAd = 4.4Bell(A)		
Temperature		Operating: 10 to 32.5°C (50 to 90.5°F) Non operating: 0 to 40°C (38 to 104°F) Storage: -20 to 40°C (-4 to 104°F)		
Humidity		Operating: 20 to 80% (non condensing) Storage: 10 to 85% (non condensing)		
Dimensions (W × D × H)	with carton	550 × 510 × 451mm (21.7 × 20.1 × 17.6inch)	550 × 510 × 520mm (21.7 × 20.1 × 20.5inch)	
	without carton	428 × 396 × 259mm (16.9 × 15.6 × 10.1inch)	428 × 396 × 304mm (16.9 × 15.6 × 12.0inch)	
Weights	with carton	13.4kg (29.5lb)	14.9kg (32.8lb)	
	without carton and toner/drum	8.7kg (19.2lb)	10.0kg (22.0lb)	

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Power consumption	Copying	Average 320W at 25°C (77°F)			
	Standby	Average 75W at 25°C (77°F)			
	Sleep	Average 10W at 25°C (77°F)			
Noise level	Sound Pressure	Printing: 50dB(A) Standby: 30dB(A)			
	Sound power	Printing: LWAd = 6.4Bell(A) Standby: LWAd = 4.4Bell(A)			
Temperature		Operating: 10 to 32.5°C (50 to 90.5°F) Non operating: 0 to 40°C (38 to 104°F) Storage: -20 to 40°C (-4 to 104°F)			
Humidity		Operating: 20 to 80% (non condensing) Storage: 10 to 85% (non condensing)			
Dimensions (W × D × H)	with carton	550 × 510 × 520mm (21.7 × 20.1 × 20.5inch)			
	without carton	428 × 396 × 304mm (16.9 × 15.6 × 12.0inch)			
Weights	with carton	14.9kg (32.8lb)			
	without carton and toner/drum	10.0kg (22.0lb)			

2.4 Network Connectivity

<Ethernet wired network> (DCP 7045N/MFC 7440N/MFC 7840W only)

Network node type	NC-6600h type 2	
Operating system support	Windows® 2000 / XP, Windows® XP Professional x64 Edition, Windows Vista®, Windows Server® 2003, 2003 x64 Edition, Mac OS® X 10.2.4 or greater	
Protocol support	TCP/IP: IPv4	ARP, RARP, BOOTP, DHCP, APIPA (Auto IP), WINS, NetBIOS name resolution, DNS resolver, mDNS, LPR/LPD, Custom Raw Port/Port9100, IPP, FTP Server, FTP Client, POP before SMTP, SMTP-AUTH, TELNET, SNMPv1, HTTP Server, TFTP client and server, SMTP Client, APOP, ICMP, LLTD responder, LLMNR responder, Web Services
	TCP/IP: IPv6 *1	NDP, RA, DNS resolver, mDNS, LPR/LPD, Custom Raw Port/Port9100, IPP, FTP Server, FTP Client, POP before SMTP, SMTP-AUTH, TELNET, SNMPv1, HTTP Server, TFTP client and server, SMTP Client, APOP, ICMPv6, LLTD responder, LLMNR responder, Web Services
Network type	10/100BASE-TX Ethernet network	
Network printing	Windows® 2000 / XP, Windows Vista® and Windows Server® 2003 TCP/IP printing Mac OS® X 10.2.4 or greater printing	

*1 If you want to use the IPv6 protocol, visit http://solutions.brother.com for more information.

<Ethernet wireless network> (MFC 7840W only)

Network node type	NC-7400w type 2	
Operating system support	Windows® 2000 / XP, Windows® XP Professional x64 Edition, Windows Vista®, Windows Server® 2003, 2003 x64 Edition, Mac OS® X 10.2.4 or greater	
Protocol support	TCP/IP: IPv4	ARP, RARP, BOOTP, DHCP, APIPA (Auto IP), WINS, NetBIOS name resolution, DNS resolver, mDNS, LPR/LPD, Custom Raw Port/Port9100, IPP, FTP Server, POP before SMTP, SMTP-AUTH, TELNET, SNMPv1, HTTP Server, TFTP client and server, SMTP Client, APOP, ICMP, LLTD responder, LLMNR responder, Web Services
	TCP/IP: IPv6 *1	NDP, RA, DNS resolver, mDNS, LPR/LPD, Custom Raw Port/Port9100, IPP, FTP Server, FTP Client, POP before SMTP, SMTP-AUTH, TELNET, SNMPv1, HTTP Server, TFTP client and server, SMTP Client, APOP, ICMPv6, LLTD responder, LLMNR responder, Web Services
Network type	IEEE 802.11b/g wireless	
Frequency	2412-2484 MHz	
RF channels	U.S.A./Canada	1-11
	Europe/Oceania	1-13
	Japan	802.11b: 1-14, 802.11g: 1-13
Communication mode	Infrastructure, Ad-hoc (802.11b only)	
Data rates	802.11b	11/5.5/2/1 Mbps
	802.11g	54/48/36/24/18/12/11/9/6/5.5/2/1 Mbps
Link distance	70m (233ft.) at lowest data rate (The distance rate will vary upon environment and other equipment location.)	
Network security	SSID/ESSID, 128 (104) / 64 (40) bit WEP, WPA/WPA2-PSK (TKIP/AES), LEAP (CKIP)	
Network printing	Windows® 2000 / XP, Windows Vista® and Windows Server® 2003 TCP/IP printing Mac OS® X 10.2.4 or greater printing	

*1 If you want to use the IPv6 protocol, visit http://solutions.brother.com for more information.

<Management utilities>

BRAdmin Light	Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003/2003 x64 Edition
	Mac OS® X 10.2.4 or greater
BRAdmin Professional *1	Windows® 2000 / XP / XP Professional x64 Edition, Windows Vista®, Windows Server® 2003/2003 x64 Edition
Web BRAdmin *1	Windows NT® 4.0, Windows® 2000 Professional / Server / Advanced Server, Windows® XP Professional/XP Professional x64 Edition, Windows Vista®, Windows Server® 2003/2003 x64 Edition

*1 BRAdmin Professional and Web BRAdmin are available as a download from http://solutions.brother.com

2.5 Service Information

These are key service information to maintain the product.

Machine life: 50,000pages/ 5years

MTBF (Meantime between failure): Up to 4,000hours

MTTR (Meantime to repair): Average 30minutes

Monthly volume: 10,000pages

Periodical replacement parts: None

There are no periodical replacement parts needed to maintain this product.

2.6 Paper

2.6.1 Paper handling

Model		DCP 7030	DCP7040/7045N, MFC7320/7340/7440N/7840W
Paper Input *1	Manual feed slot	1sheet	
	Paper tray	250sheets	
	ADF	N/A	35 sheets
Paper Output *1	Face-down	100sheets	
	Face-up	1sheet	
Duplex	Manual Duplex	Yes	

*1 Calculated with 80g/m^2 (20lb) paper

2.6.2 Media specifications

Model		DCP 7030	DCP7040/7045N, MFC7320/7340/7440N/7840W
Media types	Manual feed slot	Plain paper, Bond paper, Recycled paper, Thin paper, Thick paper, Envelopes, Labels, Transparencies	
	Paper tray	Plain paper, Recycled paper, Thin paper, Transparencies*1	
	ADF	N/A	Plain, Recycled paper
Media weights	Manual feed slot	60 to 163g/m^2 (16 to 43lb)	
	Paper tray	60 to 105g/m^2 (16 to 28lb)	
	ADF	N/A	64 to 90g/m^2 (16 to 24lb)
Media sizes	Manual feed slot	Width: 76.2 to 220mm (3.0 to 8.66 inch) Length: 116 to 406.4 mm (4.57 to 16 inch)	
	Paper tray (Standard)	A4, Letter, Legal*2, B5 (ISO), Executive, A5, A6, B6, Folio	
	ADF	N/A	Width : 148.0 to 215.9mm (5.8 to 8.5inch) Length : 148.0 to 355.6mm (5.8 to 14.0inch)

*1 Up to 10 sheets

*2 Legal size paper is not available in some regions outside the U.S.A. and Canada.

2.6.3 Type and size of paper

The printer loads paper from the installed paper tray or the manual feed slot. The names for the paper trays in the printer driver are as follows:

Paper tray	Tray 1
Manual feed slot	Manual
Auto Document Feeder	ADF

<Media type>

	Tray 1	Manual	ADF	Choose the media type from the printer driver
Plain paper 75 to 105g/m^2 (20 to 28lb)	Yes		Yes (64 to 90g/m^2) (17 to 24lb)	**Plain paper**
Recycled paper	Yes			**Recycled paper**
Bond paper Rough paper- 60 to 163g/m^2 (16 to 43lb)	N/A	Yes	N/A	**Bond paper**
Thin paper 60 to 75g/m^2 (16 to 20lb)	Yes		N/A	**Thin paper**
Thick paper 105 to 163g/m^2 (28 to 43lb)	N/A	Yes	N/A	**Thick Paper** or **Thicker Paper**
Transparency	Yes A4 or Letter		N/A	**Transparencies**
Labels	N/A	Yes A4 or Letter	N/A	**Thicker Paper**
Envelopes	N/A	Yes	N/A	**Envelopes** **Env. Thin** **Env. Thick**

Memo :

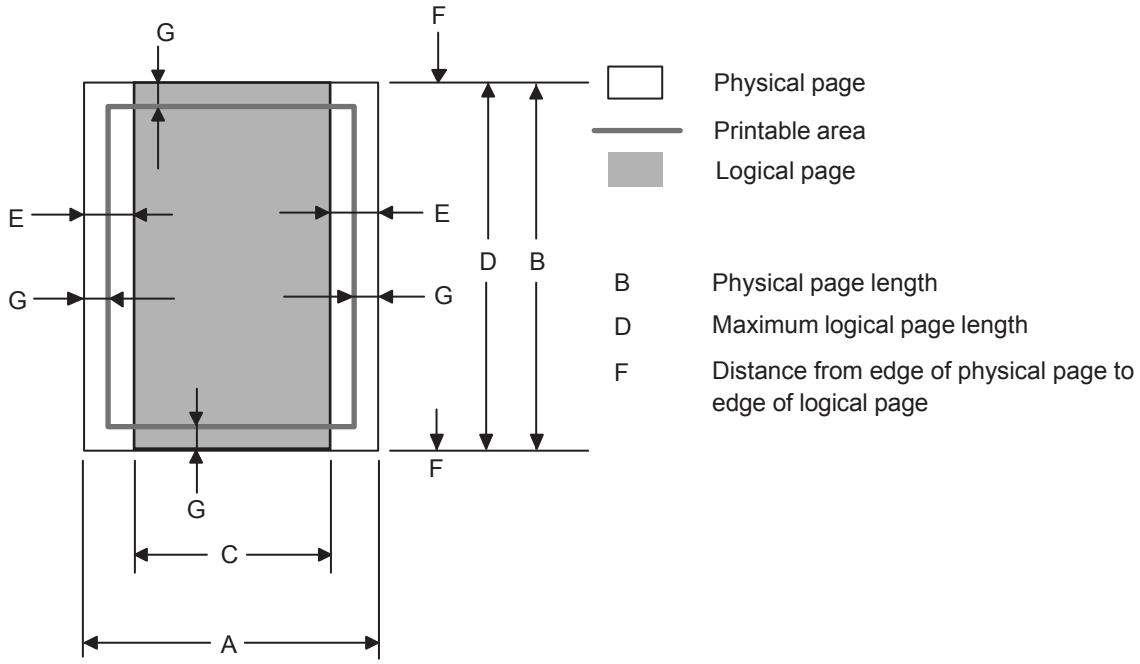
- Use paper that is made for plain-paper copying.
- Use papers that is 75 to 90g/m^2 (20 to 24lb).
- Use neutral paper. Do not use acidic or alkaline paper.
- Use long-grain paper.
- Use paper with a moisture content of approximately 5%.
- This printer can use recycled paper that meets DIN 19309 specifications.
- DO NOT use ink jet paper because it may cause a paper jam or damage your machine.

2.7 Printable Area

2.7.1 PCL5e emulation

When using PCL emulation, the edges of the paper that cannot be printed on are shown below.

Portrait



Note:

- “Logical page” shows the printable area for a PCL driver.
- “Printable area” shows mechanical printable area of the machine.
- Therefore, the machine can only print within the shaded area when you use a PCL driver.

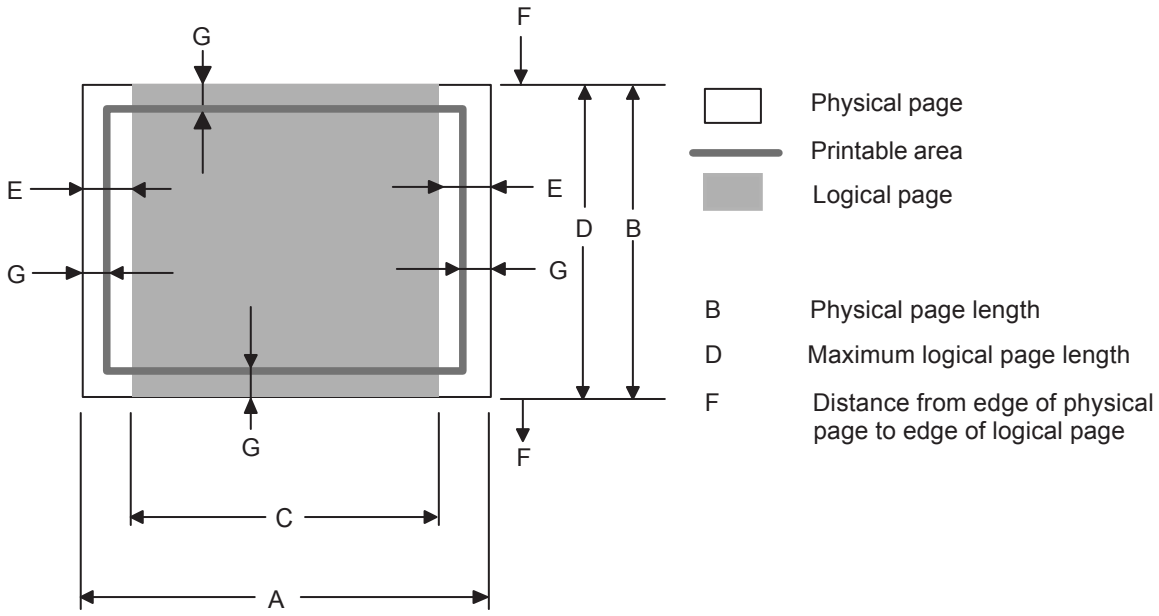
The table below shows the printable areas when printing on Portrait for each paper size.

Size	A	B	C	D	E	F	G
Letter	215.9mm 8.5" (2,550dots)	279.4mm 11.0" (3,300dots)	203.2mm 8.0" (2,400dots)	279.4mm 11.0" (3,300dots)	6.35mm 0.25" (75dots)	0mm	4.2mm 0.16" (50dots)
Legal	215.9mm 8.5" (2,550dots)	355.6mm 14.0" (4,200dots)	203.2mm 8.0" (2,400dots)	355.6mm 14.0" (4,200dots)	↑	0mm	4.2mm 0.16" (50dots)
Folio	215.9mm 8.5" (2,550dots)	330.2mm 13.0" (3,900dots)	203.2mm 8.0" (2,400dots)	330.2mm 13.0" (3,900dots)	↑	0mm	4.2mm 0.16" (50dots)
Executive	184.15mm 7.25" (2,175dots)	266.7mm 10.5" (3,150dots)	175.7mm 6.92" (2,025dots)	266.7mm 10.5" (3,150dots)	6.35mm 0.25" (75dots)	0mm	4.2mm 0.16" (50dots)
A4	210.0mm 8.27" (2,480dots)	297.0mm 11.69" (3,507dots)	198.0mm 7.79" (2,338dots)	297.0mm 11.69" (3,507dots)	6.01mm 0.24" (71dots)	0mm	4.2mm 0.16" (50dots)
A5	148.5mm 5.85" (1,754dots)	210.0mm 8.27" (2,480dots)	136.5mm 5.37" (1,612dots)	210.0mm 8.27" (2,480dots)	↑	0mm	4.2mm 0.16" (50dots)
A5 Long Edge						0mm	
A6	105.0mm 4.13" (1,240dots)	148.5mm 5.85" (1,754dots)	93.0mm 3.66" (1,098dots)	148.5mm 5.85" (1,754dots)	↑	0mm	4.2mm 0.16" (50dots)
B5 (JIS)	182.0mm 7.1" (2,130dots)	257.0mm 10.11" (3,033dots)	170.0mm 6.69" (2,007dots)	257.0mm 10.11" (3,033dots)	↑	0mm	4.2mm 0.16" (50dots)
B5 (ISO)	176.0mm 6.93" (2,078dots)	250.0mm 9.84" (2,952dots)	164.0mm 6.46" (1,936dots)	250.0mm 9.84" (2,952dots)	↑	0mm	4.2mm 0.16" (50dots)
B6 (ISO)	125.0mm 4.92" (1,476dots)	176.0mm 6.93" (2,078dots)	164.0mm 4.44" (1,334dots)	176.0mm 6.93" (2,078dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope Monarch	98.43mm 3.875" (1,162dots)	190.5mm 7.5" (2,250dots)	85.7mm 3.37" (1,012dots)	190.5mm 7.5" (2,250dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope Com-10	104.7mm 4.12" (1,237dots)	241.3mm 9.5" (2,850dots)	92.0mm 3.62" (1,087dots)	241.3mm 9.5" (2,850dots)	6.35mm 0.25" (75dots)	0mm	4.2mm 0.16" (50dots)
Envelope DL	111.0mm 4.33" (1,299dots)	220.0mm 8.66" (2,598dots)	98.0mm 3.86" (1,157dots)	220.0mm 8.66" (2,598dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope C5	162.0mm 6.38" (1,913dots)	229.0mm 9.01" (2,704dots)	150.0mm 5.9" (1,771dots)	229.0mm 9.01" (2,704dots)	6.01mm 0.24" (71dots)	0mm	4.2mm 0.16" (50dots)
Post Card	100.0mm 3.94" (1,181dots)	148.0mm 5.83" (1,748dots)	88.0mm 3.46" (1,039dots)	148.0mm 5.83" (1,748dots)	6.01mm 0.24" (71dots)	0mm	4.2mm 0.16" (50dots)
A4 Long	210.0mm 8.27" (2,480dots)	405.0mm 15.94" (4,783dots)	198.0mm 7,79" (2,338dots)	405.0mm 15.94" (4,783dots)	6.01mm 0.24" (71dots)	0mm	4.2mm 0.16" (50dots)
DL Long Edge	220.0mm 8.66" (2,598dots)	110.0mm 4.33" (1,299dots)	207.4mm 8.17" (2,450dots)	110.0mm 4.33" (1,299dots)	6.27mm 0.25" (74dots)	0mm	4.2mm 0.16" (50dots)
3X5	76.2mm 3.00" (900dots)	127.0mm 5.00" (1,500dots)	63.5mm 2.50" (750dots)	127.0mm 5.00" (1,500dots)	6.35mm 0.25" (75dots)	0mm	4.2mm 0.16" (50dots)

Note:

- The paper sizes indicated here should confirm to the nominal dimensions specified by JIS except B5 (ISO), B6 (ISO).
- The dot size is based on 300dpi resolution.

Landscape



Note:

- “Logical page” shows the printable area for a PCL driver.
- “Printable area” shows mechanical printable area of the machine.
- Therefore, the machine can only print within the shaded area when you use a PCL driver.

The table below shows the printable areas when printing on Landscape for each paper size.

Size	A	B	C	D	E	F	G
Letter	279.4mm 11.0" (3,300dots)	215.9mm 8.5" (2,550dots)	269.3mm 10.6" (3,180dots)	215.9mm 8.5" (2,550dots)	5.0mm 0.2" (60dots)	0mm	4.2mm 0.16" (50dots)
Legal	355.6mm 14.0" (4,200dots)	215.9mm 8.5" (2,550dots)	345.5mm 13.6" (4,080dots)	215.9mm 8.5" (2,550dots)	↑	0mm	4.2mm 0.16" (50 dots)
Folio	330.2mm 13.0" (3,900 dots)	215.9mm 8.5" (2,550dots)	320.0mm 12.6" (3,780dots)	215.9mm 8.5" (2,550dots)	↑	0mm	4.2mm 0.16" (50dots)
Executive	266.7mm 10.5" (3,150dots)	184.15mm 7.25" (2,175dots)	256.6mm 10.1" (3,030dots)	184.15mm 7.25" (2,175dots)	5.0mm 0.2" (60dots)	0mm	4.2mm 0.16" (50dots)
A4	297.0mm 11.69" (3,507dots)	210.0mm 8.27" (2,480dots)	287.0mm 11.2" (3,389dots)	210.0mm 8.27" (2,480dots)	4.8mm 0.19" (59dots)	0mm	4.2mm 0.16" (50dots)
A5	210.0mm 8.27" (2,480dots)	148.5mm 5.85" (1,754dots)	200.0mm 7.87" (2,362dots)	148.5mm 5.85" (1,754dots)	↑	0mm	4.2mm 0.16" (50dots)
A5 Long Edge						0mm	
A6	148.5mm 5.85" (1,754dots)	105.0mm 4.13" (1,240dots)	138.5mm 5.45" (1,636dots)	105.0mm 4.13" (1,240dots)	↑	0mm	4.2mm 0.16" (50dots)
B5 (JIS)	257.0mm 10.11" (3,033dots)	182.0mm 7.1" (2,130dots)	247.0mm 9.72" (2,916dots)	182.0mm 7.1" (2,130dots)	↑	0mm	4.2mm 0.16" (50dots)
B5 (ISO)	250.0mm 9.84" (2,952dots)	176.0mm 6.93" (2,078dots)	240.0mm 9.44" (2,834dots)	176.0mm 6.93" (2,078dots)	↑	0mm	4.2mm 0.16" (50dots)
B6 (ISO)	176.0mm 6.93" (2,078dots)	125.0mm 4.92" (1,476dots)	166.4mm 6.55" (1,960dots)	125.0mm 4.92" (1,476dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope Monarch	190.5mm 7.5" (2,250dots)	98.43mm 3.875" (1,162dots)	180.4mm 7.1" (2,130dots)	98.43mm 3.875" (1,162dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope Com-10	241.3mm 9.50" (2,850dots)	104.7mm 4.12" (1,237dots)	231.1mm 9.10" (2,730dots)	104.7mm 4.12" (1,237dots)	5.0mm 0.20" (60dots)	0mm	4.2mm 0.16" (50dots)
Envelope DL	220mm 8.66" (2,598dots)	110mm 4.33" (1,299dots)	210.0mm 8.26" (2,480dots)	110mm 4.33" (1,299dots)	↑	0mm	4.2mm 0.16" (50dots)
Envelope C5	229mm 9.01" (2,704dots)	162mm 6.38" (1,913dots)	219.0mm 8.62" (2,586dots)	162mm 6.38" (1,913dots)	4.8mm 0.19" (59dots)	0mm	4.2mm 0.16" (50dots)
Post Card	148mm 5.83" (1,748dots)	100mm 3.94" (1,181dots)	138mm 5.43" (1,630dots)	100mm 3.94" (1,181dots)	4.8mm 0.19" (59dots)	0mm	4.2mm 0.16" (50dots)
A4 Long	405mm 15.94" (4,783dots)	210mm 8.27" (2,480dots)	395mm 15.55" (4,665dots)	210mm 8.27" (2,480dots)	4.8mm 0.19" (59dots)	0mm	4.2mm 0.16" (50dots)
DL Long Edge	110mm 4.33" (1,299dots)	220mm 8.66" (2,598dots)	97.5mm 3.84" (1,151dots)	220mm 8.66" (2,598dots)	4.2mm 0.16" (50dots)	0mm	6.27mm 0.25" (74dots)
3X5	127mm 5.00" (1,500dots)	76.2mm 3.00" (900dots)	116.8mm 4.60" (1,380dots)	76.2mm 3.00" (900dots)	5.0mm 0.20" (60dots)	0mm	4.2mm 0.16" (50dots)

Note:

- The paper sizes indicated here should confirm to the nominal dimensions specified by JIS except B5 (ISO), B6 (ISO).
- The dot size is based on 300dpi resolution.

2.7.2 PCL6 emulation

You cannot print within 4.2mm (50dots in 300dpi mode) on all four sides of the paper.

2.8 Print Speeds with Various Settings

Print speed is up to 22ppm for A4 size and 23ppm for Letter size when loading A4 or Letter size paper from the paper tray in the plain paper mode.

Actual print speed varies depending on the media type or paper size as shown in the tables below;

<A4/Letter size>

Media type setting	All models
Thin Paper	11ppm (MFC7320) 20/21ppm (MFC7340) 22/23ppm (DCP7030/7040/7045N, MFC7440N/7840W)
Plain Paper	
Recycled Paper	
Thick Paper, Envelopes, Envelopes Thin	10ppm
Thicker Paper, Envelopes Thick	4ppm

<Smaller size than A4 or Letter>

Media type setting	All models
Thin Paper	22/23ppm
Plain Paper	300 seconds 22/23ppm → 8ppm
Recycled Paper	300 seconds 22/23ppm → 8ppm
Thick Paper, Envelopes, Envelopes Thin	30 seconds 22/23ppm → 8ppm
Thicker Paper, Envelopes Thick	4ppm

Note:

- The print speed may vary according to conditions, such as paper size and paper tray.
- When a smaller size paper than A4 or Letter is printed, the temperature on both edges of the fuser unit is much higher than the temperature on the center of the unit where the paper is fed depending on the setting or model. Therefore, the print speed is slowed in order to decrease the temperature on the edges after the specified time, it is maximum print speed when you first start printing.
- The actual print speed varies depending on the paper size.

2.9 Telephone

Model		DCP 7030	DCP 7040	DCP 7045N
Handset		N/A		
Chain Dialing		N/A		
Automatic Redial		N/A		
PBX Feature		N/A		
Speaker Phone		N/A		
Hold/Mute Key		N/A		
Music on Hold		N/A		
Volume	Handset Volume	N/A		
	Speaker Volume	N/A		
	Beeper Volume	Yes (3 steps + OFF)		
	Ring Volume	N/A		
Quick/ Auto Dials	One-Touch Dial	N/A		
	Speed Dial	N/A		
	Figures of One-Touch & Speed Dial	N/A		
	Resisterable Number Of Characters	N/A		
	Group Dial	N/A		
	Telephone Index (Search)	N/A		
TEL Service	Caller ID	N/A		
	Call Waiting Caller ID	N/A		
	Call waiting Ready (Only for U.S.A.)	N/A		
	Distinctive Ringing	N/A		

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Handset		N/A			
Chain Dialing		Yes			
Automatic Redial		Yes			
PBX Feature		Yes	N/A	Yes (Europe only)	
Speaker Phone		N/A			
Hold/Mute Key		N/A			
Music on Hold		N/A			
Volume	Handset Volume	N/A			
	Speaker Volume	Yes (3 steps + OFF)			
	Beeper Volume	Yes (3 steps + OFF)			
	Ring Volume	Yes (3 steps + OFF)			
Quick/ Auto Dials	One-Touch Dial	8 (4 × 2) locations			
	Speed Dial	200 locations			
	Figures of One-Touch & Speed Dial	20 digits			
	Resisterable Number Of Characters	15 characters			
	Group Dial	Yes (up to 8 groups)			
	Telephone Index (Search)	Yes (with ▼key)			
TEL Service	Caller ID	Yes			
	Call Waiting Caller ID	N/A			
	Call waiting Ready (Only for U.S.A.)	N/A			
	Distinctive Ringing	Yes (UK/Denmark only)	Yes	Yes (U.S.A./Canada/UK/Denmark Oceania only)	

2.10 Fax

Model		DCP 7030	DCP 7040	DCP 7045N
Modem Speed		N/A		
Transmission Speed	Mono	N/A		
ITU-T Group		N/A		
Coding Method		N/A		
Color FAX (Document)	Send	N/A		
	Receive	N/A		
Color FAX (Memory)	Send	N/A		
	Receive	N/A		
Fax/Tel Switch		N/A		
Super Fine		N/A		
Gray Scale		N/A		
Contrast		N/A		
Smoothing		N/A		
Dual Access		N/A		
Enhanced Remote Activate		N/A		
Station ID		N/A		
Remote Maintenance		N/A		
Remote Access		N/A		
Fax Retrieval		N/A		
Paging		N/A		
Internet FAX (ITU T.37 simple mode)		N/A		
Sending	Delayed Timer	N/A		
	Polled Sending	N/A		
	Multi Transmission	N/A		
	Multi Resolution Transmission	N/A		
	Next-Fax Reservation	N/A		
	Batch Transmission	N/A		
	Call Reservation Over Auto TX	N/A		
	Call Reservation Over Manual TX	N/A		
	Quick-Scan (Memory transmission)	N/A		
	Memory Transmission	N/A		
	ECM (Error Correction Mode)	N/A		
	Error Re-Transmission	N/A		
	Broadcasting	N/A		
	Manual Broadcasting	N/A		

Model			DCP 7030	DCP 7040	DCP 7045N
Sending	Fax Forward		N/A		
	Fax Forward Broadcast		N/A		
	Duplex Fax Send		N/A		
	Dial Restriction		N/A		
Receiving	Easy Receive/Fax Detect		N/A		
	Polling Receiving		N/A		
	Auto Reduction		N/A		
	Duplex Fax Receive		N/A		
	Out-of-Paper Reception		N/A		
	Fax Rx Stamp		N/A		
List/Report	Activity Report/Journal Report		N/A		
	Transmission Verification Report		N/A		
	Coverpage		N/A		
	Help List		N/A		
	Call Back Message		N/A		
	Caller ID List		N/A		
	Quick Dial List		N/A		
	Quick Dial List (empty box is not printed out)		N/A		
	Tel Index List	Numeric	N/A		
		Alphabetic	N/A		
	Memory Status List		N/A		
	System Setup (User Setting) List		Yes		
	Order Form		N/A		

Model			MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Modem Speed			14,400bps (Fax)			33,600bps (Fax)
Transmission Speed		Mono	Approx. 6seconds (Brother#1 Std resolution, MMR)			Approx. 2seconds (Brother#1 Std resolution, JBIG)
ITU-T Group			G3			Super G3
Coding Method			MH / MR / MMR			MH / MR / MMR / JBIG
Color FAX (Document)		Send	N/A			
		Receive	N/A			
Color FAX (Memory)		Send	N/A			
		Receive	N/A			
Fax/Tel Switch			Yes			
Super Fine			Yes (TX & RX)			
Gray Scale			8bit/256			
Contrast			Yes (Auto/Light/Dark)			
Smoothing			N/A			
Dual Access			Yes			
Enhanced Remote Activate			Yes			
Station ID			Yes (20digits / 20characters)			
Remote Maintenance			Yes			
Remote Access			Yes			
Fax Retrieval			Yes			
Paging			N/A	Yes (U.S.A./Canada only)		
Internet FAX (ITU T.37 simple mode)			N/A		Yes (Download only)	
Sending	Delayed Timer		Yes (up to 50)			
	Polled Sending		Yes (Europe Secure Polling)			
	Multi Transmission		N/A			
	Multi Resolution Transmission		N/A			
	Next-Fax Reservation		N/A			
	Batch Transmission		Yes			
	Call Reservation Over Auto TX		N/A			
	Call Reservation Over Manual TX		N/A			

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Sending	Quick-Scan (Memory transmission)	Approx. 2.5 seconds/page (A4/Letter Standard Resolution)			
	Memory Transmission	Up to 400 pages (ITU-T Test Chart, Standard Resolution, MMR) Up to 500 pages (Brother #1Chart, Standard Resolution, MMR)			Up to 500 pages (ITU-T Test Chart, Standard Resolution, JBIG) Up to 600 pages ((Brother #1Chart, Standard Resolution, JBIG)
	ECM (Error Correction Mode)	Yes			
	Error Re-Transmission	Yes			
	Broadcasting	Yes (258 locations)			
	Manual Broadcasting	Yes (50 locations)			
	Fax Forward	Yes			
	Fax Forward Broadcast	Yes (207 locations)			
	Duplex Fax Send	N/A			
	Dial Restriction	Yes			
Receiving	Easy Receive/Fax Detect	Yes			
	Polling Receiving	Yes			
	Auto Reduction	Yes			
	Duplex Fax Receive	N/A			
	Out-of-Paper Reception	Up to 400 pages (ITU-T Test Chart, Standard Resolution, MMR) Up to 500 pages (Brother #1Chart, Standard Resolution, MMR)			Up to 500 pages (ITU-T Test Chart, Standard Resolution, JBIG) Up to 600 pages (Brother #1Chart, Standard Resolution, JBIG)
	Fax Rx Stamp	Yes			
List/Report	Activity Report/Journal Report	Yes (up to 200)			
	Transmission Verification Report	Yes			
	Coverpage	Yes (Super)			
	Help List	Yes			
	Call Back Message	N/A			
	Caller ID List	Yes			
	Quick Dial List	N/A			

Model			MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
List/Report	Quick Dial List (empty box is not printed out)		Yes			
	Tel Index List	Numeric	Yes			
		Alphabetic	Yes			
	Memory Status List		N/A			
	System Setup (User Setting) List		Yes			
	Order Form		Yes	Yes (Oceania only)	Yes(Europe/Oceania only)	

2.11 Copy

Model		DCP 7030	DCP 7040	DCP 7045N
Copy Speed		Up to 22cpm(A4)* Up to 23cpm(Letter)		Up to 22cpm(A4)*
First Copy Out Time (from READY mode)		less than 15 seconds		
Multi Copy	Stack	Yes (up to 99)		
	Sort	Yes		
Reduction/Enlargement (%)		25% - 400% in 1% increments		
Resolution (dpi)		Print: 600 x 600 dpi, 1200 dpi class		
Auto Duplex Copy		N/A		
Manual Duplex Copy		N/A		
N in 1		Yes		
Poster		N/A		
Image Enhancement		N/A		

* The copy speed may vary according to the specifications.

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Copy Speed		Up to 18cpm (A4)*	Up to 20cpm (A4)* Up to 21cpm (Letter)	Up to 22cpm(A4)* Up to 23cpm(Letter)	
First Copy Out Time (from READY mode)		less than 15 seconds			
Multi Copy	Stack	Yes (up to 99)			
	Sort	Yes			
Reduction/Enlargement (%)		25% - 400% in 1% increments			
Resolution (dpi)		Print: 600 x 600 dpi, 1200 dpi class			
Auto Duplex Copy		N/A			
Manual Duplex Copy		N/A			
N in 1		Yes			
Poster		N/A			
Image Enhancement		N/A			

* The copy speed may vary according to the specifications.

2.12 Scanner

Model		DCP 7030	DCP 7040	DCP 7045N
Color/Mono		Color		
Resolution (Optical)	From Glass	Maximum 600 x 2400 dpi (color & mono)		
	From ADF	N/A	Maximum 600 x 600 dpi (color & mono)	
Resolution (Interporated)		19,200 x 19,200 dpi		
Scanning Speed	Monochrome	4.95 seconds (Letter)/5.26 seconds (A4) *1		
	Full Color	7.48 seconds (Letter)/7.95 seconds(A4) *1		
Gray Scale		256		
Color Depth (Int. /Ext.)		24 bit/24 bit		
Custom Scan Profile		N/A		
Duplex Scan		N/A		
Scan Functions	Scan to E-mail	Yes		
	Scan to Email Server (I-Fax)	N/A		
	Scan to Image	Yes		
	Scan to OCR	Yes		
	Scan to File	Yes		
	Scan to FTP	N/A		

*1 Time to scan Letter/A4 sheet at 300 dpi. The time may vary depending on the document type and other conditions. Data transmission time is not included.

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Color/Mono		Color			
Resolution (Optical)	From Glass	Maximum 600 x 2400 dpi (color & mono)			
	From ADF	Maximum 600 x 600 dpi (color & mono)			
Resolution (Interporated)		19,200 x 19,200 dpi			
Scanning Speed	Monochrome	4.95 seconds (Letter)/5.26 seconds (A4) *1			
	Full Color	7.48 seconds (Letter)/7.95 seconds(A4) *1			
Gray Scale		256			
Color Depth (Int. /Ext.)		24 bit/24 bit			
Custom Scan Profile		N/A		Yes	
Duplex Scan		N/A			
Scan Functions	Scan to E-mail	Yes			
	Scan to Email Server (I-Fax)	N/A		Yes (Download only)	
	Scan to Image	Yes			
	Scan to OCR	Yes			
	Scan to File	Yes			
	Scan to FTP	N/A		Yes	

*1 Time to scan Letter/A4 sheet at 300 dpi. The time may vary depending on the document type and other conditions. Data transmission time is not included.

2.13 Service (Not to be used in sales leaflet)

Model		DCP 7030	DCP 7040	DCP 7045N
Machine Life		50,000 pages (A4 or Letter) or 5 years		
Machine Life (ADF)		50,000 pages or 5 years		
Machine Life (Scans)		50,000 pages or 5 years		
Monthly Volume		10,000 pages		
Recommended Monthly Volume		250 to 2,000 pages		
Periodical Replacement Parts	Fusing Unit	50,000 pages		
	Separation Pad	50,000 pages		
	Picup Roller	50,000 pages		
	Scanner Unit	50,000 pages		
MTBF		4,000 hours		
MTTR		0.5 hours		

Model		MFC 7320	MFC 7340	MFC 7440N	MFC 7840W
Machine Life		50,000 pages (A4 or Letter) or 5 years			
Machine Life (ADF)		50,000 pages or 5 years			
Machine Life (Scans)		50,000 pages or 5 years			
Monthly Volume		10,000 pages			
Recommended Monthly Volume		250 to 2,000 pages			
Periodical Replacement Parts	Fusing Unit	50,000 pages			
	Separation Pad	50,000 pages			
	Picup Roller	50,000 pages			
	Scanner Unit	50,000 pages			
MTBF		4,000 hours			
MTTR		0.5 hours			

REFERENCE 2 THEORY OF OPERATION

1. GENERAL BLOCK DIAGRAM

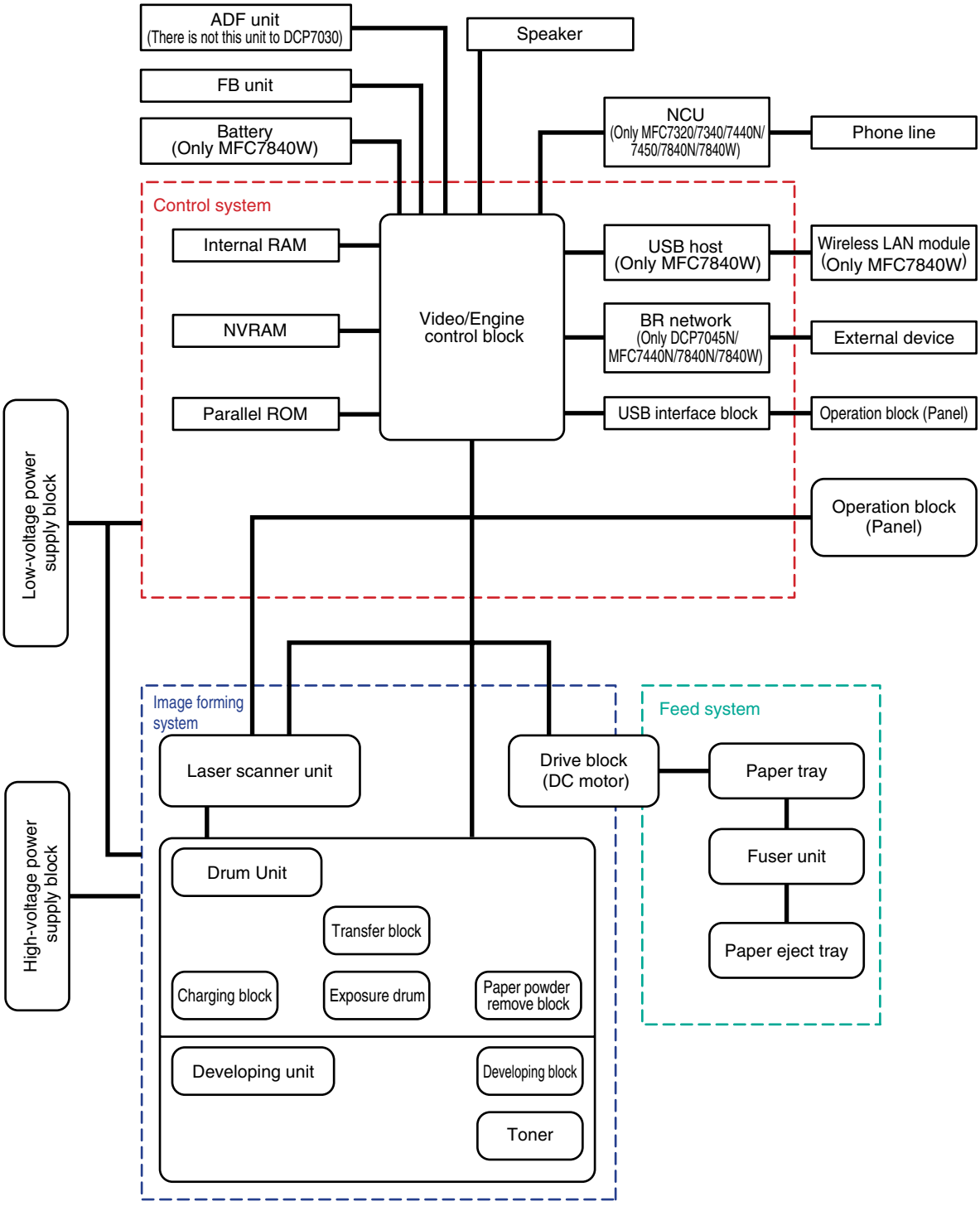


Fig. Ref. 2-1

2. ELECTRONICS GENERAL BLOCK DIAGRAM

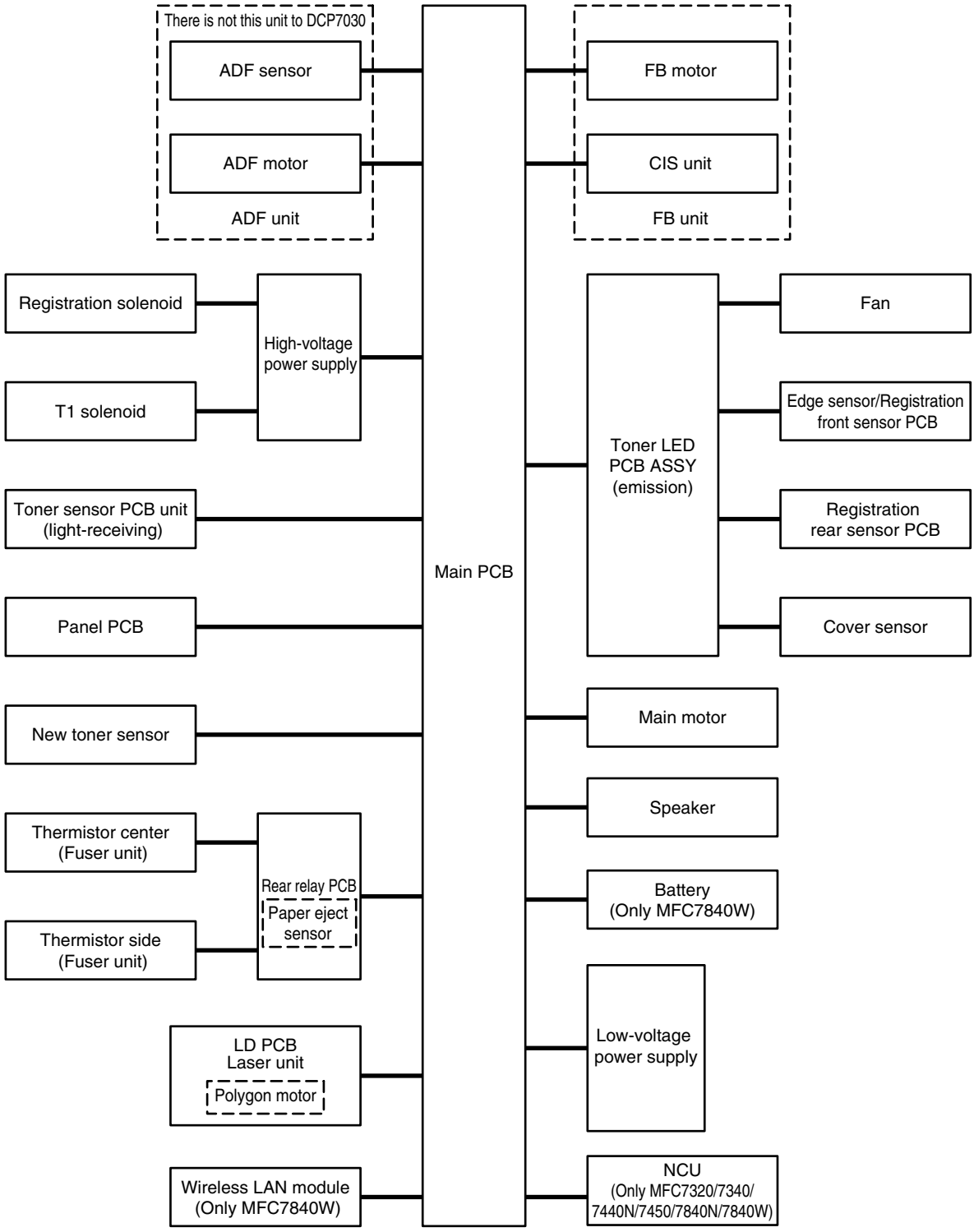


Fig. Ref. 2-2

3. MECHANICS

3.1 Cross-section Drawing

■ Printer part

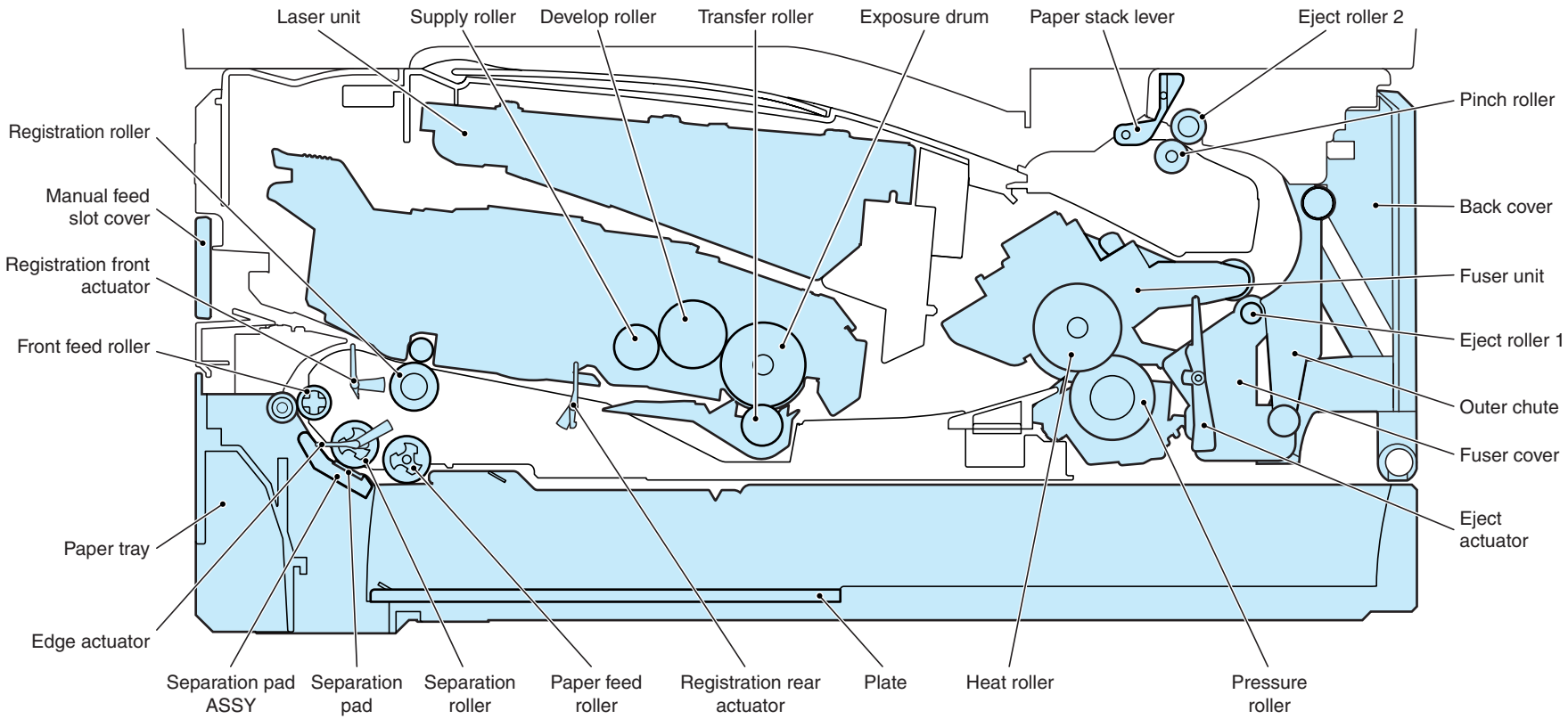


Fig. Ref. 2-3

■ ADF part

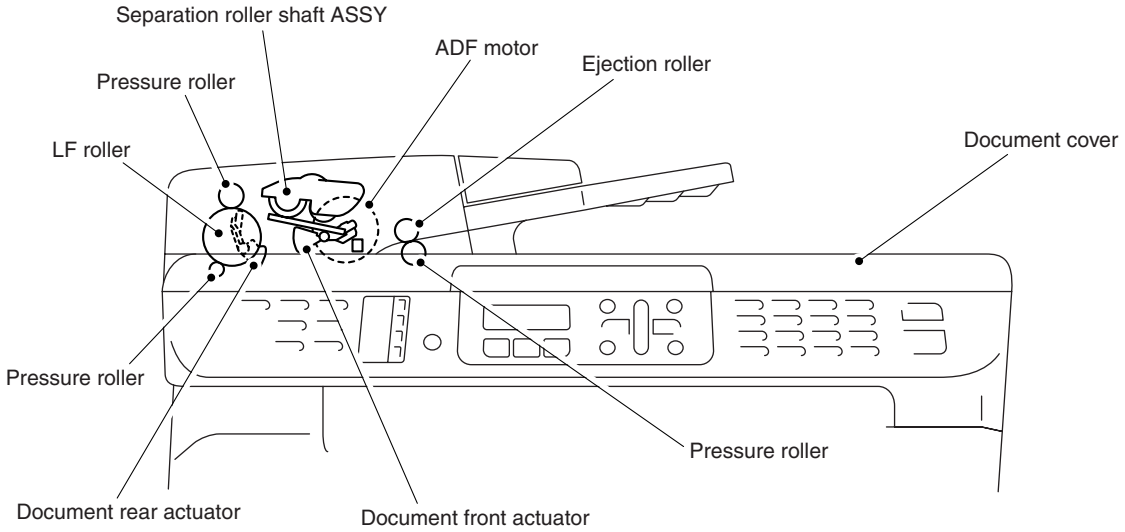


Fig. Ref. 2-4

3.2 Paper Feeding

The following figure shows the paper feeding paths.

■ Printer part

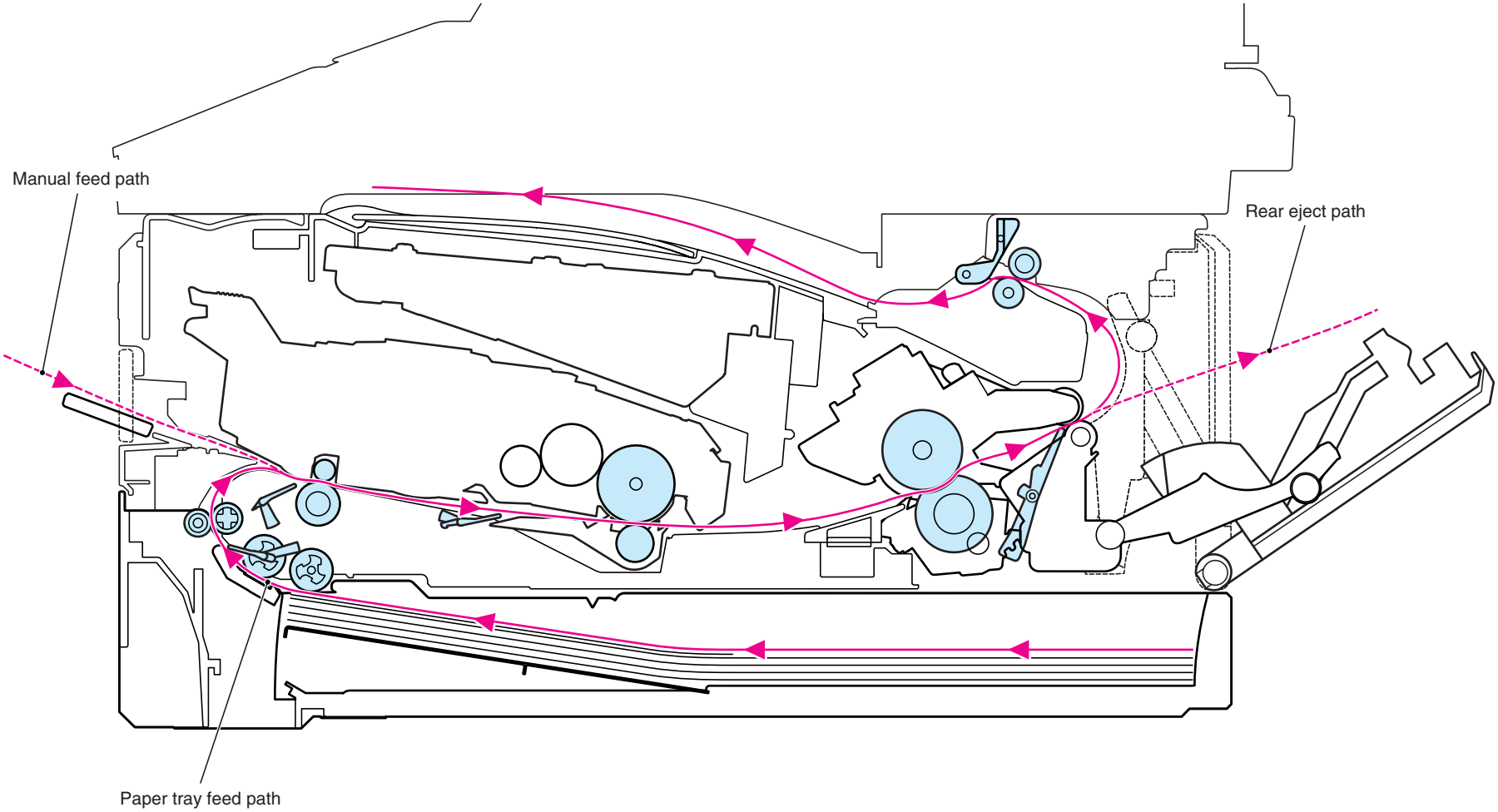


Fig. Ref. 2-5

3.2.1 Plate-up Function of the Paper Tray

The plate of the paper tray is pushed up by the force exerted by the motor not by springs so as to keep paper-feeding performance constant irrespective of the quantity of paper remaining in the tray. This paragraph provides an overview of this function.

At the time of inserting the paper tray into the main body of the machine, the plate is kept lowered. When the main motor is operated under such condition, a driving force is transmitted to the lift gear 46 by way of several gears. The force is also transmitted to the plate-up plate to push up the plate.

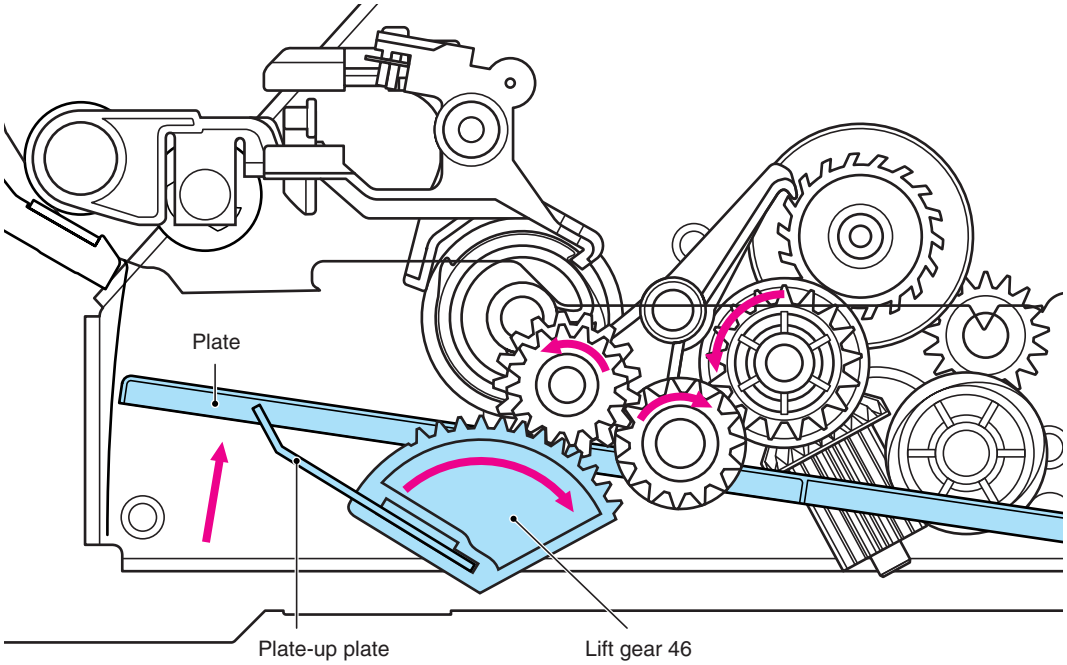


Fig. Ref. 2-6

When the plate is pushed up, the roller holder goes up. Then the lift arm goes down and the hook B is released. The PP gear clutch cam released off the hook B rotates to push down the rib of the hook A. Subsequently, the ratchet of the hook A for the clutch gear deviates from the gear and the plate-up plate stops its push-up function.

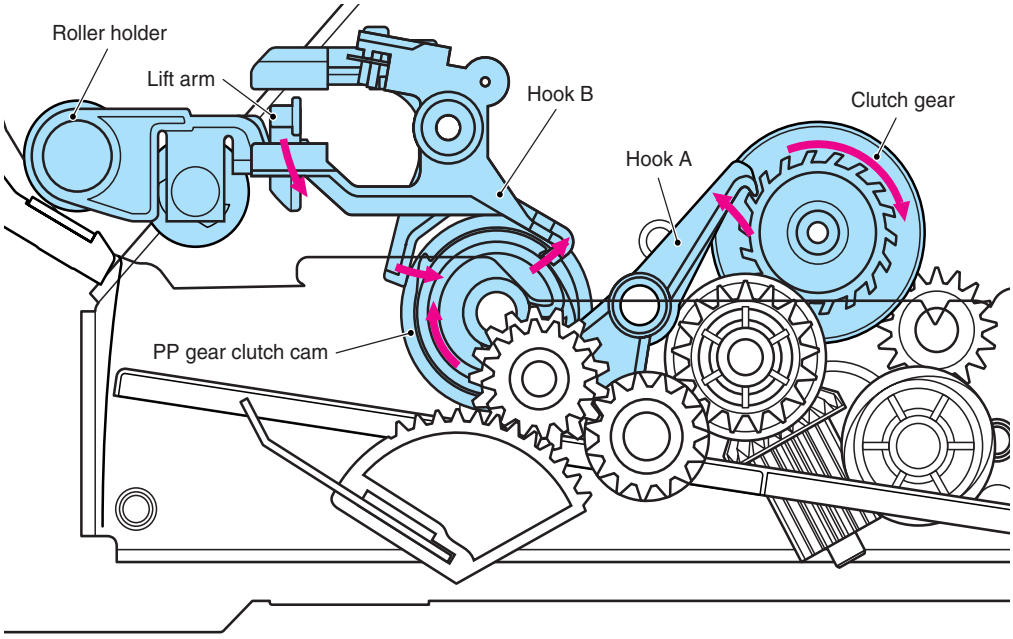


Fig. Ref. 2-7

3.2.2 Paper Supply

The paper feed roller picks up one or a few sheets of paper from the paper tray every time it is rotated and feeds it to the separation roller. Subsequently, stacks of paper are caught between the separation roller and separation pad, then separated into single sheets.

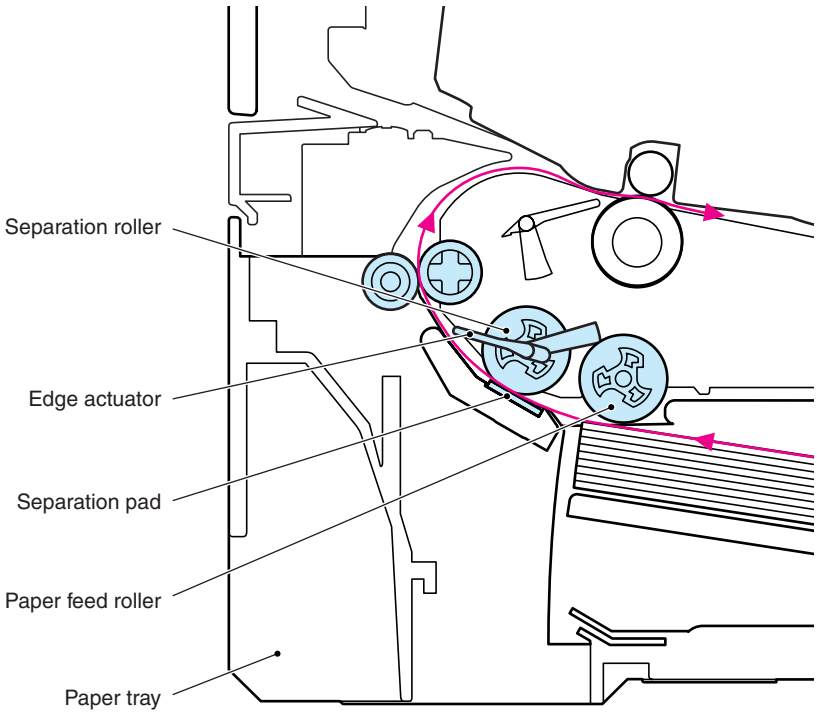


Fig. Ref. 2-8

<Operation of Actuators>

- The edge actuator detects the rear edge of the paper.

3.2.3 Paper Registration

The front-edge position of a sheet of paper after separation by the separation roller is detected by the registration front actuator. When the front edge of the paper reaches the registration roller after being carried for a certain time, it hits the stopped registration roller and the inclination of the paper is corrected. After such correction, the registration roller is rotated in the normal direction and the paper is carried to the transfer roller.

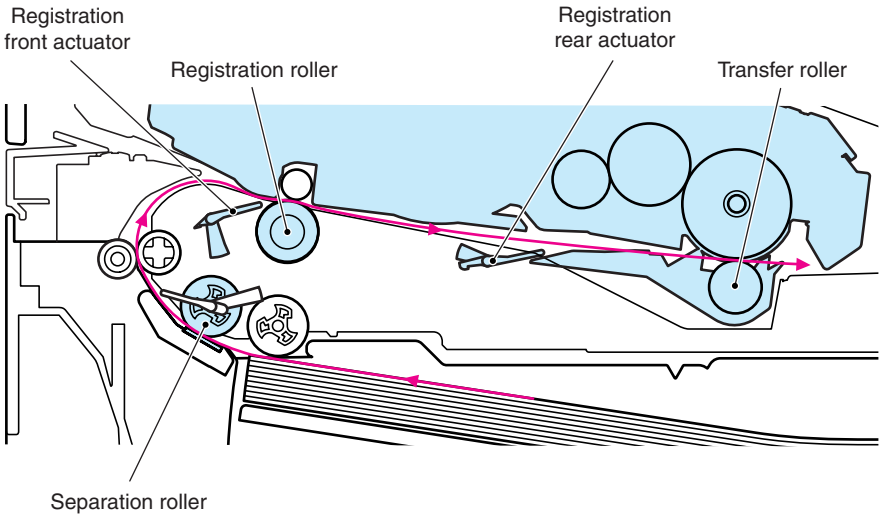


Fig. Ref. 2-9

<Operation of Actuators>

- The registration front actuator detects the front-edge of the paper, and controls the drive of registration roller and detects the passage of the paper.
- The registration rear actuator adjusts the starting position for writing on a sheet of paper.

3.2.4 Paper Eject

Toner on paper is fused by the heat roller and pressure roller of the fuser unit. Paper moves along the outer chute and is ejected into the face-down output tray from the eject roller 2 with its print side down.

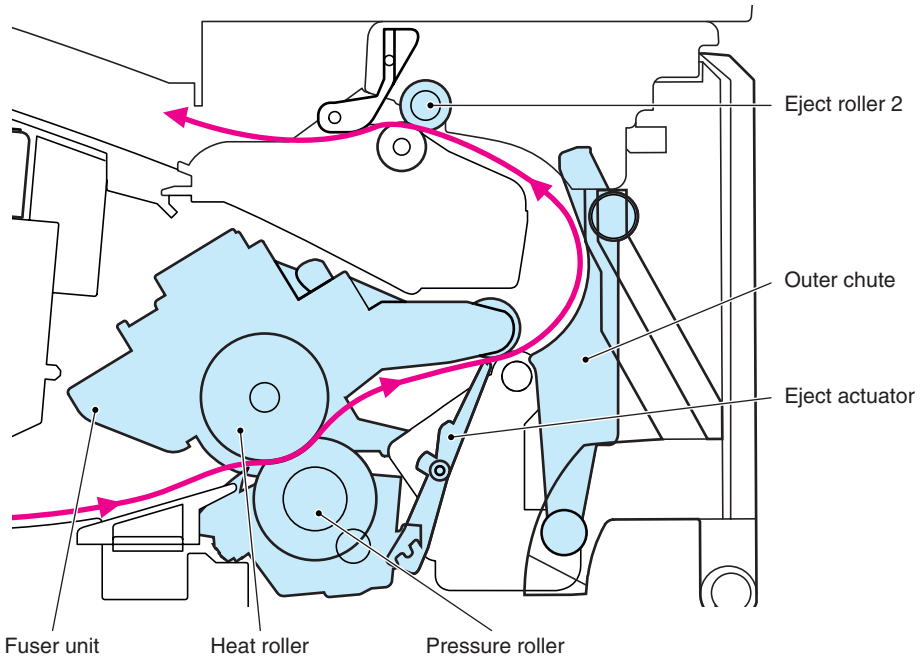


Fig. Ref. 2-10

Memo :

When a paper jam is detected near the eject actuator, the main motor reverses to move the gears out of engagement. The eject roller 2 become free, allowing the paper jam to be cleared.

<Operation of Actuators>

- The eject actuator detects whether or not paper is ejected from the fuser unit.

3.2.5 Paper Feeding from the Manual feed slot/Paper Eject from the Back

When manual feeding, one sheet of paper inserted from the manual feed slot presses the registration front actuator, and detects that there is paper, then the paper is fed.

When print with the back cover opened, the printed paper is ejected from the back of the machine with its print side up.

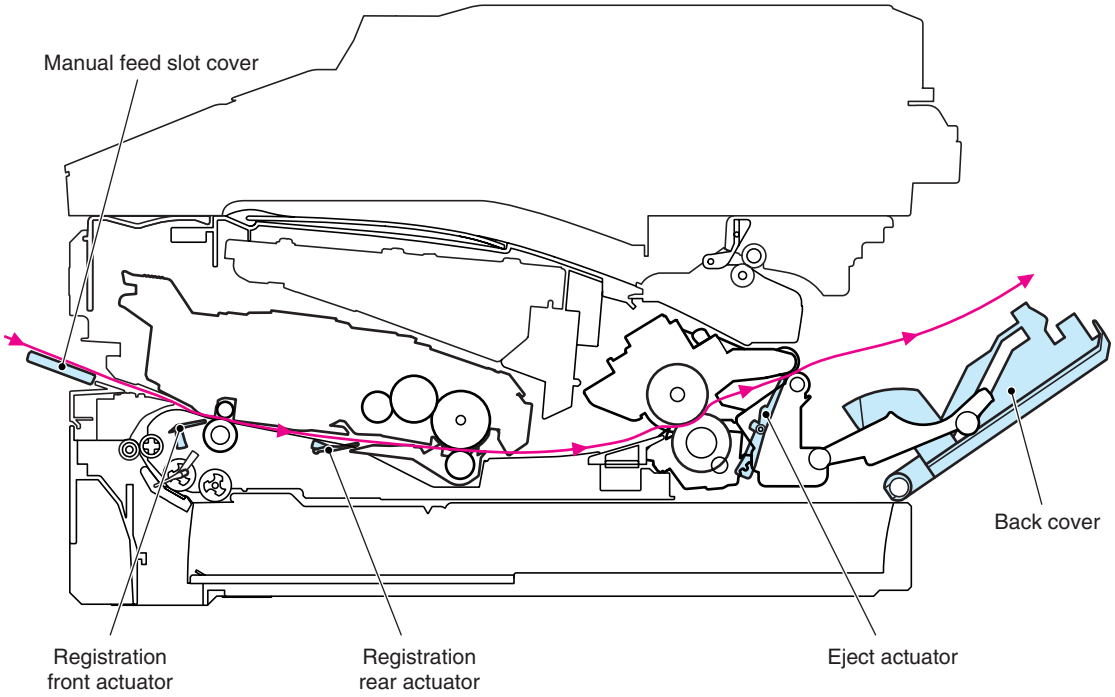


Fig. Ref. 2-11

3.3 ADF

The following figure shows the document feeding paths.

■ ADF part

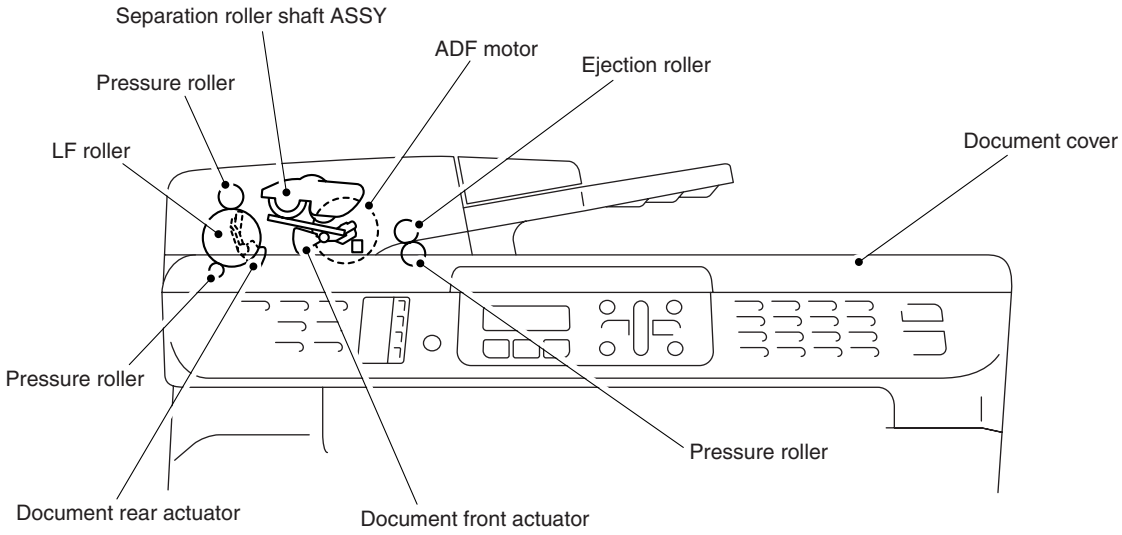


Fig. Ref. 2-12

This mechanism consists of the document cover, the document scanner unit (scanner cover), and the automatic document feeder (ADF).

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

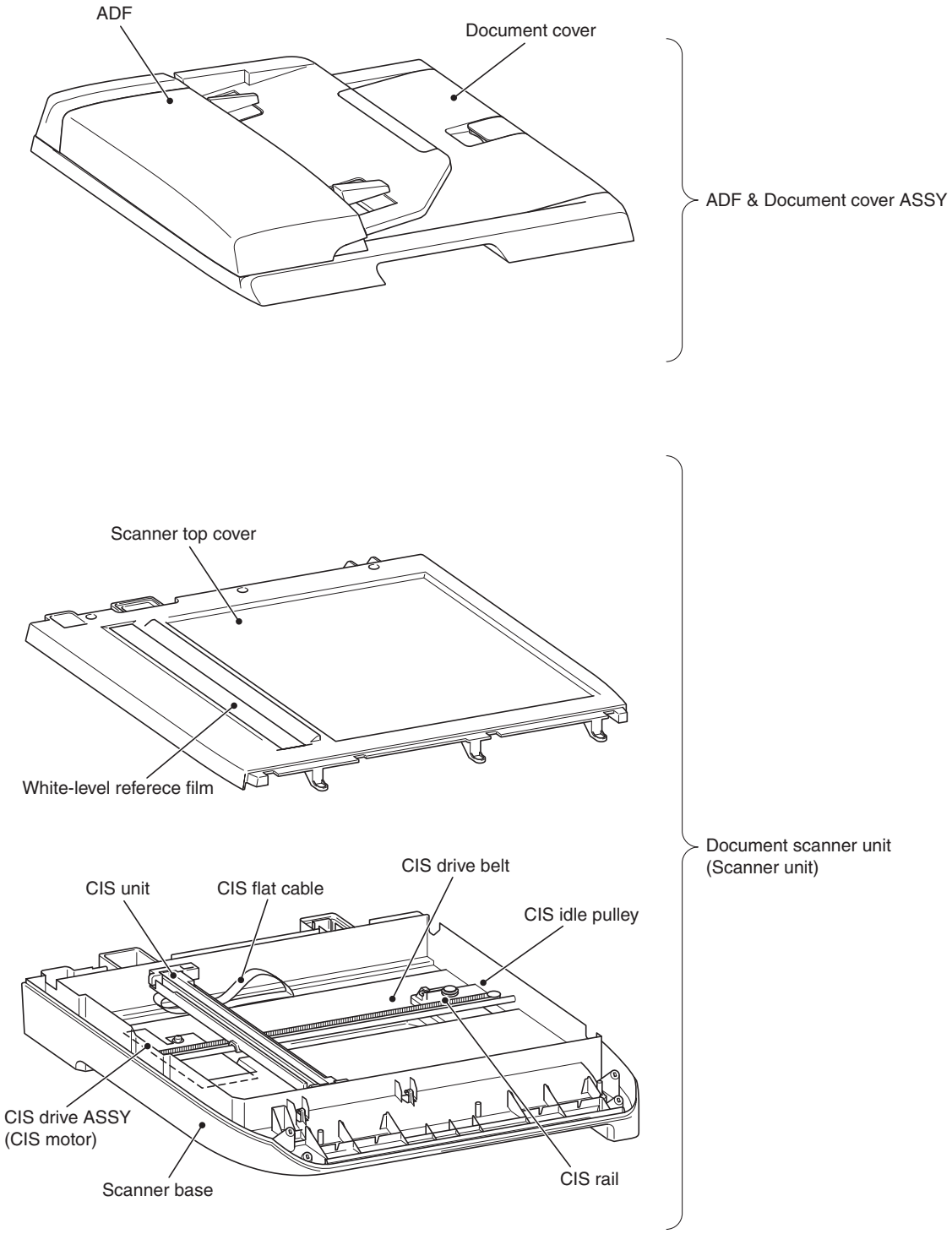


Fig. Ref. 2-13

This scanner mechanism supports a dual scanning system: ADF scanning and flat-bed scanning. They automatically switch to the former at the start of a scan operation if the document front sensor inside the ADF detects a document.

(1) ADF scanning: Document moves across stationary CIS unit
Placing a document ***face up*** in the document support activates the document front sensor, switching to ADF scanning.
The CIS drive mechanism (details below) operates for each scanning command executed. The CIS unit first moves to the white-level reference film for white level compensation and then to the ADF scanning position.
The ADF motor then rotates the document pull-in roller to pull the document into the ADF.
The document separation roller feeds the pages one at a time, ***starting from the top,*** to the document feed roller, which rotates to move the page in a curve left, down, and right. The page is scanned as it passes over the CIS unit. It then leaves the machine ***face down*** onto the document cover. The machine inserts subsequent pages under this one to preserve the document page order.

(2) Flat-bed scanning: CIS unit moves under stationary document
The user lifts the document cover, places a page (or open book) ***face down*** on the glass plate, and closes the document cover. The CIS drive mechanism (details below) operates for each scanning command executed. The CIS unit first moves to the white-level reference film for white level compensation.
It then moves right, scanning as it goes. It returns to its home position after the scan.

CIS drive mechanism

The contact image sensor (CIS) unit rides along the CIS rail driven by the CIS drive belt. Clockwise motion of the CIS motor moves the unit to the left; counterclockwise motion, to the right. This unit consists of the glass cover, the document illumination LED array, the self-focus lens array gathering the light reflected from the scanned image, the CIS PCB converts the light input to pixel data output.

3.4 Toner Cartridge

3.4.1 Methods for Detecting and Counting Toner Life

"Toner Life End" is displayed in one of two ways. First is when detection is performed by the toner sensor; Second is when the rotation rate of the develop roller reaches its upper limit.

(1) Detection by the toner sensor

The amount of toner remaining can be detected by checking the imperviousness to light of the toner in the cartridge by means of the transmissive photosensor.

(2) Detection by means of rotation rates of the develop roller reached its upper limit

The upper limit of such rotation rates can be detected before the develop roller becomes unusable due to wear.

<When a new toner cartridge is inserted>

Corresponding counter, Setting value	Operation
Counter of toner cartridge changes	+1
Page counter for each toner cartridge	Reset (0)
Coverage for each toner cartridge	Reset (0)
Developing bias voltage	Reset (Initial setting)

<When a used toner cartridge is inserted BEFORE "Toner Life End" is displayed>

Corresponding counter, Setting value	Operation
Counter of toner cartridge changes	No count up
Page counter for each toner cartridge	Continued
Coverage for each toner cartridge	Continued
Developing bias voltage	Continued (The print may fade.)

<When a used toner cartridge is inserted AFTER "Toner Life End" is displayed>

A count value before changes is continuously indicated as a rotation rate of the develop roller. Irrespective of the amount of toner, printing becomes disabled when the rotation rate reaches the upper limit.

Corresponding counter, Setting value	Operation
Counter of toner cartridge changes	No count up
Page counter for each toner cartridge	Continued
Coverage for each toner cartridge	Continued
Developing bias voltage	Continued

3.4.2 Toner Life End

A new toner cartridge can print in standard toner approximately 1,500, with high capacity toner, approximately 2,600 and with starter toner approximately 1,000 in the case of A4 or Letter size single-sided pages in accordance with ISO/IEC 19752.

The message “Toner Life End” is displayed by the number of cumulative rotation of the developer roller reaching the rated value to wear on the surface of the develop roller and deterioration of the toner seal, inhibiting printing operations. The upper limit of the rotation rate of the develop roller is as follows. For standard toner 27,000 rotations (1,800 pages x 15 rotations). For high-capacity toner 45,000 rotations (3,000 pages x 15 rotations). For starter toner 18,000 rotations (1.200 pages x 15 rotations).

The following graph shows the number of printable pages in the case of A4 printing.

Memo :

The number of rotation of the developer roller per page is as follows.

- One printed page only or the first page of continuous printing = 15 rotations
- After 2 pages for continuous printing = 4.3 rotations

Number of idling rotation when the machine is turned ON = 8.5 rotations

If a drum discharge is detected, drum life ends.

■ Standard toner cartridge* Approximately 1500 pages

Page/job	1	2	3	4	5	6	7	8	9	10	11	12
Cartridge life	1,800	2,798	3,432	3,871	4,193	4,438	4,632	4,789	4,919	5,028	5,121	5,201
Cartridge life+ON/OFF	1,149	1,942	2,523	2,967	3,317	3,600	3,834	4,030	4,197	4,341	4,466	4,576
Toner empty (A)	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Toner empty (B)	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875
Toner empty (C)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Toner empty (D)	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750
Toner empty (E)	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500	7,500

Cartridge life = 15a x 1800 / (4.3 x (a - 1) + 15) a : Page/job
Cartridge life+ON/OFF = (15a x 1800) / (4.3 x (a - 1) + 15 + 8.5)
Cartridge life (Mechanical limit) : 1800 (1Page/job)

A: in accordance with ISO/IEC 19752
B: 20% less coverage than A
C: 40% less coverage than A
D: 60% less coverage than A
E: 80% less coverage than A

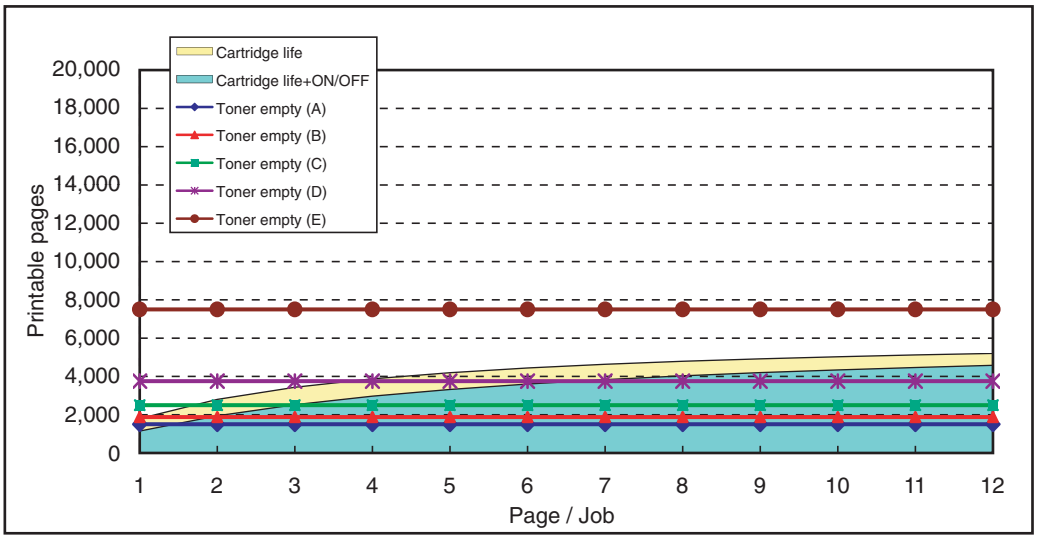


Fig. Ref. 2-14

■ High-capacity toner cartridge* Approximately 2600 pages

Page/job	1	2	3	4	5	6	7	8	9	10	11	12
Cartridge life	3,000	4,663	5,720	6,452	6,988	7,397	7,721	7,982	8,198	8,380	8,534	8,668
Cartridge life+ON/OFF	1,915	3,237	4,206	4,945	5,528	6,000	6,389	6,716	6,995	7,235	7,444	7,627
Toner empty (A)	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600
Toner empty (B)	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250
Toner empty (C)	4,333	4,333	4,333	4,333	4,333	4,333	4,333	4,333	4,333	4,333	4,333	4,333
Toner empty (D)	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
Toner empty (E)	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000	13,000

Cartridge life = 15a x 3000 / (4.3 x (a - 1) + 15) a : Page/job

Cartridge life+ON/OFF = (15a x 3000) / (4.3 x (a - 1) + 15 + 8.5)

Cartridge life (Mechanical limit) : 1800 (1Page/job) 3000 (1Page/job)

A: in accordance with ISO/IEC 19752
B: 20% less coverage than A
C: 40% less coverage than A
D: 60% less coverage than A
E: 80% less coverage than A

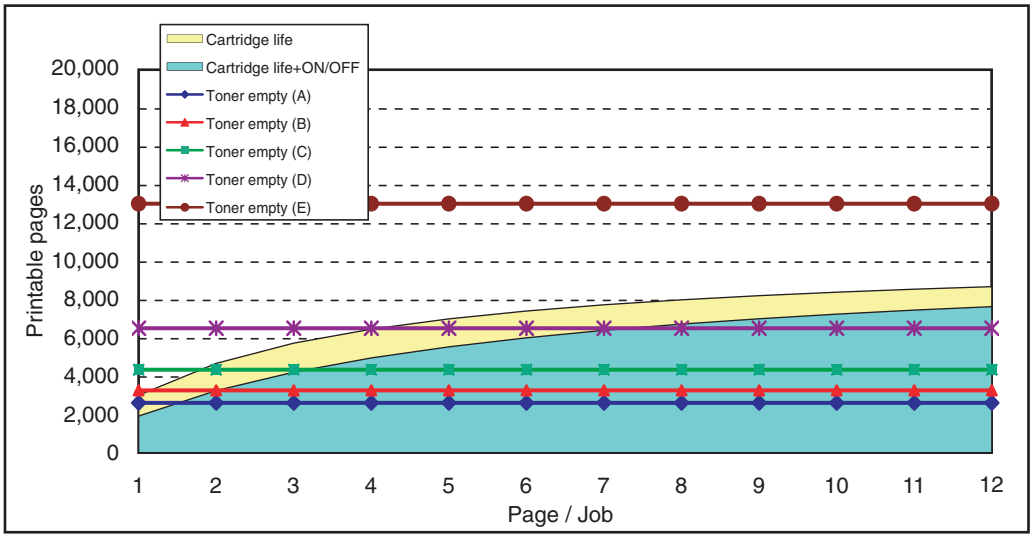


Fig. Ref. 2-15

■ Starter toner cartridge* Approximately 1000 pages

Page/job	1	2	3	4	5	6	7	8	9	10	11	12
Cartridge life	1,200	1,865	2,288	2,581	2,795	2,959	3,088	3,193	3,279	3,352	3,414	3,467
Cartridge life+ON/OFF	766	1,295	1,682	1,978	2,211	2,400	2,556	2,687	2,798	2,894	2,977	3,051
Toner empty (A)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Toner empty (B)	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250
Toner empty (C)	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667	1,667
Toner empty (D)	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Toner empty (E)	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000

Cartridge life = 15a x 1200 / (4.3 x (a - 1) + 15) a : Page/job
Cartridge life+ON/OFF = (15a x 1200) / (4.3 x (a - 1) + 15 + 8.5)
Cartridge life (Mechanical limit) : 1200 (1Page/job)

A: in accordance with ISO/IEC 19752
B: 20% less coverage than A
C: 40% less coverage than A
D: 60% less coverage than A
E: 80% less coverage than A

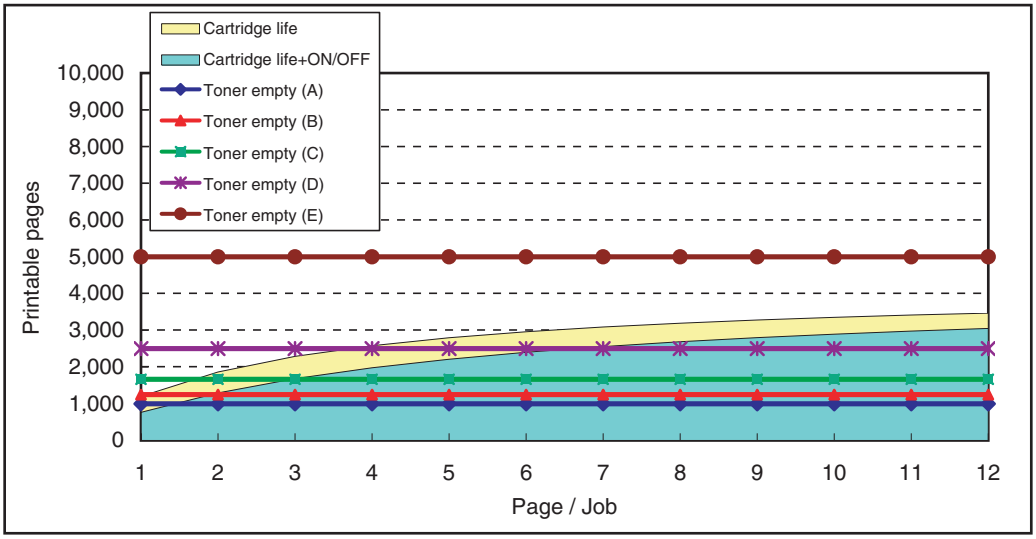


Fig. Ref. 2-16

3.4.3 New Toner Detection

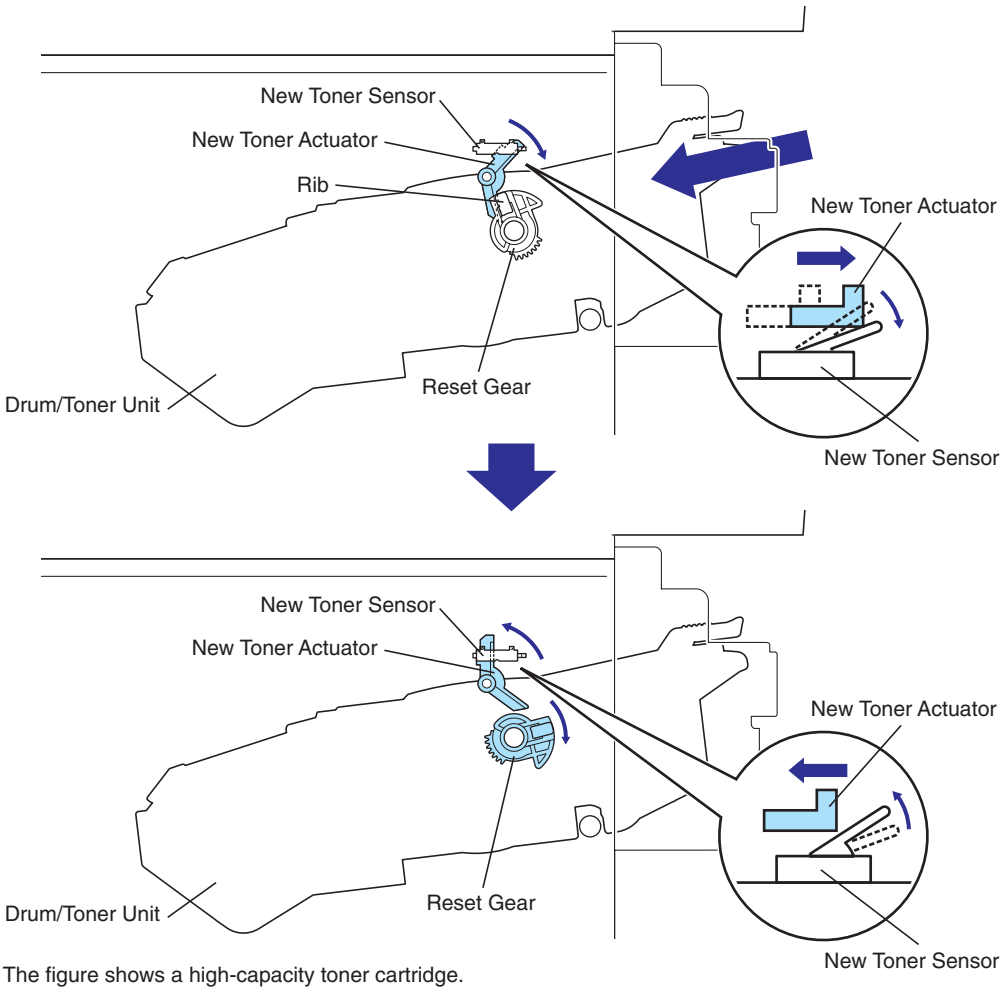
When a toner cartridge is changed, discrimination between new and used toner cartridges is performed by means of the new toner detection mechanism shown below.

<New Toner Detection Mechanism>

When a new toner cartridge is inserted into the machine, the rib on the reset gear pushes the new toner actuator which turns on (activates) the new toner sensor, allowing the presence of a brand new toner to be detected.

When the main motor operates, a driving force is transmitted to the reset gear by way of several other gears, and the rib of the reset gear deviates from the new toner actuator. Then the new toner sensor turns off.

- For high-capacity toner cartridges
  The time taken before the new toner sensor is activated is longer after the main motor starts to rotate, allowing the presence of a high-capacity toner cartridge to be detected.
- For standard toner cartridges
  The time taken before the new toner sensor is activated is quicker after the main motor starts to rotate, allowing the presence of a standard toner cartridge to be detected.
- For starter toner cartridges
  The starter toner cartridge does not have a reset gear. When turning on power for the first time after shipment, the machine presumes that the starter toner cartridge is attached.



* The figure shows a high-capacity toner cartridge.

Fig. Ref. 2-17

<Developing Bias Voltage>

The instant when the new toner detection mechanism detects a new toner cartridge, the developing bias voltage is reset. Toner in use tends to have a low printing density at the time of first use, but the density gradually becomes higher after a certain period of use.

The properties of the toner is controlled by means of the developing bias voltage. The values are varied according to counts of the amount of toner used immediately after a toner cartridge is changed, so that excellent print quality of an even contrast can be obtained constantly from the printing start time to the stop time.

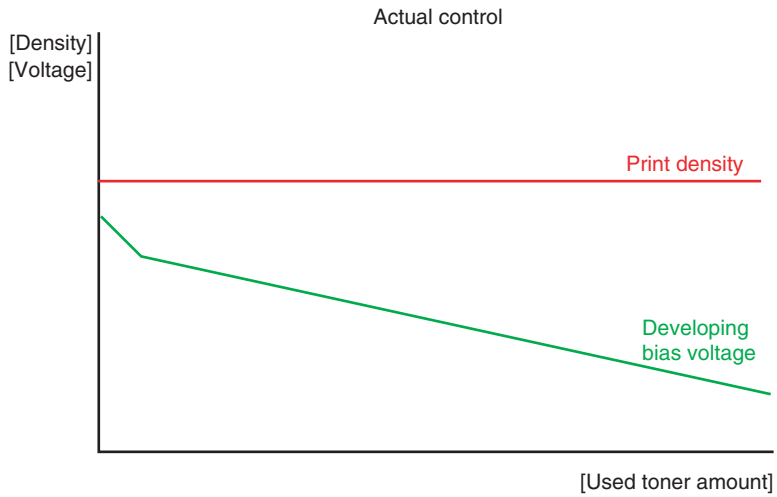


Fig. Ref. 2-18

Memo :

If a toner cartridge in use is changed to a cartridge which has previously been in use, the developing bias voltage will become incorrect for the change of the print density. Toner cartridges being used must not be replaced with other ones that are being used.

3.5 Print

3.5.1 Basic Principle

The printing process consists broadly of 5 processes: Primary charging, Exposure, Development, Transfer and Fusing.

1. Primary charging: The surface of an exposure drum is electrically charged.
2. Exposure: A latent image is formed on the surface of the drum by applying laser beam.
3. Development: Toner is adhered to the latent image on the surface of the drum.
4. Transfer: The toner on the surface of the exposure drum is transferred to paper.
5. Fusing: The transferred toner is fused into place on the paper.

After these processes, the image is printed on the paper.

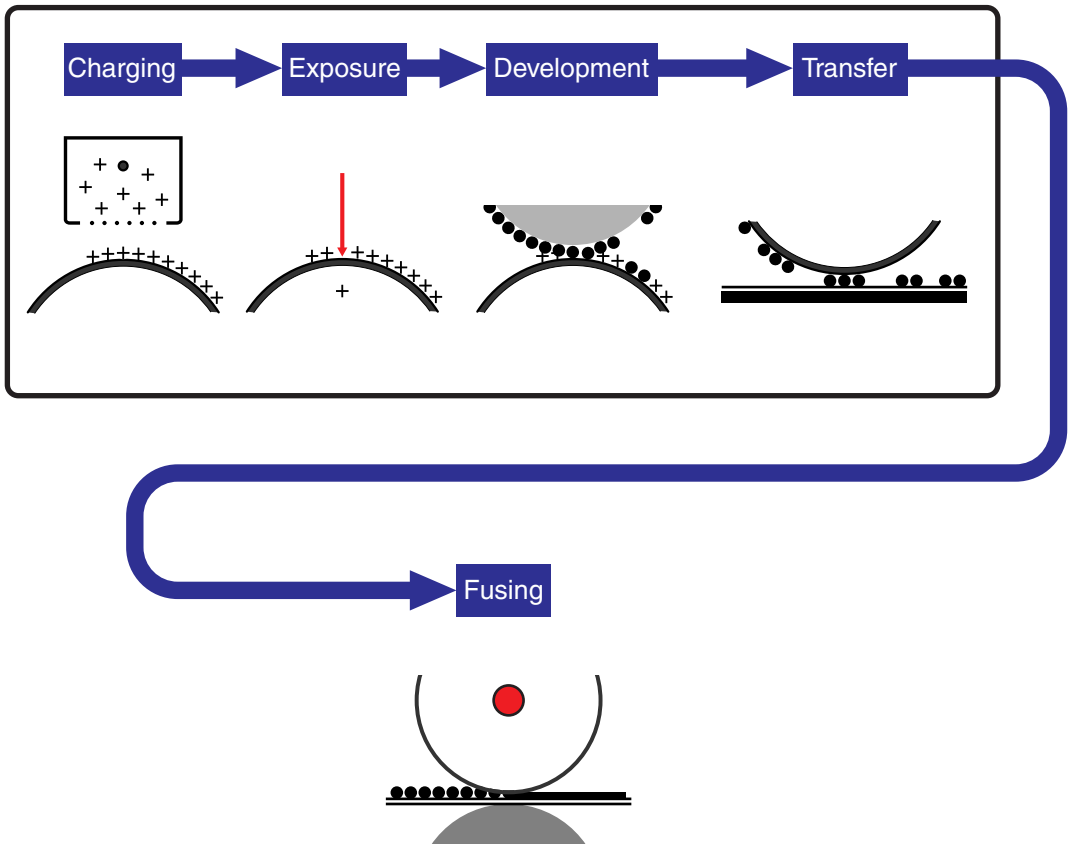


Fig. Ref. 2-19

3.5.2 Print Process

(1) Charging

The flow of the ion charge is controlled by a constant voltage of the corona wire (850V) and the grid is to ensure it is evenly distributed on the drum surface. In order for the laser to create a latent image on the drum, the drum needs to be evenly charged. Ions are produced by supplying high-voltage power to the corona wire.

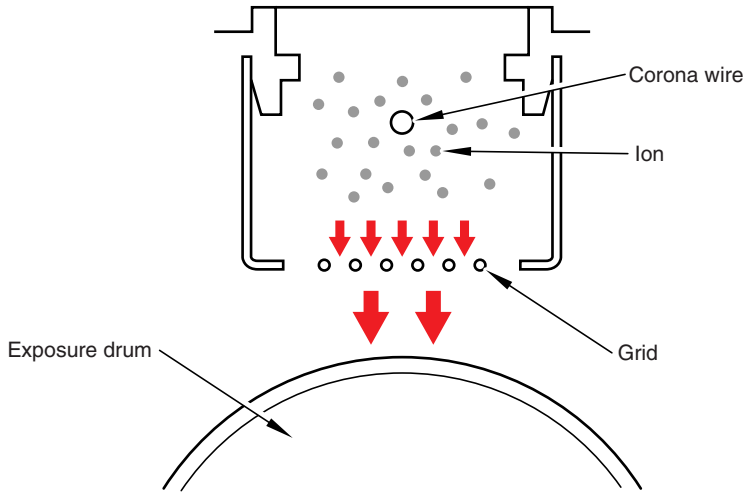


Fig. Ref. 2-20

Memo :

The level of ozone expelled from the machine is less than 3.0 mg/h therefore not harmful to the human body. Applicable safety standards have been complied with.

(2) Exposure

The laser beam radiated from the laser diode inside the laser unit are concentrated into a constant width by a slit in the CO lens cell and then reflected by a polygon mirror rotating at high speed. The evenly charged drum is irradiated with reflected light and exposed. The surface potential is lowered by such exposure and a latent image is formed.

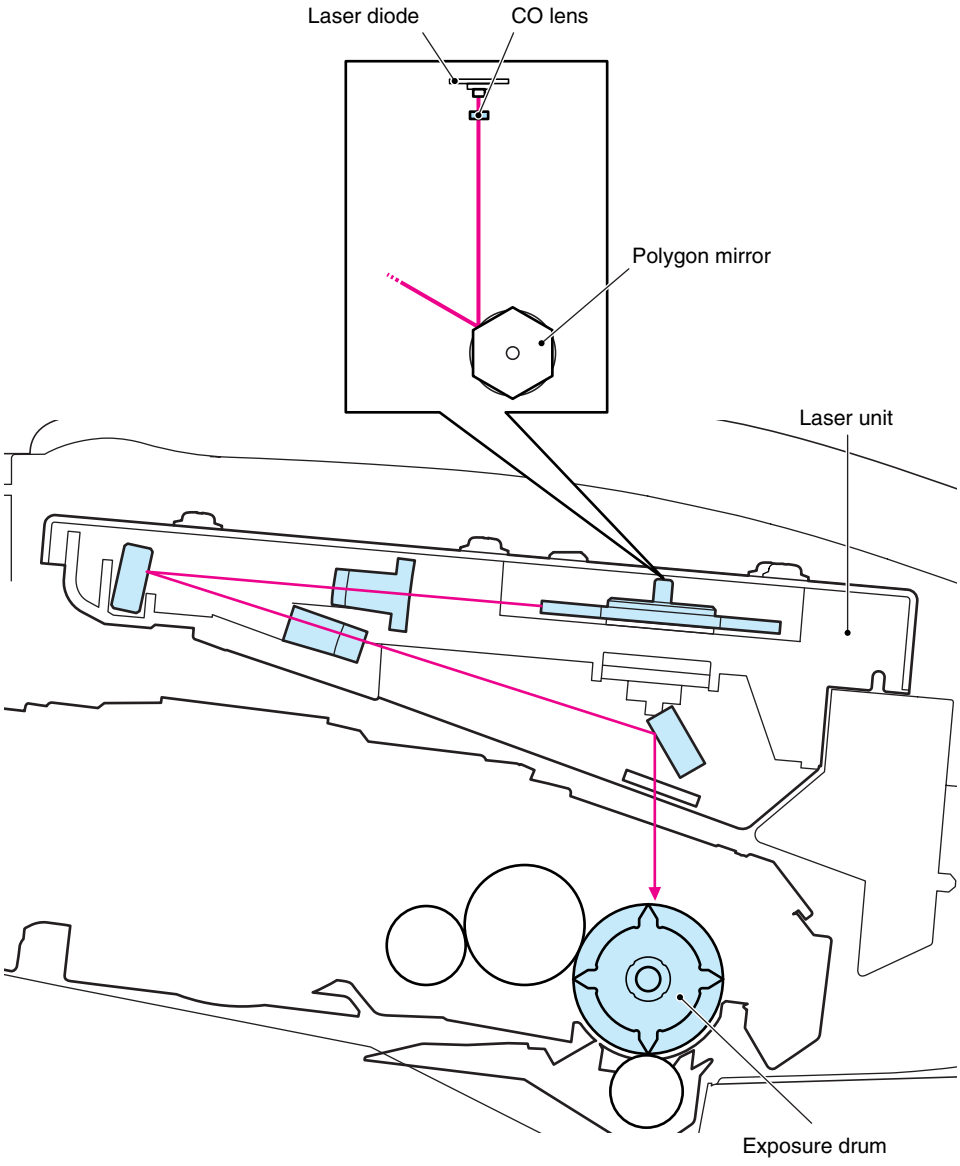


Fig. Ref. 2-21

(3) Development

Toner is attracted to the latent image area on the exposure drum where surface potential is lowered due to the exposure.

By controlling developing bias voltage supplied to the develop roller, the amount of toner taken to the drum is adjusted to keep printing density constant.

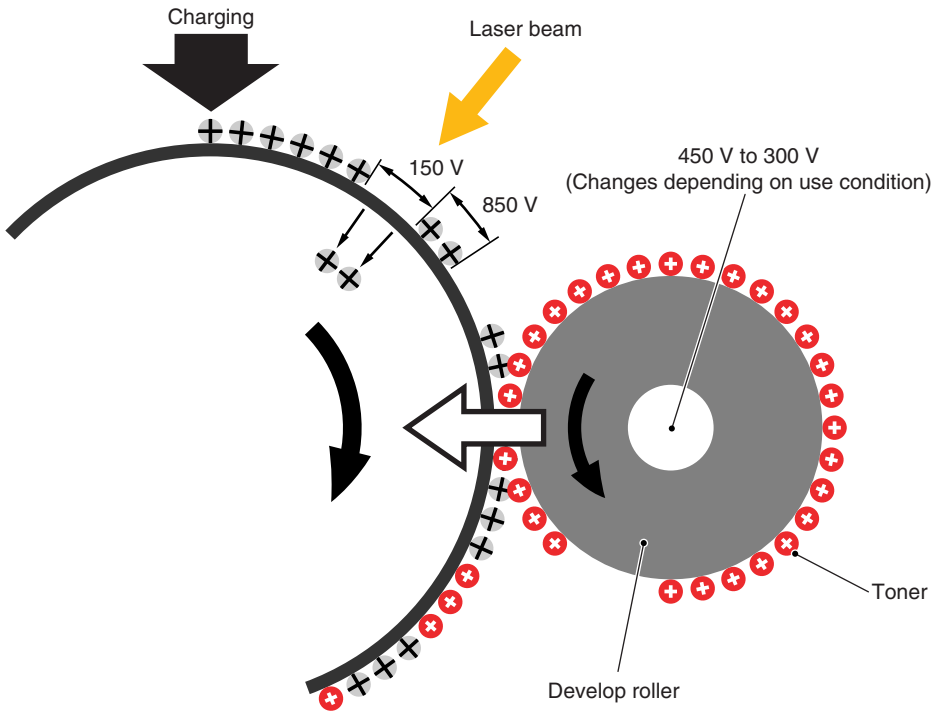


Fig. Ref. 2-22

<Supply of toner to the development process>

Toner adheres to the charged develop roller. Such adhered toner is adjusted to an even thickness, and is attracted to an exposed area on the exposured drum.

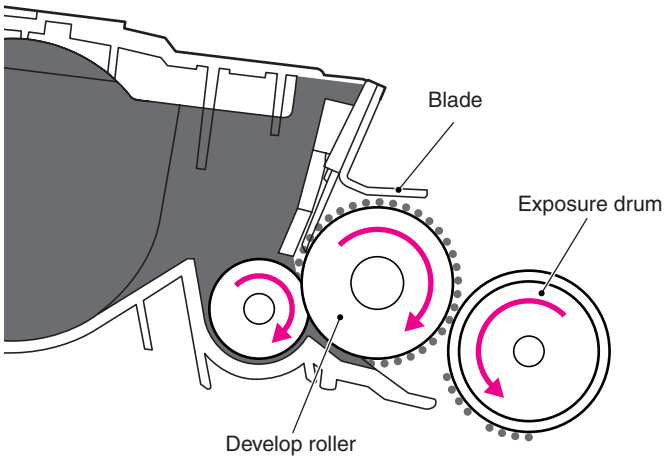


Fig. Ref. 2-23

(4) Transfer

By applying a minus charge to the transfer roller, the toner adhered to the exposured drum is transferred to the paper.

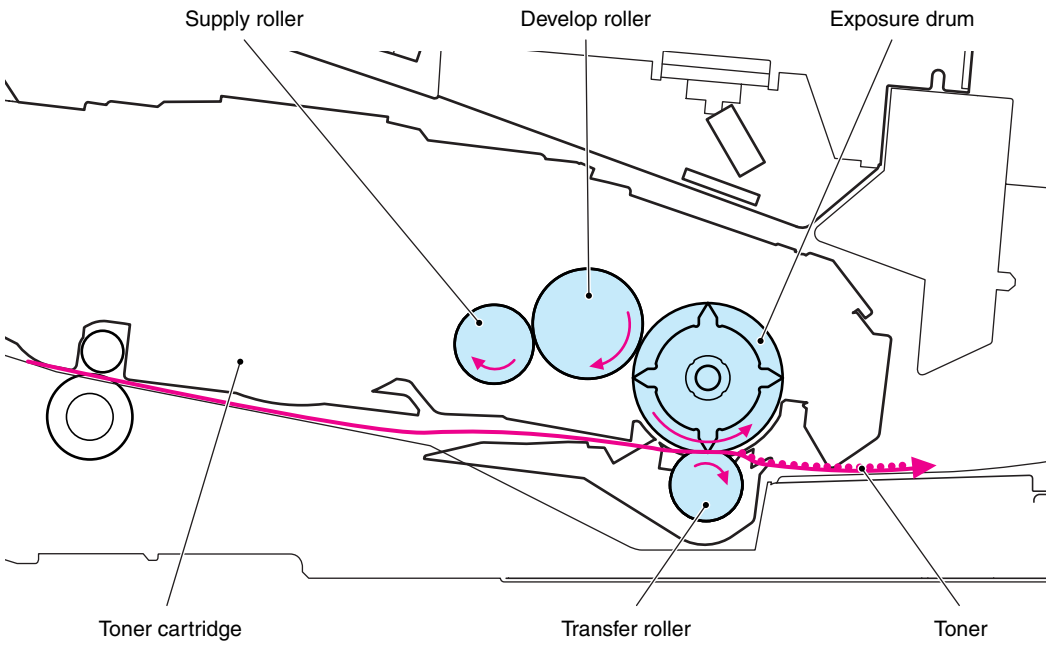


Fig. Ref. 2-24

Memo :

Control of transfer bias

The transfer bias applied in the transfer roller is adjusted according to types and sizes of paper so as to keep excellent image quality.

(5) Fusing

The toner transferred on to the paper passes between the heat roller and the pressure roller in the fuser unit, being fused by heat and pressure. The thermistor detects surface temperature of the heat roller and turns the halogen heater lamp ON and OFF. This ensures that the temperature is kept constant.

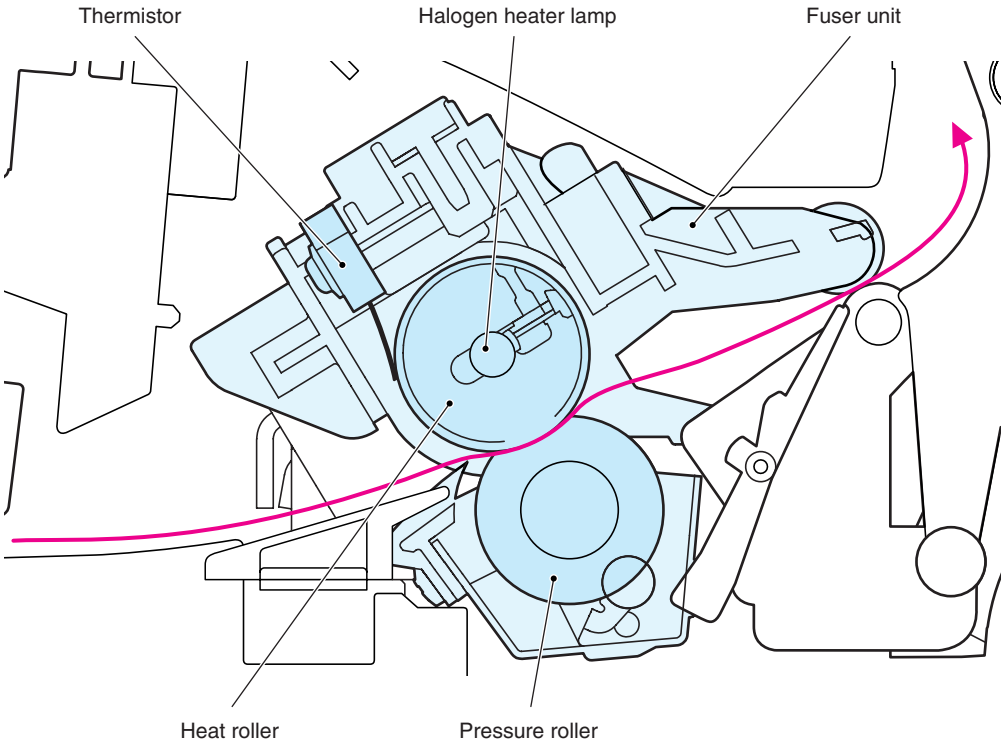


Fig. Ref. 2-25

Memo :

Control of fusing temperature

The fuser unit adjusts such temperature according to types and sizes of paper so as to keep excellent image quality.

The temperature of the fuser unit set by the two thermistors, and it is managed by the microcomputer.

APPENDIX 1 TONER CARTRIDGE WEIGHT INFORMATION

Note:
This information is an approximate weight of the toner cartridge.
The weight of the toner is likely to be revised by the design change.

High-capacity toner cartridge (TN-360/2120/2175/2150/2125)	BK (2.6K)
Brand New Toner Cartridge Weight	610g(±15g)
Toner Weight at Brand New Toner Cartridge	93g(±3g)
Toner Cartridge Weight at Toner Near Empty	565g(±15g)
Remaining Toner Weight at Toner Near Empty	48g(±3g)
Toner Cartridge Weight at Toner Life End	557g(±15g)
Remaining Toner Weight at Toner Life End	40g(±3g)
Standard toner cartridge (TN-330/2110/2135/2130/2115)	BK (1.5K)
Brand New Toner Cartridge Weight	588g(±15g)
Toner Weight at Brand New Toner Cartridge	71g(±3g)
Toner Cartridge Weight at Toner Near Empty	565g(±15g)
Remaining Toner Weight at Toner Near Empty	48g(±3g)
Toner Cartridge Weight at Toner Life End	557g(±15g)
Remaining Toner Weight at Toner Life End	40g(±3g)
Starter toner cartridge (TN)	BK (1.0K)
Brand New Toner Cartridge Weight	578g(±15g)
Toner Weight at Brand New Toner Cartridge	61g(±3g)
Toner Cartridge Weight at Toner Near Empty	565g(±15g)
Remaining Toner Weight at Toner Near Empty	48g(±3g)
Toner Cartridge Weight at Toner Life End	557g(±15g)
Remaining Toner Weight at Toner Life End	40g(±3g)

Note:

- You can print about 500 pages with 10g toner.
  (A4 size, continuous printing in accordance with ISO/IEC 19752)
- Toner cartridge weight is without the package and the protective cover.
- Toner weight may vary ± 3g.
- The mold is different on each model so that the cartridge weight is different.

APPENDIX 2 GLOSSARY

■ ACRONYMS AND TECHNICAL TERMS

In this manual and the Service Manual, the manual specific acronyms and technical terms are used in addition to the generally used ones. The table below contains typical acronyms and technical terms that are used throughout these manuals.

APIPA	Automatic Private IP Addressing
ASIC	Application Specific Integrated Circuit
ASSY	Assembly
CN	Connector
CPU	Central Processing Unit
dB	decibel
DEV	Development
DIMM	Dual Inline Memory Module
dpi	dots per inch
EEPROM	Electronically Erasable and Programmable Read Only Memory
FR	Feed Roller
FU	Fuser
HEX	Hexadecimal
HV	High Voltage
HVPS	High Voltage Power Supply
IEEE 1284	Institute of Electrical and Electronic Engineers 1284
IF	Interface
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
LCD	Liquid Crystal Display
LD	Laser Diode
LED	Light Emitting Diode
LV	Low Voltage
LVPS	Low Voltage Power Supply
N/A	Not Applicable
NC*	Network Circuit
NVRAM	Nonvolatile Random Access Memory
PF	Paper Feed
PP gear	Pressure Plate gear
ppm	pages per minute
PU	Pick-Up roller
RAM	Random Access Memory
REGI	Registration
SOL	Solenoid
SP	Spare Parts

TE	Toner Empty
TN	Toner
TR	Transfer

* Excluding the acronym shown on the wiring diagram or circuit diagram.

APPENDIX 3 REFERENCES

This page provides the retrieve information. It is possible to get the instruction of the subject by just clicking on the link below.

1. **Error indication**

   (Refer to "2.1 Error indication", Chapter 1 of the Service Manual.)

2. **Diameter of rollers**

   (Refer to "5.2 Diameter of Rollers", Chapter 1 of the Service Manual.)

3. **Machine specification**

   (Refer to "2. SPECIFICATIONS LIST", Reference 1 of the Service Reference Manual.)

4. **Paper specification**

   (Refer to "2.6 Paper", Reference 1 of the Service Reference Manual.)

5. **Toner cartridge weight information**

   (Refer to "APPENDIX 1 TONER CARTRIDGE WEIGHT INFORMATION" of the Service Reference Manual.)

6. **Parts life reset**

   (Refer to "Resetting the drum counter", Chapter 5 of the Service Manual.)