EPSON

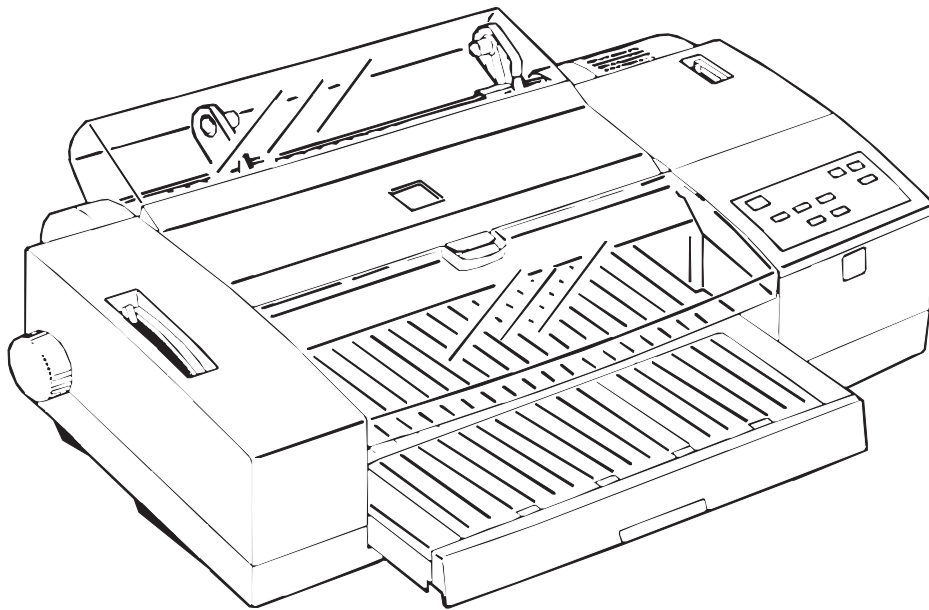*COLOR INK JET PRINTER*

EPSON Stylus COLOR 3000

SERVICE MANUAL

SEIKO EPSON CORPORATION

NOTICE

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General Notice:

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PRECAUTIONS

Precautionary notations throughout the text are categorized relative to 1) personal injury and 2) damage to equipment.

WARNING   Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by WARNING Headings.

CAUTION   Signals a precaution which, if ignored, could result in damage to equipment.

The precautionary measures itemized below should always be observed when performing repair/maintenance procedures.

WARNING

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.

2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.

3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL. DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

CAUTION

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY EPSON CERTIFIED REPAIR TECHNICIAN.

2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.

3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.

4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.

5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of Stylus COLOR 3000.

The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to the precautions on the preceding page. The Chapters are organized as follows:

CHAPTER 1. GENERAL DESCRIPTION

Provides a general product overview, lists specifications, and illustrates the main components of the printer.

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

Includes a step-by-step guide for product disassembly and assembly.

CHAPTER 4. ADJUSTMENT

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides EPSON-approved techniques for troubleshooting.

CHAPTER 6. MAINTENANCE

Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.

APPENDIX

Describes connector pin assignments, circuit diagrams, circuit board component layout and exploded diagram.

The contents of this manual are subject to change without notice.

REVISION SHEET

Revision	Issued Data	Contents
Rev. A	May 21, 1997	First issue
Rev. B	June 04, 1997	Revision B Page 4-18, Page 4-19

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Chapter 1
Product Descriptions

1.1 Overview

The EPSON Stylus COLOR 3000 is a high-performance color ink jet printer designed for the office market as well as for plotter use with a wide paper availability up to full A2 size. The main features of this printer are:

Paper availability in wide range

- ❑ A-2 (ANSI C-size) paper supported
- ❑ Printable area   410 mm (width) (A-2 /ANSI C-size paper)
- ❑ Left and right margin   5 mm (A2-size paper)
                                         0.5 inch (C-size paper)

Paper handling with ease

- ❑ Built-in ASF with a wide paper page capability (up to C-size portrait) and high capacity
  This ASF holds: 100 cut sheets ($55g/m^2$)
                                    10 envelops
                                    30 transparency films
                                    70 special paper *(up to A3)
                                    30 special paper *(Super A3 or larger)
                                        ∗:360 dpi ink jet paper, photo quality ink jet paper.
- ❑ Roll paper   Fed with a high accuracy making no skew
- ❑ Push tractor for the office use (for pre-printed continuous paper)

High Speed Printing

- ❑ LQ mode   400 cps at 10 cpi
- ❑ Draft mode   800 cps at 10 cpi

2 interfaces built-in and 1 optional interface card

- ❑ Mac serial interface (up to approximately 900 kbps/1.8 Mbps)
- ❑ Bi-directional parallel interface (IEEE1284 level 1 device)
- ❑ Optional Type-B interface card

High print quality for color graphics

- ❑ High Resolution   1440 (H) X 720 (V) dpi printing
- ❑ 4 color printing   Cyan, Magenta, Yellow, Black
- ❑ Printing Method   Traditional and new micro weave printing
- ❑ Smaller dot diameter for image improvement

4 scalable fonts and 5 LQ fonts

- ❑ Scalable fonts   Roman T, Sans Serif H, Roman, Sans Serif
- ❑ LQ fonts   Roman, Sans Serif, Courier, Prestige, Script (LQ)27

27 usable character tables   Italic, PC437, PC850, PC860, PC861, PC863, PC865, BRASCII, Abicomp, Roman 8, ISO Latin 1, PC437 Greek, PC852, PC853, PC855, PC857, PC866, PC869, MOZOAWIA, Code MJK, ISO 8559-7,
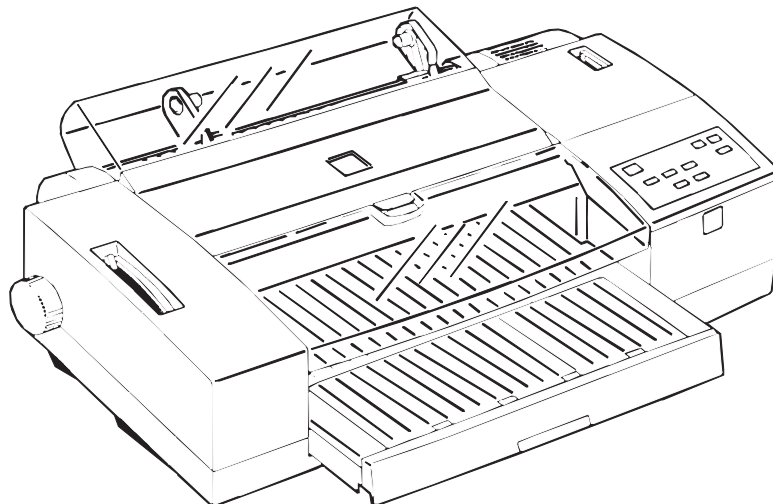

Figure 1-1. Exterior View of the EPSON Stylus COLOR 3000

1.2 Options and Consumables

Table 1-1. Options and Consumables

Model	Description
Serial Interface Cards	
C82305∗/C82306∗	Serial interface card
C82307∗/C82308∗	32 KB serial interface card
Parallel Interface Cards	
C82310∗	32 KB parallel interface card
C82345∗	32 KB Bi-directional parallel interface card
C82313∗	IEEE-488 interface card
C82314∗	Coax interface card
C82315∗	Twinax interface card
C82312∗	LoacalTalk™ interface card
C82331∗	Ethernet interface card
C823311	Ethernet interface card (Multi-protocol)
C823401	Ether Talk interface card
C823431	Ethernet interface card (Netware)
Parallel Interface Cables	
C83602∗	Parallel interface cable (shielded) from D-SUB 25-pin (computer) to Amphenol 57 (printer)
C83603∗/C83604∗	Serial interface cable from D-SUB 25-pin (computer) to D-SUB 25-pin (printer)
C83605∗/C83606∗	Serial interface cable from D-SUB 9-pin (computer) to D-SUB 25-pin (printer)
C81101∗	Banner paper holder with cutting guide (Banner Paper Kit)
Ink Cartridges	
S020118	Black ink cartridge
S020122	Yellow ink cartridge
S020126	Magenta ink cartridge
S020130	Cyan ink cartridge
EPSON Special Media	
S041059 / S041025	EPSON 360 dpi ink jet paper (A4)
S041060	EPSON 360 dpi ink jet paper (Letter)
S041065/S041046	EPSON 360 dpi ink jet paper (A3)
S041066/S041647	EPSON 360 dpi ink jet paper (Super A3/B)
S041078	EPSON 360 dpi ink jet paper (A2)
S041061 / S041026	EPSON photo quality ink jet paper (A4)
S041062	EPSON photo quality ink jet paper (Letter)
S041067/S041048	EPSON photo quality ink jet paper (Legal)
S041068/S041045	EPSON photo quality ink jet paper (A3)
S041070/S041044	EPSON photo quality ink jet paper (B)
S041069/S041043	EPSON photo quality ink jet paper (Super A3/B)
S041079	EPSON photo quality ink jet paper (A2)
S041054	EPSON photo quality ink jet card (A6)
S041121	EPSON photo quality ink jet card (5 X 8 inch)
S041122	EPSON photo quality ink jet card (8 X10 inch)

Table 1-2. Options and Consumables (continued)

Model	Description
S041071	EPSON photo quality glossy film (A4)
S041072	EPSON photo quality glossy film (Letter)
S041107	EPSON photo quality glossy film (A6)
S041073	EPSON photo quality glossy film (A3)
S041075	EPSON photo quality glossy film (B)
S041074	EPSON photo quality glossy film (Super A3/B)
S041126	EPSON photo quality glossy paper (A4)
S041124	EPSON photo quality glossy paper (Letter)
S041125	EPSON photo quality glossy paper (A3)
S041123	EPSON photo quality glossy paper (A2)
S041063	EPSON ink jet transparencies (A4)
S041064	EPSON ink jet transparencies (Letter)
S041106	EPSON photo quality self adhesive sheet (A4)
S041103	EPSON 360 dpi ink jet banner paper
S041102	EPSON photo quality banner paper
S041132	EPSON ink jet canvas
S041131	EPSON back light film (A3)
S041130	EPSON back light film (A2)

Note)   The asterisk is a substitute for the last digit of the product number.

1.3 Specification

This section provides detailed information on the EPSON Stylus COLOR 3000.

1.3.1 Printing Specifications

❑ **Print method**   On demand Ink jet

❑ **Nozzle configuration**   Monochrome   128 nozzles (32 x 4 staggered)
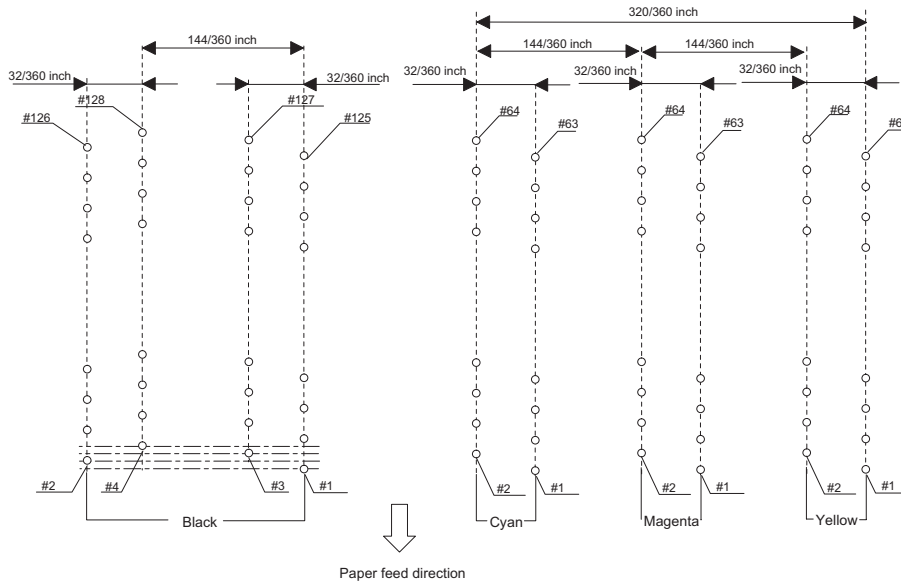Color (magenta, cyan, yellow)   64 nozzles (32 x 4 staggered, each color)

Figure 1-2. Nozzle Configuration

❑ **Print direction**   Bi-directional with logic-seeking

❑ **Print speed and printable columns**

Table 1-3. Print Speed and Printable Columns for Character Mode

Character Pitch	Printable Columns	Draft Speed	LQ Speed
10 cpi (Pica)	161	800 cps	400 cps
12 cpi (Elite)	193	960 cps	480 cps
15 cpi	242	1200 cps	600 cps
17.1 cpi (Pica condensed)	276	1368 cps	684 cps
20 cpi (Elite condensed)	322	1600 cps	800 cps

Table 1-4. Print Speed and Printable Area for Raster Graphic Mode

Print Mode	Printable Area	Available Dot	CR Speed
180 dpi X 180 dpi	16.37 inch	2947	40 ips
360 dpi X 360 dpi	16.37 inch	5893	20 ips
720 dpi X 720 dpi	16.37 inch	11786	20 ips
1440 dpi X 720 dpi [1]	16.37 inch	11786[2]	10 ips

*1   Printing at 1440 X 720 dpi is available only using driver microweave.
*2   Can be printed by sending following command sequence.
     1. Set print speed to 10 ips.
     2. Print a 180 X 720 raster image.
     3. Advance the paper using an increment of 31/720 inch.
     4. Move the print position horizontally using an increment of 1/1440 inch.
     5. Print a 180 X 720 raster image.
     6. Advance the paper using an increment of 31/720 inch.
     7. Repeat steps 2 to 6

.

1.3.2 Control codes

❑ ESCP/2 and expanded raster graphics code

❑ EPSON Remote command

❑ IBM XL24E emulation

1.3.3 Character tables

❑ **Legal and 14 international character sets**
  ❑ Standard version (27 character tables)

Italic table	PC 437 (US, Standard Europe)
PC 850 (Multilingual)	PC 860 (Portuguese)
PC 861 (IceLandic)	PC 863 (Canadian-French)
PC 865 (Nordic)	Abicomp
BRASCII	Roman 8
ISO Latin 1	PC 437 (Greek)
PC 852 (East Europe)	PC 853 (Turkish)
PC 855 (Cyrillic)	PC 857 (Turkish)
PC 866 (Russian)	PC 869 (Greek)
MOZOAWIA (Poland)	Code MJK (CSFR)
ISO 8559-7 (Latin, Greek)	ISO Latin 1T (Turkish)
Bulgaria (Bulgaria)	PC 774
Estonia	ISO 8859-2 (ISO Latin 2)
PC 866 LAT	

❑ **Typeface**
  ❑ Bit map LQ font

EPSON Roman	10 cpi, 12 cpi, 15 cpi, Proportional
EPSON Sans Serif	10 cpi, 12 cpi, 15 cpi, Proportional
EPSON Courier	10 cpi, 12 cpi, 15 cpi,
EPSON Prestige	10 cpi, 12 cpi, 15 cpi,
EPSON Script	10 cpi, 12 cpi, 15 cpi

  ❑ Scalable font

EPSON Roman	10.5 pt.; 8 pt. – 32 pt. (2 pt. increments)
EPSON Sans Serif	10.5 pt.; 8 pt. – 32 pt. (2 pt. increments)
EPSON Roman T	10.5 pt.; 8 pt. – 32 pt. (2 pt. increments)
EPSON Sans Serif H	10.5 pt.; 8 pt. – 32 pt. (2 pt. increments)

Note)   Each typeface has 4 variations:
Normal, Bold, Italic, and Bold Italic
An example of variations for Epson Roman is as follows:
Epson Roman normal
Epsom Roman bold
Epson Roman italic
Epson Roman bold italic

❑ **Combination of character tables and typefaces**

Table 1-5. Character Tables and Fonts

Character Tables (Standard version)	Bitmap Fonts EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script	Scalable Fonts EPSON Roman EPSON Sans Serif	Scalable Fonts EPSON Roman T EPSON Sans Serif H
Italic table PC 437 (US Standard Europe) PC 850 (Multilingual) PC 860 (Portuguese)) PC 861 (Icelandic) PC 863 (Canadian-French) PC 865 (Nordic) BRASCII Abicomp Roman 8 ISO Latin 1	Supported	Supported	Supported
PC 437 (Greek) PC 852 (East Europe) PC 853 (Turkish) PC 855 (Cyrillic) PC 857 (Turkish) PC 866 (Russian) PC 869 (Greek) MAZOWIA (Poland) Code MJK (CSFR) ISO 8859-7 (Latin/Greek) ISO Latin 1T (Turkish) Bulgaria (Bulgaria) PC 774 Estonia ISO 8859-2 (ISO Latin 2) PC 866 LAT	Supported	Supported	Not Supported

1.3.4 Paper Feeding

❑ Paper transport method   Friction feed with built-in auto sheet feeder (ASF)

❑ Line spacing   1/6, 1/8 inch or programmable at 1/360 inch

❑ Paper path
    ❑ Cut-sheet   ASF (Front entry)
    ❑ Continuous paper   Rear tractor

❑ Feeding speed   100 ms per line (1 line = 1/3 inch)
                 4.0 inches per second

1.3.5 Paper Handling

❑ **Cut Sheet**

Table 1-6. Cut Sheet Specification

		Width	Length
Paper	Statement	139.7 mm (5.5")	215.9 mm (8.5")
	A5	148 mm (5.8")	210 mm (8.3")
	B5	182 mm (7.2")	257 mm (10.1")
	Executive	184.2 mm (7.3")	266.7 mm (10.5")
	A4	210 mm (8.3")	297 mm (11.7")
	Letter	215.9 mm (8.5")	279.4 mm (11.0")
	Legal	215.4 mm (8.5")	355.6 mm (14.0")
	B4	257 mm (10.1")	364 mm (14.3")
	ANSI B	279.4 mm (11")	431.8 mm (17")
	A3	297 mm (11.7")	420 mm (16.5")
	A3 wide	329 mm (13.0")	483 mm (19.0")
	A2	420 mm (16.5")	594 mm (23.4")
	ANSI C	431.8 mm (17.0")	558.8 mm (22.0")
Paper Thickness		0.08 mm (0.0031") to 0.15 mm (0.0059")	
Paper Weight	ASF	64 g/ m^2 (17 lb.) to 90 g/ m^2 (24 lb.)	
	Manual insertion	52 g/ m^2 (14 lb.) to 90 g/ m^2 (24 lb.)	
Quality		Exclusive paper, Bond paper, PPC	

Note)
1. *Be sure to use the designated face of exclusive paper.*
2. *Make sure that the paper has no crease, curl, harshness or rip.*
3. *When placing paper in ASF, be sure not to overload it so that the paper will not dislocate. At manual insertion, place the paper using the mark on the case for basis and insert it until it meets resistance.*

❑ **Transparency**

Table 1-7. Transparency Specification

		Width	Length
Size	A4	210 mm (8.3")	297 mm (11.7")
	Letter	215.9 mm (8.5")	279.4 mm (11.0")
Paper Thickness		0.075 mm (0.003") to 0.085 mm (0.0033")	

Note)
1. *Transparency printing is only available at normal temperatures.*
2. *Transparency paper must be printed on the designated side.*

❑ **Envelope**

Table 1-8. Envelope Specification

		Width	Length
Size	No.10	241.3 mm (9 1/2")	104.8 mm (4 1/8")
	DL	220 mm (8.7")	110 mm (4.3)
	C5	229 mm (9")	162 mm (6.4")
Paper Thickness		0.16 mm (0.006") to 0.52 mm (0.02")	
Paper Weight		45 g/m^2 (12 lb.) to 90 g/ m^2 (24 lb.)	
Quality		Bond paper, Plain paper, Airmail	

Note)
1. *Envelope printing is only available at normal temperatures.*
2. *Place the longer side of the envelope horizontally when setting.*

❑ **Index Card**

Table 1-9. Index Card Specification

Size	A6 index card	105 mm (4.1") (width)	148 mm (5.82") (length)
Paper Thickness		0.23 mm (0.0091") or less	

Note) Make sure that the paper has no crease, curl, harshness or rip.
Note) Label must be printed at normal room temperature.

❑ **Labels (Cut Sheet)**

Table 1-10. Label Specification

Size		Width	Length
	A4	210 mm (8.3")	297 mm (11.7")
	Letter	216 mm (8.5")	279 mm (11.0")
Paper Thickness		0.2 mm (0.0079") or less (including base sheet)	
Quality		Label for page printer	

Note) Label must be printed at normal room temperature.
Note) Make sure that the sheet has no crease, curl, harshness or rip.

❑ **Continuous Paper**

Table 1-11. Continuous Paper Specification

Size	Width	101.6 mm (4") to 406.4 mm (16")
	Folding length	101.6 mm (4")
Paper Thickness	0.065 mm (0.0026") to 0.11 mm (0.0043")	
Paper Weight	52 g/ m^2 (14 lb.) to 82 g/ m^2 (22 lb.)	

Note) Make sure that the sheet has no crease, curl, harshness or rip.

❑ **Labels (Continuous)**

Table 1-12. Label (Continuous) Specification

Size	Base sheet	Width	101.6 mm (4") to 406.4 mm (16")
		Folding length	101.6 mm (4")
	Label	Width	63.5 mm (2.5")
		Length	23.9 mm (0.94")
Paper Thickness		0.02 mm (0.0079") or less (including base sheet)	
		0.12 mm (0.0047") or less (label only)	
Quality		Plain paper	

Note) Label (continuous) must be printed at normal room temperatures.
Note) Make sure that the sheet has no crease, curl, harshness or rip.

❑ **Banner**

Table 1-13. Banner Specification

Size	Width	Length
	210 mm (8.3) to 432 mm (17.0")	5.0 m or less (196.9")
Paper Thickness	0.08 mm (0.0031") to 0.1 mm (0.0039")	
Paper Weight	64 g/m^2 (17 lb.) to 82 g/ m^2 (22 lb.)	
Quality	Plain paper	

1.3.6 Printable Area
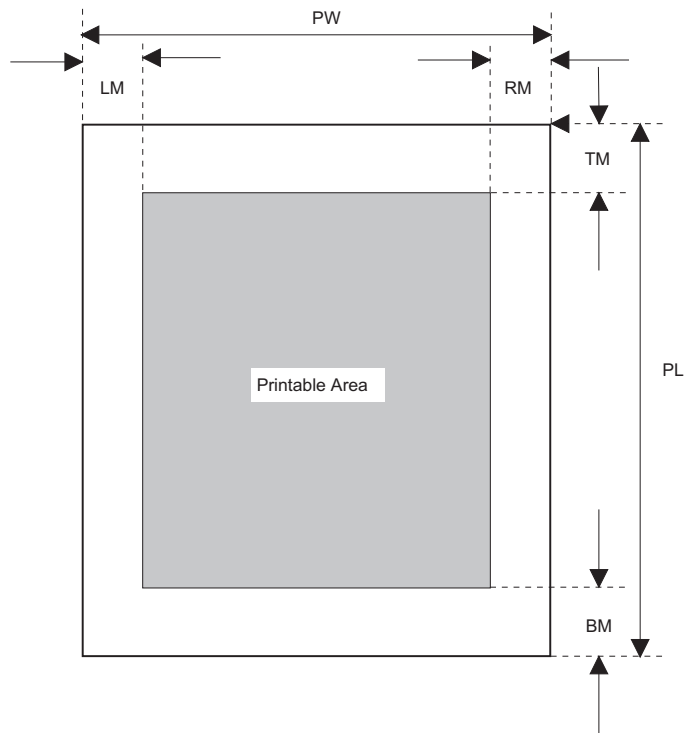
❑ **Cut Sheet / Label (cut sheet)**

Figure 1-3. Printable Area for Cut Sheet

Table 1-14. Minimum Margins for Different Cut Sheet Sizes

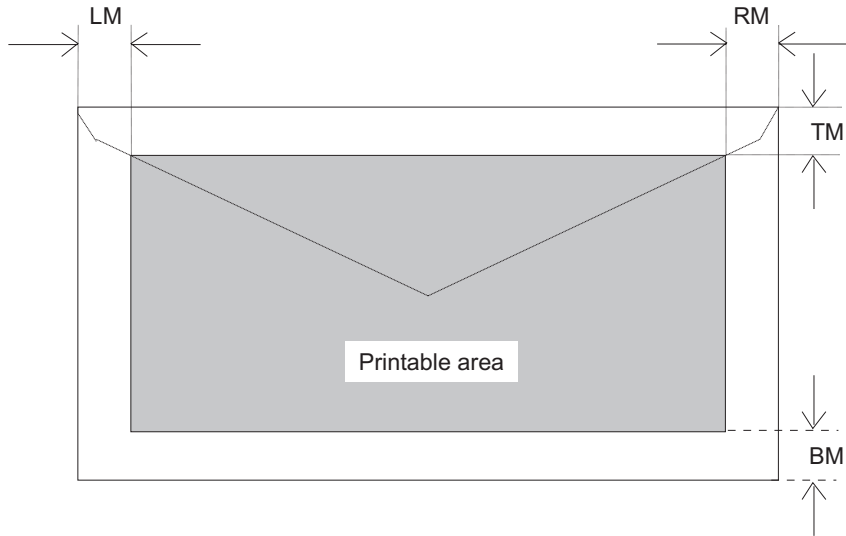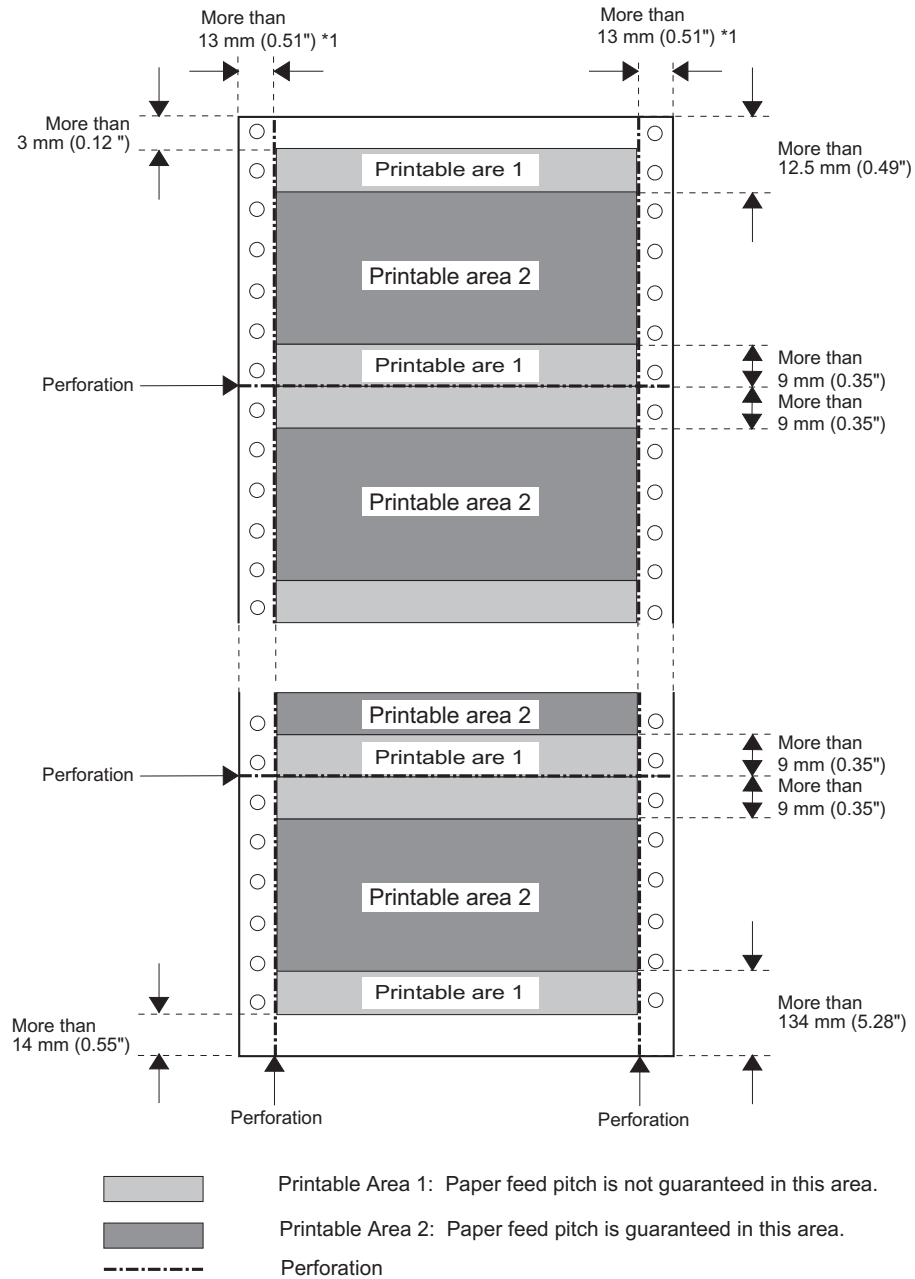| Paper width	Left margin	Right margin	Top margin	Bottom margin
Up to 420 mm (16.5")	3 mm (0.12 inch)	3 mm (0.12 inch)	3 mm (0.12 inch)	14 mm (0.54 inch)
420 mm (16.5") A3 landscape A2	5 mm (0.20 inch)	5 mm (0.2 inch)	3 mm (0.12 inch)	14 mm (0.54 inch)
432 mm(17.02) ANSI B landscape ANSI C	5 mm (0.20 inch)	11 mm (0.43 inch)	3 mm (0.12 inch)	14 mm (0.54 inch)

❑ **Envelope**

Figure 1-4. Printable Area for Envelopes

Table 1-15. Minimum Margin for Envelope

Left Margin (minimum)	Right Margin (minimum)	Top Margin (minimum)	Bottom Margin (minimum)
3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.55")

❑ **Continuous Paper / Label (Continuous Paper)**

More than
13 mm (0.51") *1

More than
13 mm (0.51") *1

More than
3 mm (0.12 ")

More than
12.5 mm (0.49")

Printable are 1

Printable area 2

Printable are 1

Perforation

More than
9 mm (0.35")
More than
9 mm (0.35")

Printable area 2

Printable area 2

Printable are 1

Perforation

More than
9 mm (0.35")
More than
9 mm (0.35")

Printable area 2

Printable are 1

More than
134 mm (5.28")

More than
14 mm (0.55")

Perforation

Perforation

Printable Area 1: Paper feed pitch is not guaranteed in this area.

Printable Area 2: Paper feed pitch is guaranteed in this area.

Perforation

*1 : When the paper width is more than 406.4 mm (16"), this width is more than
38 mm (1.50").

Figure 1-5. Printable Area for Continuous Paper

Note)   *Base sheet of label (continuous) is not printing area.*

1.3.7 Adjust Lever

The adjust lever, located at the right and upper side in the printer cover, is used to adjust the gap between the paper and platen. The adjust lever must be set to the proper position according to the paper type to avoid ink smudging caused by ink's contact with paper.

Table 1-16. Adjust Lever Position

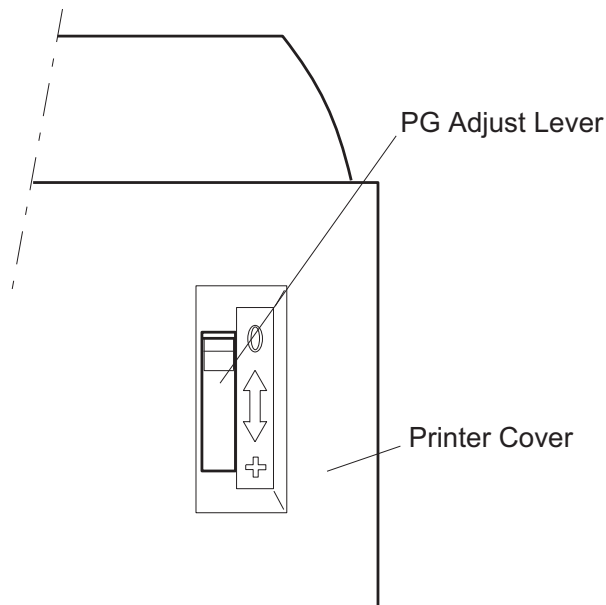| Paper Type	Lever Position	Platen Gap Adjustment Value
Cut sheet Transparency Continuous paper	Far side (0)	0 mm
Envelopes Index card	Near side (1)	+ 0.7 mm

Figure 1-6. Adjust Lever Settings

1.3.8 Ink Specification

Black ink cartridge

Table 1-17. Black Ink Cartridge Specifications

Black Ink Cartridge	
Type	Exclusive ink cartridge
Color	Black
Print capacity	3800 pages / A4 (ISO/IEC10561 Letter Pattern at 360 dpi)
Ink life	2 years from indicated production date
Storage Temperature	At storage -20 °C to 40 °C (-4 to 104°F)[*1] At packing storage -30 °C to 40 °C (-22 to 104°F)[*1] At transit (Packed) -30 °C to 60 °C (-22 to 140°F)[*1*2]
Dimension	25.1 mm (W) X 139.6 mm (D) X 105.3 mm (H) (1.22" X5.49" X4.14")

*1 The cartridge must not be kept at 40 °C (104 °F) for more than a month.

*2 The cartridge must not be kept at 60 °C (140°F) for more than 120 hours.

Note)

1. The cartridge must not be refilled. The ink cartridge is a consumable item.

2. Do not use the cartridge whose ink life has expired.

3. When the ink freezes below -4°C (23°F); it will be usable again after keeping it for more than 3 hours at room temperature.

Color ink cartridge

Table 1-18. Color Ink Cartridge Specifications

Color Ink Cartridge	
Type	Exclusive ink cartridge
Color	Magenta, Cyan, Yellow
Print capacity	2100 pages A4 (at 360 dpi, 5 % duty each color)
Ink life	2 years from indicated production date
Storage Temperature	At storage -20 °C to 40 °C (-4 to 104°F)[*1] At packing storage -30 °C to 40 °C (-22 to 104°F)[*1] At transit (Packed) -30 °C to 60 °C (-22 to 104°F)[*1*2]
Dimension	25.1 mm (W) X 139.6 mm (D) X 105.3 mm (H) (0.98"X5.49" X 4.14")

*1 The cartridge must not be kept at 40 °C (104 °F) for more than a month.

*2 The cartridge must not be kept at 60 °C (140°F) for more than 120 hours.

Note)

1. The cartridge must not be refilled. The ink cartridge is a consumable item.

2. Do not use the cartridge whose ink life has expired.

3. When the ink freezes below -4°C (23°F); it will be usable again after keeping it for more than 3 hours at room temperature.

1.3.9 Input Data Buffer

❑ Input data buffer   :64 Kbytes

1.3.10 Electric Specifications

120 V version

- ❑ Rated voltage   AC 120 V
- ❑ Input voltage range   AC 103.5 to 132 V
- ❑ Rated frequency renege   50 to 60 Hz
- ❑ Input frequency range   49.5 to 60.5 Hz
- ❑ Rated current   0.7 A (maximum)
- ❑ Power consumption   Approximately 21 W (ISO/IEC 10561 Letter pattern)
                             Energy Star program compliant
- ❑ Insulation resistance   10 M ohms min. (Between AC line and chassis, 500 VDC)
- ❑ Dielectric strength   AC 1,000 V rms. For 1 minute or
                             AC 1,200 V rms. For 1 second (Between AC line and chassis)

220 - 240V version

- ❑ Rated voltage   AC 220 to 240 V
- ❑ Input voltage range   AC 198 to 264 V
- ❑ Rated frequency renege   50 to 60 Hz
- ❑ Input frequency range   49.5 to 60.5 Hz
- ❑ Rated current   0.4 A (maximum)
- ❑ Power consumption   Approximately 21 W (ISO/IEC 10561 Letter pattern)
                             Energy Star program compliant
- ❑ Insulation resistance   10 M ohms min. (Between AC line and chassis, DC 500 V)
- ❑ Dielectric strength   AC 1,500 Vrms. For 1 minute (Between AC line and chassis)

1.3.11 Environmental Conditions

- ❑ **Temperature**
  - ❑ Operating*[1]   10°C to 35°C
  - ❑ Non operating*[2]   -20°C to 60°C
                             1 month at 40 °C (104 °F)
                             120 hours at 60 °C (140 °F)

- ❑ **Humidity**
  - ❑ Operating*[1]   20% to 80% RH (without condensation)
  - ❑ Non operating*[2]   5% to 85% RH (without condensation)

- ❑ **Resistance to vibration**
  - ❑ Operating   0.15 G
  - ❑ Non-operating*[2]   0.50 G

- ❑ **Resistance to shock**
  - ❑ Operating   1 G within 1 ms
  - ❑ Non-operating*[2]   2 G within 2 ms

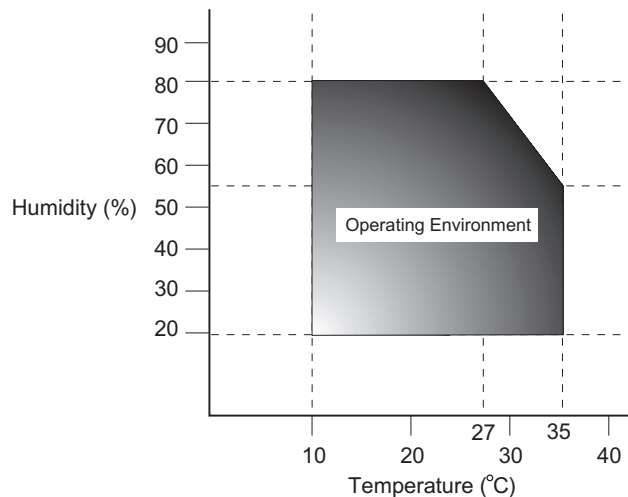*1 :Refer to the table below for guaranteed range.
*2 :In shipment container.

Figure 1-7. Environmental Conditions

1.3.12 Reliability

❑ Total print volume   75,000 pages (A3)

❑ Print head life   2,000 million dots /nozzle

1.3.13 Safety Approvals

120 V version
   ❑ Safety standards   UL1950 with D3
                             CSA22.2 No. 950 with D3
   ❑ EMI   FCC part15 subpart B class B
                             CSA C108.8 class B

220 - 240 V version
   ❑ Safety standards   EN 60950 (VDE, NEMKO)
   ❑ EMI   EN 55022 (CISPR Pub.22) class B
                             AS/NZS 3548 class B

1.3.14 CE Marking

220 - 240 V version
   ❑ Low Voltage Directive 73/23/EEC   EN60950
   ❑ EMC Directive 89/336/EEC   EN55022 class B
                                             EN61000-3-2
                                             EN61000-3-3
                                           EN50082-1
                                                  IEC801-2
                                                  IEC801-3
                                                  IEC801-4

1.3.15 Acoustic Noise

   ❑ Noise level   Approximately 45 dB (A) (According to ISO 7779)

1.3.16 Physical Specification

   ❑ Weight   22.5 Kg
   ❑ Dimension   810 mm (W) X 565 mm (D) X 240 mm (H)
                             (31.9" X 22.2" X 9.4")
Refer to Appendix for details.

1.4 Interfaces

The EPSON Stylus COLOR 3000 is equipped with the parallel and Mac serial interfaces and a card slot for an optional Type-B interface. This section provides information on each interface.

1.4.1 Parallel Interface

Forward Channel

❑ **Transmission mode**   8 bit parallel, IEEE-1284 compatibility mode

❑ **Synchronization**   By /STROBE pulse

❑ **Handshaking**   By /BUSY and /ACKNLG signal

❑ **Signal level**   TTL compatible

❑ **Adaptable connector**   57-30360 (Amphenol) or equivalent

Table 1-19. Signal level of TTL Compatible (IEEE-1284 level 1 device)

Parameter	Minimum	Maximum	Condition
VOH*	-	5.5 V	
VOL*	-0.5 V	-	
IOH*	-	0.32 mA	VOH = 2.4 V
IOL*	-	12 mA	VOL = 0.4 V
CO	-	50 pf	
VIH	-	2.0 V	
VIL	0.8 V	-	
IIH	-	0.32 mA	VIH = 2.0 V
IIL	-	12 mA	VIL = 0.8 V
CI	-	50 pf	

∗   A LOW logic level on the Logic H signal is as follows:
        2.0 V or less when the printer is powered off.
        3.0 V or more when the printer is powered on.
        The receiver provides an impedance equivalent to 7.5 K ohms to ground.

The BUSY signal is set HIGH before setting either /ERROR LOW or PE HIGH and held HIGH until all these signals return to an inactive state. The BUSY signal is HIGH in the following cases:

❑   During data entry.

❑   When the input data buffer is full.

❑   While /INIT signal is at low level or during hardware initialization.

❑   During a printer error condition (See /ERROR signal).

❑   During test printing.

❑   When the printer is in default setting mode.

❑   When the parallel interface is not selected.

The /ERROR signal is LOW when one of the following errors has occurred:

❑   Printer hardware error (fatal error)

❑   Paper-out error

❑   Paper-jam error

❑   Ink-out error
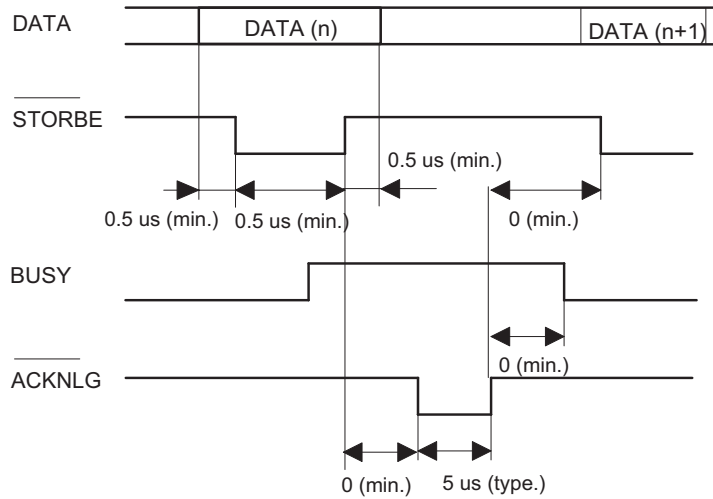
The PE signal is high level during paper-out error.

Figure 1-8. Data Transmission Timing

Table 1-20. Data Transmission Timing

Parameter	Minimum	Maximum
tsetup	500 ns	-
thold	500 ns	-
tstb	500 ns	-
tready	0	-
tbusy	-	500 ns
tt-out	-	120 ns
tt-in	-	200 ns
treply	-	-
tack***	500 ns	10 us
tnbusy	0	-
tnext	0	-

Note) *tt-out shows the rise and fall time of every output signal.*
tt-in shows the rise and fall time of every input signal.
Typical time of tack is shown in Table 1-21.

Table 1-21. Typical Time of Tuck

Parallel I/F transfer rate	Typical time of tuck
Fast	1us
Normal	3us

Table 1-22 shows the connector pin assignment and signals for forward channel of the parallel interface.

Table 1-22. Connector Pin Assignments and Signals (Forward Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	/STROBE	19	I	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	DATA 0-9	20-27	I	The data 0 to data 7 signals represent data bits 0 to 7, respectively. Each signal is at a HIGH level when data is logical 1 and a LOW level when data is logical 0.
10	/ACKNLG	28	O	This signal is a negative pulse indicating that the printer can again accept data.
11	BUSY	29	O	When this signal is at a HIGH level, the printer is not ready to accept data.
12	PE	28	O	When this signal is at a HIGH level, the paper empty status is detected.
13	SLCT	28	O	Always at a HIGH level when the printer is powered on.
14	/AFXT	30	I	Not used.
31	/INIT	30	I	The falling edge of a negative pulse or a LOW signal on this line causes the printer to initialize. Minimum 50 us pulse is necessary.
32	/ERROR	29	O	When the printer detects an error, this signal goes LOW.
36	/SLIN	30	I	Not used.
18	Logic H	-	O	Pulled up to +5V via 3.9 K-ohm resistor.
35	+5V	-	O	Pulled up to +5V via 3.3 K-ohm resistor.
17	Chassis GND	-	-	Chassis ground.
16,33,19-30	GND	-	-	Signal ground.
15,34	NC	-	-	Not connected.

Note)
1. */* at the beginning of a signal means active low.
2. The I/O column indicates the direction of the signal as viewed form the printer.

Reverse Channel

- **Transmission mode**   IEEE-1284 nibble mode
- **Adaptable connector**   Same as forward channel
- **Synchronization**   Refer to the IEEE-1284 specification
- **Handshaking**   Refer to the IEEE-1284 specification
- **Data transmission timing**   Refer to the IEEE-1284 specification
- **Signal level**   IEEE-1284 level 1 device
                                 See forward channel.

Table 1-23 shows the connector pin assignment and signals for reverse channel of the parallel interface.

Table 1-23. Connector Pin Assignment and Signals (Reverse Channel)

Pin No.	Signal Name	Return GND Pin	I/O	Description
1	HostClk	19	I	Clock signal from the host computer.
2-9	DATA 0-7	20-27	I	These signals represent parallel data on bits 2 to 9. Each signal is High when the data is logical 1 and LOW when the data is logical 0.
10	PtrClk	28	O	Clock signal from the printer
11	PtrBusy / Data bits 3,7	29	O	Busy signal from the printer. Data bit 3 or 7 in reverse channel.
12	AckDatareq / AckData Bits 2,6	28	O	Acknowledge request signal. Data bit 2 or 6 in reverse channel.
13	Xflag/Data bit 1,5	28	O	X flag signal. Data bit 1 or 5 in reverse channel.
14	HostBusy	30	I	Busy signal from the host computer
31	/INIT	30	I	Not used
32	/Data Avail / Data bits 0,4	29	O	Data available signal. Data bit 0 or 4 in reverse channel.
36	1284-Active	30	I	1284 active signal.
18	Logic-H	-	O	Pulled up to +5V via 3.9 K-ohm resistor.
35	+5V	-	O	Pulled up to +5V via 3.3 K-ohm resistor.
17	Chassis GND	-	-	Chassis ground for the printer.
16,33,19-30	GND	-	-	Signalground.
15,34	NC	-	-	Not connected.

Note)
1. **/* at the beginning of a signal means active low.*
2. *The I/O column indicates the direction of the signal as viewed form the printer.*

- **Extensibility Request**
  The printer responds affirmatively when the extensibility request values are 00H or 04H, as follows:
    - 00H   Request Nibble Mode Reverse Channel Transfer.
    - 04H   Request Device ID using Nibble Mode Rev Channel Transfer

- **Device ID**
  The printer sends following device ID string upon request:
    - [00H] [xxH]
    - MFG   EPSON;
    - CMD   ESCPL2, PRPXL, BDC;
    - MDL   Stylus [SP]COLOR[SP] 3000;
    - CLS   PRINTER;
  Note) [00H] denotes a hexadecimal values of zero.

1.4.2 Mac Serial Interface

❑ **Standard**   RS-423 compliant

❑ **Synchronization**   Synchronous

❑ **Bit rate**   Approximately 900 Kbps, 1.8 Mbps

❑ **Word format**   Start bit   1 bit
                           Data bit   8 bit
                           Parity bit   No parity bit
                           Stop bit1 bit

❑ **Handshaking**   X-ON/XOFF, DTR protocol

❑ **Adaptable connector** 8-pin mini circular connector

❑ **Recommended I/F cable** Apple System Peripheral-8 cable

Table 1-24. Connector Pin Assignment for Serial Interface

Pin No.	Signal Name	I/O	Function Description
1	SCLK	O	Synchronous clock
2	CTS	I	Clear to send
3	TxD-	O	Transmit data -
4	S.G.	I	Signal Ground
5	RxD-	I	Receive data -
6	TxD+	O	Balanced Transmit +
7	DTR	O	Data terminal ready
8	RxD+	I	Balanced Receive +

Table 1-25. X-ON/X-OFF, DTR Protocol

State	Buffer space	X-ON/X-OFF	DTR
Busy	Less than 1024 bytes	Send X-OFF code	Off
Ready	More than 2048 bytes	Send X-ON code	On
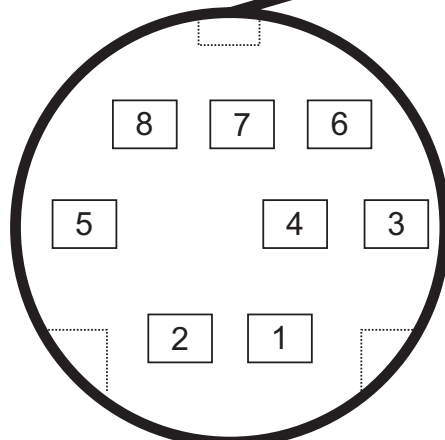
Figure 1-9.
Serial Interface Connector Pin Assignment

1.4.3 Optional Interface

The EPSON Stylus COLOR 3000 supports an optional Type-B interface (Level 2) with the following characteristics.

Reply message
❑ **In case of using Co-ax / Twin-ax I/F card**
  ❑ When ESC/P2 is selected:
    ■ Main type   MTP48p, PW161cl10cpi, PRG(W0xxxx)rev, AP800ma,
    ■ Product name   Stylus COLOR 3000
    ■ Emulation type   ESCPL2-00
    ■ Entity type   EPSONLQ2

  ❑ When XL24E is selected:
    ■ Main type   MTP48p, PW161cl10cpi, PRG(W0xxxx)rev, AP800ma,
    ■ Product name   Stylus COLOR 3000
    ■ Emulation type   PRPXL24-00
    ■ Entity type   EPSONPRPXL24

❑ **In case of using an I/F card other than Co-ax / Twin-ax I/F card**
  ❑ When ESC/P2 is selected:
    ■ Main type   MTP48p, PW161cl10cpi, PRG(W0xxxx)rev, AP800ma, SPD0fast
    ■ Product name   Stylus COLOR 3000
    ■ Emulation type   ESCPL2-00
    ■ Entity type   EPSONLQ2

  ❑ When XL24E is selected:
    ■ Main type   MTP48p, PW161cl10cpi, PRG(W0xxxx)rev, AP800ma, SPD0fast
    ■ Product name   Stylus COLOR 3000
    ■ Emulation type   PRPXL24-00
    ■ Entity type   EPSONPRPXL24

Table 1-26.Reply for Option Command

Option command No.	command name	Reply-A	Reply-B
00h	No Operation	Accept	None
01h	Start Hard Ware Reset	Accept	Excute OK
02h	Start Soft Ware Reset	Reject	
03h	Send Main System Type	Accept	
04h	Send Name Data	Reject	
05h	Inquire Name Data	Accept	
06h	Send Product Name	Accept	
07h	Send Soft Ware Emulation Type	Accept	
08h	Complete Buffered Data	Accept	Check Condition
09h	Stop Procedure	Reject	Execute OK
0Ah	Return Buffered Data	Reject	
0Bh	Send Entity Type	Accept	
0Ch	Send Status	Accept	
0Dh	Quit Procedure	Reject	
0Eh	Inquire ASCII Message	Reject	
0Fh	Send ASCII Message	Accept	None
10h - 13h		Unknown	None
14h	Inquire Emergency Message	Accept	Execute OK
15h	Send Emergency message	Accept	
16h - 1Fh		Unknown	None
20h - FFh		Reserved	None

Table 1-27. Supported Main Command and Sending Timing

Main Command	Command name	Sending Timing
01h	Start Software Reset	▪ /INIT signal on the standard parallel I/F ▪ Type-B I/F option command : 01h ▪ Cold Start
04h	Send Name Data	▪ Type-B I/F command : 05h
07h	Inquire Software Emulation Name	▪ Changing software Emulation Type
0Eh	Inquire ASCII Message	▪ Writing to DBIN register
14h	Inquire Emergency Reply	▪ Reply for Emergency command
15h	Send Emergency Message	▪ Receive Emergency Command

❑ **Emergency Command**
- ❑ 0X00 :Get device ID
- ❑ 0X01 :Get all status

❑ **Sending BDC-ST through DBIN register**
When State-Reply is set "ON" by ST from Type-B I/F, sending BDC-ST through DBIN register is started. When State-Reply is started, "Start" and "End" of BDC-ST characters are announced by sending the Main command 0Eh.

1.4.4 Prevention Hosts from Data Transfer Time-out

Generally, hosts abandon data transfer to peripherals when a peripheral is BUSY continuously for dozens of seconds. To prevent this kind of time-out, the printer receives data very slowly, several bytes par minute, even the printer is in a busy state. This slowdown starts when the remainder of input buffer drops under several hundreds of bytes. Finally, the printer is BUSY continuously when the input buffer is full.

1.4.5 Interface Selection

The EPSON Stylus COLOR 3000 has three types of interfaces: Parallel, Serial, and optional Type-B. Each interface can be selected manually or automatically. Both modes are selected thorough the default setting mode.

❑ **Manual selection**
The interface selected through the default setting mode always prints out data from the host.

❑ **Automatic selection**
Automatic interface selection is enabled in default setting mode. In automatic interface selection mode, the printer is initialized to the idle state when it is powered on (*1) scanning which interface is to receive data. Then the interface that received data first is selected. When the host stops data transfer and the printer is in the standby state for a number of seconds, the printer returns to the idle state. As long as the host sends data or the printer interface is busy state, the selected interface is left as it is.

*1 No interface is selected in this state.

❑ **Interface State and Interface Selection**
- ❑ When an interface other than the parallel interface is selected, the parallel interface goes into the BUSY state.
- ❑ When the interface other than serial interface is selected, the serial interface sets the DTR signal MARK.
- ❑ When the printer is initialized and returned to idle state, the parallel interface goes into ready state and the serial interface sets the DTR signal SPACE.

Note) *An interrupt signal such as the INIT on the parallel interface is ignored while that interface is not selected.*

1.4.6 Printer language

- ❑ ESC/P2
- ❑ IBM XL24E
- ❑ EPSON Remote

1.5 Operation

This section describes the functions of each button on the control panel and LED printer status indicators.

1.5.1 Control Panel

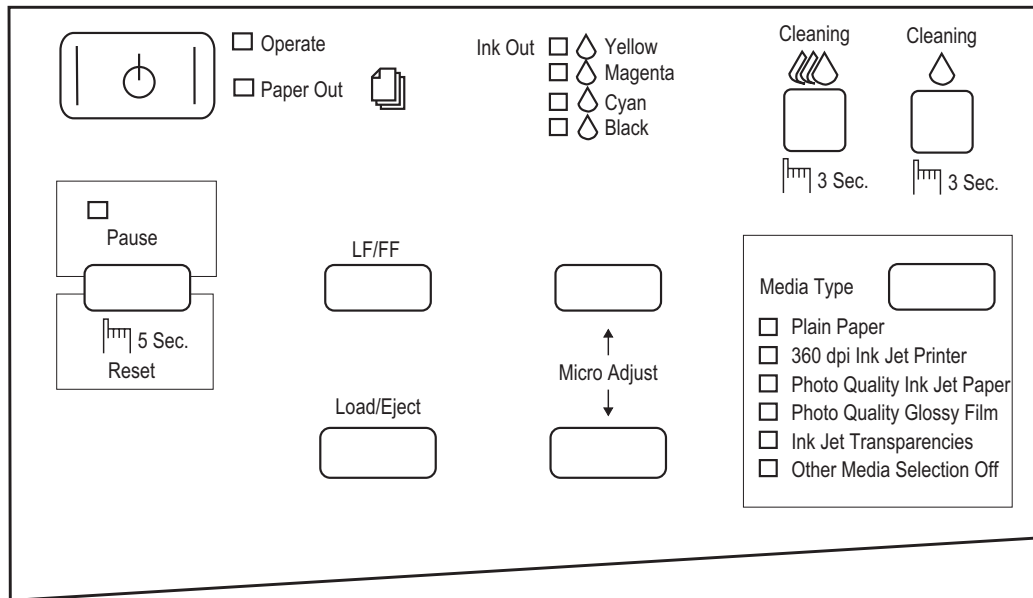The control panel for this printer consists of 8 non-lock pushbuttons, 1 lock type pushbutton, and 13 LED printer indicators for easy operation of the various printer functions. Refer to Figure 1-10.

Figure 1-10. Control Panel Appearance

Product Descriptions

❑ **Panel Functions (Normal Usage)**

Table 1-28. Panel Functions

Button	Function	Available Condition	Comment
Operate	Power On/Off	Always	At turning the printer off, the printer executes capping function before the power down.
Pause	Pause/Non-Pause	Always	
Pause (5 seconds)	Reset	Pause/Standby	The function will be recognized with this button held down for more than 3 seconds.
LF/FF	LF/FF	Pause/Standby	
Load/Eject	Load/Eject	Pause/Standby	
↑ Micro Adjust	Micro adjust (Forward feed)	Pause/Standby	See Note below.
Micro Adjust ↓	Micro adjust (Reverse feed)	Pause/Standby	See Note below.
Cleaning (Black) (3 seconds)	Cleaning (Black)	Pause/Standby	The function will be recognized with this button held down for more than 2 seconds.
Cleaning (Color) (3 seconds)	Cleaning (Color)	Pause/Standby	The function will be recognized with this button held down for more than 2 seconds.
Media Type	Selects paper type.	Pause/Standby	

Note) **TOF (Top Of Form) adjustment**
When "Micro adjust" is executed for the TOF position, the adjusted TOF position is memorized in the EEPROM. TOF positions for the ASF, manual insertion and tractor are stored in the corresponding addresses of EEPROM.
Tear off adjustment
When "Micro adjust" is executed for the tear off position, the adjusted tear off position is memorized in the EEPROM.

❑ **Panel Functions with Power On**

Table 1-29. Panel Function with Power On

Button	Function	Comment
Pause	Enters the printer adjustment mode.	Refer to Section 1.5.3.
LF/FF	Enters LQ self-test print mode.	Refer to Section 1.5.5.
Load/Eject	Enters draft-self test print mode.	Refer to Section 1.5.5.
Media type	Enters the default setting mode.	Refer to Section 1.5.2.
LF/FF + Load/Eject	Enters the hex-dump mode.	Refer to Section 1.5.6
Pause + LF/FF + Micro adjust ↓	Performs EEPROM and IC reset.	Initializes Timer IC and a part of the EEPROM.

Note) "+" means to press one button while holding down the other button(s).

⚠ CAUTION

> ☑ The power switch is connected to the secondary side of the electrical circuit. Since it has a delay circuit, voltage is still applied for the specified period of time after the printer power is turned off.
>
> ☑ As long as the printer is plugged in, voltage is applied to the primary side of the electrical circuit. Therefore be sure to unplug the printer before servicing or replacing the interface.
>
> ☑ When the EEPROM is reset, the waste ink drain pads need replacing. This must be performed by a qualified service person only. (See Chapter 3.)

❑ **Indicators**

This printer has 13 LED printer indicators, as shown in Table 1-30:

Table 1-30. Printer Condition and Printer Status (1)

LED	Color	Indication	Status
Operate	Green	On	Power on
		Blinks	Capping function in the power off
Paper Out	Red	On	Paper out
		Blinks	Paper is jamming.
Pause	Orange	On	Pause
		Blinks	The printer is in the ink sequence.
Ink Out (Yellow)	Red	On	No yellow ink cartridge or ink out
		Blinks	Ink low
Ink Out (Magenta)	Red	On	No magenta ink cartridge or ink out
		Blinks	Ink low
Ink Out (Cyan)	Red	On	No cyan ink cartridge or ink out
		Blinks	Ink low
Ink Out (Black)	Red	On	No black ink cartridge or ink out
		Blinks	Ink low
Media Type (Plain Paper)	Green	On	Plain paper is selected.
Media Type (360 dpi Ink Jet Printer)	Green	On	360 dpi Ink Jet Printer is selected.
Media Type (Photo Quality Ink jet Paper)	Green	On	Photo Quality Ink jet Paper is selected.
Media Type (Photo Quality Glossy Film)	Green	On	Photo Quality Glossy Film is selected.
Media Type (Ink Jet Transparencies)	Green	On	Ink jet transparencies is selected.
Media Type (Other/Media Selection Off)	Green	On	Paper type selection is neglected.

Note)   Refer to Table 1-36 for more detailed conditions.

1.5.2 Default Setting

Default setting mode enables users to change the default settings (initialization values). The set values are stored in the EEPROM and are not lost after the printer is turned off. To reset the values to the factory values, perform EEPROM reset operation or use the adjustment program described in Chapter 4.

1.5.2.1 Setting Method

See Figure 1-11 for the default setting method.
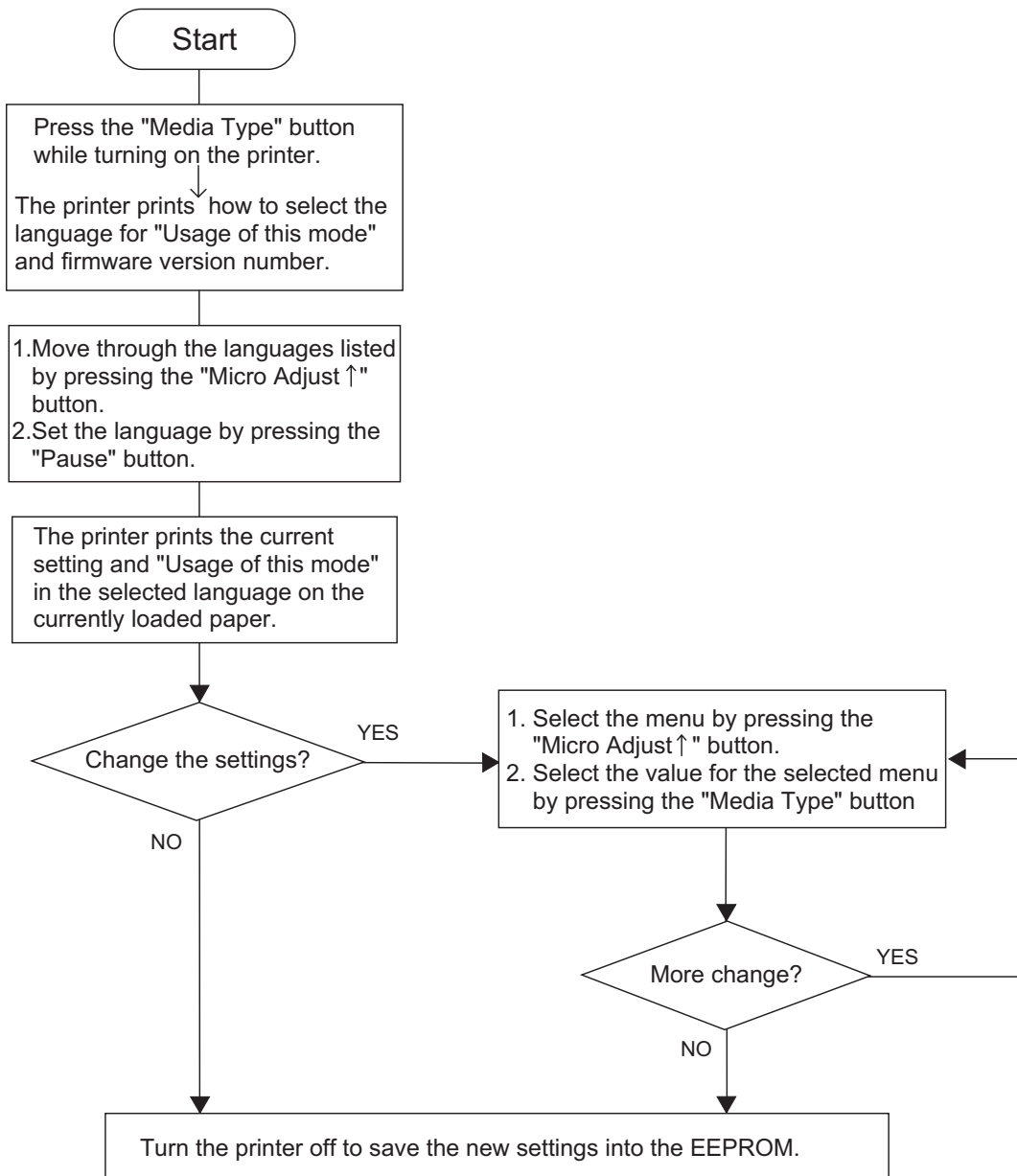
Figure 1-11. Default Setting Flowchart

⚠ CAUTION

☑ *Be sure to turn the printer off after the default setting operation is executed, since adjustment values are not stored in the EEPROM until the printer is turned off.*

☑ *The latest values set before power-off are stored in the EEPROM.*

1.5.2.2 Setting Menu

The printer enters default setting mode when you press the **Media Type** button while turning on the printer. The menus available are shown Table 1-31.

Table 1-31. Default Setting Menus

Menu	Setting *[1]
Print direction*[2]	**Auto** / Bi-d / Uni-D
Font	Roman / Sans Serif / **Courier** / Prestige / Script/ Roman T / Sans Serif H / Draft
Pitch	**10 cpi** / 12 cpi / 15 cpi / 17.1 cpi / 20 cpi / Proportional
I/F mode	**Auto** / Parallel / Mac Serial / Option
Auto I/F wait mode	**10 seconds** / 30 seconds
Software	**ESC/P2** / IBM XL24E
Auto CR (IBM mode only)	On / **Off**
A.G.M. (IBM mode only)	On / **Off**
Character tables Standard version	Italic **PC 437**, PC 850 PC 860, PC 863 PC 865, PC 861 BRASCII, Abicomp Roman 8, ISO Latin 1 PC 437 (Greek), PC 853 PC 855, PC 852 PC 857, PC 866 PC 869, MOZOAWIA Code MJK, ISO 8559-7 ISO Latin 1T, Bulgaria PC 774, Estonia ISO 8859-2, PC 866 LAT
International character set for Italic table	**Italic USA**, Italic France Italic Germany, Italic U.K Italic Denmark, Italic Sweden Italic Italy, Italic Spain 1
Auto line feed	On / **Off**
Network I/F mode	This mode is for network environment. **Off**: Used in usual environment On: Used in network environment
0 slash	**0** / 0 with slash
Page length	**11 inch** / 12 inch / 8.5 inch / 70/6 inch / other
Skip over perforation	On / **Off**
Auto tear off	**On** / Off
Banner mode *[3]	On / **Off**
Parallel I/F transfer rate	**Fast** / Normal

Note)   1. Underlined parameters in bold letters are factory default settings.
2. Refer to Table 1-32 and Table 1-33.
3. Refer to Table 1-34.

Table 1-32. Print Direction Mode Characteristics

	Black and White Printing	YMCK Printing (color)
Auto	▪ Throughput and quality is better.	▪ Throughput is better. ▪ Color quality with special paper is worse. (Because Color correction depends on the print direction.)
Bi-D	▪ Throughput is the best. ▪ Print quality may be down.	▪ Throughput is the best. ▪ Color quality with special paper is worse. (Because Color correction depends on the print direction.)
Uni-D	▪ Throughput is worse. ▪ Print quality is the best.	▪ Throughput is worse. ▪ Color quality is the best.

Table 1-33. Printing Direction and ESC U Command

			Character Mode (for DOS)	Raster Graphics Mode (for Windows / Mac) *
Default Setting Mode	Auto	ESC U 0	Auto	Bi-D
		ESC U 1	Auto	Uni-D
		ESC U 2	Auto	Auto
		—	Auto	Auto
	Bi-D	ESC U 0	Bi-D	Bi-D
		ESC U 1	Uni-D	Uni-D
		ESC U 2	Auto	Auto
		—	Bi-D	Bi-D
	Uni-D	ESC U 0	Uni-D	Bi-D
		ESC U 1	Uni-D	Uni-D
		ESC U 2	Uni-D	Auto
		—	Uni-D	Uni-D

*: Printing direction is controlled by driver with Windows/Mac environment.

When the banner mode is selected by default setting or remote command, the function is as described in Table 1-34.

Table 1-34. Vertical Print Position in the Manual Insertion

Trigger		Function	
		Banner mode Off (manual insertion operation)	Banner mode On
Command	FF	1. Case that page length is set by ESC (C → Eject 2. Case that page length is not set by ESC (C → Advances to the top-margin of the next page	Advances to the top-margin position of the next page.
	ESC EMR	No operation	No operation
Switch	FF	Eject	Advances to the top-margin position of the next page.
	Eject	Eject (maximum 44 inches)	Advances to the top-margin position of the next page.
Data	Over the page length set by command	1. Case that page length is set by ESC (C → Eject 2. Case that page length is not set by ESC (C → No operation	No operation
	Over the paper length	Eject	Eject

1.5.3 Printer Adjustment Mode

The EPSON Stylus COLOR 3000 allows users to adjust the following items.

Table 1-35. Printer Adjustment Patterns

Pattern No.	Items
Pattern 1	Uni-d adjustment at 400 cps [1]
Pattern 2	Bi-d adjustment at 400 cps [1]
Pattern 3	Bi-d adjustment at 200 cps [1]
Pattern 4	Head gap adjustment between black and color to the cross feed direction at 200 cps [2]
Pattern 5	Head gap adjustment between black and color to the cross feed direction at 100 cps [2]

[1] With an increment of 1/1,440 inch
[2] With an increment of 1/720 inch

❑ **Adjustment method**
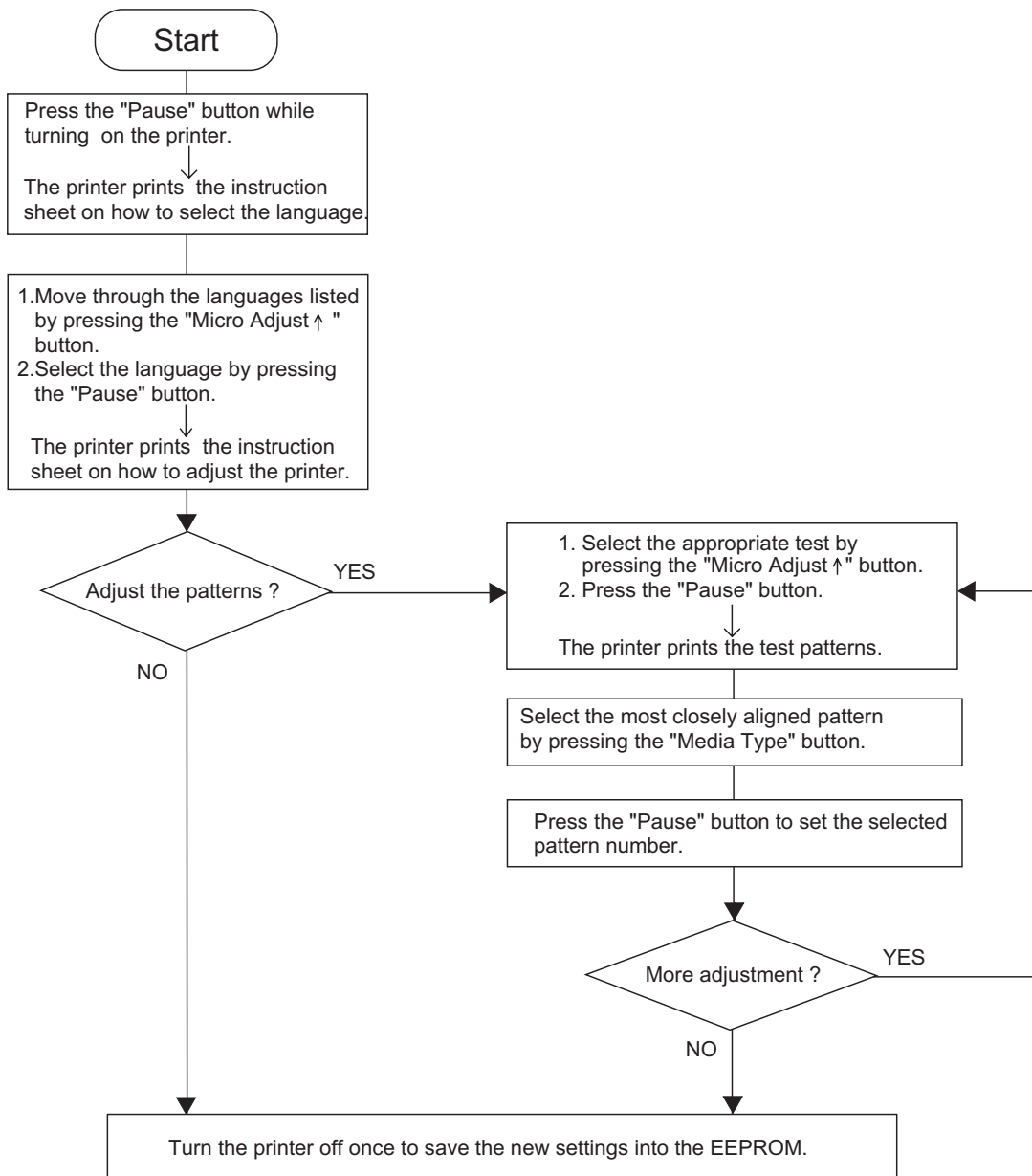
Figure 1-12. Printer Adjustment Flowchart

1.5.4 Printer Initialization

This printer has three initialization types: Power-on initialization, Operator initialization, and Software initialization.

❑ **Power-on Initialization**
   ❑ Triggers   Turning on the printer
                       Cold reset command (Remote RS command)
   ❑ Actions performed
      ■ Initialize the printer mechanism.
      ■ Clears input data buffer.
      ■ Clears download character set.
      ■ Clears print buffer.
      ■ Sets default values.

❑ **Operator Initialization**
   ❑ Triggers   Pressing the Pause button for 3 seconds
                       The printer recognizes the /INIT signal (negative pulse) of parallel interface.
   ❑ Actions Performed
      ■ Clears input data buffer.
      ■ Clears download character set.
      ■ Clears print buffer.
      ■ Sets default values.

❑ **Software Initialization**
   ❑ Trigger   ESC @ commend
   ❑ Actions Performed
      ■ Clears print buffer.
      ■ Sets default values.

1.5.5 Self-test Printing Mode

This printer has the self-test printing mode to check several printer functions.
   ❑ Trigger   LQ mode: Pressing LF/FF button while turning on the printer
                      Draft mode: Pressing Load/Eject button while turning on the printer
   ❑ Items checked
      ■ Function of the control circuit board
      ■ Function of the printer mechanism
      ■ Print quality

1.5.6 Hexadecimal Dump Function

Pressing the LF/FF and Load/Eject buttons while turning on the printer activates the hexadecimal dump mode. Each line has Hexadecimal codes, along with their corresponding letters printed in the right column. If a received code denotes an unprintable character, a control code such as "." (period) is printed in the right column. This function enables users to check whether the data from the host is properly transferred. Turn off the printer to exit the mode.

1.5.7 Monochrome Printing Mode

When the printer is in the ink end (color) condition, the black ink is substituted to continue to print. To switch to monochrome printing mode, turn off and back on the printer. This mode is also selected by the command "**ESC (K)**". The Color select command "**ESC r**" is ignored in this mode.

1.5.8 Error Condition

When any of the conditions listed below is detected, the printer goes into an error status and the /ERROR signal goes LOW and the BUSY signal goes HIGH. On this condition, the printer accepts no data and goes into a pause status automatically.

❑ The CR moves abnormally. (Fatal error)
❑ Paper ends or paper is jamming.
❑ Release lever position is inappropriate for the paper path currently used.
❑ No ink cartridge is installed or ink ends.
❑ Maintenance is required.

Table 1-36. Printer Condition and Panel Status (2)

Printer Condition	LED Indicators							Media Type
	Operate	Paper Out	Pause	Ink Out				
				Yellow	Magenta	Cyan	Black	
Power on	On	—	—	—	—	—	—	—
Capping function in the power off	Blinks	—	—	—	—	—	—	—
Data exit	Blinks	—	—	—	—	—	—	—
Paper Out	—	On	—	—	—	—	—	—
Paper jam	—	Blinks	—	—	—	—	—	—
Pause	—	—	On	—	—	—	—	—
During ink sequence	—	—	Blinks	—	—	—	—	—
No color ink cartridge or ink out	—	—	—	Corresponding color goes on.				—
Ink Low (color)	—	—	—	Corresponding color blinks.				—
No black ink cartridge or ink out	—	—	—	—	—	—	On	—
Ink Low (black)	—	—	—	—	—	—	Blinks	—
Lever error	—	—	—	—	—	—	—	Blinks
Fatal error	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks
Maintenance request	Blinks	Blinks	Blinks	On	On	On	On	Blinks
Panel reset function	On for 1 second only.							
Reset EEPROM and Timer IC	On for 1 second only.							

Note)

1. "—" means no effect.

2. To recover from the fatal error, turn off and back on the printer or send the /INIT signal after eliminating the trigger.

3. Maintenance request occurs when the wasted ink fills to capacity, and servicing is required. To clear the error status, perform EEPROM reset. (See Table 1-29. Panel Function with Power On, Chapter 2 and Chapter 3.)

4. Refer to Table 1-30 for detailed conditions indicated by the Media type LED indicators.

1.6 Main Components

The main components of the EPSON Stylus COLOR 3000 are as follows:

- ❑ Main control board   C203 MAIN
- ❑ Power supply board   C172 PSB/PSE
- ❑ Control panel bard   C203 PNL
- ❑ Printer mechanism   M-4J60
- ❑ Housing

1.6.1 C203 MAIN Control Board

This board consists of the following:

- ❑ 16-bit CPU   (IC5) (clock wave : 19.66Mhz)
- ❑ Gate arrays   B05B33 (IC6), B05B45 (IC16)
- ❑ PROM   (IC13)
- ❑ CG-ROM   (IC11)
- ❑ DRAM   (IC12),
- ❑ SRAMs   (IC14, IC28)
- ❑ RESET ICs   (IC3, IC9)
- ❑ EEPROM   (IC1)
- ❑ Motor driver ICs   (IC17, IC18) for the pump motor and PF motor
- ❑ Motor driver ICs   (IC19, IC20) for CR motor
- ❑ Head common driver hybrid ICs   (IC22, IC23).
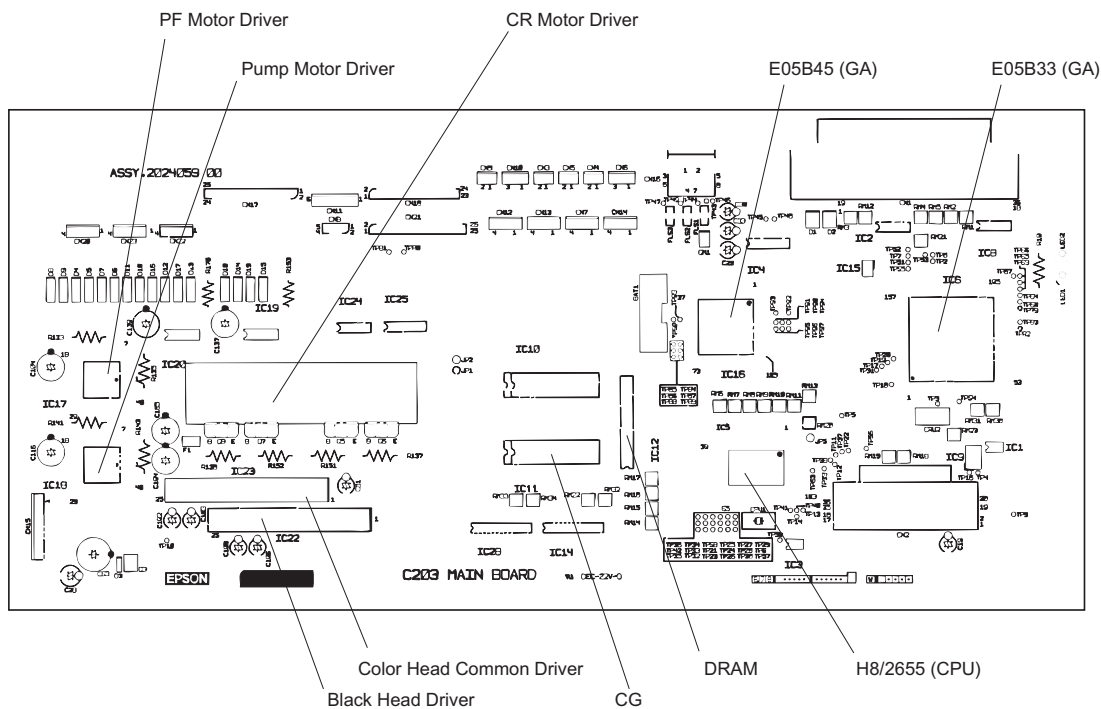
Figure 1-13. C203 MAIN Board Component Layout

1.6.2 C172 PSB/PSE Board

C172 PSB/PSE board, same as for Stylus COLOR 1500, consists of the transformer, switching FET, regulator IC on the secondary circuit, diode bridge, fuse, and so on.
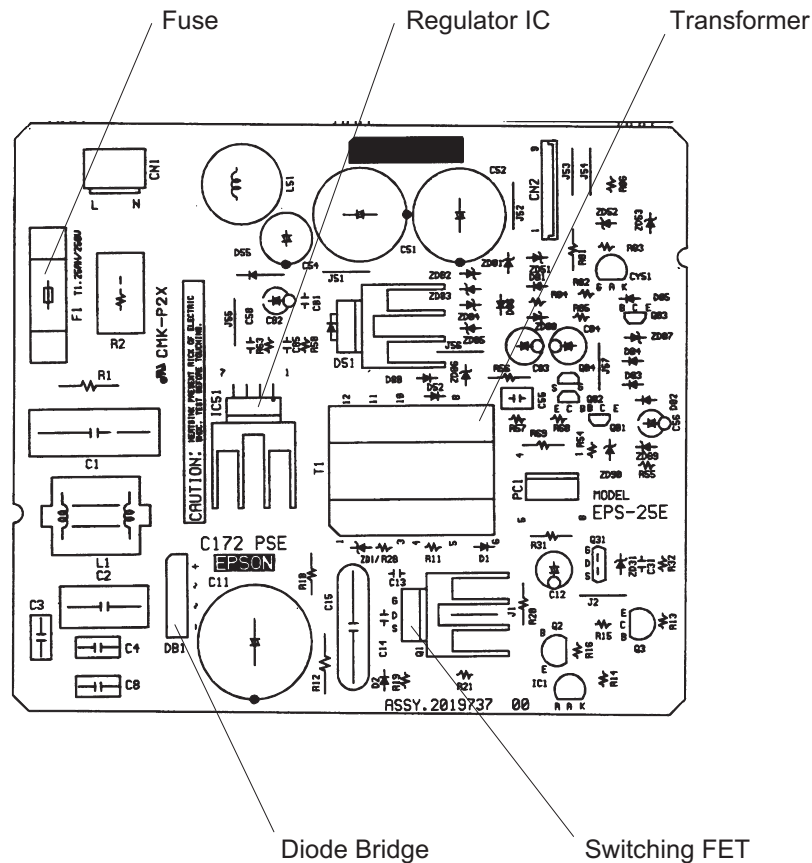
Figure 1-14. C172 PSB/PSE Board Component Layout

1.6.3 Control Panel

The control panel for this printer consists of 9 pushbuttons and 13 printer LED indicators.

1.6.4 Printer Mechanism Unit (M-4J60)

The printer mechanism unit for this printer is composed of the CR motor, PF motor, pump motor, paper feeding mechanism, and ink system mechanism.

1.6.5 Housing

The housing for this printer consists of the upper housing, lower housing, printer cover, ink cartridge cover, rear sheet guide, tractor unit, knob, adjust lever and release lever.

Chapter 2
Operating Principles

2.1 Overview

This chapter describes the operating principle of the printer mechanism and electrical circuit.

2.2 Printer Mechanism Operating Principle

2.2.1 Printer Mechanism

The printer mechanism of this printer is composed of the printhead unit, paper feeding mechanism, CR (Carriage) mechanism and the pump mechanism. The block chart for the printer mechanism is shown in Figure 2-1. The printer mechanism has 3 motors: CR motor, PF (Paper Feed) motor and pump motor. Torque from the CR motor moves the CR in the column direction. PF motor sends torque to load, feed and eject paper. The pump motor drives the pump mechanism. The release lever switches torque from the PF motor side to the tractor side to feed continuous paper.
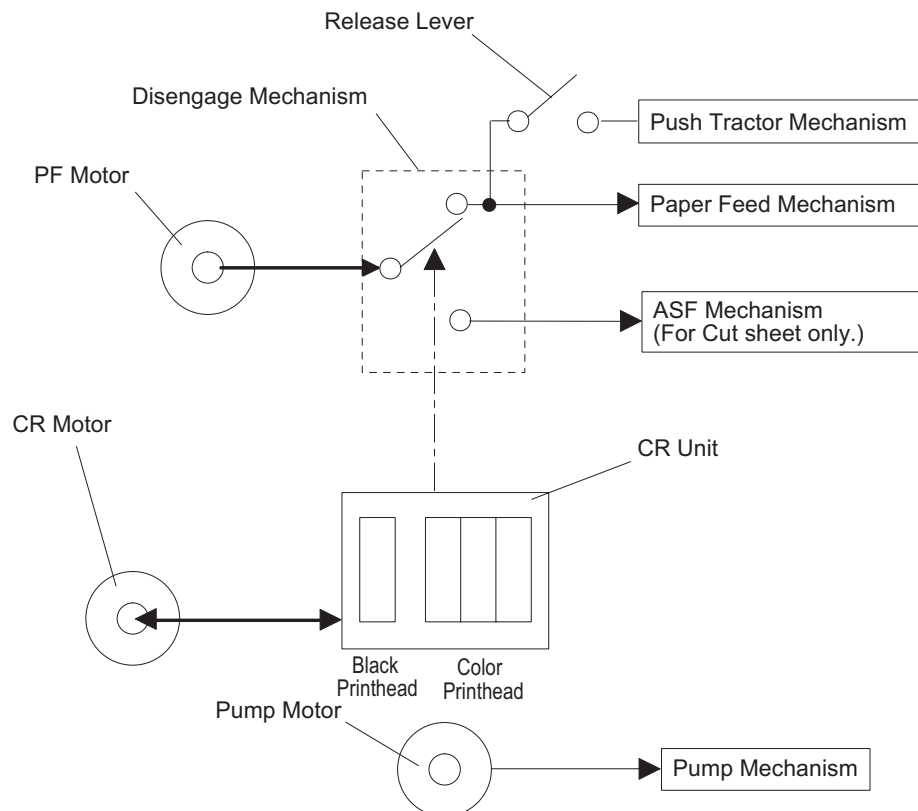
Figure 2-1. Printer Mechanism Block Diagram

2.2.2 Printing Mechanism

The printing method used for this printer is On-demand ink jet, same as for other EPSON ink jet printers. However, use of the new type of printhead improves print quality and speed. The printing mechanism has 2 parts: printhead and ink cartridge which is filled with ink.

2.2.2.1 Printhead Structure

The printhead for this printer has the black and color printheads. The structures of the printheads are basically the same except for the nozzle configuration. The black printhead, used for the black ink only, is composed of 128 nozzles (32 nozzles for each of 4 rows), while the color printhead, composed of 3 printheads for Magenta, Cyan and Yellow, has 64 nozzles (32 nozzles for each of 2 rows) for each color.
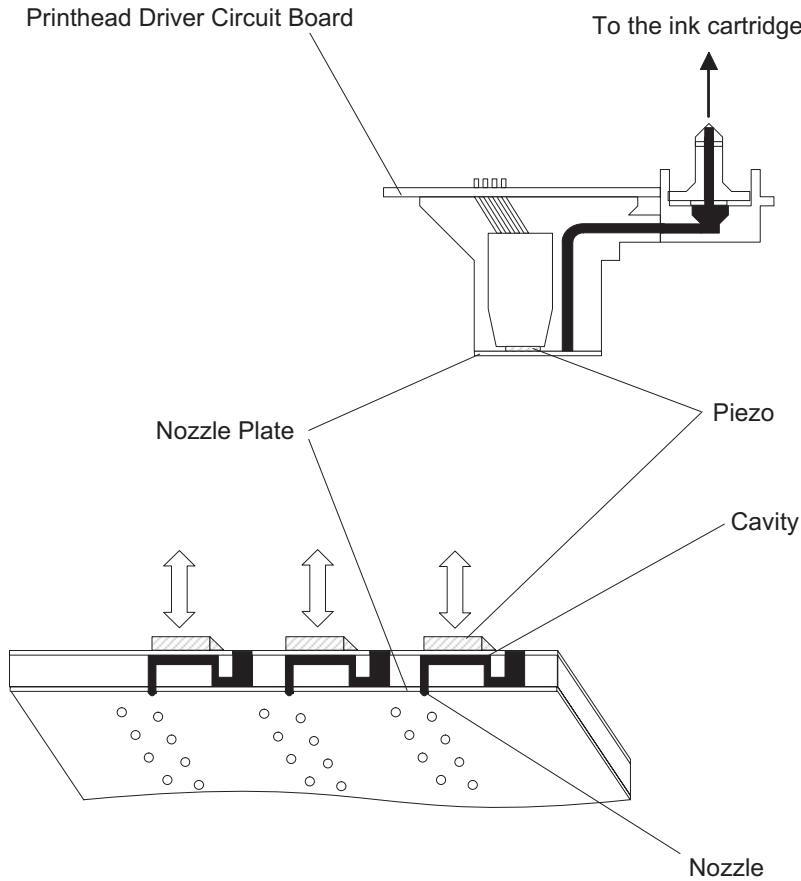
Figure 2-2. Printhead Structure

2.2.2.2 Printing Process

Steps bellow describe how the ink is ejected from each nozzle with the on-demand ink jet system.

<Step 1> Normal state

No print signal is applied to the PZT (Piezo electric element). In this state, the PZT does not displace and no pressure is added to the ink inside the cavity. Therefore the pressure in the cavity is kept at a constant level.

<Step 2> Ejecting state

Print signal is applied to a specific nozzle via the head driver circuit to activate the PZT of the nozzle. The voltage which activates the PZT is produced in the common driver circuit on the control board. When the voltage is applied to the PZT, the PZT displaces and the pressure in the cavity changes. Then the ink ejects as a result.
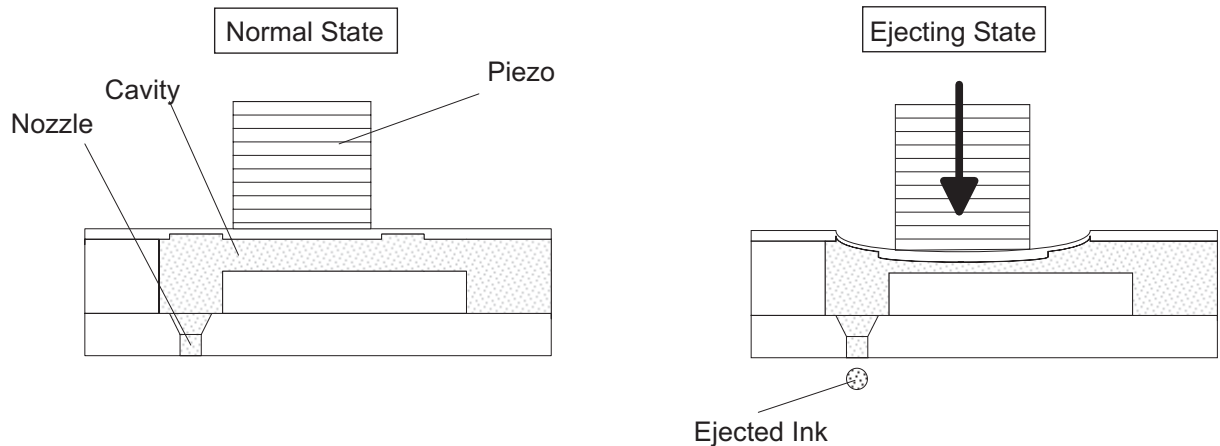
Figure 2-3. Printing Operation States

When no more print signal is applied to the PZT, the PZT recovers from the displaced status. With this process, the cavity also returns to its normal size, which brings the pressure negative. The negative pressure in the cavity then absorbs the ink from the cartridge to fill the cavity with the ink again for the next printing motion. The ink which was not used for printing adheres on the nozzle surface and increases viscosity in the nozzles, and it causes printing malfunction. Therefore the ink is periodically absorbed and wasted into the waste ink drain pads by the pump mechanism. Ink viscosity varies depending on the temperatures around the printhead. Since the change in the ink viscosity leads to decline in print quality, the thermistor is attached to the color printhead to keep the drive voltage at a proper level based on the detected printhead temperature.

2.2.2.3 Printing Methods

❑ **EPSON micro dot printing**

Both black and color printings can be performed in the normal dot printing mode and EPSON micro dot printing mode. In the normal dot printing mode, the printer uses less ink to create sharper dots. Therefore the gradation range is expanded in more delicate tone. This mode is available when the 1440X720-dpi paper or glossy film is selected.

❑ **Micro weave printing**

In this mode, the printer prints 1 line with multiple passes by using specific nozzles for each pass. The paper is also fed in smaller increments for this operation. Since this mode eliminates white banding problem, the graphic images quality is improved. However, decrease in paper feed speed is inevitable. The Micro Weave printing can be selected through the printer driver.

2.2.3 Carriage (CR) Mechanism

The CR mechanism is composed of the CR unit, timing belt, CR guide shaft, paper eject frame, HP (Home Position) sensor and CR motor. The CR motor sends torque to the timing belt to move the CR unit in the both right and left directions along the paper eject frame and CR guide shaft. A stepping motor used for the CR motor enables the CR unit to move and stop at any position. The CR is primarily detected at the home position by the HP sensor when the printer is turned on and its position is then controlled by the open loop. Table 2-2 and Table 2-3 show the specification for the CR motor and the CR motor drive terms, respectively.

Table 2-1. CR Motor Specification

Item	Description
Motor type	4-phases / 200-pole / Hybrid type stepping motor
Drive voltage	42 VDC $\pm$ 5% (The voltage applied to the driver)
Coil resistance	5 $\Omega \pm$ 7% (at 25° C per 1 phase)
Excitation mode	▪ Bipolar drive ▪ 2-2 phase, 1-2 phase, W1-2, 2W1-2 phase, 4W1-2 phase ▪ Constant current drive
Drive frequency	480 to 9600 Hz
Minimum step	0.202 mm (2-2 phase drive) 0.106 mm (1-2 phase drive) 0.053 mm (W1-2 phase drive) 0.026 mm (2W1-2 phase drive) 0.013 mm (4 W 1-2 phase drive)

Table 2-2. CR Motor Drive Terms

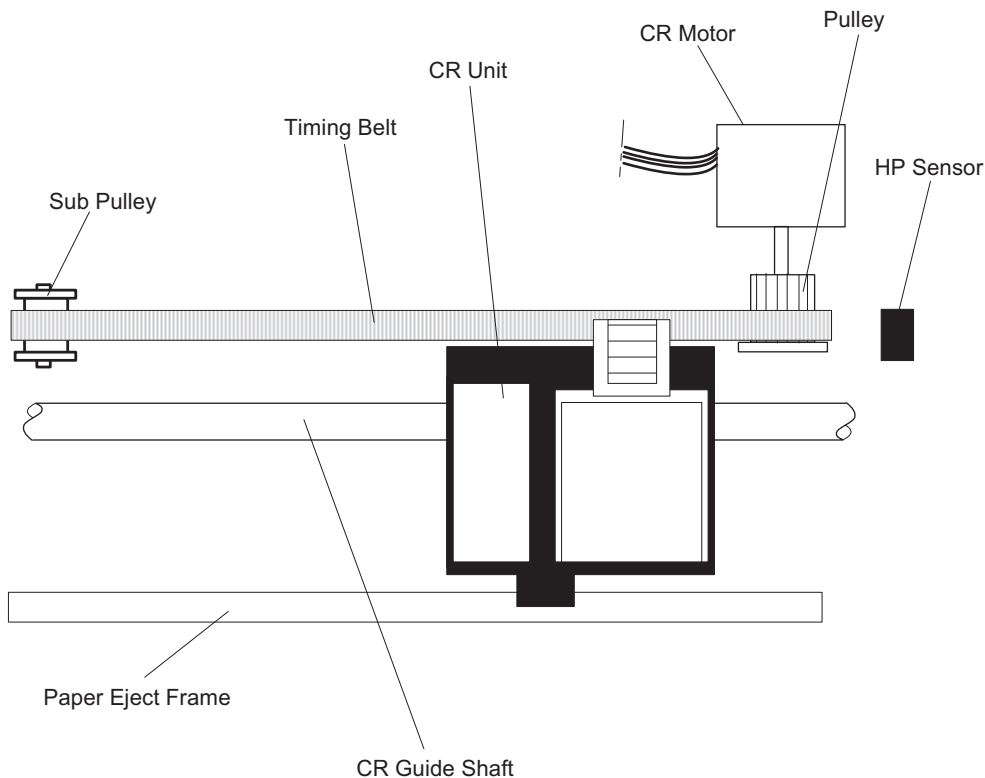| Print mode	Print speed	Acceleration 1	Acceleration 2	Constant	Deceleration 1	Deceleration 2
Draft	400 cps	0.91	0.91	0.63	0.91	0.91
LQ	200 cps	0.91	0.91	0.49	0.63	0.63
SLQ	100 cps	0.63	0.63	0.49	0.63	0.63

Figure 2-4. CR Mechanism

2.2.4 Paper Feed Mechanism

The paper feed mechanism of this printer consists of the integrated ASF (Auto Sheet Feeder) mechanism, tractor mechanism, PF (Paper Feed) motor, front/rear PE (Paper End) sensors, PF roller, paper guide mechanism, paper eject unit, and PF motor drive disengage mechanism. The torque from the PF motor drives the paper load mechanism, paper feed mechanism and paper eject mechanism. While the printer is not printing, the PF motor drive disengage mechanism switches the torque sent from the PF motor to the ASF mechanism, which depends on the CR position. While the paper feed mechanism is driven, the torque from the PF motor is transmitted via PF motor pinion gear and disengage gear to the PF roller, where the torque splits in 2 directions: one is to the paper eject mechanism via the gear train in the paper guide assembly and the other is to the ASF mechanism via the transmission gear. The tractor drive gear train is set at the left end of the PF roller. Table 2-3 and Table 2-4 shows the specification for the PF motor and PF motor drive terms, respectively. Figure 2-5 illustrates the paper feed mechanism.

Table 2-3. PF Motor Specification

Item	Description
Motor type	4-phases / 96-pole / Hybrid type stepping motor
Drive voltage	42 VDC $\pm$ 5% (The voltage applied to the driver)
Coil resistance	10 Ω $\pm$ 10% (at 25° C per 1 phase)
Connection	Bipolar
Excitation mode	2-2 phase, 1-2 phase, W1-2 phase constant current drive
Minimum step	1/720 inch / step (2-2 phase drive)

Table 2-4. PF Motor Drive Terms

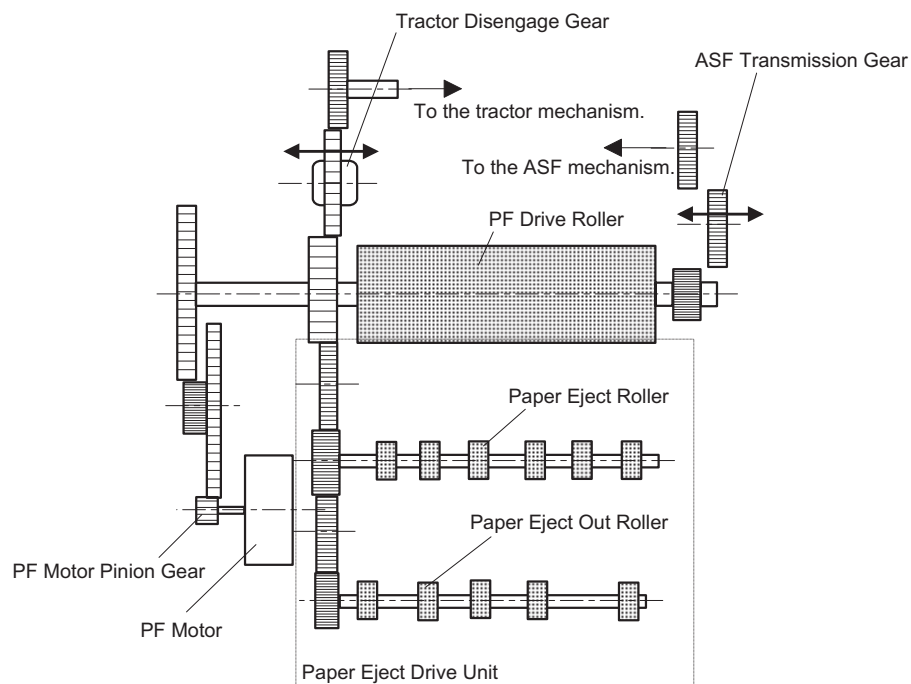| Operation mode	Acceleration	Constant	Deceleration	Stand-by
Paper feed (Line feed: 1/6 inch)	0.9/0.9	0.9	0.75/0.75	0.6
ASF Feed	0.9/0.9	0.9	0.75/0.75	0.6
Pump driven	— /0.9	0.9	0.9	0.6
Pump driven (slow)	— / —	0.9	— / —	0.6

Note)   Double 1-2 phase drive / 2-2 phase drive

Figure 2-5. Paper Feeding Mechanism

2.2.4.1 ASF (Auto Sheet Feeder) Mechanism

When the printer is not printing, the PF motor drive disengage mechanism switches the torque sent from the PF motor to the LD rollers in the ASF mechanism via the planetary gear based on the detected position of the CR unit. The LD roller shaft has 2 cams on the right and left ends. They push down the paper support to make the paper surface come in contact with the LD rollers. The one way clutch rotates the LD roller in the specified direction to load paper. Once the paper is loaded, the torque from the planetary gear is disengaged and the paper is then transported by the paper feed mechanism.
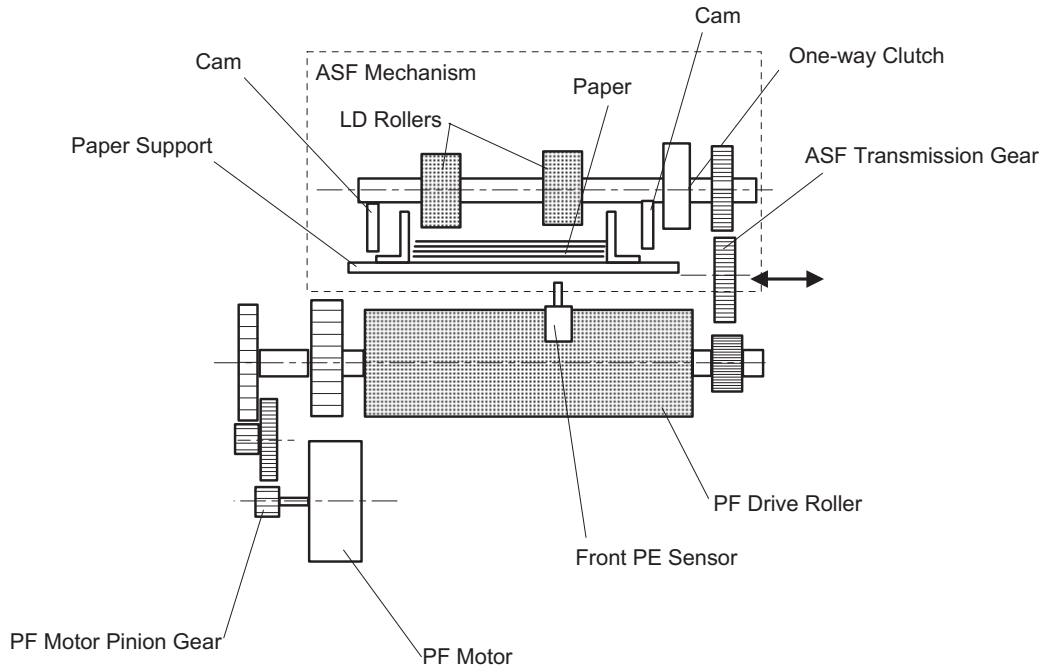
Figure 2-6. ASF Mechanism

2.2.4.2 Tractor Mechanism

Torque sent from the PF motor to the PF roller is transmitted to the tractor gear via disengage mechanism operated with the release lever. When the release lever is set to the tractor side, the release sensor detects the condition and torque transmission to the ASF mechanism is cut off as a result.
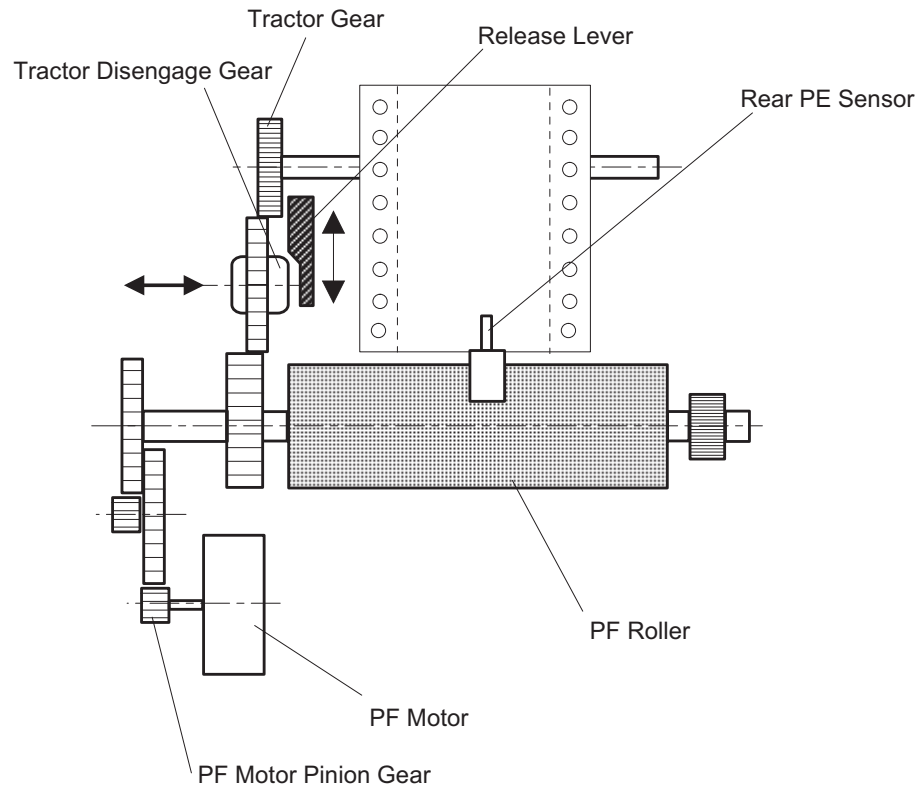

Figure 2-7. Tractor Mechanism

2.2.4.3 Manual Feed Mechanism

The printer loads cut sheet and roll paper in the rear paper slot. When the rear PE sensor detects the paper, the CR unit leaves the ASF paper feed position. Therefore the paper is manually loaded even if paper is set in ASF. This mode allows use of types of paper that differs from the one set in ASF.

2.2.5 Platen Gap (PG) Adjust Mechanism

The PG adjust mechanism, located at the top right of the printer cover, allows the user to set the proper platen gap (distance between paper and nozzle surface) for the paper thickness to prevent ink smudging. The PG adjustment mechanism consists of the PG adjust lever, CR guide shaft, and parallelism adjust bushings. Switching the lever from "0" to "1" turns the CR guide shaft which joins to the lever. Since the joint for the parallelism adjust bushing and CR guide shaft has an eccentricity toward the guide shaft, the guide shaft moves from or toward the platen as the lever moves. With this movement, the platen gap also changes from wide to narrow or vice versa.

Table 2-5. Platen Adjust Lever Positions

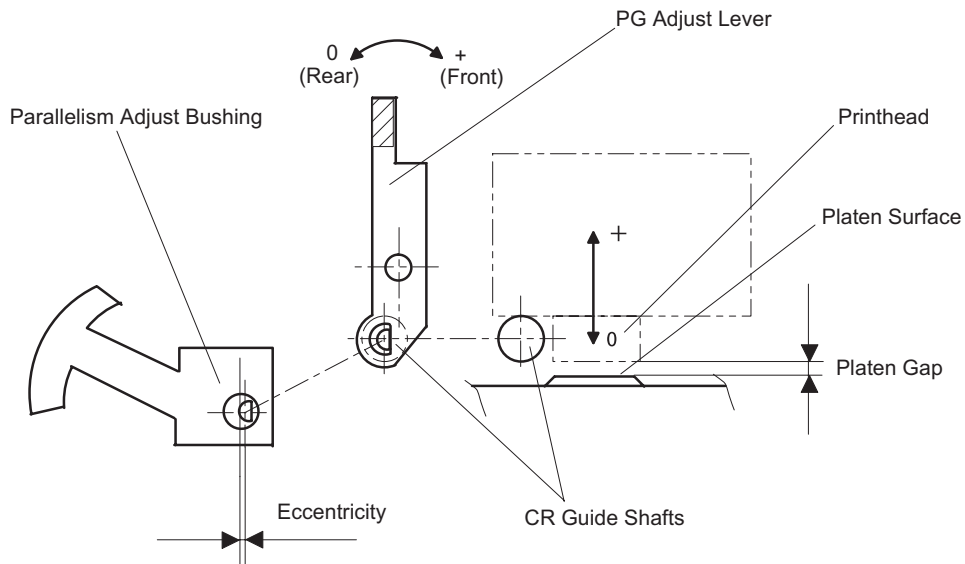| Paper Type	Adjust lever Position	PG Adjustment Value
Cut Sheet, OHP Sheet, Label, Continuous paper	Rear	0
Envelope ,Card, Index card	Front	+ 0.7 mm

Figure 2-8. Platen Gap Adjustment Mechanism

2.2.6 Ink System

The ink system for this printer is composed of the following mechanisms.

❑ Ink cartridge
❑ Pump mechanism
❑ Capping mechanism
❑ Waste ink drain pads
❑ Wiping mechanism

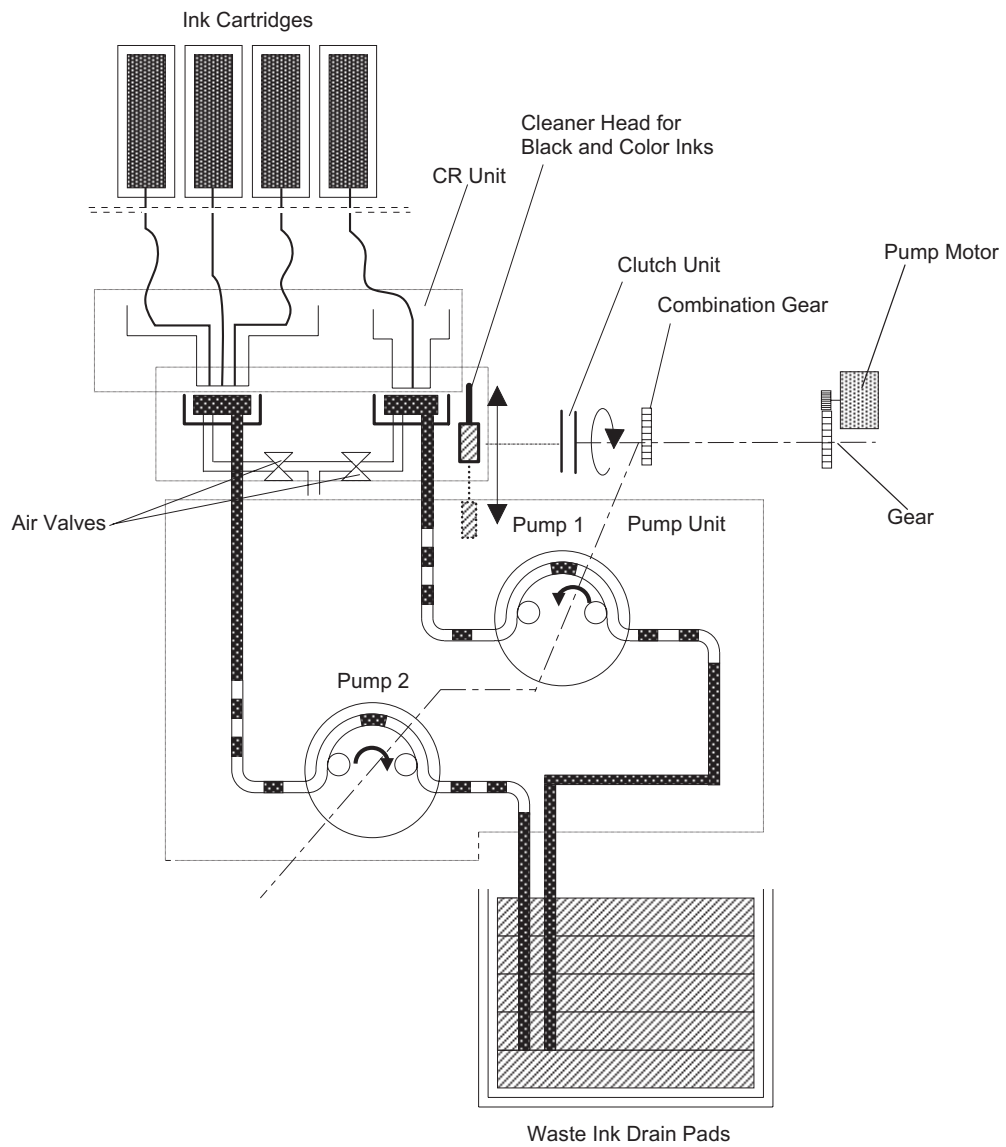Figure 2-9 shows the block chart of the ink system. flowchart

Figure 2-9. Ink System Mechanism

2.2.6.1 Pump Mechanism

The pump mechanism, composed of the pump motor and pump unit, absorbs viscous ink in the printhead nozzles and drains it to the waste ink drain pad through the cap. Since this printer has only one pump, it uses the pump for both black and color inks by alternating the rotational direction of the pump motor. When the pump motor rotates forward [1] it absorbs black ink. On the other hand, it absorbs color ink with backward rotation [2]. The pump unit is composed of the pulley, tube and 2 rollers, as shown in Figure 2-10. To draw ink, the pulley rotates the rollers which squeeze the tube reducing volume as they move to produce negative pressure. As a result, the ink is vacuumed and drained into the waste ink drain pads by the pressure produced through the operation.

[1] The direction in which the paper is fed.
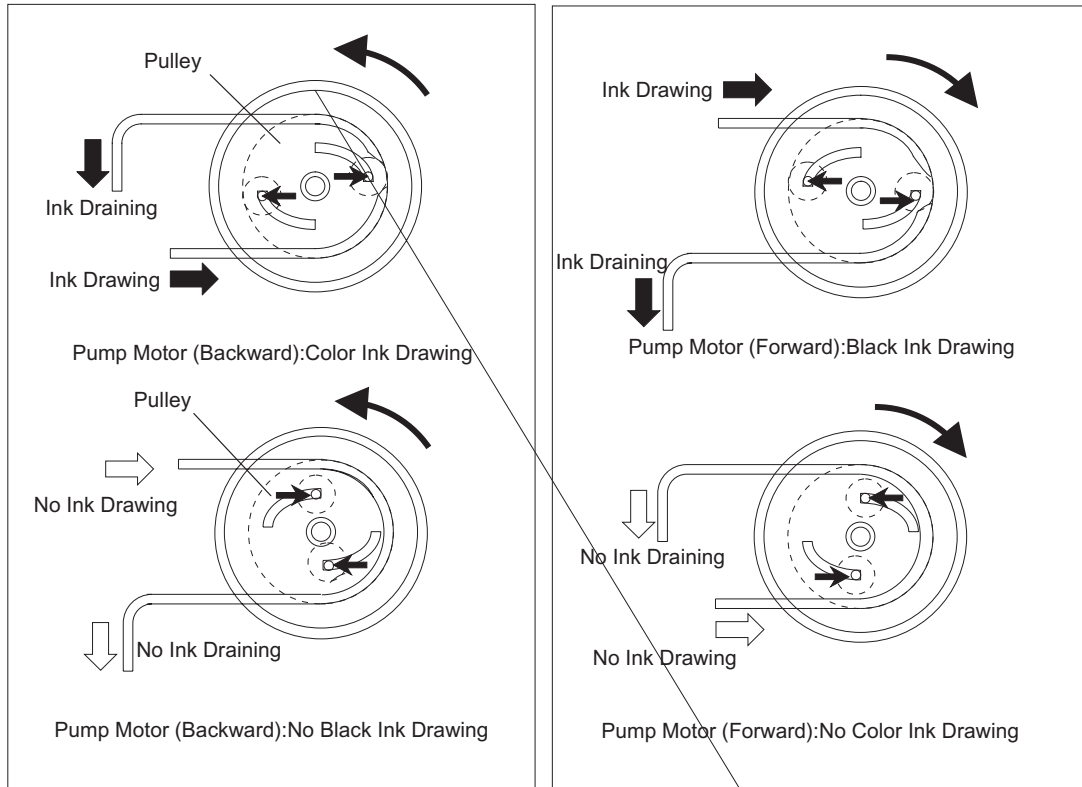[2] The direction in which the paper is fed back.

Figure 2-10. Pump Operation

Table 2-6. Pump Motor Specification

Item	Description
Motor type	4-phases / 48-pole / PM type stepping motor
Drive voltage	42 VDC $\pm$ 5% (The voltage applied to the driver)
Coil resistance	7.7 Ω ± 10% (at 25°C per phase)
Connection	Bipolar
Excitation mode	▪ 2-2 phase, 1-2 phase, W1-2 phase, ▪ Constant current drive
Drive frequency	281 to 1250 Hz
Drive current	825 mA (at fast absorption) 500 mA (at slow absorption)

2.2.7 Capping Mechanism

Ink around head nozzles loses moisture If they are left exposed while the printer is in non-printing or power off status. Therefore the printheads must be capped to avoid increasing viscosity due to dried nozzles. The caps are individually equipped for the black and color printhead. When the CR moves right from the home position, the cap holder also shifts right and strikes the right frame. This motion opens the air valve and the air in the cap is release. To resume printing, the CR moves right from the home position to strike the right frame with the cap holder so that the air valve opens. This operation brings the negative pressure in the cap back to normal and the CR goes back to the home position. Since the power switch of this printer uses the secondary power-on circuit, the printer power stays on to allow the printer to complete the capping operation even if the printer is turned off during the operation.
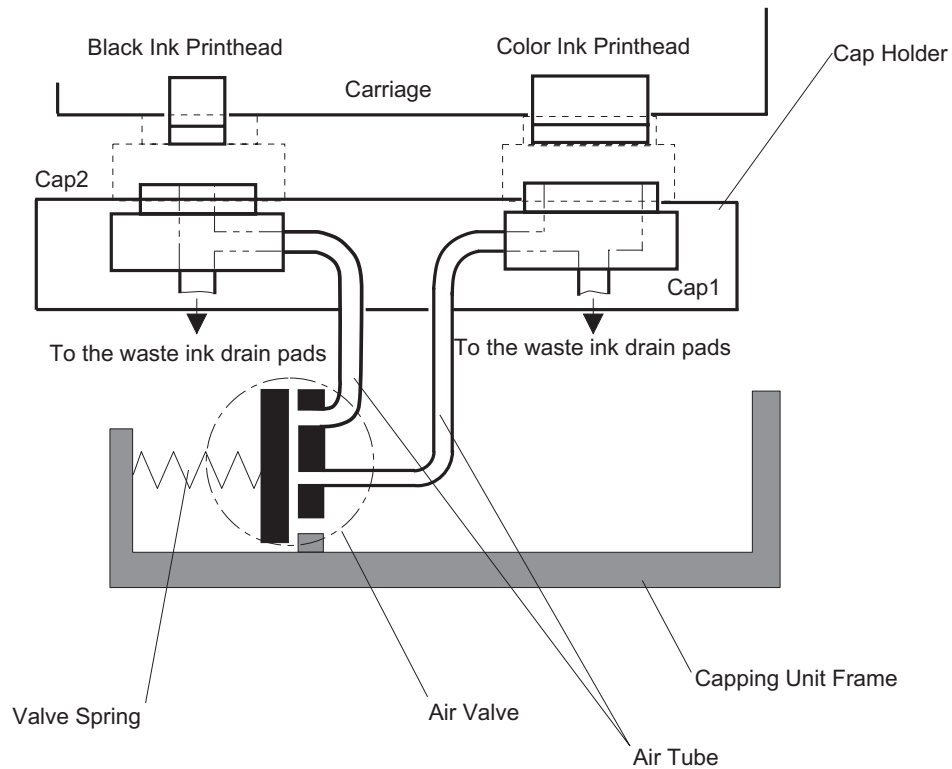
Figure 2-11. Capping Mechanism

2.2.7.1 Wiping/CR Lock Mechanism

The wiping operation removes the ink and dust adhered around the nozzles. This is operated during a cleaning sequence. When the pump motor rotates backward, the torque sent via the head cleaner (wiper) drive gear and the clutch moves the head cleaner to the printhead route. The CR unit then begins to move right and left to wipe the nozzle surface against the head cleaner. When the wiping operation is complete, the pump motor rotates forward to move back the head cleaner. Only one cleaner head is used for the both black and color printheads. The head cleaner also functions as the CR lock mechanism. When the printer power is off, it keeps the CR unit from shifting left (to the printing side). The switch lever locks the CR at the right end by joining with the disengagement mechanism. With this mechanism, the CR unit remains in the capping position while transported.

<Wiping Mechanism>

<CR Lock Mechanism>
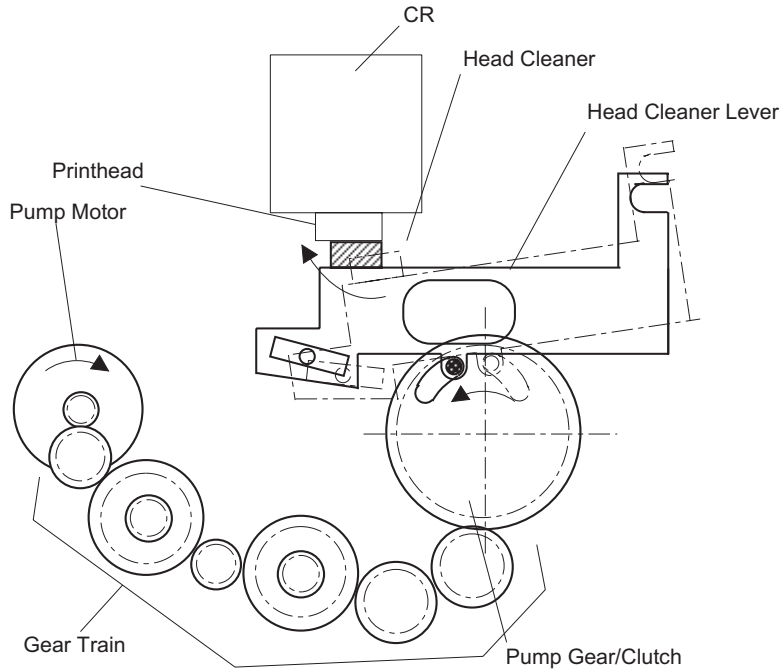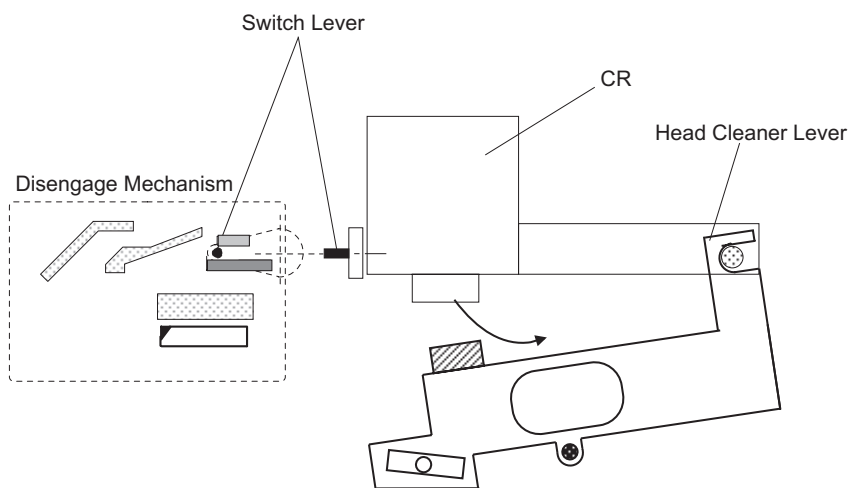
Figure 2-12. **Wiping/Carriage Lock Mechanism**

2.3 Electrical Circuit Operation Principles

This printer consists of the following circuit board:

- ❑ C203 MAIN board
- ❑ C178 PSB/PSE board
- ❑ C203 Panel board

Head driver circuits are directly attached to the black and color printheads. Figure 2-13 shows the block diagram of the electrical circuit.
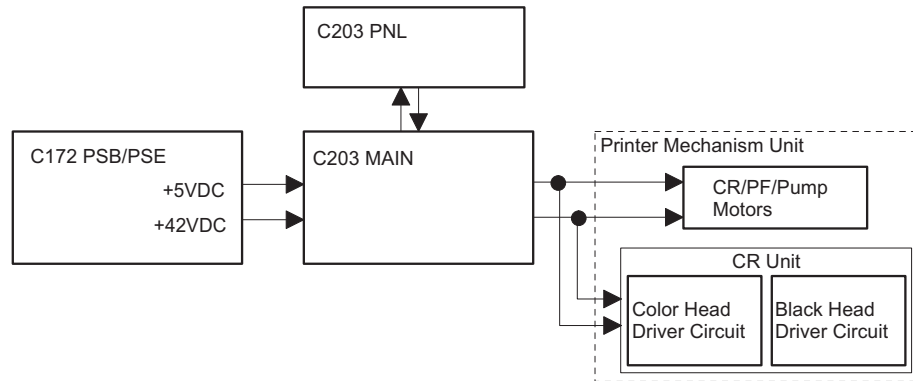

Figure 2-13. Electrical Circuit Block Diagram

2.3.1 C172 PSB/PSE Electrical Circuit Board

The output voltages of the PSB/PSE board are as shown in Table 2-7. Since the electrical circuit of this printer is in a secondary circuit, the delay timer can be used to allows the printer to execute the capping operation after the printer power is turned off. This is to prevent ink clogging or smudging caused by the exposed condition of the printhead.

Table 2-7. DC Voltage Distribution

VDC	Application
+42 V	▪ CR motor/PF motor ▪ Printhead common voltage
+5 V	▪ C203 MAIN control board (logic) ▪ Sensors ▪ Control panel, Head nozzle selection

The electrical circuit of this board uses the RCC (Ringing Choke Converter) switching regulator. AC voltage is first input to the filter circuit for higher harmonics absorption and is converted into DC voltage thorough the rectifier and smoothing circuits. The DC voltage is then input to the switching circuit. These operations are followed by the transformer which generates and stabilizes +42 VDC in the secondary side. The produced +42 VDC is then converted into the stable +5 VDC by the regulator IC. The CPU on the C203 MAIN board monitors the on/off signal from the power switch on the control panel. When the power switch is turned off, the CPU sends the POWER OFF signal (PSC) to the electrical circuit. The electrical board has a delay circuit (ZD86, C82 and Q84) to delay the power off. The delay period depends on the electrolytic capacitor. It continues to output +5 V and +42 V to keep the main circuit switch on the primary side active until all electric charge is discharged. The minimum delay period is normally 30 seconds, which ,however, varies depending on the capacitor size.

Operating Principles

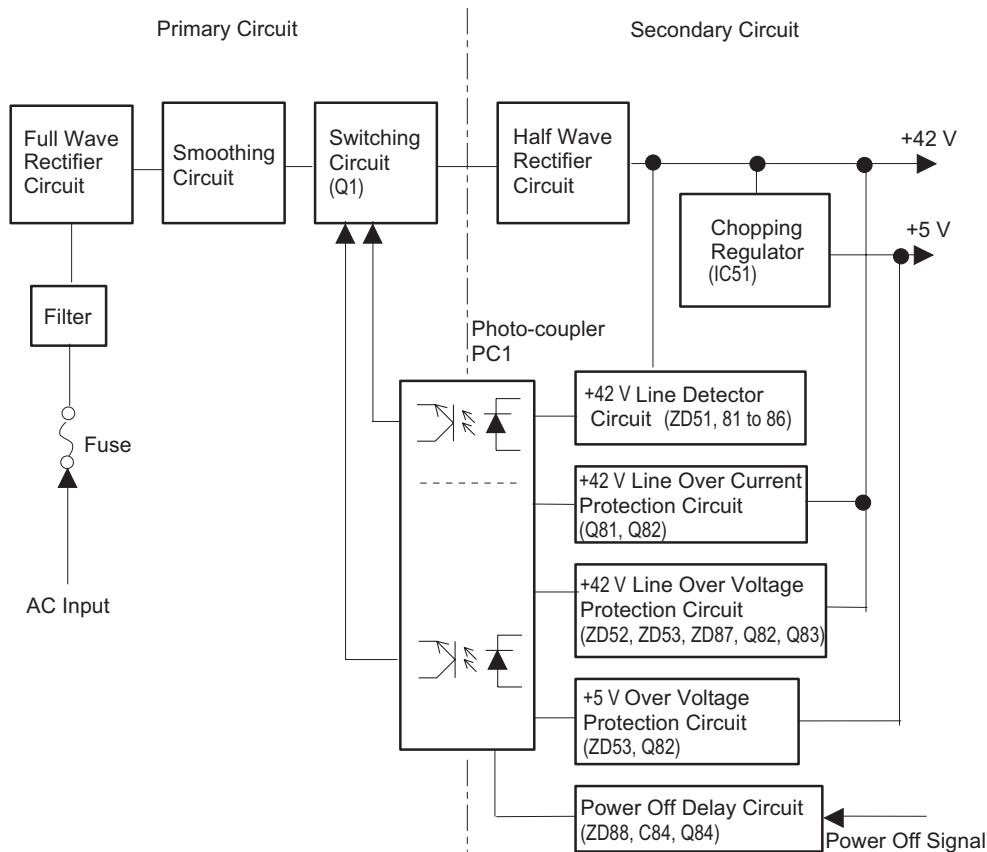Figure 2-14 illustrates the electrical circuit diagram.

Figure 2-14. Power Supply Circuit Diagram

❑ **+5 VDC line over voltage protection circuit**
The output voltage level of the 5 V line is monitored by a Zener diode (ZD53). If the voltage level exceeds 9 V, the status is fed back to the primary switching circuit through the transistor (Q82) and photocoupler (PC1) to cut off the +42 V line to the regulator (IC51).

❑ **+5 VDC line constant voltage control circuit**
Voltage at +5 VDC line is controlled by the regulator IC (IC51). When the abnormal voltage at +5 VDC line is detected, the status is input to the internal comparator of the regulator to control the voltage.

❑ **+42 VDC line over voltage protection circuit**
The output level of the +42 VDC line is monitored by the 2 Zener diodes ZD52 and ZD87. When the output level of the +42 VDC line exceeds +48 V, the switching FET operation on the primary side is stopped via the thyristor (CY52), transistor (Q81) and photocoupler (PC1).

❑ **+42 VDC line constant voltage control circuit**
Voltage at the +42 VDC line is monitored by the Zener diodes (ZD51, ZD81−ZD86). This circuit feeds back the output voltage level status through photocoupler (PC1) to the primary switching circuit to control the on/off time of the switching FET to constant output voltage level.

❑ **+42 VDC line overcurrent protection circuit**
The output current is monitored by the transistors Q81 and Q82. When the output current is abnormally low, the status is assumed to be a short circuit and the information is fed back to the primary circuit to stop the switching FET operation.

2.3.2 C203 MAIN Control Board

This printer uses C203 MAIN for the main control circuit board. It consists of the following:

- ❏ 16-bit CPU H8S/2655 (IC5)   Runs at 19.66 MHz
- ❏ 2 gate arrays   E05B33 (IC6)   Manages interfaces, motors and printheads.
              E05B45 (IC16)
- ❏ P-ROM, DRAM and MROM
- ❏ Drivers   Produces common voltage for printheads
                                 Drives motors.

Table 2-8 and Figure 2-15 show the allocated functions for major components and the main control circuit block diagram, respectively.

Table 2-8. Location and function of the Major Components

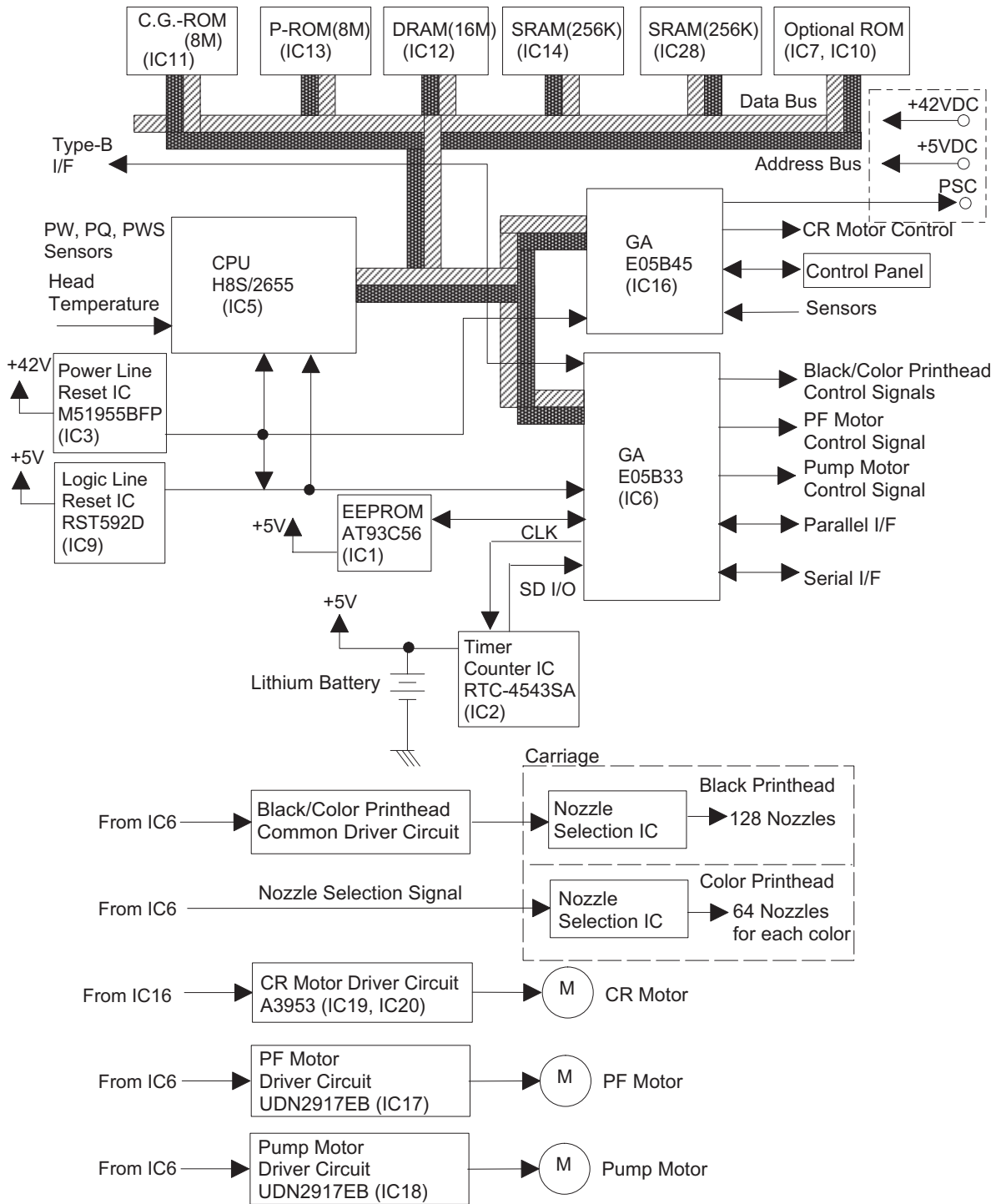| IC	Location	Function
CPU	IC5	▪ 16-bit CPU ▪ Runs at 19.66 MHz ▪ Controls the printer at the gate arrays IC5 and IC6 according to the program in P-ROM. ▪ Monitors the printhead temperature.
Gate Array	IC16	▪ Controls the I/F for the control panel. ▪ Controls the CR motor. ▪ Manages the sensors.
	IC6	▪ Controls the parallel I/F. ▪ Controls the serial I/F. ▪ Controls Type-B I/F. ▪ Controls the PF motor. ▪ Controls the pump motor. ▪ Controls black and color printheads.
DRAM	IC12	▪ Manages buffers, work area in the CPU.
SRAM	IC14, IC28	▪ Manages input buffer.
C.G. ROM	IC11	▪ Manages C.G. (Character Generator).
P-ROM	IC13	▪ Manages printer control program.
Optional ROM	IC7, IC10	▪ For optional fonts and CG (not attached as a standard item.)
EEPROM	IC1	▪ Stores values for the default settings and other values.
Timer counter IC	IC2	▪ Manages timers for the ink system.
Reset IC	IC9	▪ Outputs a reset signal to the logic line (+5V).
	IC3	▪ Outputs a reset signal to the power line (+42V).
Common driver IC	IC22	▪ Produces common voltage for the black printhead.
	IC23	▪ Produces common voltage for the color printhead.
Driver	IC17	▪ Drives the PF motor.
	IC18	▪ Drives the pump motor.
	IC25	▪ D/A converter for CR motor control
	IC19, IC20	▪ Drives the CR motor.

Figure 2-15. Control Circuit Block Diagram

2.3.2.1 Reset Circuits

The C203 MAIN board contains two reset circuits: for logic line (+5 V) and power line (+42 V). Reset IC M51955BFP (IC3) monitors the +42 V line. It outputs /NMI signal to the CPU and the gate array to cut off the power line for the motors when the voltage level drops below 33.2 V. Reset IC RST592D (IC9) monitors the +5 V line and sends low pulse when the voltage level drops below 4,2 V. While the printer power is on, it outputs LOW until stabilized +5 V is produced to ensure the CPU's proper operation.
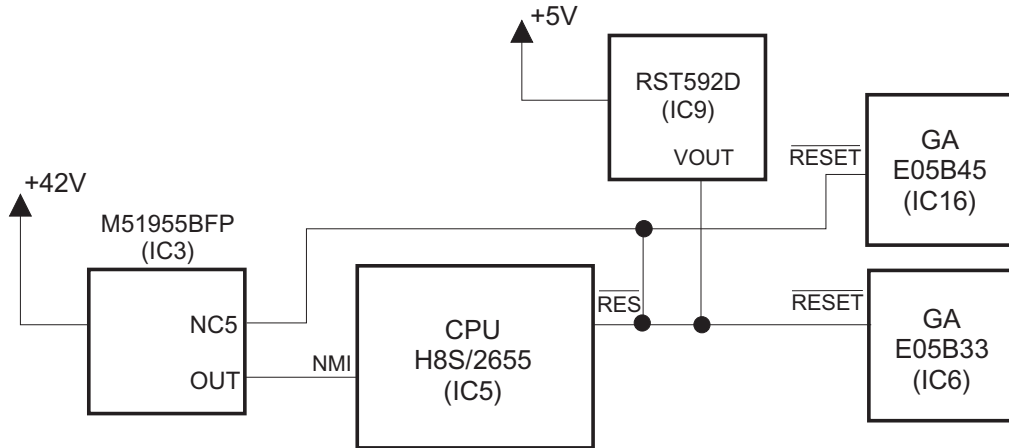
Figure 2-16. Reset Circuit Block Diagram

2.3.2.2 Sensor Circuits

CPU and the gate array E05B45 (IC 16) monitor printer condition referring to the signals from 13 sensors described below

❑ **HP : Output from the HP(Home Position) sensor.**
The HP sensor for this printer uses the reliable photo interrupter system. the signal HP is LOW when the CR unit is at the home position, and is HIGH when it is not at the home position.

❑ **PE_R : Output from the rear PE (Paper End) sensor.**
The rear PE sensor, attached to the rear part of the paper path, detects paper presence condition for continuous paper or cut sheet set in the rear paper slot. A mechanical switch is used for this sensor and the signal PE_R is HIGH with paper detected and LOW without any paper detected.

❑ **PE_F : Output from the front PE (Paper End) sensor.**
The front PE sensor, located in the paper guide unit, detects paper presence condition for ASF. This sensor uses a mechanical switch and the signal PE_F is HIGH with paper detected and is LOW without any paper detected.

❑ **REL : Output from the release sensor.**
Release sensor is built into the rear part of the left frame in the printer mechanism. It determines whether the release lever is set to the cut sheet side (friction mode) or to the continuous paper side (tractor mode). The signal REL is LOW when the lever is set to the friction mode and is HIGH when the lever is set to the tractor mode.

❑ **CO_B/C/M/Y :Output from each ink cartridge sensor.**
The ink cartridge sensor for each color is individually attached to the ink cartridge holder in the printer mechanism. It determines whether the corresponding ink cartridges is installed or not. A mechanical switch is used for this sensor and the signals CO_B/C/M/Y is LOW when the cartridge is installed and is LOW when the cartridge is not installed. When the sensor detects no cartridge condition, the ink consumption counter is reset.

❑ **IE_B/C/M/Y : Output from each ink end sensor.**
The ink end sensor for each color, individually attached to the ink cartridge holder in the printer mechanism, detects ink end condition*. It uses the mechanical switch system and the signal IE_B/C/M/Y is LOW or HIGH on the ink left or end condition, respectively. If the ink end condition is detected while the ink cartridge is detected by the ink cartridge sensor, the ink consumption counter is reset.
Note) The ink end sensor detects an ink end condition when the remainder of the ink drops to 5 % of the capacity.

❑ **Thermistor**
Thermistor is attached onto the color printhead to monitor the temperatures around the printhead. It functions to avoid change in ink viscosity, which affects printing result. The signal output from the sensor is directly transmitted to the analog port of the CPU.

❑ **ASF_PW : Output from the ASF PW (Paper Width) sensor.**
The ASF PW sensor uses a sliding potentionmeter. (The maximum resistance :10kΩ.) It is attached to the left edge guide in the ASF hopper assembly. By aligning the left edge guide to the paper, the sensor actuator runs along the grooves at the bottom of the stacker. The length measured by the actuator is converted into ohms which corresponds to the paper width, then the value is transferred to the analog port of the CPU. The paper width is detected in 10 ranges between 98 mm and 441 mm. (See Table 2-9.) If the detected paper width does not match the width for the selected page size, the printer ignores the data which does not fit in the printable area of the paper. In case no change is detected in paper size by the ASF PW sensor and ASF PL sensor, the CR PW sensor* is not activated.
*Note) *CR PW sensor: See Page 2-19.*

Table 2-9. Paper Width Range

Detecting Range	Paper Width (mm):D (Length between right and left edge guides)
1	98=<W=<108.6 / 123.4=<W=<141.9
2	146.7=<W=<151.9 / 161.6=<W=<187.8
3	196.6=<W=<232.1
4	231.8=<W=<260.6
5	276=<W=<283
6	293.6=<W=<300.6
7	325.4=<W=<332.6
8	349.6=<W=<367.6
9	416.6=<W=<423.1
10	429.1=<W=<441

❑ **ASF_PL : Output from the PL (Paper Length) sensor.**
Paper length is determined by three mechanical switches which detect the paper tray condition based on the rear edge guide position and paper tray extension position. Each paper size range is detected by the paper tray condition based on the combination of on/off status of the switches, as shown in Table 2-10. The paper size is determined and memorized by combining the paper width and paper length detected by the ASF PW sensor and the PL sensor.

Table 2-10. Paper Length Detecting Range

Length Range	Paper tray condition		Corresponding sensor combination		
	Rear edge guide	Paper tray extension	Switch 1	Switch 2	Switch 3
Up to 158 mm	0 to 22 mm	In	On	On	Off
Up to 232 mm	Up to 96 mm	In	On	Off	Off
Up to 260 mm	Up to 125 mm	In	Off	On	Off
Up to 283 mm	Up to 147 mm	In	Off	Off	Off
Up to 302 mm	Up to 167 mm	In	Off	On	Off
Up to 623 mm	Down	Pulled out more than 5 mm.	On	On	On

❑ **ASF_PQ :Output from the PQ (Paper Quantity) sensor.**
The paper quantity sensor uses a sliding potentionmeter. (The maximum resistance:10 ohms) The sensor ,attached to the right edged guide in the hopper assembly, detects the paper quantity between the maximum of 15 mm and the minimum of 3 mm. The detected quantity is converted into the corresponding resistance and the information is transferred to the analog port of the CPU. When the sensor detects the condition of 3.6 mm which accommodates 25 sheets of 55 kg/m^2-paper, it outputs the signal PAPERLOW.

❑ **GAP : Output from the PG (Platen Gap) sensor.**
The PG sensor determines whether the adjust lever is set to the thin paper side or thick paper side. The signal GAP is HIGH when the lever is on the thick paper side, and LOW on the thin paper side. This sensor uses a mechanical switch.

❑ **REL : Output from the release sensor.**
Release sensor attached to the left and rear side of the printer mechanism determines whether the release lever is set to friction feed side or tractor side. The signal REL is HIGH on the tractor side and is LOW on the friction feed side.

❑ **CR_PW : Output from the CR PW (Paper Width) sensor.**
The CR PW sensor, attached to the left side of the CR unit, uses a photo interrupt system. While the CR makes 1 return in the paper width seek mode, sensor reads the voltage level of the output signal at each CR motor phase change pulse to determine the positions for the both edges of the paper. This operation prevents printing on the platen. In case no change is detected in paper size from the previous paper by the ASF PW sensor and ASF PL sensor, the CR PW sensor is not activated. The signal output from this sensor is directly sent to the analog port of the CPU.

Figure 2-21 shows the sensor circuit block diagram.
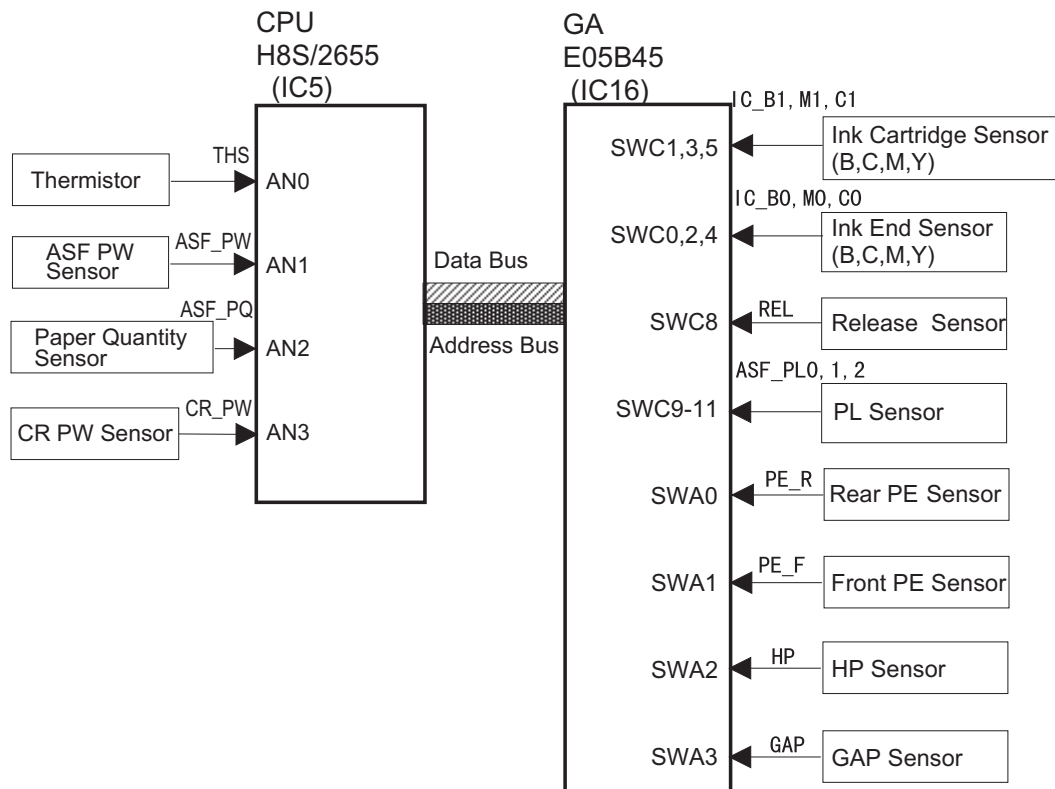
Figure 2-17. Sensor Circuit Block Diagram

2.3.2.3 CR Motor Driver Circuits

The gate array E05B45 produces the phase data (CRDA0-5) for the CR motor and sends it to 2-channel D/A converter in parallel data. When the phase-change trigger signal (CRTRG) is sent from the CPU to the gate array, the A/B phase-change signal (CRDASEL) is output. Then the A-phase-data and B-phase-data are transferred to the channel A and channel B in the D/A converter, respectively. The transferred data for 2 phases are converted into analog data in the converter to be transferred to the CR motor driver ICs (IC19 and IC20), where the phase excitation current is determined for each micro step of the motor. The minimum micro step 0.013 mm/step is enabled by 4-phase motor with 4W1-2 phase driven. The gate array E05B45 (IC16) sends phase data (PHASEA/B, ENAN/ENBN) directly to the CR motor driver ICs A3953 (IC19 and IC20) to control the excitation mode and rotational direction and amount of the motor.

While the CR is in the home position or the printer is in the ink cartridge replacement mode, the 2-2 phase is driven in the low current hold mode to hold the motor. Figure 2-18 shows the CR motor driver circuit block diagram.
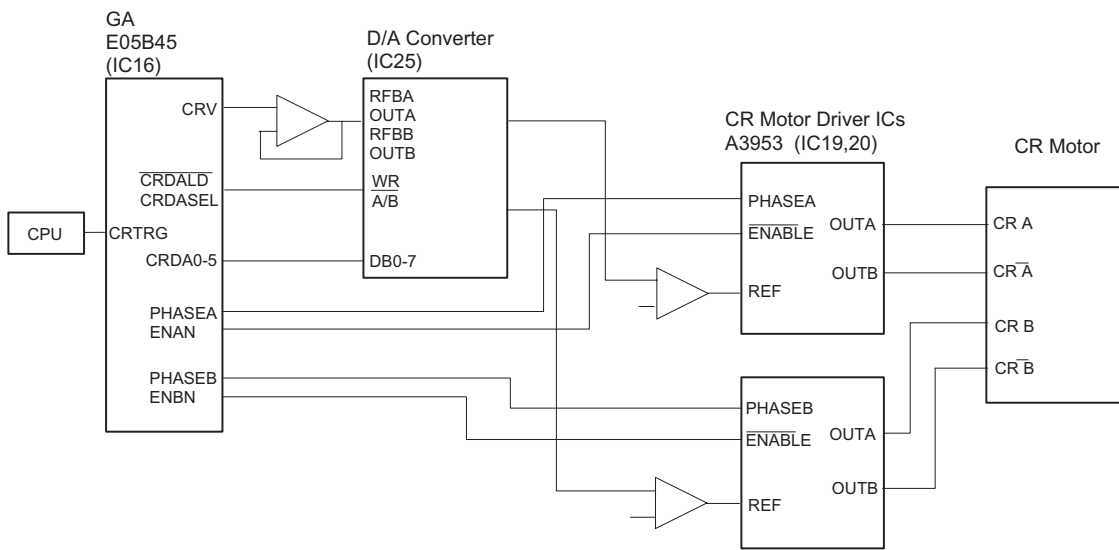
Figure 2-18. CR Motor Block Diagram

2.3.2.4 PF Motor Driver Circuit

The PF motor for this printer operates the following:

❑ Paper loading
❑ Paper feeding

The gate array E05B33 (IC6) outputs the phase drive control signals (PFAPH and PFBPH), phase data signal (PFA0/1 and PPFB1/0) and voltage reference data (PFV) to the driver IC UDN2917EB (IC17). The driver IC then controls the phase current based on the voltage reference data. This sequence enables the micro step with a minimum of 1/720 inch at 2-2 phase.
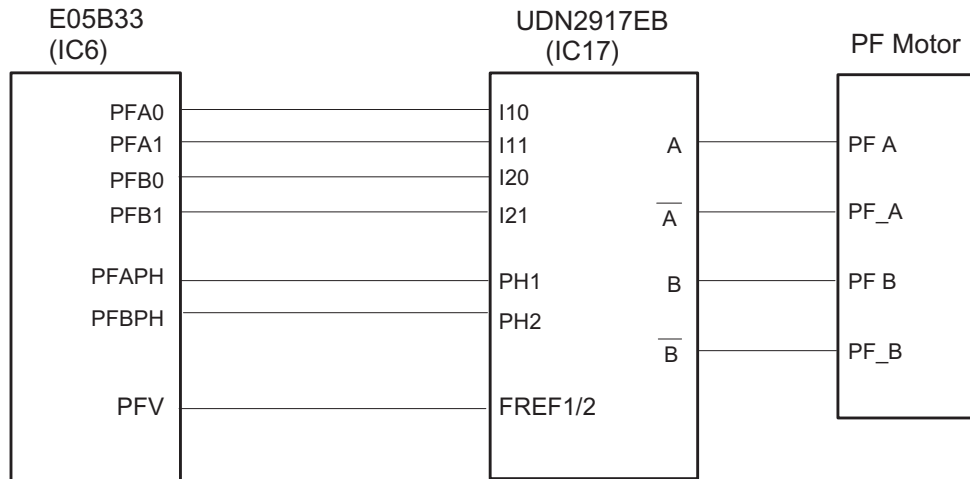
Figure 2-19. PF Motor Driver Circuit Block Diagram

2.3.2.5 Printhead Driver Circuit

This printer has 2 separate printhead driver circuits for the black and color printheads. Each circuit has the common voltage driver circuit attached to the circuit control board, and the nozzle selector circuit attached to the printhead. The each of the black and color common driver circuits is composed of the hybrid IC H8D2813E (IC22) and the terminal transistor. The black head nozzle selector circuit is composed of the 128-bit transfer gate array IC IR2C72C, and the color head nozzle selector circuit consists of the 128-bit transfer gate array IC IR2C72C (for cyan and yellow) and 64-bit transfer gate array IC IR2C73C (for magenta). Printing data is separated into the common voltage signal and the nozzle selection signal at the gate array E05B33 (IC6) and is then transferred to the corresponding circuit. Figure 2-20 shows the printhead driver circuit block diagram.
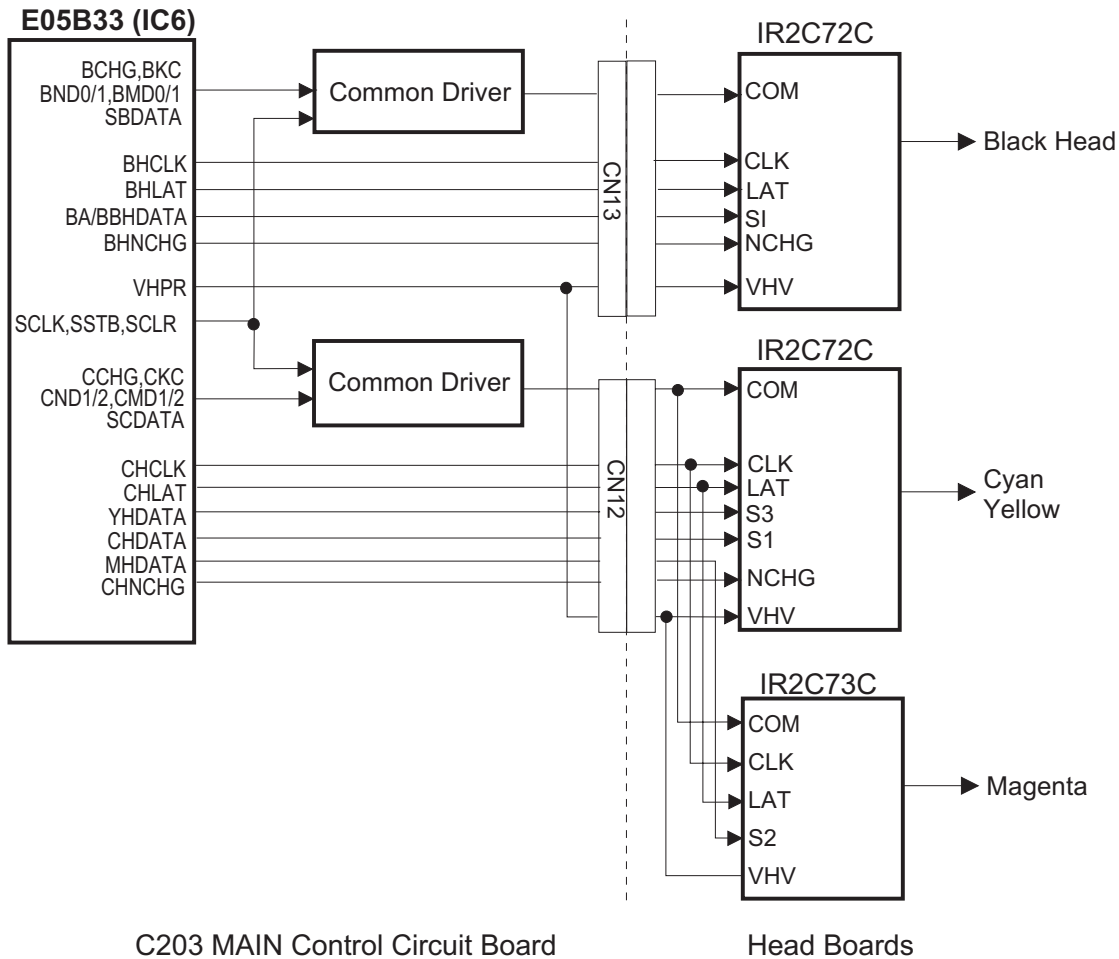
Figure 2-20. Prinrhead Driver Circuit Block Diagram

❑ **Common driver circuit for the black printhead**
Gate array E05B33 (IC6) sends serial data to the head nozzle selector circuit on the printhead to select nozzles to be activated. Then the data is transferred to the common driver on the control board to drive all PZT that correspond to each nozzle. The operating principles for the black printhead is as follows:

❑ Nozzle selector circuit
Nozzles for the black printhead are divided into 2 rows with 64 nozzles on each, and 2 different types of nozzle selection signal (BAHDATA and BBHDATA) are sent in serial data to the corresponding row. Clock signal (BHCLK) is composed of the pulses from #1 to #64. The nozzles to be activated are determined by the nozzle selection signal synchronized with the clock signal by the latch signal (BHLAT). However, the pulse number and the selected nozzle number have no relevance.

❑ Common driver circuit
The common voltage (VH) and the rank value are established to correspond to each of the black printhead characteristics. This value is stored in advance in the EEPROM when the printer power is off. At power on, the value is stored in the RAM. The gate array E05B33 (IC6) refers to this value when transferring the serial data SBDATA to the common driver circuit as the voltage control signals. The serial data transmission control signals (SCLK, SSTB and SCLR) are used for this operation. The thermistor controls the common voltage by outputting the signals to compensate for changes in ink viscosity.
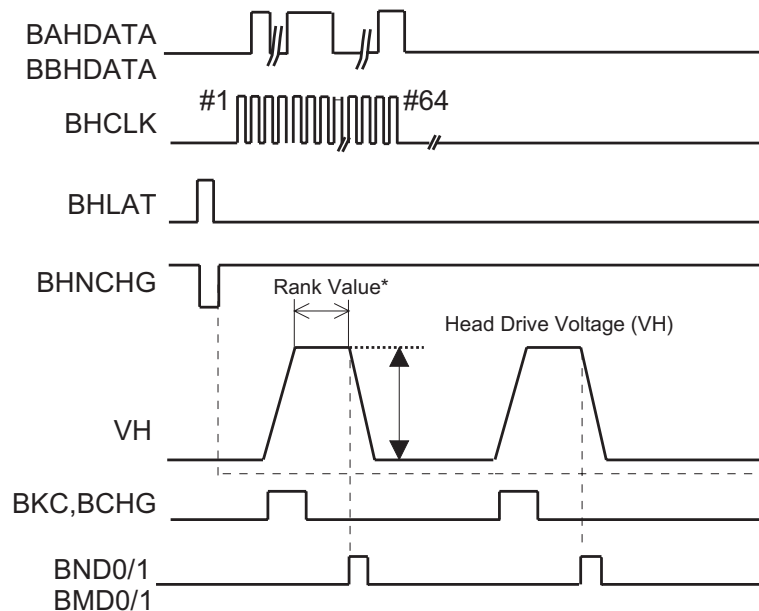
* Rank Value: The period of time in which the signal COM stays HIGH.
Normal value is approximately 8 ms.

Figure 2-21. Black Data Transmission Timing

Operating Principles

❑ **Color printhead nozzle selector circuit**
The operating principle for the color printhead is the same as for the black printhead except that color print is performed with data for 3 different colors: yellow, cyan, and magenta. The operating principle for the color printhead is as described below:

❑ Nozzle selector circuit
The nozzles for the color printhead are divided into 3: for yellow, cyan, and magenta with 64 nozzles for each of them. The nozzle selection signals for each color (YHDATA for yellow, MHDATA for magenta and CHDATA for magenta) are sent simultaneously in serial data. The clock signal (CHCLK) is composed of the pulses from #1 to #64. The nozzle selection signal and the corresponding clock signal are synchronized by the latch signal (CHLAT) to determine the nozzle to use. However, the pulse number and the selected nozzle number have no relevance.

❑ Common driver circuit
The common voltage (VH) and the rank value are established to correspond to each of the color printhead characteristics. This value is stored in advance in the EEPROM when the printer power is off. At power on, the value is stored in the RAM. The gate array E05B33 (IC6) refers to this value and outputs the serial data SCDATA to the common driver circuit as the voltage control signals. The serial data transmission control signals SCLK, SSTB and SCLR are used for this operation. The thermistor controls the common voltage by outputting the signals to compensate for changes in ink viscosity.

Rank value: The period of time in which the signal COM stays HIGH.
Normal value is approximately 8 ms.
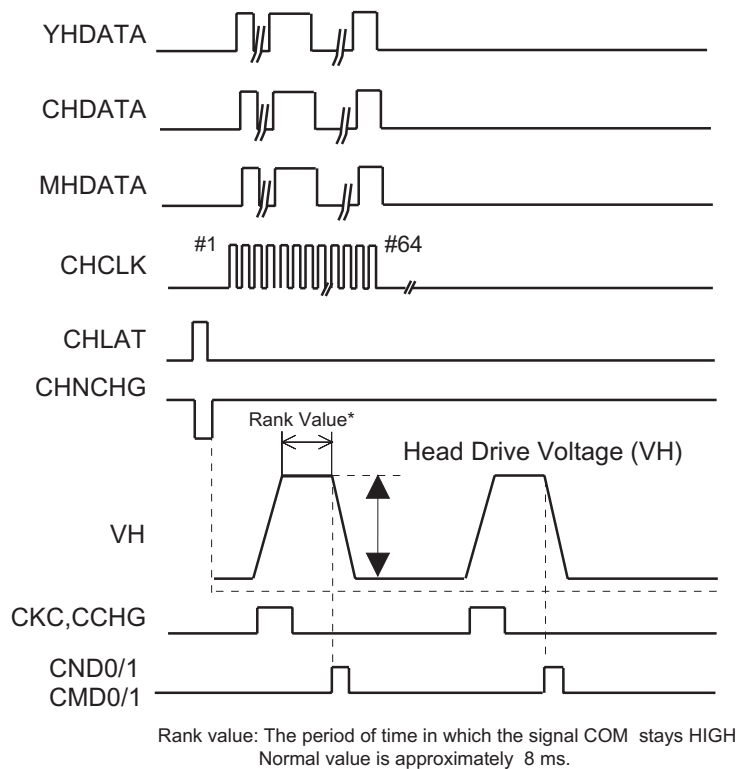
Figure 2-22. Color Data Transmission Timing

Special printing

This printer has the following special printing modes to print various types of graphic images. Each mode is selected through the printer driver based on the selected type of the paper and print quality.

❑ Double firing normal dot / Single dot printing mode
   This printer forms 1 dot with double ink ejection in the ANK or bitmap image mode. In the raster graphics mode which requires a high-resolution printing, however, forms 1 dot with a single ink ejection.
❑ EPSON micro dot printing
   In this mode, the printer uses less ink to create sharper dots when high-resolution printing is required.

Table 2-11. Special Printing Availability

Paper Type	180 dpi	360 dpi	720 X 360 dpi	720 dpi	1440X720 dpi
Black printing for the raster data					
360 dpi exclusive	—	—	1-dot printing Normal dot	—	—
720 dpi exclusive	—	—		1-dot printing Normal dot	1-dot printing EPSON micro dot
OHP sheet	—	2-dot printing Normal dot	—	—	—
Glossy film	—	—	—	1-dot printing Normal dot	1-dot printing EPSON micro dot
Plain paper	2-dot printing Normal dot	2-dot printing Normal dot	1-dot printing Normal dot	—	—
Color printing for the raster data					
360 dpi exclusive	—	—	1-dot printing Normal dot	—	—
720 dpi exclusive	—	—		1-dot printing Normal dot	1-dot printing EPSON micro dot
OHP sheet	—	2-dot printing Normal dot	—	—	—
Glossy film	—	—	—	1-dot printing Normal dot	1-dot printing EPSON micro dot
Glossy paper	—	—	—	1-dot printing Normal dot	1-dot printing EPSON micro dot
Plain paper	2-dot printing Normal dot	2-dot printing Normal dot	1-dot printing Normal dot	—	—
ANK, Bitmap image data					
360 dpi exclusive OHP sheet Plain paper	2-dot printing Normal dot	2-dot printing Normal dot	—	—	—

2.4 Ink System Management

This section explains how the ink system is controlled to protect the printheads and to ensure high print quality. The ink system consists of following operations:

❑ Power On
❑ Initialization
❑ Ink Cartridge Replacement
❑ Cleaning
❑ Print Start
❑ Flushing
❑ Waiting
❑ False Absorption
❑ Wiping
❑ Rubbing
❑ Micro Absorption
❑ Carriage Lock

The printer also selects an ink sequence based on the printer condition by referring to the value for the timer counter IC that has a back-up lithium battery and timer counter stored in the EEPROM. The printer has following counters:

❑ Protect Counter A
❑ Ink Consumption Counter
❑ One-time Flag

2.4.1 Ink System Operations

The ink system operations are as described below.

❑ **Power on**
Performed when the printer is turned on. It performs a cleaning sequence by referring to the counter value.

❑ **Initialization**
Performed when the printer receives the initialization command. The CR returns to the home position and holds during this operation.

❑ **Ink Cartridge Replacement**
Performed through the control panel operation when the ink cartridge needs replacing. It determines whether the ink cartridge is installed or not and performs a cleaning sequence if necessary.

❑ **Cleaning**
Performed to solve decline in print quality caused by the abnormal nozzle status such as nozzle clogging and inaccurate ink ejection.

❑ **Print Start**
Performs the cleaning or flushing operation before the printer starts printing after power on.

❑ **Flushing**
Performed to eject few ink dots during printing to prevent increase in ink viscosity.

❑ **Waiting**
Performs the flushing operation after the printing operation to avoid nozzle clogging caused by the viscous ink.

❑ **False Absorption**
Absorbs the ink inside the cap and eliminates the ink on the nozzle plate after ink is absorbed.

❑ **Rubbing**
Performed to eliminate the ink and dust that adheres on the nozzle surface. Few dots of ink is absorbed to moisten the nozzle surface prior to this operation.

❑ **Micro Absorption**
Performed to eject bubbles formed inside the cavity.

❑ **Carriage Lock**
Locks the carriage when turning off the printer or no printing is performed for 5 minutes or more with the printer power on.

2.4.2 Counters

The EEPROM on the control board stores the values for the following counters to manage the ink system:

❑ **Protect Counter A**
This counter counts total amount of drained ink. If the counter value exceeds 75,000, the maintenance error occurs and the current printing job stops as a result. (Refer to Section 1.5.8.) The occurrence of this error requires EEPROM clear operation and waste ink drain pad replacement. (Refer to Section 1.5.1 and Chapter 3.) The current value for this counter can be found in the default setting mode. (Refer to Section 1.5.2.) To reset the counter, perform EEPROM clear through the control panel operation or the reset operation using the adjusting program.

❑ **Black/Color One-time Flag**
This flag set in the EEPROM sets a limit to prevent frequent initial ink charge by users. The initial ink charging is normally performed only when the user begins to use a new printer. It is, however, performed on the condition that the user needs to reinstall the ink cartridge which has been removed before transporting the printer some distance to avoid ink leakage. The procedure for the initial ink charge for this occasion is as follows:

1. Turn the printer on and remove the ink cartridges.
2. Turn the printer off, and the printer starts ejecting ink from the printheads and tubes to the waste ink drain pads.
3. After transportation, install the ink cartridges.
4. Turn the printer on, and the printer enters the initial ink charge mode.

❑ **Ink Consumption Counter**
This counter accumulates the amount of ink used throughout the printing, cleaning, and flushing operations after a new cartridge is installed. The value is used to monitor the ink amount remaining in the ink cartridge. The counter value is reset when the ink cartridge is removed. This counter is normally reset with an ink low condition detected by the ink end sensor *. Then the Ink End error occurs when the counter exceeds the specified value.

Note) *The ink end sensor detects an ink end condition when the remainder of the ink drops to 5 % of the capacity.*

⚠ **CAUTION**

Be sure to replace the waste ink drain pads when the EEPROM is reset.(Refer to Chapter 3.)

Chapter 3
Disassembly and Assembly

3.1 Overview

This section describes the procedures for disassembling the printer. Unless otherwise specified, no assembly procedures are included, since it is usually performed by reversing the disassembly. Points to note at disassembling and assembling is described under the heading WORK POINTS. Adjustment required after assembling is described under the heading REQUIRED ADJUSTMENTS. Read precautions in Section 3.3.1 before disassembling and assembling. Description in this chapter only refers to disassembly and assembly procedures for major units. Therefore, refer to the exploded diagrams and part list in Appendix regarding other units.

3.1.1 Precautions for Disassembling the Printer

The main control circuit of this printer is equipped with a lithium battery as a back-up battery for the timer IC. Mishandling of this battery may lead to a short-circuit. Therefore see CAUTION carefully prior to disassembly and assembly.

⚠ CAUTION

- ❑ Disconnect the power cable before disassembling or assembling the printer.
- ❑ Wear goggles to protect your eyes from ink. If ink gets in your eye, flush it with fresh water and see a doctor immediately.
- ❑ If ink comes in contact with your skin, wash it off with soap and water. If irritation occurs, contact a physician.
- ❑ A lithium battery is installed on the main board of this printer. Be sure to observe the following instructions when servicing the battery:
  - ▪ Keep the battery away from any metal or other batteries so that electrodes of the opposite polarity do not come in contact with each other.
  - ▪ Do not heat the battery or put it near fire.
  - ▪ Do not solder on any part of the battery. (Doing so may result in leakage of electrolyte from the battery, burning, or explosion.)
  - ▪ Do not charge the battery. (An explosive may be generated inside the battery and cause burning or explosion.)
  - ▪ Do not dismantle the battery. (The gas inside the battery may hurt your throat. Leakage, burning, or explosion also may result.)
  - ▪ Do not install the battery in the wrong direction. (This may cause burning or explosion.)

⚠ CAUTION

Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to government laws and regulations.

⚠ ATTENTION

Risque d'esplosion si la pile est remplacée incorrectment. Ne remplacer que par une pile fu mêmetype ou d'un type équivalent recommandé par le fabricant. Eliminer les piles déchargées selon lois e t les règles de sécurité en vigueur.

⚠ CAUTION

- ❑ Never remove the ink cartridge from the carriage unless the manual specifies to do so.
- ❑ When transporting the printer, be sure to remove ink cartridges before turning off the printer to let the printer enter the ink ejection mode.
- ❑ Make sure that no cartridge is installed during transportation. (After transported, the printer automatically enters initial ink charge mode by turning on the printer after installing the ink cartridges.
- ❑ Use only recommended tools for disassembling, assembling, or adjusting the printer.
- ❑ Apply lubricants and adhesives as specified. (See Chapter 6 for details.)
- ❑ Make adjustments specified when you disassemble the printer. (See Chapter 4 for details.)

3.1.2 Tools

Make sure you use the tools listed in Table 3-1.

Table 3-1. Tools

Tools	Distributor	Part No.
Philips screwdriver #1	EPSON	B743800400
Phillips screwdriver #2	EPSON	B743800200
Standard screwdriver	EPSON	B743000100
Nippers	EPSON	B740500100
Thickness gauge set	EPSON	B776702201
Tweezers	EPSON	B741000100
Paper quantity detective adjusting tool	EPSON	103679400
Paper width detective position tool (A4 In)	EPSON	103679500
Paper width detective position tool (A4 Out)	EPSON	103679600
Paper width detective position tool (B4 In)	EPSON	103679900
Paper width detective position tool (B4 Out)	EPSON	103680000
Paper width detective position tool (Letter In)	EPSON	103680100
Paper width detective position tool (Letter Out)	EPSON	103680200
B4 size tool	EPSON	103679700
Letter size tool	EPSON	103679800

3.2 Disassembly and Assembly

This section describes procedures for disassembling and assembling the major units and parts.

⚠ **CAUTION**

Read CAUTION in Section 3.1.1 prior to disassembling the printer.

```
                    ┌─────────┐
                    │  Start  │
                    └─────────┘

┌──────────────────┐   ┌──────────────────┐
│ Upper Case Removal│   │ ROM Replacement  │
└──────────────────┘   └──────────────────┘

┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────────┐
│ Printer      │ │ Printhead    │ │ HP Sensor    │ │ PWS Paper Width  │
│ Mechanism    │ │ Removal      │ │ Removal      │ │ Sensor Removal   │
│ Removal      │ │              │ │              │ │                  │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────────┘

┌──────────────┐ ┌──────────────┐ ┌──────────────┐ ┌──────────────┐
│ Main Board   │ │ PSB/PSE Board│ │ Waste Ink    │ │ PL Sensor    │
│ Removal      │ │ Removal      │ │ Drain Pad    │ │ Removal      │
│              │ │              │ │ Removal      │ │              │
└──────────────┘ └──────────────┘ └──────────────┘ └──────────────┘
```

```
        ┌──────────────────┐
        │ Printer Mechanism│
        │ Disassembly      │
        └──────────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│ CR Unit      │   │ Ink Cartridge    │   │ Release      │
│ Removal      │   │ Holder Removal   │   │ Sensor       │
│              │   │                  │   │ Removal      │
└──────────────┘   └──────────────────┘   └──────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────────┐
│ LD Roller    │   │ Ink End Sensor   │   │ Front/Rear PE    │
│ Shaft Removal│   │ Removal          │   │ Sensor Removal   │
└──────────────┘   └──────────────────┘   └──────────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│ PF Roller    │   │ Cartridge Sensor │   │ PF Motor     │
│ Shaft Removal│   │ Removal          │   │ Removal      │
└──────────────┘   └──────────────────┘   └──────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│ Rear Paper   │   │ Edge Guide Unit  │   │ CR Motor     │
│ Guide Removal│   │ Removal          │   │ Removal      │
└──────────────┘   └──────────────────┘   └──────────────┘

┌──────────────┐   ┌──────────────────┐   ┌──────────────┐
│ Middle Frame │   │ Paper Quantity   │   │ Pump Motor   │
│ Assembly     │   │ Sensor Removal   │   │ Removal      │
│ Removal      │   │                  │   │              │
└──────────────┘   └──────────────────┘   └──────────────┘

                   ┌──────────────────┐   ┌──────────────────┐
                   │ ASF PW Sensor    │   │ Paper Eject      │
                   │ Removal          │   │ Frame Removal    │
                   └──────────────────┘   └──────────────────┘

                                          ┌──────────────┐
                                          │ Pump Unit    │
                                          │ Removal      │
                                          └──────────────┘
```

Figure 3-1. Printer Disassembly Procedures

3.2.1 Upper Housing Removal

1. Remove the knob, tip of the PG adjust lever, rear sheet guide, stacker and paper support.
2. Using tweezers, release the hooks which fixes the tractor unit to the printer mechanism. Then remove the tractor unit by lifting up the rear part of the tractor unit.
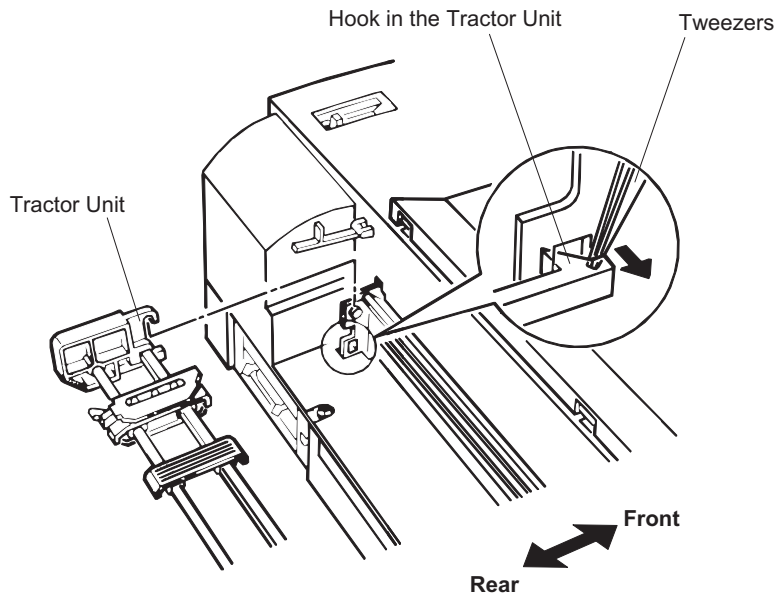
Figure 3-2. Tractor Unit Removal

3. Open the ink cartridge cover and release the hooks fixing the panel unit to the upper housing by inserting the tweezers into the cutouts in the illustrated part of the panel unit. Then disconnect the connector cable for the panel unit from the panel unit and remove the panel unit.
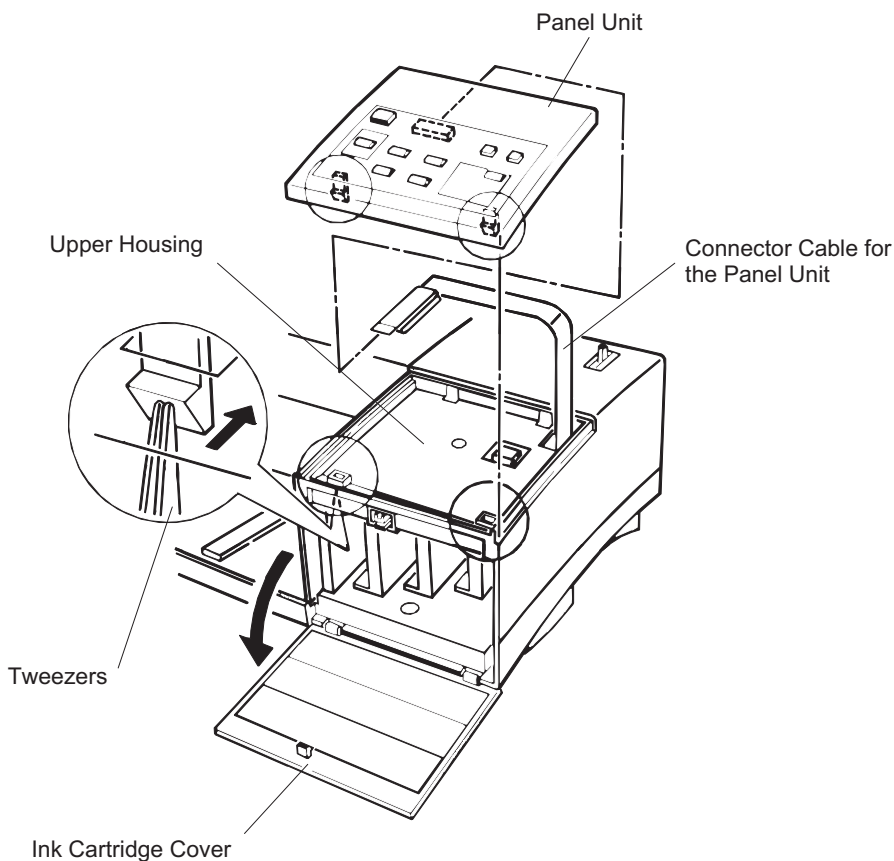
Figure 3-3. Panel Unit Removal

4. Remove 1 screw (CBS, 3X6) under the panel unit and 7 screws (CBP, 3X12) securing the upper housing to the lower housing.
5. Inserting tweezers from the bottom side of the lower housing, release 2 hooks fixing the upper housing to the lower housing. Then remove the upper housing by pulling it forward.

WORK POINT

When replacing the upper housing or printer cover, be sure to remove the label such as CAUTION and put it to the same position on the replaced part.
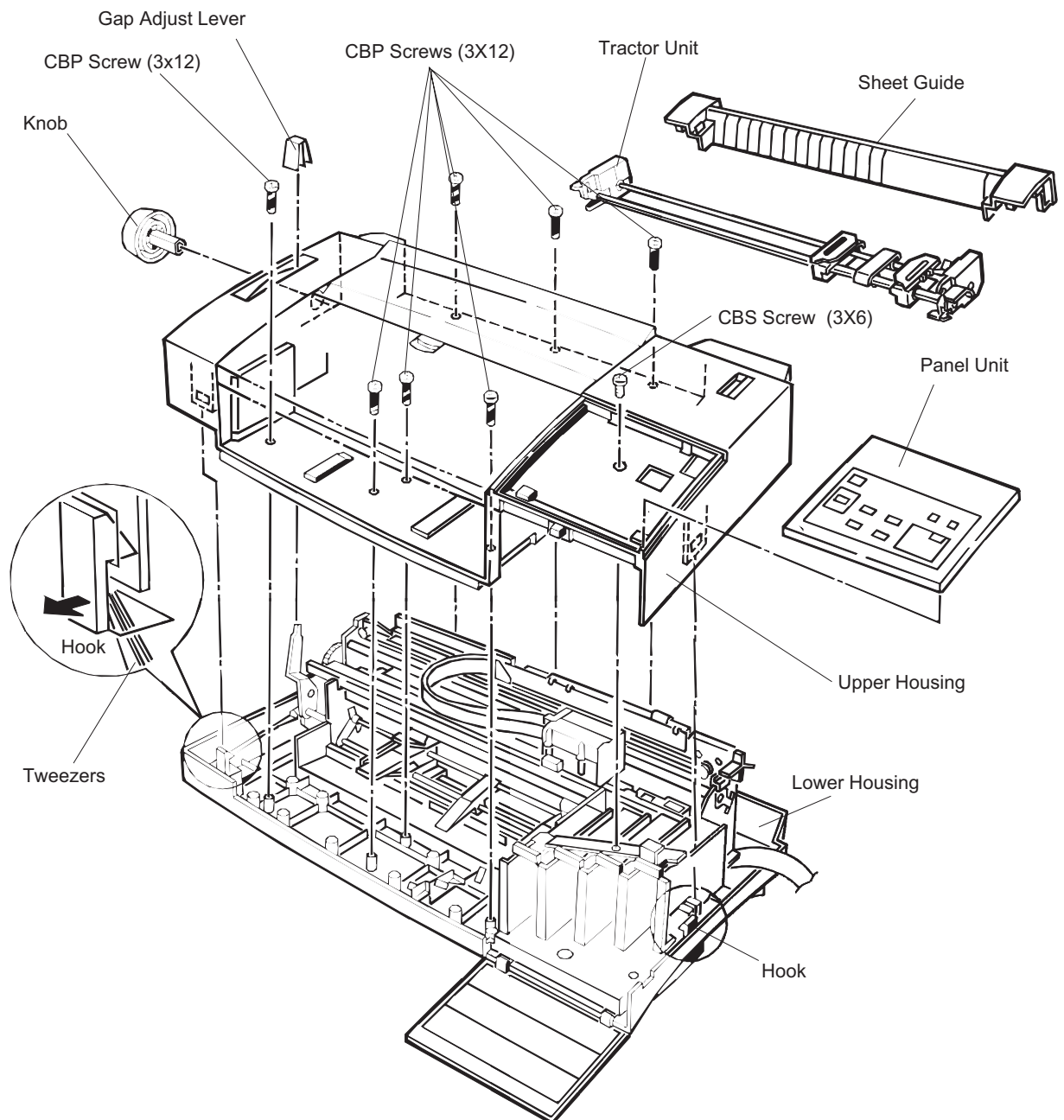
Figure 3-4. Upper Housing Removal

3.2.2 ROM Replacement

1. Remove 2 screws securing the ROM cover to the bottom of the lower housing and remove the ROM cover.
2. Remove the ROM.

⚠ **CAUTION**

Be sure to disconnect the power cable from the AC socket before replacing the ROM.

3.2.3 CR PW (Paper Width) Sensor Board Assembly Removal

1. Remove the upper housing. (See Section 3.2.1.)
2. Remove 2 screw (CBP, 3X8) and 2 plain washer (3X0.5X7) securing the damper cover to the CR unit.
   Note)   If the any ink cartridge is installed, remove it to avoid ink leakage during disassembly and assembly.
3. Remove the damper cover.
4. Inset tweezers into the small cutout inside the CR unit to push the notch. Then remove the CR PW sensor cover covering the black and color cables by pulling it up.
5. Remove the CR PW sensor board assembly from the black head cable.
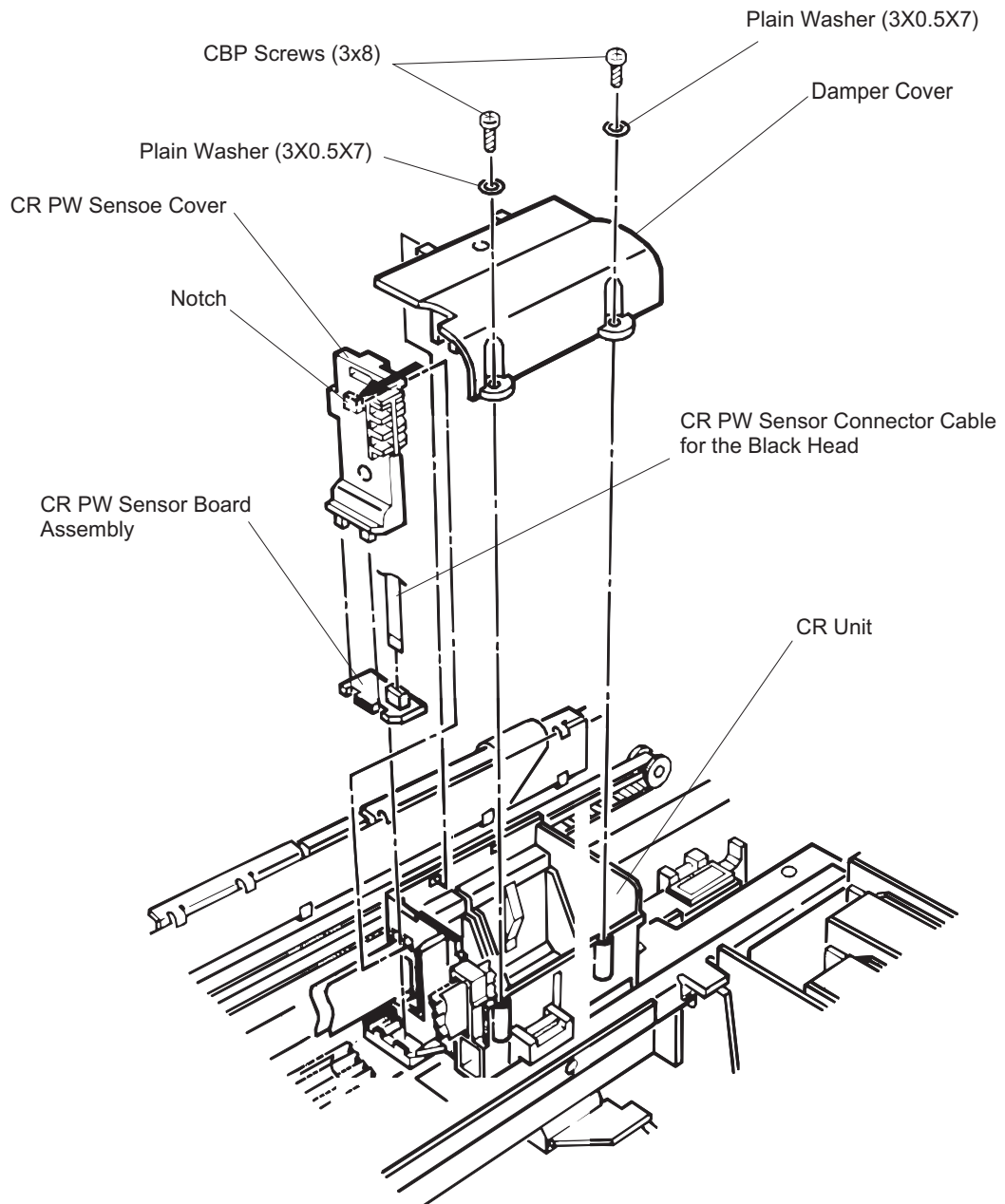
Figure 3-5. CR PW Sensor Board Assembly Removal

3.2.4 Printhead Removal

1. Remove the upper housing. (See Section 3.2.1.)
2. Remove 2 screw (CBP, 3X8) and 2 plain washer (3X0.5X7) securing the damper cover to the CR unit.
    Note)   If any ink cartridge is installed, remove it to avoid ink leakage during disassembly and assembly.
3. Remove the damper cover.
4. Remove the PW sensor cover securing the black and color head cables to the CR unit. Then release the black and color head cables. (See Section 3.2.3.)
5. Remove 1 leaf spring securing the ink tubes to the CR unit. Then remove the tubes from the CR unit.

⚠ CAUTION

*The tube clamp in the CR unit is breakable .Therefore do not force the clamp to remove the tubes.*

6. Remove each tube from the head along with the damper assembly.

WORK POINT

❑ *Be careful handling the damper assembly so that the ink doesn't leak.*

❑ *Make sure that you connect each color tube to the corresponding color ink cartridge.*

7. Remove the black and color head cables.
8. Remove 2 compression springs from the printhead units.
9. Remove 2 head fixing screws and plain washers, then remove the printheads by pulling them forward.

WORK POINT

❑ *When removing the black head, be sure not to catch the color head cable.*

❑ *When disconnecting the black/color head cables from the CR unit, be careful not to damage it. Be sure to connect the black head cable to the black head which is already installed to the CR unit.*

❑ *When installing the head cables to the CR unit through the tube clamp, be sure to fit the square cutouts on the tube cover to the tube clamp, as shown in Figure 3-6.*

REQUIRED ADJUSTMENT

❑ *After replacing the head, perform necessary adjustments. (See Chapter 4.)*

Tube Cover

Tube Fixing Leaf Spring

Head Fixing Screw

Damper Assembly for Black Ink

Damper Assemblies for Color Inks

Color Printhead

Black Printhead

Head Fixing Screw

Plain Washer
(6.3X0.2X8.3)

Plain Washer
(6.3X0.2X8.3)

Compression Spring (9.9)

Color Printdead Cable

Black Printhead Cable

Tube Clamp

CR PW Sensor
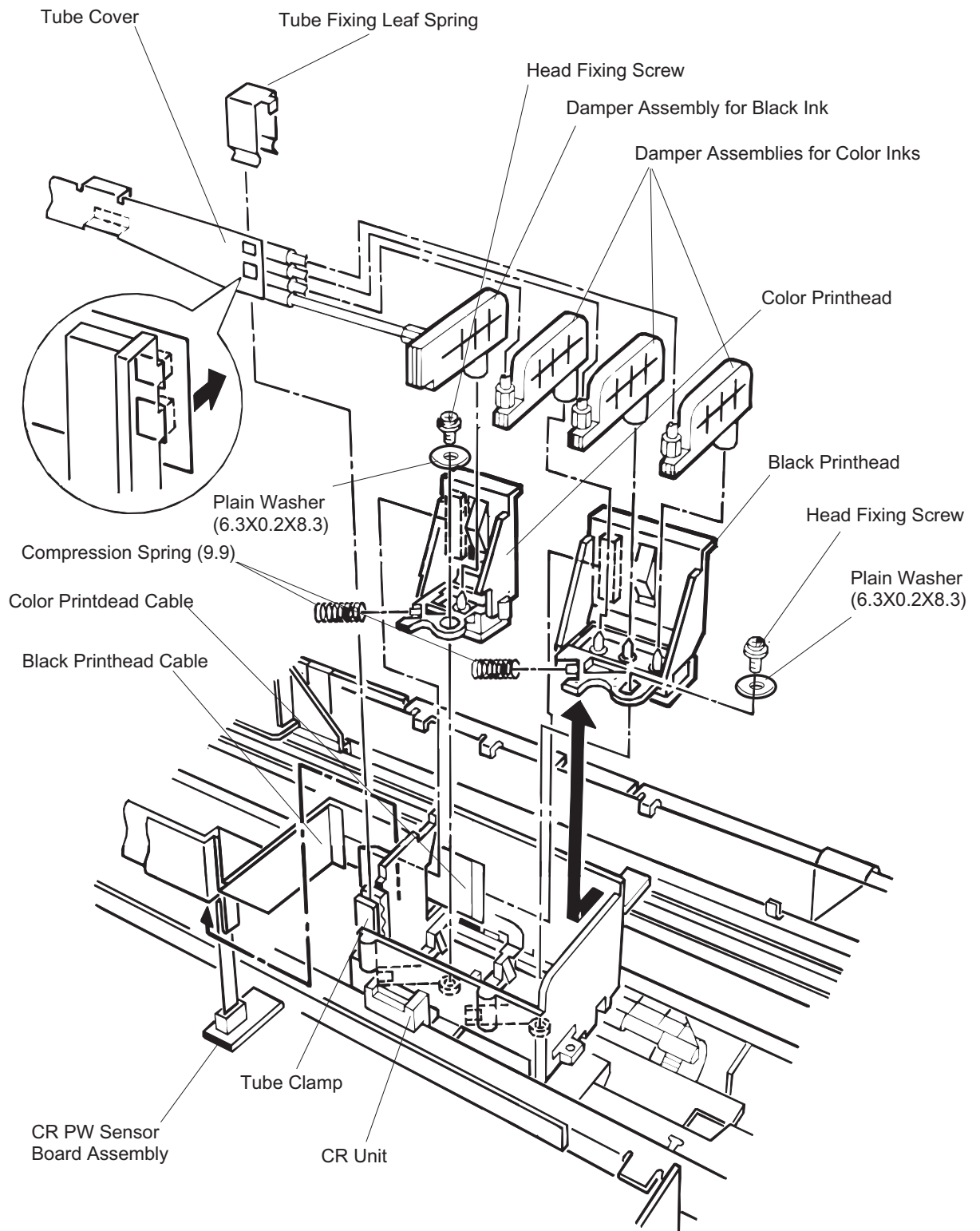Board Assembly

CR Unit

Figure 3-6. Black/Color Head Removal

3.2.5 HP Sensor Removal

1. Remove the upper housing. (See Section 3.2.1.)
2. Disconnect the connector cable for the HP sensor from the sensor connector.
3. Using tweezers, release the hook securing the HP sensor to the HP sensor holder and remove the HP sensor.
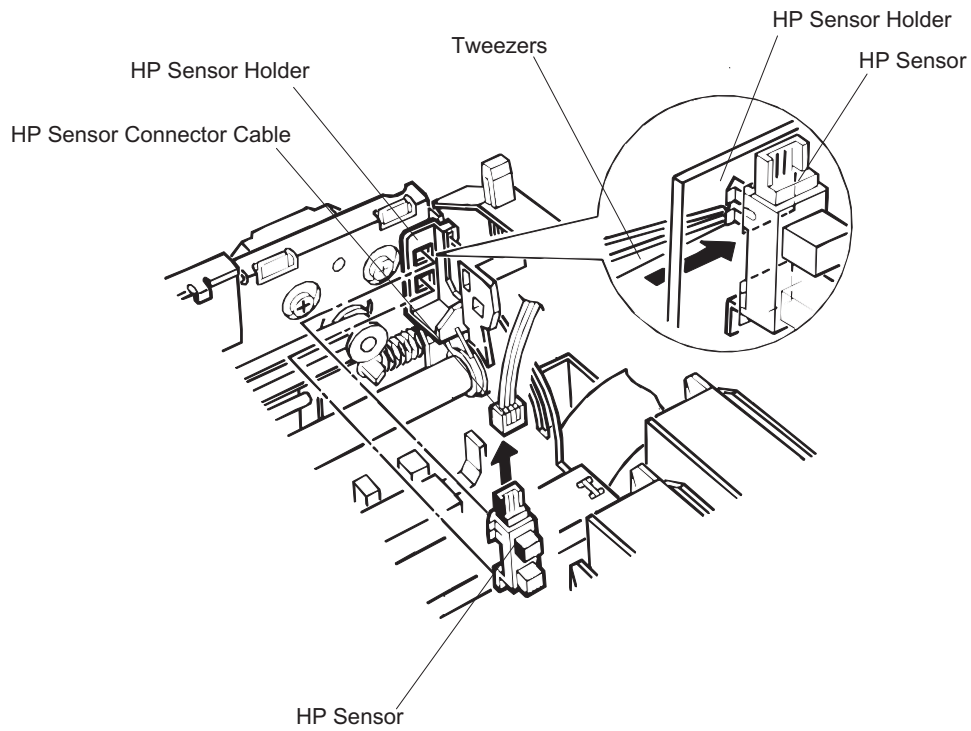
Figure 3-7. HP Sensor Removal

3.2.6 Printer Mechanism Unit Removal

1. Remove the upper housing. (See Section 3.2.1)
2. Disconnect the following connector cables from the connectors on the main board assembly:
   CN3   CN4   CN 5   CN6   CN7   CN10   CN11   CN12
   CN13   CN14   CN18   CN20   CN21   CN22   CN23
3. Disconnect the ASF PW sensor connector cable from the PW sensor connector on the left edge guide of the ASF assembly.
4. Remove 7 screws (6 CB screws, 4X14 and 1 CBP screw, 3X8) securing the printer mechanism unit to the lower housing.

⚠ CAUTION

The connectors for the motor (CN20,22 and 23) and for the ink cartridges (CN7, 12, 13 and 14) look similar. Therefore, be sure to connect them properly, since inappropriate connection may result in malfunction of the PSE/PSB board or the main control board.

WORK POINT

❏ *Be sure to lubricate the top surface of the paper eject frame in an ASP printer mechanism unit, since the frame, along which the CR unit slides, is not lubricated.*
❏ *After installing the printer mechanism unit to the lower housing, be sure to insert the waste ink draining tubes linking to the pump unit into the sub waste ink drain pads. (See Section 3.2.11.7.)*

REQUIRED ADJUSTMENT

❏ *After replacing the printer mechanism unit, perform required adjustments to write appropriate values such as head data and several adjustment values into the EEPROM on the main control board. (See Chapter 4.)*
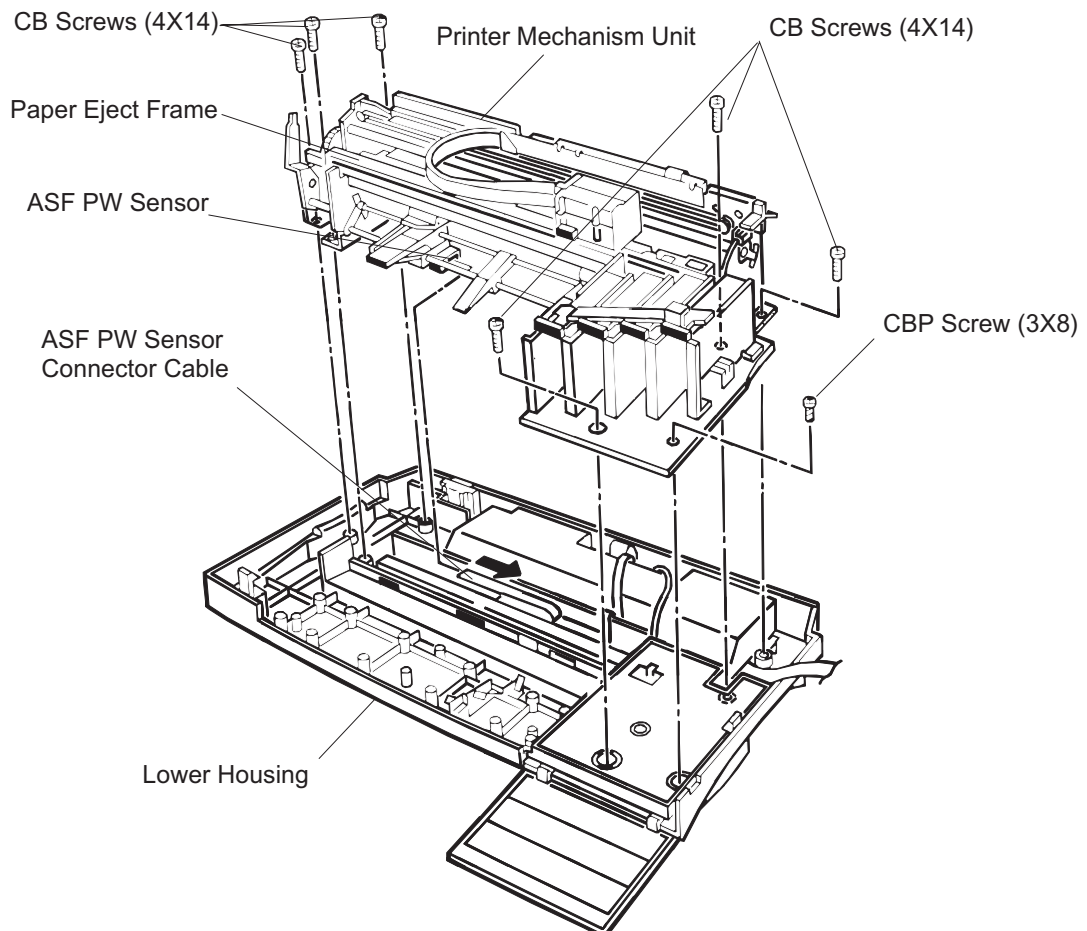
Figure 3-8. Printer Mechanism Unit Removal

3.2.7 PSB/PSE Board Assembly Removal

1. Remove the upper housing. (See Section 3.2.1.)
2. Remove the printer mechanism unit. (See Section 3.2.6.)
3. Remove 7 screws (6 CBS screws , 3X8 and 1 CBP screw, 3X12) securing the upper shield plate to the lower housing.
4. Disconnect the power cable and connector cable for the main board assembly from the CN1 and CN2, respectively.
5. Remove 4 screws (CBS, 3X6) securing the PSB/PSE board assembly to the lower housing, then remove the PSB/PSE board.

> ⚠ **WARNING**
>
> ❑ *After disconnecting the power cable from the AC socket, never disconnect the cable from the CN1 for about 5 minutes, since the capacitor on the C172 PSB/PSE board is still discharging electricity.*
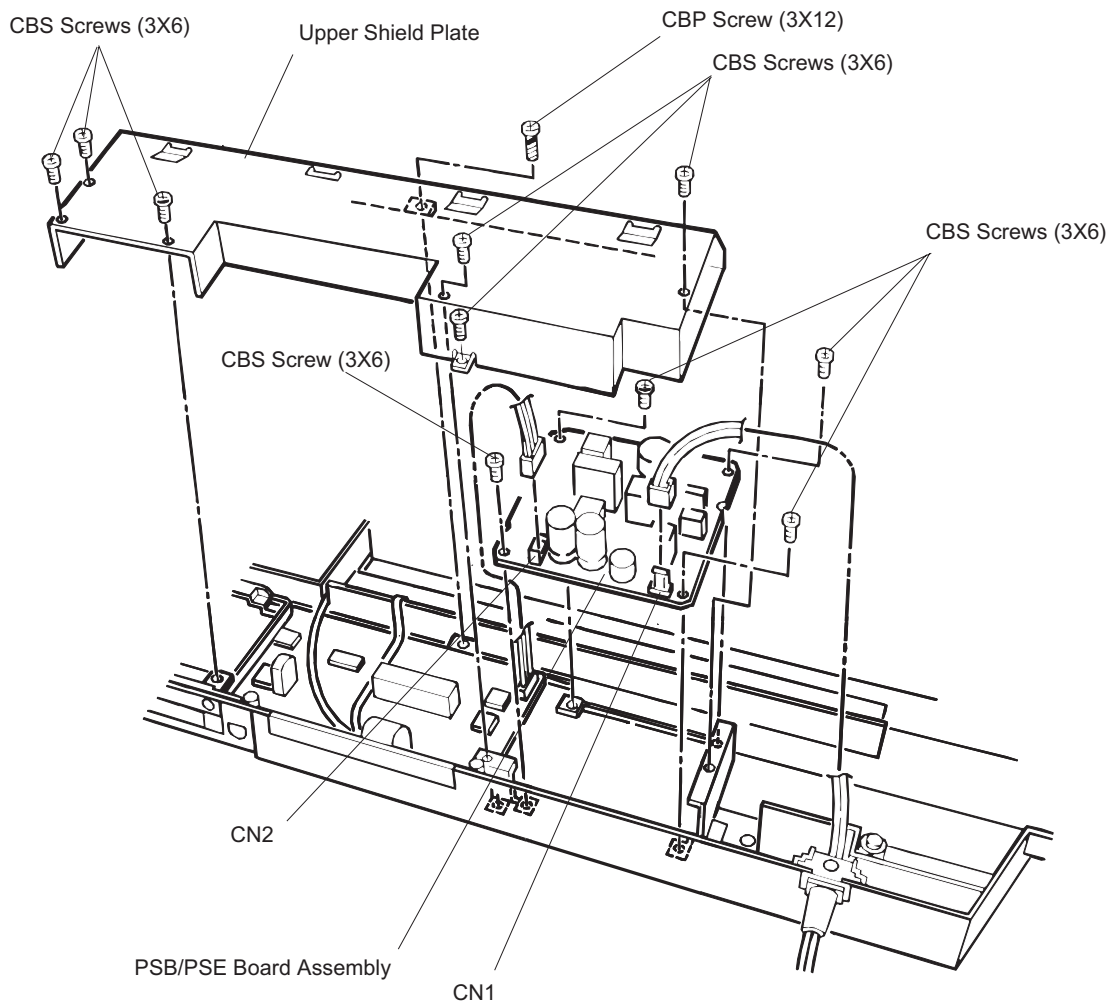
Figure 3-9. PSB/PSE Board Removal

3.2.8 C203 MAIN Board Assembly Removal

1. Remove the upper housing. (See Section 3.2.1.)
2. Remove the printer mechanism unit. (See Section 3.2.6.)
3. Remove the connector cable for the ASF PW sensor from the CN8 on the main board assembly.
4. Remove the connector cable for the PL (Paper Length) sensor from the CN11 on the main board assembly.
5. Remove the connector cable for the PNL board from the CN17 on the main board assembly.
6. Remove the connector cable for the PSB/PSE board from the CN15 on the main board assembly.
7. Remove 7 screws (6 CBS screws, 3X8 and 1 CBP screw, 3X12) securing the upper shield plate to the lower housing.
8. Remove 2 screws (CBS, 3X6) securing the upper connector cover to the lower housing at the back, then remove the upper connector cover.
9. Remove 10 screws (8 CBS screws, 3x6 and 2 CP screws, 3X6) securing the main board assembly to the lower housing.
10. Remove the earth spring ;B.
11. Remove Type-B interface board guide from the main board assembly.
12. Remove the main board assembly.

⚠CAUTION

The connectors for the motor (CN20,22 and 23) and for the ink cartridges (CN7, 12, 13 and 14) look similar. Therefore, be sure to connect them properly, since inappropriate connection may result in malfunction of the PSE/PSB board or the main control board.

REQUIRED ADJUSTMENT

When the main board assembly is replaced, reset EEPROM prior to other adjustments to avoid failure such as bugged data.

⚠WARNING

❑ *Be careful in servicing the lithium battery. (See Section 3.1.1.)*

❑ *Pay attention to the sharp edges of the upper shield plate.*

Type-B I/F Board Guide

ASF PW Sensor Connector Cable

Earth Spring for Type-B I/F

ASF PL Sensor Connector Cable

CBS Screws (3X8)

CBS Screw (3X8)

CBS Screws (3X8)

CN8

CBS Screw (3X8)

CBS Screw (3X8)

CN15

CBS Screw (3X8)

Main Board Assembly

CN11

CN17

CP Screws (3X6)

CBS Screws (3X8)

Upper Connector Cover

Lower Housing
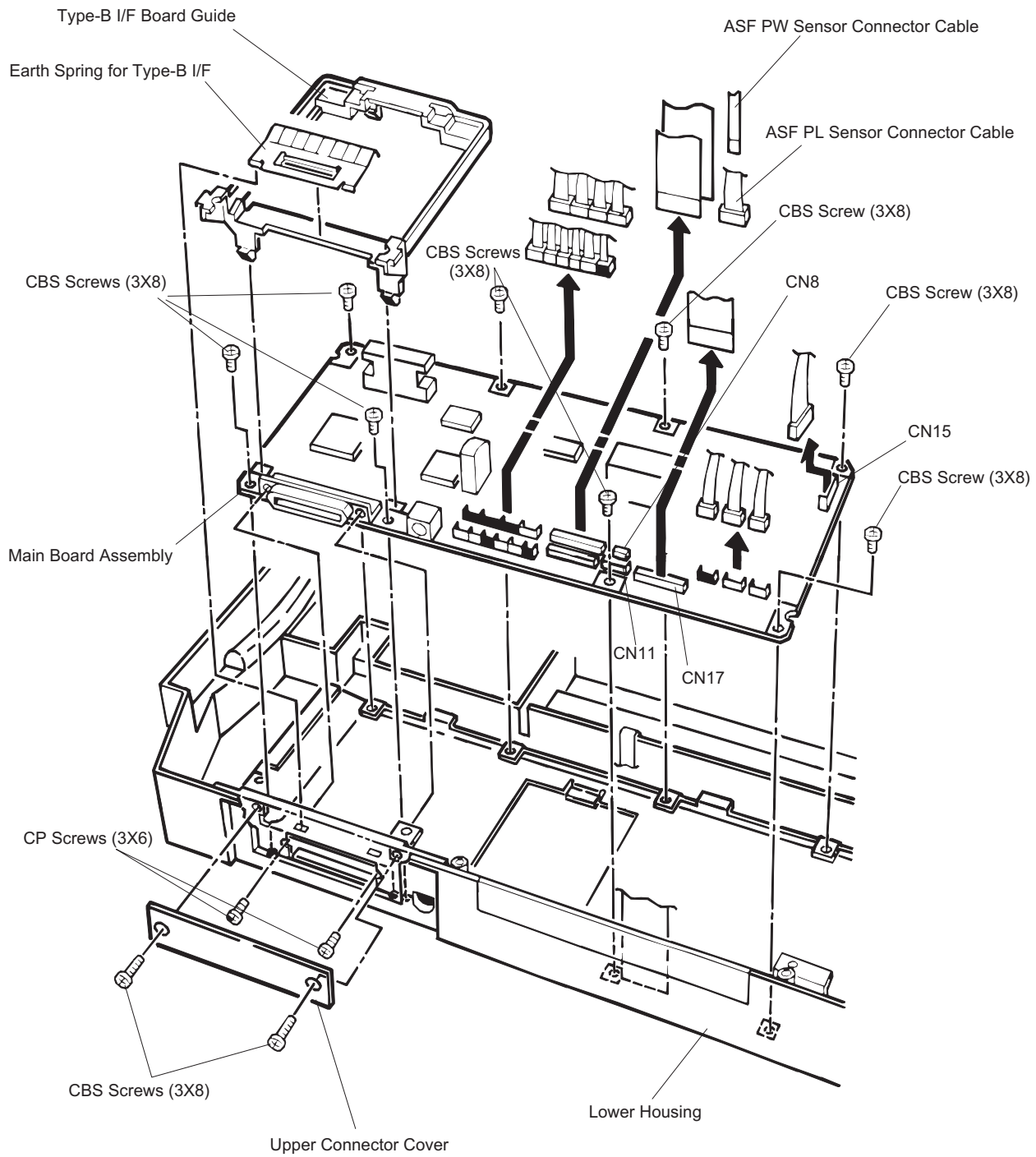
Figure 3-10. C203 MAIN board Removal

3.2.9 Main Waste Ink Drain Pad Removal

Note) *In case the value for the protect counter A* has reached the limit and the maintenance error is indicated, or the value has exceeded 60,000, replace the waste ink drain pads on the agreement with your customer.*
*: The value for the protect counter A can be found on the sheet printed during the default setting mode.
   (Refer to Chapter 1, Section 1.5.2.1.)

1. Perform EEPROM reset. (See Section 1.5.1 in Chapter 1.)
2. Remove upper housing. (See section 3.2.1.)
3. Remove the printer mechanism unit. (See Section 3.2.6.)
4. Remove the main waste ink drain pads. (See Section 3.2.9.)

WORK POINT

Current value for the protect counter A is shown along with the ROM version number on the test print sheet (1st line on the top page) printed in the default setting mode. (See Section 1.5.2.)

Cartridge Holder Unit

Waste Ink Drain Pad
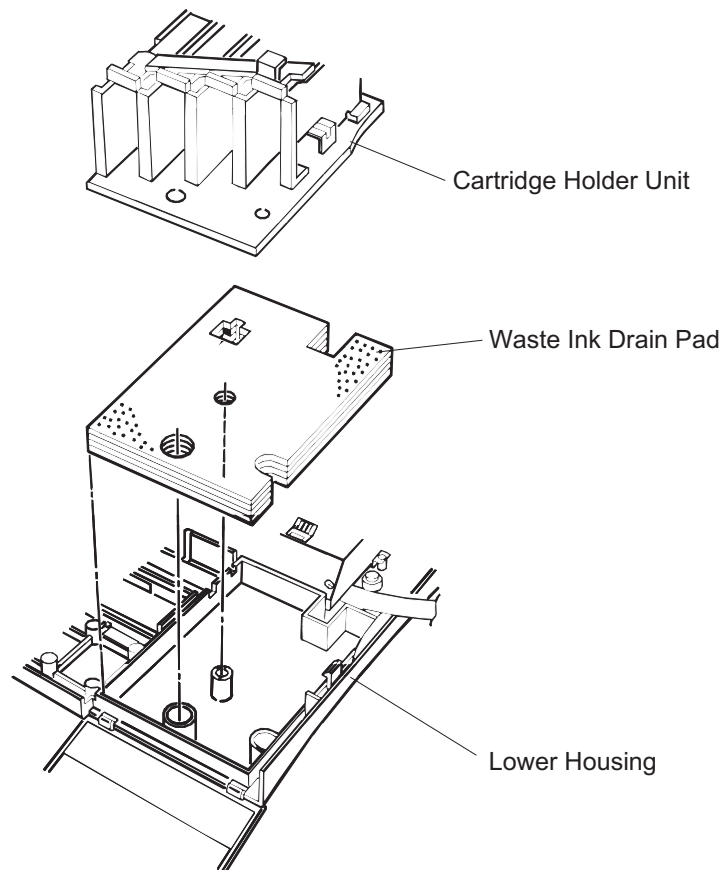
Lower Housing

Figure 3-11. Main Waste Ink Drain Pad Removal

3.2.10 PL (Paper Length) Sensor Removal

1. Remove the upper housing. (See section 3.2.1.)
2. Remove the printer mechanism unit. (See Section 3.2.6.)
3. Disconnect the connector cable for the PL sensor from the CN11 on the main board assembly.
4. Using tweezers, release 3 hooks securing the PL sensors to the lower housing.

WORK POINT

Make sure you connect each connector cable to the appropriate connector paying attention to the cable length which locates the proper connector.

Connector Switches

Lower Housing
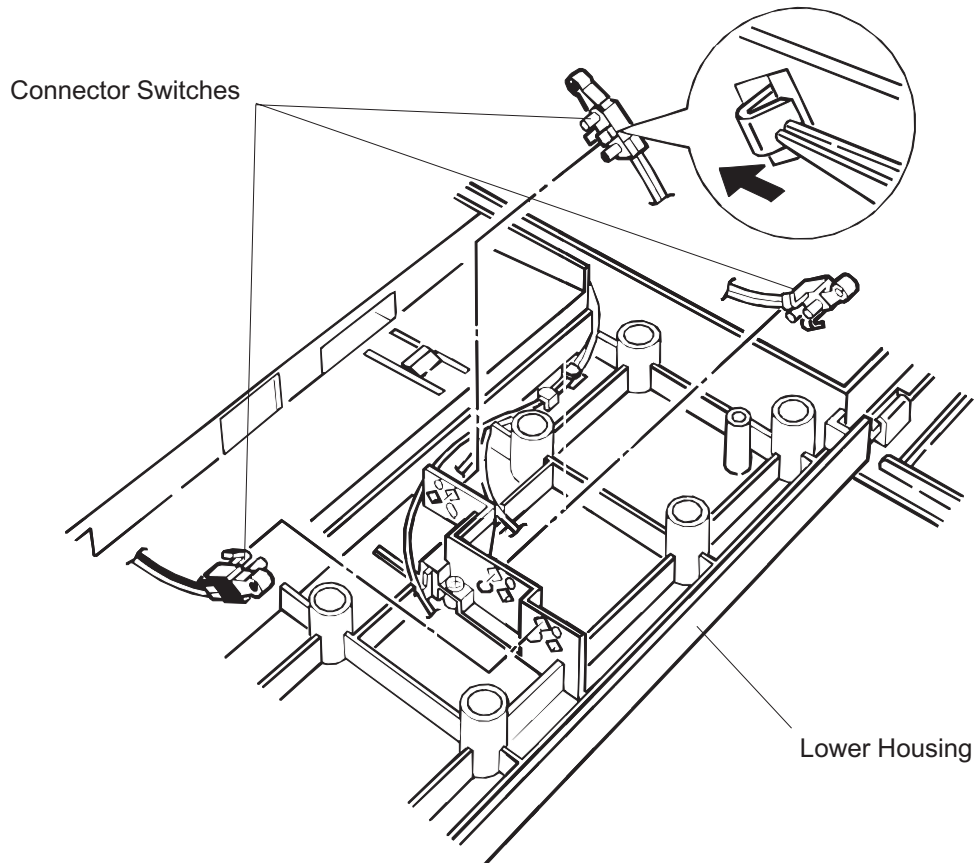
Figure 3-12. PL Sensor Removal

3.2.11 Printer Mechanism Disassembly

Section 3.2.11.1 thorough to Section 3.2.11.18 describe procedures for printer mechanism unit disassembly.

3.2.11.1 CR Motor Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Dismount the belt tension spring to loosen the timing belt.
3. Remove the timing belt from the pulley on the CR motor.
4. Release the joint for the CR motor and base frame assembly by turning the motor counterclockwise in the order shown by the steps 1 to 3 in Figure 3-13. Then remove the CR motor by pulling it toward the bottom edge of the base frame assembly.
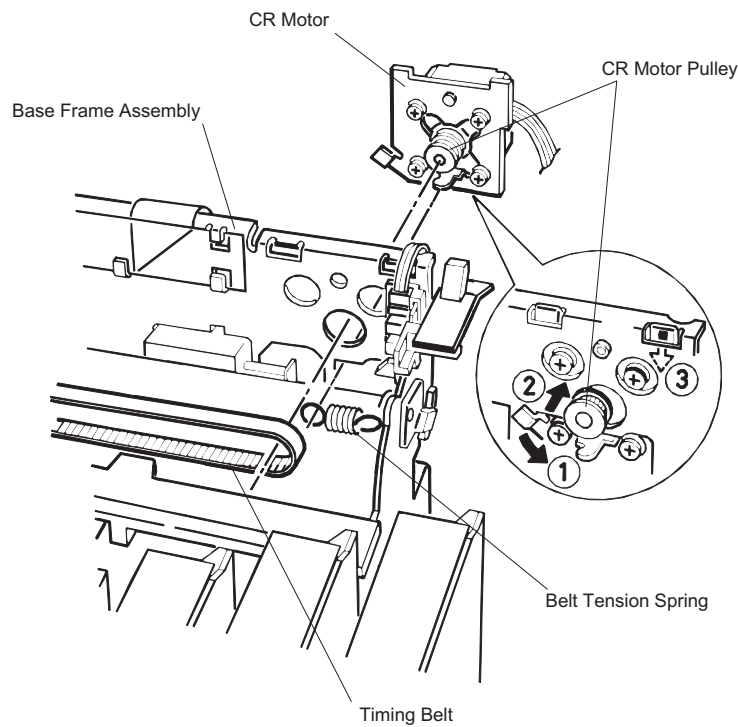
Figure 3-13. CR Motor Removal

⚠️ **CAUTION**

CR motor fan and CR motor assembly are 2 separate parts. Therefore be sure to mount the CR motor fan with specified adhesive when replacing the CR motor. Make sure that you leave some portion of 0 to 2 mm on the end of the CR motor shaft, as shown in Figure 3-14.
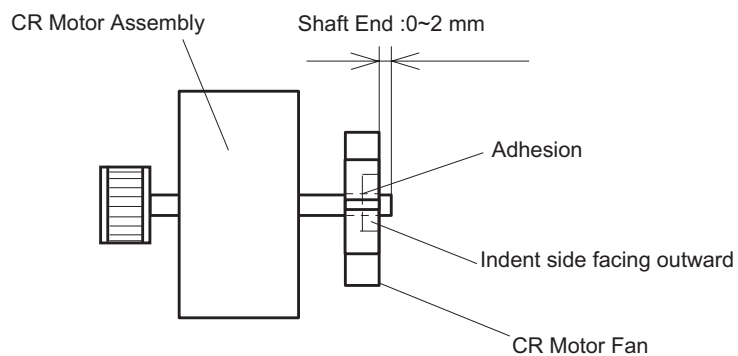
Figure 3-14. Adhering the CR Motor Fan to the CR Motor

3.2.11.2 Pump Motor Assembly Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the connector cable for the pump motor assembly securing the pump motor to the printer mechanism unit from the clump.
3. Remove 2 screws (CBS, 3x6) securing the pump motor assembly to the sub frame assembly. Then remove the pump motor assembly.
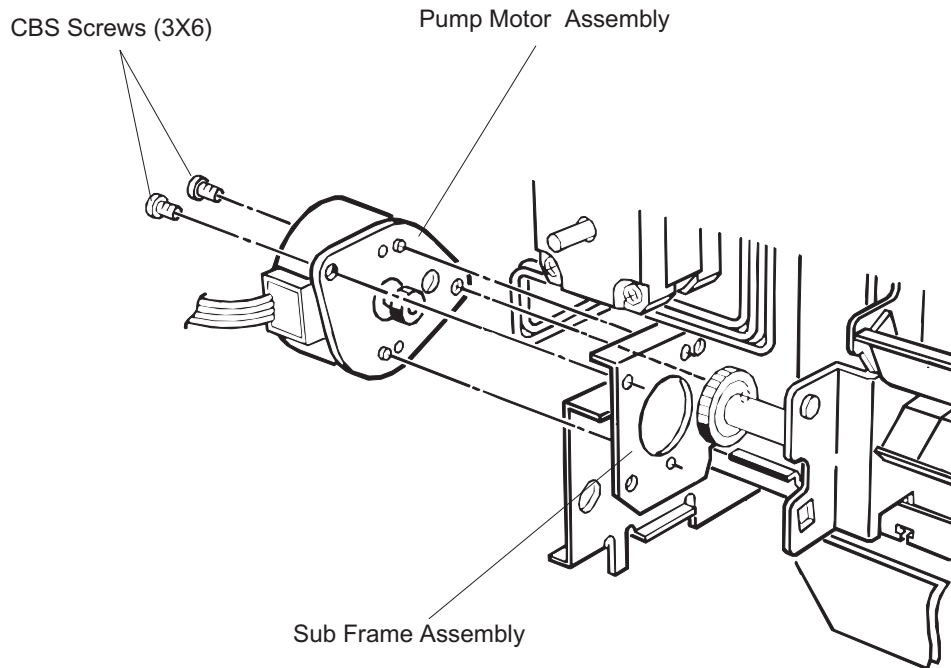
Figure 3-15. Pump Motor Assembly Removal

3.2.11.3 PF Motor Assembly Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the connector cable for the PF motor assembly from the clump attached to the printer mechanism unit.
3. Remove 2 screws (CBS, 3x6) securing the PF motor assembly to the left frame unit. Then remove the PF motor assembly.

WORK POINT

The PF motor pinion gear is made precise and easy to rust. Therefore, be careful not to touch it with your bare hands or bump it against other objects.
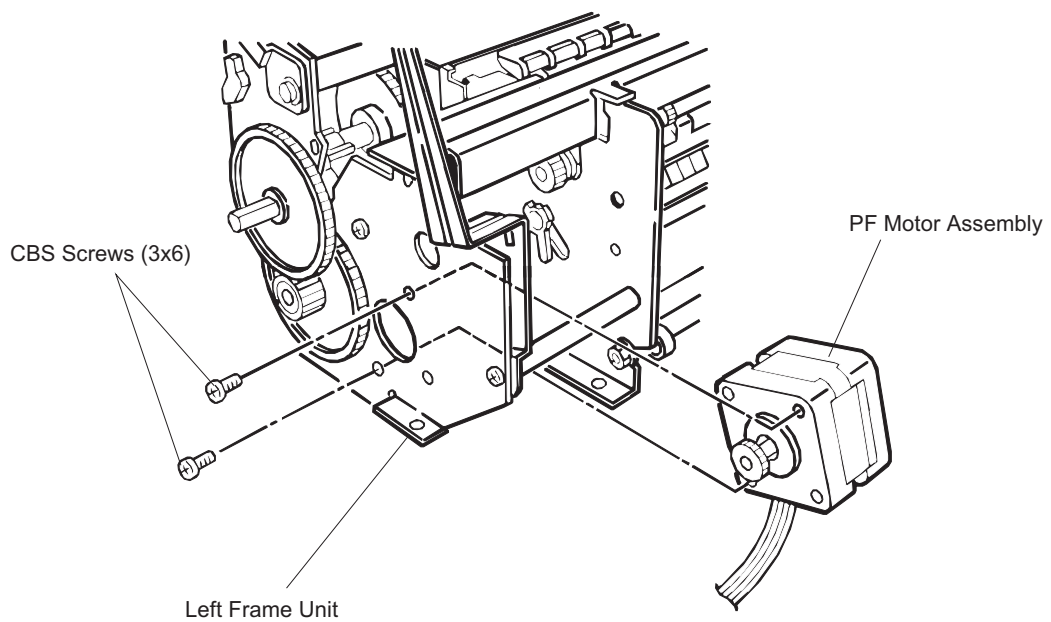
Figure 3-16. PR Motor Assembly Removal

3.2.11.4 Front/Rear PE Sensor Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Using tweezers, release 2 hooks securing the front and rear PE sensors to the rear paper guide assembly at the bottom of the printer mechanism unit. Then remove the sensors.
3. Disconnect the sensor connector cables from the sensor connectors.
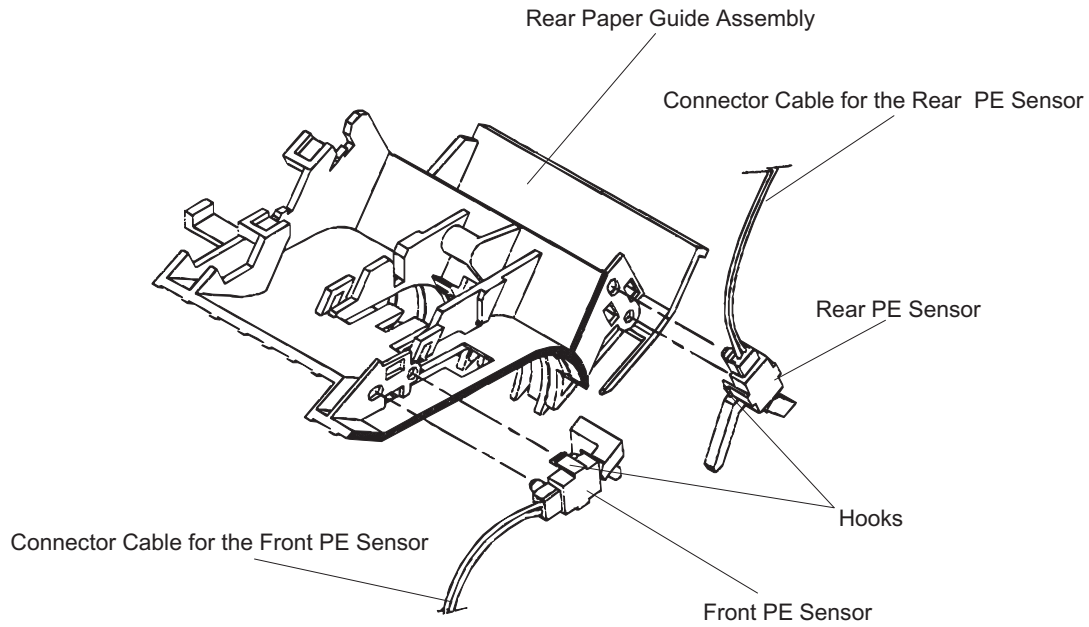
Figure 3-17. Front/Rear PE Sensor Removal

3.2.11.5 Release Sensor Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Using tweezers, release 1 hook securing the release sensor to the left frame unit. Then remove the release sensor.

Release Sensor

Left Frame Unit

Hook

Release Sensor Connector Cable
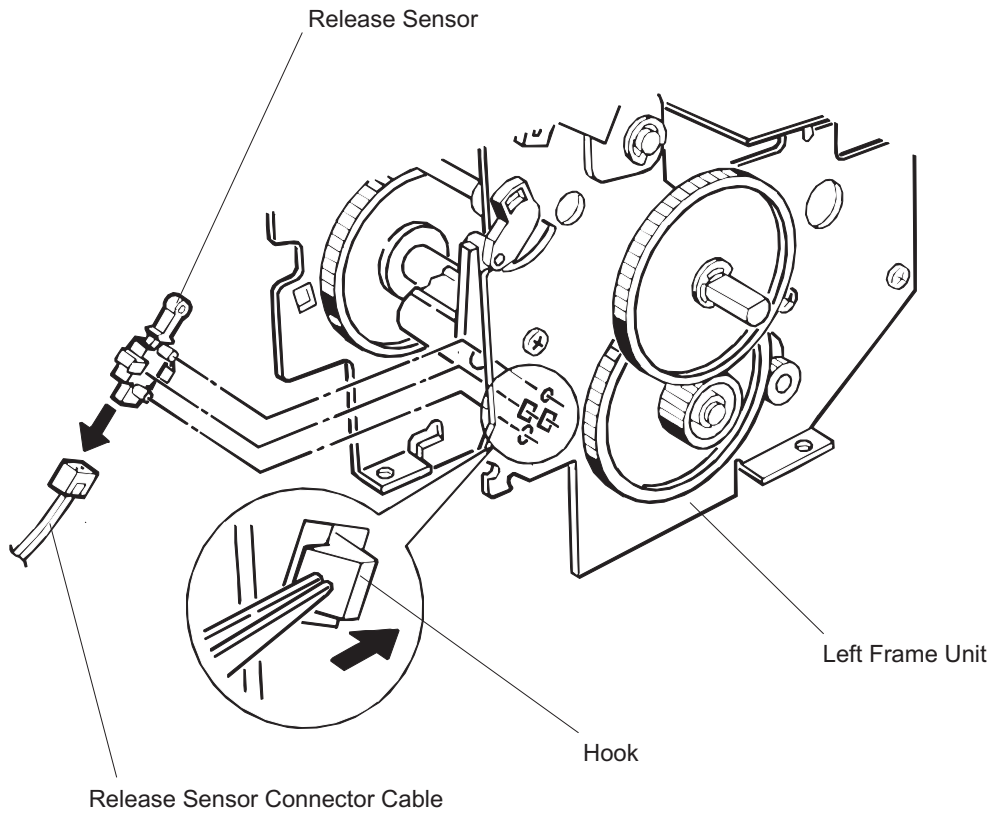
Figure 3-18. Release Sensor Removal

3.2.11.6 Paper Eject Frame Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove connector cables for the HP sensor and cover open sensor from the connectors on the sensors.
3. Remove 4 screws (CBS, 3X6) securing the paper eject frame unit to the printer mechanism unit.
4. Remove the paper eject frame unit from the printer mechanism unit by releasing the joint with the CR unit.

WORK POINT

When removing the paper eject frame unit, insert a piece of clean paper or equivalent between the platen surface in the paper eject frame unit and printheads in the CR unit to protect the printheads.

CBS Screws (3X6)

Paper Ejecft Frame Unit

CBS Screws (3X6)

Printer Mechanism Unit
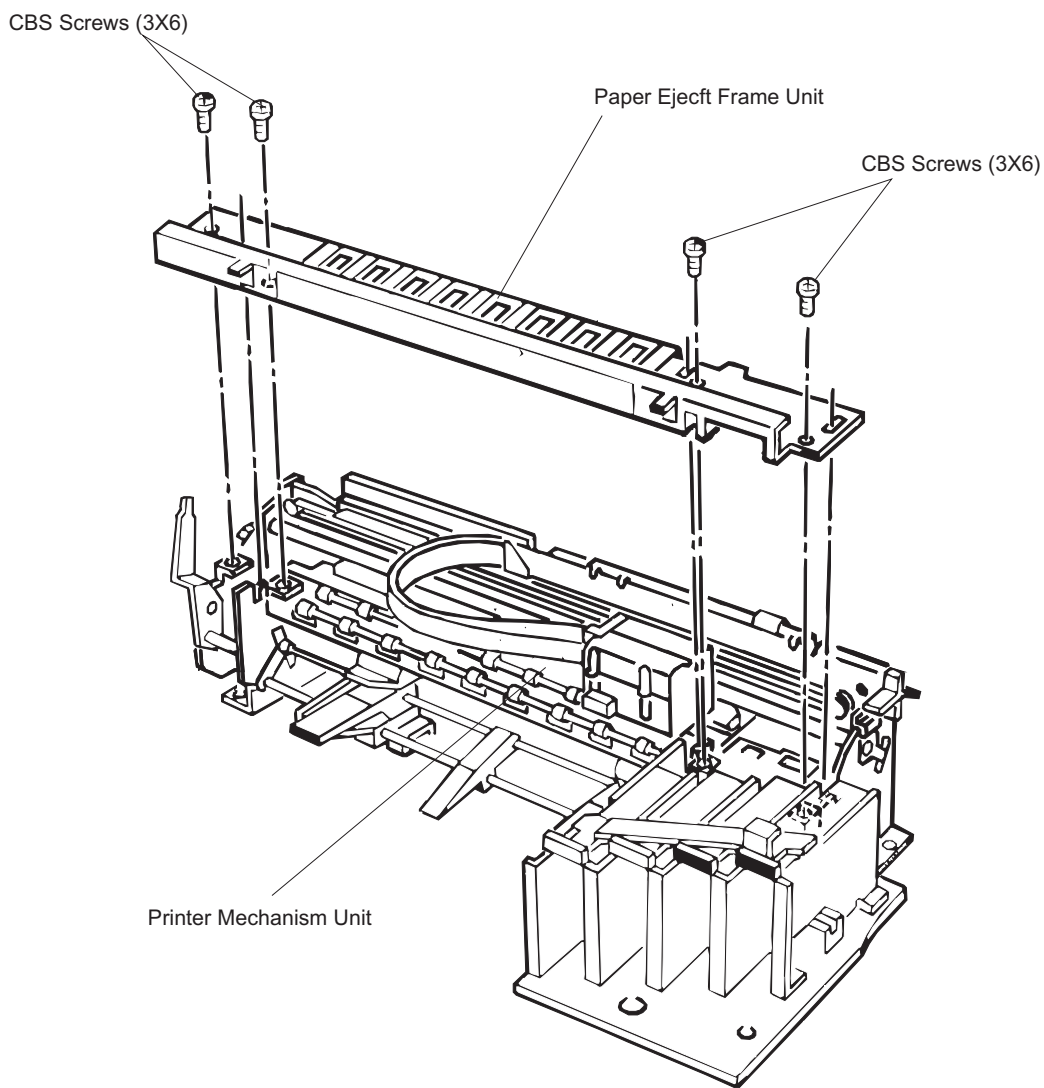
Figure 3-19. Paper Eject Frame Unit

3.2.11.7 Pump Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove 2 screws (1 CBS, 3X6 and 1 CBP, 3X8) securing the pump unit to the printer mechanism unit. Then remove the pump unit.
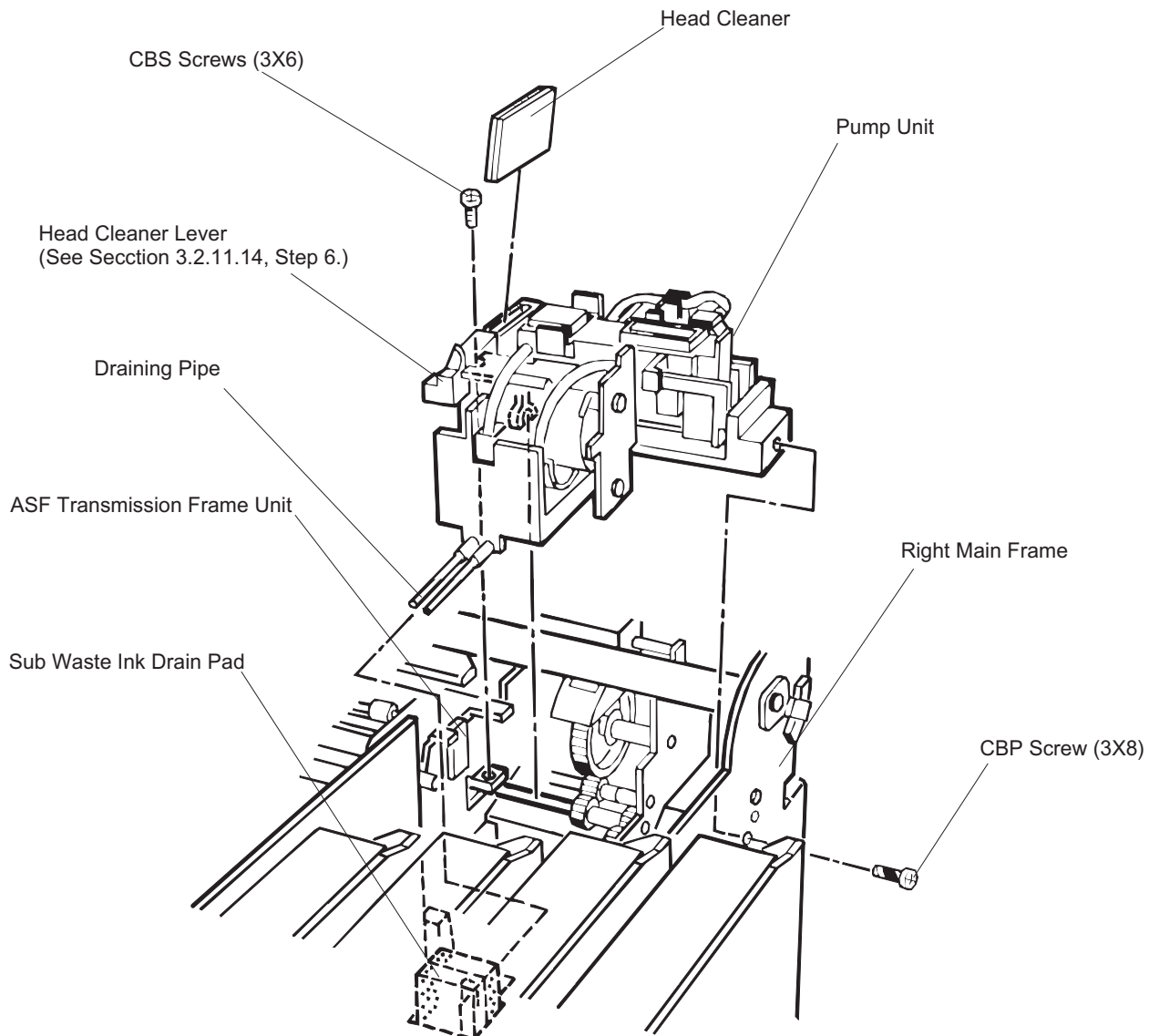
Figure 3-20. Pump Unit Installation

WORK POINT

❏ *When installing the head cleaner to the pump unit, face the rubber part of the clear to the pump side, as shown in Figure 3-20.*

❏ *When installing the pump unit, place the tubes into the cutout first and then insert the sub waste ink pads to set the tubes between them.*

3.2.11.8 Edge Guide Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Release the joints for the slide covers on the LD shaft and the edge guides.
3. Disconnect the connector cable for the PQ (Paper Quantity) sensor located at the right side of the right edge guide.
4. Remove 1 screw (CBS, 3X8) securing the ink cartridge holder to the middle frame so that the flange nut under the cartridge holder will be removed easily in the next step.
5. Remove 2 flange nuts (M4) securing the edge guide unit to the left frame assembly and middle frame unit. Then remove the edge guide unit.
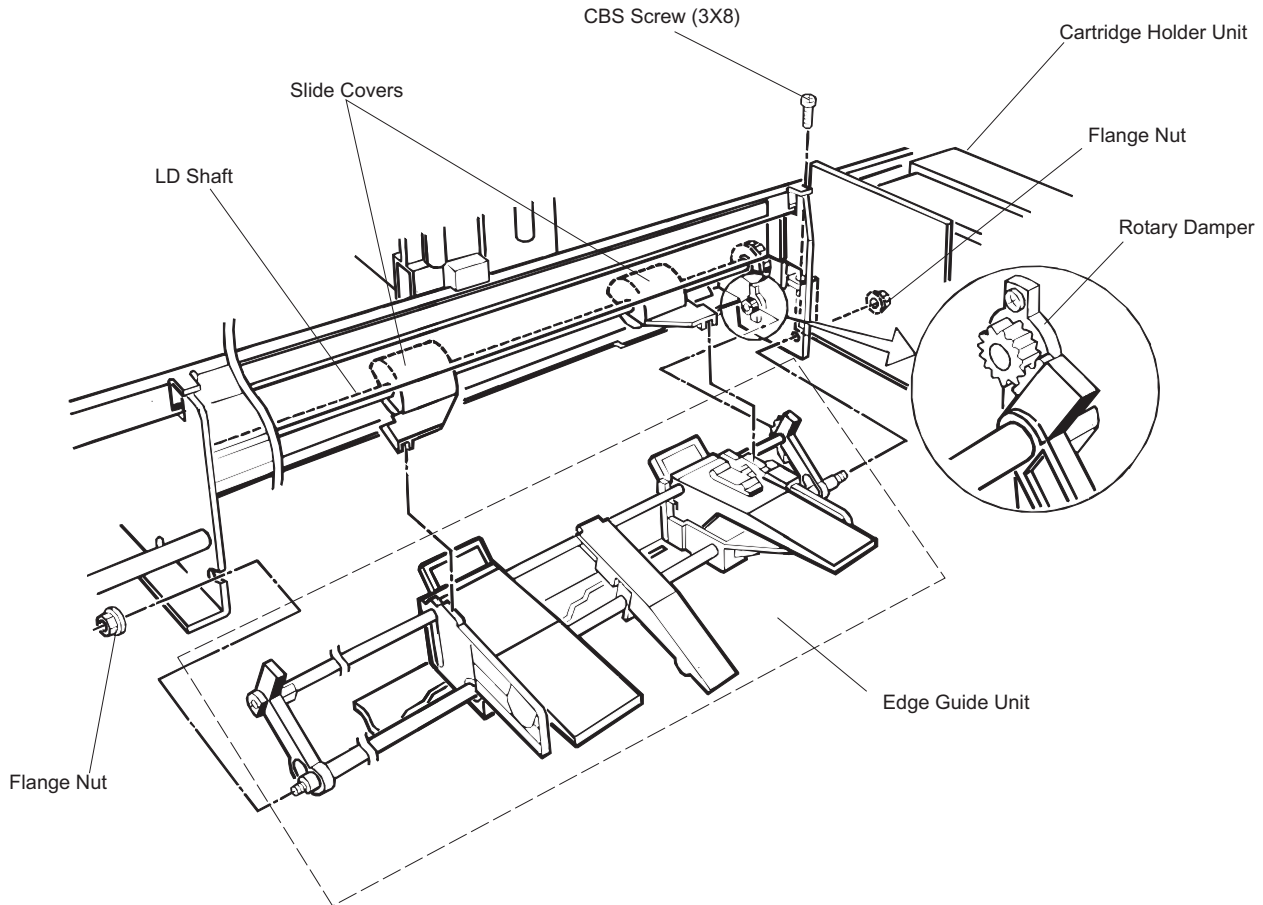
Figure 3-21. Edge Guide Unit Removal

WORK POINT

When installing the edge guide unit to the printer mechanism unit, engage the rack on the edge guide unit with the pinion on the damper.

WORK POINT

❑ *When installing the edge guide unit to the printer mechanism unit, engage the edge guide unit with the main bottom frame, as shown in Figure 3-22.*

❑ *Be sure to fix the flange nuts with the specified adhesive. (See Chapter 6.)*
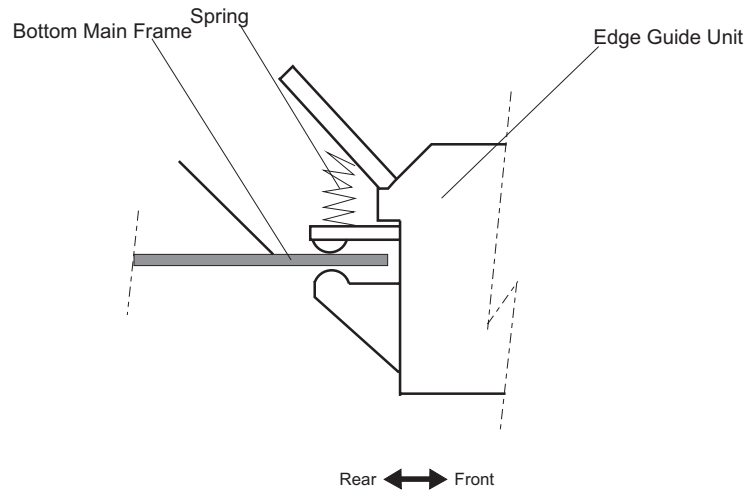
Figure 3-22.
Joining the Edge Guide Frame and Bottom Main Frame

3.2.11.9 PQ (Paper Quantity) Sensor Board Assembly Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the edge guide unit. (See Section 3.2.11.8.)
3. Remove 2 pan camera screws (2X5.5) securing the PQ sensor cover to the edge guide unit.
4. Remove 1 tension spring securing the PQ sensor sub lever to the PQ sensor, and remove the PQ sensor sub lever.
5. Remove 1 pan camera 1B tight screw (2X3.5) securing the PQ sensor to the right edge guide. Then remove the PQ sensor board assembly.

> ⚠️ **CAUTION**
>
> *Do not apply too much torque when tightening the screws. Otherwise, the threads of the tapped holes in the edge guide unit might crush.*
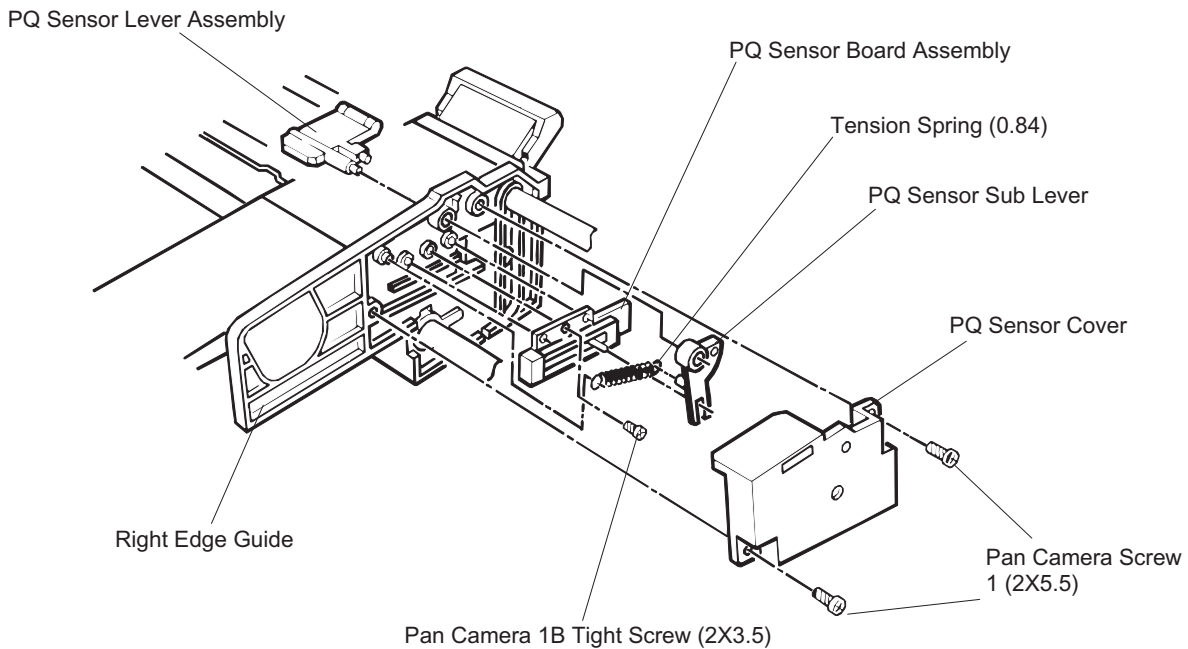
Figure 3-23. PQ Sensor Removal

3.2.11.10 ASF PW (Paper Width) Sensor Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the edge guide unit. (See Section 3.2.11.8.)
3. Using a screwdriver or other pointing tool, release 1 hook securing the ASF PW sensor cover to the left edge guide unit. Then remove the PW sensor cover by opening it in 2 steps shown in Figure 3-24.
4. Remove the ASF PW sensor.

WORK POINT

❏ *After placing the printer mechanism unit back on the lower housing, connect the PW sensor connector cable to the PW sensor first. Then attach the ASF PW sensor cover.*

❏ *When mounting the PW sensor, fit the actuator of the PW sensor into the groove on the PW sensor sliding plate.*

ASF PW Sensor Cover

ASF PW Sensor Board Assembly

ASF PW Sensor Connector Cable

Groove on the Sliding Plate

Left Edge Guide
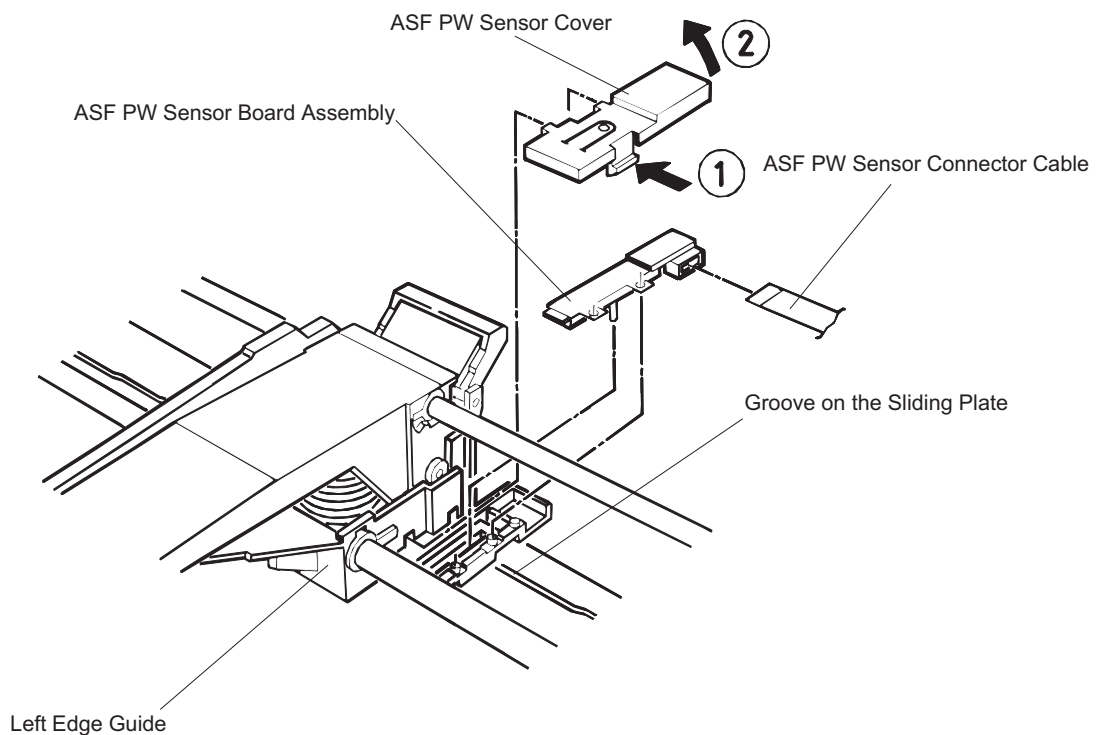
Figure 3-24. PW Sensor Removal

3.2.11.11 Ink Cartridge Holder Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the pump unit. (See Section 3.2.11.7.)
4. Release 4 coupling screws (M6) connecting each ink tube unit to the corresponding ink cartridge holder unit, then disconnect the tubes.
5. Remove 4 screws (CBS, 3x6) securing the ink cartridge sub plate to the ink cartridge holder units. Then remove the sub plate.
6. Remove following screws securing the ink cartridge holder units to the ink cartridge fixing plate, and remove the ink cartridge holder units. (See CAUTION below.)

    2 screws (CBP, 3X8) from each of the black, magenta and yellow cartridge holders
    3 screws (2 CBP screws ,3x8 and 1 CBS screw, 3X6) from cyan ink cartridge holder

⚠ CAUTION

❑ *When removing one of the cartridge holders, you need to remove all cartridge holders on its right, since they are laid on top of the left in the order of yellow magenta cyan and black from left. For instance, you must remove the black, cyan and magenta ink cartridge holders to remove the yellow ink cartridge holder.*

❑ *Be careful when tightening the coupling screw, since the threads in the cartridge is breakable.*

WORK POINT

❑ *Note that the coupling screw compresses the tube fixing O-ring to prevent ink leakage. Therefore, be sure to install them in the appropriate order, as follows:*
   1) Insert the tube to the coupling screw.
   2) Insert the tube to the O-ring.

❑ *When installing the ink cartridge holders, fit each ink cartridge holder to the supporting point of the cartridge holder on its left.*

❑ *ASP ink cartridge holder assembly has a protection tube, which must be removed once the ASP ink cartridge is installed.*

Ink Cartridge Supporting Plate

CBS Screw (3x6)

×4

Cartridge Holder Unit

Coupling Screw (M6)

Ink Tube Unit

CBP (3X8)

CBP (3X8)

CBP (3X8)

×2

×2

×2

×4

Tube Fixing O-Ring

CBP (3X8)

×2

CBS Screw (3x6)

Yellow

Magenta

Cyan

Black

Ink Cartridge Fixing Plate
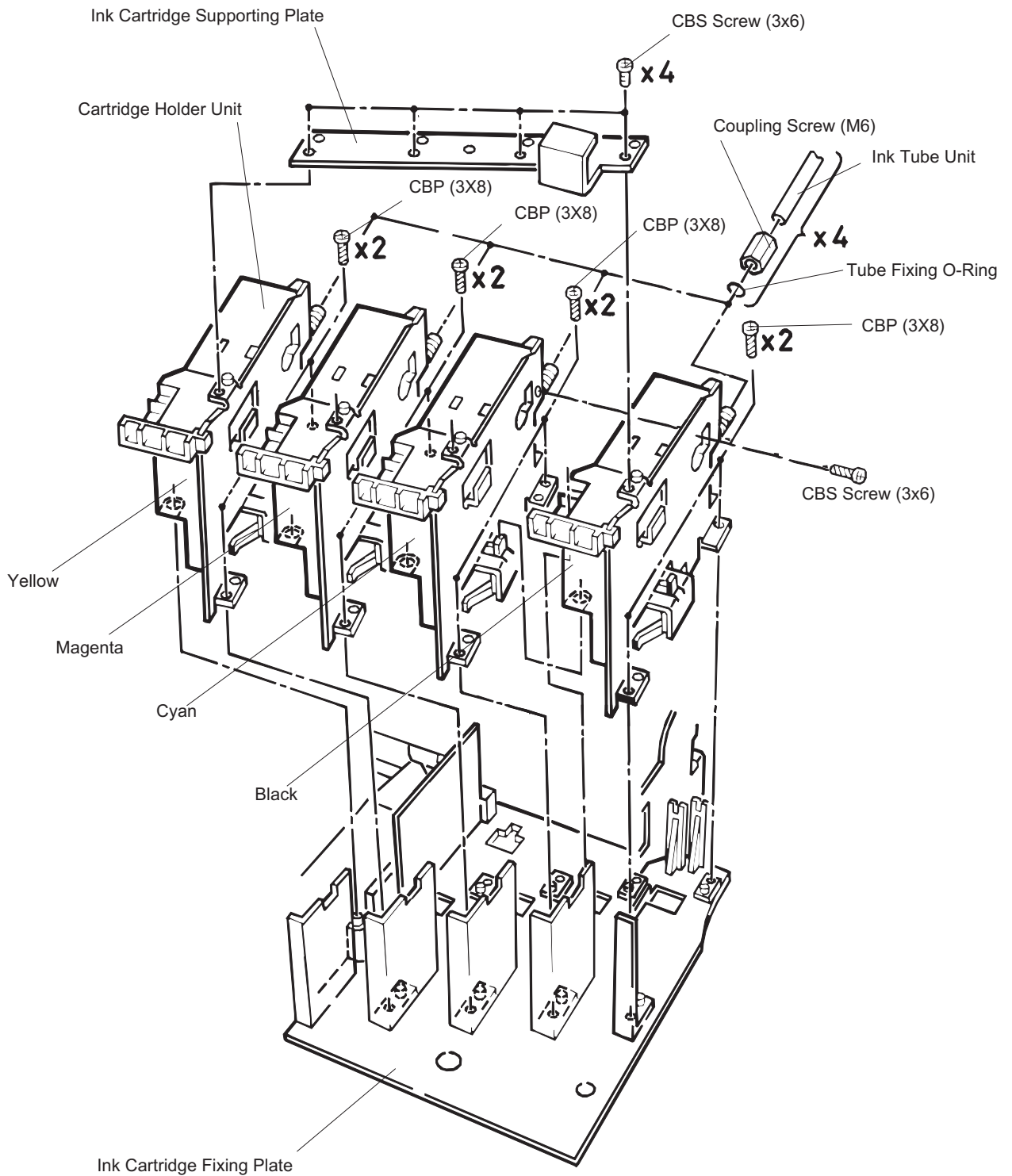
Figure 3-25. Ink Cartridge Holder Removal

3.2.11.12 Ink Sensor Assembly Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the pump unit. (See Section 3.2.11.7.)
4. Remove the ink cartridge holders. (See Section 3.2.11.11.)
5. Remove the ink sensor connector cables from the clump on the ink cartridge holder mounting plate.
6. Remove 1 screw (CBS, 3X10) securing the ink sensor assembly to the ink cartridge holder mounting plate. Then remove the ink sensor assembly.

3.2.11.13 Ink Cartridge Sensor Assembly Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the pump unit. (See Section 3.2.11.7.)
4. Remove the ink cartridge sensor connector cables from the clump on the ink cartridge holder.
5. Remove the ink cartridge holder unit. (See Section 3.2.11.11.)
6. Remove 2 screws (CB, 3X10) securing the pin holder to the pin holder assembly and 2 hexagon nuts (M3). Then remove the pin holder.
7. Remove 1 pan camera B tight screw (2X10) securing the ink cartridge sensor assembly to the pin holder. Then remove the ink cartridge sensor assembly.
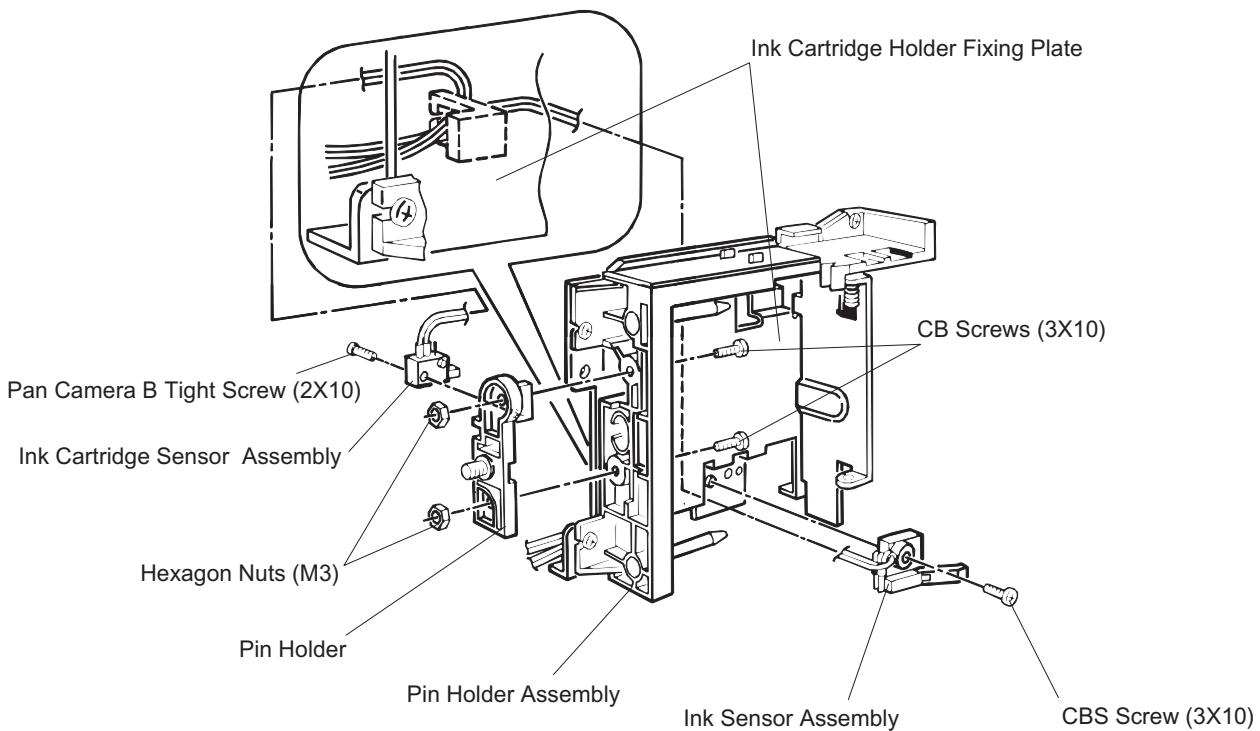
Figure 3-26. Ink Sensor /Ink Cartridge Sensor Assembly Removal

3.2.11.14 CR Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Disconnect the HP sensor connector cable from the HP sensor.
3. Remove the belt tension spring to loosen the timing belt.
4. Disengage the timing belt from the pulley on the CR motor and the sub pulley.
5. Remove 1 E-ring and 1 plain washer (6X0.7X12) from each end of the CR guide shaft.
6. If the head cleaner lever* is locking the CR unit, push the lever down manually to unlock the CR unit.
   * Head cleaner lever: See Figure 3-20.
7. Remove 1 screw (CBS, 3X6) and 2 CR mounting shafts securing the black and the color cables with the head cable guide to the base frame assembly. Then remove the head cable guide and tube mounting plate, and remove the ink tubes from the printer mechanism.
8. Release the coupling screws connecting the ink tubes to the ink tube unit. Then remove the tubes.
9. Turn the parallelism adjust bushings joining the CR guide shaft to the right and left frame assemblies and release the bushings. Then remove the CR unit along with the CR guide shaft.
10. Remove the CR guide shaft from the CR unit.
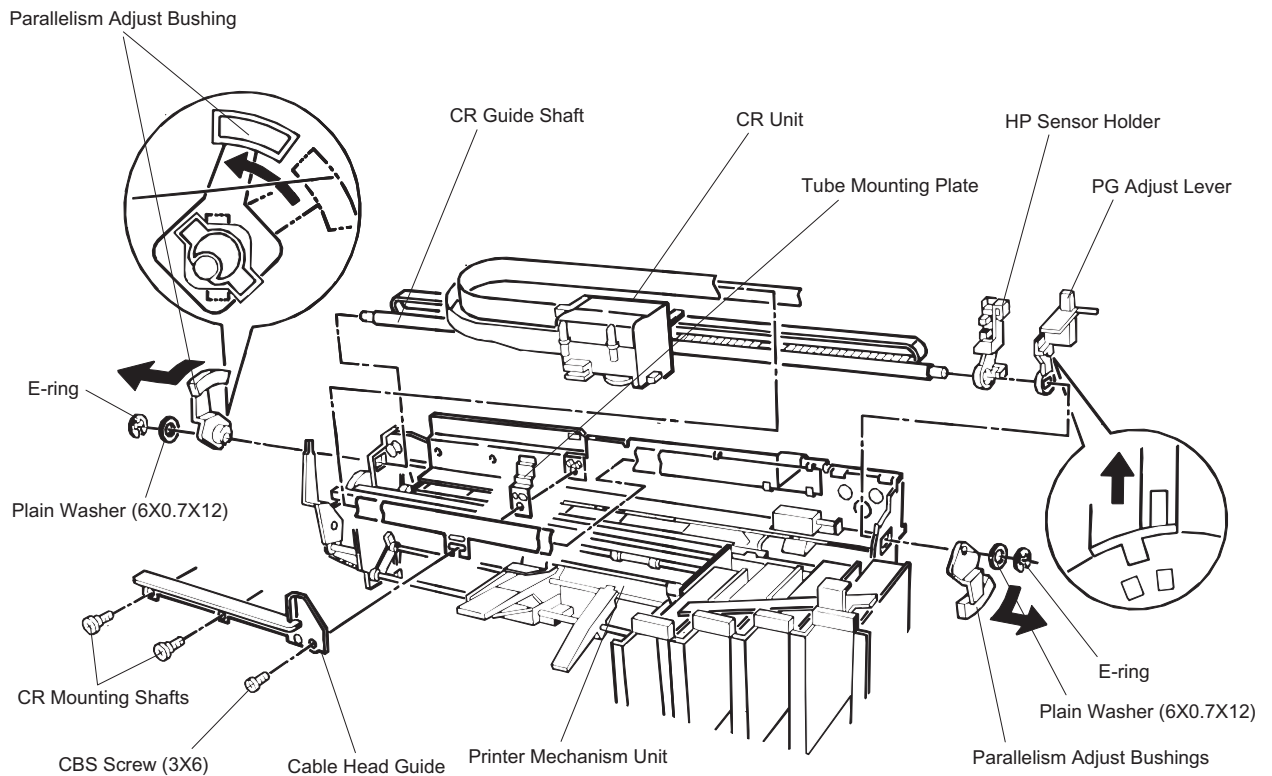
Figure 3-27. CR Unit Removal

WORK POINT

❑ *Do not touch or damage the head surface in the removed CR unit. Be careful with static electricity in handling the printhead which has a head driver circuit directly attached.*

❑ *Pay attention to the oil pad when removing the CR guide shaft from the CR unit, since it tends to dislocate.*

❑ *When installing the CR guide shaft to the printer mechanism unit, fit the PG adjust lever to the cutout on the right frame assembly. (See Figure 3-27.)*

REQUIRED ADJUSTMENT

❑ *After reinstalling the CR unit or parallelism adjust bushings, perform following adjustment:*
  ▪ *PG adjustment*
  ▪ *Bi-D adjustment*
  ▪ *Uni-D adjustment*
   (See Chapter 4.)
❑ *If you replace the printhead along with the CR unit, be sure to write new head voltage data to the EEPROM. (See Chapter 4.)*

WORK POINT

When installing the timing belt to the CR unit, note 2 parts on the belt: flat part and tooth part. Be sure to position the 2 parts carefully, as shown in Figure 3-28.
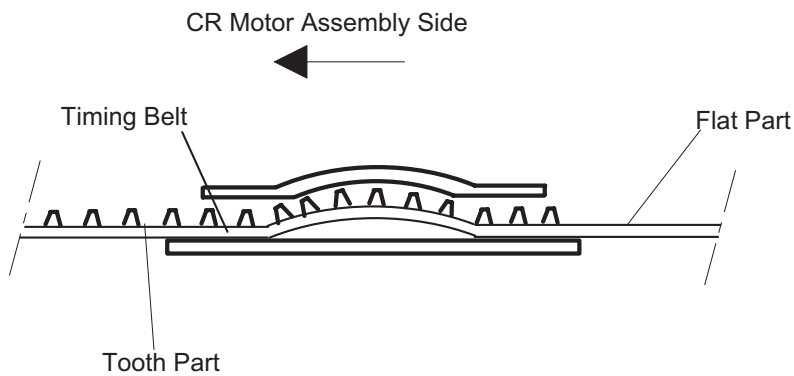
Figure 3-28. Timing Belt Installation

3.2.11.15 LD Shaft Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the CR unit. (See Section 3.2.11.14.)
4. Remove 1 screw (CBP, 3x8) securing the ink supplying tube unit to the tube fixing holder on the printer mechanism with the tube fixing holder (B). Then release the tubes from printer mechanism.
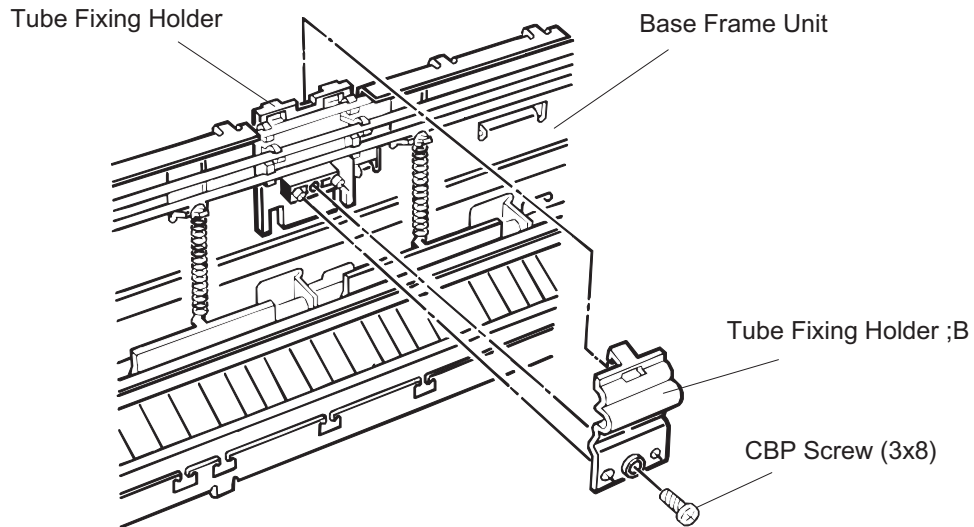
Figure 3-29. Ink Tube Unit Removal

5. Set the release lever to the tractor side and push the release transmission lever* inward. Then turn the sub tractor release cam as shown in Figure 3-30 until it fits into the cutout on the left frame unit .Then release the joint for the sub tractor cam and left frame unit.
   * Release transmission lever: A black plastic lever located at the inner side of the left frame
6. Pull out the tractor release shaft along with the tractor sub release cam.
7. Remove 5 screws (CBS, 3X6) securing the base frame assembly to the printer mechanism unit. Then remove the base frame assembly.
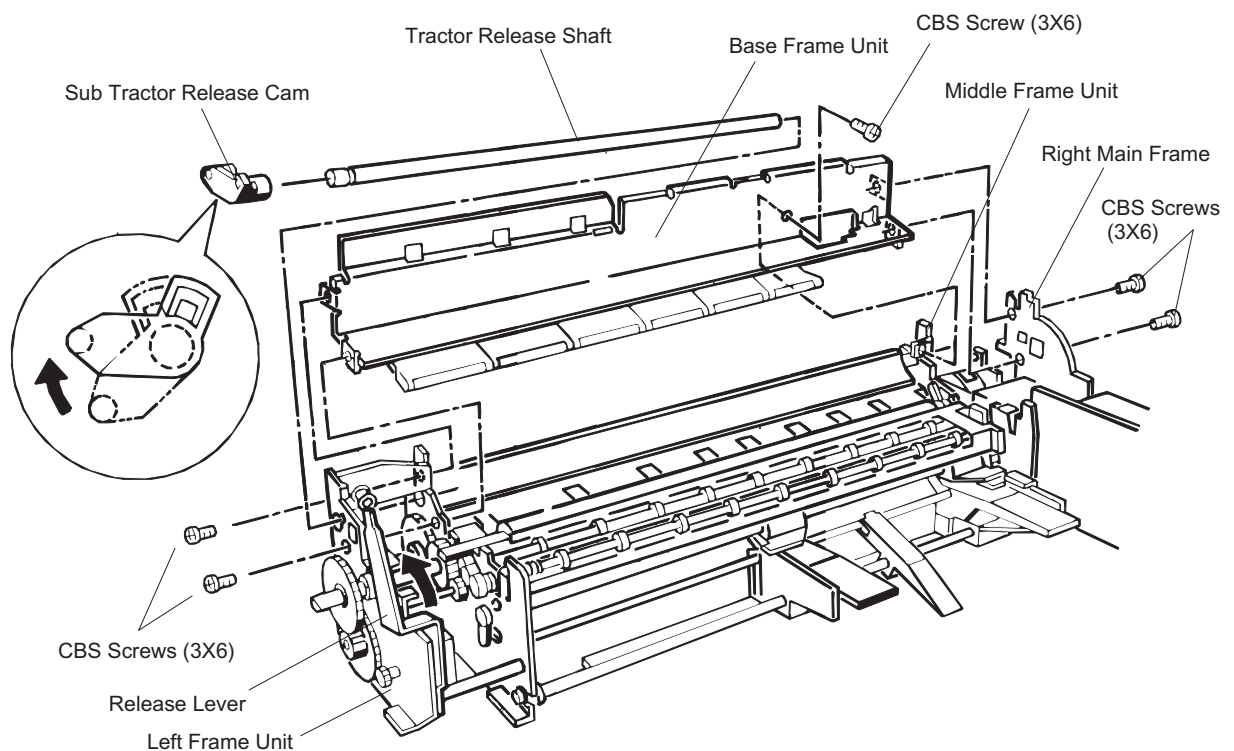
Figure 3-30. Base Frame Assembly Removal

Disassembly and Assembly

8. Remove 1 screw (CBP, 3X8) securing the paper eject drive unit to the left main frame assembly.
9. Attach the knob to the PF roller shaft. Then hold down the trigger lever on the right end of the PF roller, and turn the PF roller shaft until the edge guides don't lift up any further.
10. Remove the paper eject drive unit by lifting up the front part of the unit.

Paper Eject Drive Unit

PF Roller

Trigger Lever

Edge Guides

LD shaft

Left Frame

Left Main Frame Assembly

CBP Scerw (3X8)
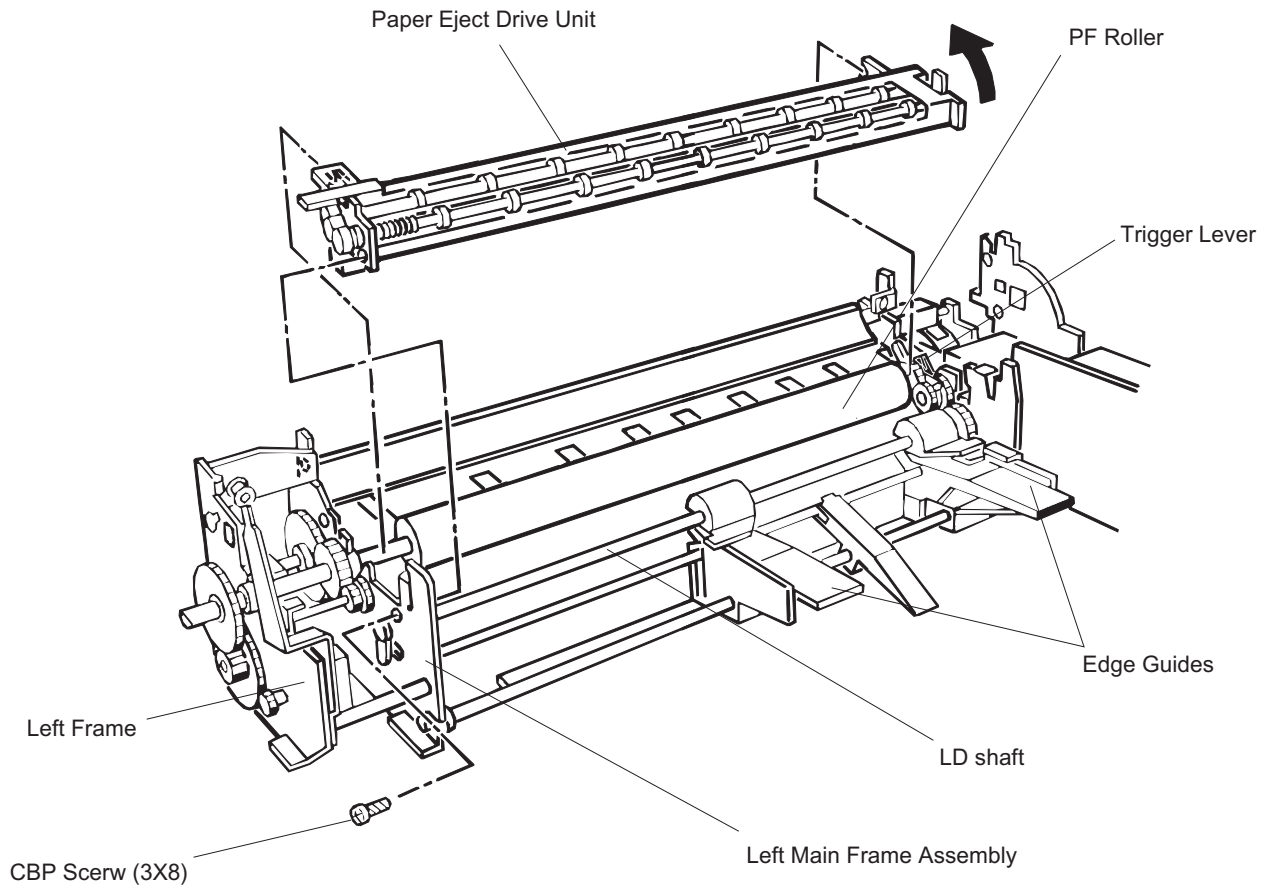
Figure 3-31. Paper Eject Drive Unit Removal

11. Remove the edge guide. (See 3.2.11.8.)
12. Remove 1 E-ring at the left end of the LD shaft.
13. Release the LD shaft bushing fixing the LD shaft to the left main frame assembly.
14. Release the joint for the LD gear on the right end of the LD shaft and ASF transmission gear in the middle frame unit. Then shift the LD shaft toward the left frame assembly and remove it

-

WORK POINT

❑ Engage the LD gear and the gear (29) in the ASF gear set as shown in Figure 3-32.

❑ Don't touch the gear surface with your bare hands, since damage on the gear causes decline in paper feed accuracy.
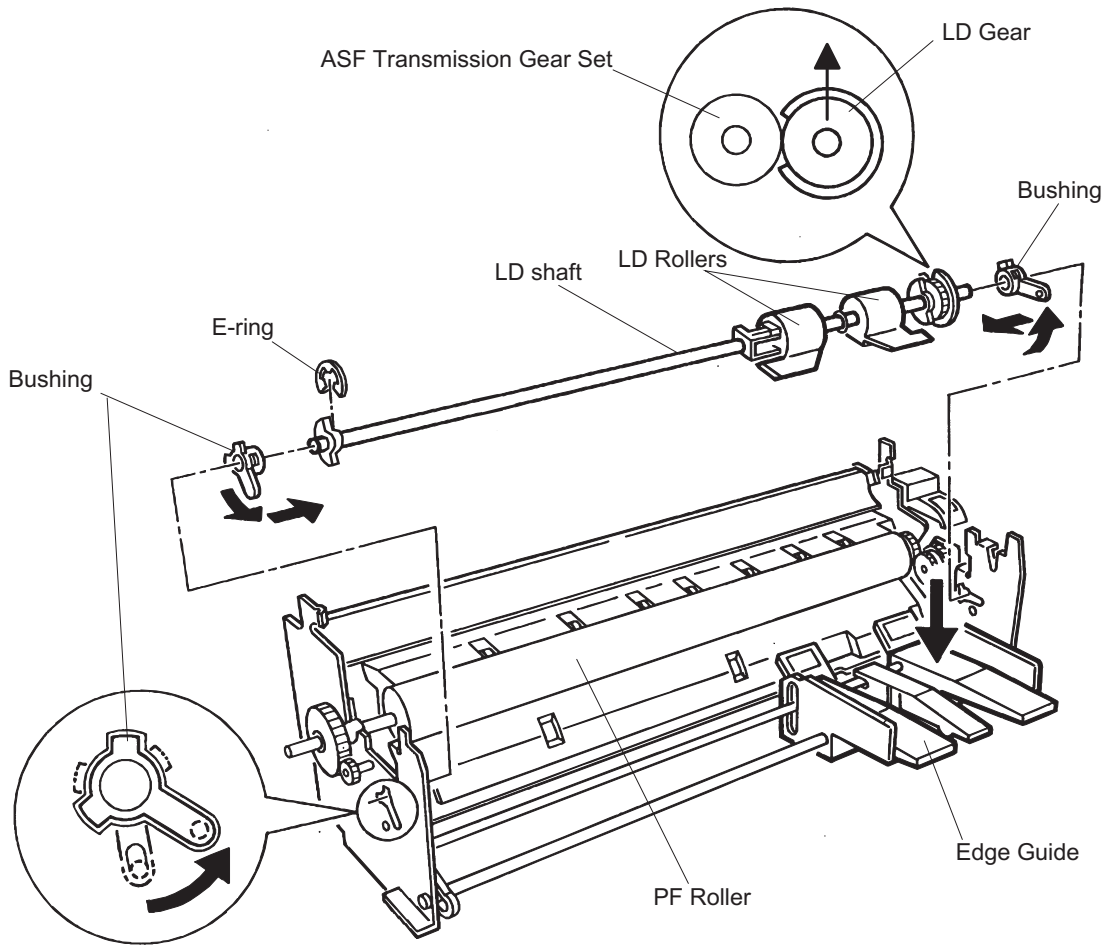
Figure 3-32. LD shaft Removal
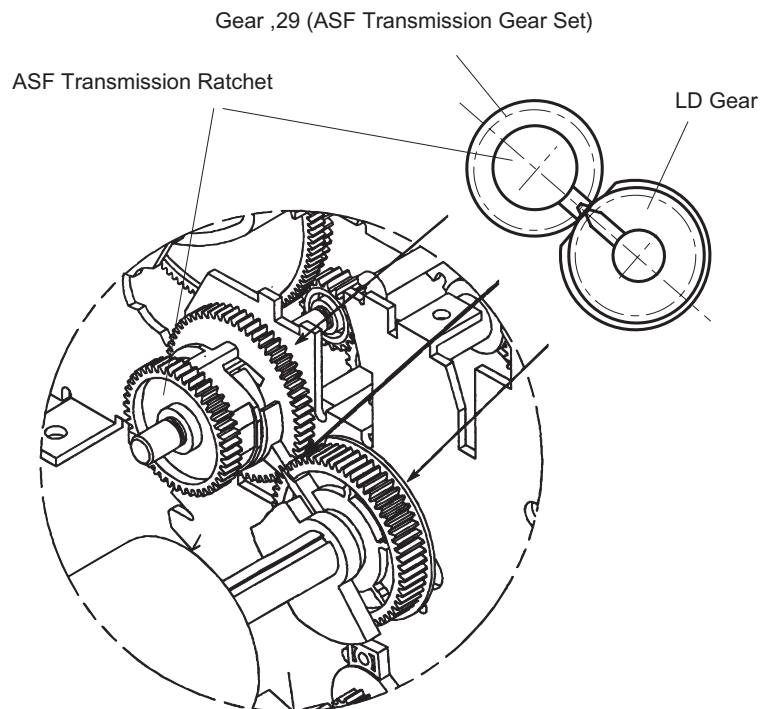
Figure 3-33. ASF Gear Set Engagement

3.2.11.16 PF Roller Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the CR unit. (See Section 3.2.11.14.)
4. Remove the base frame assembly. (See Section 3.2.11.15, Step 4 to 10.)
5. Remove the roller contact spring in the left part of the PF roller.
6. Remove the trigger lever from the PF roller.
7. Turn the PF roller bushings at the right and left ends of the PF roller and release joints with right/left frame assemblies and left main frame assembly.
8. Remove 1 E-ring attached to the left end of the PF roller.
9. Shift the PF roller left and release the joints for the PF roller gear (24) and ASF transmission ratchet. Then remove the PF roller.
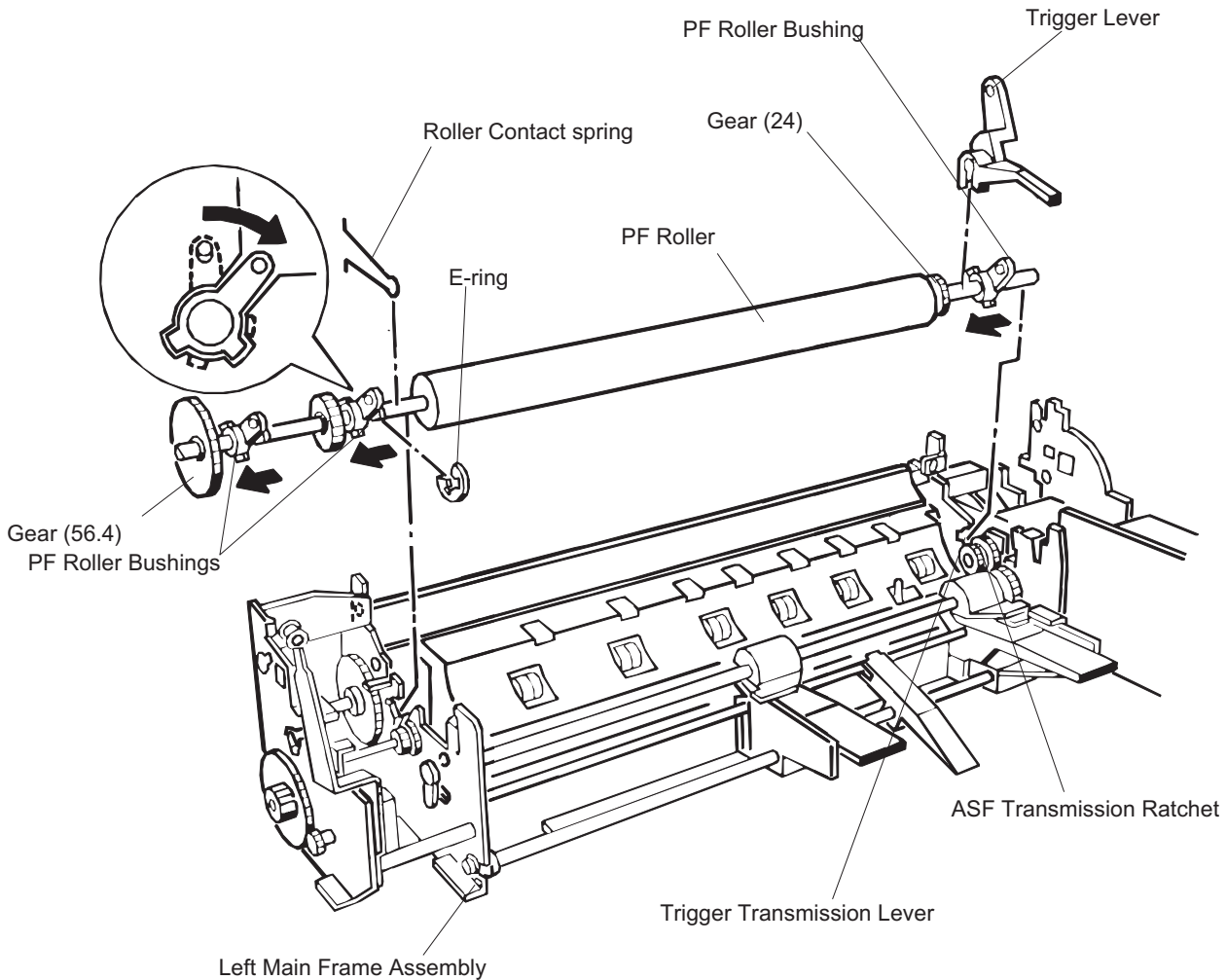
Figure 3-34. PF Roller Removal

⚠ CAUTION

Do not touch the gears with your bare hands. Otherwise they will be damaged and lose accuracy.

3.2.11.17 Rear Paper Guide Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the paper eject frame unit. (See Section 3.2.11.6.)
3. Remove the CR unit. (See Section 3.2.11.14.)
4. Remove PF roller shaft. (See Section 3.2.11.16.)
5. Remove 2 screws (CBS, 3X6) securing the LD guide frame to the left frame unit and middle frame unit. Then remove the LD guide frame.
6. Release 1 hook on the rear paper guide securing the rear paper guide to the right end of the bottom frame assembly. Then shift the rear paper guide left and remove it.
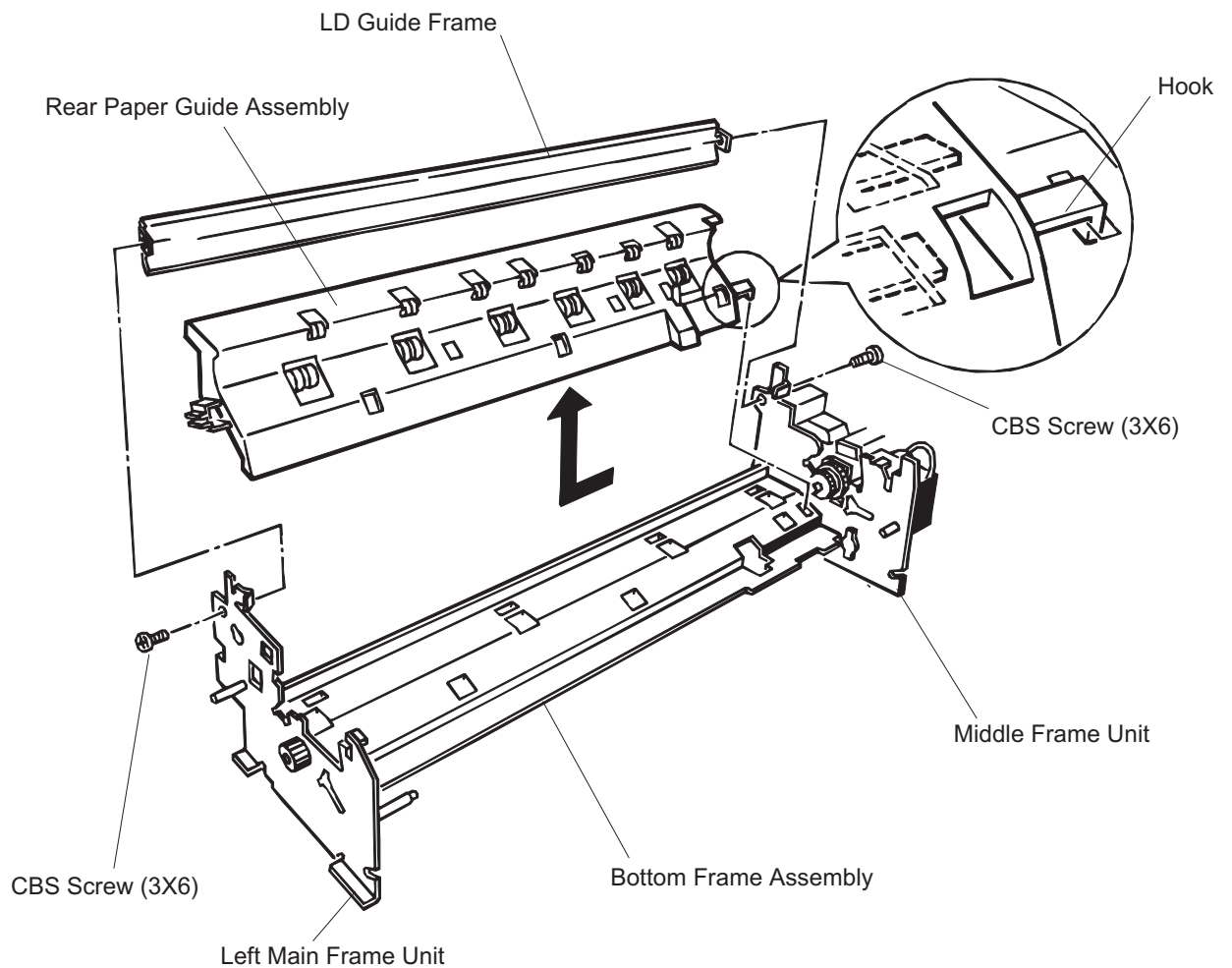
Figure 3-35. Rear Paper Guide Removal

3.2.11.18 Middle Frame Unit Removal

1. Remove the printer mechanism unit. (See Section 3.2.6.)
2. Remove the Paper eject frame unit. (See Section 3.2.11.6
3. Remove the pump unit. (See Section 3.2.11.7)
4. Remove the edge guide.(See Section 3.2.11.8
5. Remove the CR unit. (See Section 3.2.11.14.)
6. Remove the LD shaft. (See Section 3.2.11.15.)
7. Remove the PF roller. (See Section 3.2.11.16.)
8. Remove 1 screw (CBS, 3x6) securing the LD frame guide to the middle frame unit.
9. Remove the connector cable for the middle frame from the clump.
10. Remove 2 screws (CBS, M 3X6) securing the middle frame to the bottom frame assembly and 1 screw (CBS, 3x8) fixing the ink cartridge holder base. Then remove the middle frame unit.
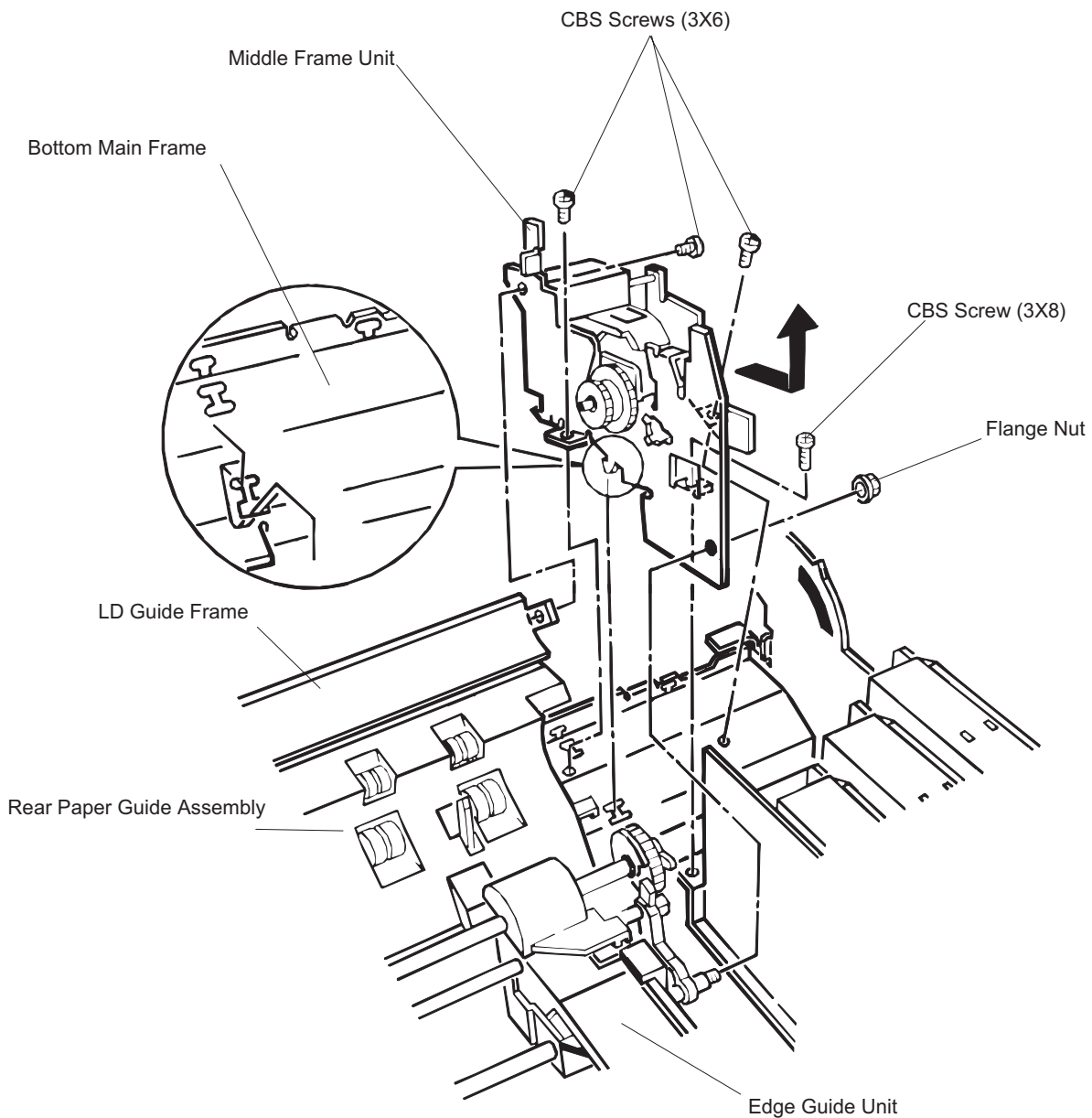
Figure 3-36. Middle Frame Removal

Chapter 4
Adjustment

4.1 Overview

This section describes adjustment required after disassembling and assembling the printer.

⚠ CAUTION

❑ *Adjustment must be performed in the order shown in Table 4-1.*
❑ *Be sure to remove all ink cartridges from the printer when returning the printer to the customer.*
❑ *Use 720 dpi exclusive paper when printing the adjustment pattern.*

Table 4-1. Required Adjustment

Occasion	Required adjustments
▪ Printer mechanism is replaced. ▪ Main control board is replaced.	1. EEPROM clear (Refer to Section 1.4.3.) 2. Head voltage write operation 3. Head vertical adjustment 4. Head gap adjustment 5. Uni-D adjustment 6. Bi-D adjustment 7. PQ (Paper Quantity) sensor adjustment 8. PW (Paper Width) sensor adjustment
▪ Black printhead is replaced.	1. Head voltage write operation 2. Black printhead angular adjustment 3. Head vertical adjustment 4. Head gap adjustment
▪ Black printhead is removed.	1. Black printhead angular adjustment 2. Head vertical adjustment 3. Head gap adjustment
▪ Color printhead is replaced.	1. Head voltage write operation 2. Color printhead angular adjustment 3. Head vertical adjustment 4. Head gap adjustment
▪ Color printhead is removed.	1. Color printhead angular adjustment 2. Head vertical adjustment 3. Head gap adjustment
▪ CR unit is replaced.	1. Platen gap adjustment 2. Head voltage write operation 3. Uni-D adjustment 4. Bi-D adjustment
▪ CR unit is removed or disassembled.	1. Platen gap adjustment 2. Uni-D adjustment 3. Bi-D adjustment
▪ CR motor is removed or replaced.	1. Uni-D adjustment 2. Bi-D adjustment

*Note) You can not run the adjustment program without inputting the market code first. (Refer to Section 4.1.2 **"Market Setting".**)*

4.1.1 Platen Gap Adjustment

This adjustment is performed to obtain the appropriate gap between the head nozzle surface and the platen. It must be adjusted after reinstalling or replacing the CR guide shaft, CR unit or parallelism adjust bushing. **The specified value range for the platen gap is 1.26 ± 0.02 mm.**

1. Set the right and left parallelism adjust bushings to the middle of the adjusting range.

2. Place the thickness gauges at the illustrated positions in Figure 4-1.
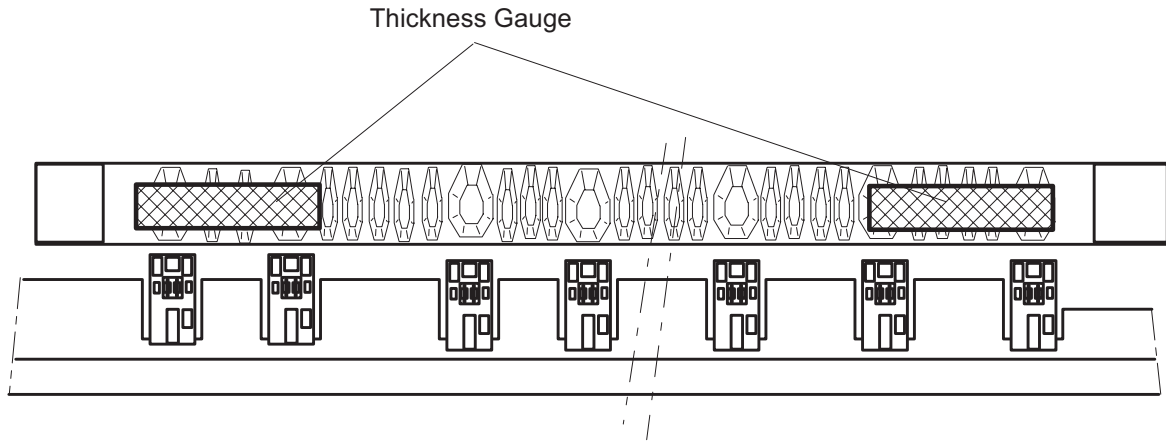
Thickness Gauge

Figure 4-1. Thickness Gauge Placement

3. (See the flowchart in Page 4-3.)
   Turn the left parallelism adjust bushing to make the gap as follows:
       Wide enough to insert a 1.24 mm-thick gauge
       Too narrow to insert a 1.28 mm-thick gauge
   (Table 4-2 shows the direction for moving the parallelism adjust bushing to make the platen gap from wide to narrow or vice versa.)

Table 4-2. Direction for turning the Parallelism Adjust Bushing

Platen gap	Left parallelism adjust bushing	Right parallelism adjust bushing
To narrow	Clockwise	Counterclockwise
To widen	Counterclockwise	Clockwise

4. Apply the same procedure for the right parallelism adjust bushing.

⚠ CAUTION

❑ *Be sure to place the thickness gauge under the both black and color printheads.*
❑ *Before moving the CR unit, set the PG adjust lever to "+" to open the platen gap.*

```
                ╭───────────╮
                │   Start   │
                ╰───────────╯
                      │
        ┌─────────────────────────────┐
        │   Set the PG lever to "+".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │  Shift the CR to the left end. │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │   Set the PG lever to "0".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │       PG Adjustment         │
        └─────────────────────────────┘
                      │
                    ╱     ╲          NO
                 Is the left PG OK? ──────►
                    ╲     ╱
                      │ YES
        ┌─────────────────────────────┐
        │   Set the PG lever to "+".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │ Shift the CR to the right end. │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │   Set the PG lever to "0".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │       PG Adjustment         │
        └─────────────────────────────┘
                      │
                    ╱     ╲          NO
                 Is the right PG OK? ──────►
                    ╲     ╱
                      │ YES
        ┌─────────────────────────────┐
        │   Set the PG lever to "+".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │ Shift the CR unit to the left end. │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │   Set the PG lever to "0".  │
        └─────────────────────────────┘
                      │
        ┌─────────────────────────────┐
        │       PG Adjustment         │
        └─────────────────────────────┘
                      │
                    ╱     ╲          NO
                 Is the left PG OK? ──────►
                    ╲     ╱
                      │ YES
                      ▽
                    END


                ╭───────────────╮
                │ PG Adjustment │
                ╰───────────────╯
                      │
                    ╱     ╲          YES
                 Does a 1.24-mm Gauge ──────►
                 go through?
                    ╲     ╱
                      │ NO
        ┌─────────────────────────────┐
        │       Widen the PG.         │
        └─────────────────────────────┘
                      │
                    ╱     ╲          NO
                 Does a 1.28-mm Gauge ──────►
                 go through?
                    ╲     ╱
                      │ YES
        ┌─────────────────────────────┐
        │       Narrow the PG.        │
        └─────────────────────────────┘

                      ▽
              Return to the main flow.
```

Figure 4-2. Platen Gap Adjustment Flowchart

4.1.2 Input of Market Setting

This operation is performed to write the market code into the EEPROM on the main control board. With this operation, all factory values are written in at a time.

1. Connect the printer and the host computer with a parallel interface cable.

2. Start the adjustment program in the host computer.

3. The market setting menu appears. Move the cursor using ↑ or ↓ key to select your marketing code from the list and press "Return" key. An example (for EAI) is shown below:

```
       << Market Setting>>

Now :

1.  C203001 (JPN)
2.  C203011 (EAI)
   ⋮              ⋮
   ⋮              ⋮
H.  C203161 (RUSSIA)

Select
```

Note
   1. Unless "Market Setting" is executed, the program does not proceed to the Main menu.
   2. Input of an incorrect market code will cause failure in running the program.

4. The Main menu appears on the monitor. Perform one of the followings:

   ❑ Select "**2. Adjustment and Check**" by moving the cursor using ↑ or ↓ key. Then press "Return" key. to proceed to the Adjustment and Check menu.
   ❑ Select **"E. END"** using ↑ or ↓ key to exit the program.

```
        <<<Main>>>

1.Market         (001)
2.Adjustment & Check
3.Sensor Check
E.End

Select
```

```
    < 3. Sensor Check >
1.  CR-PWS
2.  ASF Quantity
3.  ASF-Width
4.  ASF Length
5.  PG
R.  Rerturn
```

WORK POINT

❑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore, make sure you turn off the printer once after executing the adjustment program.*
❑ *The set value is transferred to the printer when each adjustment menu is complete. Therefore do not turn off the printer before executing the menus.*

4.1.3 Head Voltage Write Operation

This operation is performed to write the printhead drive voltages in the EEPROM. You need to perform this operation whenever you replace the printhead.

1. Connect the printer and the host computer with a parallel interface cable.

2. Run the adjustment program in the host computer.

3. Perform **"Market Setting"**. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.

5. Move the cursor using ↑ or ↓ key to select **"1. VH, EEPROM"** and press "Return" key to enter the menu.

```
<<<Adjustment and Check>>>
0.Market (001)
1.VH, EEPROM
2.Angle Adjustment
3.Vertical Adjustment
4.Gap
5.Uni-d
6.Bi-d
7.A4 *1
8.A3 *2
R.Return

    Select
```

Head Voltage Marked Here.
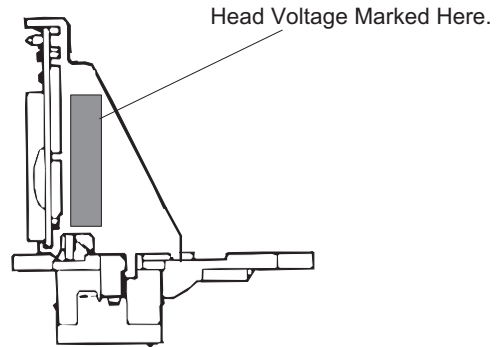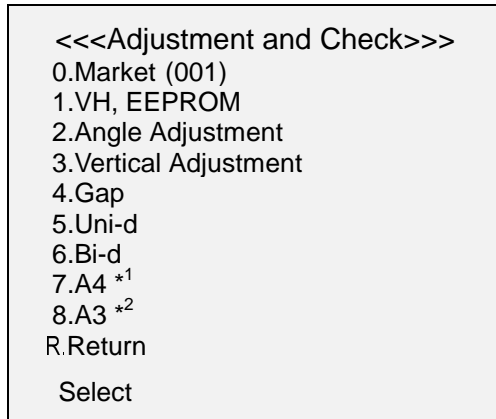
Figure 4-3. Head ID Marking

*1: To print an A4 check pattern, set the paper portrait.
*2: To print an A3 check pattern, set the paper landscape.

6. Write the black head ID (head voltage), which is composed of 5 digits, as shown below. (Refer to Section 4.1.3.1 for details.)

```
        <1. VH, EEPROM>

    BK      VH      18216
    YMC     VH      16215
```

7. Press one of the following keys:
  [SPACE]   Retry the operation.
  [0]   Quit the menu and return to the Adjustment and Check menu.
  [RETURN]   Enter the initial ink charge mode and return to the Adjustment and Check menu.
  [ESC]   Return to the Adjustment Check menu without changing the current values.

8. Perform one of the following:
  ❑ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
  ❑ Select other adjustments using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)

9. Move the cursor using ↑ or ↓ key to select "**END**" and press "Return" key to exit the adjustment program.

WORK POINT

❑ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
❑ *The set values are transferred to the printer when this operation is executed. Therefore do not turn off the printer before exiting* **"VH, EEPROM".**

4.1.3.1 Finding Out the Head Voltage

Normally, the head voltage is not acknowledged without removing the printhead. This program is, however, designed to read the head voltage data stored in the EEPPROM on the main control board. This section describes how to find out the head voltages.
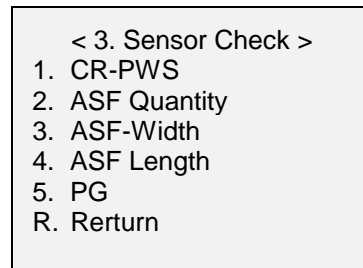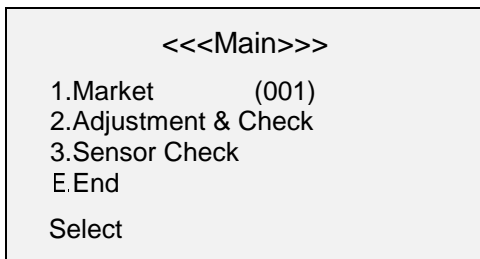
1. Connect the printer and the host computer with a parallel interface cable.

2. Run the adjustment program in the host computer.

3. Input the market code. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.

5. Move the cursor using ↑ or ↓ key to select **"7. A4"**. Then press "Return" key, and the printer prints an A4 check pattern. See the paragraph under **6.TITLE**, in which the head IDs are printed in 8 digits, as shown in the bold letters in the example below:

```
6. TITLE
   Rev. A <2>     For C206.      (011)=<000000>CLB   0   CLC    0
   BK :(      )=<01802016 >  YMC: (      )=<01602015> 01-03-01980   22:10:19   No.
```

See the 2nd line which shows the black head ID (**BK**) and the color head ID (**YMC**). The 2nd and 3rd digits show the head ID for the normal dot, and the 5th digit shows the rank value. The last 2 digits show the head ID for the micro dot, as shown below:

    [Black printhead] **18**: Head ID for the normal dot
                     2: Rank value
                    16: Head ID for the micro dot
    [Color printhead] **16**: Head ID for the normal dot
                     2: Rank value
                    15: Head ID for the micro dot

6. Omit the "0"s from the head ID, and the head voltage is composed of the head ID for the normal dot, rank value and head ID for the micro dot, as shown below:
    Black head voltage (**BK**): 18216
    Color head voltage (**YMC**): 16215

4.1.4 Black Head Angular Adjustment

This adjustment must be made when replacing or disassembling the black printhead. Each printhead is held by the compression spring to the supporting point of the CR unit and the angle adjust lever located under the printhead. The adjust lever is used to swing the black printhead in parallel to the printing surface. With this operation, the nozzles on the printhead are aligned parallel to the paper feed direction.

Figure 4-4. Head Angular Adjustment

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the market code. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.
5. Move the cursor using ↑ or ↓ key to select **"2. Angle Adjustment"**. Then press "Return" key, and the printer prints the angle adjustment pattern.
6. See the pattern and follow the flowchart in Page 4-8 to align the vertical lines continuously by making the gap width less than 1/4 of the line width.
7. After making the adjustment, press one of the following keys:
[SPACE]	Retry the operation.
[0]	Enter a cleaning sequence.
[RETURN]	Quit the operation and return to the Adjustment and Check menu.
[ESC]	Return to the Adjustment and Check menu without changing the current settings.
8. Perform one of the followings:
   - ❑ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
   - ❑ Select other adjustment using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)
9. Move the cursor using ↑ or ↓ key to select **"E.END"** and press "Return" key to exit the adjustment program.

⚠ **CAUTION**

❑ *Lift up the tip of the lever when moving the head angle adjust lever.*
❑ *Be sure to fit the notch on the lever to the one of the adjusting holes to secure the set position.*
❑ *The head angle adjust lever is breakable. Therefore, be careful not to apply too much forth.*

```
                    ┌──────────────┐
                    │    Start     │
                    └──────────────┘
                            │
            ┌───────────────────────────────┐
            │ The printer prints the head   │
            │ angle adjustment pattern.     │
            └───────────────────────────────┘
```

Is the black head angle OK? — No — Loosen the black head fixing screw by turning it 1/4. (See Figure 3-6 in Chapter 3.)

Yes

Is the color head angular OK? — No — Loosen the color head fixing screw by turning it 1/4. (See Figure 3-6 in Chapter 3.)

Yes

What does the pattern show?

Move the black head adjust lever left.

Move the black head adjust lever right.

What does the pattern show?

Move the color head adjust lever left.

Move the color head adjust lever right.

Fasten the black/color head fixing screw while holding the arm of the printhead.

Press "Space" key.

The printer prints another head angule adjustment pattern.

Press "Return" key.

End

* : ↓ The direction in which paper is fed.

Figure 4-5. Head Angle Adjustment Flowchart

4.1.5 Head Vertical Adjustment

You must make this adjustment after removing or replacing one or both of the black and color printheads. With this adjustment, the vertical positions for the black and color printheads are aligned. This is performed by moving the head vertical adjust lever located on the right side of the CR unit to adjust the vertical position for the color printhead to the black printhead.

1. Connect the printer and the host computer with a parallel interface cable.
2. Run the adjustment program in the host computer.
3. Input the market code. (Refer to Section 4.1.2.)
4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.
5. Move the cursor using ↑ or ↓ key to select **"3. Vertical Adjustment"**. Then press "Return" key, and the printer prints the vertical adjustment pattern.
6. Follow the flowchart below to align the black and color lines continuously by making the gap width less than 1/4 of the line width.
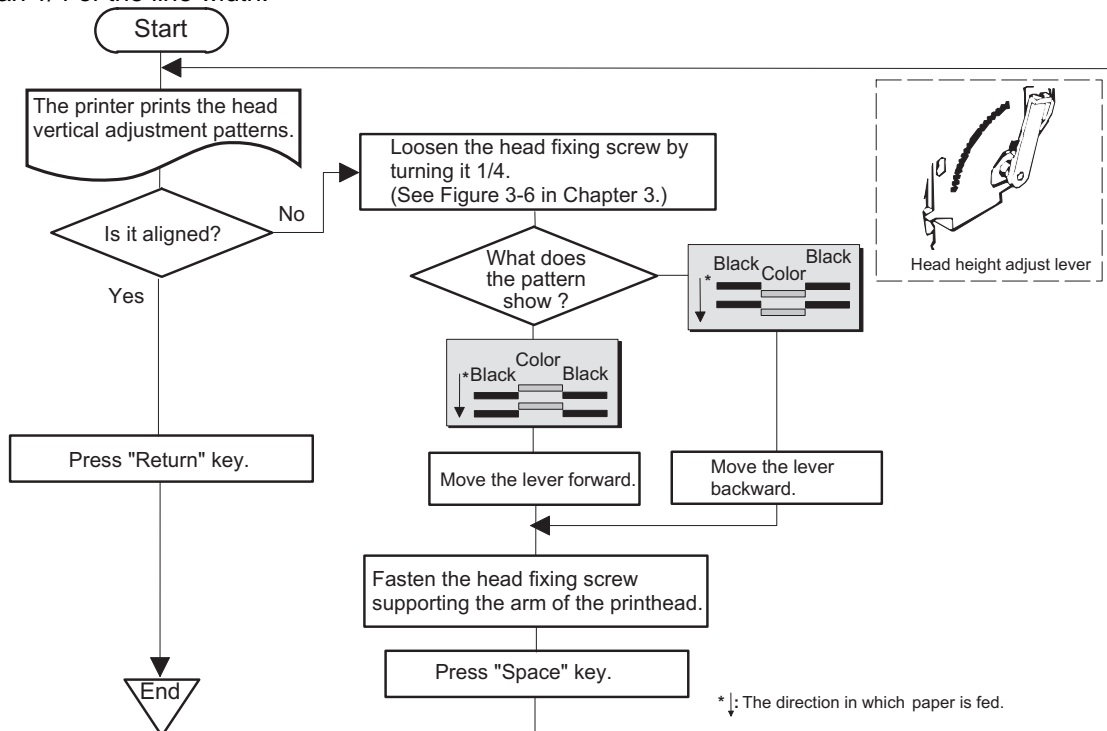
Figure 4-6. Head vertical Adjustment Flowchart

7. After making an adjustment, press one of the following keys:

[SPACE]	Retry the operation.
[0]	Enter a cleaning sequence.
[RETURN]	Quit the operation and returns to the Adjustment and Check menu.
[ESC]	Return to the Adjustment and Check menu without changing the current settings.

8. Perform one of the followings:
   - ❏ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
   - ❏ Select other adjustment using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)
9. Move the cursor using ↑ or ↓ key to select **"E.END"** and press "Return" key to exit the adjustment program.

⚠ CAUTION

❏ *When moving the vertical angle adjust lever. lift up the tip of the lever.*
❏ *Be sure to fit the notch on the lever to the setting hole to set the position securely.*

4.1.6 Head GAP Adjustment

This operation is required when one or both of the black and color printheads are removed or replaced. This operation aligns vertical lines between black and color printheads toward the column direction.
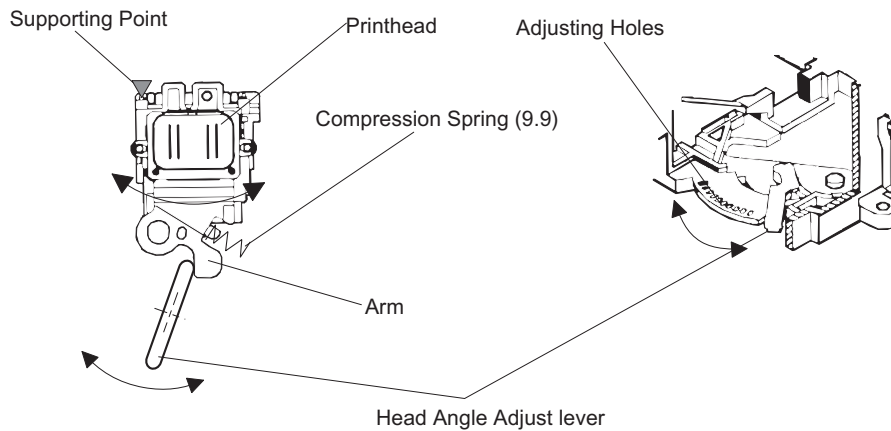
1. Connect the printer and the host computer with a parallel interface cable.

2. Run the adjustment program in the host computer.

3. Input the market code. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.

5. Move the cursor using ↑ or ↓ key to select **"4. Gap"**. Then press "Return" key, and the printer prints the head gap adjustment patterns in LQ and SLQ mode.

6. Follow the flowchart in Page 4-11 to align the black and color lines continuously by making the gap width as follows:
    LQ mode: Less than 1/3 of the line width
    SLQ mode: Less than 1/4 of the line width

7. After making an adjustment, press one of the following keys:
    [0]   Correct values if you input wrong values.
    [SPACE]   Print to check the result with proper values.
    [RETURN]   Quit the operation and return to the Adjustment and Check menu.
    [ESC]   Return to the Adjustment and Check menu without changing the current values.

8. Perform one of the followings:
    ❏ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
    ❏ Select other adjustment using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)

9. Move the cursor using ↑ or ↓ key to select **"E.END"** and press "Return" key to exit the adjustment program.

⚠ CAUTION

❏ *Adjusted values are not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
❏ *The set values are transferred to the printer when this adjustment is executed. Therefore do not turn off the printer before executing* ***"Gap"***.

Start

Select "4. Gap" from the adjustment program.

The printer prints the adjustment pattern in the LQ and SLQ modes.

Is the head gap OK? — No

Yes

Press "Return" key.

End

What does the pattern show?

Gap Width

Change the value using ↓ key.

Change the value using ↑ key.

Is the value correct? — Yes

No

Press "Space" key to print.

Press "0" key to correct the value.

The printer prints another adjustment pattern in the LQ and SLQ modes.

Is the head gap OK? — No

Yes

Figure 4-7. Head Gap Adjustment Flowchart

4.1.7 Uni-D Adjustment

This is required when the CR unit or CR motor is replaced or removed. You perform this operation to adjust the deviation occurs between lines printed in the Uni-D mode.

1. Connect the printer and the host computer with a parallel interface cable.

2. Start the adjustment program in the host computer.

3. Input the market code. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.

5. Move the cursor using ↑ or ↓ key to select **"5. Uni-d"**. Then press "Return" key, and the printer prints the Uni-d adjustment pattern in the draft mode.

6. Follow the flowchart in Page 4-13 to align the black lines continuously by making the deviation width less than 1/2 of the line width.

7. After making an adjustment, press one of the following keys:
[0]	Correct the input values.
[SPACE]	Print to check the result with the input values.
[RETURN]	Quit the operation and return to the Adjustment and Check menu.
[ESC]	Return to the Adjustment and Check menu without changing the current values.

8. Perform one of the followings:
   - ❑ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
   - ❑ Select other adjustment using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)

9. Move the cursor using ↑ or ↓ key to select **"E.END"** and press "Return" key to exit the adjustment program.

⚠ **CAUTION**

❑ *Adjusted value is not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
❑ *The set values are transferred to the printer when this adjustment is executed. Therefore do not turn off the printer before executing **"Uni-d"**.*

Start

Select "5. Uni-d" from the adjustment program.

The printer prints the Uni-D adjustment pattern in the draft mode.

Is Uni-D OK?

No

Yes

Press "Return" key.

End

What does the pattern show?

Change the value using "↓" key.

Change the value using "↑" key.

Gap Width

Is the value correct?

Yes

No

Press "Space" key to print.

Press "0" key to correct the value.

The printer prints another Uni-D adjustment pattern in the draft mode.

Is Uni-D OK?

No

Yes

Figure 4-8. Uni-D Adjustment Flowchart

4.1.8 Bi-D Adjustment

This is required when the CR unit or CR motor is replaced or removed. You perform this operation to adjust deviation occurs between lines printed in Bi-directional mode.

1. Connect the printer and the host computer with a parallel interface cable.

2. Start the adjustment program in the host computer.

3. Input the market code. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"2. Adjustment & Check"** from the Main menu. Then press "Return" key, and the Adjustment & Check menu appears.

5. Move the cursor using ↑ or ↓ key to select **"6. Bi-d"**. Then press "Return" key, and the printer prints the Bi-D adjustment pattern in the LQ and draft modes.

6. Follow the flowchart in Page 4-15 to align the lines continuously by making the gap width as follows:
   LQ mode: Less than 1/3 of the line width
   Draft mode: Less than 1/2 of the line

7. After making an adjustment, press one of the following keys:
   [0]   Correct the input values.
   [SPACE]   Print to check the result with the input values.
   [RETURN]   Quit the operation and return to the Adjustment and Check menu.
   [ESC]   Return to the Adjustment and Check menu without changing the current values.

8. Perform one of the followings:
   ❑ Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the Main menu.
   ❑ Select other adjustment using ↑ or ↓ key to and press "Return" key to make the selected adjustment. (Select **R.Return** using ↑ or ↓ key to and press "Return" key to return to the main menu when all necessary adjustments are done.)

9. Move the cursor using ↑ or ↓ key to select **"E.END"** and press "Return" key to exit the adjustment program.

⚠ CAUTION

❑ *Adjusted value is not stored in the EEPROM until the printer is turned off. Therefore be sure to turn off the printer once after the adjustment program is executed.*
❑ *The set values are transferred to the printer when this adjustment is executed. Therefore do not turn off the printer before executing **"Bi-D"**.*
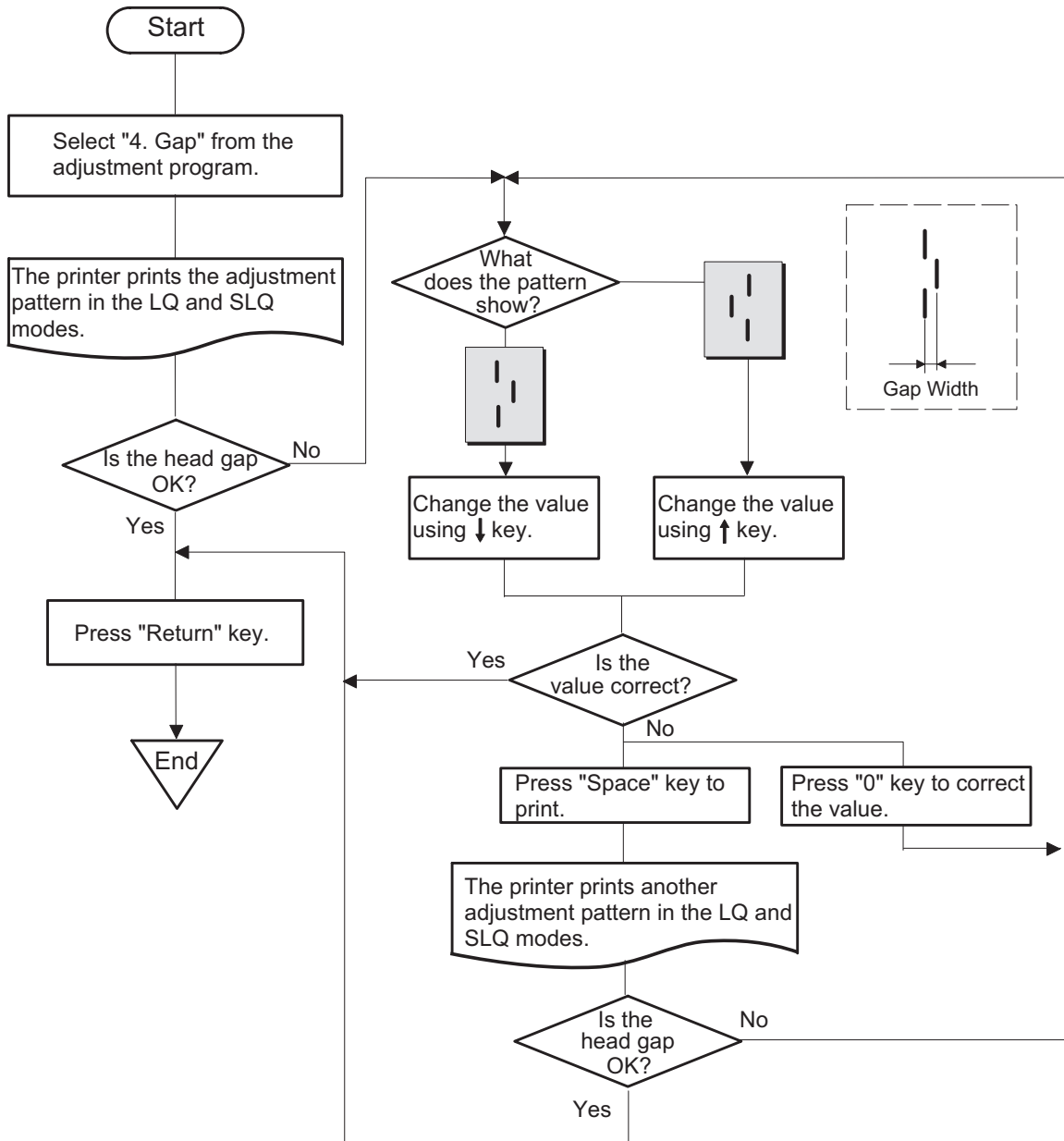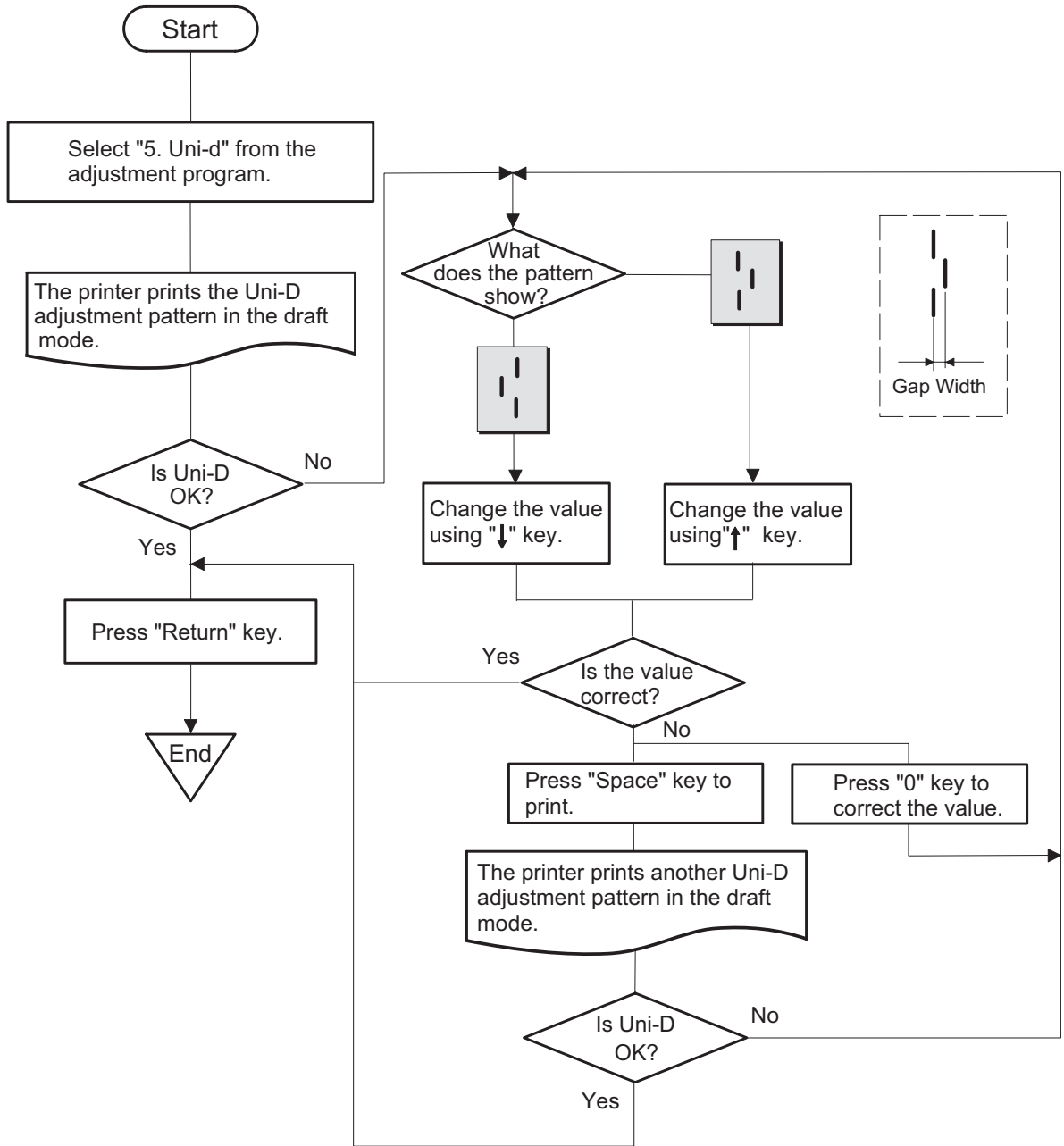
Figure 4-9. Bi-D Adjustment flowchart

4.1.9 Sensor Check

This operation is performed to store several values in the EEPROM. The values and the sensors used are as follows:

❑ Value used as the basis for the detecting paper quantity remaining in ASF. PQ sensor attached to the right edge guide in ASF is used.

❑ Value used as the basis for the detecting paper width and the following sensors are used:.
    ASF PW (Paper Width) sensor attached to the left edge guide in ASF
    CR PW sensor attached to the right side of the CR unit.
    PL (Paper Length) sensor attached to the lower housing.

This must be performed whenever the main control board or the CR unit is replaced. Follow the step 1 to 4 to enter the Sensor check menu.

1. Connect the printer and the host computer with a parallel interface cable.

2. Start the adjustment program in the host computer.

3. Input the market code. (Refer to Section 4.1.2.)

4. Move the cursor using ↑ or ↓ key to select **"3. Sensor Check"** from the Main menu. Then press "Return" key, and the Sensor Check menu appears.

```
  < 3. Sensor Check >
1. CR-PWS
2. ASF Quantity
3. ASF-Width
4. ASF Length
5. PG
R. Rerturn
```

⚠ CAUTION
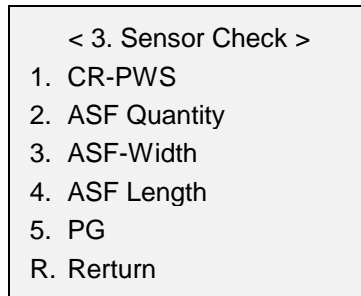
❑ *Don not set any paper or tool unless instructed.*

❑ *If any sensor does not function properly, all LED indicators blink. In that case, check the connection of the sensors and the main control board.*

4.1.9.1 PQ Sensor Adjustment

⚠ **CAUTION**

❏ *Follow the steps exactly in the way instructed. Otherwise the fatal error will occur.*
❏ *Inaccuracy in this adjustment does not guarantee the proper operation of the printer.*

1. Enter the **"Sensor Check"** menu. (See Section 4.1.9.)

2. Move the cursor using ↑ or ↓ key to select **"1.CR-PWS"** and press "Return key.

3. Move the cursor using ↑ or ↓ key to select **"2. ASF Quantity"**. and press "Return" key.

4. Remove paper and press "Return" key.

5. Set a stack of paper * or the paper quantity detective adjust tool on the right edge guide in the ASF. Then press "Return" key, and the Sensor check menu appears.
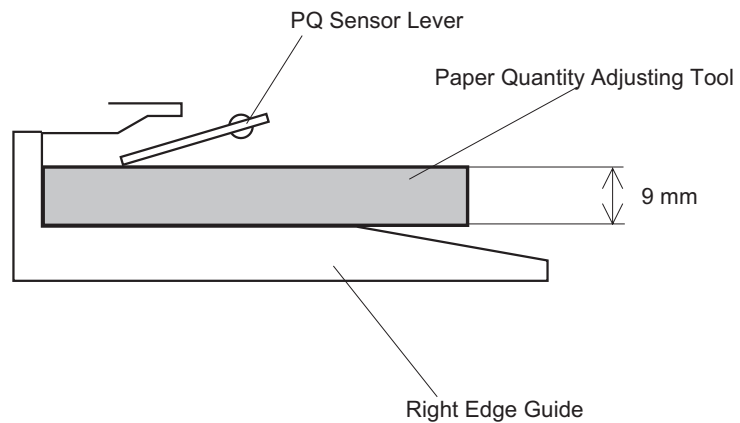
Figure 4-10. Setting the Paper Quantity Detective Adjust Tool

Note)   Stack of paper: With a thickness of 9 mm to 9.1 mm or approximately 100 sheets of 64-g paper (17-lb. paper)

4.1.9.2 ASF PW Sensor Adjustment

⚠CAUTION

❏ *Follow the steps exactly in the way instructed. Otherwise Fatal error will occur.*
❏ *Inaccuracy in this adjustment does not guarantee the proper operation of the printer.*

1. Enter the **"Sensor Check"** menu. (See Section 4.1.9.)

2. Move the cursor using ↑ or ↓ key to select **"3. ASF-Width"** and press "Return" key.

3. Move the right and left edge guides to the right and left ends, respectively; then press "Return" key.

4. Move the right edge guide back to the locking position and adjust the left edge guide to the right edge guide; then press "Return" key.

5. Move the left edge guide to the left end.

6. Place the paper width detective position tool (A4 In) on the right edge guide and move the left edge guide back to adjust it to the tool, as shown in Figure 4-11. Then press "Return" key.

Right and Left Edge Guides

A4 (portrait)
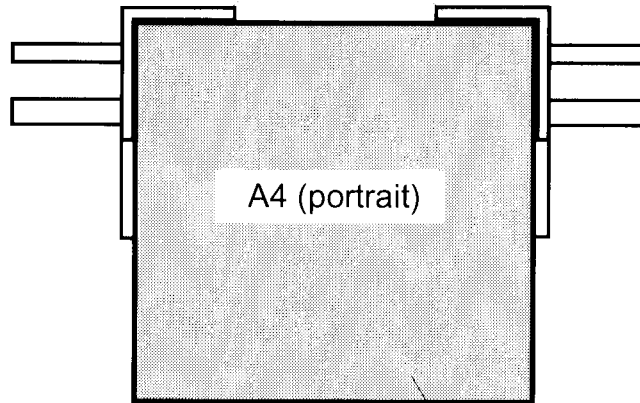
Paper Width Detective Position Tool (A4 In)

Figure 4-11.
Placing the PW Sensor Detective Position Tool

7. Place the paper width detective adjust tool (A4 Out) over the right and left edges and adjust the left edge guide to the left side of the tool, as shown in the figure below. Then press "Return" key, and the Sensor Check menu appears.
    Note) *Another procedure for the step 7 is as follows:*
    Keep the status as it is in the step 6 and press "Return" key.

Right and Left Edge Guides   Papr Width Detective Position Tool (A4 Out)
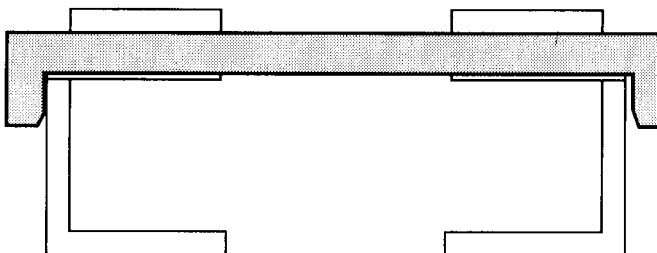
Figure 4-12.
Placing the PW Sensor Detective Position Tool

4.1.9.3 Paper Length Sensor Adjustment

⚠ **CAUTION**

❏ *Follow the steps exactly in the way instructed. Otherwise Fatal error will occur.*
❏ *Inaccuracy in this adjustment does not guarantee the proper operation of the printer.*

1. Enter the **"Sensor Check"** menu. (See Section 4.1.9.)

2. Move the cursor using ↑ or ↓ key to select **"4. ASF-Length"** and press "Return" key.

3. Set the right edge guide to the locking position and place a Letter-size paper or letter size tool with the longer side adjusted to the right edge guide. Then adjust the left edge guide to the paper/tool, as shown in the figure below.

4. Put the rear edge guide up and adjust it to the rear edge of the paper, then press "Return" key.

5. Remove the paper/tool and push the rear edge guide and put it down to the position.

6. Place a B4-size paper or B4 size tool with the longer side of the paper/tool adjusted to the right edge guide, then adjust the left edge guide to the paper/tool, as shown in the figure below.

Right and Left Edge Guides

Letter-size paper (portrait) (279.4 mm x 215.9 mm)

Rear Edge Guide (Up)
Letter -size Paper or the Letter-size tool.
Paper Tray Extension

Right and Left Edge Guides

B4-size paper (portrait) (364 mm x 257 mm)

Rear Edge Guide (Down)
B4 -size Paper or the B4-size tool.
Paper Tray Extension (Out)
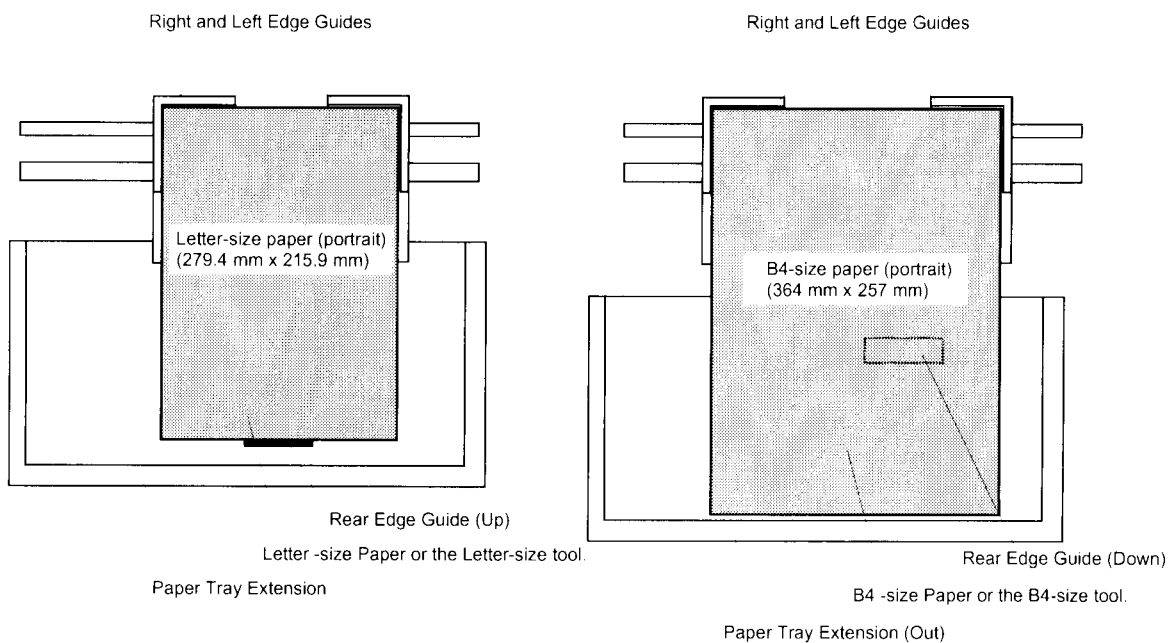
Figure 4-13. Setting the Letter/B4 Size Tool

7. Adjust the paper tray extension to the rear edge of the paper. Then press "Return" key, and the Sensor Check menu appears on the monitor.

8. Remove the paper/tool.

4.1.9.4 PG Adjustment

1. Enter the **"Sensor Check"** menu. (See Section 4.1.9.)

2. Move the cursor using ↑ or ↓ key to select **"5. PG"** and press "Return key.

3. Set the PG adjust lever to the front (+) and press "Return" key.

4. Set the PG adjust lever to the rear (-). Then press "Return" key, and the Sensor Check menu appears.

5. Select **R. Return.** Then press "Return" key, and the Main menu appears.

6. Select **E. END** to exit the program.

Chapter 5
Toubleshooting

5.1 General Description

This section describes procedures for isolating the failure unit in 2 levels; unit level troubleshooting and the component level troubleshooting. Refer to the flowchart below to isolate the defective unit and perform repair at the component level. Table 5-1, Table 5-2 and Table 5-3 show the coil resistance for the motors, sensor status , and error codes and error condition, respectively.
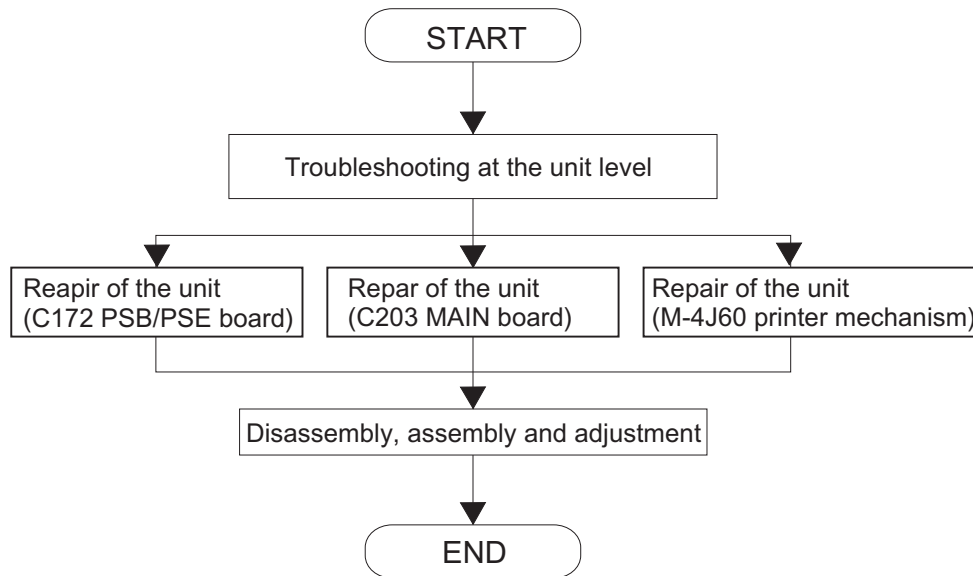
Figure 5-1. Troubleshooting Flowchart

Table 5-1. Coil Resistance for the Motors

Motor	Connector No.	Test pin No.	Test method (Set the multimeter to Ohms. Be sure to unplug the power cable from the AC inlet and disconnect the harnesses from the MAIN board.)	Meter reading
CR (Carriage) motor	CN22	Pin 1 and Pin 2 or Pin 3 and Pin 4	Place one lead to the Pin 1 and the other to the Pin 2, then check the coil resistance per phase.	5 Ω ± 7 % (at 25••, per phase)
Pump Motor	CN20	Pin 1 and Pin 2 or Pin 3 and Pin 4	Place one lead to the Pin 1 and the other to the Pin 2 and check the coil resistance per phase.	7.7 Ω ± 10 % (at 25 °C per phase)
PF (Paper Feed) motor	CN15	Pin 1 and Pin 3 or Pin 2 and Pin 4	Place one lead to the Pin 1 and the other to the Pin 2 and check the coil resistance per phase.	10 Ω ±10 % (at 25 °C per phase)

Table 5-2. Sensor Status

Sensor	Connector No. Test pin No.	Signal level	Detected condition
HP sensor	CN6	Close *1	In the false absorbing position
	Pin 1 and Pin 2	Open *2	Off the false absorbing position
Rear PE sensor	CN5	HIGH	Paper loaded
	Pin 1 and Pin 2	LOW	No paper loaded
Front PE sensor	CN4	HIGH	Paper loaded
	Pin 1 and Pin 2	LOW	No paper loaded
Release sensor	CN3	HIGH	Tractor feed mode
	Pin 1 and Pin 2	LOW	Friction feed mode
Black ink cartridge sensor	CN14	HIGH	No black ink cartridge installed
	Pin 3 and Pin 4	LOW	Black ink cartridge installed
Cyan ink cartridge sensor	CN13	HIGH	No cyan ink cartridge installed
	Pin 3 and Pin 4	LOW	Cyan ink cartridge installed
Magenta ink cartridge sensor	CN7	HIGH	No magenta ink cartridge installed
	Pin 3 and Pin 4	LOW	Magenta ink cartridge installed
Yellow ink cartridge sensor	CN12	HIGH	No yellow ink cartridge installed
	Pin 3 and Pin 4	LOW	Yellow ink cartridge installed
Black ink end sensor	CN14	HIGH	Black Ink end
	Pin 1 and Pin 2	LOW	Black Ink remaining
Cyan ink end sensor	CN13	HIGH	Cyan Ink end
	Pin 1 and Pin 2	LOW	Cyan Ink remaining
Magenta ink end sensor	CN7	HIGH	Magenta Ink end
	Pin 1 and Pin 2	LOW	Magenta Ink remaining
Yellow ink end sensor	CN12	HIGH	Yellow Ink end
	Pin 1 and Pin 2	LOW	Yellow Ink remaining
ASF PW sensor	CN8 Pin 2 and Pin 4	Analog data	Maximum 10kΩ
ASF PL sensor	CN11	HIGH	Not set
	Pin 1 and Pin 2, Pin 3 and Pin 4, Pin 5 and Pin 6	LOW	Set
ASF PQ sensor	CN10 Pin 3 and Pin 2	Analog data	Maximum 10kΩ
Platen gap sensor	CN9	HIGH	Thick paper side
	Pin 1 and Pin 2	LOW	Thin paper side
CR PW sensor	CN21	HIGH	Paper detected
	Pin 24 and Pin 25(GND)	LOW	No paper detected
Thermistor	CN18 Pin 2 and GND	Analog data	Maximum 10kΩ (at 24°C)

∗1: When it is close, output voltage level is 2.5V or higher.
∗2: When it is open, output voltage level is lower than 2.5V.

Table 5-3. LED Error Status and Solutions

Printer Status	Power	Pause	Paper Out	Ink End	Media Type	Solution
Power on	On	—	—	—	—	—
Data proceeding	Blinks	—	—	—	—	—
Paper Out	—	—	On	—	—	After loading paper, press the Pause button and then press the Load/Eject button.
Paper Jam	—	—	Blinks	—	—	After removing paper, press the Pause button and then press the Load/Eject button.
Print ready	—	On	—	—	—	—
During ink sequence	—	Blinks	—	—	—	—
No cartridge or ink end	—	—	—	On *1	—	Replace the ink cartridge.
Ink low	—	—	—	Blinks*1	—	Have a new cartridge ready.
Fatal error	Blinks	—	—	—	—	Turn off and back on the printer.
Release lever error	—	—	—	—	Blinks	Set the lever back to the previous position and eject the loaded paper. Then set the lever to the appropriate position for the selected type of paper.
Maintenance requested	Blinks	Blinks	Blinks	On*2	Blinks	Replace the waste ink drain pads and perform EEPROM reset. (See Section 1.4.3 and Section 3.2.9.)
Reset, Timer IC reset, EEPROM Clear	All go on for 1 second.					—

*1: Corresponding Ink End LED indicator goes on.
*2: All Ink End LED indicators go on.

5.2 Unit Level Troubleshooting

This section provides flowcharts which enable you to isolate the defective unit. Once the defective unit is identified by following the corresponding chart, proceed to Section 5.3 to identify more specific part to be replaced at the component level.

Table 5-4. Symptom and Problem

Symptom	Problem	Flowchart No.
The printer does not operate at all.	▪ No LED indicator lights up. ▪ The printer mechanism does not operate at all.	1
An error is indicated.	▪ An error is indicated by LED indicators.	2
Printing operation is abnormal.	▪ The printer does not print. ▪ Abnormal printing occurs. ▪ Print quality is poor.	3
Paper is fed abnormally.	▪ The printer feeds paper abnormally. ▪ Paper is jamming. ▪ The top edge of the loaded paper is improperly positioned.	4
Control panel operates abnormally.	▪ Button operation has no affect on the printer.	5

1. The printer does not operate at all.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                          │
                          ▼
                   ╱─────────────╲          NO      ┌──────────────────┐
                  ╱  Is the AC     ╲───────────────▶│  Apply the correct│
                  ╲  input voltage ╱                │  AC input voltage.│
                   ╲  correct?    ╱                 └──────────────────┘
                    ╲────────────╱
                       │ YES
                       ▼
                   ╱─────────────╲     YES   ┌──────────────────────┐
                  ╱   Has the      ╲────────▶│ Replace the fuse and │
                  ╱   fuse (F1) on  ╲        │ disconnect the connector
                  ╲   PSB/PSE board ╱        │ cable from the CN2 on │
                  ╲   blown?       ╱         │ PSB/PSE board.       │
                   ╲─────────────╱          └──────────────────────┘
                       │ NO                              │
                                    NO    ╱──────────────╲
                       │◀───────────────╱  Does the      ╲
                       ▼                 ╲  fuse blow again╱
         ┌─────────────────────┐         ╲  at power on?  ╱
         │ Check the voltage level│       ╲──────────────╱
         │ output from the CN2 on │           │ YES
         │ PSB/PSE board.         │
         └─────────────────────┘
                       │
                       ▼
                   ╱─────────────╲      NO
                  ╱ Is the voltage ╲──────────────────────────┐
                  ╲ correct?       ╱                          │
                   ╲─────────────╱                            │
                       │ YES                                  ▼
                       ▼                          ┌──────────────────┐
         ┌─────────────────────┐                 │ Replace the PSB/PSE│
         │ Replace the MAIN board.│              │ board.            │
         └─────────────────────┘                 └──────────────────┘
                       │
                       ▼
                   ╱─────────────╲      NO
                  ╱ Is the problem ╲──────────┐
                  ╲ corrected?     ╱          │
                   ╲─────────────╱            ▼
                       │ YES       ┌──────────────────────┐
                       │           │ Check the motor and  │
                       │           │ driver circuits.     │
                       │           │ (Refer to Section 5.5.)│
                       │           └──────────────────────┘
                       ▼◀──────────────────┘
                    ▽ END ▽
```

Figure 5-2. Flowchart (1)

2. An error is indicated.

```
                    ┌──────────────┐
                    │    START     │
                    └──────────────┘
                           │
                           ▼
        ┌─────────────────────────────┐
        │ See Table 5-3 to identify   │
        │ the error type.             │
        └─────────────────────────────┘
                           │
                           ▼
```

Is it "Fatal error"? — YES → Turn off the printer and move the carriage manually. → Does it move smoothly? — NO → Proceed to Section 5.5 " Repair of the printer mechanism ".

Does it move smoothly? — YES → Check the CR motor and drivers. If they are normal, replace the MAIN board. → Is the problem corrected? — YES → Does the error still occur?

Is the problem corrected? — NO → Proceed to Section 5.5 " Repair of the printer mechanism ". → END

Is it "Fatal error"? — NO

Is it "No ink cartridge error" or "Ink low error"? — YES → Replace the ink cartridge with a new one. → Does the error still occur?

Is it "No ink cartridge error" or "Ink low error"? — NO

Is it "Release lever error"? — YES → Reset the release lever and check if any paper is loaded in the printer. → Does the error still occur?

Is it "Release lever error"? — NO

"Maintenance error" has occurred.

Replace the Ink drain pads and then reset the EEPROM. (Refer to Section 1.5.1 and Section 3.2.9.)

Does the error still occur? — YES → Check the ink cartridge sensor or release sensor. If they are defective, replace them. → END

Does the error still occur? — NO → END

Figure 5-3. Flowchart (2)

3. Printing operation is abnormal.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                    ┌─────────────────┐
                    │ Run the "Self-test". │
                    └─────────────────┘
                           │
                    ◇ Does the "Self ──── NO ────────┐
                      test" print? ◇                 │
                           │                          │
                         YES                    ◇ Are all
                           │                      connector ──── YES ──┐
                    ◇ Is the               cables connected to          │
                      printing result ─ NO ─┐  the main board          │
                      abnormal? ◇          │   properly? ◇             │
                           │               │        │                  │
                         YES               │       NO                  │
                           │               │        │                  │
                ┌──────────────────┐  ┌──────────────┐  ┌───────────────────┐
                │ Repeat cleaning  │  │ Perform       │  │ Connect them      │
                │ sequence or      │  │ adjustments.  │  │ properly.         │
                │ perform initial  │  │ (Refer to     │  └───────────────────┘
                │ ink charge       │  │ Chapter 4.)   │        │
                │ operation.       │  └──────────────┘  ◇ Is the problem ─ YES ┐
                └──────────────────┘        │            corrected? ◇          │
                           │◄───────────────┘                 │                │
                           │                                 NO                │
                    ◇ Is the problem ─ NO ─┐                  │                │
                      corrected? ◇         │                  │◄───────────────┘
                           │               │         ┌───────────────────────┐
                         YES               │         │ Check the motors,     │
                           │        ┌──────────────┐ │ drivers, and          │
                           │        │ Proceed to   │ │ printheads.           │
                           │        │ Section 5.5  │ │ If they are normal,   │
                           │        │ "Repair of   │ │ replace the main      │
                           │        │ the Printer  │ │ control board.        │
                           │        │ Mechanism".  │ └───────────────────────┘
                           │        └──────────────┘         │
                           │               │                 │
                           │        ◇ Is the problem ─ NO ────┤
                           │          corrected? ◇            │
                           │               │                  │
                           │             YES                  │
                           │◄──────────────┘                  │
                        ▽ END                              ▽ END
```
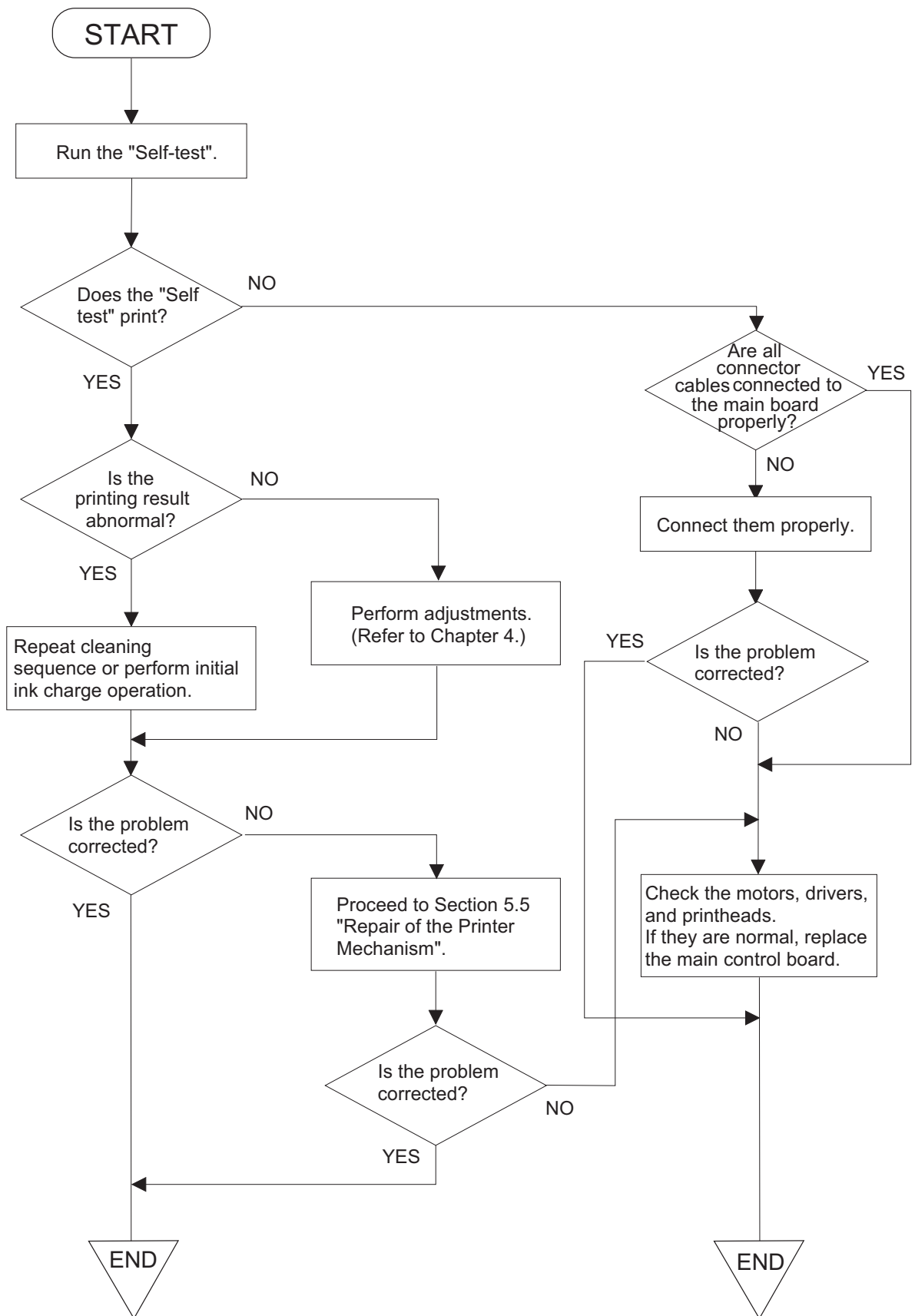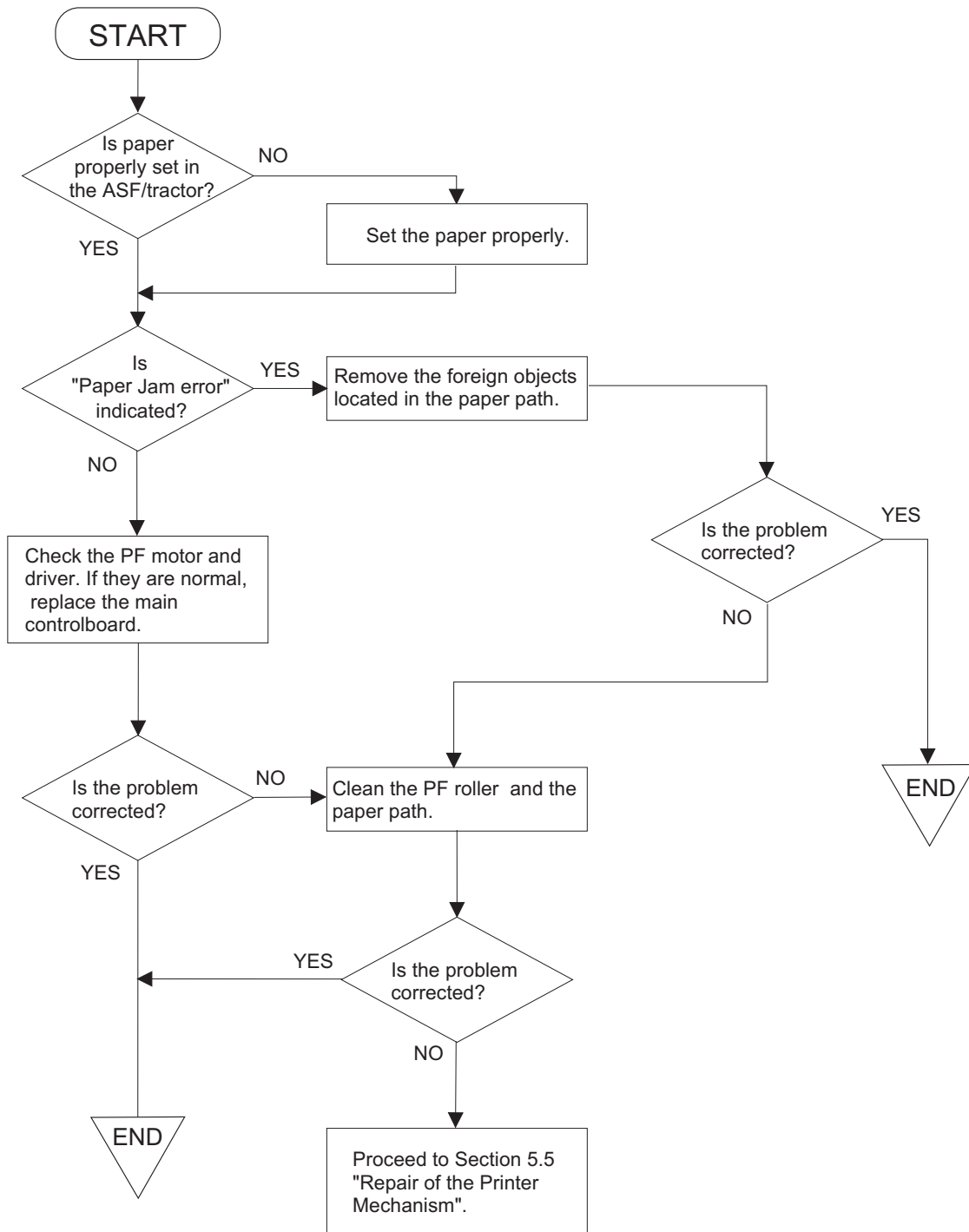
Figure 5-4. Flowchart (3)

4. Paper is fed abnormally.

Figure 5-5. Flowchart (5)

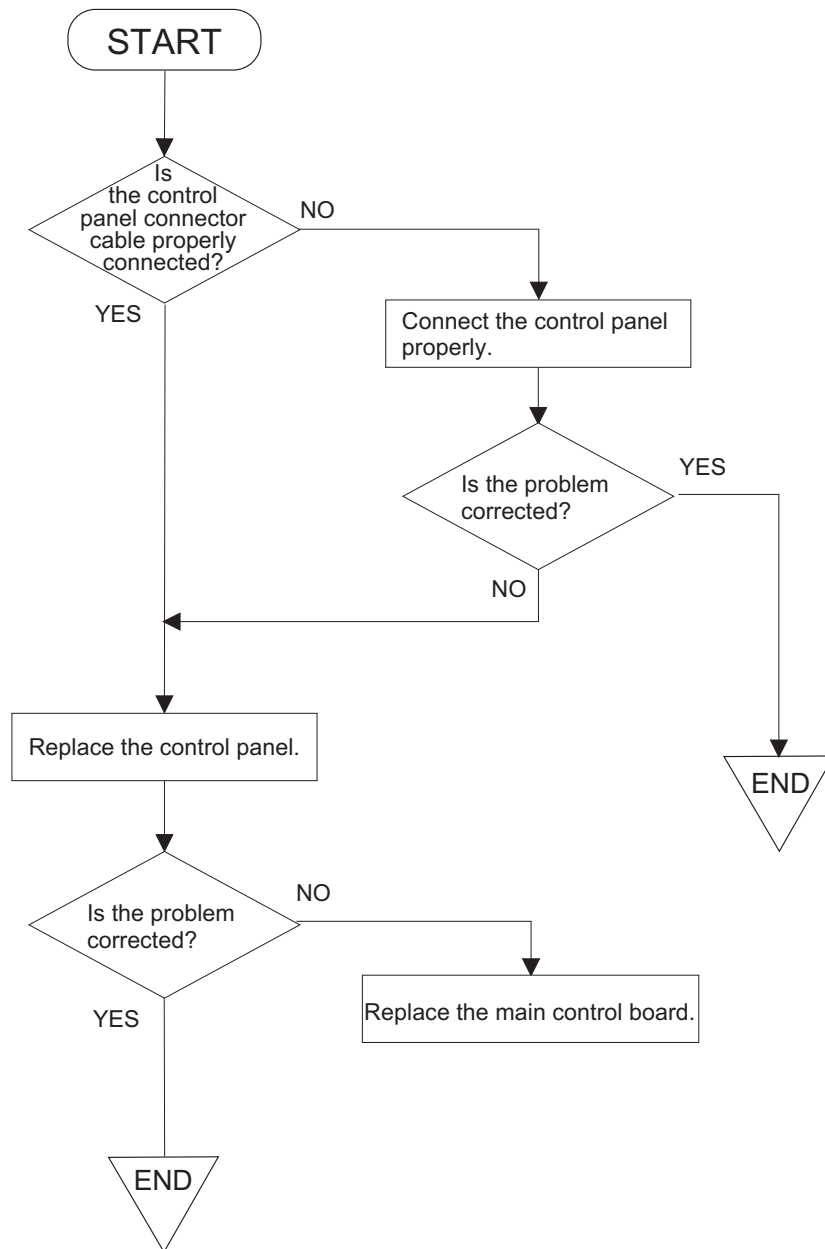## 5. The control panel operates abnormally.

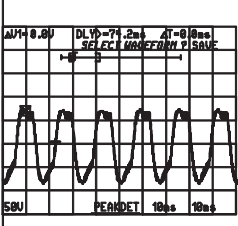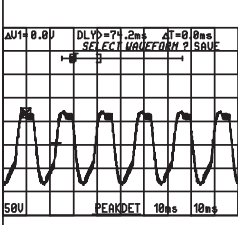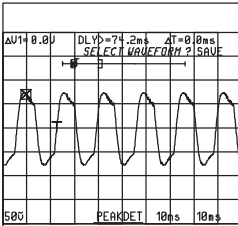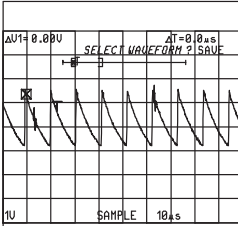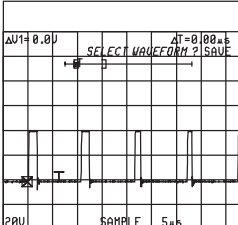**Figure 5-6. Flowchart (5)**

5.3 Repair of the C172 PSB/PSE Board at Component Level

This section contains information which enables you to repair and replace the components on the electrical board (C172 PSB/PSE). Table 5-5 lists the potential causes for each symptom in order of possibility, with which you are able to find and repair the defective part.

Table 5-5. Component Repair of the C172 PSB/PSE Board

Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	+42 VDC is not output.	Fuse (F1) is open.	Check visually if the fuse is good.	Replace the fuse F1.
		Transformer (T1) is open.	Check the transformer using a multimeter.	Replace the transformer T1.
		Q1 is dead.	Check the waveform at drain. Waveform (1)	Replace the Q1.
		Q2 or Q3 is dead.	Check the waveform at corrector. Waveform (2)	Replace the Q2 or Q3.
		PC1 is dead.	Check the voltage in lowering at the Pin 5 or 7. Waveform (3)	Replace PC1.
	+5 VDC is not output.	L4962 is dead.	Check the reference waveform at the Pin 5. Waveform (4) Check the output waveform at the Pin 7. Waveform (5)	Replace the L4962.

5.4 Component Repair of the C203 MAIN Board

This section provides information which enables you to repair and replace defective components on the C203 MAIN board. Table 5-6 and 5-7 lists the causes for each symptom in order of possibility, with which you are able to find and repair the defective part.

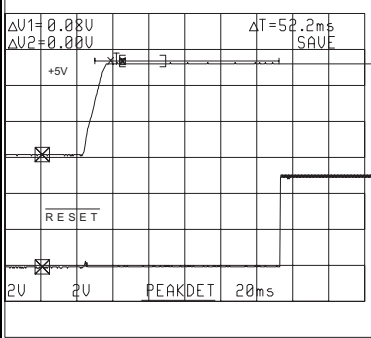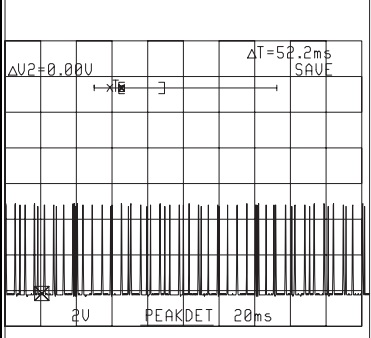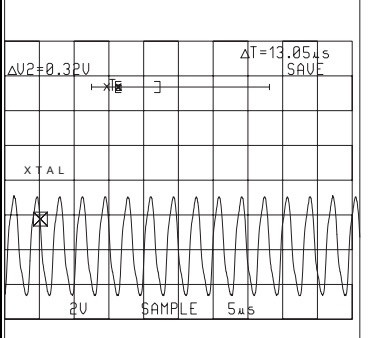**Table 5-6. Component Repair of the C211 MAIN Board**

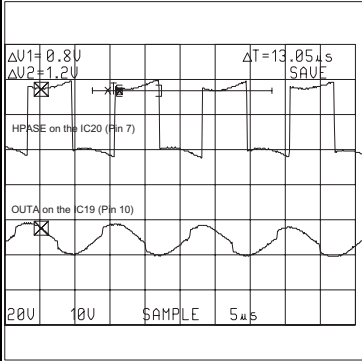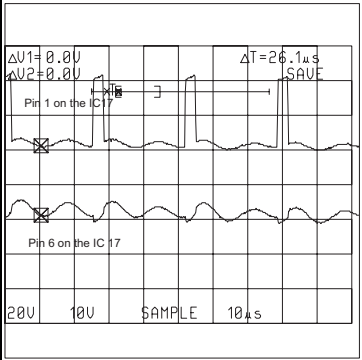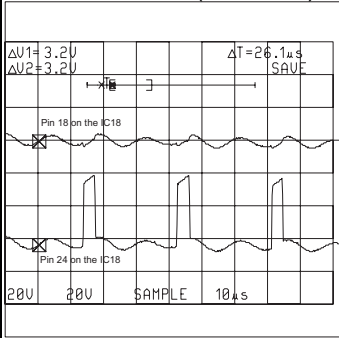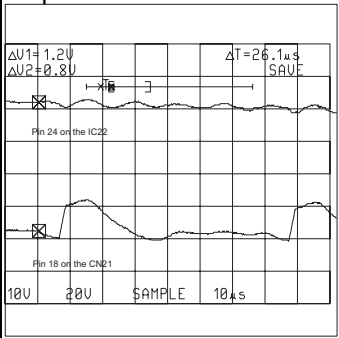| Condition	Cause	Checkpoint	Solution
	Symptom : The printer does not operate at all.		

CPU doesn't operate. (The driver mechanism doesn't operate properly at power on/off.)	Reset circuit is defective.	Check the following signals for the waveforms:
		    IC9:/RESET (Pin 1), V line (Pin 3)
		    IC3:OUT (Pin 6), 42 V line (Pin 2)
		
		Waveform (6)
			Replace the MAIN board or the reset IC.

	Selection of ROM and sub gate array is improper.	Check the waveform for one of the following signals output from the CPU (IC5) for the change in the signal High and Low :
		    /CS0 (Pin 1), /CS1 (Pin 2),
		    /CS2 (Pin128), /CS3 (Pin 127)
		
		Waveform (7)
			Replace the MAIN board.

	CG-ROM or PROM is defective.		Replace the MAIN board or PROM.
	CPU is defective.	Check the waveform for one of the following signals output from the CPU (IC5): XTAL (Pin 85), EXTAL (Pin 86) Waveform (8)	Replace the MAIN board or CRU1.

Table 5-7. Component Repair of the C211 MAIN Board (continued))

Condition	Cause	Checkpoint	Solution
Symptom : CR does not operate normally.			
CR motor does not rotate normally.	Sub gate array IC16 is defective.	Check the waveform for the signals HPASEA/B (Pin 7) output from the IC19/20. △V1= 0.8V　△T=13.05µs △V2=1.2V　SAVE HPASE on the IC20 (Pin 7) OUTA on the IC19 (Pin 10) 20V　10V　SAMPLE　5µs Waveform (9)	Replace the MAIN board or IC16.
	CPU is defective.	—	Replace the MAIN board.
	IC19 or IC20 is defective.	Check the the CR drive waveform for the signals OUTA/B (Pin 10/15) output from the IC19/20. (See the waveform (9))	Replace the IC19 or IC20.
	CR motor is defective.	Check if the resistance of the motor coil is as follows; $5\Omega \pm 7$ % at 25°C per phase (Refer to Table 5-1.)	Replace the CR motor.
Symptom : The printer feeds paper abnormally.			
PF motor does not operate normally.	Sub gate array IC6 is defective.	Check the waveform for one of the following signals output from the IC17: PFA0/1 (Pin1/2) PFB0/1 (Pin 23/24) △V1= 0.0V　△T=26.1µs △V2=0.0V　SAVE Pin 1 on the IC17 Pin 6 on the IC 17 20V　10V　SAMPLE　10µs Waveform (10)	Replace the MAIN board.
	CPU is defective.	—	Replace the MAIN board.
	IC17 is defective.	Check the wavefoarms for one of the following signals output from the IC17: PFA0/1 (Pin 2/1) PFB0/1 (Pin 23/24) (Refer to the waveform (10).)	Replace the MAIN board.
	PF motor is defective.	Check if the resistance of the motor coil is as follows; $10\Omega \pm 10$ % at 25 °C (Refer to Table 5-1.)	Replace the PF motor.

Table 5-8. Component Repair of the C211 MAIN Board (continued))

Condition	Cause	Checkpoint	Solution
Symptom : The pump does not operate normally.			
The pump motor does not operate normally.	Sub gate array IC6 is defective.	Check the waveform for one of the following signals output from the IC18: PUA0/1 (Pin1/2) PUB0/1 (Pin23/24). Waveform (11)	Replace the MAIN board.
	IC18 is defective.	Check the waveform for one of the following signals from the IC18: A (Pin 6), /A (Pin 3) B (Pin 18) /B (Pin 21) (Refer to the waveform (11).)	Replace the MAIN board or IC18.
	The pump motor is defective.	Check if the resistance of the motor coil is as follows; 7.7 Ω ± 10 % at 25°C (Refer to Table 5-1.)	
Symptom : The printer does not perform Self-test.			
—	Sub gate array IC6 is defective.	Run the Self-test and check the waveforms for the signals SBDATA (Pin 24) and SCDATA (Pin 24) output from the IC22: Waveform (12)	Replace the MAIN board.
	CPU is defective.	—	Replace the MAIN board.
	Common driver IC 22 and IC23 are defective.	Check the common signal waveform output from one of the following pins: CN21:Pin 18, 19, or 20 CN18:Pin 20, 21 or 22 (Refer to the waveform (12).)	Replace the MAIN board or IC22 and IC23.
	Fuse is blown.	Check the continuity of the fuse F1 on the MAIN board.	Replace the MAIN board or the fuse.
	Printhead is defective.	—	Replace the printhead.

⚠ **CAUTION**

EEPROM must not be replaced alone.

5.5 Repair of the M-4J60 Printer Mechanism

This section provides information which allows you to repair and replace defective components of the M-4J60 printer mechanism. Table 5-8, 5-9, and 5-10 contain various symptoms and the corresponding causes listed in order of possibility. Find the symptom in the table and troubleshoot the problem as instructed.

Table 5-9 Repair of M-4I60 Printer Mechanism.

Condition	Cause	Checkpoint	Solution
Symptom : The CR unit moves abnormally.			
The CR unit moves abnormally at power on	Cleaner lever and CR are interfering with each other.	Check if the cleaner lever lock is released with the CR unit on the platen side.	Push the lever down manually to clear the lever of the CR route.
Symptom : The pump unit operates abnormally.			
The pump unit operates abnormally at power on.	Cam select assembly or cam change lever in the CR unit is defective.	Check if it is normally operating by performing cleaning and loading and ejecting paper using the control panel.	Replace the cam select assembly or cam change lever in the CR unit.
	The pump motor is defective.	Check if the resistance of the motor coil is as follows; 7.7 $\Omega \pm 10$ % at 25 °C per phase (Refer to Table 5-1.)	Replace the pump motor.
Symptom : Ink absorption is abnormal.			
Ink is does not drain into the ink drain pads normally. Cleaning is repeated, but it does not solve the dot missing problem.	Ink drain tube is caught in the cleaner lever in the pump unit.	Check if the tube is properly routed.	Route the tube properly.
	The tube is disconnected from the cap.	Check if the tube is securely connected.	Connect the tube securely.
	Ink drain tube is bent or damaged.	Check if the tubes in the pump unit and under the cap are bent or damaged.	Replace the pump unit.
	The cap is damaged.	Check if the cap is damaged.	Replace the pump unit.
	The pump unit is defective.	Rotate the pump manually and check if it rotates with constant resistance and check if it is damaged.	Replace the pump unit.
	The printhead is defective.	Check if signals are transferred to the printhead.	Replace the printhead.
Symptom : CR motor operates abnormally			
Abnormal rotation at power on.	Foreign objects are lodged in the CR mechanism.	Check visually if any foreign object is lodged.	Remove the foreign object.
	CR motor is defective.	Check if the resistance of the motor coil is as follows; 5Ω ± 7% at 25 °C per phase (Refer to Table 5-1.)	Replace the CR motor.
CR motor rotates, but the CR unit does not move.	The timing belt is damaged or disengaged.	Check if the timing belt is installed at the specified position in the CR unit.	Reinstall the timing belt properly.
		Check if the timing belt is bent, worn out or has a lack of some teeth.	Replace the timing belt.
	CR motor sub pulley is damaged.	Check if some teeth of the sub pulley broke off.	Replace the CR motor.

Table 5-10. Repair of M-4I60 Printer Mechanism(continued)

Condition	Cause	Checkpoint	Solution
Symptom : CR motor operates abnormally (continued)			
CR moves slightly at power on, then stops.	CR does not move smoothly.	Move the CR manually and check if it moves smoothly.	Clean and lubricate the CR guide shaft. (Refer to Chapter 6.)
		Check if the timing belt has appropriate tension.	Replace the tension spring or timing belt.
		Check if the platen gap is proper.	Adjust the platen gap. (Refer to Chapter 4.)
Symptom :The printer does not print.			
The CR moves normally, but no printing is performed.	The head FFC is disconnected from the printhead or MAIN board.	Check if the FFC is connected to the printhead and MAIN board.	Connect the FFC securely.
	The head FFC is damaged.	Check if there is continuity using the multimeter.	Replace the head FFC.
	The ink cartridge is defective.	Install a new cartridge and run the Self-test. (Because the user might have removed and reinstalled the cartridge several times.)	Replace the ink cartridge.
	The printhead is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the printhead and run the Self-test.	Replace the printhead.
Symptom : The printer prints abnormally.			
A particular dot causes abnormal printing constantly.	Ink is not ejected straight or dot is missing due to viscous ink.	Repeat cleaning sequence and run the Self-test.	Clean the printhead surface.
	The head FFC is disconnected from the printhead or MAIN board.	Check if the FFC is connected to the printhead and MAIN board.	Connect the head FFC securely.
	The head FFC is damaged.	Check if there is continuity using the multimeter.	Replace the head FFC.
	The printhead is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the printhead and run the self-test.	Replace the printhead.
Some dots don't print occasionally.	Ink is not ejected straight or dot is missing due to viscous ink.	Repeat cleaning sequence and run the Self-test.	Clean the printhead surface.
	The head FFC is disconnected from the printhead or MAIN board.	Check if the FFC is connected to the printhead and MAIN board.	Connect the FFC securely.
	The head FFC is damaged.	Check if there is continuity using the multimeter.	Replace the FFC.
	The printhead is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the printhead and run the Self-test.	Replace the printhead.
	Ink cartridge is defective.	Install a new cartridge and run the Self-test. (Because the user might have removed and reinstalled the cartridge several times.)	Replace the ink cartridge.

Table 5-11. Repair of M-4I60 Printer Mechanism(continued)

Condition	Cause	Checkpoint	Solution
Symptom : Abnormal printing (continued)			
Vertical lines don't align.	Bi-D is not properly adjusted.	—	Perform necessary adjustments. (Refer to Chapter 4.)
White banding problem occurs.	The printhead is defective.	Repeat cleaning at least 3 times and check if the condition is improved. If not, replace the printhead and run the Self-test.	Replace the printhead.
	Paper feed mechanism does not operate normally.	—	Replace the PF motor.
Outline of the image is not clear. Color inks don't print properly.	Head angular is not properly adjusted.	—	Perform necessary adjustment. (Refer to Chapter 4.)
	Head gap is not properly adjusted.	—	Perform necessary adjustment. (Refer to Chapter 4.)
	Black and color printheads are not vertically aligned.	—	Perform necessary adjustment. (Refer to Chapter 4.)
	The printhead is defective.	—	Replace the printhead.
Symptom : Paper is fed abnormally.			
Paper is not fed.	Foreign objects are lodged in the edge guide, PF roller, paper guide unit, or paper eject drive unit.	Turn the knob and check if the paper feed mechanism is normally functioning.	Remove the foreign objects.
	The PF motor is defective.	Check if the resistance of the motor coil is as follows; 10 Ω ± 10% at 25 °C per phase (Refer to Table 5-1.)	Replace the PF motor.
The top edge of the loaded paper is not properly positioned.	The PF roller surface has micro pearl of the glossy film and doesn't grip paper properly.	Check if micro powder is remaining on the PF roller.	Clean the PF roller.
Symptom : The printer detects paper size incorrectly.			
The printer prints beyond the printing area.	CR PW sensor is defective.	Load the paper and check the Pin 24 and Pin 25 on the CN21 for the change in the signal HIGH and LOW.	

Chapter 6
Maintenance

6.1 Cleaning

This chapter provides information on how to maintain this printer. This printer is basically designed to require no cleaning. It is, however, preferable to perform cleaning to preserve its function and printing performance in the optimum condition for a long period of time. Therefore be sure to perform occasional cleaning described in the following sections.

⚠ WARNING

☑ *Be sure to unplug the power cable from the AC power inlet before cleaning the printer.*

☑ *Be careful not to get ink in your eyes. In case ink gets in your eyes, wash it away with fresh water and see a doctor.*

☑ *Follow the instructions below when handling the lithium battery installed on the C211 MAIN board.*
   1.Keep the battery away from any metal materials.
   2.Ensure to mount the battery in the right direction. Otherwise it may result in explosion.
   3.Do not heat up or burn the battery

⚠ CAUTION

☑ *Never apply thinner, trichloroethilene, and toner-based solvents. Use of a soft and dry cloth is recommended. In case stain adheres, use a cloth dumped with mild detergent.*

☑ *Do not use a hard brush for cleaning so as cases won't be scratched.*

☑ *Be careful not to damage any interior parts when cleaning inside the printer.*

⚠ CAUTION

☑ *When transporting the printer, be sure to remove the ink cartridges and lock the CR unit.*

☑ *ASP printer mechanism is not lubricated. Therefore be sure to apply lubricants to paper eject frame when replacing it.*

6.2 Service Maintenance

When an abnormal printing or the maintenance request error occurs, perform maintenance service described below.

6.2.1 Head Cleaning

In case abnormal printing occurs, you can enter the printhead cleaning mode through the control panel operation. Also, to keep the printer in the best condition, the printer automatically selects the cleaning level (including flushing) and carries it out even while printing. Follow the steps below to enter the printhead cleaning mode.

1. Press "Pause" button to put the printer into the off-line status. (Pause LED goes off.)
2. Clean the black or color printhead by pressing the corresponding "Cleaning" button. (The printer goes back to the off-line status when the cleaning completes.)
3. Press "Pause" to put the printer back to the stand-by status.

⚠**CAUTION**

☑ *Do not perform forcible cleaning unless the printing result is obviously abnormal.*

☑ *Excessive cleaning may shorten the cartridge life.*

6.2.2 Maintenance Request

This printer counts the amount of ink absorbed from the ink cartridges to monitor the capacity of the ink drain pads. When the ink drain pads are close to capacity, the maintenance request error is indicated. While the printer is in this status, the printer stops accepting printing data from the host and every operative signal except for the power on/off signals sent from the control panel. In this case, perform EEPROM reset operation. (Refer to Chapter 1.)

⚠**CAUTION**

☑ *Be sure to replace the waste ink drain pads when performing EEPROM reset. (Refer to Chapter 3)*

6.3 Lubrication and Adhesive

Use of lubricant and adhesive has a considerable affect on the performance and durability of the printer. Especially, lubrication at low temperatures requires appropriate selection of the lubricant. Therefore, be sure to apply adequate lubricant and adhesive specified by EPSON based on the analysis of technical information and result from the experimental use of lubricants and adhesives in wide range. Note the followings:

❑ Clean the lubrication point before lubricating.
❑ Lubricate the printer periodically according to the specification.
❑ Additional cleaning is also needed after cleaning, disassembling and assembling the printer.
❑ Adhere the specified parts when assembling the printer or replacing the parts. Be sure to use adequate amount of adhesive and dry it thoroughly since overflow of surplus adhesive may cause malfunction to nearby parts.

⚠ CAUTION

The lubricants and adhesives specified for this printer are selected based on the evaluation on the condition that they are used for this printer. Therefore never apply items which are not listed since use of other items may result in short printer life and poor printer performance.

Table 6- 1. Recommended Lubricants

Type	Product name	Content	Part code	Applicability
Grease	G-26	40 g	B702600001	EPSON-exclusive product
Oil	O-8	40 g	1019753	EPSON-exclusive product
Adhesive	NEJI lock B1401B	1000 g	B730200200	EPSON-exclusive product

Table 6- 2. Lubrication Points and Application

Reference No.	Lubrication Points	Quantity

1	Front paper guide assembly
	    – Installation sockets for PF roller and paper eject roller
	    – Mounting shaft for the gear (11.5)
		G-26 (3-5 g)

2	Shaft in the paper eject roller assembly	G-26 (3-5 g)
3	Paper eject drive unit – Points where the PR roller shaft slides.	G-26 (3-5 g)

4	Base frame assembly
	    – Installation hole where the tractor release shaft is inserted
	    – 5 points where the tractor release shaft slides
		G-26 (3-5 g)

5	Base frame assembly – Contact points with the CR motor unit	G-26 (3-5 g)
6	2 oil pads in the CR unit and the CR shaft	O-8 (0.63 - 0.65 ml)
7	CR guide shaft	O-8 *(Evenly and thinly over the whole shaft surface)*
8	Slope on the tractor release cam	G-26 (3-5 g)
9	8 points on the top edge of the paper eject frame	G-26 (10-20g)

Table 6- 3. Adhesive Points

NO.	Adhesive Points
1	Point where the CR motor fan is attached to the CR motor shaft
2	Right and left hexagon nuts in the edge guide unit

⚠ CAUTION

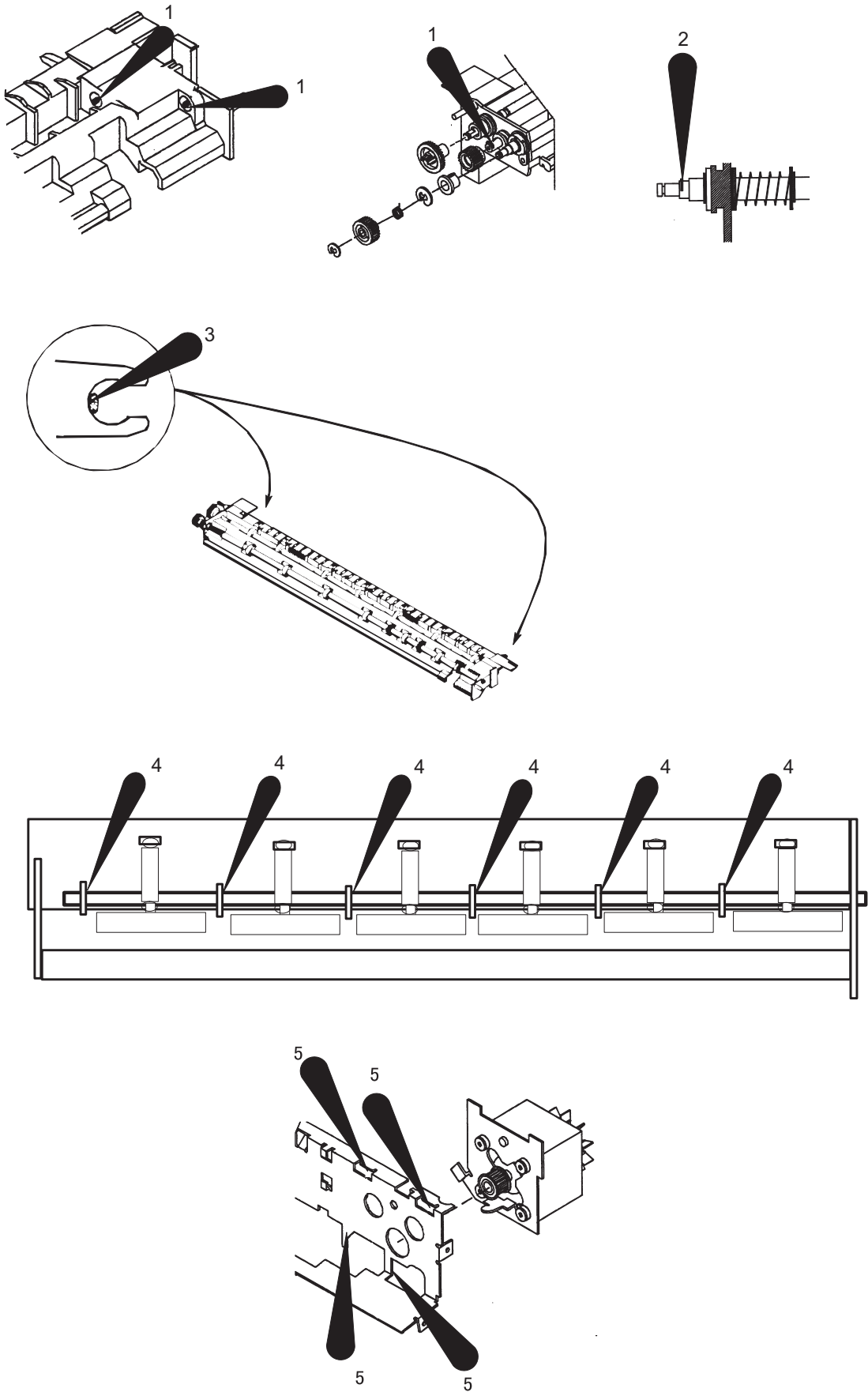*Do not apply too much lubricant or adhesive to avoid printer malfunction.*
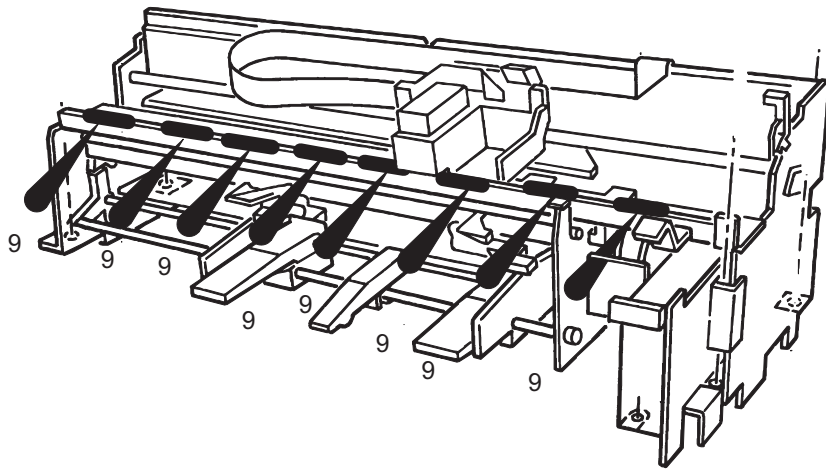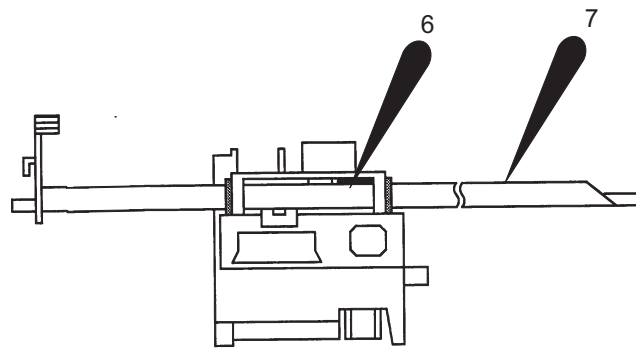
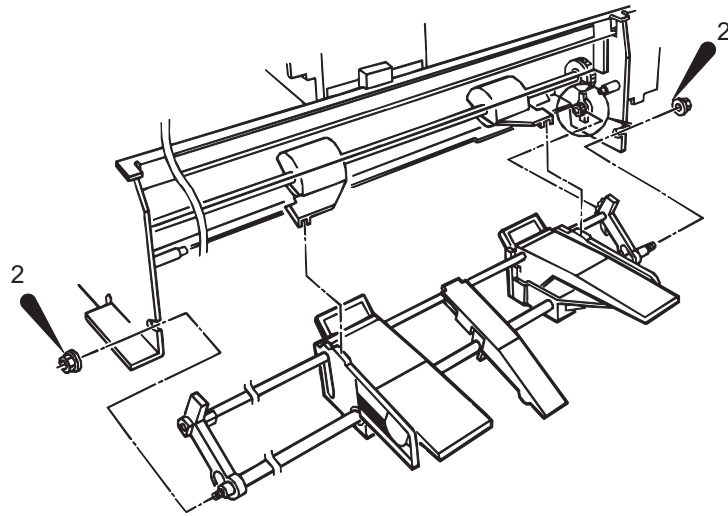**Figure 6-1. Lubrication Points (1)**
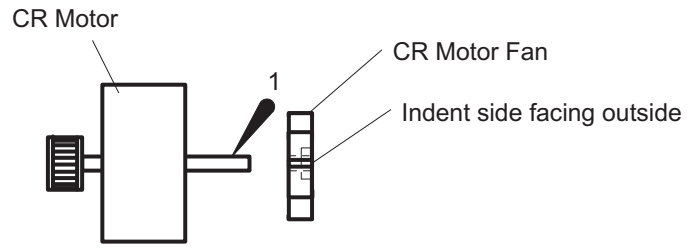
Figure 6-2. Lubrication Points (2)

CR Motor

CR Motor Fan

1

Indent side facing outside

2

2

Figure 6-3. Adhesive Points

Appendix

A.1 Connector Summary

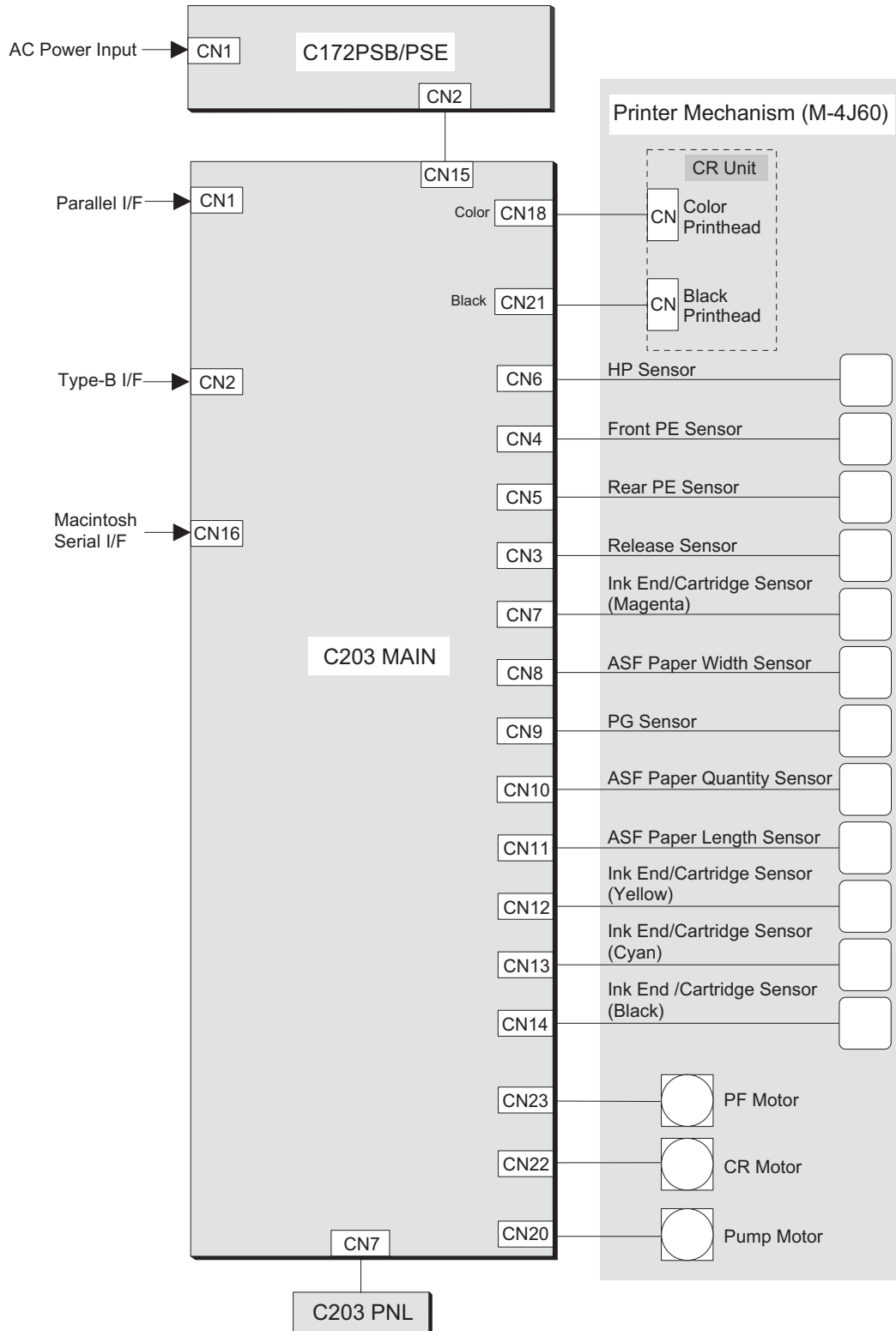Figure A-1 illustrates the electrical interconnection of the main components.

Figure A-1. Electrical Interconnection of the Main Components

A.1.1 Connector Pin Assignment

Table A-1 shows the locations and descriptions for the connectors on the circuit boards in this printer. Tables from A-2 to A-13 show the pin assignment for each connector.

Table A-1. Connector Summary

Circuit Board	Connector No.	Pin No.	Description
C203 MAIN-B Board	CN1	36	Parallel I/F (Refer to Section 1.3.1 and 1.3.2.)
	CN2	36	Type-B I/F (Refer to Section 1.3.4.)
	CN3	2	Release sensor
	CN4	2	Front PE sensor
	CN5	2	Rear PE sensor
	CN6	3	HP sensor
	CN7	4	Ink end/Cartridge sensor (Magenta)
	CN8	5	ASF PW sensor
	CN9	2	Platen gap sensor
	CN10	3	ASF PQ sensor
	CN11	6	ASF PL sensor
	CN12	4	Ink end/Cartridge sensor (Yellow)
	CN13	4	Ink end/Cartridge sensor (Cyan)
	CN14	4	Ink end/Cartridge sensor (Black)
	CN15	9	DC input from the C172 PSB/PSE board Power off signal
	CN16	8	Mac Serial I/F (Refer to Section 1.3.3.)
	CN17	26	C203 PNL Board
	CN18	24	Color head
	CN20	4	Pump motor
	CN21	26	Black head
	CN22	5	CR motor
	CN23	4	PF motor
C172 PSB/PSE Board	CN1	2	AC power input
	CN2	9	DC power input
C203 PNL Board	CN1	26	To C203 MAIN-B board

Table A-2. Connector Pin Assignment (CN3)

Pin No.	I/O	Signal Name	Description
1	I	REL	Release sensor signal
2	—	GND	Ground

Table A-3. Connector Pin Assignment (CN4)

Pin No.	I/O	Signal Name	Description
1	I	PE_F	Front PE sensor signal
2	—	GND	Ground

Table A-4. Connector Pin Assignment (CN5)

Pin No.	I/O	Signal Name	Description
1	I	PE_R	Rear PE sensor signal
2	—	GND	Ground

Table A-5. Connector Pin Assignment (CN6)

Pin No.	I/O	Signal Name	Description
1	I	HP	HP sensor signal
2	—	+ 5	+ 5 VDC
3	—	GND	Ground

Table A-6. Connector Pin Assignment (CN7)

Pin No.	I/O	Signal Name	Description
1	I	IC_M0	Ink cartridge sensor signal
2	—	GND	Ground
3	I	IC_M1	Ink end sensor signal
4	—	GND	Ground

Table A-7. Connector Pin Assignment (CN8)

Pin No.	I/O	Signal Name	Description
1	—	NC	—
2	I	ASF_PW	ASF PW sensor signal
3	—	+ 5	+ 5 VDC
4	—	GND	Ground
5	—	NC	—

Table A-8. Connector Pin Assignment (CN9)

Pin No.	I/O	Signal Name	Description
1	I	GAP	Platen gap sensor signal
2	—	GND	Ground

Table A-9. Connector Pin Assignment (CN10)

Pin No.	I/O	Signal Name	Description
1	—	+ 5	+ 5 VDC
2	—	GND	Ground
3	I	ASF_PQ	ASF PQ sensor signal

Table A-10. Connector Pin Assignment (CN11)

Pin No.	I/O	Signal Name	Description
1	I	ASF_PL0	ASF PL sensor signal
2	—	GND	Ground
3	I	ASF_PL1	ASF PL sensor signal
4	—	GND	Ground
5	I	ASF_PL2	ASF PL sensor signal
6	—	GND	Ground

Table A-11. Connector Pin Assignment (CN12)

Pin No.	I/O	Signal Name	Description
1	I	IC_Y0	Ink cartridge sensor signal
2	—	GND	Ground
3	I	IC_Y1	Ink end sensor signal
4	—	GND	Ground

Table A-12. Connector Pin Assignment (CN13)

Pin No.	I/O	Signal Name	Description
1	I	IC_C0	Ink cartridge sensor signal
2	—	GND	Ground
3	I	IC_C1	Ink end sensor signal
4	—	GND	Ground

Table A-13. Connector Pin Assignment (CN14)

Pin No.	I/O	Signal Name	Description
1	I	IC_B0	Ink cartridge sensor signal
2	—	GND	Ground
3	I	IC_B1	Ink end sensor signal
4	—	GND	Ground

Table A-14. Connector Pin Assignment (CN15)

Pin No.	I/O	Signal Name	Description
1	—	GND	Ground
2	—	+ 42	+ 42 VDC
3	—	+ 42	+ 42 VDC
4	—	GND	Ground
5	—	+ 5	+ 5 VDC
6	—	GND	Ground
7	O	PSC	Power off signal
8	—	GND	Ground
9	—	+ 5	+ 5 VDC

Table A-15. Connector Pin Assignment (CN17)

Pin No.	I/O	Signal Name	Description
1	O	LED 2	LED 2 signal
2	O	LED 0	LED 0 signal
3	O	LED 1	LED 1 signal
4	O	LED 3	LED 3
5	I	SW 0	SW 0 signal
6	I	SW 1	SW 1 signal
7	I	SW 2	SW 2 signal
8	O	LED 4	LED 4 signal
9	O	LED 5	LED 5 signal
10	O	LED 6	LED 6 signal
11	O	LED 7	LED 7 signal
12	O	LED 8	LED 8 signal
13	O	LED 9	LED 9 signal
14	I	SW 3	SW 3 signal
15	I	SW 4	SW 4 signal
16	—	GND	Ground
17	I	SW 5	SW 5 signal
18	I	SW 6	SW 6 signal
19	I	SW 7	SW 7 signal
20	—	+ 5	+ 5 VDC
21	I	PWS	PWS signal
22	I	PSC	Power scan signal
23	O	LED 10	LED 10 signal
24	O	LED 11	LED 11 signal
25	O	LED 12	LED 12 signal

Table A-16. Connector Pin Assignment (CN18)

Pin No.	I/O	Signal Name	Description
1	—	CCO	—
2	I	THS	Thermistor signal
3	—	GND	Ground
4	O	CHLAT	Latch signal
5	—	GND	Ground
6	O	CHDATA	Cyan data
7	—	GND	Ground
8	O	MHDATA	Magenta data
9	—	GND	Ground
10	O	YHDATA	Yellow data
11	—	GND	Ground
12	O	CHCLK	Clock signal
13	—	GND	Ground
14	O	CHNCHG	NCHG signal
15	—	GND	Ground
16	—	+ 5	Power source
17	—	GND	Ground
18	—	GND	Ground
19	—	GND	Ground
20	O	COM	Common output
21	O	COM	Common output
22	O	COM	Common output
23	—	VHPR	Drive voltage
24	—	VHPR	Drive voltage

Table A-17. Connector Pin Assignment (CN20)

Pin No.	I/O	Signal Name	Description
1	O	A	Phase A output
2	O	/ A	Phase / A output
3	O	B	Phase B output
4	O	/ B	Phase / B output

Table A-18. Connector Pin Assignment (CN21)

Pin No.	I/O	Signal Name	Description
1	—	BCO	—
2	I	THS	Thermistor signal
3	—	GND	Ground
4	O	BHLAT	Latch signal
5	—	GND	Ground
6	O	BSI 2	Data
7	—	GND	Ground
8	O	BSI 1	Data
9	—	GND	Ground
10	O	BHCLK	Clock signal
11	—	GND	Ground
12	O	BHNCHG	NCHG signal
13	—	GND	Ground
14	—	+ 5	Power source
15	—	GND	Ground
16	—	GND	Ground
17	—	GND	Ground
18	O	COM	Common output
19	O	COM	Common output
20	O	COM	Common output
21	—	VHPR	Drive voltage
22	—	VHPR	Drive voltage
23	—	NC	—
24	I	CR_PW	CR PW sensor signal
25	—	GND	Ground
26	—	+ 5	Power source

Table A-19. Connector Pin Assignment (CN22)

Pin No.	I/O	Signal Name	Description
1	O	A	Phase A output
2	O	/ A	Phase/ A output
3	O	B	Phase B output
4	O	/ B	Phase / B output

Table A-20. Connector Pin Assignment (CN23)

Pin No.	I/O	Signal Name	Description
1	O	A	Phase A output
2	O	B	Phase B output
3	O	/ A	Phase / A output
4	O	/ B	Phase / B output

A.2 Circuit Diagrams

Figure A-2. C203 MAIN-B Board Circuit Diagram (1/2)

Figure A-3. C203 MAIN-B Board Circuit Diagram (2/2)

Figure A-4. C203 PNL Board Circuit Diagram
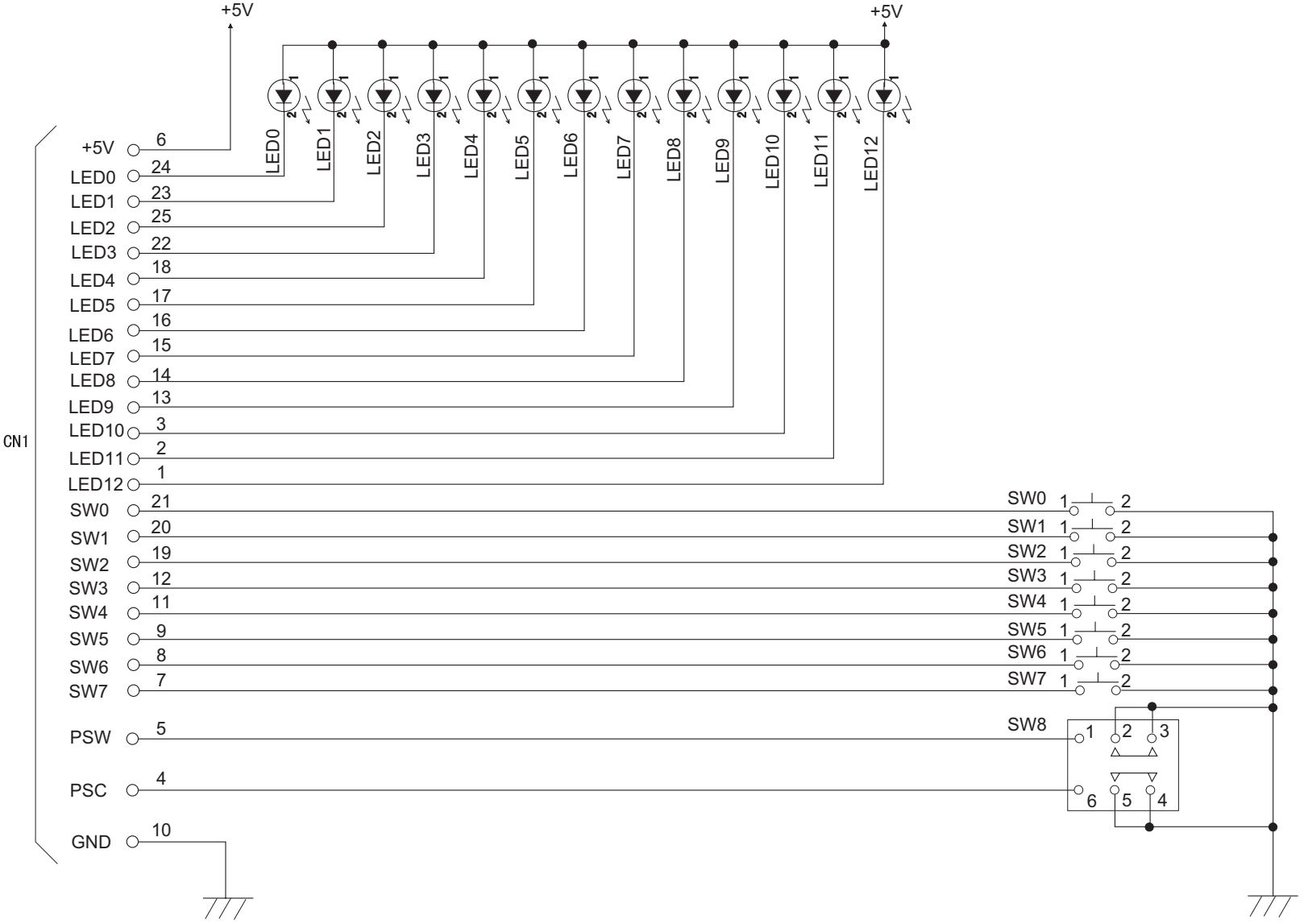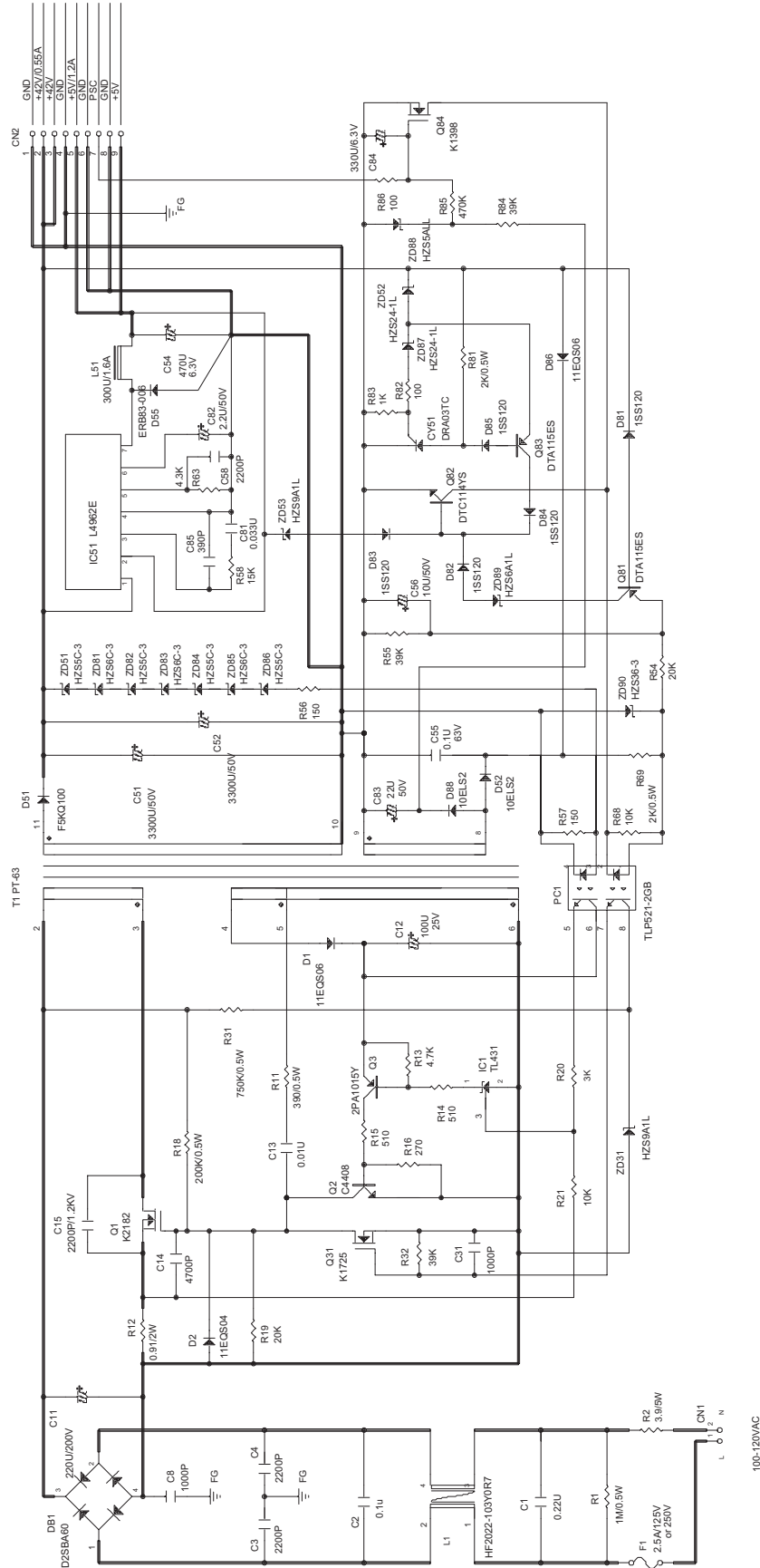
Figure A-5. C172 PSB Board Circuit Diagram
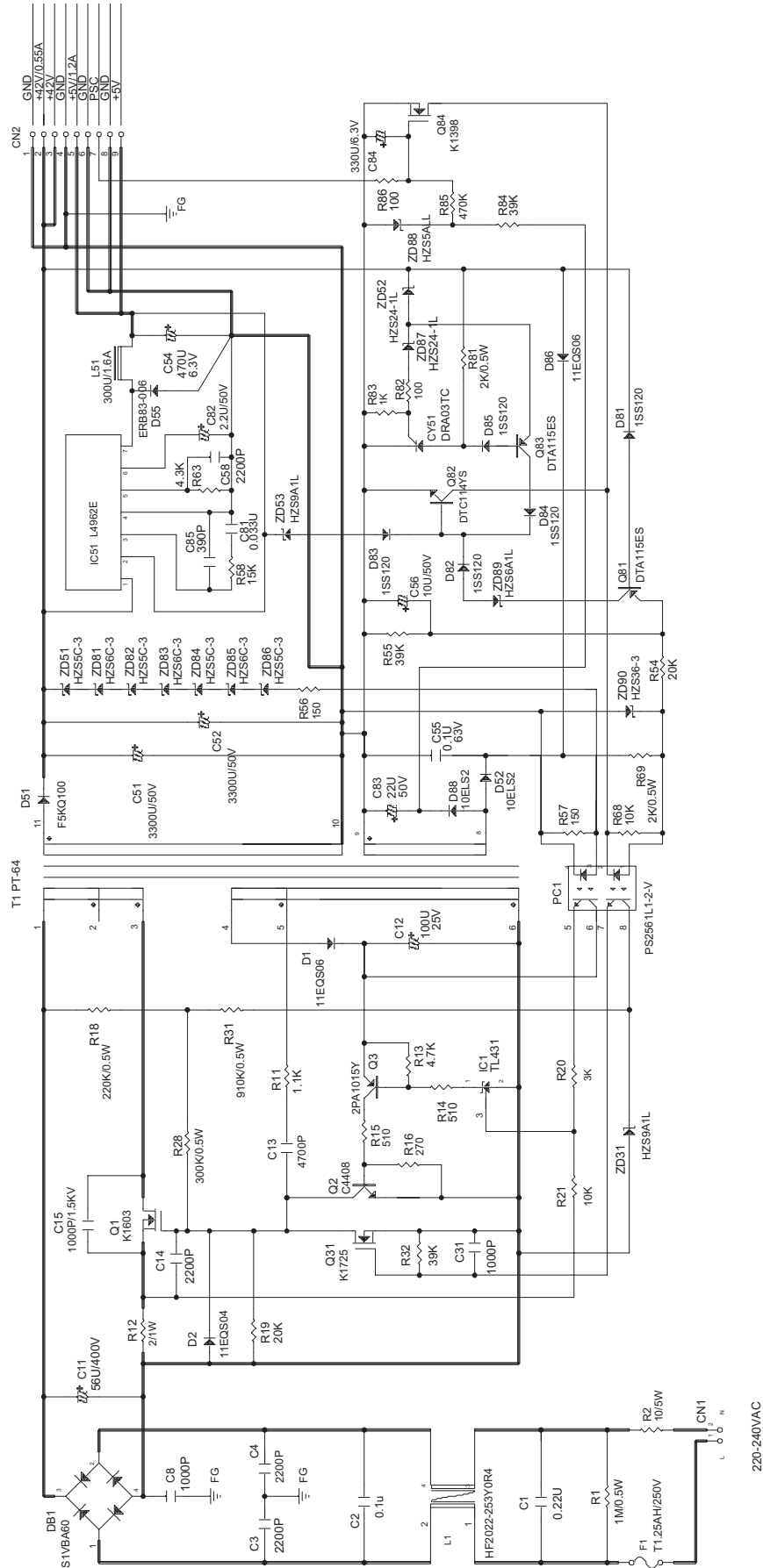
Figure A-6. C172 PSE Board Circuit Diagram

A.3 Component Layout
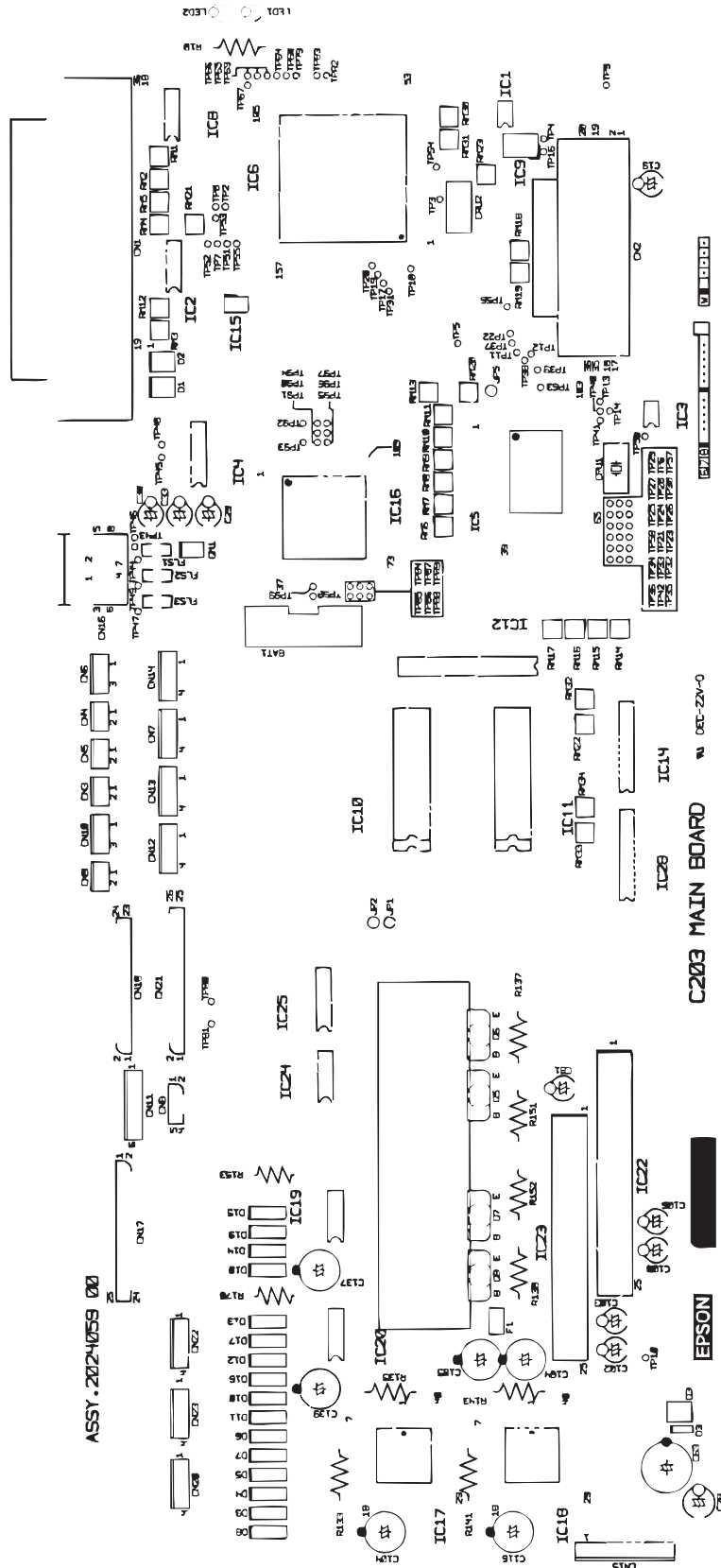
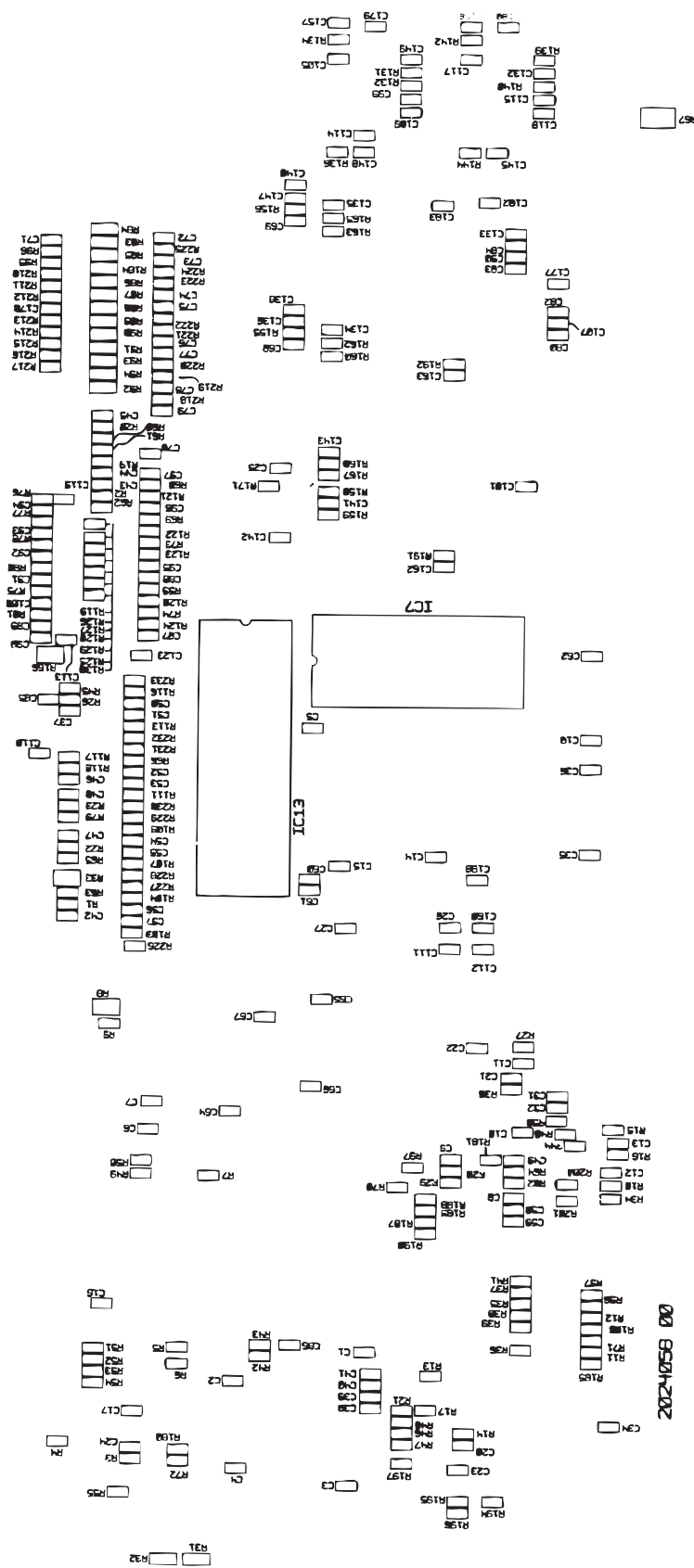Figure A-7. C203 MAIN-B Board Component Layout (1)
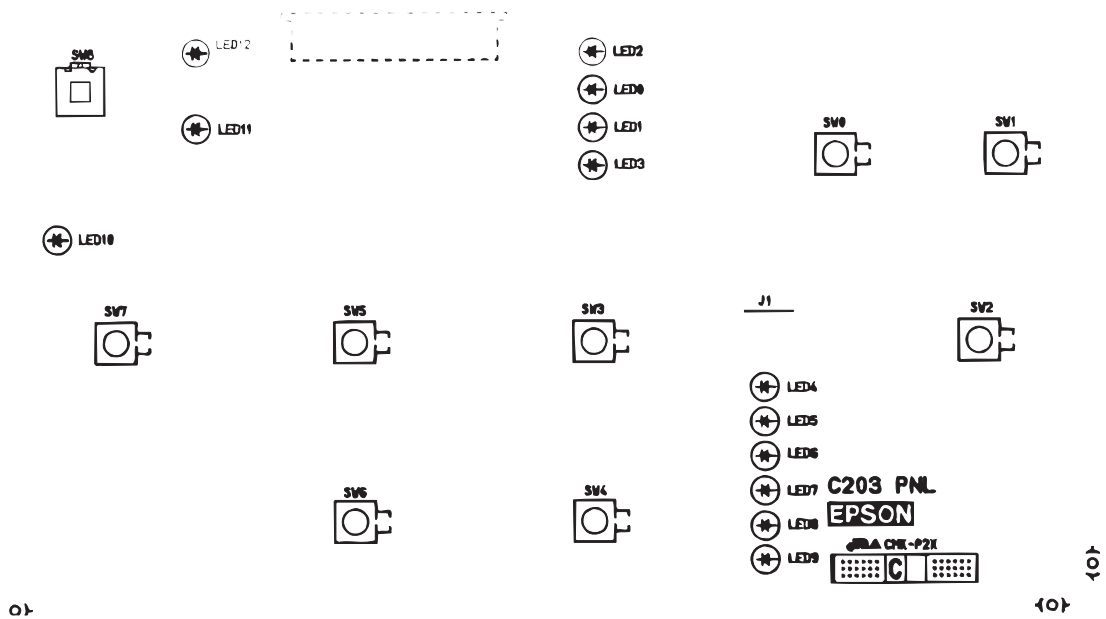
Figure A-8. C203 MAIN-B Board Component Layout (2)
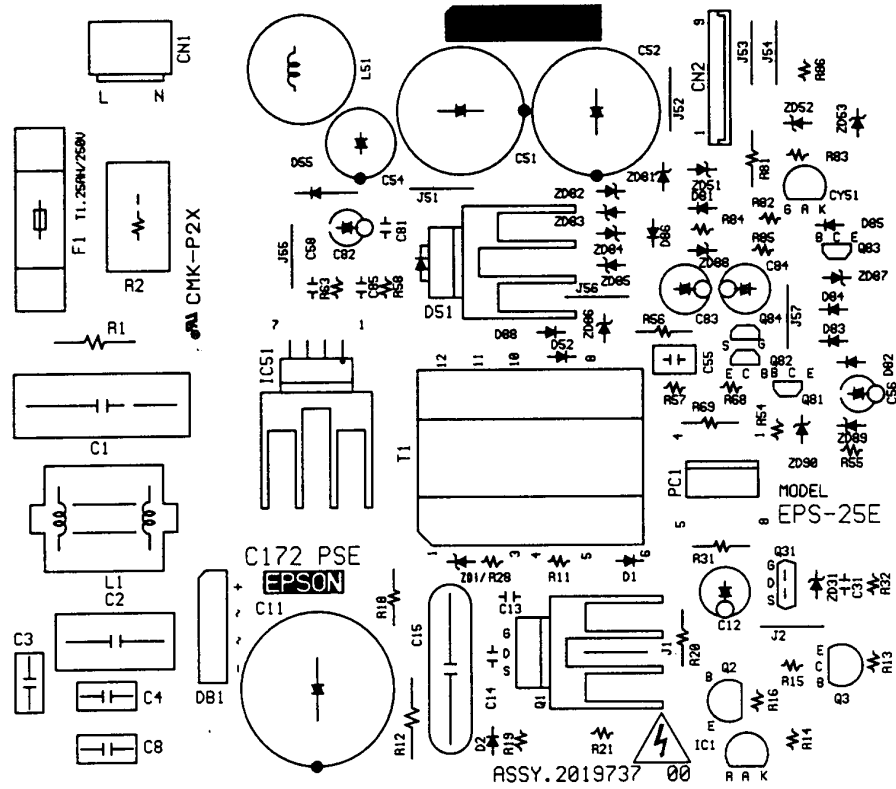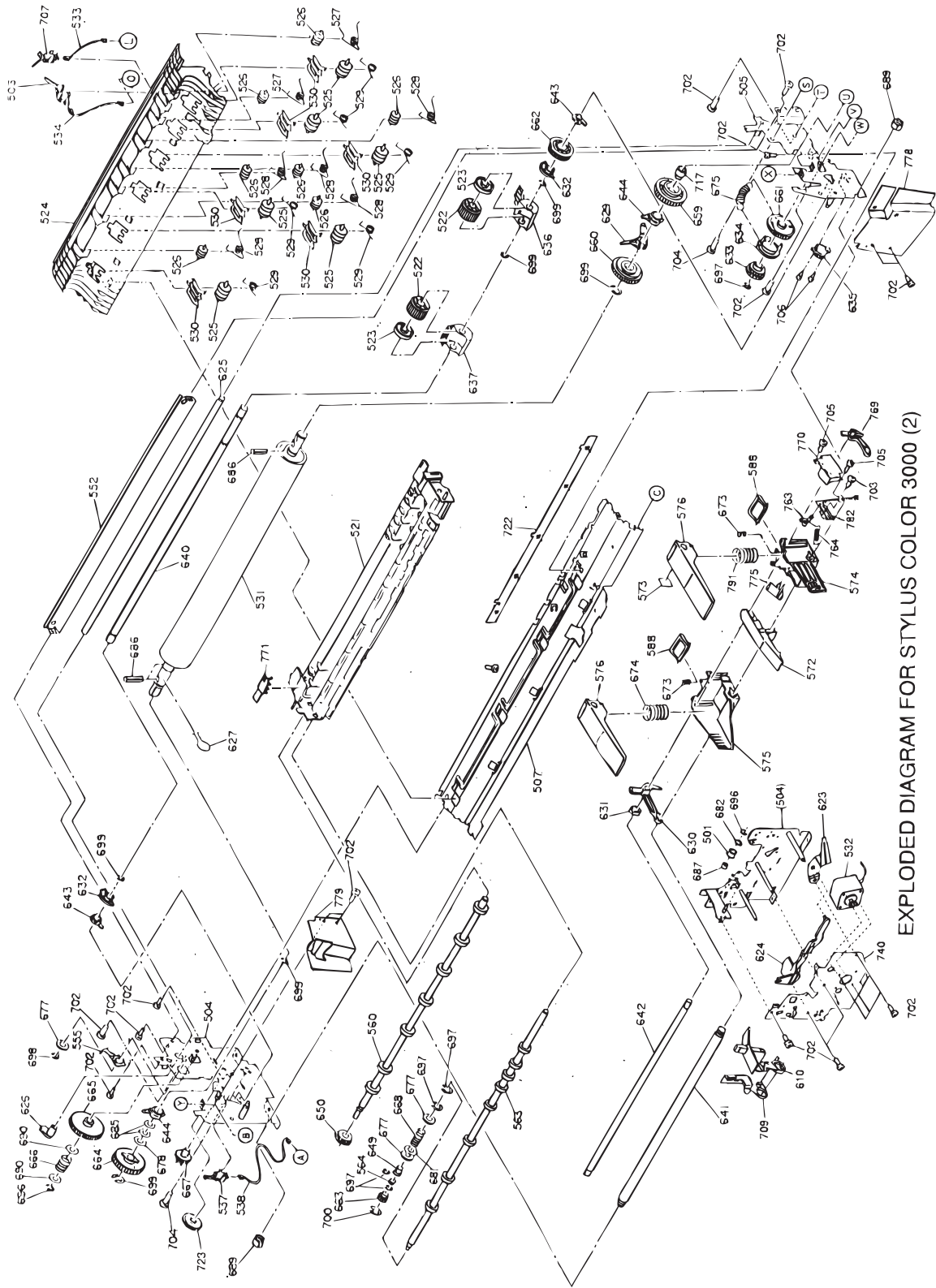
Figure A-9. C203 PNL Board Component Layout

Figure A-10. C172 PSB Board Component Layout
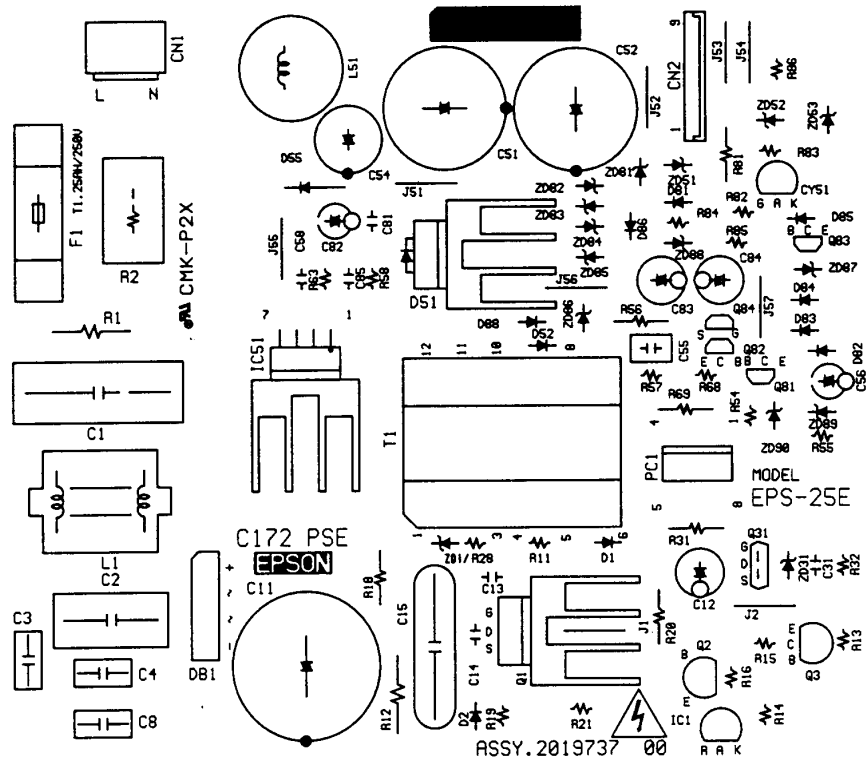
Figure A-11. C172 PSE Board Component Layout

A.4 Exploded Diagrams
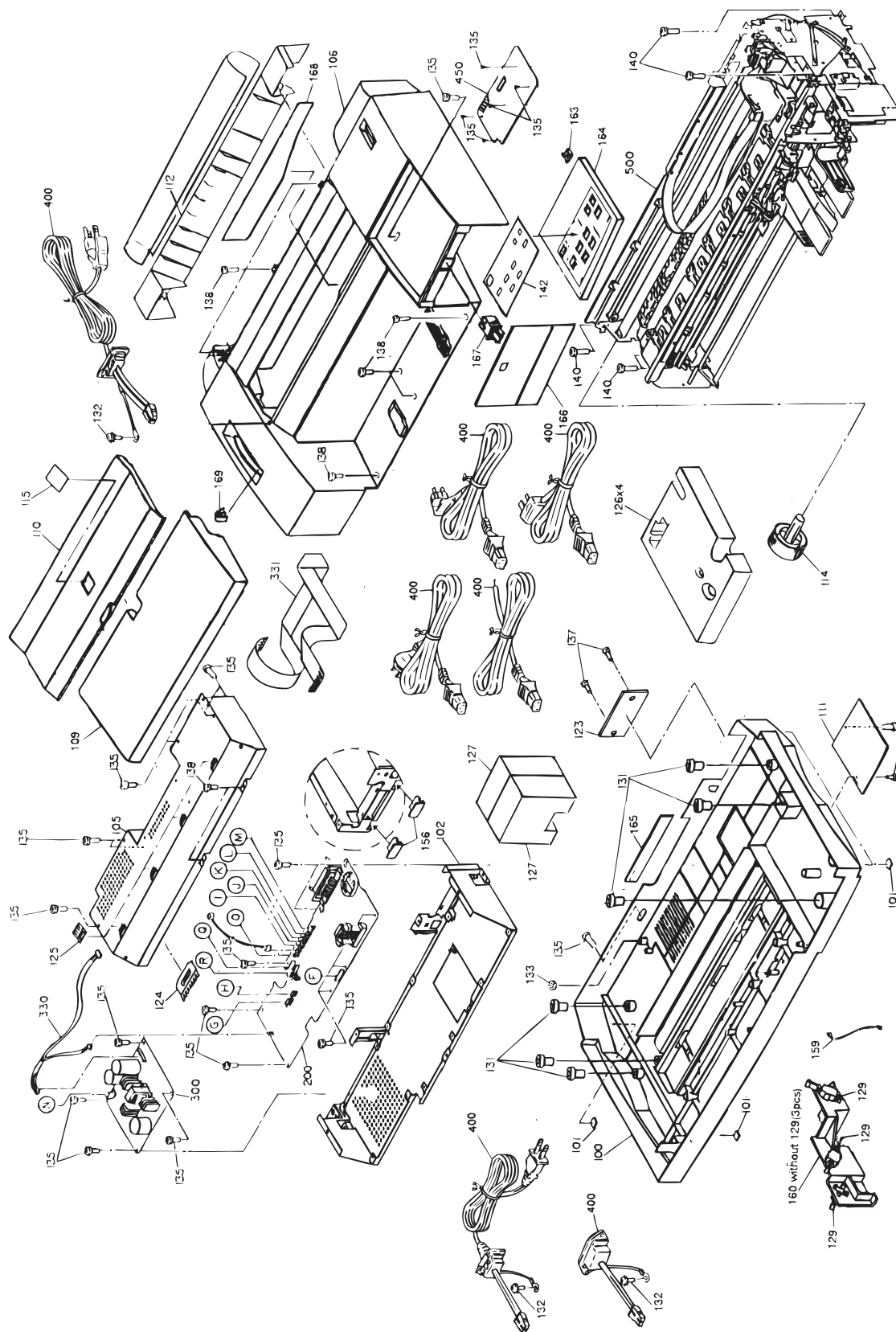
EXPLODED DIAGRAM FOR STYLUS COLOR 3000 (1)
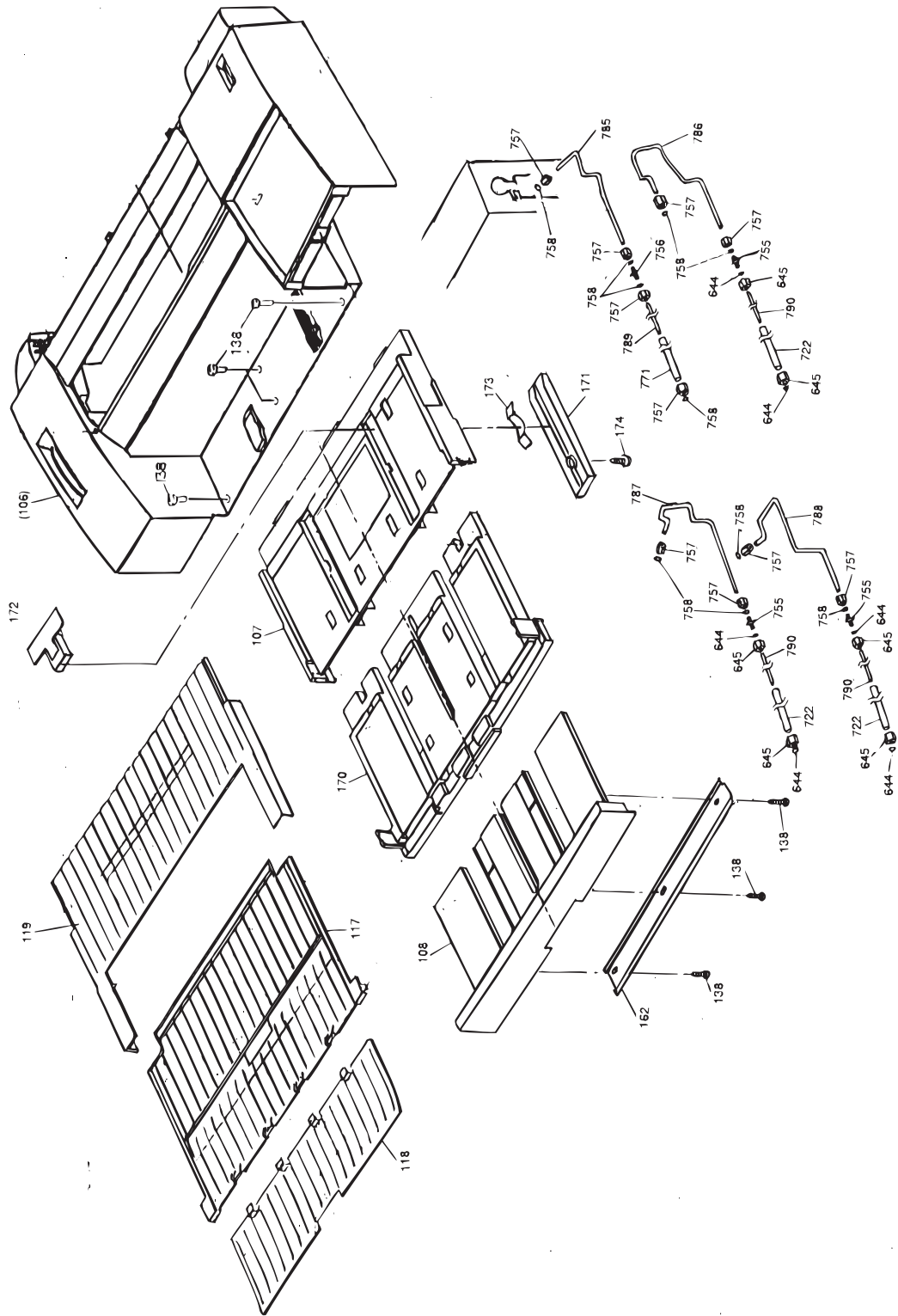
Figure A-12. Stylus COLOR 3000 Exploded Diagram (1)

Figure A-13. Stylus COLOR 3000 Exploded Diagram (2)
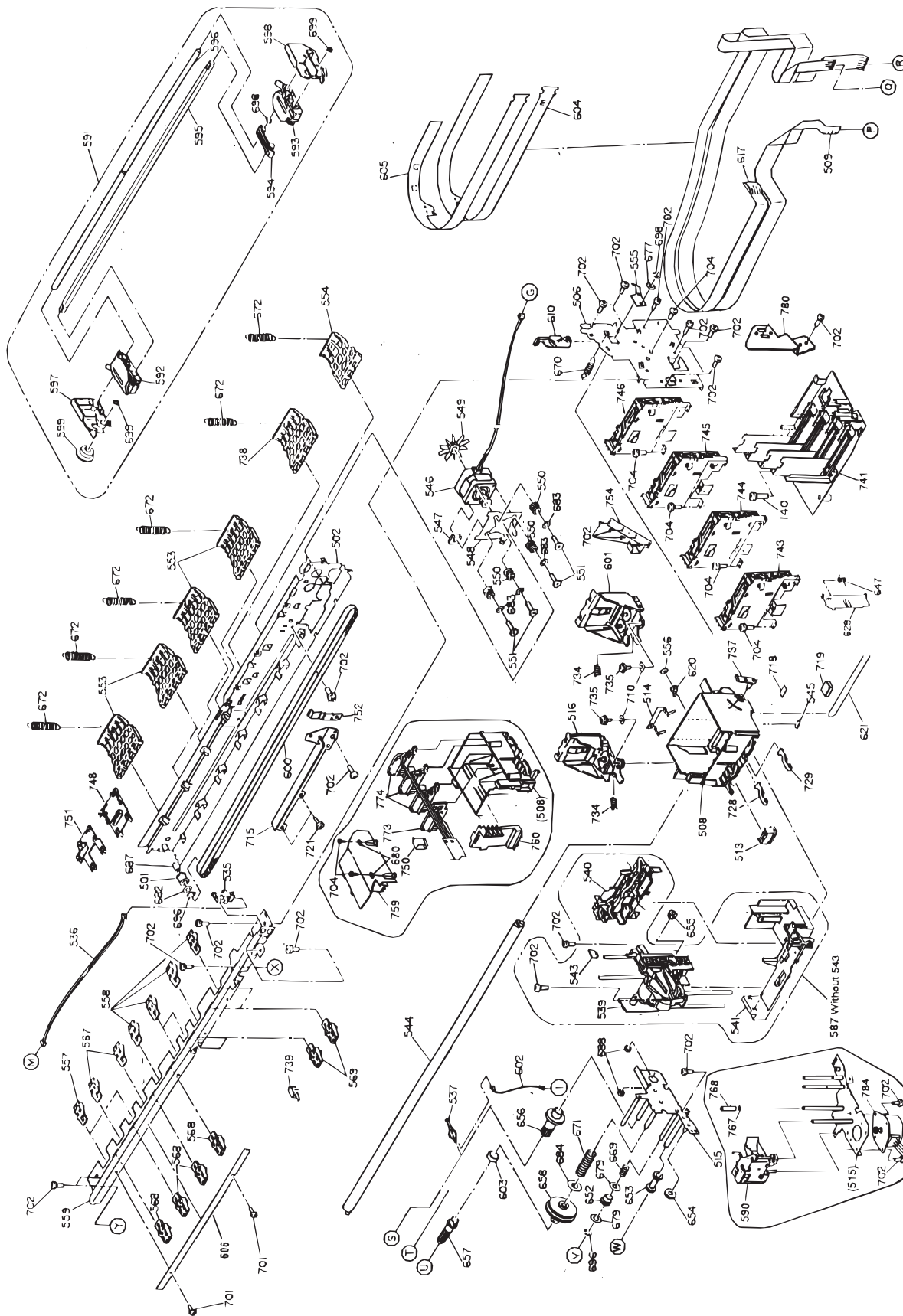
EXPLODED DIAGRAM FOR STYLUS COLOR 3000 (3)

Figure A-14. Stylus Color 3000 Exploded Diagram (3)

Figure A-15. Stylus Color 3000 Exploded Diagram (4)

EXPLODED DIAGRAM FOR STYLUS COLOR 3000 (4)

A.5 Dimension and Weight

❑ Dimension   :810 mm (W) X 565 mm (D) X 240 mm (H)
                    31.8 inch (W) X 22.2 inch (D) X9.4 inch (H)
❑ Weight   :22.5 Kg

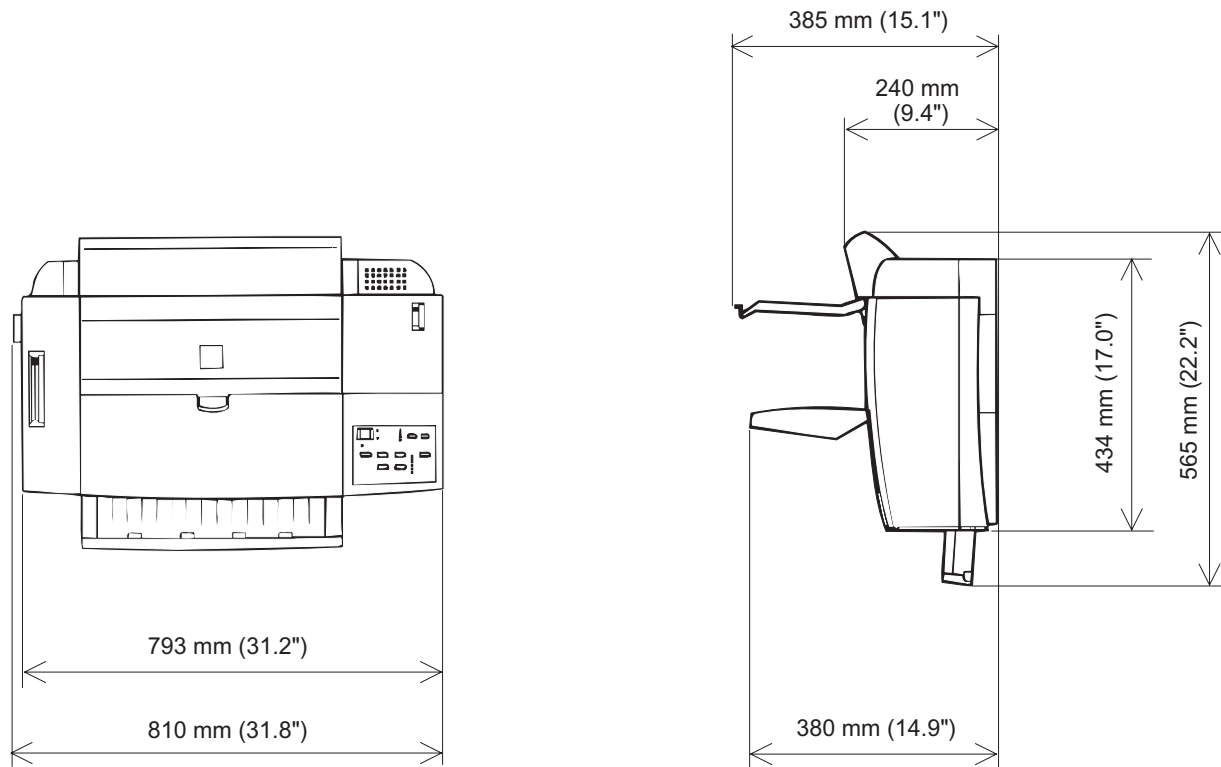Figure A-12 illustrates the exterior dimension of the Stylus COLOR 3000.

Figure A-16. Dimension of the Stylus COLOR 3000

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