EPSON

COLOR INK-JET PRINTER

EPSON Stylus Photo

SERVICE MANUAL

SEIKO EPSON CORPORATION

NOTICE

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 EPSON Stylus Photo.

The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to die 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	March 26, 1997	First issue

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Chapter 1
Product Descriptions

1.1 Features

EPSON Stylus Photo is a high quality color ink jet printer designed for printing photo images and color graphics. The major printer features are;

❑ High color print quality
- 720(H) x 720(V) dpi printing
- 6 color printing CMYK and output of photo quality by light-C/M
- Traditional and New Microwave
- 32 nozzles x 6 (Black, Cyan, Magenta, Yellow, Light Cyan, Light Magenta)
- During 360 dpi printing, 1 dot is fired by 2 shots, and 1 dot is fired by 1 shot during 720 dpi printing.

❑ Built-in auto sheet feeder
- Holds 100 cut-sheets (55g/‡u)
- Holds 10 envelopes
- Holds 50 transparency films
- Holds 65 special papers

❑ Built-in 2 I/F
- Mac serial I/F(up to approx.900 kbps)
- Bi-directional parallel I/F(Nibble mode. IEEE-1284 level 1 device)

❑ High-speed print
- 200cps
- By driving the print head at frequency; 14.4KHz, printing speed is twice faster than Stylus Color.

❑ Windows/Macintosh exclusive

❑ Compact size
- Non-operating : 429mm(W) x 234mm(D) x 162mm(H)
- Operating   : 429mm(W) x 695mm(D) x 309mm(H)
- Weight   : 5.2Kg(without cartridge)

❑ Acoustic noise
- Approximately 45 dB

❑ One unit combined with black and color heads

The following table shows consumable and option.

Table 1-1. Consumables and options

Item	Code	Remark
Black Ink Cartridge	S020093	Color: Black
Color Ink Cartridge	S020110	Color: Cyan/Magenta/Yellow/Light Light Cyan/Light Magenta
EPSON 360 dpi Ink Jet Paper	S041025	Size: A4(200 sheets)
EPSON 360 dpi Ink Jet Paper	S041059	Size: A4(100 sheets)
EPSON 360 dpi Ink Jet Paper	S041060	Size: Letter(100 sheets)
Photo Quality Ink Jet Paper	S041026	Size: A4(200 sheets)
Photo Quality Ink Jet Paper	S041061	Size: A4(100 sheets)
Photo Quality Ink Jet Paper	S041062	Size: Letter
Photo Quality Ink Jet Paper	S041067	Size: Legal
Photo Quality Glossy Paper(New Release)	S041126	Size: A4
Photo Quality Glossy Paper(New Release)	S041124	Size: Letter
Photo Quality Glossy Film	S041071	Size: A4
Photo Quality Glossy Film	S041072	Size: Letter
Photo Quality Glossy Film	S041107	Size: A6
Ink Jet Transparencies	S041063	Size: A4
Ink Jet Transparencies	S041064	Size: Letter
Photo Quality Ink Jet Card	S041054	Size: A6
Photo Quality Ink Jet Card	S041121	Size: 5.8 inches
Photo Quality Ink Jet Card	S041122	Size: 10.8 inches
Photo Quality Self Adhesive Sheet	S041106	Size: A4

1.2 Specifications

This section describes each specification for EPSON Stylus Photo; 1) Printing specification, 2) Paper specification, 3) Adjust lever settings, 4) Printing area, 5) Environmental condition, 6) Ink Cartridge specification, 7) Physical specification, 8) Electric specification, 9) Reliability.

1.2.1 Printing Specification

❑ Print method
  ■ On demand ink jet (E-CHIPS type. One unit combined with black and color head)

❑ Nozzle configuration
  ■ Black head: 32 nozzles (Space between nozzle: 90DPI)
  ■ Color head: 32 nozzles/ each color x 5 colors (Space between nozzle: 90DPI)
Note) During 360 dpi printing mode, one line is completed by 2-pass for black and by 4-pass for CMYcm.

❑ Print direction
  ■ Bi-direction with logic seeking

❑ Print speed
  ■ Raster Graphics Mode. Refer to Table 1-2.

Table 1-2. Raster Graphics Mode

Horizontal Resolution	Printable Area	Available Dot	CR Speed(IPS)
180 dpi	8.26 inch	1488	20 IPS
360 dpi	8.26 inch	2976	20 IPS
720 dpi	8.26 inch	5952	20 IPS

  ■ Character Mode*. Refer to Table 1-3.

Table 1-3. Character Mode

Character Pitch	Printable Colums	LQ Speed
10CPI	80	200CPS **

Note) * Reference only.
  **This value is the speed of one print-pass in which the 1/4of character matrix is printed.

❑ Nozzle arrangement
  ■ Refer to figure1-1.
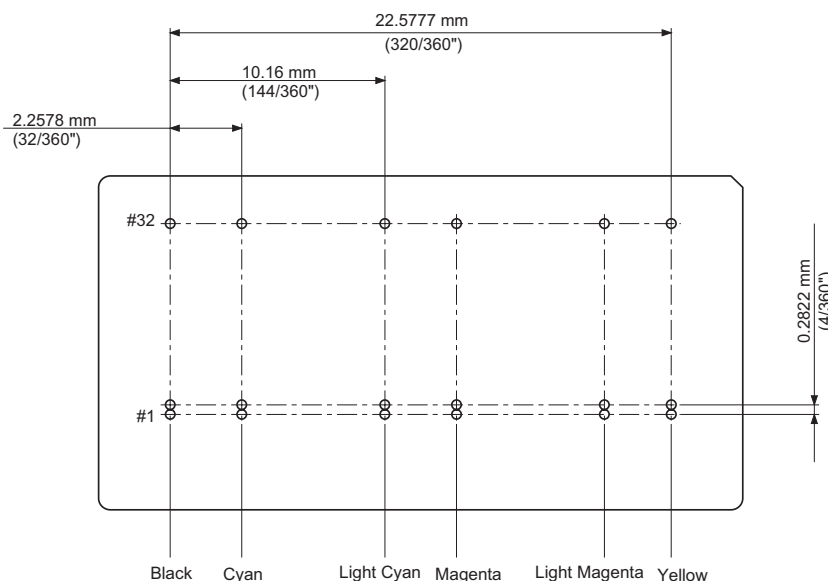
Figure 1-1. Head Nozzle Arrangement

EPSON Stylus Photo

❑ Feeding method
 ■ Friction feed with ASF

❑ Line spacing
 ■ 1/6 inch or programmable at 1/360 inch

❑ Paper path
 ■ Cut-sheet ASF(Top entry)

❑ Feeding speed
 ■ 66.6ms (1/6 inch)
 ■ 3.0 inch/sec (Continuous)

❑ Ink supply
 ■ Exclusive ink cartridge(Black and CMYcm)

❑ Built in ASF
 ■ Size   : Index card•`Legal
 ■ Thickness   : Less than 8mm
 ■ Paper capacity   : Holds 100 Cut sheets
                     : Holds 10 Envelopes
                     : Holds 10 transparency sheet
                     : Holds 65 ink jet papers (A4)
                     : Holds 30 index card (A6)
                     : Holds 30 glossy papers

Note1) Those numbers above should be considered as reference. The actual paper accumulation should
          be considered first.
Note2) The printer can hold 10 transparency sheets only when the top margin is 30mm. Otherwise, only
          one sheet can be hold.
Note3) Change the paper support position for the transparency printing position when you print on the
          transparency sheet.

❑ Character tables*
 ■ PC437(US, Standard Europe)
 ■ PC850(Multilingual)

❑ Typeface*
 ■ Bit map LQ font   : EPSON Courier 10CPI

❑ Control code
 ■ ESC/P Raster
 ■ EPSON Remote command

Note)   * Reference only.

1.2.2 Paper Specification

This section describes the printable area and types of paper that can be used in this printer.
Note)   Do not perform reverse feed more than 9.5mm(0.38").

1.2.2.1 Cut Sheet

[Size]   : A4   [Width 210mm(8.3") x Length 297mm(11.7")]
                      : Letter   [Width 216mm(8.5") x Length 279mm(11.0")]
                      : B5   [Width 182mm(7.2") x Length 257mm(10.1")]
                      : Legal   [Width 216mm(8.5") x Length 356mm(14.0")]
                      : Statement [Width 139.7mm(5.5") x Length 215.9mm(8.5")]
                      : Exclusive [Width 190.5mm(7.5") x Length 254mm(10")]

[Thickness]   : 0.08mm(0.003") - 0.11mm(0.004")

[Weight]   : 64g/m^2 (17lb.) - 90g/m^2 (24lb.)

[Quality]   : Exclusive paper, Bond paper, PPC

1.2.2.2 Transparency, Glossy Paper

[Size]   : A4   [Width 210mm(8.3") x Length 297mm(11.7")]
                      : Letter   [Width 216mm(8.5") x Length 279mm(11.0")]

[Thickness]   : 0.075mm(0.003") - 0.085mm(0.0033")

Note) Transparency printing is only available at normal temperature.

1.2.2.3 Envelope

[Size]   : No.10   [Width 241mm(9 1/2") x Length 104.8mm(4 1/8")]
                      : DL   [Width 220mm(8.7") x Length 110mm(4.3")]
                      : C6   [Width 162mm(6.4") x Length 114mm(4.5")]

[Thickness]   : 0.16mm(0.006") - 0.52mm(0.02")

[Weight]   : 45g/m^2 (12lb.) - 75g/m^2 (20lb.)

[Quality]   : Bond paper, Plain paper, Air mail

Note 1) Envelope printing is only available at normal temperature.
Note 2) Keep the longer side of the envelope horizontally at setting.

1.2.2.4 Index Card

[Size]   : A6 Index card: [Width 105mm(4.1") x Length 148mm(5.8")]
                      : A5 Index card: [Width 148mm(5.8") x Length 210mm(8.3")]
                      : 5x8" Index card: [Width 127mm(5.0" x Length 203mm(8.0")]
                      : 10x8" Index card: [Width 127mm(5.0") x Length 203mm(8.0")]

[Thickness]   : Less than 0.23mm(0.0091")

Note 1) No curled, wrinkled, scuffing or torn paper be used.
Note 2) Set the lever to the proper position according to the paper type you print. (Refer to section
          1.2.3 for details)
Note 3) Printing should be performed at room temperature in spite of the paper types.
Note 4) Perform printing under the room temperature.

1.2.3 Adjust Lever Settings (PG adjust lever)

The adjust lever located on the right side(blue) that is under the printer cover needs to be set to the proper position according to the paper you print. (Refer to the table below). Also, if there is any dirt caused by friction on the wavy or wrinkled paper, this can be prevented by changing the lever position to rear position (marked with "+") in spite of paper types.

Table 1-4. Adjust Lever Settings

Paper	Lever position	PG adjustment value
Normal paper, Coated paper	Front (0)	0 mm (1.04mm between head and paper feed assembly)
Envelopes	Rear(+)	0.9 mm (1.94mm between head and paper feed assembly)
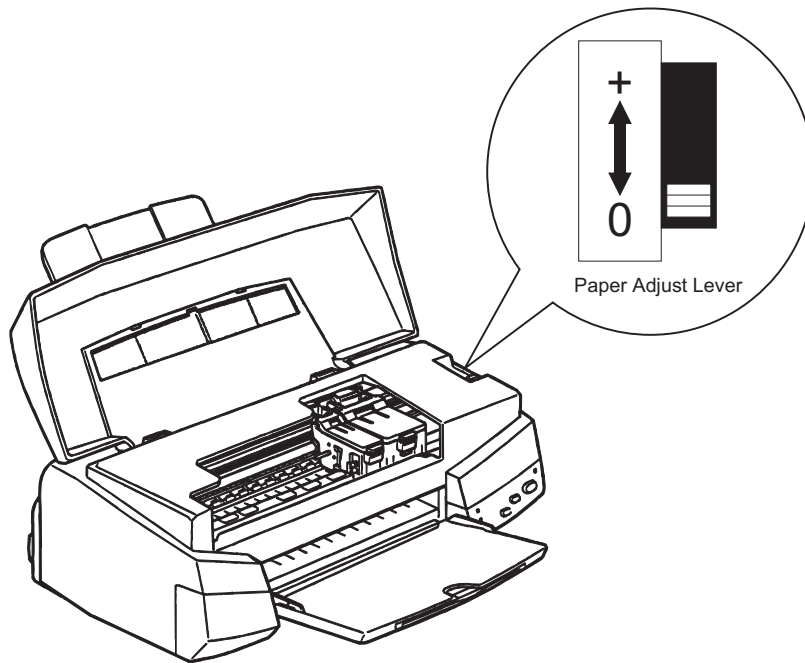
Figure 1-2. Adjust Lever

1.2.4 Printing Area

1.2.4.1 Cut Sheet

The following table shows printable area.

Table 1-5.Printable Area for Cut Sheet

Paper size	PW(Paper width) (typ)	PL(Paper Length) (typ.)	LM(Left margin) (min.)	RM(Right margin) (min.)	TM(Top margin) (min.)	BM(Bottom margin) (min.)
A4	210mm(8.3")	297mm(11.7")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
Letter	216mm(8.5")	279mm(11.0")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
B5	182mm(7.2")	257mm(10.1")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
Legal	216mm(8.5")	356mm(14.0")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
Statement	139.7mm(5.5")	215.9mm(8.5")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
Executive	190.5mm(7.5")	254mm(10")	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.54")
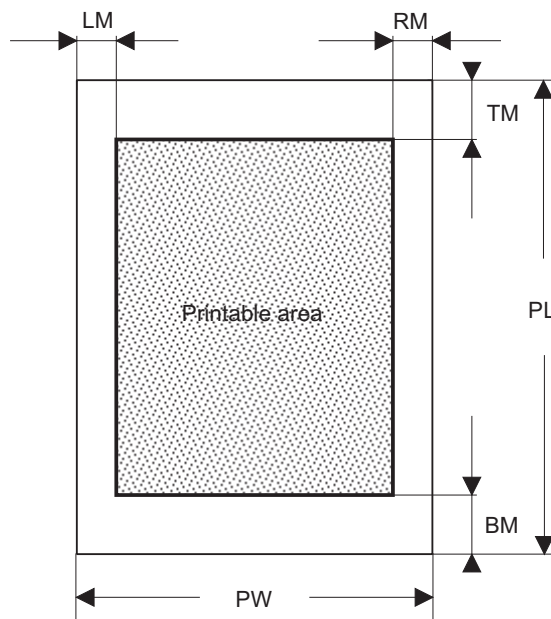
Figure 1-3. Printing Area for Cut Sheet

1.2.4.2 Envelope

The table and figure below show the printable area for envelopes.

Table 1-6. Printable Area for Envelope

Paper size	LM(Left margin) (min.)	RM(Right margin) (min.)	TM(Top margin) (min.)	BM(Bottom margin) (min.)
#10	28mm(1.10")	3mm(0.12")	3mm(0.12")	14mm(0.55")
DL	7mm(0.28")	3mm(0.12")	3mm(0.12")	14mm(0.55")
C6	3mm(0.12")	3mm(0.12")	3mm(0.12")	14mm(0.55")
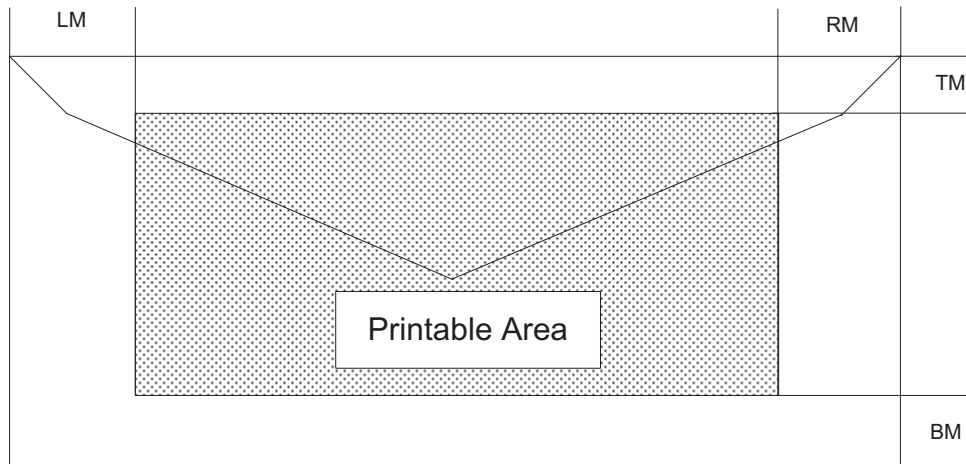
Figure 1-4. Printing Area for Envelope

1.2.5 Environmental Condition

❑ Temperature
  ■ Operating   :10 to 35°C (Refer to the figure below for condition)
  ■ Non-operating   : -20 to 60°C (with shipment container)
Note) 1 month at 40°C and 120 hours at 60°C

❑ Humidity
  ■ Operating   : 20 - 80% RH (without condensation. Refer to the figure below for condition)
  ■ Non-operating   : 5 - 85% RH (without condensation and with shipment container)
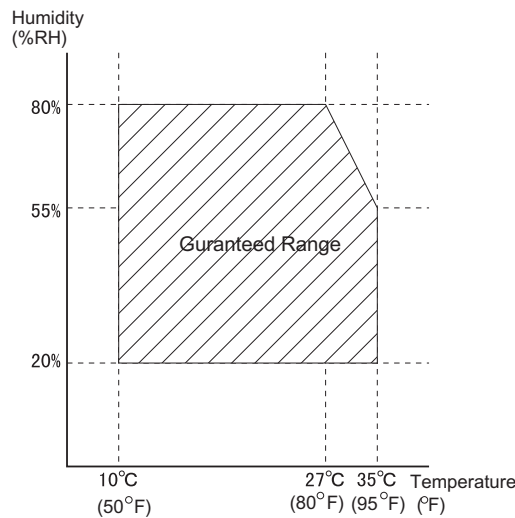
Figure 1-5. Temperature/Humidity of Range

❑ Resistance to shock
  ■ Operating   : 1G, within 1 ms   X,Y,Z directions
  ■ Non-operating   : 2G, within 2 ms   X,Y,Z directions (with shipment container)

❑ Resistance to vibration
  ■ Operating   : 0.15G, 10 - 55Hz   X,Y,Z directions
  ■ Non-operating   : 0.50G, 10 - 55Hz   X,Y,Z directions (with shipment container)

Note 1)   During non-operating, make sure that the head is capped.
Note 2)   During the transport, make sure that the head is capped and ink cartridge is installed to the printer.
Note 3)   If the head is not capped at the power-off state, turn the power on with installed ink cartridge and turn off the power after confirming that Power on operation is completed and the head is capped.
Note 4)   Ink will be frozen under -4°C environment, however it will be useable after placing it more than 3 hours at 25°C.

1.2.6 Ink Cartridge Specifications

1.2.6.1 Black Ink Cartridge

Table 1-7. Black Ink Cartridge Specifications

Item	Specifications
Type	Exclusive cartridge
Color	Black
Print capacity	540 pages / A4 (ISO/IE10561 Letter Pattern at 360 dpi)
Validity	2 years from production date(sealed in package) / 6months(out of package)
Environmental conditions	❑ Temperature ■ Storage : -20 - 40°C (within a month at 40°C) ■ Packing storage : -30 - 40°C (within a month at 40°C) ■ Transit : -30 - 60°C (within 120 hours at 60°C and within a month at 40°C) ❑ Humidity ■ 5 - 85%(without condensation) ❑ Resistance to vibration ■ Sealed in package : 5 - 55Hz ■ Acceleration : 29.4m/s less than 3G ■ Direction : X, Y, Z direction ■ Time : 1 hour ❑ Drop ■ Sealed in package : ❑ Dropping height : Less than 0.8m ❑ Direction : Drop it facing the 6 areas, bottom, sides and one edge down.
Dimension	19.8mm(W) x 52.7mm(D) x 38.5mm(H)
Weight	■ Total ink cartridge : 54g ■ Total ink :16.4±0.5g (Quantity in the ink cartridge) ■ Consumable ink :More than 12.1g(Usable ink quantity until ink ends)

Note 1)   Ink cartridge can not re-fill, only ink cartridge is prepared for article of consumption.

Note 2)   Do not use the ink cartridge which is passed away the ink life.

Note 3)   Ink will be frozen under -4°C environment, however it will be usable after placing it more than 3 hours at room temperature.

Figure 1-6. Black Ink Cartridge

1.2.6.2 Color Ink Cartridge

Table 1-8. Color Ink Cartridge Specification

Item	Specifications
Type	Exclusive cartridge
Color	5 Colors(Magenta, Cyan, Yellow, Light Magenta, Light Cyan)
Print capacity	190 pages / A4 (360 dpi, 5% duty each color)
Validity	2 years from production date (sealed in package) / 6months(out of package)

Environmental conditions	❑ Temperature
	  ■ Storage : -20 - 40°C (within a month at 40°C)
	  ■ Packing storage : -30 - 40°C (within a month at 40°C)
	  ■ Transit : -30 - 60°C (within 120 hours at 60°C and within a month at 40°C)
	❑ Humidity
	  ■ 5 - 85%(without condensation)
	❑ Resistance to vibration
	  ■ Sealed in package : 5 - 55Hz
	  ■ Acceleration : 29.4m/s less than 3G
	  ■ Direction : X, Y, Z direction
	  ■ Time : 1 hour
	❑ Drop
	  ■ Sealed in package :
	    ❑ Dropping height : Less than 0.8m
	    ❑ Direction : Drop it facing the 6 areas, bottom, sides and one edge down.

Dimension	51.4mm(W) x 52.7mm(D) x 38.5mm(H)
Weight	■ Total ink cartridge : 81g ■ Total ink : 8.6±0.5g (Each color quantity in the ink cartridge) Only Yellow 11.7±0.5g ■ Consumable ink : More than 8.7g for Yellow and 6.1g for other colors. (Usable ink quantity until ink ends)

Note 1)   Ink cartridge can not re-fill, only ink cartridge is prepared for article of consumption.
Note 2)   Do not use the ink cartridge which is passed away the ink life.
Note 3)   Ink will be frozen under -4°C environment, however it will be usable after placing it more than 3 hours at room temperature.

Cyan (C)
Light Cyan(LC)
Magenta(M)
Light Magenta(LM)
Yellow (Y)

Figure 1-7. Color Ink Cartridge

1.2.7 Physical Specification

[Dimension] : 429mm(W) x 234mm(D) x 162mm(H)
: 429mm(W) x 695mm(D) x 309mm(H) with extended stacker and paper support.

[Weight] : 5.2Kg
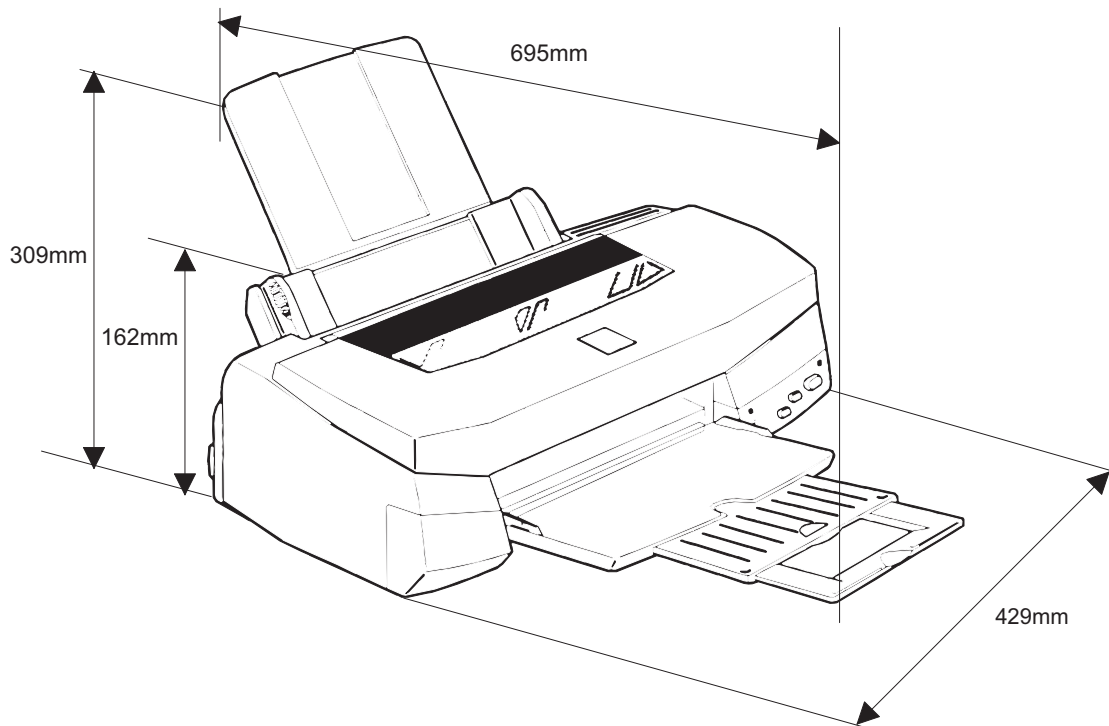
Figure 1-8. Dimension of EPSON Stylus Photo

1.2.8 Input Data Buffer

❑   64 Kbytes

1.2.9 Electric Specification

- ❑ 120V version
  - ■ [Rated voltage]   : AC120V
  - ■ [Input voltage range]   : AC103.5 ~132V
  - ■ [Rated frequency range]   : 50 ~ 60Hz
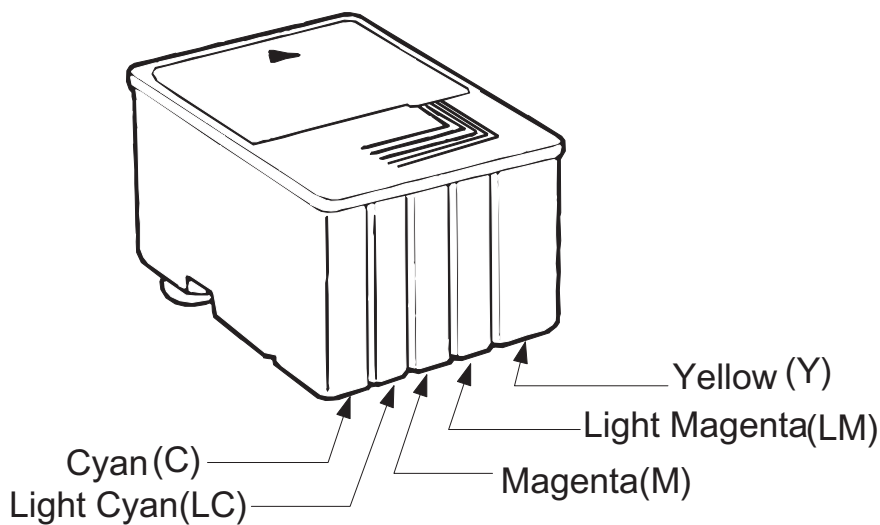 - ■ [Input frequency range]   : 49.5 ~ 60.5Hz
  - ■ [Rated current]   : 0.4A(Max. 0.5A)
  - ■ [Power consumption]   : Approx.15W(ISO/IEC 10561 Letter pattern)
                                        : Energy Star compliant
  - ■ [Insulation Resistance]   : 10M ohms min.(between AC line and chassis, DC500V)
  - ■ [Dielectric strength]   : AC1000 V rms. 1 minute or AC1200 V rms. 1 second (between
                                          AC line and chassis)

- ❑ 220 ~ 240V version
  - ■ [Rated voltage]   : AC220V ~ 240V
  - ■ [Input voltage range]   : AC198 ~ 264V
  - ■ [Rated frequency range]   : 50 ~ 60Hz
  - ■ [Input frequency range]   : 49.5 ~ 60.5Hz
  - ■ [Rated current]   : 0.2 A(Max. 0.3A)
  - ■ [Power consumption]   : Approx.15W(ISO/IEC 10561 Letter pattern)
                                        : Energy Star compliant
  - ■ [Insulation Resistance]   : 10M ohms min.(between AC line and chassis, DC500V)
  - ■ [Dielectric strength]   : AC1500 V rms. 1 minute (between AC line and chassis)

1.2.10 Reliability

- ❑ Total print volume   : 10,000 pages(A4, letter)
- ❑ Print head life   : 2000 million dots/nozzle

1.2.11 Safety Approvals

[120V version]
- ❑ Safety standard   : UL1950 with D3
                                      : CSA22.2 No.950 with D3
- ❑ EMI   : FCC part 15 subpart B class B
                                      : CSA C108.8 class B

[220 - 240V]
- ❑ Safety standard   : EN 60950(VDE,NEMKO)
- ❑ EMI   : EN55022(CISPR Pub.22) class B
                                      : AS/NZS 3548 class B

1.2.12 Acoustic Noise

- ❑ Noise Level   : Approx.45 dB(A) (According to ISO 7779)

1.2.13 CE Marking

[220 - 240V 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

1.2.14 Printer Language and Emulation

❑ Printer Language : ESC/P Raster
: EPSON Remote

❑ [ESC/P control codes]

< Character mode >
  ■ General Operation
    ❑ Initialize Printer : ESC@

  ■ Paper feeding
    ❑ Form Feed : FF
    ❑ Line Feed : LF
    ❑ Carriage Return : CR

< Graphic mode >
  ■ General operation
    ❑ Initialize Printer : ESC@
    ❑ Unidirectional Printing : ESC U
    ❑ Print a Image : ESC ACK*
    ❑ CSF Mode Control : ESC EM

  ■ Paper feeding:
    ❑ Form Feed : FF
    ❑ Line Feed : LF
    ❑ Line Spacing : ESC+
    ❑ Carriage Return : CR

  ■ Page format
    ❑ Page Length : ESC(C
    ❑ Top/Bottom Margin : ESC(c

  ■ Print position motion
    ❑ Horizontal Print Position : ESC$, ESC\
    ❑ Vertical Print Position : ESC (V,ESC (v

  ■ Spacing
    ❑ Define Unit : ESC(U

❑ Graphics
  ■ Graphics Mode : ESC(G
  ■ Raster Graphics : ESC.
  ■ Microweave control : ESC(i
  ■ Dot size control : ESC(e

❑ Color
  ■ Printing color : ESC r, ESC(r

❑ EEPROM control
  ■ EEPROM control : ESC•b

1.3 Interface

This printer provides parallel interface and serial interface as standard.

1.3.1 Parallel Interface (Forward Channel)

[Transmission mode] : 8 bit parallel, IEEE-1284 compatibility mode
[Synchronization] : By STOPBE pulse
[Handshaking] : BY BUSY and ACKLG signal
[Signal level] : TTL compatible level
[Adaptable connector] : 57-30360 (amphenol) or equivalent

BUSY signal is set high before setting either/ERROR low or PE high and held high until all these signals return to their inactive state.

BUSY signal is at high level in the following cases.
- During data entry (see Data transmission timing)
- When input data buffer is full
- During -INIT signal is at low level or during hardware initialization
- During printer error (See /ERROR signal)
- When the parallel interface is not selected

ERROR signal is at low level when the printer is in one of the following states.
- Printer hardware error (fatal error)
- Paper-out error
- Paper-jam error
- Ink-out error

PE signal is at high level during paper-out error.

Table 1-9 shows the signal and connector pin assignments for parallel interface(forward channel*1).
In case of these signals, twist pair line is used and returning side is connected to signal GND.
(*1): Forward channel is the mode when the ordinary data such as an order to print is sent
    from the PC to the printer.

Table 1-9. Signal and Connector Pin Assignment for Parallel Interface

Pin No.	Signal Name	Return GND pin	In/Out	Functional Description
1	/STROBE	19	In	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	DATA0-7	20-27	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0.
10	/ACKNLG	28	Out	This signal is a negative pulse indicating that the printer can again accept data.
11	BUSY	29	Out	A high signal indicates that the printer cannot receive data.
12	PE	28	Out	A high signal indicates paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	/AFXT	30	In	Not used.
31	/INIT	30	In	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	Out	A low signal indicates printer error condition.
36	/SLIN	30	In	Not used.
18	Logic H	-	Out	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND.
16,33,19-30	GND	-	-	Signal GND.
15,34	NC	-	-	Not connected.

Note) In/Out refers to the direction of signal flow from the printer's point of view.

1.3.2 Parallel Interface (Reverse Channel)

[Transmission mode] : IEEE-1284 nibble mode
[Synchronization] : Refer to the IEEE-1284 specification
[Handshaking] : Refer to the IEEE-1284 specification
[Data trans. timing] : Refer to the IEEE-1284 specification
[Signal level] : IEEE-1284 level 1 device
                : TTL compatible level
[Adaptable connector] : 57-30360 (amphenol) or equivalent
[Extensibility request] : The printer responds affirmatively when the extensibility
                request values are 00H or 04H, that mean,
          00H   :Request Nibble Mode Reverse Channel Transfer.
          04H   :Request device ID; Return Data using Nibble Mode Rev
                Channel Transfer.

Note) The printer sends following device ID string when it is requested.

Table 1-10. Device ID Description

<00H> *1	<38H>	Contents
MFG	EPSON	Production Maker
CMD	ESCPL2,BDC	Command system
MDL	Stylus[SP]PHOTO	Model name *2
CLS	PRINTER	Class

*Note*1)* [00H] denotes a hexadecimal value of zero.
*Note*2)* MDL value depends on the EEPROM setting. Model name can be changed by changing a
        certain address in the EEPROM.

The table below shows pin assignment for reverse channel(*3). In these case of signals, twist pair line
is used and returning side is connected to Signal GND.
(*3): Reverse channel is the mode that any data is transferred from the printer to the PC.

Table 1-11. Pin Assignment for Reverse Channel

Pin No.	Signal Name	Return GND pin	In/Out	Functional description
1	HostClk	19	In	Host clock signal.
2-9	Data0-7	20-27	In	The DATA0 through DATA7 signals represent data bits 0 to7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0. These signals are used to transfer the 1284 extensibility request values to the printer.
10	PrtClk	28	Out	Printer clock signal.
11	PtrBusy, Data Bit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq, DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag, DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host busy signal.
31	/INIT	30	In	Not used.
32	/DataAvail, DataBit-0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	-	Out	Pulled up to +5V via 3.9K ohm resister.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resister.
17	Chassis GND	-	-	Chassis GND.
16,33,19-30	GND	-	-	Signal GND.
15,34	NC	-	-	Not connected.

Note) In/Out refers to the direction of signal flow from the printer's point of view.

Following lists "Notes" when using Parallel Interface.

Note1) "Return GND pin" in the table means twist pair return and is used for all control signals except for Logic H,+5V, Chassis, GND and NC. In this twist pair return, returning side is connected to GND (16, 33, 19-30 pin) for twist pair return. Also, these cables are shielded wires and it is effective to connect to each chassis GND in the PC and printer for electrostatic noise.

Note2) Conditions for Interface are based on TTL level. Rise and fall time should be within 0.2μs.

Note3) Refer to the figure 1-9 for transmission timing of each signals.

Note4) Do not perform data transmission ignoring /ACK or BUSY signal. (Perform the data transmission after confirming that /ACK and BUSY signals are Low.)

Note5) It is possible to perform the printing test including interface circuit without using equipment from outside when 8-bit data signal(20-27 pin) is set to appropriate word code and connect them forcefully to /ACK and /STRB.

[Data Transmission Timing for Forward Channel]
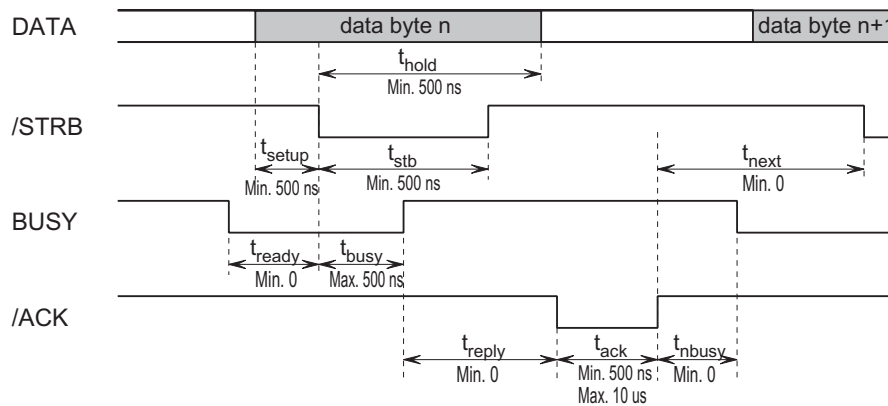
tt-out Max. 120 ns : Rise and fall time of every output signals
tt-in   Max. 200 ns : Rise and fall time of everu input signals
Typical value of tack takes followig values according to Parallel I/F speed(by the settin of EEPROM 24H).
High speed (default) 1 us.
Ordinary 3us

Figure 1-9. Parallel Interface Timing Chart (Forward Channel)

Table 1-12. Maximum and Minimum Timing for Data Transmission

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

* Rise and fall time of every output signals.
** Rise and fall time of every input signals.

Typical time of tack is shown below.

Table 1-13. Typical Time of Tack

Parallel I/F mode	Typical time of tack
High speed	1us
Normal speed	3us

[Signal level: TTL compatible (IEEE-1284 level 1 device)]

Table 1-14. Signal Level

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

*A low logic level on the Logic H signal is 2.0V or less when the printer is powered off and this signal is equal or exceeding 3.0V when the printer is powered on. The receiver shall provide an impedance equivalent to 7.5K ohm to ground.

1.3.3 Serial Interface

[Standard]	: based on RS-423
[Synchronization]	: Synchronous
[Bit rate]	: Approx. 900Kbps
[Word format]	: Start bit 1 bit
	: Data bit 8 bit
	: Parity bit none
	: Stop bit 1 bit
[Handshaking]	: X-ON/X-OFF, DTR protocol
[Adaptable Connector]	: 8-pin mini circular connector
[Recommended interface cable]	: Apple System Peripheral-8 cable

Following table shows connector pin assignment and signals:

Table 1-15. Connector Pin Assignment and Signals

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

Note) In/out refer to the direction of signal flow as viewed from the printer.
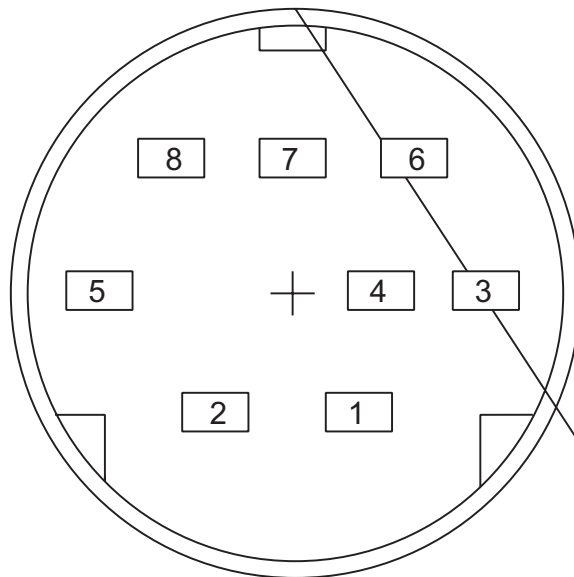Following figure shows port arrangement of serial I/F connector.

Figure 1-10. Serial I/F Connector Port

Following table shows timing relation of DTR, X-on/X-off handshaking.

Table 1-16. DTR, X-ON/X-OFF Protocol

State	Buffer Space	X-ON/X-OFF	DTR
Busy	Less than 3072 bytes	Send X-OFF code	Off
Ready	More than 5120 bytes	Send X-ON code	On

1.3.4 Prevention Hosts from Data Transfer Time-out

Generally, hosts abandon data transfer to peripherals when a peripheral is in the busy state for dozens of seconds continuously. To prevent hosts from this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slow down is started when the rest of the input buffer becomes several hundreds of bytes. Finally, the printer is in the busy state continuously when the input buffer is full.

1.3.5 Interface Selection

The printer has 2 built-in interfaces; the parallel interface and serial interface. These interfaces are selected automatically.

■ Automatic selection
In this automatic interface selection mode, the printer is initialized to the idle state scanning which interface receives data when it is powered on. Then the interface is that receives data first is selected. When the host stops data transfer and the printer is in the stand-by state for the seconds, the printer is returned to the idle state. As long as the host sends data or the printer interface is busy state, the selected interface is let as it is.

■ Interface state and interface selection
When the parallel interface is not selected, the interface got into the busy state. When the serial interface is not selected, the interface sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface got into the ready state, the serial interface sets the DTR signal SPACE. Caution that the interrupt signal such as the /INIT signal on the parallel interface is not effective while that interface is not selected.

1.4 Control Panel

EPSON Stylus Photo does not require many buttons since the printer driver can start various settings and motions. Therefore, there are only 2 non-lock type push buttons, 1 lock type push button and 4 LEDs. Following figure shows control panel of EPSON Stylus Photo.
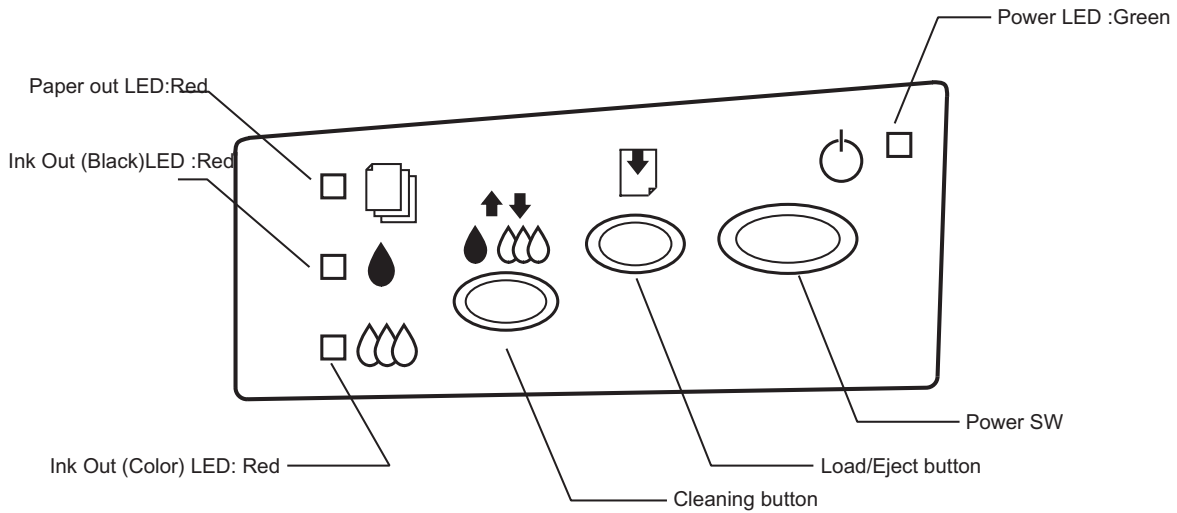
Figure 1-11. Control Panel

1.4.1 Indicators

(1) Power

Lights when the operate button is "ON", and AC power is supplied.

(2) Paper out

Lights during the paper-out condition, and blinks during the paper-jam condition.

(3) Ink Out (Black)

Lights during no Black ink condition, and blinks during the Black ink low condition.

(4) Ink Out (Color)

Lights during no Color ink condition, and blinks during the Color ink low condition.

1.4.2 Panel Functions

[Panel Functions]

Table 1-17. Panel Function

Button	Function
Load/Eject (Pushing within 2 seconds)	• Loads or Ejects the paper. • When carriage is on the Ink Cartridge change position, return carriage from Ink Cartridge change position.
Load/Eject (Pushing for 2 seconds)	• Starts the Ink Cartridge change sequence.* Moves the carriage to cartridge change position.
Cleaning (Pushing for 2 seconds)	• Starts the Cleaning of head. • In the condition of "Ink Low" or "Ink Out" or "No Ink Cartridge" starts the Ink Cartridge change sequence.*
Cleaning (Pushing within 2 seconds)	• When carriage is on the Ink Cartridge change position, return carriage from Ink Cartridge change position.

*This function is not available in printing status.

[Panel Functions with Power ON]

Table 1-18. Panel Function with Power On

Button	Function
Load/Eject	• Starts status printings.**
Cleaning	• Changes a Code Page.
Load/Eject + Cleaning	• Enters the particular settings mode.(Factory use only.) • To enter the particular settings mode, it is necessary to push following button while Paper Out LED is blinking.(It blinks about 5 seconds)

** status printings prints firmware version, ink counter, selected code page and nozzle check patterns.

[Particular setting mode]

Table 1-19. Particular Setting Mode

Button	Function
Load/Eject (Pushing for 10 seconds)	• Initialize EEPROM*** and reset timer IC.

*** Refer to EEPROM map.(Refer to EEPROM map in the Appendix)

[Maintenance Error Reset Procedure]
You can reset the maintenance error by pressing the cleaning button after you enter the particular setting mode(Refer to table 1-18, 19). There are no function which can be reset the all address in EEPROM on the EPSON Stylus Photo. Following are detail procedure of maintenance error reset operation

[Step 1]   By pushing Load/Eject and Cleaning buttons at the same time, turn on the power switch.
               (By operating this performance, the LED for paper out starts blinking.(5 seconds only))
[Step 2]   Push the Load/Eject button for 10 seconds while the LED for Paper Out is blinking.

Note)   If the printer accepts this function correctly, it returns to the standby mode after the
            Maintenance LEDs (both black and CMYcm) blink for 1 second.
            Following shows the lists that will be cleared by this performance.

         1. Clear the value of Ink Counter
         2. Clear Time IC
         3. Initialization of I/F selection (returns to AUTO)

⚠ **WARNING**

☑ *Since EPSON Stylus Photo does not have "All Clear function" for EEPROM like other printers, do not perform this operation except for the purpose of the maintenance error reset.*

☑ *Be sure to replace a waste ink pad in the printer enclosure with a new one after you perform [Maintenance error reset procedure].*

☑ *If the waste ink pad is replaced regardless of maintenance error, perform this operation.*

1.4.3 Printer Condition and Panel Status

The table below shows printer condition and panel status. Since this table shows various error status and also presents printer status, you can judge appropriate repair ways from this table.

Table 1-20. Printer Condition and Panel Status

Printer status	Indicators				Priority
	Power	**Ink Out (Black)**	**Ink Out (Color)**	**Paper Out**	
Power on condition	On	---	---	---	9
Ink sequence	Blink	---	---	---	6
Ink Cartridge change mode	Blink	---	---	---	5
Data processing	Blink	---	---	---	8
Paper Out 1*	---	---	---	On	4
Paper jam condition1*	---	Off	Off	Blink	3
No Ink cartridge or Ink end(black)1*	---	On	---	---	7
Ink level low(black)	---	Blink	---	---	7
No Ink cartridge or Ink end(color)1*	---	---	On	---	7
Ink level low(color)	---	---	Blink	---	7
Enter EEPROM and Timer IC reset 2*	---	On (1 second only)	On (1 second only)	On (1 second only)	---
Maintenance request1*	Blink	Blink	Blink	Blink	2
Fatal error1*	Blink	On	On	Blink	1

Note1)*: Refer to section 1.5 for error status.
Note2)*: It does not mean that all address would be cleared.
Note3)*: --- means no changes.

1.5 Error Status

When following status occur, the printer goes to the error status and stops taking data, setting the /ERROR signal in the interface as "Low", and Busy signal as "High". At this time, the printer goes to non printable status. Refer to section 1.4.3 for more details of LED Panel indicators during the various error status.

1.5.1 Ink Out

When the printer runs out most part of the ink of any one color, it warns ink-low and keeps printing. When the printer runs out the whole ink of any one color, it stops printing and indicates ink-out error. User is requested to install a new ink-cartridge in this state. A ink-cartridge once taken out should never be used again. Re-installation of the cartridge not filled fully upsets the ink level detection and may cause a serious problem in the print head as a result.

⚠ **WARNING**

☑ *Never use the ink cartridge once taken out.*

Following explains above warning sign.

[Step 1] After the cartridge is once taken out, bubbles come in from the ink supply hole located at the top of cartridge and are absorbed into the head during printing performance. Therefore, the head will be unable to discharge the ink properly. Also, inevitable entering of bubbles when installing a new ink cartridge can be absorbed to ink itself since the ink itself in the cartridge is deaerated during the production process. However, this absorbing ability can last only about one hour after the cartridge is installed.

[Step 2] Even after the bubble absorbing ability described above stops, there is no worry about entering bubbles as long as the ink cartridge is being installed to the printer. However, if the ink cartridge which does not have absorbing ability any more is once removed from the printer, new coming bubbles into the cartridge will never disappear naturally. These bubbles may cause not only printing malfunction but also thickening ink. This thickened ink goes into the head and clogs ink path in the head or nozzle and may cause serious head damage.

[Step 3] As standard specification for EPSON Stylus Photo, ink consumption counter is reset when the ink cartridge is removed. If an ink cartridge is removed and re-installed unnecessarily the value on the ink consumption monitor which the user can check will be wrong and printer may keep printing even though the ink cartridge is installed empty. This may cause head damage.

1.5.2 Paper Out

When printer fails to load a sheet after power on operation including timer-cleaning is done and Load/Eject button on the FF command or operation panel is pressed, it goes paper out error.

1.5.3 Paper Jam

When the printer fails to eject a sheet even after feeding motion is completed or Load/Eject button on the FF command or operation panel is pressed, it goes paper jam error.

1.5.4 No Ink-Cartridge

Following reasons can be the causes when printer goes to this error mode.

1) When the printer is turned on for the first time.
   (This is a normal error state and it returns to the normal state after installing an ink cartridge according to the ink cartridge exchange operation.)
2) Ink cartridge exchange operation is not done correctly.
   After the position of carriage is moved by exchange operation, if the cleaning button is pushed without installing ink cartridge or if the carriage returns to the home-position automatically without doing any operation, it is considered as handling mistake. However, it returns to normal state by performing ink exchange operation again and installing cartridge correctly.
3) If "No ink-cartridge error" appears even after the ink cartridge is installed, the printer must be something wrong and around the sensor area in the carriage need to be repaired.
4) If sometimes printer can print normally but also sometimes "No ink-cartridge error" appears, the printer must be something wrong. (Same reason as 3) above)

1.5.5 Maintenance Request

When the total quantity of ink wasted through the cleanings and flushing reaches to the limit, printer indicates this error and stops. The absorber in the printer enclosure is needed to be replaced with new one by a service person. The ink quantity that is absorbed by the absorber (waste ink pad) is monitored by the software counter as "total ink counter". This counter is added by point system and also absorber's maximum ability is set at the following reference value.

$$37000 \times 0.0113 \text{ ml} = \text{Approximately 418 ml}$$

- □ 1-point = 0.0113ml (the value which is multiplied evaporating rate and 1-dot ink weight 0.02ml)
- □ 37000 = Maximum point number (Maintenance error threshold)

However, considering dispersion of ink absorbing quantity and the number of using nozzles, ink total value is calculated by the following formula.

$$418 \times 1.1/ 67\% = 526 \text{ ml (but up to 687ml can be retained)}$$

⚠ **WARNING**

When you perform self test after completing repairs, it is possible to check the present value of total ink counter conditions of all nozzles by performing status printing in the built-in function. Therefore, make sure that the printer has enough value of total ink counter (if the number is close to 29500 or not). If there is not enough value, the service man is required to judge if it is necessary to clear EEPROM after replacing the absorber (waste ink pad) or not. Refer to section 1.4.2 if you need to perform EEPROM Clear.

1.5.6 Fatal Errors

When printer detects fatal errors such as carriage control error or CG access error, it goes to this error mode. Refer to followings for each error.

1) Carriage control Error : Parallel adjustment malfunction, HP detection malfunction,
   shortage of lubricant on the carriage guide shaft, etc.

2) CG Access Error   : Short circuit, etc.

1.6 Printer Initialization

EPSON Stylus Photo has three kinds of initialization methods. Following explains each initialization.

[1.Power-on initialization]
This printer is initialized when turning the printer power on, or printer recognized the cold-reset command (remote RS command). When printer is initialized, following action is performed.
        (a) Initializes printer mechanism.
        (b) Clears input data buffer.
        (c) Clears print buffer.
        (d) Sets default values.

[2.Operator(Panel) initialization]
This printer is initialized when turning the printer power on again within 10 seconds from last power off, or printer recognized the /INIT signal (negative pulse) of parallel interface. When printer is initialized, following action is performed.
        (a) Cap the printer head.
        (b) Eject a paper.
        (c) Clears input data buffer.
        (d) Clears print buffer.
        (e) Sets default values.

[3. Software initialization]
The ESC@ command also initializes the printer. When printer is initialized, following action is performed.
        (a) Clears print buffer.
        (b) Sets default values.

1.7 Initialization Settings

EPSON Stylus Photo initializes following settings when the initialization is performed. Also, if the user changes the settings in the Panel setting, Default setting or Remote command setting, values or settings which are possible to be stored are initialized as initialization settings.

- Page position   : Page heading location as present paper location
- Line spacing   : 1/6 inch
- Right margin position   : 80 lines
- Left margin position   : first line
- Character pitch   : 10CPI
- Printing mode   : Text mode (Not Raster graphics mode)

1.8 Main Components

EPSON Stylus Photo has following major units. Also, it is one of the major characteristics that the bottom of the Printer mechanism plays the role as Lower case at the same time. Each units from 2) to 4) are simply explained as following.

      1) C209 Main control board
      2) C206 PSB/PSE(Power Supply Board)
      3) C209 PNL(Panel Board)
      4) Printer Mechanism
      5) Upper Case

1.8.1 C209 Main Control Board

In the C209 main control board, TMP95C061BF(Toshiba, TLCS900/H series) is mounted and it is operated by 25.0 MHz drive frequency. By this CPU, circuit in 16 bit bus width is consisted and various memories are added. These memories are controlled by MMU of the gate array(E05B43YA).
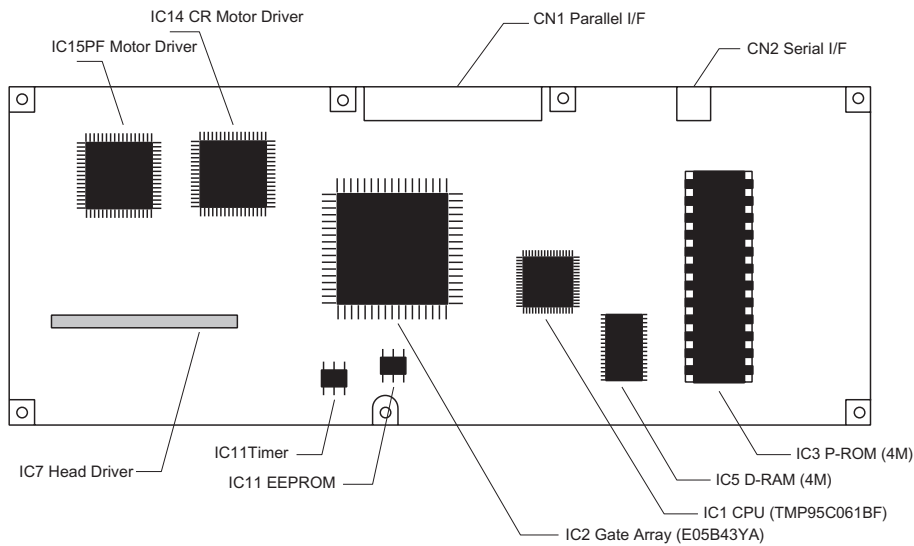

Figure 1-12. C209 Main Control Board

1.8.2 C206 PSB/PSE(Power Supply) Board

The C206 PSB/PSE board is a switching regulator type power supply unit and constantly supplies stable logic and power voltages to the printer mechanism and the main control board. Also, since this C206 PSB/PSE board has the power switch in the secondly side of the circuit, it is possible to keep supplying electricity to the C209 MAIN control board for 30 seconds even after the power switch is turned off. Using this time difference, even when mis-operation is done by the user such as turning off the power during the middle of printing work, it prevents unexpected trouble with the printhead from occurring, by transferring the printhead to the cap position before complete shut down. The C206 PSB Board is for AC100 - 120V input voltage and the C206 PSE Board is for AC220-240V input voltage.
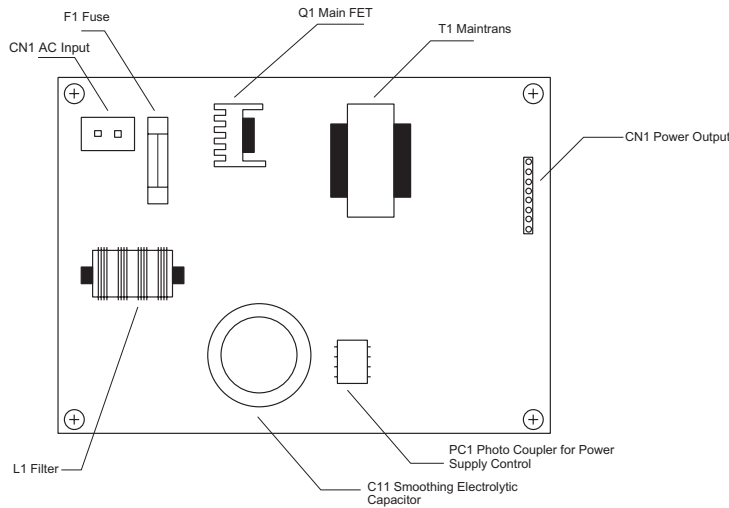
Figure 1-13. C206 PSB Board

1.8.3 C209PNL Panel Unit

Panel unit (C209 PNL board) consists of 3 switches, 4 LEDs and 1 connector as they are illustrated in the figure below.
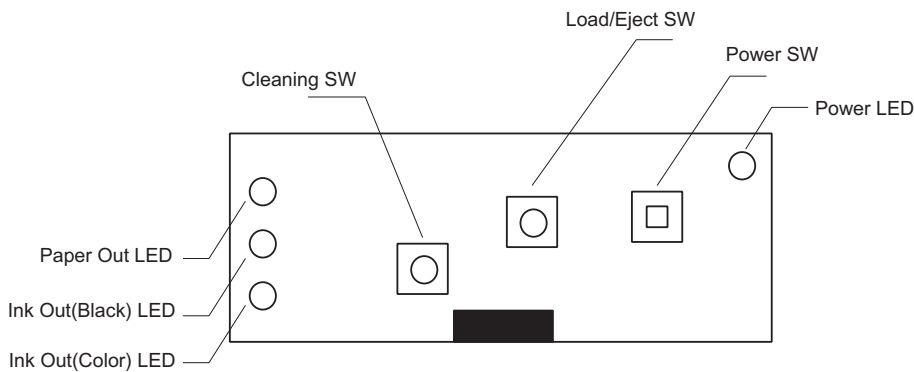
Figure 1-14. C209 PNL Panel Unit

1.8.4 Printer Mechanism

This printer mechanism consists of ASF(auto sheet feeder) mechanism, paper load mechanism, carriage mechanism, print head, pump mechanism and waste ink absorber.

1.8.5 Housing

This printer's housing consists of upper case, print cover, paper support and paper eject tray.
In this printer, there is no lower case since the printer mechanism plays its role.

Paper Support

Printer Cover

Upper Case
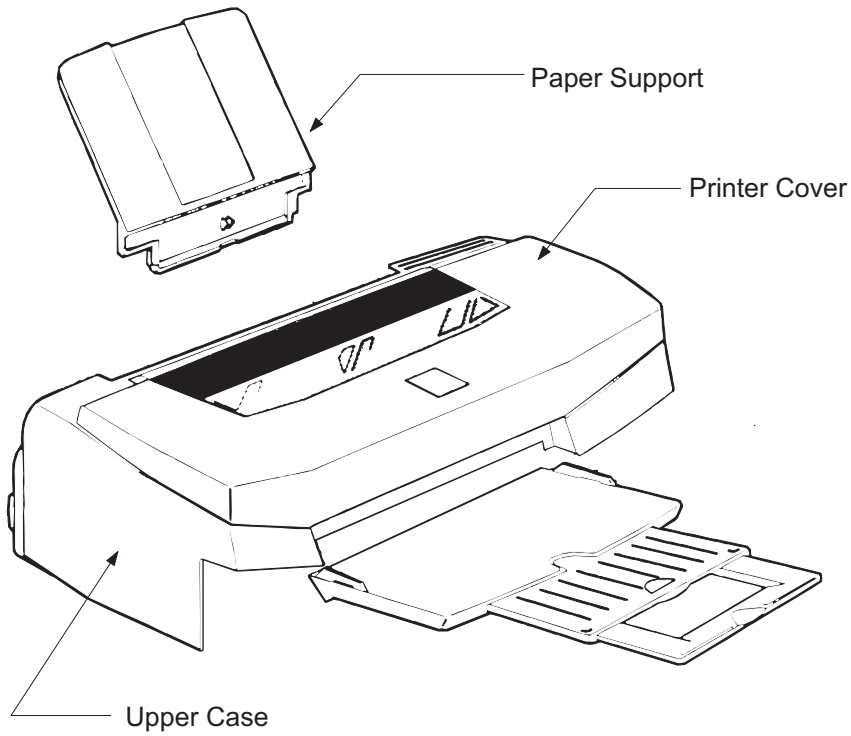
Figure 1-15. Housing

Chapter 2
Operating Principles

2.1 OVERVIEW

This section describes Printer Mechanism, electric circuit board (C206 PSB/PSE, C209 Main, C209PNL board) of EPSON Stylus Photo.

2.1.1 Printer Mechanism

Unlike the previous EPSON Ink Jet printers, printer mechanism of EPSON Stylus Photo does not have exclusive mechanism to change over paper feeding and pumping operation. In stead, this control is done by the turning direction of paper feed/pump motor and changing the position of carriage at that time. Also, unlike previous print heads, the print head of this printer became one unit combined with black, CMY(Cyan, Magenta, Yellow), LM(Light Magenta) and LC(Light Cyan) head. Black head has 32 nozzles, 90 dpi(vertical direction) and CMY, LC, LM head has 32 nozzles for each color, 90 dpi (vertical direction). Also, since these print head is driven by frequency 14.4KHz, this printer can print twice faster (200-dpi) than Stylus Color even at 720-dpi high resolution printing. Since the head drive frequency of Stylus Color was 7.2KHz, it was driven by 100-cps printing speed in order to perform 720-dpi printing. Following figure2-1 shows outline of the printer mechanism.
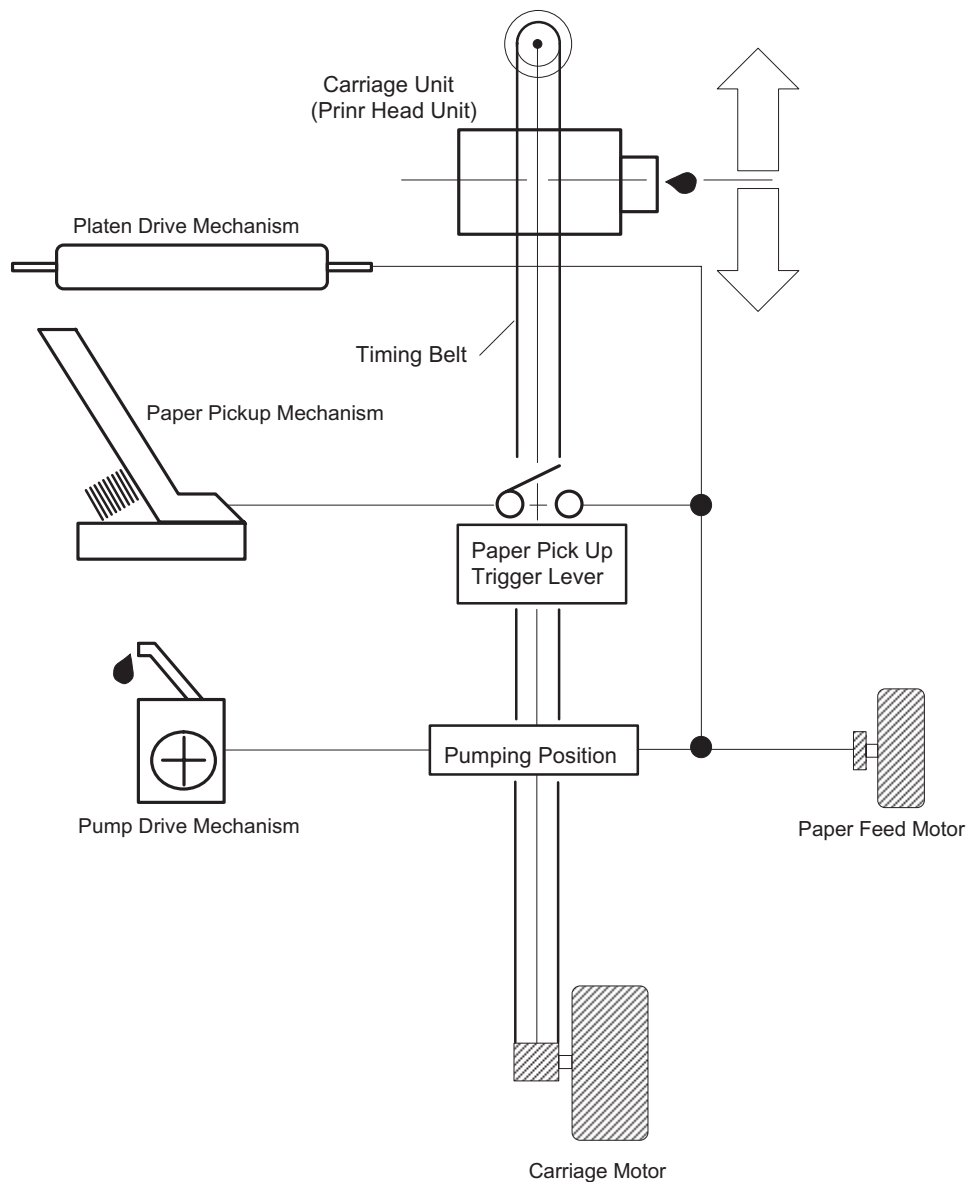
Figure 2-1. EPSON Stylus Photo Printer Mechanism Block Diagram

As you can see major printer mechanisms in the figure 2-1, there are four major mechanisms as they are listed below.

1) Printing mechanism 2) Carriage drive unit 3) Paper pick up mechanism   4) Pump drive mechanism

2.1.1.1 Printing Mechanism

Basic operating principles of the print head which plays major role of printing mechanism is the same as previous models; on demand type MACH head method, but there is some differences in the resolution. (Refer to figure1-1) Also, unlike Stylus Color II, Stylus 820 and Stylus Color 200 automatic correction type, in order to fix the dispersion of mufti layer piezo electric element which is used for driving each nozzles, it is necessary to input the VH value written on the side of print head by using exclusive program when you replace the print head, control board, or the printer mechanism.(However, there are no resistor array to decide the VH voltage on the main control board.) Following explains the print heads.

❑ PZT
  ■ PZT is an abbreviation of Piezo Electric Element. Print signal from C209 board is sent through the driver board on the print head unit and to the PZT. Then, the PZT pushes the top cavity which has ink stored, and make the ink discharge from each nozzle located on the nozzle plate.
❑ Cavity Set
  ■ Ink which is absorbed from ink cartridge go through the filter and will be stored temporarily in this tank, which is called "cavity", until PZT is driven.
❑ Nozzle Plate
  ■ The board with nozzle holes on the printer head surface is called Nozzle Plate.
❑ Filter
  ■ When the ink cartridge is installed, if any dirt or dust around the cartridge needles are absorbed into the head inside, there is a great possibility of causing nozzle clog and disturbance of ink flow and finally causing alignment failure and dot-missing. In order to prevent this, filter is set at cartridge needle below and ink is once filtered here.
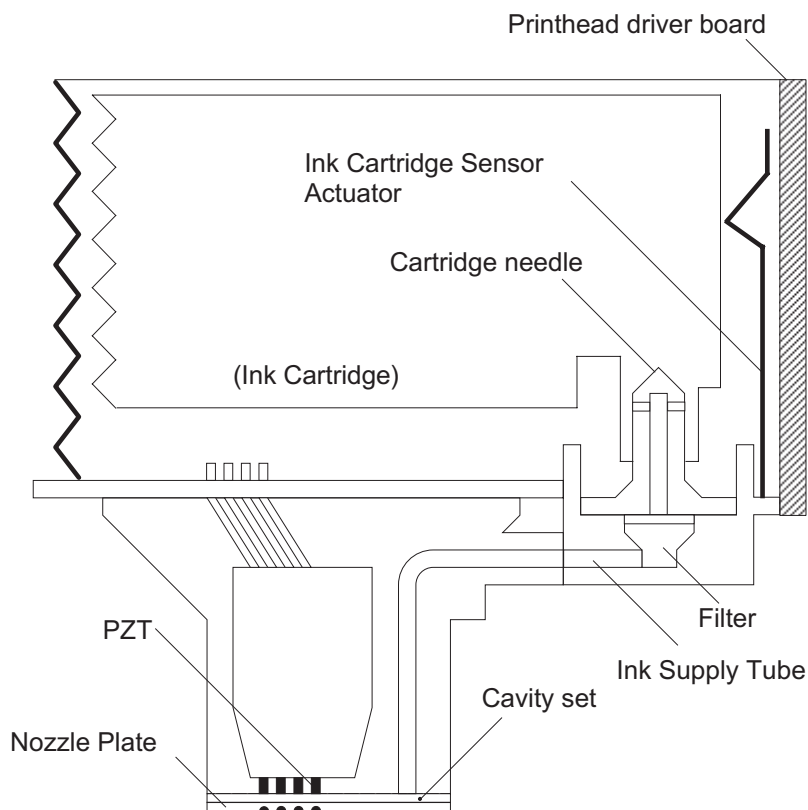
Figure 2-2. Print Head Sectional Drawing

2.1.1.1.1 Printing Process

Following figures indicate the sectional drawing of normal state and ejecting state of print head.

(1) Normal State:
   When the printing order is not output, PTZ also does not move and stays in the waiting mode (normal state).
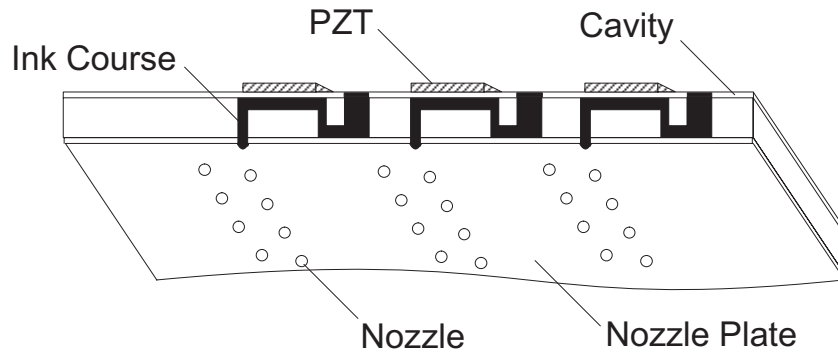
Figure 2-3. Print Head Normal State

(2) Ejecting State:
   When the print signal is output from the C209 main board, IC(IR2C72C and IR2C73C:Nozzle Selector) located on the print head unit latches the data once by 1-byte unit. Appropriate PZT latched by nozzle selector is pushed in to the cavity by applying common voltage from the C209 main board. By this operation, ink that is stored in the cavity pops out from nozzles.
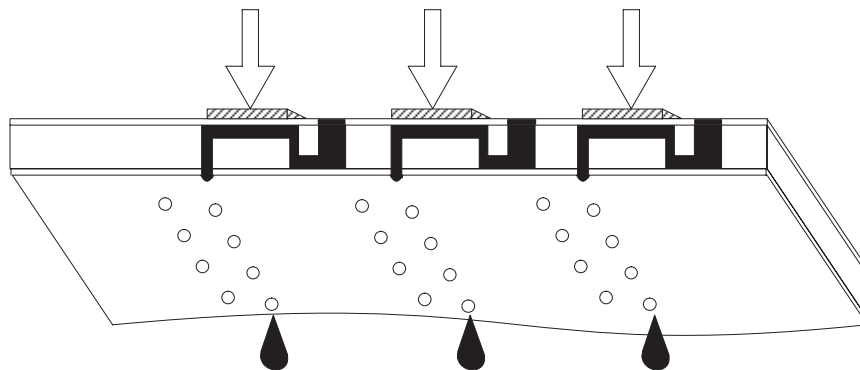
Figure 2-4. Print Head Ejecting State

2.1.1.1.2 Printing Method

This section explains printing method of actual printing such as printing text at various resolution select/printing mode and graphics printing. In order to prevent white or color banding which are peculiar problem of ink-jet, new Micro-Weave functions are added to the previous Micro-Weave function. The number of nozzles and printing mode according to the selected resolution are used separately by a user. The table below shows relation between selected resolution and printing mode.

1) Full Overlap Micro-Weave
2) Part Line Overlap Micro-Weave
3) Micro-Weave: (same as previous control)

Table 2-1. Resolution and Printing Mode

Vertical direction [dpi]	Printing mode	Paper feed pitch [inch]	Forward Overlap-Nozzle	Non Overlap-Nozzle	Backward Overlap-Nozzle	Not used Nozzle
360	FOL M/W	15/360	#16・`#30	---	#1・`#15	#31, #32
	M/W	31/360	---	#1・#31	---	#32
720	FOL M/W	15/720	#16・`#30	---	#1・`#15	#31，#32
	POL M/W	29/720	#30・`#32	#4・`#29	#1・`#3	---

Note1: M/W means Micro-Weave.
Note2: FOL means Full Overlap Micro-Weave.
Note3: POL means Part line Overlap Micro- Weave.
Note4: Forward Overlap-Nozzle and backward Overlap -Nozzle are described in the [1.Full Overlap Mirco-Weave] and [2.Part line Overlap Micro-Weave] below.

Following explains operation outlines of new Micro-Weave functions listed above.

[1. Full Overlap Micro-Weave]

In order to print one line at horizontal direction, this printing method is designed to complete a printing pattern by two-pass carriage operation with two different types of dot. When these two different types of dot pass one same line twice, it does not print the same dot twice. Following explains the outline of this movement.

■ The number of all nozzles which are going to be used are divided equally into 2 groups.
■ Paper feeding will be done as many as each number of nozzles which are divided into two groups and the same number of dots.(for example, if there are two 10-nozzle groups during 360-dpi printing at longitudinal direction, paper feeding of 10/360-inch becomes available.)
■ At this time, two groups perform Micro-Weave individually and particular lines are passed by two different nozzles.

Note1) Two groups which are divided according to each elements will be divided either even dot or odd dot when particular lines(level direction line) are formed and eventually, these lines will be completed at selected resolution. Following is a conceptual figure when full overlap micro-weave forms a particular line.
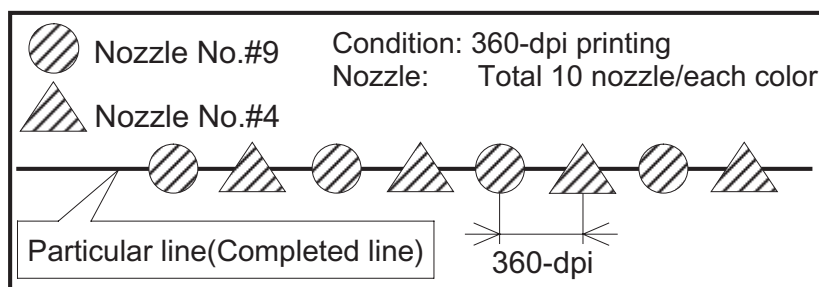
Figure 2-5. Full Overlap Micro-Weave

Note 2) The way firmware decides which nozzle becomes even dot or odd dot is determined as it is described below.

❑ If the line which is about to be printed is even line:
  ■ First dot prints odd dot lines and 2nd dot prints even dot lines.

❑ If the line which is about to be printed is odd line:
  ■ 1st dot prints even dot lines and 2nd dot prints odd dot lines. Eventually, horizontal resolution will be the same resolution as selected one.

[2.Part Line Overlap Micro-Weave]

This printing method is to perform Micro-Weave printing, overlapping part of nozzles which are used for printing. As a result, a part of line which is overlapped consists of different browse with different nozzles. The figure below shows 1-line overlap at 5-dot sending as an example with explanation on the next page.

Note1: The paper feed pitch is 5/360-dpi in this figure.
Note2: Mark of ⊘ and ▨ mean overlap nozzle.
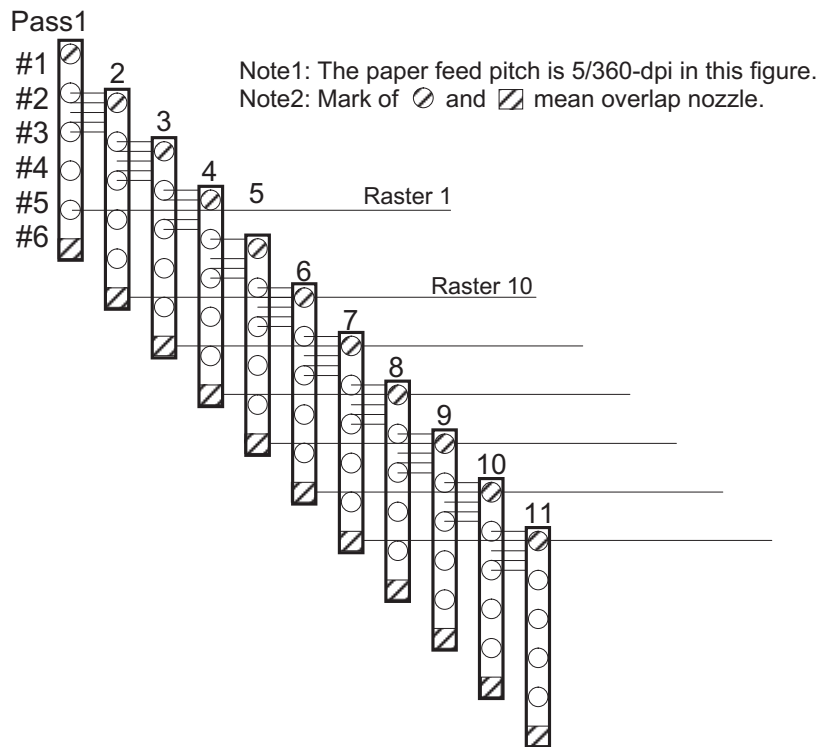
Figure 2-6. Part line Overlap Micro-Weave

■ The difference between Full-Overlap Micro-Weave and Part line Overlap Micro-Weave are following;

▪ ***Full-Overlap Micro-Weave:***
Printing is performed, judging if nozzles are even or odd dot by 2 different dots in all different lines.

▪ ***Part line Overlap Micro-Weave:***
After particular nozzles(only#1, and #6 in the figure2-6) are determined as overlap nozzles, even or odd dot will be determined like Full-overlap Micro-Weave does.
(Forward Overlap Nozzle is determined as even and backward nozzle is odd.)
Also, nozzles other than particular nozzles can print at even and odd dot just by one nozzle.

1) Overlap Nozzle : Head drive frequency is driven half of the ordinal one like 2) below.
2) Nozzle other than Overlap nozzle : Head drive frequency is twice as much as overlap nozzle.

Usually, the firmware changes over automatically these full overlap Micro-Weave, Part line Overlap Micro-Weave, and ordinal Micro-weave according to the selection of resolution. Also, when these three printing modes are performed by the EPSON Stylus Photo, the printer performs top and bottom margin process in order to control the overprinting volume as little as possible.

2.1.1.2 Carriage Mechanism

Carriage mechanism is to drive the carriage with print head from left to right or vice versa.
The carriage drive motor in this printer is a 4-phase, 200-pole stepping motor and is driven by
1-2phase, 2-2phase and W1-2phase drive method. This stepping motor allows the carriage to
move freely to the particular positions which is necessary for various operation, such as paper feeding,
ink absorbing, flashing, ink exchange and cleaning operations. The tables below show carriage motor
specifications and motor controls at each mode.

Table2-2. Carriage Motor Specification

Item	Description
Motor type	4-phase/200-pole Stepping motor
Drive voltage Range	42VDC ±5%
Internal coil resistance	7.8 Ohms ±10% (per phase under 25°C environment)
Driving speed(frequency) range[cps (pps)]	5(60) - 340(4080)
Control method	Bi-Pola Drive

Table 2-3. Motor Control at each mode

Mode	Driving speed [CPS]	Drive frequency [PPS]	Drive method
High speed skip	340	4080	W1-2, 2-2,1-2phase drive*
Printing(1→ 80 column direction)	200	2400	W1-2phase drive
Printing(80→ 1 column direction)	200	2400	W1-2phase drive
Capping	80	960	W1-2phase drive
Wiping	40	480	W1-2phase drive
Cap(valve released)	20	240	W1-2phase drive
Cap (Release)	5	60	W1-2phase drive

Note 1): The reason why plural drive methods exist is that following some sequences described below
exist in the each mode and, more stable carriage operation and printing are performed
individually by different drive methods. This drive method is necessary especially for high
speed skip.

Acceleration 1 mode → Acceleration 2 mode → Deceleration 1 mode → Deceleration 2 mode
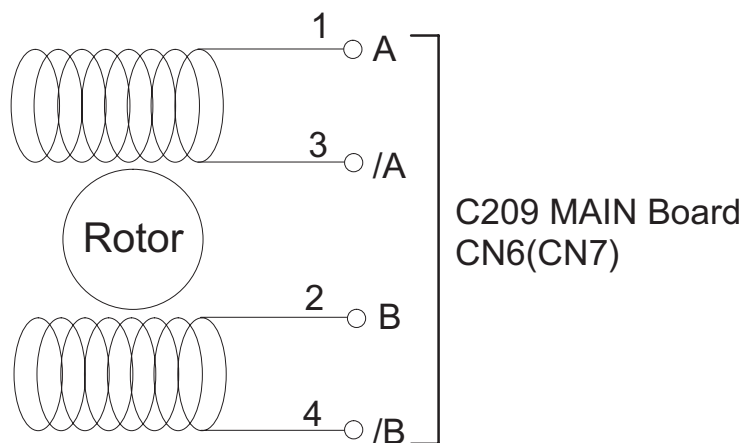
Figure 2-7.CR(PF/Pump) Motor Internal Block Diagram

EPSON Stylus Photo

The table below shows W1-2 phase drive sequence at each steps when the rotor of carriage motor makes one rotation. In the EPSON Stylus Photo, in addition to a function that printing is performed with W1-2 drive phase, high speed skip mode which is a function to skip over the blank from the end of the printing data to the next data starting point in high speed, can be also performed by 2-2 and 1-2 phase drive. W1-2 phase requires 4 times as much steps as 2-2 phase drive, calculating 2-2 phase as standard. By using this method, it becomes possible to supply constant and stable torque to the motor. As a result, it also becomes difficult to be influenced by vibration from the printer mechanism during printing.

Table 2-4.Motor Drive Sequence(W1-2.phase drive)

Sequence Number	Phase A				Phase B			
	Phase a	10a	I1a	Current Duty	Phase b	10b	I1b	Current Duty
0	0	1	0	+2/3	0	1	0	+2/3
1	0	0	1	+1/3	0	0	0	+1
2	X	1	1	0	0	0	0	+1
3	1	0	1	-1/3	0	0	0	+1
4	1	1	0	-2/3	0	1	0	+2/3
5	1	0	0	-1	X	0	1	+1/3
6	1	0	0	-1	1	1	1	0
7	1	0	0	-1	1	0	1	-1/3
8	1	1	0	-2/3	1	1	0	-2/3
9	1	0	1	-1/3	1	0	0	-1
10	X	1	1	0	1	0	0	-1
11	0	0	1	+1/3	1	0	0	-1
12	0	1	0	+2/3	1	1	0	-2/3
13	0	0	0	+1	1	0	1	-1/3
14	0	0	0	+1	X	1	1	0
15	0	0	0	+1	0	0	1	+2/3

This W1-2 phase drive (or 2W1-2 phase drive) is called Micro-step and is attached with so called 2/3・EVref or 1/3・EVref factor, compared with drive current value (Vref100%) which is supplied at 2-2phase drive. This Micro-Step allows the rotor to have delicate rotation. In the 2-2 phase drive method, it is usually
required to take 4-step sequence in order to rotate the rotor once. However, in case of W1-2 phase, it is required to take 16-step sequence(in the table 2-4, sequence 0・`15) which is 4 times more than 2-2 phase method to do that. Also, in case of 2W1-2 phase drive which can be seen in the Stylus Color etc., it takes 2-step to rotate the rotor once. The table below shows relation of rotation direction of the rotor and carriage proceeding direction.

Table 2-5. Relationship Between Rotation Direction and Carriage Operation

Carriage proceeding direction	Rotation direction of Rotor 1*	Drive method	Proceeding order of sequence
HP→80 column direction	Clockwise direction	2-2, 1-2, W1-2 phase	Sequence No.0→15
80 column→HP direction	Counterclockwise direction	2-2, 1-2, W1-2 phase	Sequence No.15→0

Note) 1* Looking from rotor shaft side.

The figure below shows carriage mechanism. The print head as a core of the printing mechanism is installed in the carriage unit. This print head keeps the angle of print head in flexible and adjustable structure by moving the adjustment lever up and down with the Angular adjustment mechanism. (Refer to chapter 4 for more details) Also, parallelism adjustment lever is mounted on right side of the carriage guide shaft and it adjusts parallelism between paper and shaft when this shaft is installed to the printer mechanism.

After this adjustment is completed, operating the PG adjustment lever makes possible to change the space between the surface of paper and print head surface into 2 phases; either 1.04mm to 1.94mm. It is possible to vary the space between the surface of paper feed assembly and the print head by rotating the axis of carriage guide shaft which itself is decentralized, with the operation of PG lever. This is the mechanism that user can adjust the appropriate PG value by himself according to the paper thickness or any other environmental conditions such as paper curl.

Carriage lock mechanism is to prevent the carriage from being left uncapped for a long time because of vibration during the printer transport or mishandling by the users. If the carriage is left uncapped for a long time, an ink on the print head surface gradually becomes viscosity. As a result, the nozzle will be unable to discharge ink. To make matters worse, the nozzle may be completely clogged by the viscosity ink and it may not be able to return to the normal condition just by the normal cleaning operation. In order to prevent this, printer goes to carriage lock state at the following conditions.

- ❑ **After Power OFF operation:**
  - ■ If the power is turned off during the printing or any other performance, carriage lock will be performed in the end after completing initialize operation.
- ❑ **After power ON operation:**
  - ■ After power is turned on and automatic P-On Cleaning(power on cleaning) is performed, then carriage lock will be performed. The timer IC always counts printer's power OFF time by using the power of lithium battery mounted on the C209 main board. P-on cleaning function automatically selects the cleaning level according to the time which the printer is not in used.
- ❑ **After Eject the paper:**
  - After Load/Eject button is pressed and the paper is ejected, if the data is not input, the printer performs carriage lock and goes to standby state. However, if the paper is loaded to the printer inside by Load/Eject button, the printer does not perform the carriage lock operation.
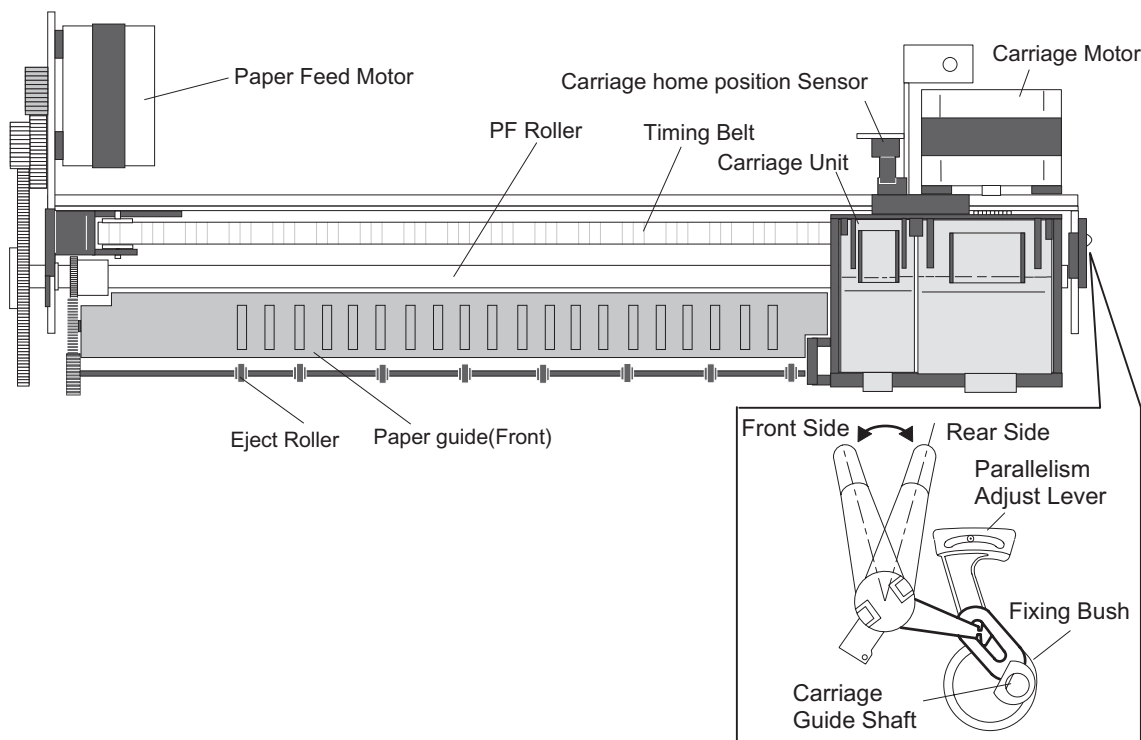
Figure 2-8. Carriage Mechanism(Top Viewing)

2.1.1.2.1 Paper Gap Adjust Mechanism

This mechanism can be set by the users and can prevent various problems related to low image density or print with any dirt by changing the positions of PG lever according to the paper types.

Table 2-6. PG Lever Setting

Paper	Lever Position	PG Value
Normal paper, Coated paper	Front	0 mm (1.04mm between head and paper feed assembly)
Envelopes	Rear	0.9mm (1.94mm between head and paper feed assembly)

It is a major premise that parallelism adjustment is done correctly for the space between head and paper (PG value above) which can be changed by adjusting the paper gap.
Parallelism adjustment should be done when the serviceman mounts the carriage guide shaft on the printer mechanism during repair service. In the adjustment, the space should be adjusted to 1.04 mm, using a thickness gauge.

2.1.1.3 Paper Feed Mechanism and Pump Mechanism

Mechanisms that send the paper in the hopper to inside the printer and perform constant paper feed in order to perform printing on the sent paper are called paper feed mechanism as generic name. In the EPSON Stylus Photo, 4-phase, 200-pole hybrid type pulse motor is used in the PF motor as a motive power for the paper mechanism and driving is done at 2-2 and 1-2 phase drive method. This motor is not only used as a power source for paper feed mechanism but also used as power source for pump mechanism which is necessary for the print head cleaning. By using this pulse motor, it becomes possible to use high speed drive or intermittent drive for the various paper feeds and pump operations, such as paper feed, slight paper feed, high and low speed absorption of pump operations. Following tables(Table 2-7 and 2-8) show PF motor specifications and control method at each mode.

Table 2-7. PF Motor Specification

Item	Description
Motor type	4-phase/200-pole Stepping motor
Drive voltage	42VDC±5%
Coil Resistance	7.8 ohms±10% (per 1 phase under 25°C environment)
Drive frequency	400-4320Hz
Control method	Bi-Pola Drive

Table 2-8. Motor Control Method at Each Mode

Mode	Drive Method	Drive Frequency [Hz]	Pulse Space (fÊs)
Paper feed A	2-2 phase	4320	231
Slight paper feed	1-2 phase	400	2500
Slight paper feed	1-2 phase	2400	417
High speed attraction of pump	2-2 phase	4100	243
Low speed attraction of pump	1-2 phase	1800	555
Low speed paper feed	1-2 phase	1200	833
Paper feed B	2-2 phase	3400	294
Paper feed C	1-2 phase	4000	250
Ordinal absorption of pump	1-2 phase	4100	243

Following tables show 1-2phase drive method at PF motor drive and each drive sequence at 2-2phase drive method.

Table 2-9. 1-2 Phase Drive Method

Step No.	Clockwise		Counter clockwise	
	Phase A	Phase B	Phase A	Phase B
1	+2/3	+2/3	+2/3	+2/3
	0	+1	+1	0
2	-2/3	+2/3	+2/3	-2/3
	-1	0	0	-1
3	-2/3	-2/3	-2/3	-2/3
	0	-1	-1	0
4	+2/3	-2/3	-2/3	+2/3
	+1	0	0	+1

Table 2-10. Drive Sequence at 2-2 Phase Drive

Step No.	Clockwise(CW)		Counter clockwise(CCW)	
	A	B	A	B
1	+2/3	+2/3	+2/3	+2/3
2	-2/3	+2/3	+2/3	-2/3
3	-2/3	-2/3	-2/3	-2/3
4	+2/3	-2/3	-2/3	+2/3

Papers on the ASF (auto-sheet-feeder) supplied by the user are carried to the printer inside by paper pick up sequence. Unlike the previous models, ASF of EPSON Stylus Photo has multi feed prevention mechanism. Following explains this function and figure below shows its mechanism.

[1. Multi feed prevention mechanism]
When the Load/Eject button is pressed, reversed rotation of PF motor is performed.
The return lever resets papers which are already in the out of stand by position and make it possible to perform stable paper feeding by picking up the paper again.
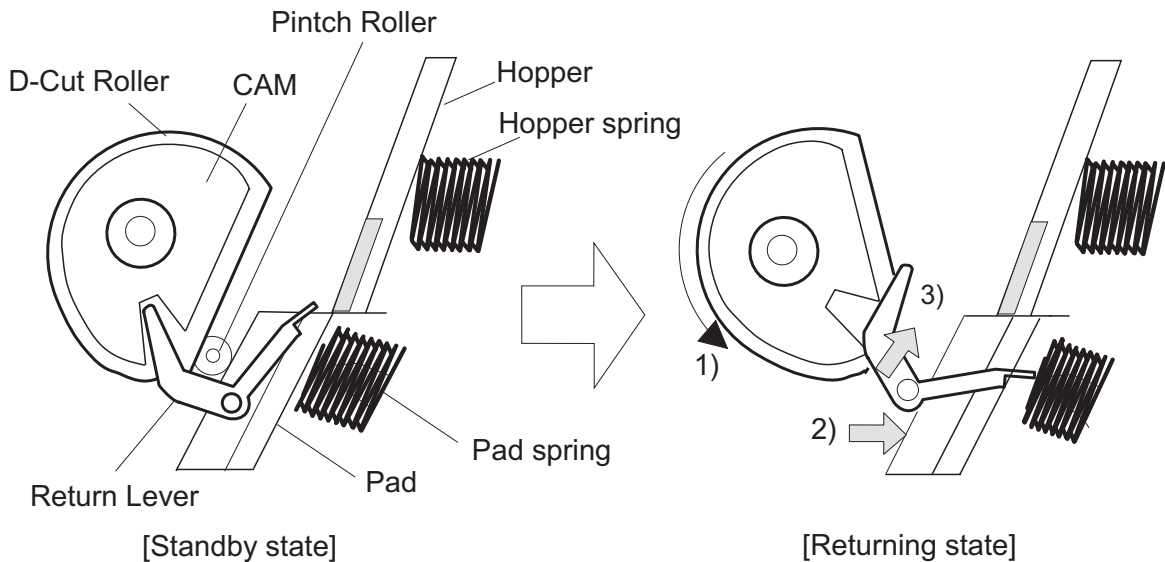
Figure 2-9. Multi Paper Feed Prevention Mechanism

Following explains process of multi feed prevention step by step. Refer to the figure above and confirm its operation.

[Step 1]   When the Load/Eject button is pressed or the signal of printing order is input from the PC, PF motor rotates counterclockwise and makes the CAM rotate towards direction of 1) in the figure above.
[Step 2]   When the CAM covers the notch by the return lever, that position is considered as home position, being monitored by ASF sensor.
[Step 3]   When the CAM rotates toward 1) in the figure above, the return lever is pushed by the notch of CAM and falls towards 2). At this time, the return lever moves to direction 3) by this motion, and push down the pad which is waiting in the below part. At this time, friction of pinch roller and pad will be canceled.
[Step 4]   The papers which are out of stand by position by the previous paper feed motion are returned to the paper stand by position by flip over strength of return lever. After this, PF motor rotates clockwise and the printer goes to pick up sequence.

In the paper pick up mechanism of EPSON Stylus Photo, same mechanism as Stylus Color IIs/820 are applied. This mechanism changes adjoined lines of gear by colliding trigger lever with carriage unit, and convey the motive power on the paper feed assembly to the ASF side(paper roller). The figure below shows mechanism with explanation.

[2. Paper pick up mechanism]
When the Load/Eject button is pressed or printing order is input, the carriage unit moves to the left edge and collides with paper pick up trigger lever. When the carriage collides with this trigger level, a planetary gear located on the same axis is also pushed at the same time and conveys the motive power on the paper feed assembly to the adjoined gear line side for ASF drive.
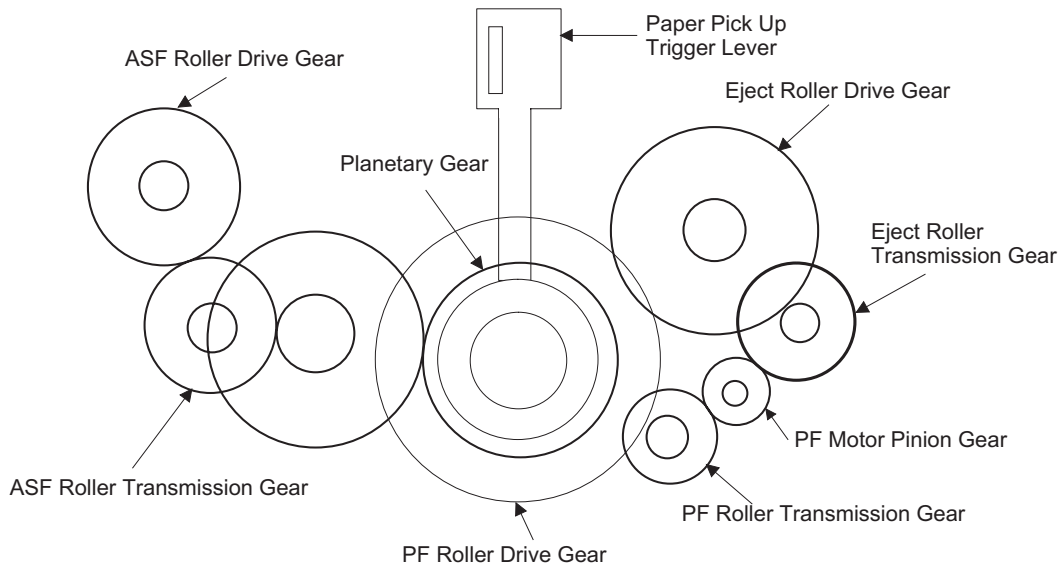
Figure 2-10. Paper Pick Up Mechanism

[3. Paper feed mechanism]
After papers in the ASF receive controls from pick up and multi feed prevention mechanism, they are sent to the printer inside. The papers picked up by paper roller in the ASF goes to between paper feed assembly and roller support. Also, the eject roller pushes out the paper completely to the end and the roller support drops the paper in the eject tray. The eject roller is driven with an eject paper notched roller as pair where is located on the paper eject roller. Paper eject notched roller solves the deflection of paper that is in between eject notched roller and paper eject roller and always keep a certain space between the print head and paper surface. The figure below shows paper feed mechanism.
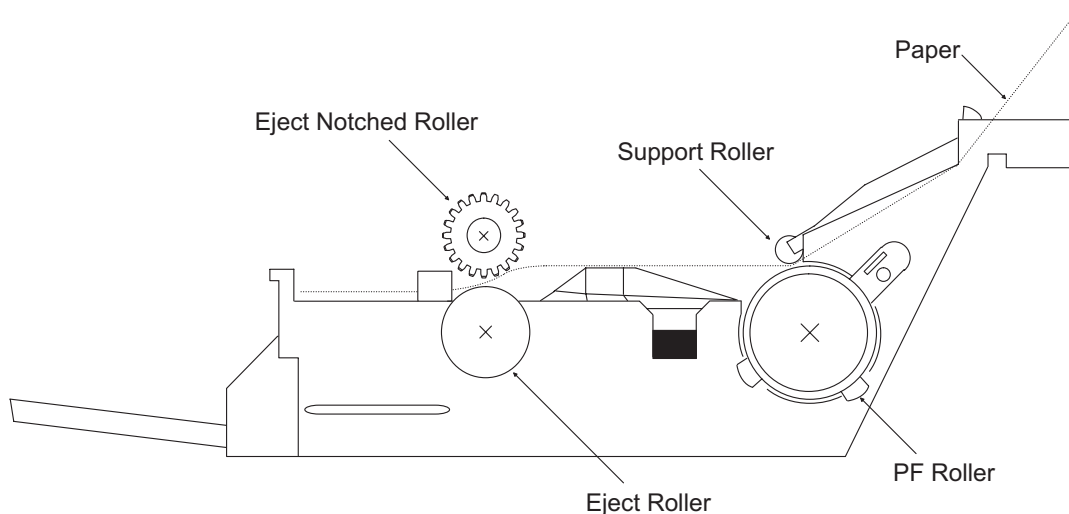
Figure 2-11. Paper Feed Mechanism

2.1.1.4 Ink System

Ink system mechanism consists of 1)cap mechanism, 2)pump mechanism, 3)carriage lock mechanism, 4)waste ink absorber and 5)ink sequence. Out of these mechanism, from 1) to 4) are physical mechanism and parts which are mounted on the printer mechanism, and 5) ink sequence is performed automatically by the firmware. Also, unlike the previous models, since EPSON Stylus Photo has no engage/disengage mechanism to change over pump mechanism and paper feed mechanism, it is one of the major characteristics that pump and paper feed assembly are always at work whenever the PF motor is driven. The figures below shows head positions when the ink system and various ink sequence are performed.
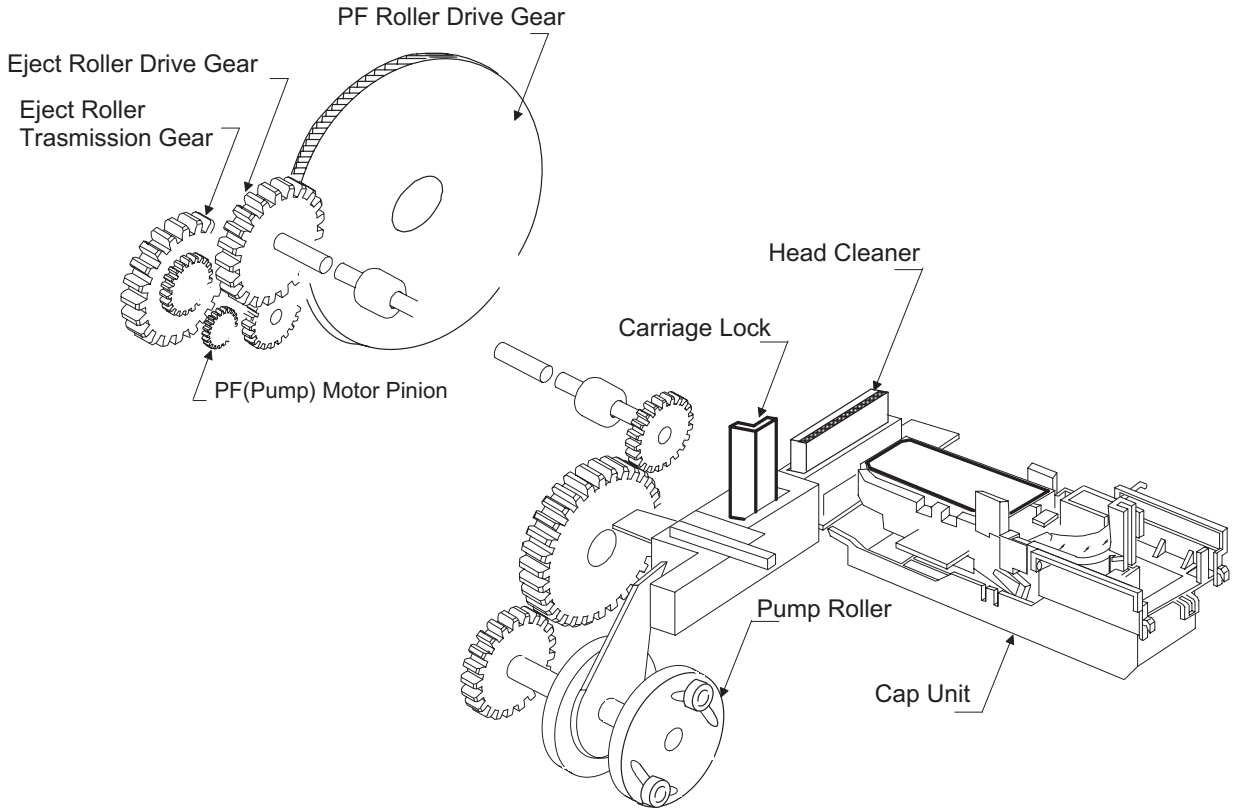
Figure 2-12. Ink System Mechanism

A: Dummy pumping position
B: Home position
C: Flashing position(right side)
D: I/C replacing position
E: Wipping complete/Rubing start position
F: ASF Standby position
G: Flashing position
H: ASF pick up position
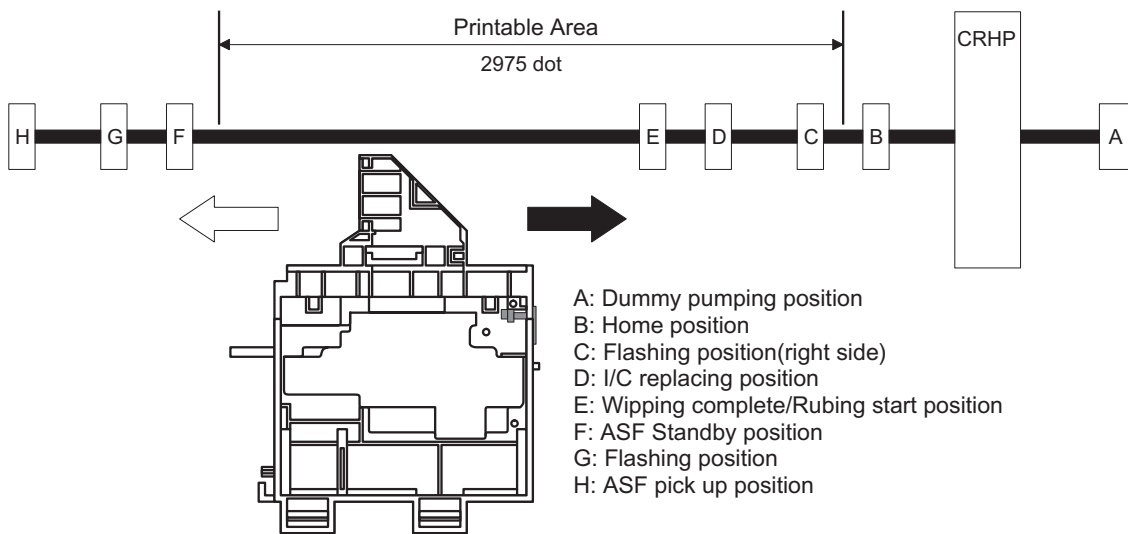
Figure 2-13. Major Ink Sequence Position on the Carriage Mechanism

2.1.1.4.1 Pump, Carriage Lock, Head Cleaner Mechanism

In the EPSON Stylus Photo, there is no button or mechanism to change over the pump/paper feed mechanism. Therefore, whenever the paper feed/pump motor rotate, the pump drive roller in the pump unit inside rotates. However, ink absorbing/non ink absorbing are separated by the roller rotational directions. Also, even if the pump drive roller(pump motor) rotates toward ink absorbing and the carriage is in the false absorbing position, only driving in the pump mechanism is performed and actual ink absorption is not done. The figure below shows process of conveying motive power to the pump drive roller.

Gear A

Axis of Paper Eject Roller

Gear B

Gear C

Actually, these parts are one unit.

Compression Spring

Pump Drive Roller
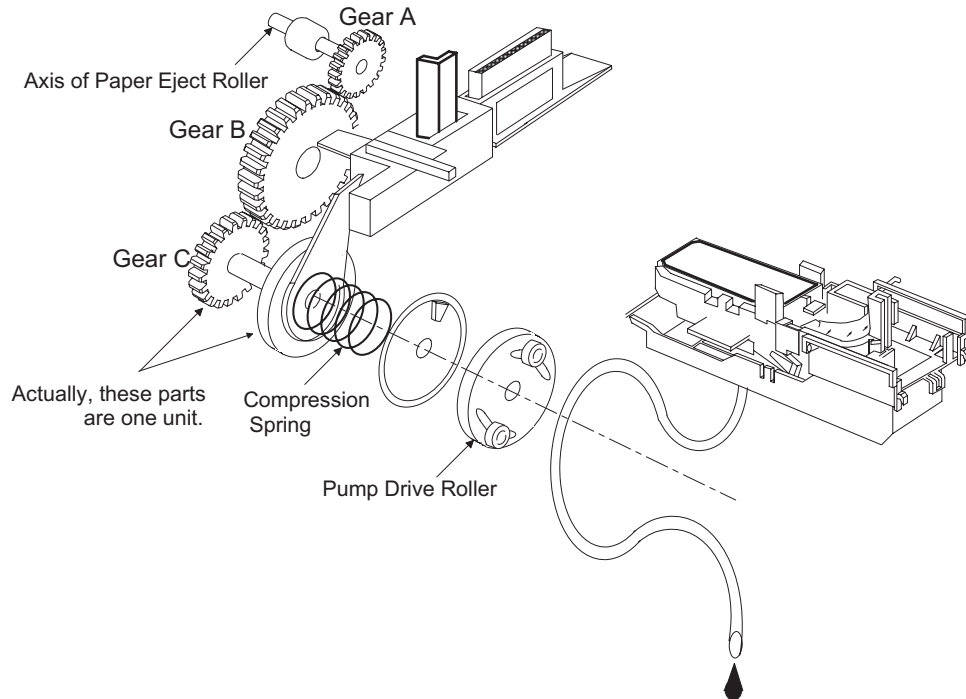
Figure 2-14. Pump Mechanism Power Transmission Process

The process of conveying the motive power to the paper eject roller by rotating the pinion of PF motor is shown in figure 2-12. This motive power is conveyed to the Gear C through Gear B.
In the figure above, although the lever in order to drive Gear C, carriage lock, head cleaner mechanism is shown separately, it is constructed as one unit. Since the engagement of these two parts depends on the tension of the compression spring, if the lever is burdened, only Gear C and pump roller rotate and no more motive power is conveyed to the lever part.

The table below shows PF/Pump motor rotational direction and pump system operation.

Table 2-11. Relationship Between Pump Motor Rotation and Pump Operation

PF/Pump motor rotational direction	Pump unit operation
Clockwise(CW) forward rotation	1)Released from the pressured pump 2)Head cleaner reset 3)Carriage lock reset
Counterclockwise(CCW) backward rotation	1)Move to the state that pump is pressed 2)Head cleaner set 3)Carriage lock set

The figure below shows the pump operation at clockwise and counterclockwise rotations.

CCW Rotation

CW Rotation

Tube pressured

Tube released
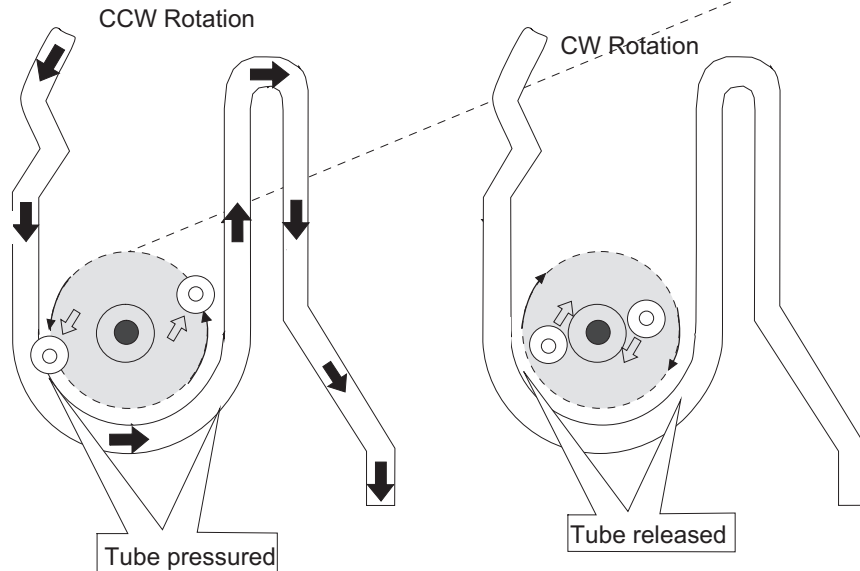
Figure 2-15. Pump Roller Rotation and it's Operation

In the ink absorptive operation such as cleaning, flushing initial ink charge except for printing operation, ink in the ink cartridge drains to the waste ink absorber(pad) through the cap by the pump unit drive.
In case of printing and flushing, ink is popped out by the PZT in the print head, but in case of absorptive operation such as cleaning and initial ink charge, ink absorption is performed only by the pump drive without PZT drive after the head surface is adhered to the cap.
The next page explains cap mechanism and relation between printer operation and cap mechanism.

2.1.1.4.2 Cap Mechanism

In the cap mechanism, in order to prevent ink from being viscosity on the head surface, it is controlled that the head surface stays adherent to the rubber frame of the cap surface when the power is off. The absorber is spread in the cap and can hold a certain amount of ink which is absorbed from the head without draining it to the waste ink pad. Also, in the bottom of absorber, there are two valves in order to control adhesion of head and cap surface, and one exits to drain ink to the waste ink pad.

A
B

Flag for Carriage

Ink Eject Valve

Negative pressure release valve

Valve

Close state

Release state

Flag for frame

Head surface and cap are adhered each other. Actual and false absorptions.

Ink absorption in the cap.

During cleaning, initial ink charge, and right flushing.etc.

During left flushing and paper feeding,etc.
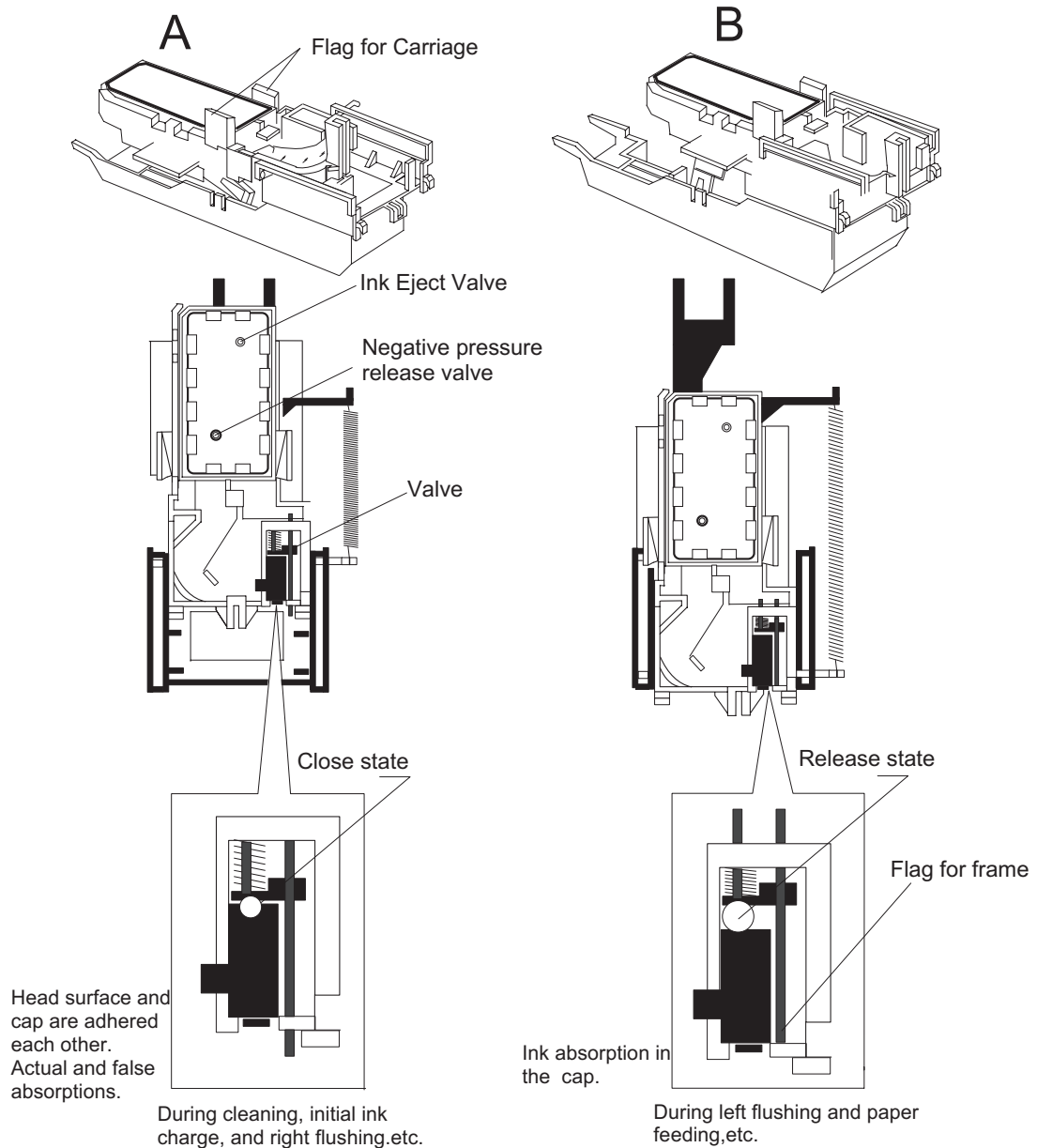
Figure 2-16. Cap Mechanism Operation Principle

If the carriage is out of HP(in this case, in the printable area or paper feed position), the valves on the cap mechanism stays in the position A in the figure above and are always closed. In this condition, the carriage collides with flag, actual ink absorption and slight ink absorption are performed.
Also, by moving the carriage to further right side and colliding the flag for opening the valves with the frame, negative pressure is released in the state that head surface and cap are adhered. This makes it possible for ink in the nozzle to be ready for being ejected from the cap in the stable condition.

2.2 Electrical Circuit Operating Principles

EPSON Stylus Photo contains the following four electric circuit boards.

■ C206 PSB/PSE board
■ C209 Main board
■ Head Driver board
■ C209 PNL board

C206 PSB/PSE, C209 main board are explained in this section. The head drive board is installed in the head unit the carriage. The figure below shows electric circuit block diagram.
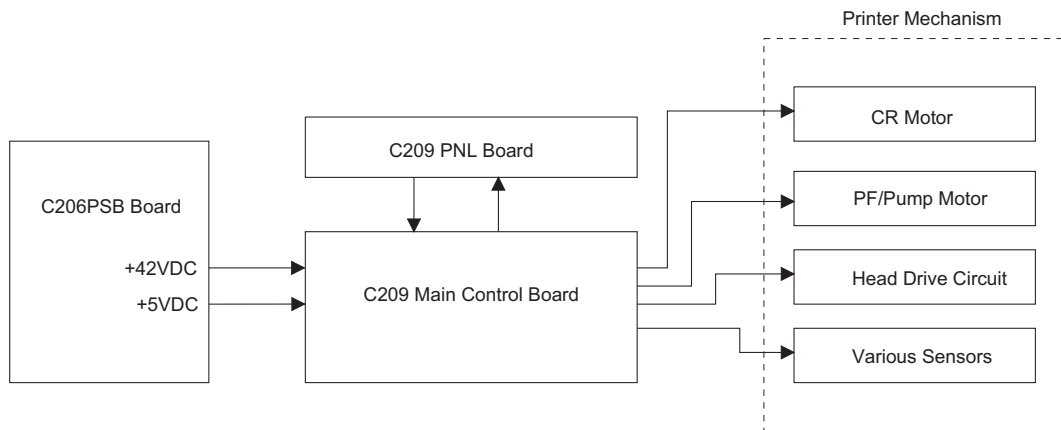
Figure 2-17. Electric Circuit Block Diagram

2.2.1 C206 PSB/PSE Power Board

C206 PSB/PSE board is a power supply board with a RCC switching regulator, which generates +42VDC for drive part and +5VDC for logic part to drive the printer. The table 2-12 below shows application of voltages generated by C206 PSB/PSE board.

Table 2-12. Application of DC Voltage

Voltages	Application
+42V	■ Motors(CR Motor, PF/Pump Motor) ■ Print Head Common Voltage
+5V	■ C209 Main control Board logic ■ C209PNL Panel Board ■ Sensors (HP sensor, ASF HP sensor, PE sensor)

The power switch of this printer is in the secondary circuit that allows the PSB/PSE board to continue to supply voltage for both power and logic line for at least 30 seconds until the printhead returns to the capping position even if the printer turned off during printing. This prevents ink leakage or dried print head caused by the print head being left uncapped. The AC voltage from the AC inlet is first input to the filter circuit for higher harmonics absorption and is then input to the rectification and smoothing circuit, converting into DC voltage. This DC voltage is then input to the switching circuit. Along with this switching operation by FET on the primary side, +42V voltage is generated and stabilized on the secondary side, which is then converted into the stable +5V VDC by the chopping regulator IC.
Figure 2-18 shows the block diagram of the electrical circuit.
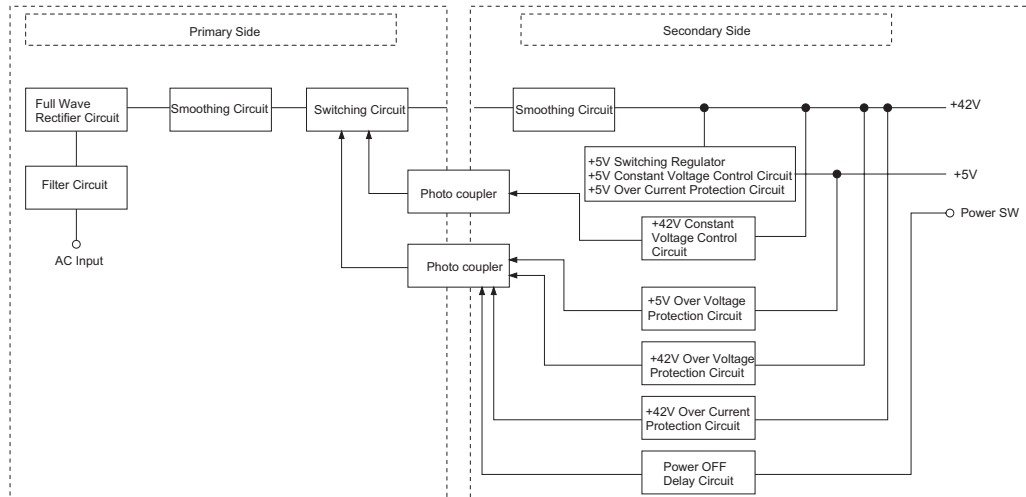
Figure 2-18. C206 PSB/PSE Board Block Diagram

The operating principles of various circuit and controller circuit in the figure above are described below.

❑ +5V Line Over Voltage Protection Circuit:
The output voltage level of +5V is monitored by a Zener diode(ZD53) on the secondary circuit. If the voltage level exceeds 9V, the Switching FET Q1 goes off by the following operation, and no induced electromotive force is generated, and generation of +5V and +42V stops as the result.
■ Zener diode(ZD53) detects the voltage which exceeds +9V at the +5V line.
■ Transistor Q81 goes On.
■ Photo coupler PC1 goes On.
■ FETQ31 goes On and the gate voltage for Switching FETQ1 is cut off.
■ Switching FETQ1 goes Off.

❑ +5V Line Constant voltage Control Circuit:
Voltage at the +5VDC line is monitored by the regulator IC51. Abnormal voltage at the +5VDC line is detected and the information is fed back to the +5V comparator in the IC, then +5VDC is cut off.

❑ +42V Line Over Voltage Protection Circuit:
The output level of the +42V line is monitored by the 2 Zener diodes;ZD52 and ZD87.
When the output level of the +42V line exceeds +48V, the Switching FET Q1 goes Off by the following operations.
■ Zener diodes(ZD52, ZD87) detect the voltage which exceeds +48V at the +42V line.
■ Transistor Q81 goes On.
■ Photo coupler PC1 goes On.
■ FET Q31 goes On and the gate voltage for switching FET Q1 is cut off.
■ Switching FET Q1 goes off.

❑ +42V Line Control Circuit:
The output level of the +42V is detected by the Zener diodes; ZD51, ZD81 to ZD86.
When the voltage at the +42V line exceeds +38V, the Switching FET Q1 is controlled by the following operations.
■ Zener diodes(ZD51 and ZD81 to ZD86) detect the voltage over +38V at the +42V line.
■ Photo coupler PC1 goes On.
■ Transistor Q3, Q2 go On and gate voltage for the Switching FET Q1 is cut off.
■ When the voltage level drops under +38V at the +42 line, the photo coupler PC1 and transistors Q3 and Q2 go Off and the Switching FET Q1 goes back On.

❑ +42V Line Over Current Protection Circuit:
The output current is monitored by the transistors Q81 and Q82. When the output current is abnormally low, the information is fed back to the primary circuit via the photo coupler PC1 to stop the switching operation.

2.2.2 C209 Main Board

C209 Main control board consists of the following;
- Logic Circuit(PROM, DRAM,CPU, ASIC, EEPROM)
- Motor control, Drive Circuits(CR Motor, PF/Pump Motor)
- Head Control, Drive Circuit(Black and Color heads)
- I/F Circuit (Parallel I/F, Serial for Mac)
- Sensor Circuit, RTC Timer Circuit, Reset Circuit

Since EPSON Stylus Photo is the printer designed for output of the photo images/color graphics, there is no CG-ROM.

The figure below shows block diagram for the main board.
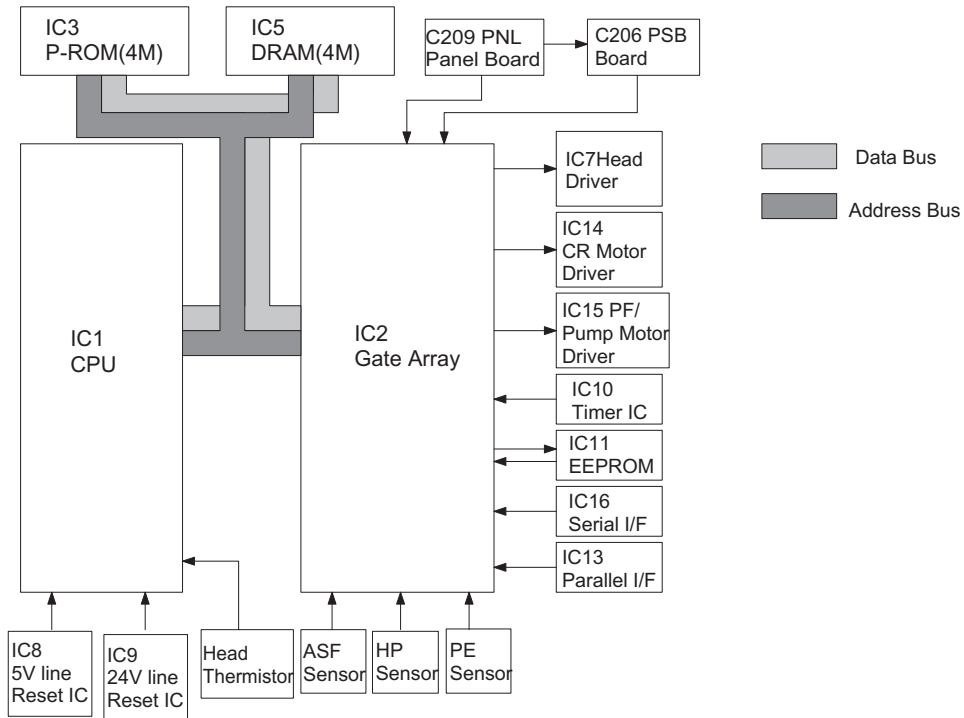
Figure 2-19. C209 Main Control Board Block Diagram

Table 2-13.Functions of CPU and Gate Array

IC	Location	Function
CPU	IC1	❑ Outputs driving trigger pulse for each motor. ❑ Outputs driving trigger pulse for each head. ❑ Inputs the resistance value for thermistor. ❑ Control PROM, DRAM(selection, read and write) ❑ Outputs Watchdog timer
Gate Array	IC2	❑ Controls various motor drivers ❑ Monitors various sensors (Ink cartridge sensor, PE, HP and ASF) ❑ Controls Mac serial ❑ Controls printing data for each head ❑ Controls parallel I/F ❑ Outputs head driver control pulse ❑ Counts the number of printing dot ❑ Controls voltages for EEPROM, control panel, timers, and heads

2.2.2.1 Reset Circuits

On the C209 main board, 2 ICs are mounted ; IC for monitoring the logic line(+5V) and IC for monitoring the power line(+42V) and both are monitored by the gate array and CPU.

The reset circuit prevents the CPU from running away, which is caused by the unstable voltage in the logic circuit during the power ON/OFF. Also, this circuit monitors the level of power voltage at the overloading or malfunction on the circuit and manages the printer to operate normally, keeping the damage to the printer minimum during the abnormal situations.

❑ **+5V Line Reset Circuit**

In the +5V reset circuit, IC8 PST592D monitors +5V voltage and outputs reset signal from VOUT to CPU and gate array when the abnormal voltage is detected. IC8 starts operating under the following conditions.

■ When the power is turned on, a reset signal is output for 100ms after the +5V line level rises to +4.2V.

■ During the print operation, if the +5V lines goes below 4.2V, a reset signal is output. The reset signal does not go off until 100ms passed after the +5V line voltage level recovers to 4.2V, as described above.
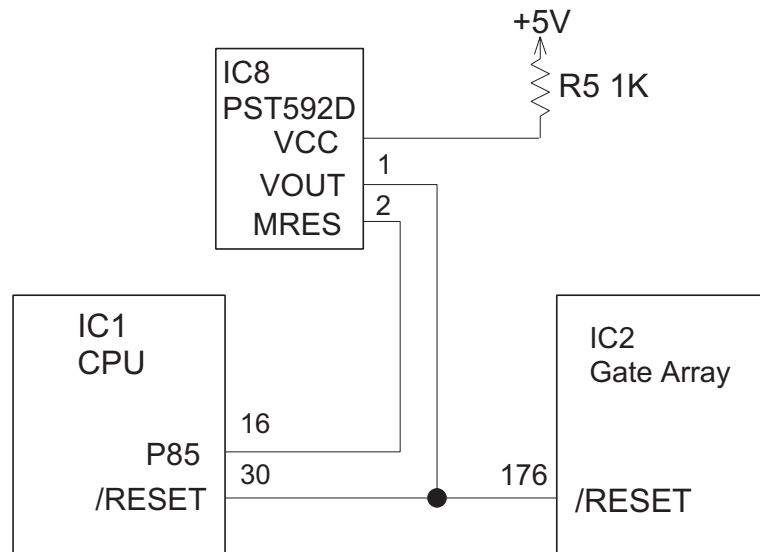
Figure 2-20. +5V Line Reset Circuit

❑ **+42V Line Reset Circuit**

In the +42V line reset circuit, IC9 M51955B monitors the voltage of +42V line in the port IN and feeds back information to CPU. When the +42V line goes below +33.2V, IC9 outputs the reset signal to the CPU port /NMI from the port OUT which is in the power off state. When the +42V line reaches 33.2V, the reset signal is released from the port of IC9 and is detected in the port 15 of CPU.
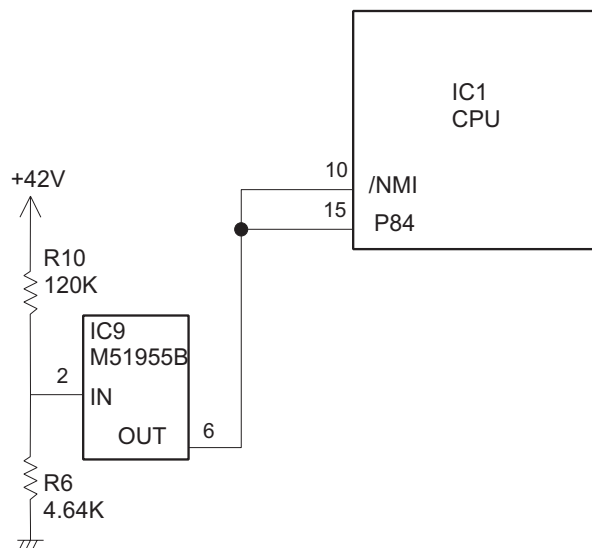
Figure 2-21. +42V Line Reset Circuit

2.2.2.2 Sensor Circuits

This printer has 3 photo diode sensors(ASF sensor, PE sensor and HP sensor), 2 mechanical switch sensors (black/color ink cartridge sensor) and one thermistor sensor.
The following explains each sensor's function and principles of detection.

- **ASF Sensor:** ASF sensor is a photo-interrupter type sensor and is installed on the left edge of the ASF and detects the home position of the ASF. Home position means waiting mode and ASF is controlled to return to this home position at the waiting mode after the power is turned on. The home position of ASF is detected by ASF HP sensor wheel which is located in the left edge of the LD roller axis. In the ASF HP sensor wheel, there is only one small hole and it is detected as ASF home position when this small hole is among the photo diode terminals. In the home position, since the space among photo diode terminals is not cut in, Low signal is output to the CPU. Therefore, when it is detected as out of home position, the photo diode terminals is interrupted and then High signal is output to the CPU.

- **PE Sensor:** PE sensor is a photo-interrupter type sensor and is installed under the right edge of the frame on the printer mechanism and detects if there is any paper in the printer or not. When there is no paper, the PE sensor lever interrupts sensor, outputting the High signal to the CPU. When there is any paper, PE sensor lever is pushed up by the paper. This motility also pushes the sensor lever out of the photo diode sensor terminals and Low signal is output to the CPU.

- **HP Sensor:** HP sensor is a photo-interrupter type sensor and is installed on the right edge of the frame on the printer mechanism and detects the carriage home position. When the CR unit is in the home position, the sensor flag, which is located back of the CR assembly, interrupts sensor, outputting the High signal to the CPU. When the CR unit moves out of home position, Low signal is output to the CPU.

- **Print Head Thermistor:** Print Head Thermistor is located on the print head driver. By this thermistor, surrounding temperature of the head is monitored and it is fed back to the analog port of CPU. By this sensor signal, voltage of electric discharge is controlled according to temperature.

- **Ink Cartridge Sensors:** This sensor is mounted on the each print head board and detects if ink cartridge is there or not. When there is an ink cartridge, the sensor board spring, which is pushed in at installing the ink cartridge to the CR unit, connects two terminals on the print head board and outputs Low signal to the CPU. If there is no ink cartridge, the sensor board spring detaches from two terminals, blocking electric connection between two terminals and outputs High signal to the CPU.
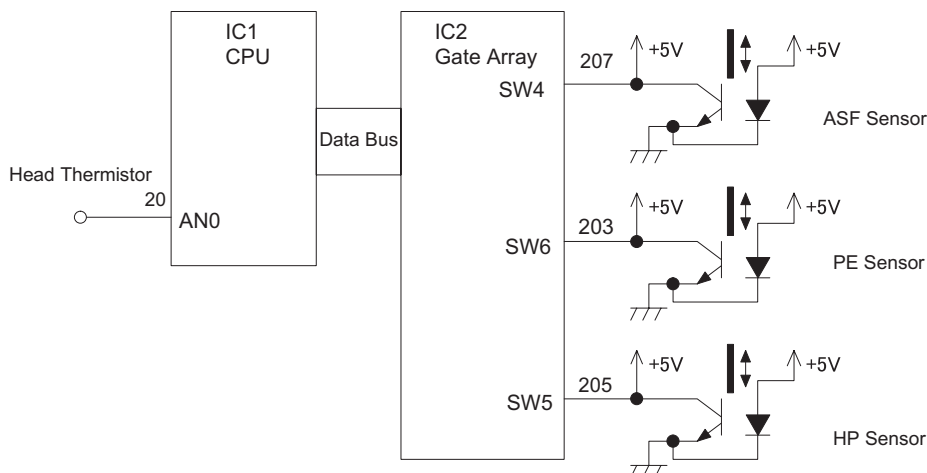
Figure 2-22. Sensor Circuit

2.2.2.3 EEPROM Control Circuits

The EEPROM of EPSON Stylus Photo has following contents. Gate array E05B43YA(IC2) controls operations of reading data when the power is on, and writing data when the power is off.

- Ink consumption(Bk, CMYcm)
- CL counter(Various cleaning operations which are previously done are memorized)
- Destination information
- Information of various adjustment values(Bi-D, VH voltage, etc.)
- CPSI pass word
- Other various setting values by the user

EEPROM is connected to the gate array by 4 lines and performs following functions.
The figure below shows EEPROM control circuit.

- CS : Chip selection signal
- CK : Data synchronism clock pulse
- DI : Data writing line(serial data) at power off.
- DO : Data reading line(serial data) at power on.
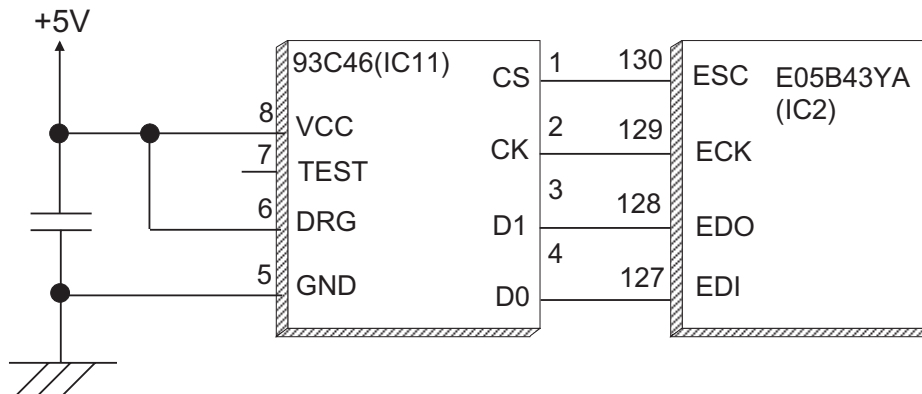
Figure 2-23. EEPROM Circuit Block Diagram

2.2.2.4 Timer Circuit

The Timer IC mounted on the C209 main board counts how long the printer is not used.
The lithium-battery (BAT1) is mounted on the board and performs power supply to the Timer IC when the power is off.
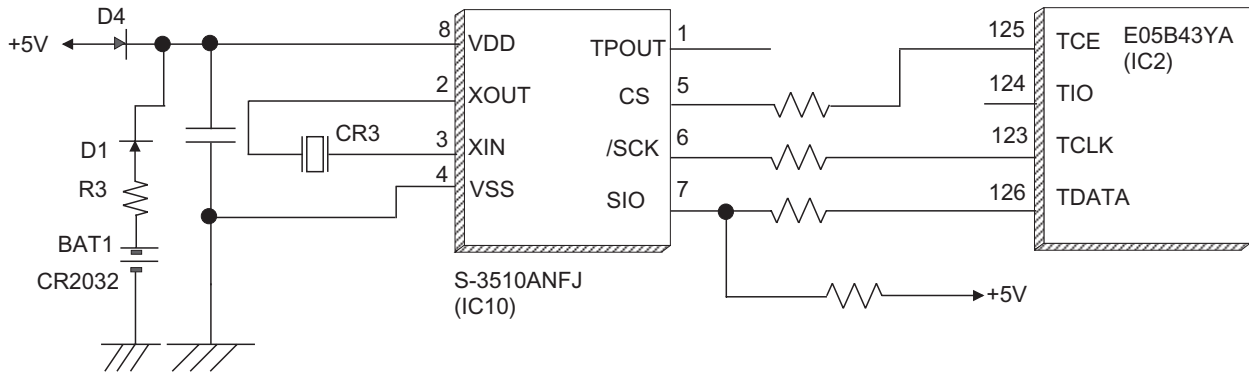
Figure 2-24.Timer Circuit Block Diagram

The followings explain about operation of this circuit.

- When the printer is on, power is supplied to the Timer IC by applying +5V through the D4.
- This power is also used to oscillate the outer CR1. The oscillation signal is input to XIN terminal.
- When the printer is turned on, the Timer IC outputs power off time as serial data to the gate array.
- Once the printer is turned off, 3VDC of BAT1(lithium battery) is supplied as power source for the Timer IC through D1.
- While the printer is on, +5V supplied through D4 is higher than +3V of the lithium battery, therefore, the power is not being consumed from the lithium battery.

2.2.2.5 Print Head Drive Circuit

The head drive circuits consist of the common driver IC7on the C209 main board and nozzle selectors on the head driver boards. Each common driver produces trapezoidal pulses according to the signals sent from the IC2 gate array, and transfer them to the nozzle selector on the head driver board. Printing data is converted into serial data [SI1(B,M), SI2(LM,C) and SI3(LC,Y)]at the gate array and is then transferred to the nozzle selector on the head driver board to select the nozzles to be activated. The nozzles selected by the printing data are driven by the trapezoidal drive pulse generated on the common driver.
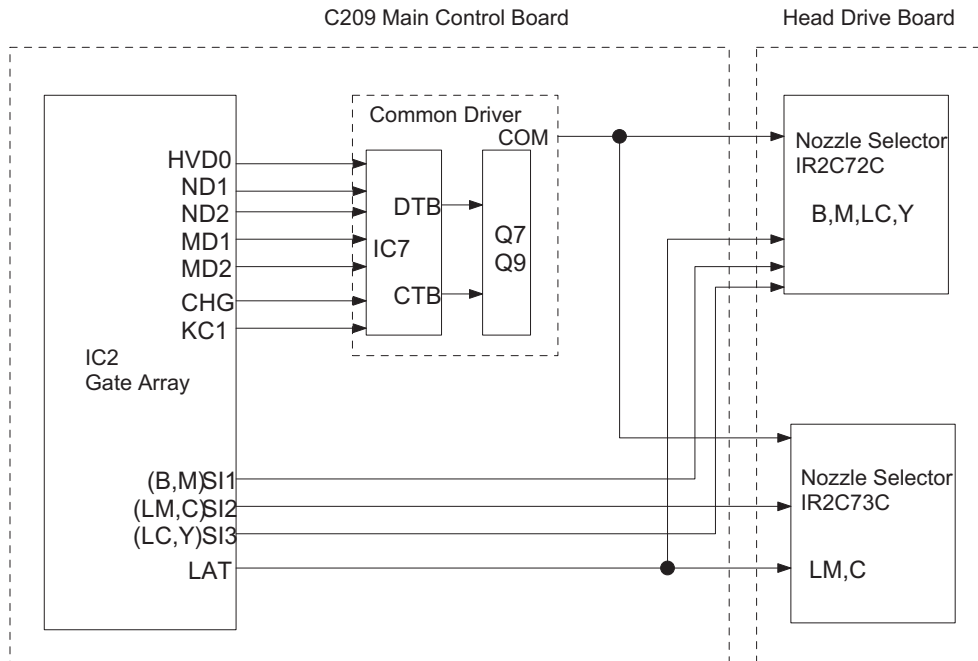
Figure 2-25. Print Head Drive Block Diagram

[Common Drive Circuit]

The common driver IC7 H8D2813E produces trapezoidal pulses by combining the 6 different signals CHG, KC1, ND1,ND2, MD1, and MD2 output from the IC2 gate array using VM voltage as the basis. By the combinations of signal width from these 6 different signals, total 6 particular types of trapezoidal waveforms such as normal dot and micro dot. etc are generated. The rising form is determined by the CHG and KC1 signals regardless of the printing mode. The falling form is determined by ND1, ND2, MD1 and MD2 signals. The VH voltage adjusting values stored in the EEPROM, which are unique to each head and, are read into the gate array, and then are set in the common driver from HVD0 in the IC2 gate array. With this procedure, the number of the internal resistance is determined and the drive waveform is adjusted individually according to each head as the result.
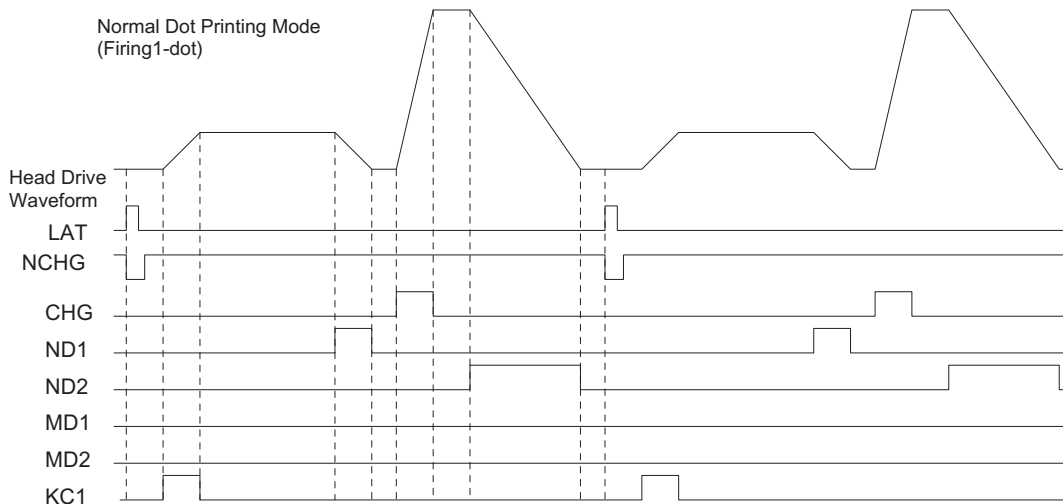
Figure 2-26. Head Drive Waveform

[Nozzle Selector Circuit]

The printing data is sent from the serial data SI1,SI2 and SI3 of the gate array to the nozzle selector; IR2C72C and IR2C73C on the head driver. Serial data SI1 and SI3 are handled by IR2C72C , and SI2 is handled by IR2C73C. The serial printing data is allocated; B(black)line and M line for SI1, LM line and C line for SI2 , LC line and Y line for SI3 ,and is transferred respectively in the order of nozzles from #1 to #32.The printing data sends "H" level to the driving nozzles and "L" level to the non-driving nozzles.

2.2.2.6 Motor Drive Circuits

This printer is equipped with 2 kinds of motors; CR motor and PF motor. Since they are all driven by UDN2917EB, they use the same control system.

❑ **CR Motor Drive Circuit**

The phase control signal for the CR motor is output from the port 74, 77 of IC2 gate array to the port 26 and 43 of the IC14 UDN2917EB. IC14 determines the phase mode according to the signal sent. The current control signal is also produced in IC2 gate array and output from the port 72, 73, 75 and 76 to the port 1, 2, 23 and 24 of the IC14 UDN2917EB. IC14 outputs signals to the each phase of the CR motor and drive them.
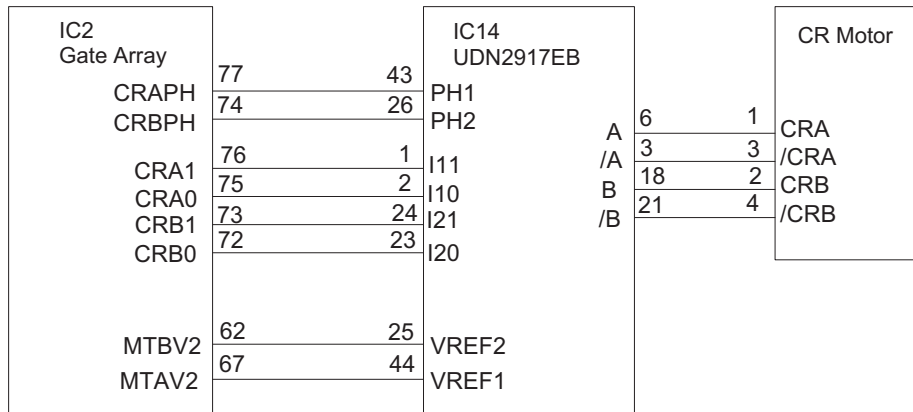
Figure 2-27. CR Motor Drive Circuit

❑ **PF/Pump Motor Drive Circuit**

PF/Pump motor drive circuit basically consists of the same circuit as the CR motor drive circuit. The phase control signal for the PF/Pump motor is output from the port 50 and 59 of IC2 gate array to the port 26 and 43 of the IC14 UDN2917EB. IC14 determines the phase mode according to the signal sent. The current control signal for each phase is also produced in IC2 gate array and output from the port 55, 56, 57 and 58 to the port 1, 2, 23 and 24 of the IC14 UDN2917EB. IC14 outputs signals to the each phase of the PF/Pump motor and drive them.
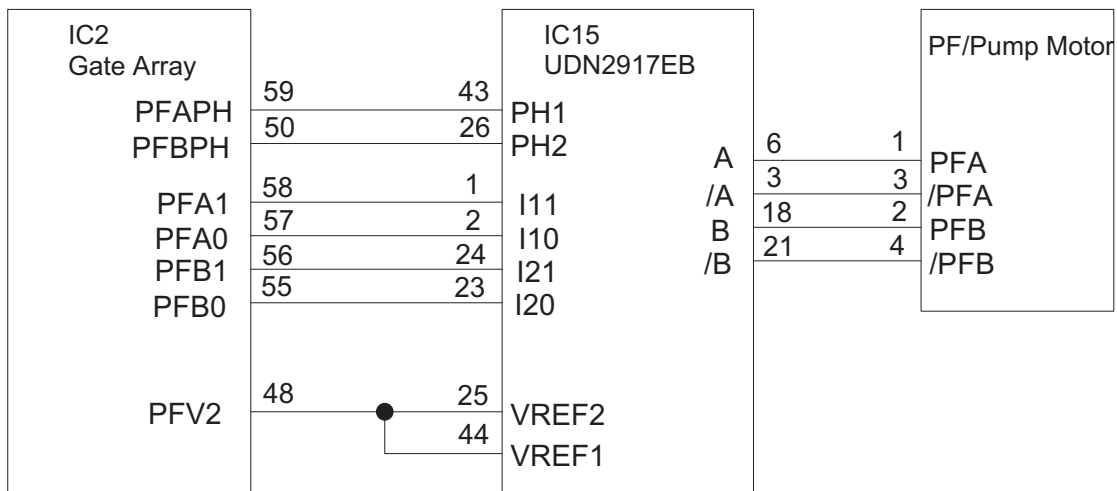
Figure 2-28. PF/Pump Motor Drive Circuit

2.3 Ink System Control

In this section, the Ink system to protect the print head and ink supply system and maintain high printing quality is described here. Ink system control has various kinds combined with several basic functions. In these kinds of ink control systems, an appropriate sequence is selected according to the various timers, counters, flags and sensors which are stored in EEPROM. In this section, compositions of the ink system; basic functions various timers, counters, flags and various ink system sequences, are described here.

2.3.1 Ink System Basic Functions

Basic functions that consists the ink system is described below.

❑ Wiping
During this operation, the CR moves from left to right to rub the printheads against the rubber part of the head cleaner (left half of the blade) in the pump unit. This operation is to remove ink, dust and fuzz adherent to the head surface and to regain normal ink ejection state and ensure firm capping. A little amount of ink is absorbed to the nozzle surface before Rubbing operation to let the adhered objects come off easily.

❑ Rubbing
This operation is to rub the printhead surface against the felt part of the head cleaner(right half of the blade) in the pump unit by shifting the CR from right to left. The purpose of this operation is to remove unnecessary ink and dust adhered to the head surface after ink absorption in order to regain normal ink ejection state.

❑ Ink Absorbing Operation
This operation is to absorb ink from the ink cavities by rotating the pump for both black and color heads with the specified steps while the head surfaces are capped and the air valve is closed. The purpose of this operation is to eliminate ink which has increased viscosity and bubbles around the head nozzles.

❑ False Absorbing Operation
This operation removes ink remaining inside the caps by rotating the black and color pumps with the specified steps while the head surfaces are capped and the air valve is opened. This operation is accomplished to remove ink from the nozzle plate by vacuuming and ejecting the ink remained after the ink absorbing operation and flushing operation.

❑ Micro Absorbing
This operation absorbs ink from the ink cavity by rotating the black and color pumps with the specified steps while the head surfaces are capped and the air valve is opened. The purpose of this operation is to eject air bubbles formed in the head cavity after ink absorption.

❑ Flushing operation
In this operation, the CR unit moves to false absorption position and discharge specified amount of ink from the head. The purpose of this position is to prevent ink in the print head nozzle from being viscosity. There are 3 kinds of flushing as they are listed below.

Table 2-14. Flushing

Type of Flushing	The Number of Shot	Drive Wave Form
Power Flushing	4000 shots	+2V, max.36V to the normal dot optimum voltage.
Normal Flushing (Black)	48 shots/per second	Drive waveform of Normal dot
Normal Flushing (Color)	36 shots/per second	Drive waveform of Normal dot
Flushing at Cleaning (Black)	200 shots	Drive waveform of Normal dot
Flushing at Cleaning (Color)	2000 shots	Drive waveform of Normal dot

❑ Micro Vibration
This operation is to add micro vibration to the ink in the head cavity by applying driver voltage and pulse so that the piezo in the print head is vibrated slightly. The purpose of this operation is to prevent ink from being viscosity around the head nozzle. This operation is only performed while the CR motor is accelerating to move the CR for printing operation.

2.3.2 Timers and Counters

In this printer, there are several kinds of timer counters, soft counters and flags before each ink sequence is determined and most of them are stored in the EEPROM.

❑ **Periodic Flushing Timer Counter**
This timer is for periodic flushing. This timer counter is reset when the printing starts, or periodic flushing or flushing in the waiting state is performed.

❑ **CL Timer Counter**
This is the timer that manages auto cleaning. It remains active while the printer is turned off and is reset when the cleaning(ink absorption) is executed.

❑ **Accumulated Printing Timer Counter**
This timer accumulates the period of time spent for printing and retains its values even at the power off. This timer starts counting when the cap is opened and stops counting once when the printer enters to waiting state. The value of this counter is reset when the ink absorbing operation is performed.

❑ **Stop Timer**
This timer monitors how long the head is capped in the waiting state during the power is still on. If ink absorption is performed in the waiting state, this timer starts counting after flushing at power on. It is reset when the cap is released from the head.

❑ **Power Supply Block Timer**
This timer measures time from power off to power on. This timer starts at power off and stops when the ink absorbing is performed at power on.

❑ **Ink Counter Rb, Ry**
This counter is installed individually for black(Rb) and Color(Ry) and monitors amount of ink used in the cap during the flushing operation. Its value is retained even at the power off. When the value exceeds a specified value, false absorbing is performed and resets the value.

❑ **CL2 Counter KK**
This counter is for determining the order of manual cleaning sequence operated by the panel button. A cleaning is usually performed in the order of CL1, CL'1, and CL2. This printer, however, does not necessarily follow this order depending on the numbers of pages printed after the last cleaning operation.

❑ **Protect Counter A**
This counter monitors the quantity of ejected ink to the ink waste pad. If the quantity exceeds a specified value, maintenance error is indicated. This counter is reset by operating EEPROM reset operation.

❑ **Ink Consumption Counter Cb, Cy, Cm, Cc, Cml, Ccl**
This counter is installed individually for black and color inks. This counter counts consumed ink quantity over printing, cleaning and flushing after the cartridge is exchanged. It also counts a certain amount of ink even when the power is turned off during the cleaning operation. This counter is reset when the ink cartridge is removed from the printer during the ink cartridge exchange sequence.

2.3.3 Ink System Sequence

The ink system sequences in this printer are combinations of basic functions described in section 2.3.1. The printer selects the most suitable ink sequence according to the various timers, counters and flags described in section 2.3.2. The major ink system sequences are described below.

❑ Manual Cleaning Sequence
   Manual cleaning is classified as following 4 modes according to the cleaning counter, the number of pages printed after the latest cleaning.

   ■ CL1(Normal cleaning mode) : Wiping, Ink absorbing, Micro absorbing and False absorbing.

   ■ CL1'(Powerful cleaning, without rubbing) : Wiping, Ink absorbing, Micro absorbing, False absorbing. The composed operation is the same as CL1, but the quantity of ink absorbing is set more than CL1.

   ■ CL2(Powerful cleaning, with rubbing) : Wiping, Ink absorbing, Micro absorbing, False absorbing. The quantity of each absorbing is the same as CL'1, but rubbing operation is added.

   ■ CL3(False Cleaning) : Wiping, Micro absorbing, False absorbing. It absorbs very little amount of ink, which is about 1/10 of CL1.

   ■ One-Time CL : The composed operation is the same as the CL1, except that this mode absorbs more ink. This mode specifically performed only when "One-Time flag" is set by a removal of I/C without Ink Low/End detection.

Cleaning counter determines mode to be performed according to the repeated order when the manual cleaning is operated continuously. Cleaning is usually performed in the order, CL1, CL1', and CL2. However, if the printing quantity after the latest cleaning is fewer than one line, CL3 is performed. Depending on the printing quantity after the last cleaning, other cleaning mode is selected.

Step	Condition	Yes/No	Subsequent Cleaning Mode
1	Perform more than 1-pass printing after the last cleaning?	No	CL3
		Yes	Go to Step 2
2	Perform less than 5 pages printing after the last cleaning?	No	CL1
		Yes	Go to Step 3
3	Perform more than 1 page printing after last cleaning?	No	Go to Step 5
		Yes	Go to Step 4
4	What is the CL2 Counter KK value?	KK=2	CL2 1*
		KK=1	CL1' 1*
		KK=3	CL1 1*
5	One-Time Flag set?	No	Go to Step 4
		Yes	Perform One-Time CL.

Note) 1*: CL2 Counter KK value is shifted to next step after the cleaning operation.
   (e.g. KK=1 → KK=2, KK=3 → KK=1)

❑ Power On Sequence
   This sequence sets cleaning mode and CL2 counter according to the CR unit position at the power on, ink consumption counter and the time that timer counts. If the initial charge operation is not performed, it performs ink initial charge after the ink cartridge exchange operation is done.

❏ Cartridge Exchange Sequence
This sequence is used at the ink cartridge replacement. It is performed when the black or color cartridge is considered as ink low at the manual cleaning operation, and panel button is pressed longer than specified time. If the initial ink charge is not performed, this sequence performs cartridge exchange operation and initial ink charge. After the initial ink charge operation is completed, the initial charge flag is reset.

❏ Eject Paper Sequence
In order to prevent ink around the head nozzle from being viscosity, this sequence performs flushing in the cap; 48 shots for black and 36 shots for color. Also, it performs false absorbing according to the value of ink counter RB, Ry.

Chapter 3
Disassembly and Assembly

3.1 OVERVIEW

This section describes procedures for disassembling the main components of EPSON Stylus Photo. Unless otherwise specified, disassembly units or components can be reassembled by reversing the disassembly procedure. Therefore, no assembly procedures are included in this section. Precautions for any disassembly or assembly procedure are described under the heading "WORK POINT". Any adjustments required after disassembling the units are described under the heading "REQUIRED ADJUSTMENT".

3.1.1 Precautions for Disassembling the Printer

See the precautions below when disassembling or assembling EPSON Stylus Photo.

⚠ WARNING

☑ *Disconnect the power cable before disassembling or assembling the printer.*

☑ *Wear protective goggles to protect your eyes from ink. If ink gets in your eye, flush the eye with fresh water and see a doctor immediately.*

☑ *If ink comes into 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. The leakage may affect other devices close to the battery.)*
- *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 may also be resulted.)*
- *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 manufacture. Dispose the used batteries according to government's law and regulations.

⚠ ATTENTION

Risque d'explosion si la pile est remplacée incorrectment. Ne remplacer que par une pile du même type ou d'un type équivalent recommandé par le fabricant. Eliminer les piles déchargées selon les lois et les règles de sécurité en vigueur.
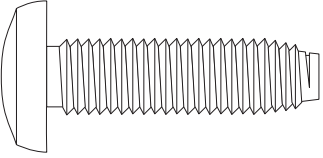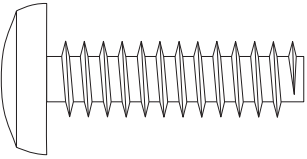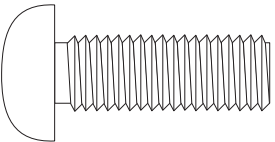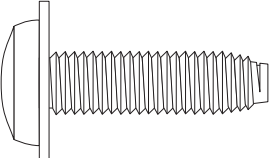
⚠ CAUTION

☑ *Never remove the ink cartridge from the carriage unless manual specify to do so.*

☑ *When transporting the printer after installing the ink cartridge, be sure to pack the printer for transportation without removing the ink cartridge.*

☑ *Use only recommended tools for disassembling, assembling or adjusting the printer.*

☑ *Apply lubricants and adhesives as specified. (See Chapter 6 for details.)*

☑ *Make the specified adjustments when you disassemble the printer. (See Chapter 4 for details.)*

3.1.2 Specification for Screws

Table 3-1 lists the abbreviation of screws and its use. Refer to the screw number in the following table to identify the type of screw shown in the disassembly procedures.

Table 3-1. Screw Identification Table

No.	Shape	Name	Standard
1		CBS (Cross/Bind/S-tight screw)	M3x6
2			M3x10
3		CBP (Cross/Bind/P-tight screw)	M3x6
4			M3x10
5			M3x8
6		CP (Cross/Pan-head screw)	M3x4
7		CBS with Washer (Cross/Bind/S-tight screw with washer)	M3x6

3.1.3 Tools

Table 3-2 lists the tools required for disassembling and assembling the printer. Use only specified tools to avoid damaging the printer.

Table 3-2. Required Tools

Name	Availability	EPSON Parts Code
Philips Screw Driver (No.1)	○	B743800200
Philips Screw Driver (No.2)	○	B743800400
Tweezers	○	B741000100
Hexagonal Box Driver (5.5mm)	○	B741700100

3.1.4 Work Completion Check

If any service is made to the printer, use the check list shown below, to confirm that all works are completed properly and the printer is ready to return to the user.

Category	Item	Check Point	Status
Main Unit	Self-Print Test	Is the printing successful?	☐Checked/☐Not necessary
	Online Print Test	Is the printing successful?	☐Checked/☐Not necessary
	Printhead	Is ink discharged normally from all nozzle?	☐Checked/☐Not necessary
	Carriage Mechanism	Does it moves smoothly?	☐Checked/☐Not necessary
		Is there any abnormal noise in its motion?	☐Checked/☐Not necessary
		Is there any dirt or scratch in the CR guide shaft?	☐Checked/☐Not necessary
		Is the CR Motor at the correct temperature? (Not too hot)	☐Checked/☐Not necessary
	Paper Feeding Mechanism	Is paper advanced smoothly? *No paper jamming *No paper skew *No multiple feeding *No abnormal noise	☐Checked/☐Not necessary
		Is the PF Motor at the correct temperature? (Not too hot)	☐Checked/☐Not necessary
		Is the paper path clear of all obstructions?	☐Checked/☐Not necessary
Adjustment	Specified Adjustment	Are all the adjustments done correctly?	☐Checked/☐Not necessary
Lubrication	Specified Point	Does all the lubrication made at specified points?	☐Checked/☐Not necessary
		Is the amount of lubrication correct?	☐Checked/☐Not necessary
System	ROM Version	Version (Latest):	☐Checked/☐Not necessary
Packing	Ink Cartridge	Are brand-new ink cartridges installed correctly?	☐Checked/☐Not necessary
	Protective Materials	Have all relevant protective materials been attached to the printer?	☐Checked/☐Not necessary
Other	Attachment, Accessories	Have all relevant items been included in the package?	☐Checked/☐Not necessary

3.2 DISASSEMBLY AND ASSEMBLY

This section describes the step-by-step disassembly procedures shown in the diagram below.

Housing Removal
Section 3.2.1

Circuit Boards Removal
Section 3.2.2

Printer Mechanism Disassembly
Seciton 3.2.5

Control Panel Removal
Section 3.2.3

Waste Ink Pad Assembly Removal
Section 3.2.4

Printhead Removal
Section 3.2.5.1

Pump/Cap Assembly Removal
Section 3.2.5.2

CR Motor Assembly Removal
Section 3.2.5.3

PF Motor Assembly Removal
Section 3.2.5.4

ASF Assembly Removal
Section 3.2.5.5

ASF Disassembly
Section 3.2.5.5.1

Carriage Assembly Removal
Section 3.2.5.6

Pick-Up Roller Assembly Removal
Section 3.2.5.5.2

PF Roller Assembly Removal
Section 3.2.5.7

PE Sensor Assembly Removal
Section 3.2.5.8

HP Sensor Assembly Removal
Section 3.2.5.9

Figure 3-1. Flow Chart of Disassembly

3.2.1 Housing Removal

Since the EPSON Stylus Photo has no lower housing as previous EPSON printers, the printer mechanism can be taken out by only removing the upper housing.

1.   Open the printer cover and set the PG adjust lever on the right-hand side to (+) position.
2.   Remove 4 screws (No.2) and remove the upper housing.

WORK POINT

Pull the front end of the upper housing while lifting up the upper housing to remove it.

⚠ CAUTION

Be careful not to pinch the cables with the posts of the upper housing when reinstalling it. (Especially with the cables from the motors and doing so causes fatal damage to the mechanism and the electric circuitry.)

Upper Housing
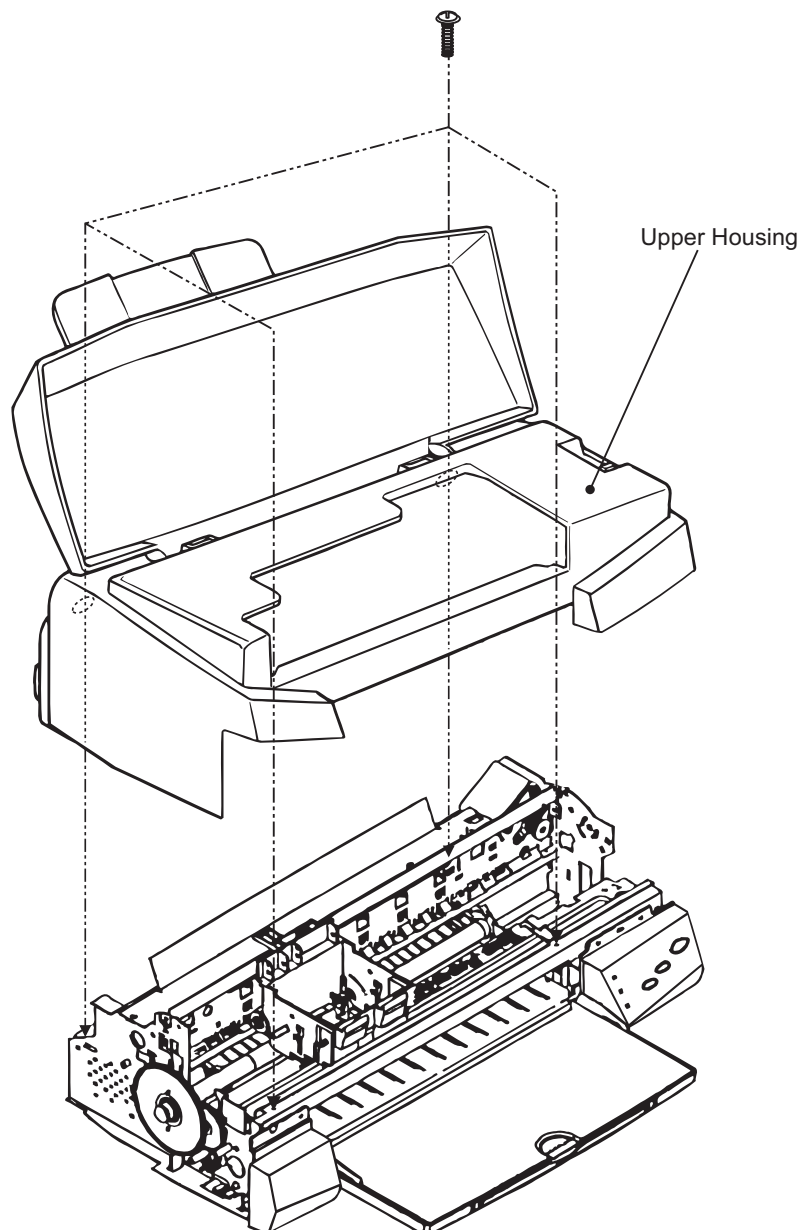
Figure 3-2. Housing Removal

3.2.2 Circuit Boards Removal

The electric circuit boards of the printer (Main control circuit board: C209 MAIN / Power supply circuit board: C206 PSB/PSE) are both installed on single metal chassis and attached to the printer mechanism. Therefore, first detach the metal chassis from the printer mechanism to remove the electric circuit boards.

1. Remove the upper housing (Refer to section 3.2.1)
2. Remove 5 screws (No.1 / three at the back of the printer mechanism and one each at both sides of the printer mechanism)
3. Slightly pull out "SHIELD PLATE, M/B" (metal chassis) from the printer mechanism and take out the cable holders inserted to the edge of "SHIELD PLATE, M/B".
4. Fully separate "SHIELD PLATE, M/B" from the printer mechanism and remove all cables connected to the connectors on the main board; C209 MAIN.
5. If you need further to remove each electric circuit board from "SHIELD PLATE, M/B", remove the screws fixing each board and remove the board.

    • C209 MAIN BOARD: 10 screws (No.1 = 7 screws, No.6 = 3 screws)
    • C206 PSB/PSE BOARD: 4 screws (No.1)

    Also disconnect the cable from the connector; CN10 (locking type) on the C209 MAIN, when you remove the C206 PSB/PSE BOARD.

WORK POINT

Unlock the connector CN6/7 on the C209 MAIN by pulling its lock before disconnect the cables, and be sure to lock it when reconnecting the cables.

[Cable Holders]
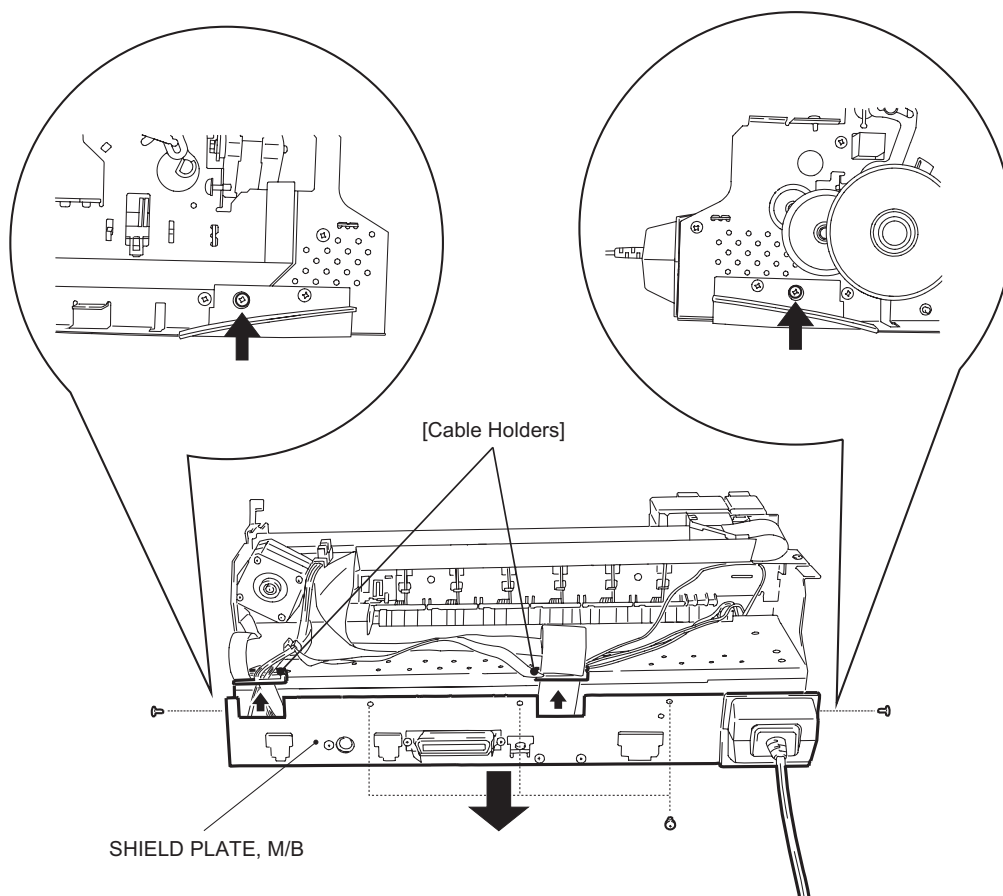
SHIELD PLATE, M/B

Figure 3-3. SHIELD PLATE M/B Removal

MAIN Board
(C209 MAIN)

Power Supply Board
(C206 PSB/PSE)

SHIELD PLATE, M/B
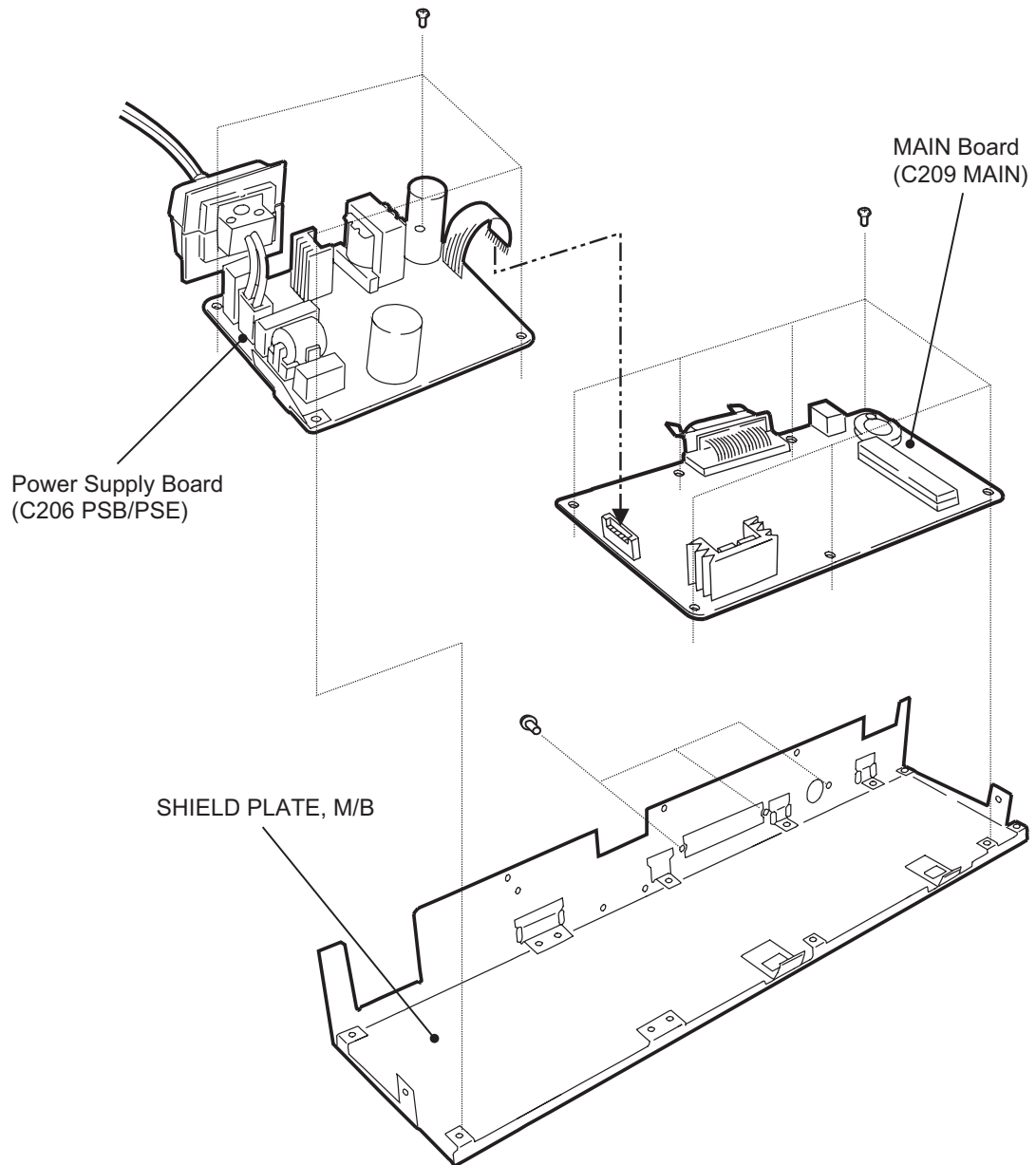
Figure 3-4. Circuit Boards Removal

REQUIRED ADJUSTMENT

Be sure to perform the following adjustments when the C209 MAIN board is replaced:
1) VH Setting   (Refer to Chapter 4 / Section 4.2.2.4.)
2) Head Angular Adjustment   (Refer to Chapter 4 / Section 4.2.2.5.)
3) Bi-D Alignment Adjustment   (Refer to Chapter 4 / Section 4.2.2.6.)

3.2.3 Control Panel Removal

1. Remove the upper housing (Refer to Section 3.2.1)
2. Remove 2 screws (No.1) and remove the "PANEL, ASSEMBLY" and "HOUSING, PANEL, LEFT" from the printer mechanism and disconnect the flat cable from the connector of the panel assembly.

WORK POINT

By removing the control panel assembly, the stacker assembly is also detached from the printer mechanism since it is held by the control panel assembly.

SHIELD PLATE, PANEL

C209 PNL Board

PANEL, ASSEMBLY

STACKER, ASSEMBLY

HOUSING, PANEL, LEFT
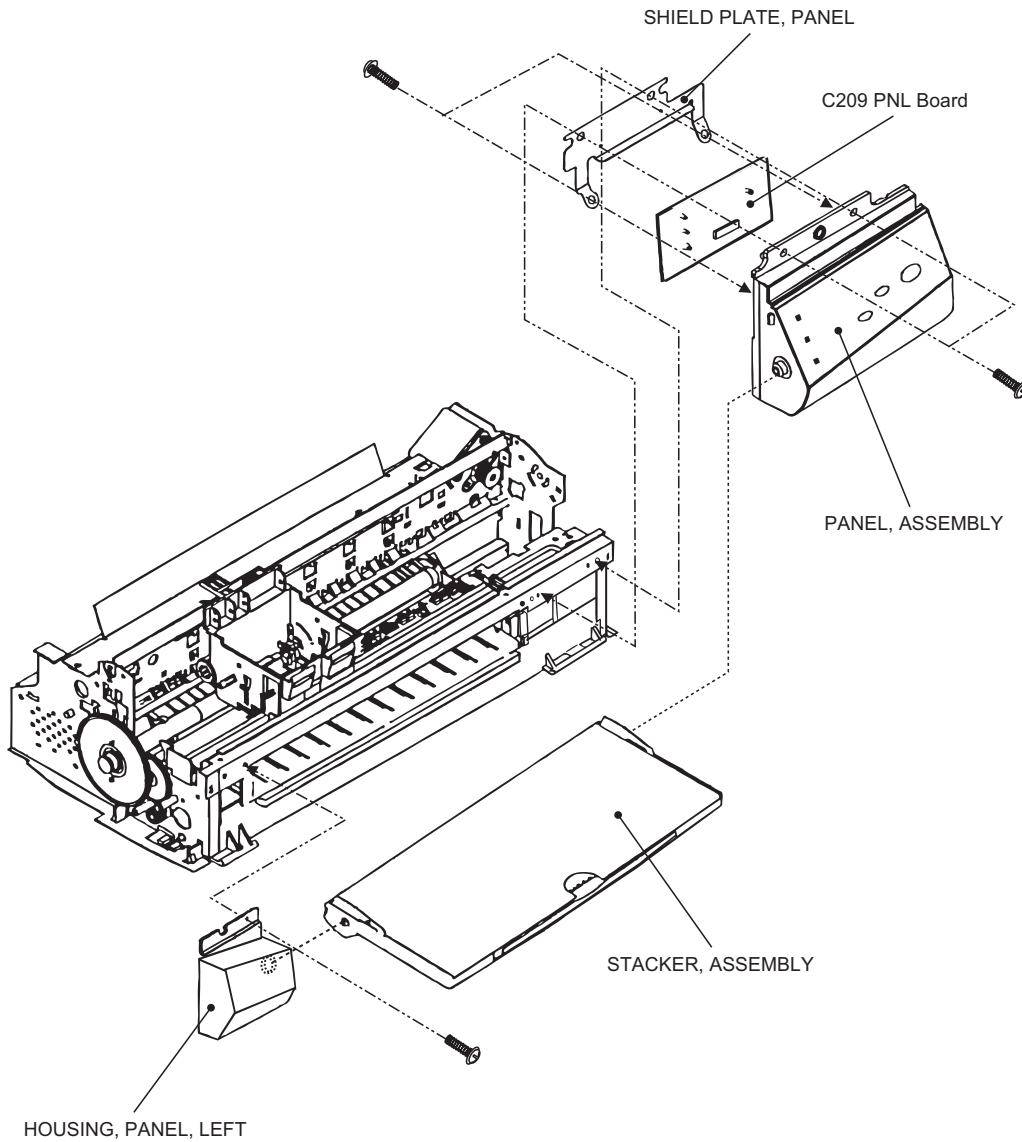
Figure 3-5. Control Panel Removal

3.2.4 Waste Ink Pad Assembly Removal

1. Removing the upper housing (Refer to section 3.2.1)
2. Removing the control panel assembly (Refer to section 3.2.3)
3. Remove 1 screw (No.4) at the right-hand side of the printer mechanism, that fixing "Waste Ink Pad Assembly".
4. Remove "SPACER, TRAY" fixing "Waste Ink Pad Assembly" at the left-hand side of the printer mechanism and remove "Waste Ink Pad Assembly" by pulling it downward.

⚠ CAUTION

When you replace "Waste Ink Pad Assembly" to new one, be sure to perform the ink counter reset operation. (Refer to Chapter 1 / Section 1.4.2 for details)

WORK POINT

When re-installing "Waste Ink Pad Assembly", be sure that "Stopper, Stacker" that attached to the exit roller shaft is correctly pushed in to back of the projections of "Waste Ink Pad Assembly".

Section (A)

SPACER, TRAY

Waste Ink Pad Assembly

[Projections]

Paper Exit Roller Shaft

Front side

STOPPER, STACKER

Push it to the back of projection
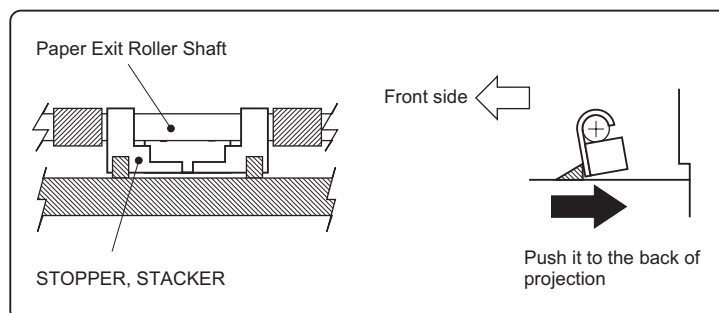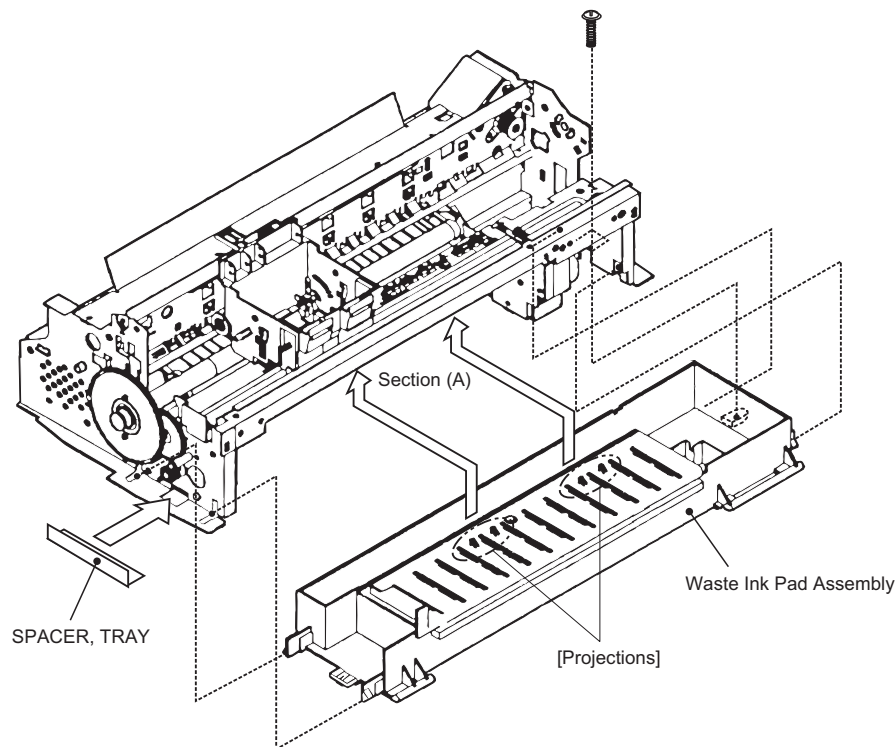
Figure 3-6. Waste Ink Pad Assembly Removal

3.2.5 Disassembling the Printer Mechanism

This section describes the procedures for removing the main components consisting the printer mechanism.

3.2.5.1 Printhead Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Rotate "Gear, 67.2" (largest gear at the left-hand side of the printer mechanism) toward the front to disengage the carriage lock mechanism, and move the carriage assembly to the middle of the printer.
3. Remove both black and color ink cartridges.
4. Remove both carriage cover assemblies from the carriage.
5. Remove "Twist Spring, 49" at left-hand side of the carriage and remove 1 screw (No.3) fixing "FASTNER, HEAD". Then, remove "FASTNER, HEAD" from the carriage.
6. Unhook the flat cables from the carriage assembly and tae out the printhead unit from the carriage.
7. Disconnect the cables from the connector of the printhead unit.

WORK POINT

☑ *Notice that the grounding plate is installed in correct position. (there are two fixing pins in the carriage)*

☑ *Be sure that fixing pin of the carriage is correctly located into the cut out of the printhead unit.*

⚠ CAUTION

☑ *Once the ink cartridge is removed, it is not re-usable and always install brand-new ink cartridge before returning the printer to the user.*

☑ *When returning the printer to the user, be sure that the ink cartridge is installed and the carriage is at the capping position. (Turn the printer off while the carriage is at the capping position and pack it in that state)*
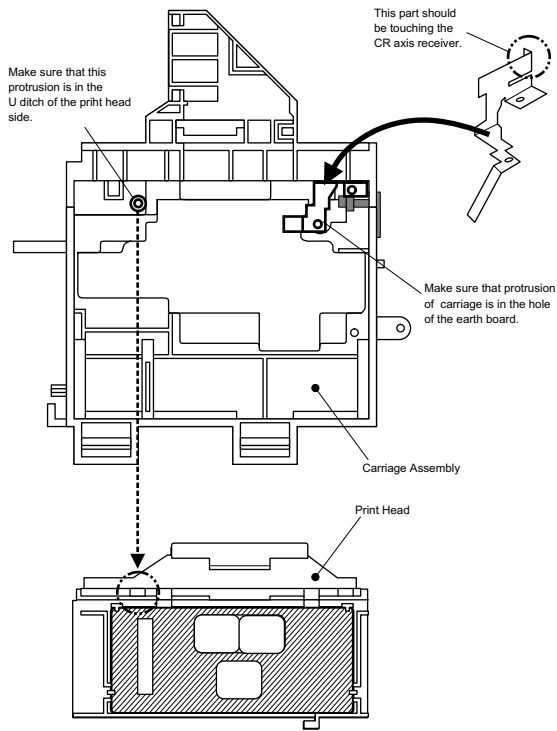
Figure 3-7.Printhead Installation
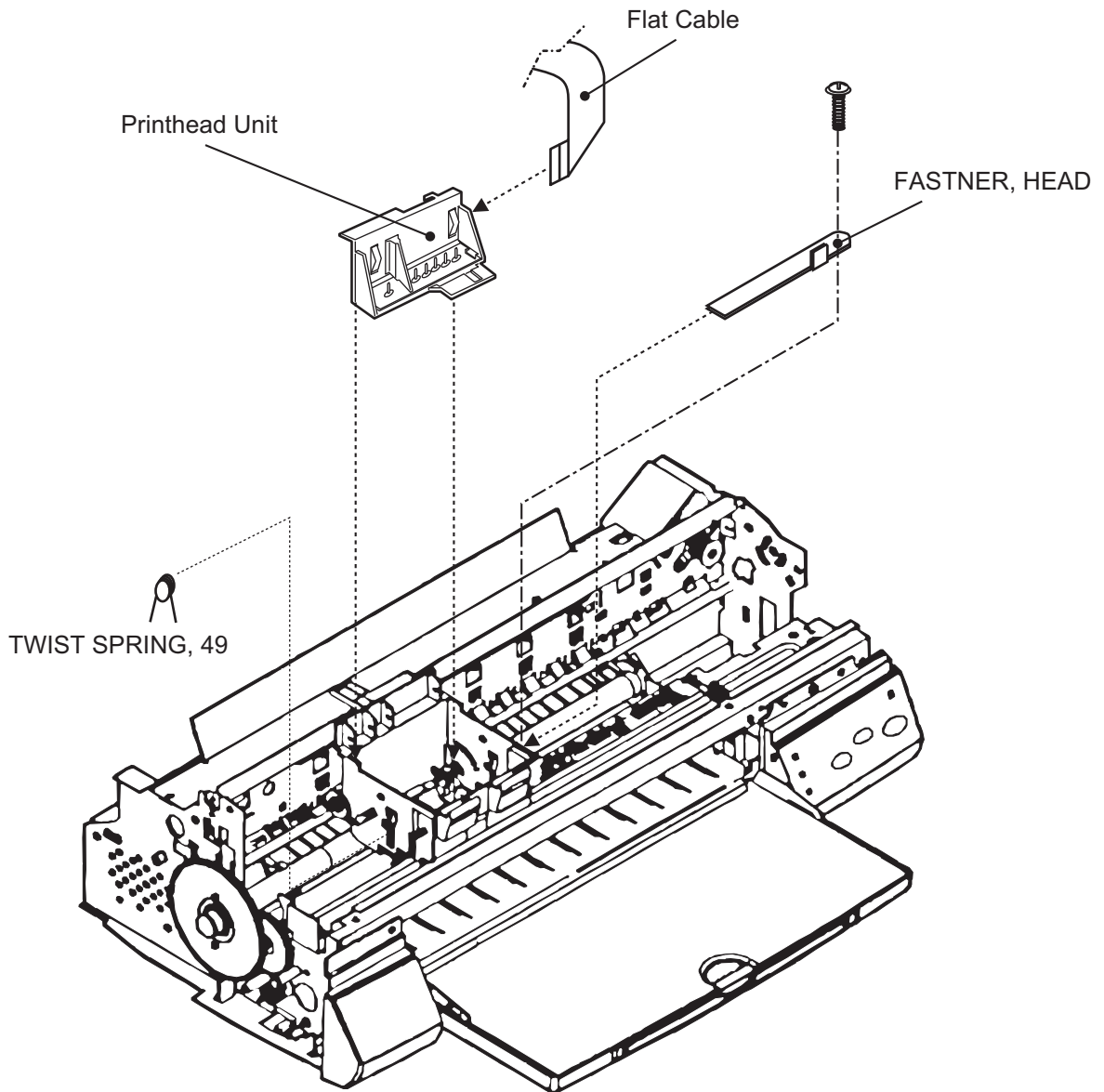
Figure 3-8. Printhead Unit Removal

⚠ CAUTION

> ☑ *If you remove the Flat cable from the printer mechanism, make sure that the Flat cable is fixed to the frame firmly when assembling.*

REQUIRED ADJUSTMENT

When you remove or replace the printhead unit, be sure to perform the following adjustments:

1) *Ink Charge Operation*   *(Refer to Chapter 4 / Section 4.2.2.3.)*
2) *VH Setting*   *(Refer to Chapter 4 / Section 4.2.2.4.)*
3) *Head Angular Adjustment (Refer to Chapter 4 / Section 4.2.2.5.)*

3.2.5.2 Pump Assembly and Cap Assembly Removal

1. Removing the upper housing. (Refer to Section 3.2.1)
2. Removing the control panel assembly. (Refer to section 3.2.3)
3. Removing "Waste Ink Pad Assembly". (Refer to section 3.2.4)
4. Loosen 2 screws (No.1) fixing the exit frame assembly and disengage the frame from the side frames. Then, put the printer mechanism on its back as you can see the bottom of the mechanism.
5. At the right-hand of the mechanism, unhook the cap assembly by releasing one hook and take out the cap assembly by lifting up the right end of it. (Note that the cap assembly is still connected to the pump assembly by the ink tube.)
6. Remove 2 screws (No.5) fixing the pump assembly to the frame.
7. Unhook the pump assembly by releasing one hook and slide the pump assembly to the right direction to remove it.

⚠ CAUTION

☑ *Be careful not to damage rubber part of the cap assembly. (Damaging the rubber part causes incomplete capping and the nozzle condition become unstable.)*

☑ *Be careful with the followings when you handle "CLEANER, HEAD":*
  •Do not handle it with bare hands and avoid attaching any oil or dust.
  •Make sure that the rubber side of "CLEANER, HEAD" is facing to the right.

WORK POINT

☑ *Be careful not to popping the components from the pump assembly when you remove it from the mechanism, since there is a spring inside the pump assembly.*

☑ *Be sure that the ink tube from the cap assembly is routed to the correct position and not pinched by the cap assembly and the frame.*

☑ *Verify that "CLEANER, HEAD" moves smoothly by rotating "GEAR, 67.2" after you re-assemble the pump assembly. (Hold the cap assembly to the right direction while you rotating the gear for check)*

Ink Tube Routing

OK
(Ink tube goes behind of the cap assembly)

Viewed from front

NG
(The ink tube is on the part of the cap assembly)
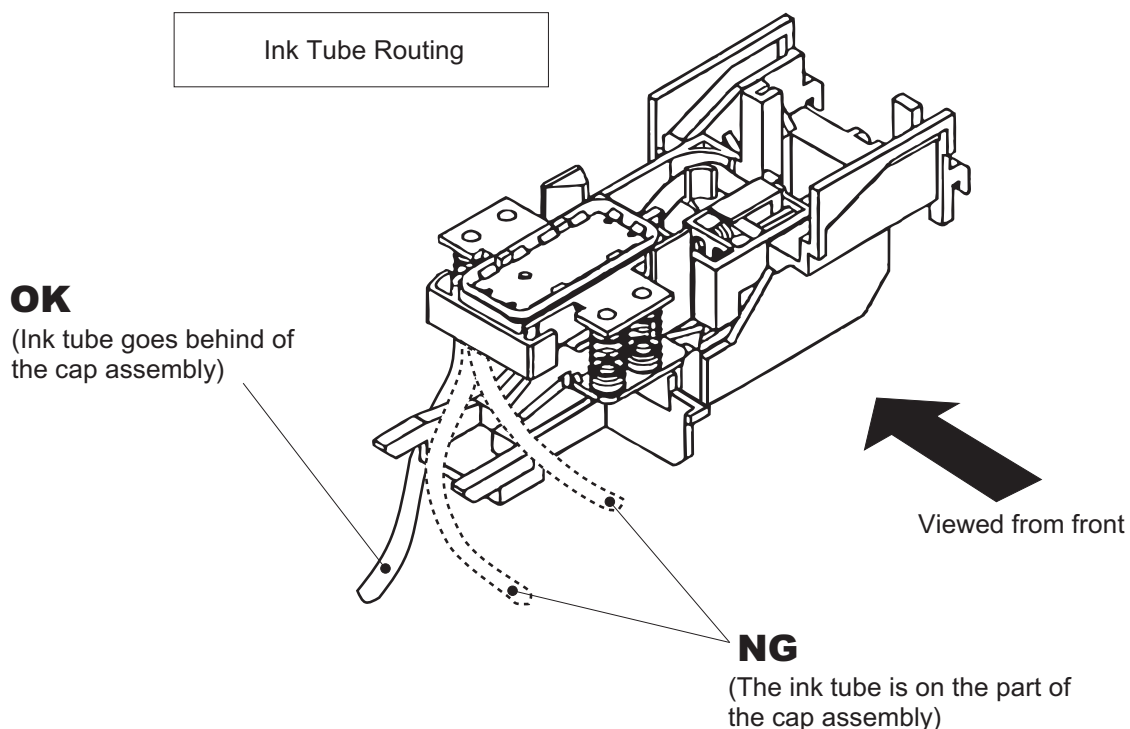
Figure 3-9. Ink Tube Routing

Loosen screw and
lift up the exit frame

Unhock the cap assembly

PUMP ASSEMBLY

CAP ASSEMBLY

Remove 2 screws and unhook the hooks
to remove the pump assembly
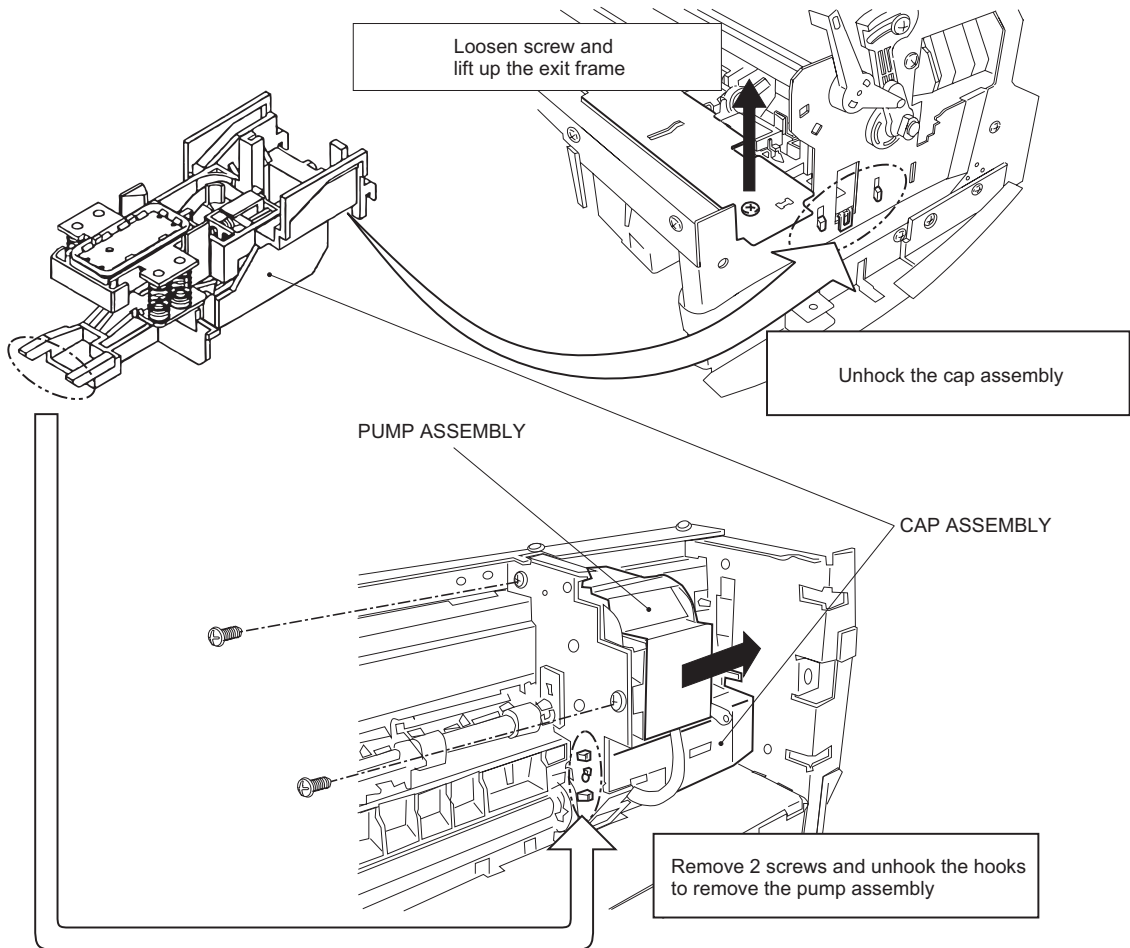
Figure 3-10.Cap Assembly Removal

CLEANER, HEAD

Pump Components
Assembly Order
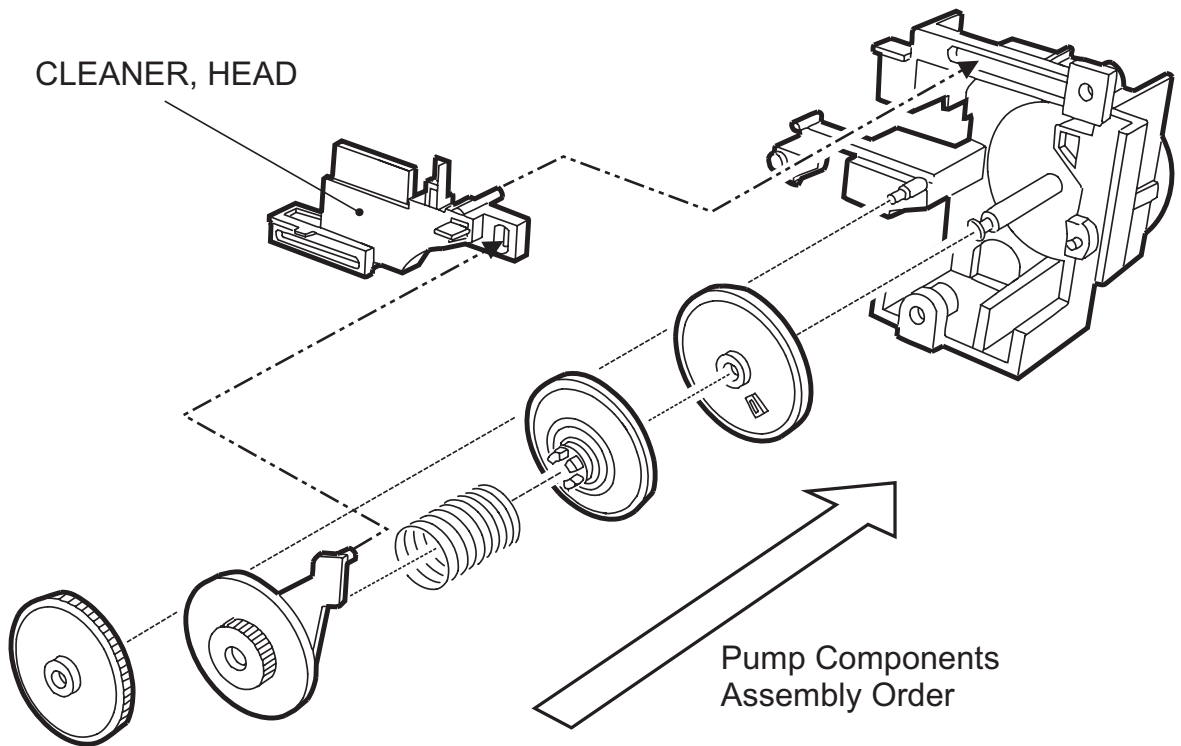
Figure 3-11.Pump Assembly Removal

3.2.5.3 CR Motor Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Rotate "Gear, 67.2" (largest gear at the left-hand side of the printer mechanism) toward the front to disengage the carriage lock mechanism, and move the carriage assembly to the middle of the printer.
3. Push "HOLDER, PULLEY, DRIVEN" inward to loosen the timing belt and detach the timing belt from the drive pulley of CR Motor assembly.
4. Remove 2 screws (No.1) and remove "MOTOR, ASSEMBLY, CR" from the mechanism.

WORK POINT

Be sure that the projections of the motor bracket is inserted to the holes of the frame properly.

REQUIRED ADJUSTMENT

When you replace "MOTOR, ASSEMBLY, CR", be sure to perform the following adjustment:

> *1) Bi-D Alignment Adjustment (Refer to Chapter 4 / Section 4.2.2.6.)*
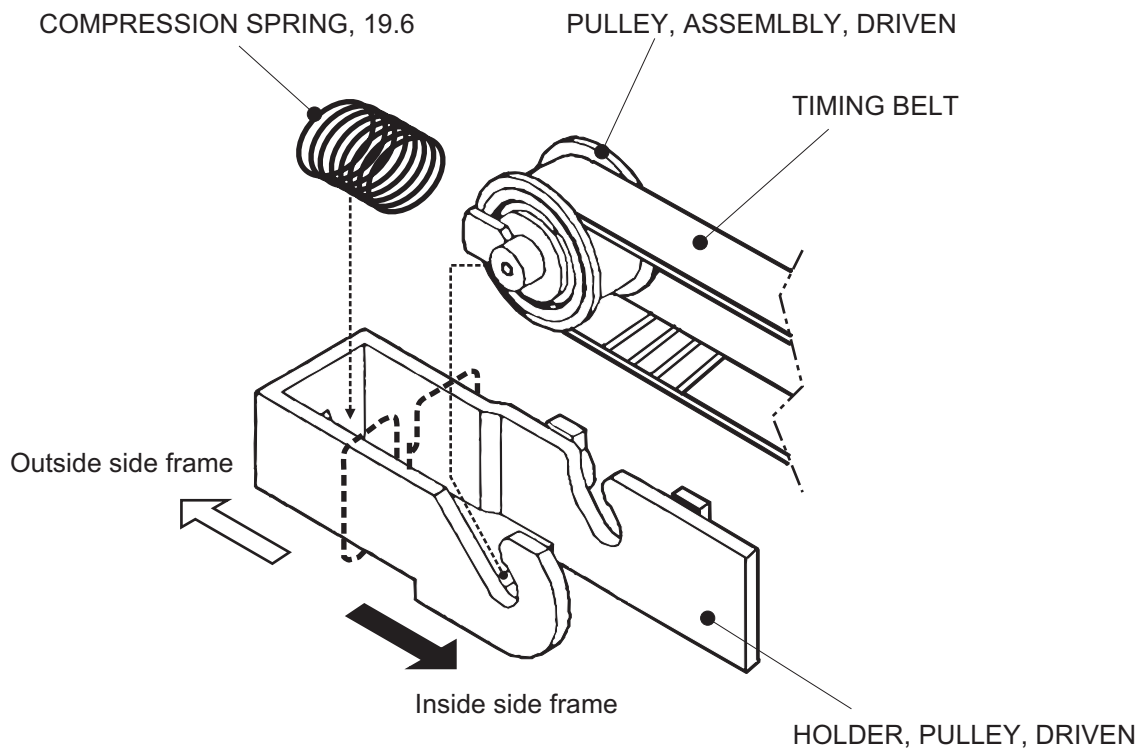
Figure 3-12. Driven Pulley Removal
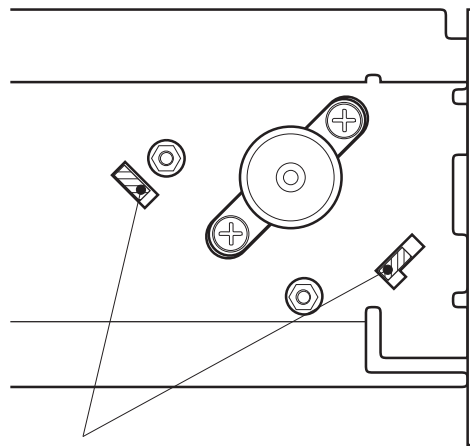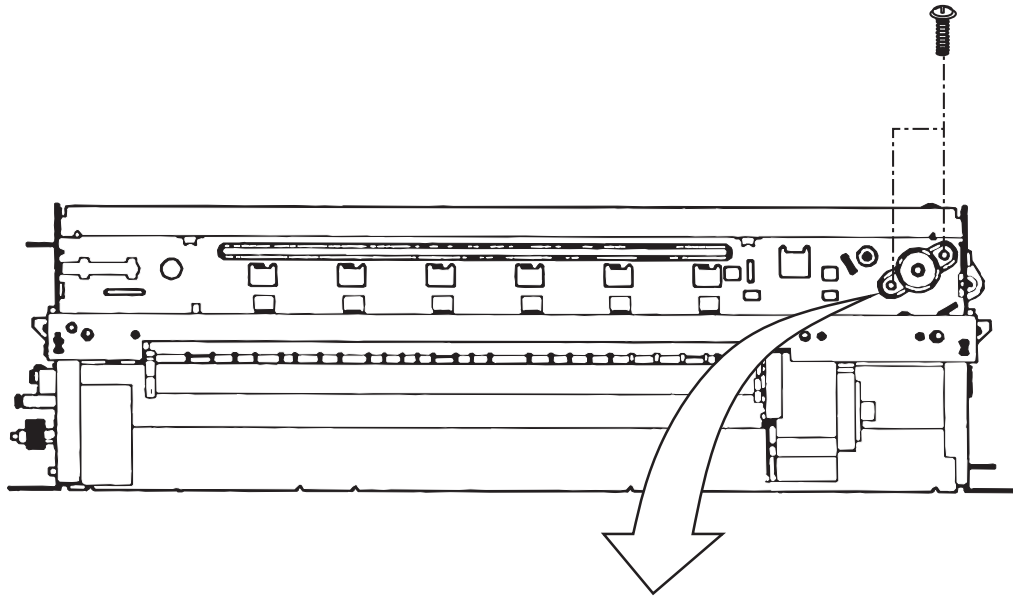
The projections of motor assembly must
locate inside the holes

Figure 3-13. CR Motor Removal

3.2.5.4 PF Motor Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Removing "Waste Ink Pad Assembly". (Refer to section 3.2.4)
3. By referring the figure below, remove the specified gears from the mechanism:
   - "GEAR, 67.2"
   - "COMBINATION GEAR, 8, 14.4"
   - "COMBINATION GEAR, 8.8, 21.6"
   - "GEAR, 36"
4. Remove 2 hexagonal lock nuts and remove "MOTOR, ASSEMBLY, PF".

WORK POINT

☑ *When removing the PF Motor, first, slightly pulling out the PF Motor from the frame and slide the motor shaft to a larger cut out of the frame and remove it.*

☑ *Be careful with the routing direction of the cable from the PF motor.*

COMPRESSION SPRING, 0.9

MOTOR, ASSEMBLY, PF

Hexagonal Nut

GEAR, 67.2

COMBINATION GEAR, 8, 14.4

COMBINATION GEAR, 8.8, 21.6

GEAR, 36

Lock Ring
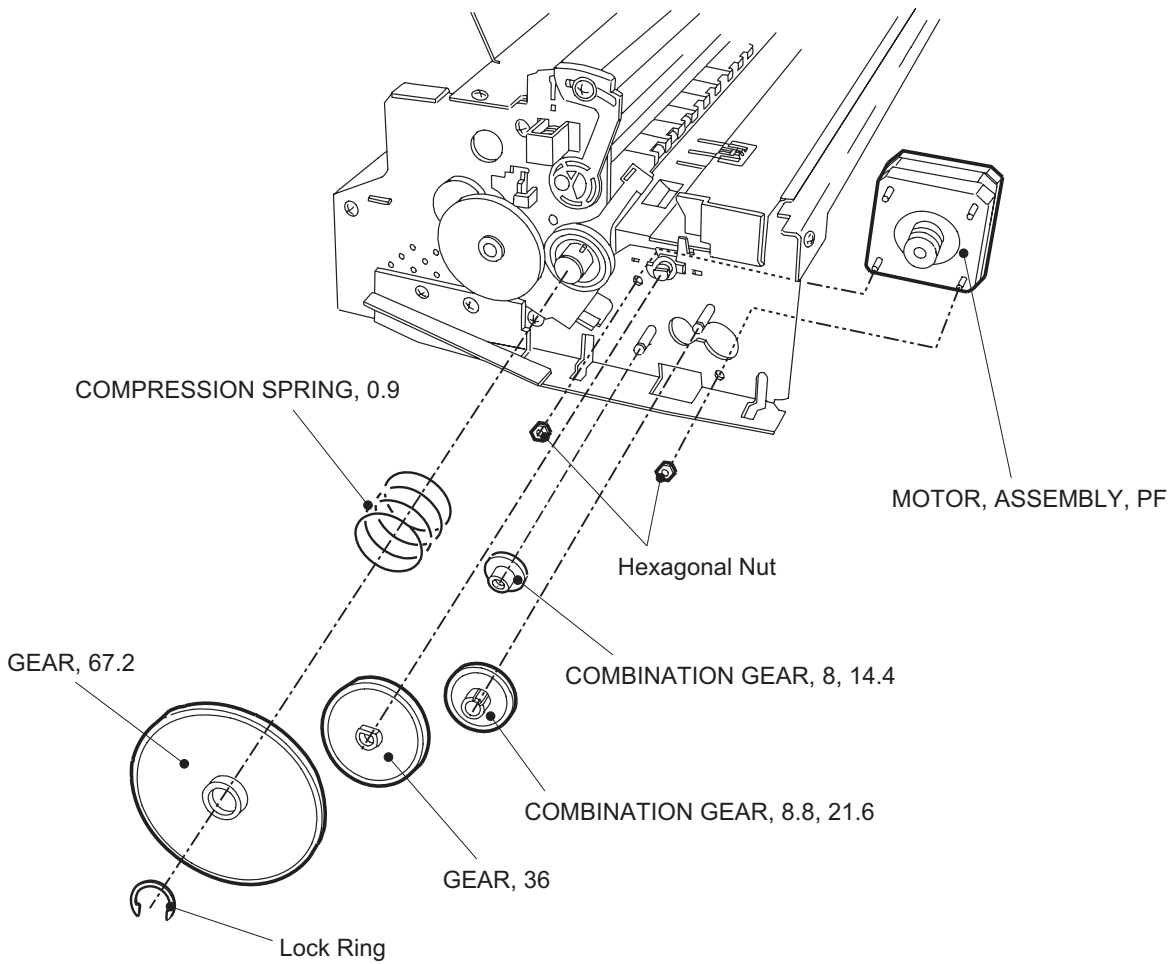
Figure 3-14. PF Motor Removal

MOTOR, ASSEMBLY, PF
(behind the frame)

Cable Direction

Put the motor shaft once in a larger hold
then slide it to a smaller hole
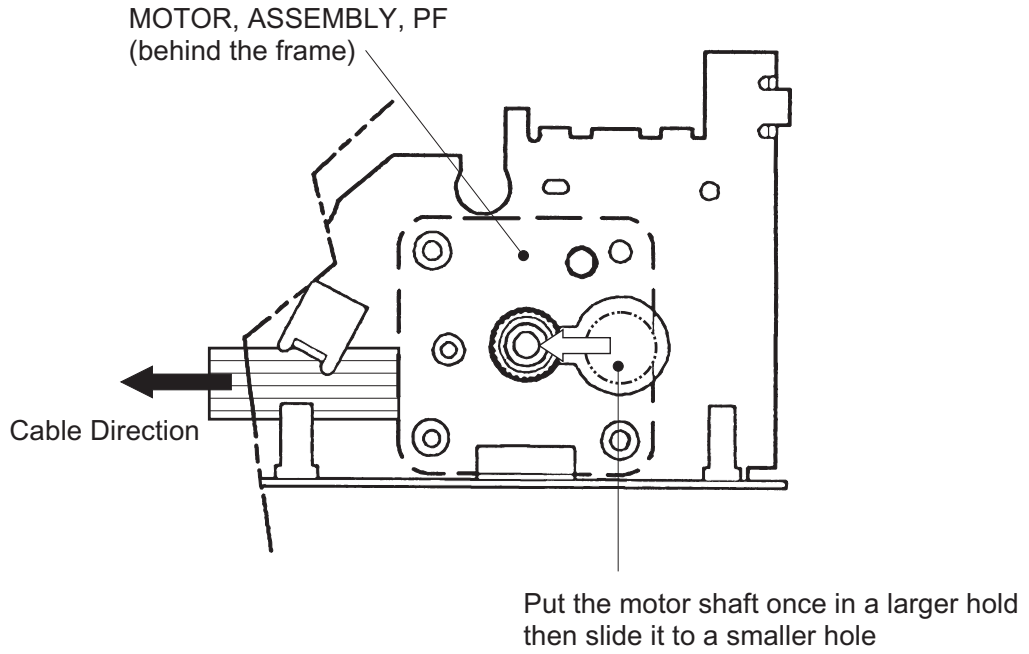
Figure 3-15. PF Motor and Frame

3.2.5.5 ASF Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Remove the locking pin from center of "GEAR, 34" and remove "GEAR, 34" from the shaft.
3. Unhook the cables from the cable hook of the ASF and the printer mechanism.
4. Remove 2 screws (Refer to the figures) fixing the ASF and remove the ASF from the mechanism by detaching the projection of ASF (at left) from the hole of the mechanism.

WORK POINT

☑ *Make sure that the ASF is firmly attached to the mechanism.*

☑ *Use proper type of screw at specified position (viewed from the back of the mechanism):*
   Right: "SHAFT, FIXING, CR"
   Left: Screw - No.7 (CBS with washer)

⚠CAUTION

When re-installing the ASF, be sure that no cables (except the flat cable to the printhead) are pinched between the ASF and the frame.

Especially, if the cables from CR/PF Motor is pinched, there is a danger of short-circuit with the frame and possibly causes hazardous problem like over-heating, burning of components.

SHAFT, FIXING, CR

[CBS with washer]

GEAR, 34

The projections of ASF must be
in these holes
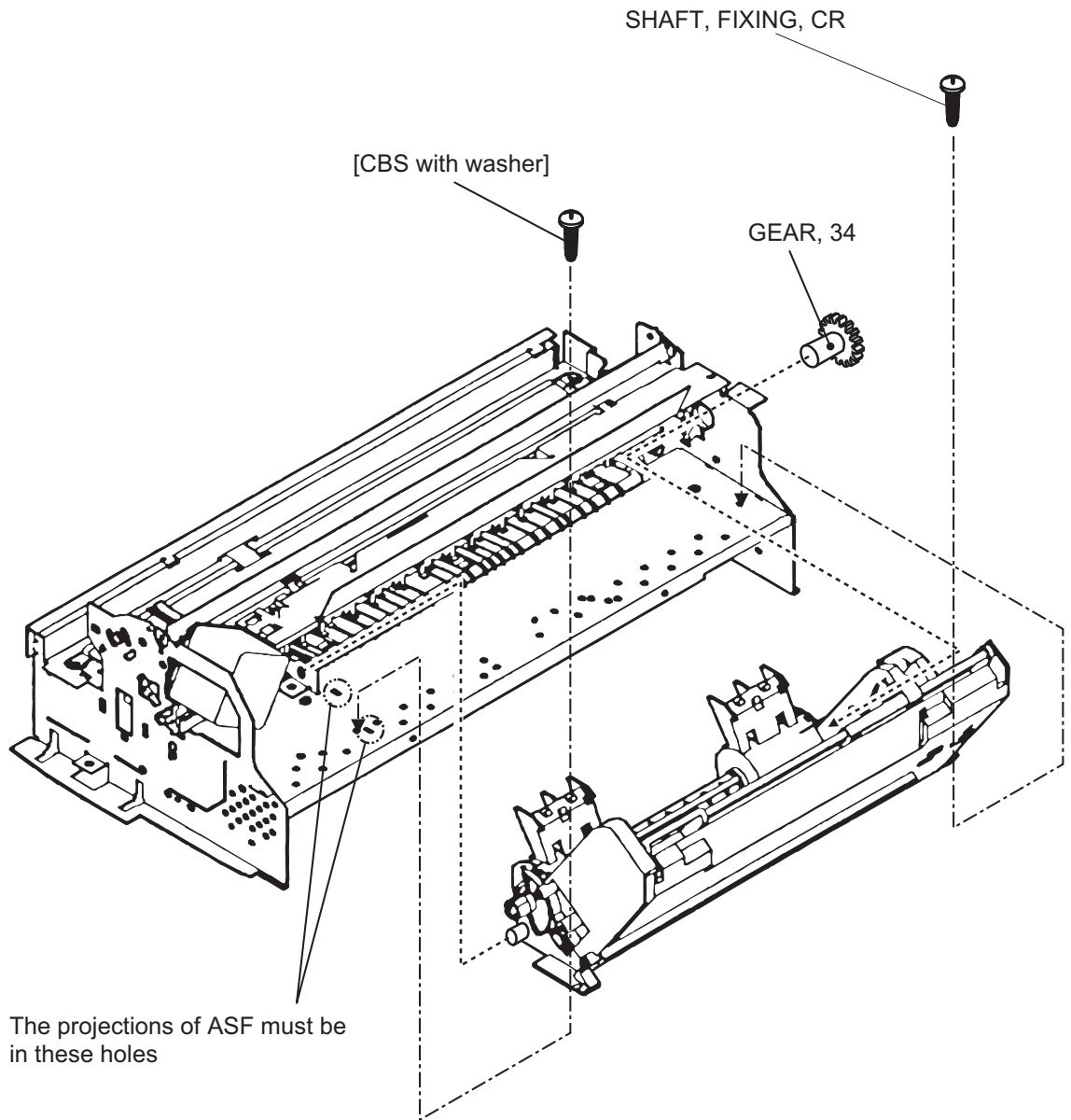
Figure 3-16. ASF Assembly Removal

3.2.5.5.1 ASF Disassembly

1. Removing the ASF. (Refer to section 3.2.5.5)
2. Remove "TWIST SPRING, 41.2" by unhooking one end from the ASF frame and remove "LEVER, BRAKE".
3. Remove "BUSH, FIXING, SHAFT" from the right end of "SHAFT, ROLLER, LD" and remove "LEVER, HOPPER, RELEASE".
4. Move the left paper pick-up assembly to the middle of the ASF and remove "BUSH" from the shaft.
5. Push out "SHAFT, ROLLER, LD" to the left and remove "BUSH, FIXING, SHAFT, LEFT" from the left-end of the shaft by unhook it.
6. Unhook the top of "HOPPER, ASSEMBLY" from the both sides of "FRAME, ASF".
7. Push out "SHAFT, ROLLER, LD" to the right while pulling up "PICKUP, ROLLER ASSEMBLY, RIGHT" slightly. Then, detach the left end of "SHAFT, ROLLER, LD" from "FRAME, ASF".
8. Holds "HOPPER, ASSEMBLY" and remove the right cam part of "HOPPER, ASSEMBLY" through the hole at the right side of "FRAME, ASF".

To this point, the ASF assembly is disassembled and both left and right "PICKUP, ROLLER ASSEMBLY" and "HOPPER, ASSEMBLY" are separated.

WORK POINT

☑ *When removing "HOPPER, ASSEMBLY", be careful that the grease that applied to the cam part of it, not to attach to the other part of the ASF. If so, wipe it off completely.*

☑ *Be careful of the direction when you install the "LEVER, HOPPER, RELEASE".*

☑ *Make sure that bushes at the both ends of the shaft are firmly attached.*
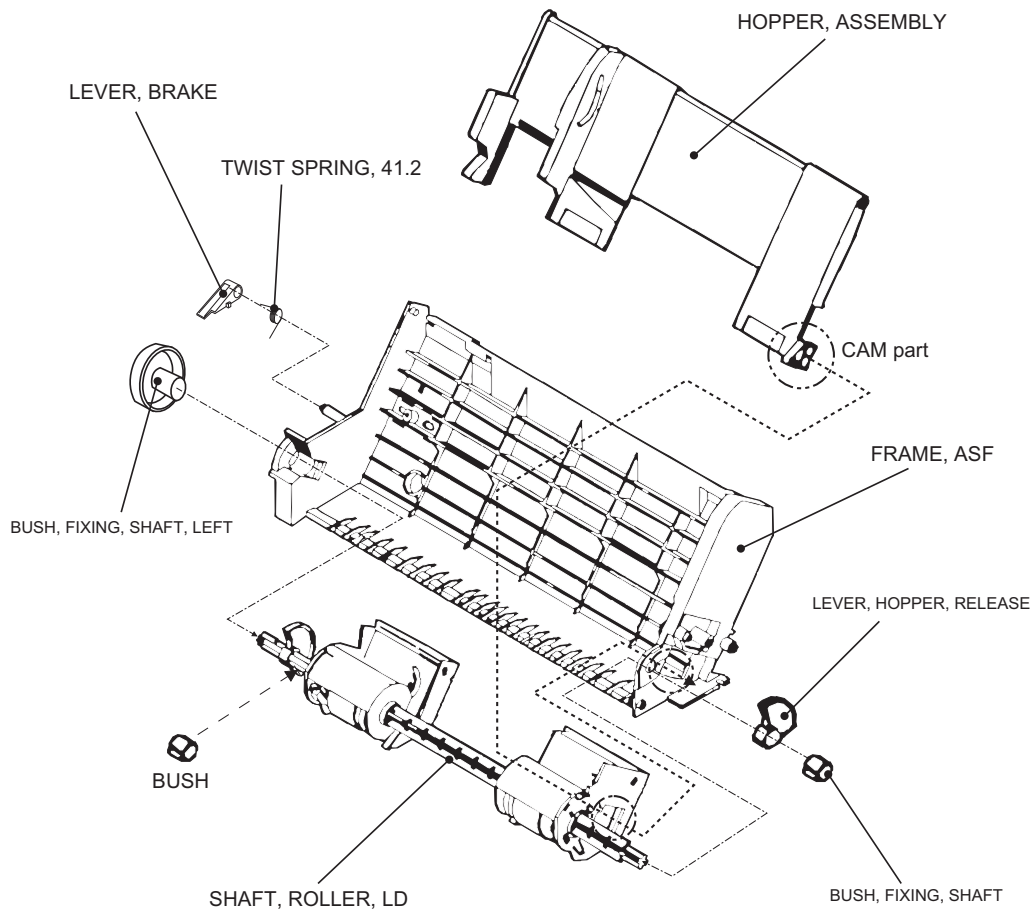
Figure 3-17. ASF Disassembly

3.2.5.5.2 Pick-Up Roller Assembly Removal

1. Disassemble the ASF and separate "PICKUP, ROLLER ASSEMBLY" and "HOPPER, ASSEMBLY". (Refer to section 3.2.5.5.1)
2. Remove "COMPRESSION SPRING, 1.66" from the back of "HOPPER, ASSEMBLY".
3. Pull out the right cam part of "HOPPER, ASSEMBLY" though the hole of right frame of "PICKUP, ROLLER ASSEMBLY, RIGHT".

   <To this point, "HOPPER, ASSEMBLY" and "PICKUP, ROLLER ASSEMBLY" is separated>
4. Unhook "ROLLER ASSEMBLY, LD" from the assembly frame and remove "COVER, ROLLER, LD" by unhooking it from the assembly frame. Then, remove "ROLLER ASSEMBLY, LD".

WORK POINT

☑ *When you re-assemble, be sure that "ROLLER ASSEMBLY, LD" is hooked to assembly frame firmly.*

☑ *Before re-assemble the unit, make sure that "COMPRESSION SPRING, 1.66" is set on the assembly frame and hooked to the hooks as shown in the figure. This helps you easier assembly. After assemble the unit, do not forget to unhook the springs by rotating the spring from the holes located at the back of the ASF assembly.*
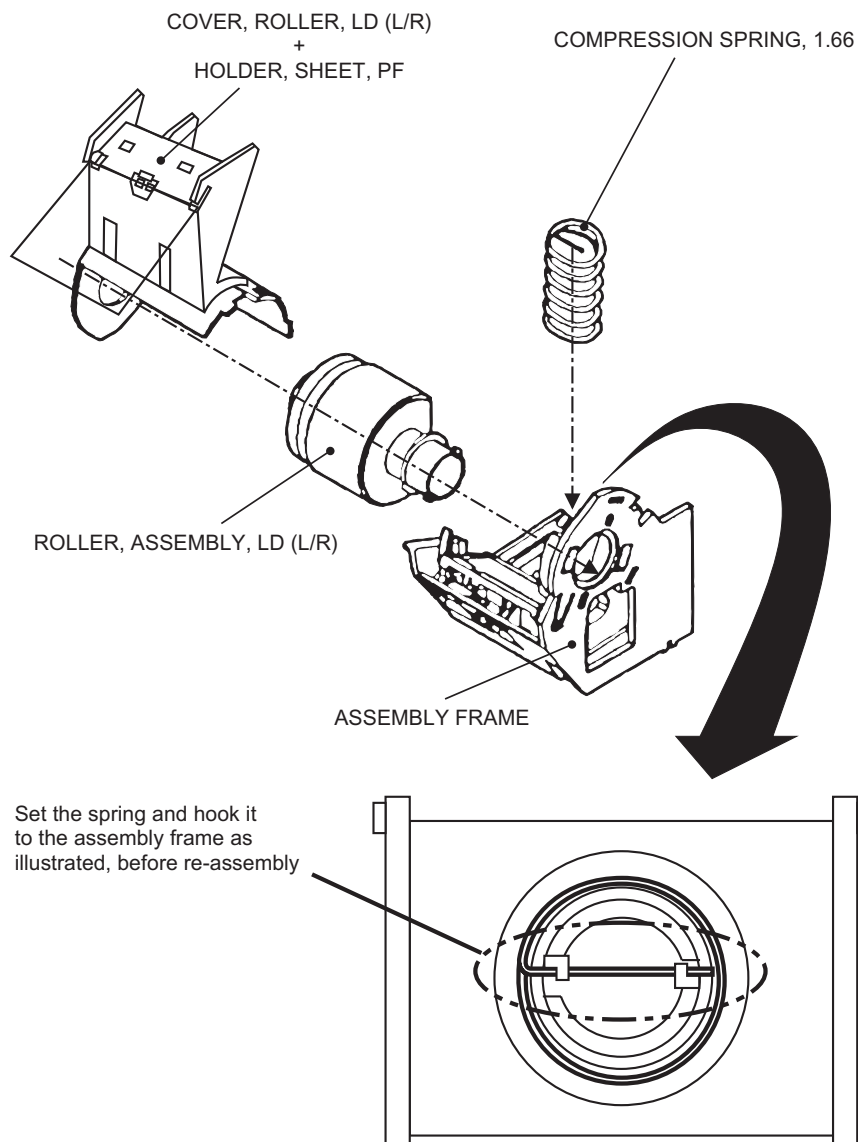
Figure 3-18. Pick-Up Roller Removal

3.2.5.6 Carriage Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Push "HOLDER, PULLEY, DRIVEN" inward to loosen the timing belt and detach the timing belt from the drive pulley of CR Motor assembly.
3. Take out "COMPRESSION SPRING, 19.6" from "HOLDER, PULLEY, DRIVEN".
4. Remove "PULLEY, ASSEMBLY, DRIVEN" and the timing belt together from "HOLDER, PULLEY, DRIVEN" and remove "HOLDER, PULLEY, DRIVEN" from the mechanism.
5. Unhook "LEVER, PG" and remove it.
6. Unhook "LEVER, PG, SUB" and remove "LEVER, PG, SUB" and a spring washer from the end of "SHAFT, CR, GUIDE".
7. Remove 1 screw (No.7) and rotating "BUSH, PARALLEL ADJUST, RIGHT" to match it with the cut out of the frame. Then, take out "BUSH, PARALLEL, ADJUST, RIGHT".
8. Remove "CARRIAGE, ASSEMBLY" together with "SHAFT, CR, GUIDE".

WORK POINT

☑ *It is good idea to mark the current position of "BUSH, PARALLEL ADJUST, RIGHT" before removal. This enables you to omit the paper gap adjustment after the assembly.*

☑ *Be careful with the direction of spring washer at the assembly. (A convex side must face the bush)*

REQUIRED ADJUSTMENT

When you remove or replace the carriage assembly, be sure to perform the following adjustments:

  1) Paper Gap Adjustment (Refer to Chapter 4 / Section 4.2.1.)
  2) Head Angular Adjustment (Refer to Chapter 4 / Section 4.2.2.5.)
  3) Bi-D Alignment Adjustment (Refer to Chapter 4 / Section 4.2.2.6.)

BUSH, PARALLEL ADJUST, RIGHT   BUSH, PARALLEL ADJUST, RIGHT

Side frame of
printer mechanism

Cut out of side frame
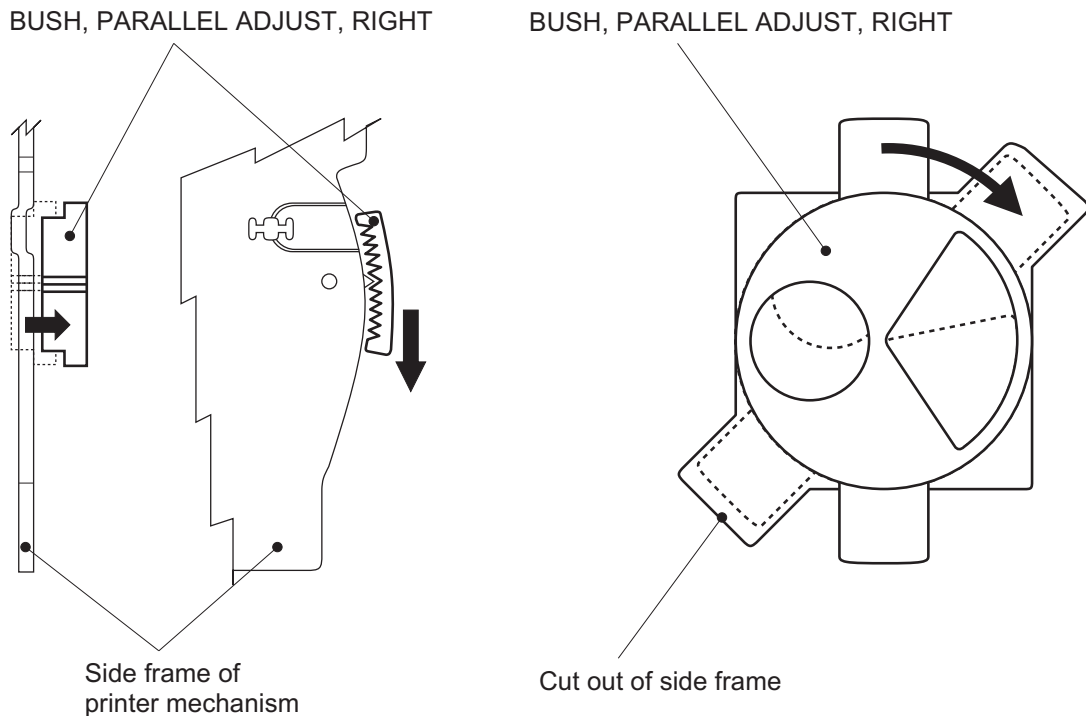
Figure 3-19. BUSH PARALLEL ADJUST Removal

Carriage Assembly

BUSH, PARALLEL ADJUST, LEFT

SHAFT, CR, GUIDE

BUSH, PARALLEL ADJUST, RIGHT

LEVER, PG, SUB

Spring Washer
(Convex side must be facing the bush)
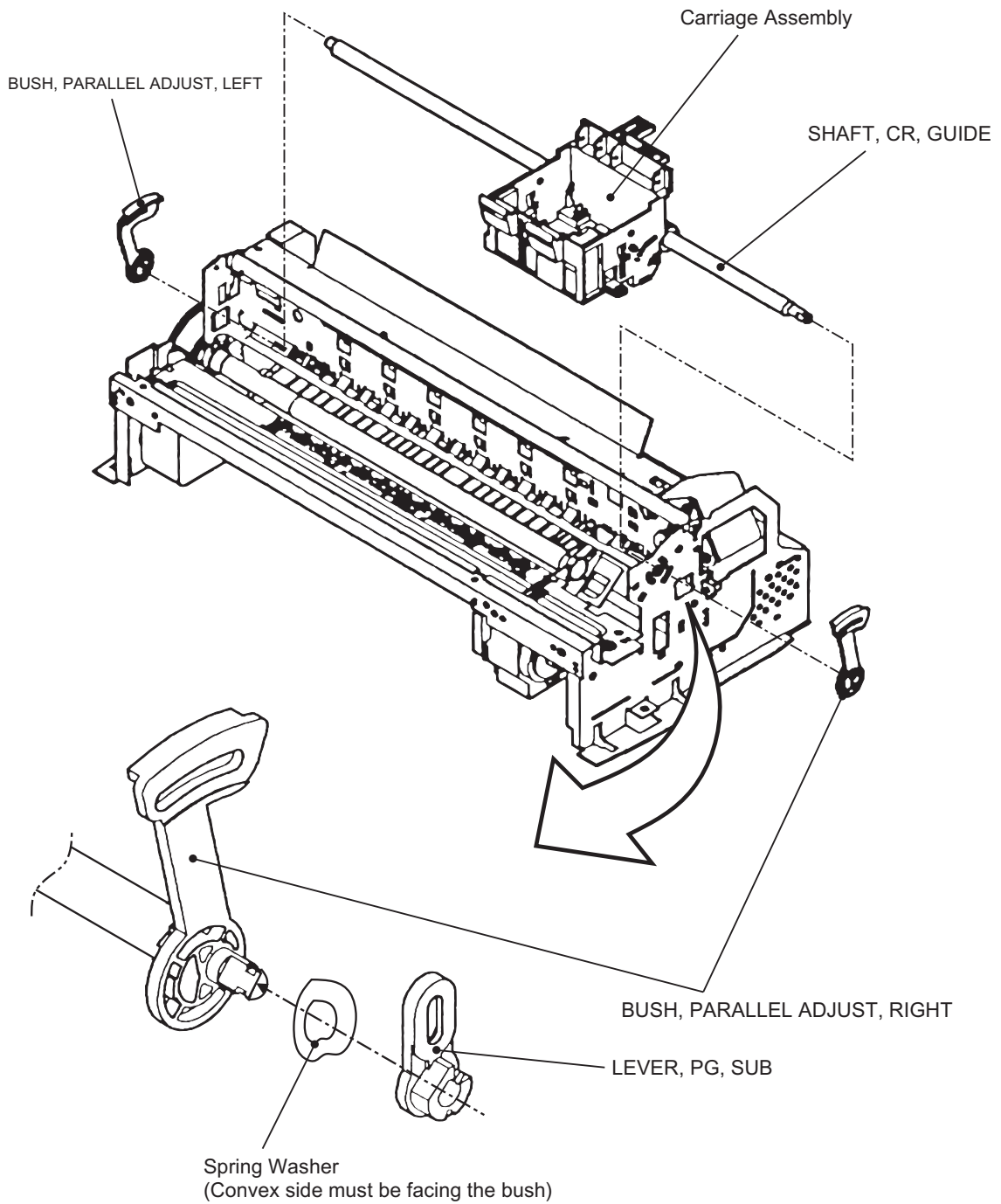
Figure 3-20. Carriage Assembly Removal

3.2.5.7 PF Roller Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Removing the carriage assembly (Refer to section 3.2.5.6)
3. Remove 2 screws (No.1) at the top of mechanism and remove "GUIDE PLATE, CABLE".
4. From the back of the mechanism, unhook the springs from the frame and remove "PAPER GUIDE, ASSEMBLY, UPPER" (total 6 pieces).
5. Unhook "PAPER GUIDE, FRONT;B" and remove it.
6. Unhook the both shaft holders of "ROLLER, ASSEMBLY, PAPER EXIT" and remove it.
7. Unhook the left shaft holder of "ROLLER, ASSEMBLY, PF" and rotate it as to match with the cut out of the frame.
8. Slide "ROLLER, ASSEMBLY, PF" to the left and pulling it out.

WORK POINT

☑ When reinstalling "PAPER GUIDE, ASSEMBLY, UPPER" at right-most position (viewed from the front), be careful with the detection lever of the PE sensor.

☑ Be careful not to damage the hook of "PAPER GUIDE, FRONT;B" during disassembly and assembly.

☑ Be careful not to damage the black coated part of "ROLLER, ASSEMBLY, PF" during disassembly and assembly.

☑ Be careful not to damage the gears.
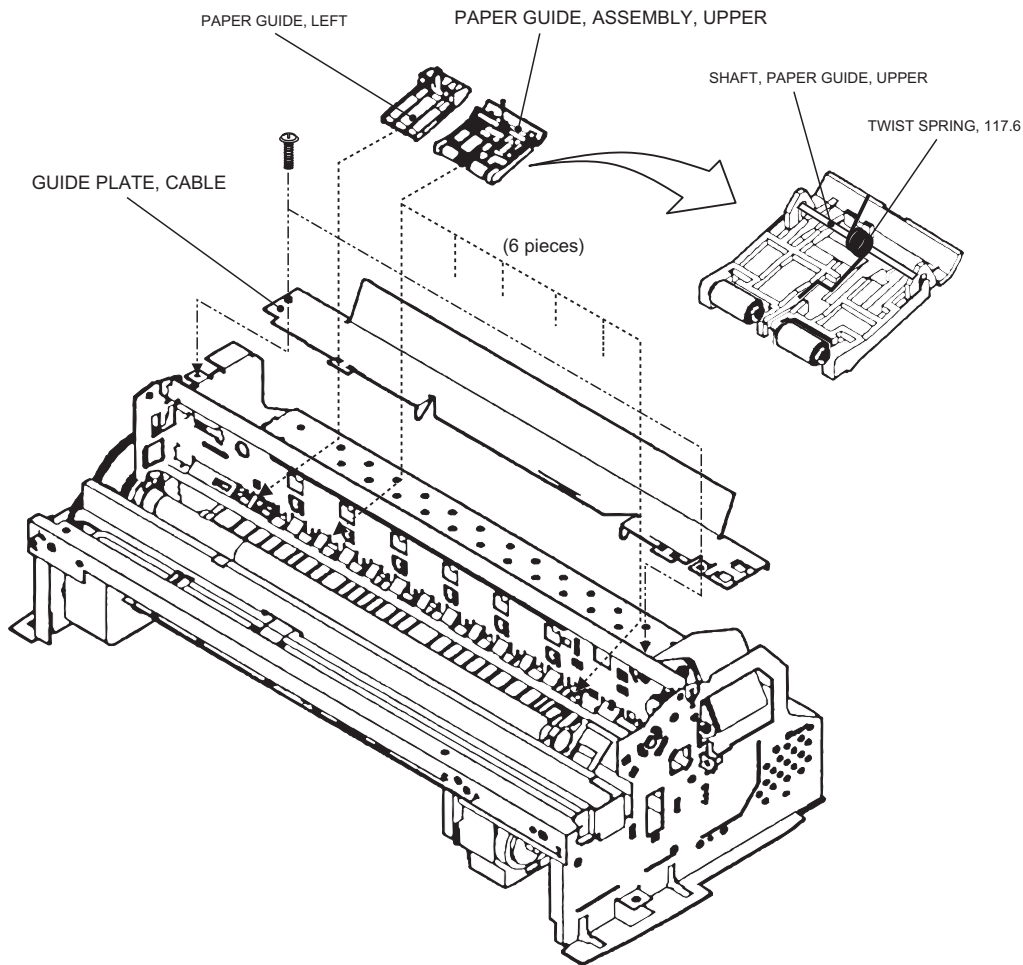
Figure 3-21. PAPER GUIDE ASSEMBLY Removal

PAPER GUIDE, LEFT

PAPER GUIDE, ASSEMBLY, UPPER

SHAFT, PAPER GUIDE, UPPER

TWIST SPRING, 117.6

GUIDE PLATE, CABLE

(6 pieces)
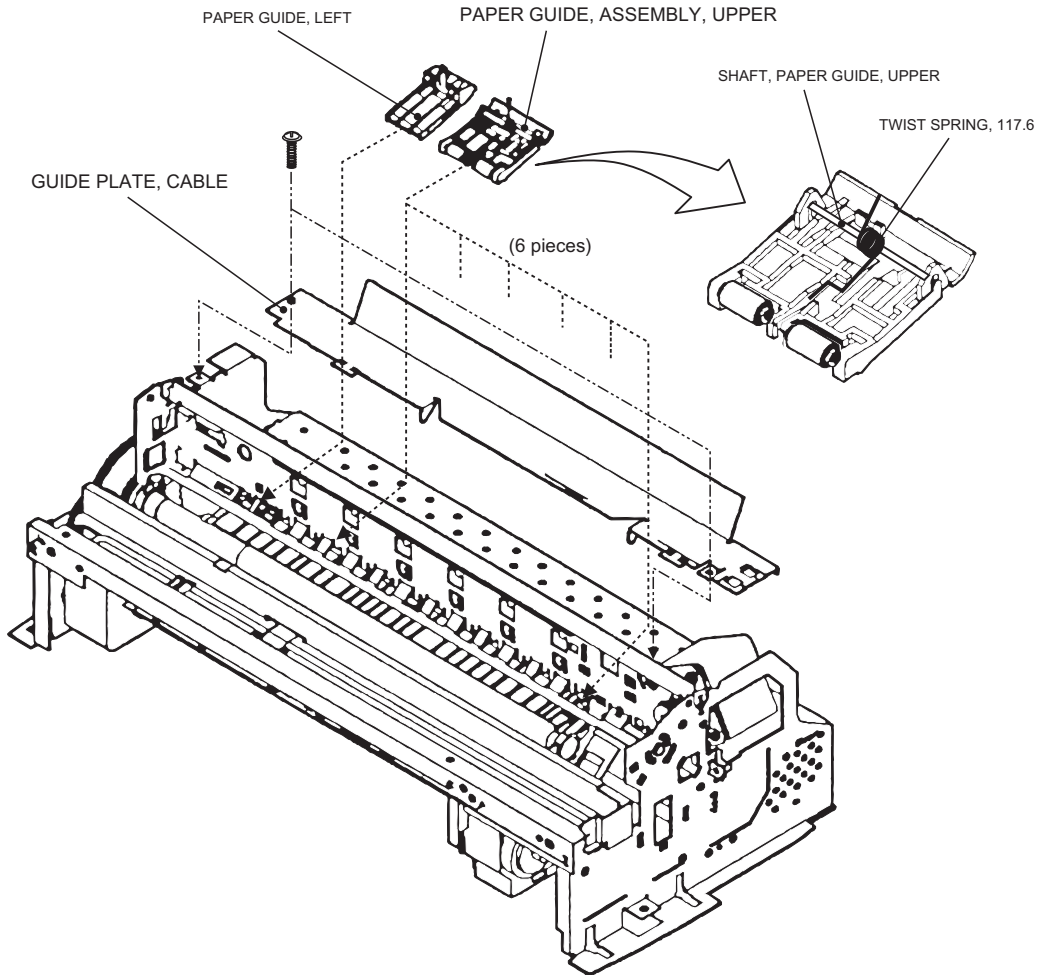
Figure 3-22. ROLLER, ASSEMBLY, PAPER EXIT Removal

PAPER GUIDE, FRONT;B

ROLLER, ASSEMBLY, PAPER EXIT
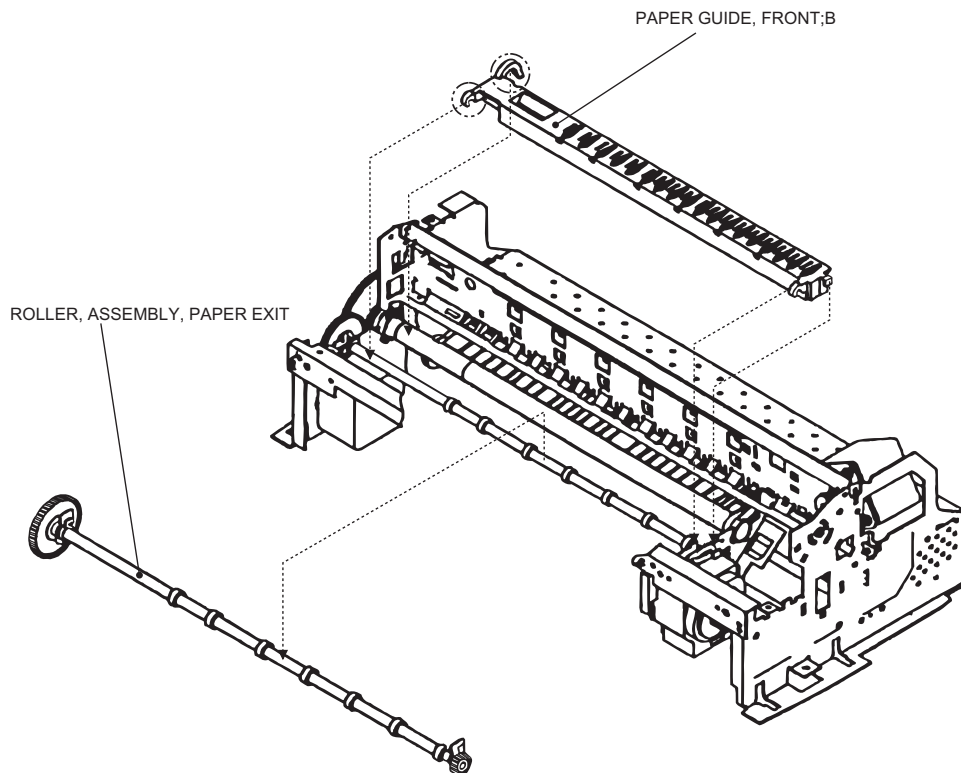
Figure 3-23. ROLLER, ASSEMBLY, PF Removal

3.2.5.8 PE Sensor Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. From the front side of the mechanism, unhook two hooks fixing "SENSOR, ASSEMBLY, PE" to the mechanism. Then, slide it to upward to remove it. After removal, disassemble the assembly if necessary.

WORK POINT

When re-install the assembly, be sure that the sensor lever is correctly inserted into a hole of "PAPER GUIDE, ASSEMBLY", UPPER".

Release these hooks to
remove the PE Sensor Assembly

From the back side of
the mechanism

HOLDER, PE

To frame

BOARD ASSY., PE

LEVER, PE
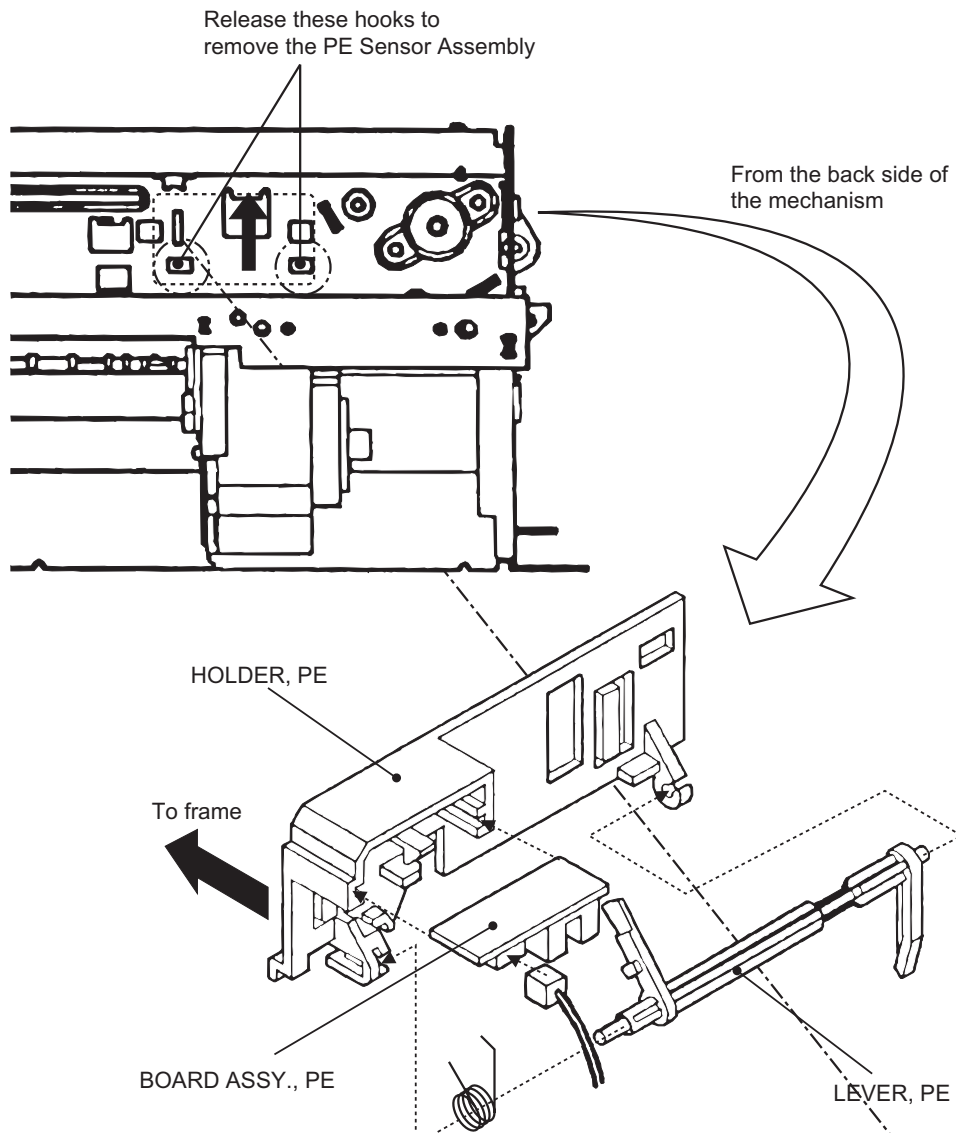
Figure 3-24.PE Sensor Assembly Removal

⚠ CAUTION

☑ *Be careful not to damage the cable when inserting or pulling out it from the PE sensor board.*

☑ *Make sure the sensor lever moves smoothly when installing it.*

3.2.5.9 HP Sensor Assembly Removal

1. Removing the upper housing. (Refer to section 3.2.1)
2. Detach the cable from the sensor and remove it by unhook it from the frame.

SENSOR, HP

CR MOTOR
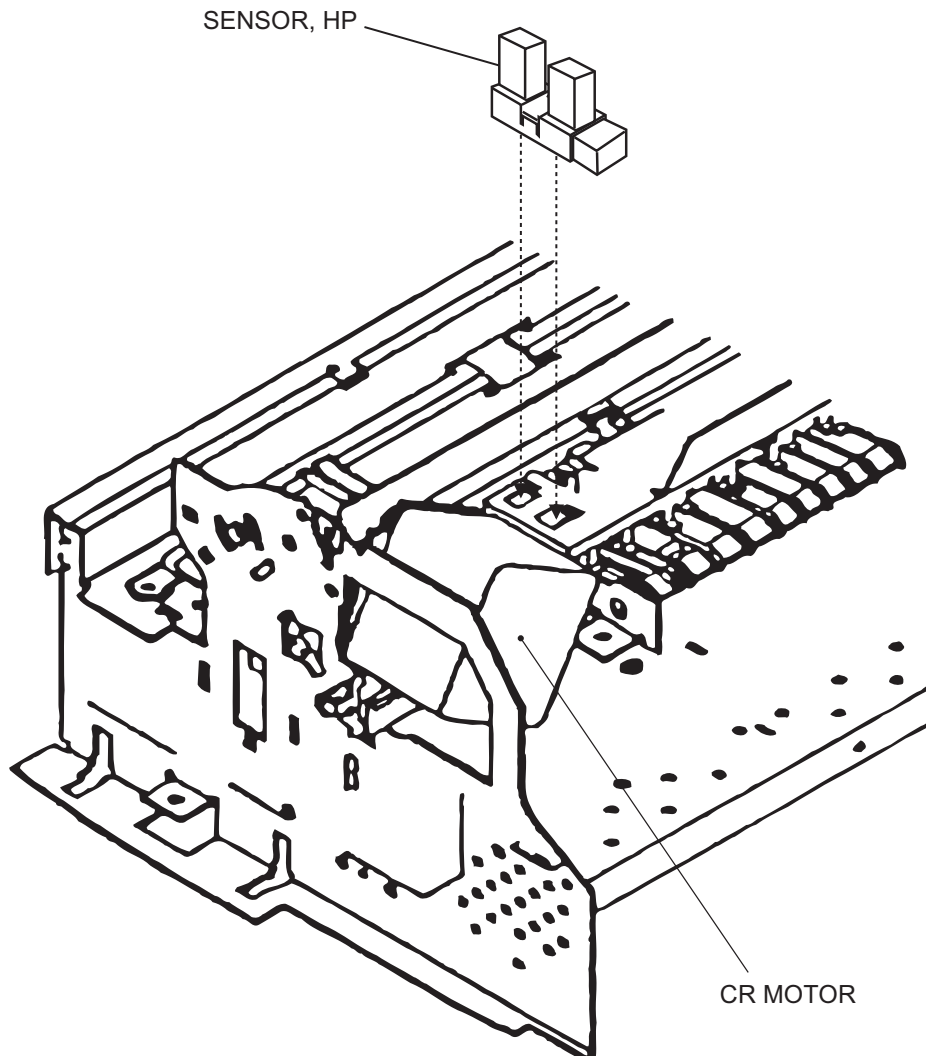
Figure 3-25. HP Sensor Removal

⚠**CAUTION**

☑ *Make sure that the sensor itself is attached firmly to the frame when installing the HP sensor again.*

☑ *Be careful not to damage the sensor board when installing or pulling out the cable from the HP sensor.*

Chapter 4
Adjustment

4.1 OVERVIEW

This section describes the procedure for adjustments required when the printer is disassembled and assembled for repair.

4.1.1 Required Adjustments

Table 4-1 lists all the adjustments required with this printer. If any service listed in this table is carried out, all adjustments corresponding to that service should be performed to ensure proper operation of the printer.

Table 4-1. Required Adjustments

Performance Order	1	2	3	4	5
Service Performed	Paper-Gap Adjustment	Ink Charge	VH Setting	Head Angular Adjustment	Bi-D Adjustment
Replacing the printer mechanism	NA	O	O	NA	O
Replacing the C209 MAIN board	NA	O	O	O	O
Replacing the printhead unit	NA	O	O	O	NA
Replacing the CR Motor	NA	NA	NA	NA	O
Replacing or disassembling the carriage assembly	O	NA	NA	O	O
Replacing or disassembling the PF Roller assembly	O	NA	NA	NA	NA

Note) *"O":* *Required adjustment*
"NA": *Not applicable*

4.1.2 Tools Required for Adjustment

Table 4-2 lists all the tools required to make the specified adjustments.

Table 4-2. Required Tools

No.	Name	Adjustment	Notes
1	Thickness Gauge	Paper-Gap Adjustment	● Thickness: 1.04mm ● EPSON Code: B776702201
2	Adjustment Program	● Ink Charge ● VH Setting ● Head Angular ● Bi-D Alignment	● Program Name: K00A10VE.BAS

⚠**CAUTION**

☑ *Do not use rusty or deformed thickness gauge for adjustment.*

☑ *Wipe off any dirt or dust from the thickness gauge before using.*

4.2 Adjustments

This section describes the detail procedure of each adjustment.

4.2.1 Paper Gap Adjustment

The paper gap is a distance between nozzle surface of the printhead unit and a paper surface and is adjusted to specified gap at the assembly. Therefore, if the carriage assembly is removed from the printer mechanism for any reason, this adjustment should be made to fix the gap.

⚠ CAUTION

> ☑ *Do not scratch the surface of "PAPER GUIDE, FRONT;B" and "ROLLER, ASSEMBLY, PF".*
>
> ☑ *Be careful not to damage or make dirty the nozzle surface of the printhead unit.*

[Paper gap - Right-hand side Adjustment]

1. Attach both "BUSH, PARALLEL ADJUST" (L/R) to the side frame and align the position mark on top edge of it to a notch on the edge of the side frame.
2. Set "LEVER, PG" to front side (Position "0").
3. Move the carriage assembly to the middle, and put the thickness gauge at the position specified in the figure.
4. Move the carriage assembly over the thickness gauge.

WORK POINT

> ☑ *The thickness gauge must be placed on a flat surface of the ribs of "PAPER GUIDE, FRONT;B".*
>
> ☑ *During adjustment, always pull the timing belt to move the carriage assembly.*

5. Shift the position of "BUSH, PARALLEL ADJUST, RIGHT" to backward (Gap: Narrower) until when the thickness gauge starts sliding together with the carriage assembly when you move it to right and left for about 20mm.
6. At the point of above step, shift the position of "BUSH, PARALLEL ADJUST, RIGHT" for one notch to forward (Gap: Wider).
7. Then, confirm that the thickness gauge do not slide when you move the carriage assembly, with either "LEVER, PG" is at position "0" or "+".

[Paper gap - Left-hand side Adjustment]

8. Repeat the above step 2 to 7 with "BUSH, PARALLEL ADJUST, LEFT".

[Gap Confirmation]

9. Repeat the step 3 to 4 again.
10. Confirm that the thickness gauge do not slide when you move the carriage assembly to right and left for above 20mm.
11. Shift the position of "BUSH, PARALLEL ADJUST, RIGHT" for one notch to backward (Gap: Narrower) and confirm that the thickness gauge is sliding by moving the carriage assembly. If not, return to step 1 and repeat adjustment again.
12. If the gap is correct, shift "BUSH, PARALLEL ADJUST, RIGHT" for one notch to forward (Gap: Wider).

[Fixing "BUSH, PARALLEL ADJUST"]

13. Fix both bushes with 2 screws (1 each : No.1).

When the paper gap adjustment complete, confirm that the overlap of printhead nose and "CLEANER, HEAD".

1. Move the carriage assembly next to "CLEANER, HEAD".
2. Confirm that the overlap of printhead nose and top edge of "CLEANER, HEAD" is more than 0.5mm.
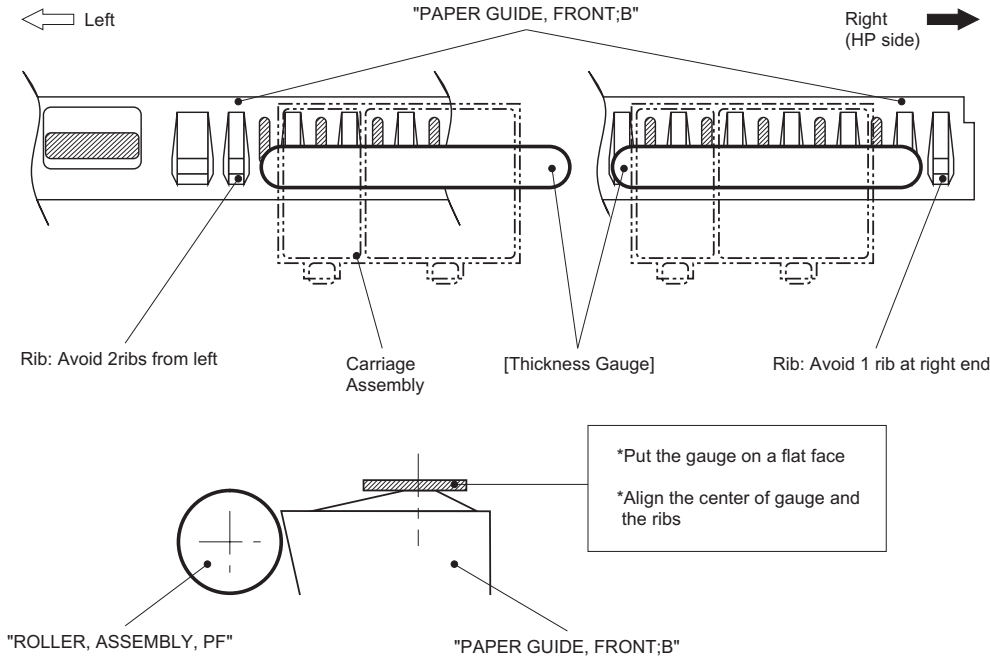
Figure 4-1. Paper Gap Adjustment - Thickness Gauge Setting
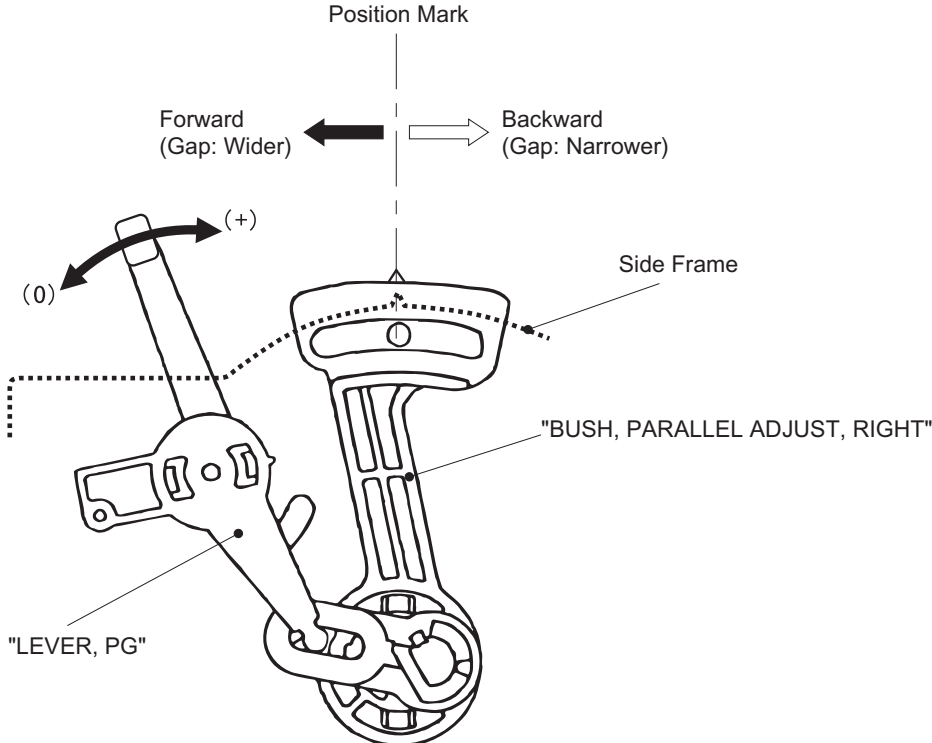
Figure 4-2. Paper Gap Adjustment - Adjustment Procedure
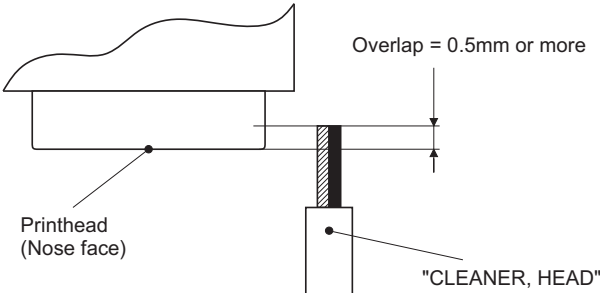
Figure 4-3. "CLEANER, HEAD" Overlap

4.2.2 Adjustment using Adjustment Program

Since the characteristic of printer mechanism and its components are varying, every printer mechanism are checked and it's own characteristic information is stored in EEPROM of the main control board as a compensation parameter for the mechanism control. Therefore, if the combination of printer mechanism and the main control board is changed, the printer should be adjusted using the adjustment program in order to maintain optimum performance of the printer.

4.2.2.1 Overview of Adjustment Program

This adjustment program(K00A10VE.BAS) is developed specifically for this printer and the basic operation with this adjustment program is illustrated in figure below.
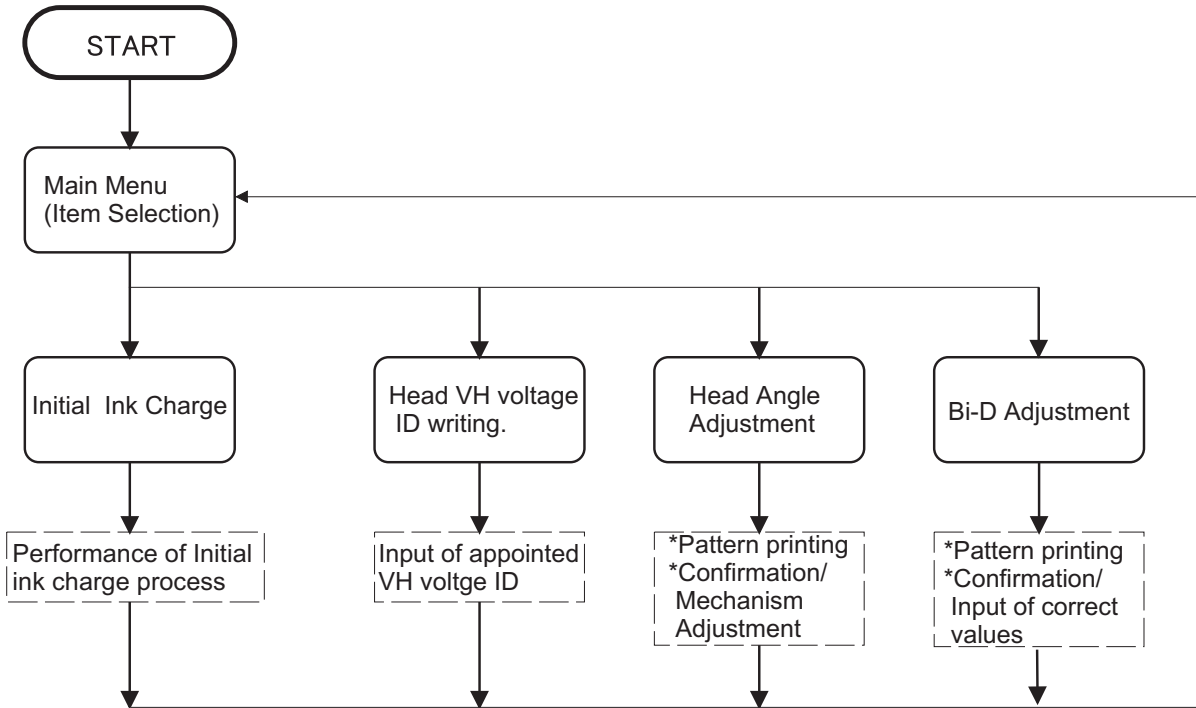
Figure 4-4. Adjustment Program Flow

4.2.2.2 Preparation for Adjustment

Before you start adjustment, have the following items ready for adjustment.

- PC (MS-DOS Machine)
- I/F cable (Parallel)
- Brand new ink cartridges (Black and Color)
- Photo quality ink jet paper (#S041061/2)
- Printer that is necessary to adjust (At least, the printer mechanism, electrical circuits, boards and panel should be connected.)

⚠ CAUTION

☑ *Make sure to use the new ink cartridge, which is not used and also not opened before.*

☑ *Use the special ink-jet paper in order to check the adjustment result accurately.*

1. Connect the PC to the printer and turn the PC and the printer on. Then, unpack a brand-new ink cartridges and install them on to the printer.
2. Load "GWBASIC.EXE" and execute the adjustment program "K00A10VE".
3. At the menu [SCREEN-1], input "2" to select "Cartridge" and press ENTER key.
4. Then, at the menu [SCREEN-2], input the number corresponding to your market and press ENTER key.

[SCREEN-1]
```
***** TOOL ***** PM-700C/STYLUS COLOR PHOTO K00A10Ve


        1. Jig
        2. Cartridge

Input ITEM No. : ?_
```

[SCREEN-2]
```
***** CUSTOMER ***** PM-700C/ STYLUS COLOR PHOTO K00A10Ve


        1. 000: (WORLD)
        2. 100: (JAPAN)
        3. 000: (KOREA)
        4. 000: (RUSSIA)

Input ITEM No. :?__
```

[SCREEN-3]
```
<MAIN MENU for Production> STYLUS COLOR PHOTO  K00A10Ve


        1:  VH Setting
        2:  Ink Charge
        3:  Angular Adjust Printing      XX-XX-XXXX  XX:XX:XX
        K:  Angular Adjust Setting
        4:  Bi-d Adjust                  CUSTOMER:WORLD

        P:  Print Inspection (GOS)       Jig  No.  :CT
        L:  Print Inspection (S/F)       M/C No.  :
        M:  Print Inspection (Post-card)

                                         HEAD VH :

        CL. Cleaning:
        9.  INK Discharge

        E.  END / Go to SETTING MENU

Input ITEM No. :?_
```

4.2.2.3 Ink Charge Operation

If either of the following service is made, internal ink paths of the printhead unit is completely empty. Therefore, a brand-new ink cartridge must be installed and all ink paths must be charged with fresh ink by performing the following operation to ensure proper printing operation.

■　Replacing the printer mechanism
■　Replacing the printhead unit

⚠CAUTION

☑ *Since this operation consumes large amount of ink, do not perform it unnecessarily:*
　　　*Black:　　*Approx. 8.8% of the ink charged in the cartridge*
　　　*Color:　　*Approx. 16.2% of the ink charged in the cartridge (CMYcm total)*

☑ *The ink charge operation takes long time to complete. Do not turn off the printer until it stops completely.(The POWER indicator blinks during the operation.)*

1.　Start "Preparation for Adjustment" and complete 1 to 4 procedures. (Refer to section 4.2.2.2)
2.　At the main menu [SCREEN-3], input "2" to select "Ink Charge" and press ENTER key. Then, the printer starts the ink charge operation.

4.2.2.4 VH Setting

The piezo-electric element used in each printhead unit has unique electrical characteristic and the electrical characteristic of each printhead is measured at the production and each printhead unit is given with the ID code. Therefore, this ID code is need to be stored in EEPROM on the main board when the following service is made and the printer read this information to compensate the difference of characteristic for printing control and an amount of injected ink is maintained at the specified level.

■　Replacing the printhead unit
■　Replacing the printer mechanism (the after-service unit comes with the printhead unit installed)

*Refer to the next page for [SCREEN -1] to [SCREEN-3].
1.　When replacing the part mentioned above, take a note of the ID code indicated on the unit as below.

　　●　Printhead Unit:　　　Stamped at the side of the unit
　　●　Printer mechanism:　　Indicated on a label attached to the packing box for the after-service unit.

2.　Re-assemble the printer.
3.　Start "Preparation for Adjustment" and complete 1 to 4 procedures.(Refer to section 4.2.2.2)
4.　At the main menu [SCREEN-1], Input "1" to select "VH Setting" and press ENTER key.
5.　At the next menu screen[SCREEN-2], input "0" as "M/C No." and press ENTER key.
6.　Then next menu [SCREEN-3] appears on the screen, and input the ID code which you noted at the beginning of this procedure.

　　●　VH ID Code format:　　*1st/2nd digits (from left)　　=Normal dot VH ID
　　　　　　　　　　　　　　*3rd digit　　　　　　　　=Drive frequency ID
　　　　　　　　　　　　　　*4th/5th digits　　　　　=Micro dot VH ID

7.　After inputting the ID code, the program returns to the main menu and you can continue to another adjustments.

WORK POINT

☑ *Timing to write the specified value to EEPROM: Upon pressing ENTER key after ID code input.*

---

*[SCREEN-1] to [SCREEN-3] for VH Setting.

[SCREEN-1]

```
< MAIN MENU for Production >  STYLUS COLOR PHOTO  K00A10Ve

       1. VH Setting
       2. Ink Charge
       3. Angular Adjust-Printing        XX-XX-XXXX        XX:XX:XX
       K. Angular Adjust-Setting
       4. Bi-d Adjust                    CUSTOMER:WORLD

       P. Printing Inspection (GOS)      JIG No.        :CT
       L. Printing Inspection (S/F)      M/C No.        :
       M. Printing Inspection (Post-card)
                                         HEAD VH        :
       CL. Cleaning
       9. INK Discharge

       E. Go to SETTING MENU

Input ITEM No.: ?_
```

[SCREEN-2]

```
M/C No.          ?_
```

[SCREEN-3]

```
<<<< HEAD VH WRITE >>>>

Head VH ( 5 digit ID (ex.18109 or 18A0 ):


-------------------VD VALUE-------------------
   M/C No.         :0
   HEAD VH         :
M/C No.     ? 0
```


Head VH ID

Viewed from front
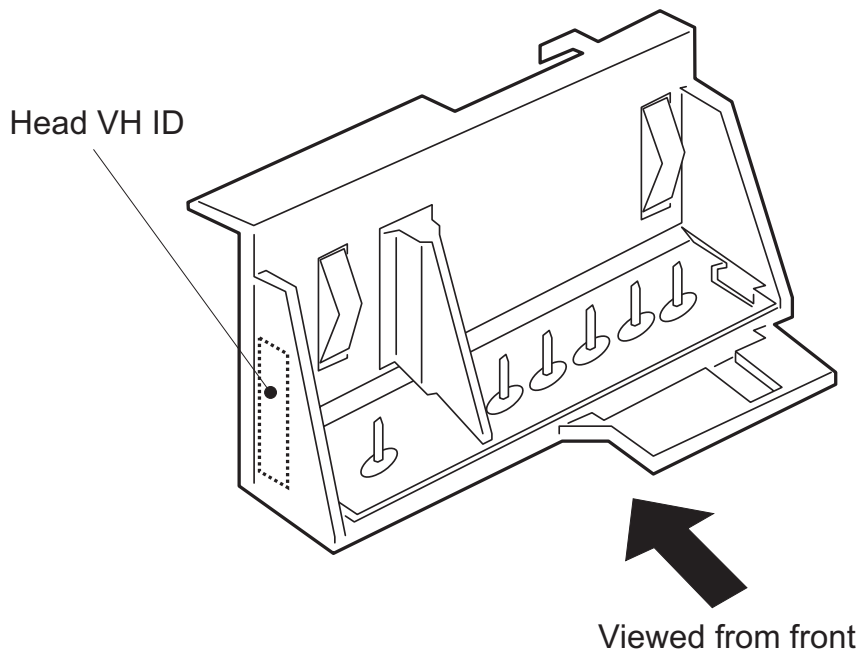
Figure 4-5.Head VH ID Indication

4.2.2.5 Head Angular Adjustment

The head angular means the angle at which the printhead unit installed on the carriage assembly against the carriage movement direction and the printhead must be parallel with the carriage movement direction so that the lines printed with each nozzle are evenly positioned. Therefore, this adjustment should be made when the following service is made:

■   Replacing or removing the printhead unit

The head angular actually set by the adjust lever installed on the carriage assembly and the program print the check pattern to see the level of head angular.

*Refer to next page for [SCREEN-1] to [SCREEN-2].
1. Before performing this adjustment, be sure to perform "VH Setting" (Refer to section 4.2.2.4)
2. At the main menu [SCREEN-1], input "3" to select "Angular Adjust Printing" and press ENTER key.
3. Check to see if the lines printed in MAGENTA color is positioned in the middle of two BLACK lines with the check pattern printed by the program. If the position of MAGENTA lines are incorrect, input "K" to select "Angular Adjust Setting" at the main menu and the carriage assembly moves to the middle of the printer. Then, loosen a screw (No.3) fixing "FASTNER, HEAD" a little bit and shift the position of angular adjust level located at the right bottom of the carriage assembly to either forward (move MAGENTA line to down) or backward (move MAGENTA line to up).
4. After adjusting the position of angular adjust lever, input "Y" and press ENTER key and the carriage assembly returns to the home position.
5. Input "3" to print the check pattern again. If the level is still not correct, repeat the step 3 and 4.
6. If the level is correct, input "K" again and tighten a screw to fix "FASTNER, HEAD". Then, at the menu [SCREEN-2], input "Y" and press ENTER key to complete the adjustment.
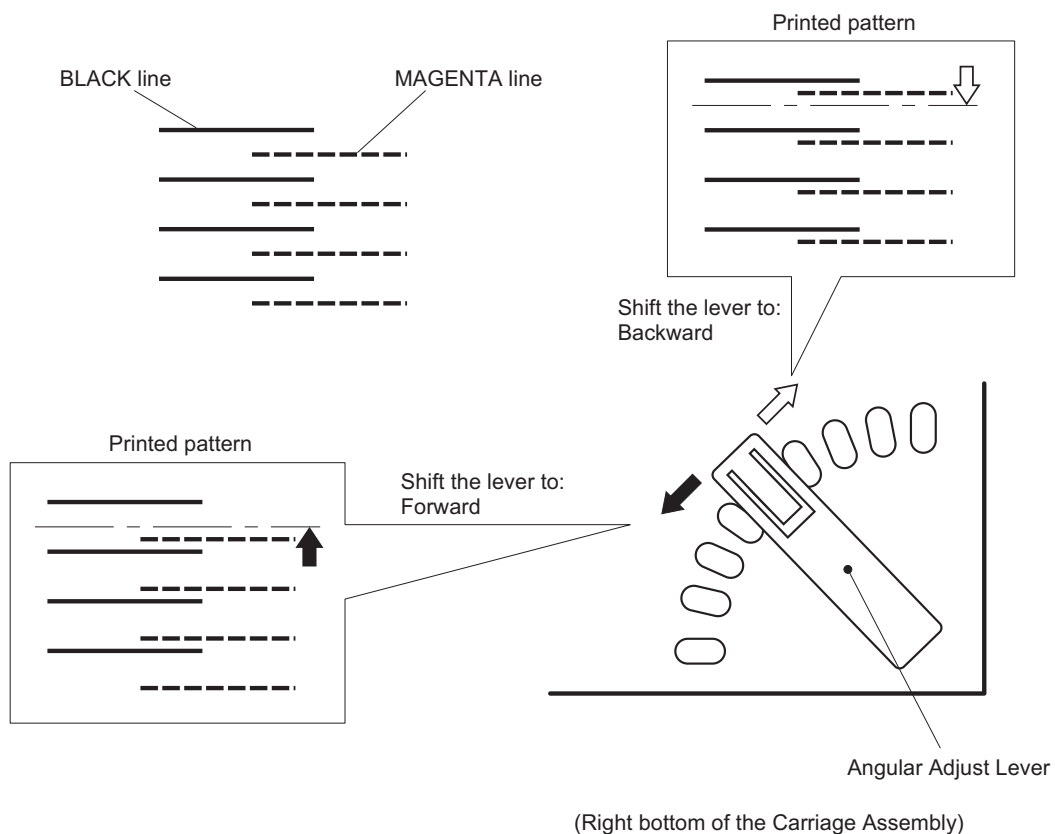
Figure 4-6. Head Angular Adjustment

*[SCREEN-1] to [SCREEN-2] for Head Angular Adjustment.

[SCREEN-1]

```
          < MAIN MENU for Production >  STYLUS COLOR PHOTO  K00A10Ve

        1.  VH Setting
        2.  Ink Charge
        3.  Angular Adjust Printing        XX-XX-XXXX        XX:XX:XX
        K.  Angular Adjust Setting
        4.  Bi-d Adjust                    CUSTOMER:WORLD

        P.  Printing Inspection (GOS)      JIG No.         :CT
        L.  Printing Inspection (S/F)      M/C No.         :
        M.  Printing Inspection (Post-card)
                                           HEAD VH         :
        CL.Cleaning
        9.  INK Discharge

        E.  Go to SETTING MENU

   Input ITEM No. : ?__
```

[SCREEN-2]

```
   Input ITEM No. :  ? k
   Angular Adjustment Finish (Yes):?_
```

4.2.2.6 Bi-D Alignment Adjustment

This adjustment defines the carriage drive control parameters to compensate the variation in mechanism components characteristic so that the print position become even in bi-directional printing. This adjustment is required when one of the following service is made:

■ Replacing the printer mechanism
■ Replacing the main board (C209 MAIN)
■ Replacing the CR Motor assembly
■ Replacing the carriage assembly

The values defined with this adjustment are stored in EEPROM on the main board.

*Refer to next page for [SCREEN-1] to [SCREEN-3].

1. If the printer mechanism is replaced, the ink charge operation and the VH Setting operation should be performed prior to this adjustment. (Refer to section 4.2.2.3 and 4.2.2.4)
2. Go to the main menu [SCREEN-1].
3. Input "4" to select "Bi-d Adjust" and press ENTER key.
4. The program prints the check pattern (one with the compensation value="0" and another two patterns each printed with the value "-2" and "+2"). Select the number of the pattern with which the printed lines are most properly aligned, and input the number and press ENTER key at the menu [SCREEN-2]. Then, the program print the sample pattern with the compensation value you have selected.
5. If all patterns printed by the program are completely mis-aligned, confirm the inclination of misalignment with the pattern printed with the value "0" by checking the relative position of the EVEN line to the ODD line:

   ● If EVEN line is shifted to RIGHT =   Requires (−) value
   ● If EVEN line is shifted to LEFT =   Requires (+) value

Then, once input "Y" and press ENTER key to return to the main menu, and input "E" to select "Go to SETTING MENU" and press ENTER key. At the setting menu screen [SCREEN-3], input "6" to select "BI-D Center" and input the approximation number that corresponding to the inclination of misalignment you have confirmed previously. After changing the reference value for the Bi-D alignment check printing, input "1" to select "(Production)" and back to the main menu and continue for the Bi-D alignment adjustment from step 4.

WORK POINT

☑ *Timing to write the specified value to EEPROM: Upon pressing ENTER key after input "Y".*

[Printed pattern]

Input (-) value

Input (+) value
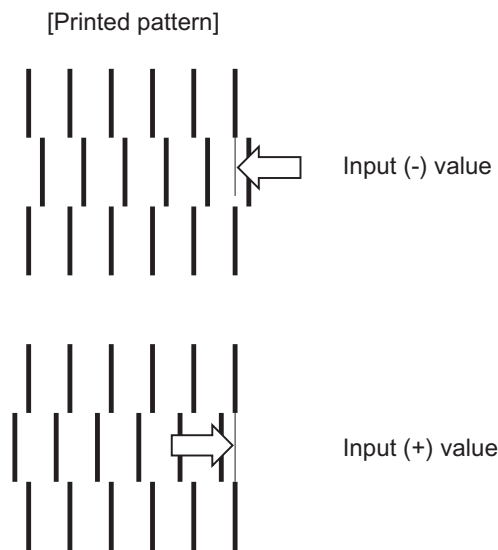
Figure 4-7.Bi-D Alignment

*[SCREEN-1] to [SCREEN-3] for Bi-D Alignment Adjustment.

[SCREEN-1]

```
< MAIN MENU for Production >  STYLUS COLOR PHOTO  K00A10Ve


        1.  VH Setting
        2.  Ink Charge
        3.  Angular Adjust Printing          XX-XX-XXXX        XX:XX:XX
        K.  Angular Adjust Setting
        4.  Bi-d Adjust                      CUSTOMER:WORLD


        P.  Printing Inspection (GOS)        JIG No.        :CT
        L.  Printing Inspection (S/F)        M/C No.        :
        M.  Printing Inspection (Envelope)
                                             HEAD VH        :
        CL. Cleaning
        9.  INK Discharge

        E.  Go to SETTING MENU

Input ITEM No.   : ?_
```

[SCREEN-2]

```
   << Definable Range (-30=< x <=30). >>

   Input Adjust Value (If OK, input Y) :? _
```

[SCREEN-3]

```
***** SETTING MENU *****        K00A10Ve

        1:  (Production)/Adjustment
        2:

        3:  DATE/TIME              [XX-XX-XXXX] [XX:XX:XX]
        4:  TOOL                   [CT]  JI=JIG CT=Cartridge WAIT=80s
        5:  CUSTOMER               [WORLD]
        6:  BI-D Center            [ 0 ]
        7:  Print Position         [60]

        Q: QUIT

Input ITEM No.: ?
```

Chapter 5
Troubleshooting

5.1 Troubleshooting

The printer may exhibit different symptoms for the same problem, which makes troubleshooting more difficult. This section, however, provides simple and effective ways to facilitate troubleshooting.
The following flowchart illustrates the main steps of the troubleshooting process.

```
                              ┌─────────┐
                              │  START  │
                              └────┬────┘
                                   │
                     ┌─────────────┴─────────────┐
                     │ Unit Level Troubleshooting │
                     └─────────────┬─────────────┘
           ┌─────────────────┬─────┴──────────┬─────────────────┐
   ┌───────┴───────┐ ┌───────┴───────┐ ┌──────┴────────┐
   │  Unit Repair  │ │  Unit Repair  │ │  Unit Repair  │
   │ (C206 PSB/PSE)│ │  (C209 Main)  │ │Printer Mechanism│
   └───────┬───────┘ └───────┬───────┘ └──────┬────────┘
           │                 │                 │
           └─────────────────┼─────────────────┘
                             │
                  ┌──────────┴───────────────┐
                  │ Disassembly and Adjustment│
                  └──────────┬───────────────┘
                             │
                        ┌────┴────┐
                        │   END   │
                        └─────────┘
```
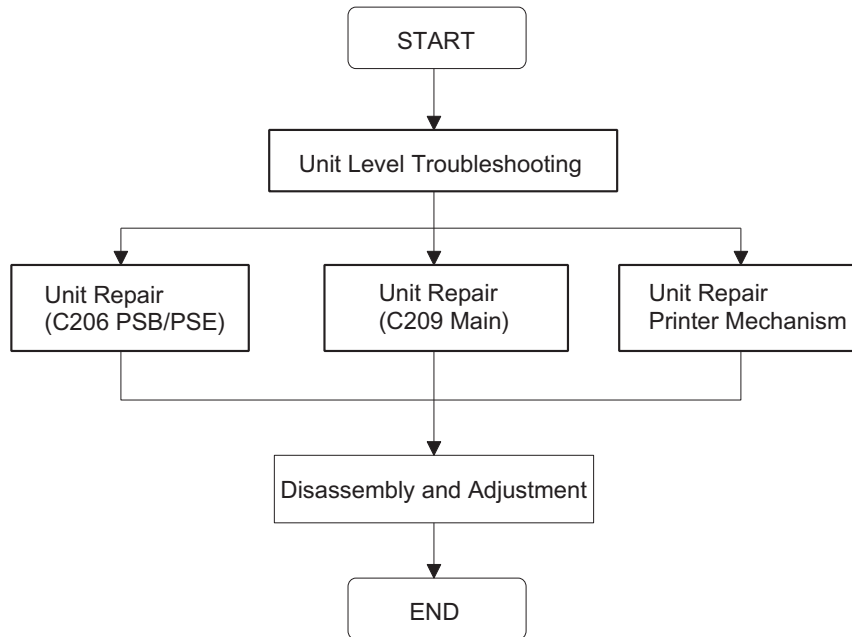
Figure 5-1. Troubleshooting Process Flowchart

Table 5-1. Motor Resistance and Measurement Procedure

Motor Name	Location	Check Point No.*	Meter Reading
CR Motor Assembly	CN6(C209 MAIN)	1 & 3pin or, 2 & 4pin	7.8 Ohms ±10% (25 °C)
PF(Pump) Motor Assembly	CN7(C209 MAIN)	1 & 3pin or, 2 & 4pin	7.8 Ohms ±10% (25 °C)

Note*) Set the Multi-meter for measuring resistance range.
Make sure the power is off and remove the motor connectors from the main board.

Table 5-2. Sensor Check

Sensor Name	Check Point	Signal Level	Sensor Status
Paper end sensor	CN4 / 1-pin,	H (5V)	No paper
		L (GND)	Paper in
Carriage home position sensor (HP sensor)	CN5 / 1-pin,	H (5V)	Home position
		L (GND)	Out of home position
ASF phase Sensor	CN11 / 1-pin,	H (5V)	Friction(paper feeding) position
		L (GND)	Release(waiting) position
Black cartridge sensor	CN8 / 1-pin,	H (5V)	Black ink cartridge out
		L (GND)	Black ink cartridge exists
Color cartridge sensor	CN8 / 2-pin,	H (5V)	Color ink cartridge out
		L (GND)	Color ink cartridge exists
Thermistor	CN8 / 3-pin,	Resistance value	It changes according to the peripheral temperature. (10KOhms ±1% at 25°C)

Table 5-3. Printer Condition and Panel Status

Error status	Indicators				Recovery
	Power	**Ink Out (Black)**	**Ink Out (Color)**	**Paper Out**	
Paper Out	---	---	---	On	Load paper then press load/eject button.
Paper jam condition	---	Off	Off	Blink	Eliminate a paper then press load/eject button.
No Ink cartridge or Ink end(black)	---	On	---	---	Install a new black ink cartridge according to ink cartridge exchange operation.
No Ink cartridge or Ink end(color)	---	---	On	---	Install a new color ink cartridge according to ink cartridge exchange operation.
Ink low (Black)	---	Blink	---	---	---
Ink low (Color)	---	---	Blink	---	---
Maintenance error	Blink	Blink	Blink	Blink	Change the waste ink absorber and reset the protect counter.
Fatal error	Blink	On	On	Blink	Turn off the printer and turn it on again. If the printer can not recover, repair the suitable part.

5.2 Unit Level Troubleshooting

When a problem occurs, you can identify the defective unit according to the symptoms exhibited. The table below lists the symptoms of certain problems. Once the problem is identified, refer to the flowchart that corresponds to the problem.

Table 5-4. Symptom and Problem

Symptom	Problem	Flowchart No.
Printer does not operate at power on	● LEDs do not light up. ● Printer mechanism does not operate.	1
Error is detected	● Error is indicated by LED indication.	2
Failure occurs during printing	● Printing is not performed. ● Abnormal printing(missing dot, etc.) ● Print quality is poor	3
Printer does not feed the paper correctly	● No paper is fed. ● Paper feed is irregular. ● Paper jam occurs.	4
Control panel operation is abnormal	● No response to button access.	5

5.2.1 Printer does not operate at power on

```
                    ┌──────────┐
                    │  START   │
                    └────┬─────┘
                         │
                         ▼
                    ╱ Is AC ╲
                 ╱ power voltage ╲    NO    ┌─────────────────┐
                ╲   normal?    ╱  ────────▶ │ Input normal    │
                   ╲        ╱               │ power supply.   │
                      YES                   └─────────────────┘
                       │
                       ▼
                  ╱ Is the ╲              ┌──────────────────────┐
               ╱ fuse(F1) of ╲           │ Exchange the fuse.   │
              ╱ power supply   ╲   YES    │ Disconnect CN10 in   │
              ╲    board      ╱ ───────▶ │ the main board and   │
                ╲ opened?   ╱             │ turn the power on    │
                   NO                     │ again.               │
                    │                     └──────────┬───────────┘
                    ▼                                │
         ┌──────────────────────┐       NO      ╱ Is the ╲
         │ Check output voltage │ ◀────────── ╱ fuse opend ╲
         │ of CN2 in the power  │             ╲   again?  ╱
         │ supply board.        │               ╲      ╱
         └──────────┬───────────┘                 YES
                    │                              │
                    ▼                              │
              ╱ Is the ╲      NO                   │
           ╱ output voltage ╲ ──────────────────┐ │
          ╲ of power supply ╱                    │ │
            ╲  normal?   ╱                        │ │
               YES                                │ ▼
                │                         ┌─────────────────┐
                ▼                         │ Exchange the power │
      ┌──────────────────┐               │ supply board       │
      │ Exchange the main│               └─────────────────┘
      │ board.           │
      └──────────────────┘
                 │
                 ▼
         ┌──────────────────┐
         │ Check the motor and│
         │ head. Refer to the │
         │ repair item of the │
         │ printer mechanism. │
         └─────────┬──────────┘
                   │
                   ▼
                ▽ END ▽
```

Figure 5-2. Flow Chart 1

5.2.2 Error is detected

```
                    ┌──────────────┐
                    │    START     │
                    └──────┬───────┘
                           ▼
              ┌──────────────────────┐
              │ Check the error      │
              │ message.(Refer to    │
              │ Table5-3)            │
              └──────────┬───────────┘
```

Check the error message.(Refer to Table5-3)

Is it carriage error? — Yes → Turn off the printer, and move the carriage by hand.

Is it carriage error? — NO

No ink cartridge error? — Yes → Exchange the ink-cartridge with new one.

No ink cartridge error? — NO

Maintenance Error

Exchange the waste ink absorber and reset the counter. (Refer to 1.4.2)

Does the carriage move smoothly? — NO

Does the carriage move smoothly? — Yes

Check CR motor. Exchange the main board if there is no problem.

Is the problem solved? — Yes

Is the problem solved? — NO

Does error appear again? — Yes

Does error appear again? — NO

Check ink cartridge sensor and exchange the head if it's ubnormal.

Refer to 5.4 Repair of the printer mechanism.

END

END

Figure 5-3. Flow Chart 2

5.2.3 Failure occurs during printing

```
                    ┌──────────┐
                    │  START   │
                    └────┬─────┘
                         │
              ┌──────────────────┐
              │ Perform self-    │
              │ test printing    │
              └────────┬─────────┘
                       │
                  ◇ Is printing
                    carried out        NO ──────────────┐
                    O.K?                                 │
                       │ YES                        ◇ Is all
                       │                              cables connected
                  ◇ Is printing                       to the main      YES ──┐
                    quality     YES ──┐               board?                  │
                    normal?            │                 │ NO                 │
                       │ NO       Perform printing   ┌──────────────┐         │
                       │          adjustment.        │Connect cables│         │
              ┌──────────────┐    (Refer to Chapter4)└──────┬───────┘         │
              │Perform       │                              │                 │
              │cleaning      │                         ◇ Is the               │
              └──────┬───────┘                           problem              │
                     │                                   solved?   NO ──┐     │
                ◇ Is the    ┌───────────────┐              │ YES        │     │
                  problem   │Exchange the ink│                     ┌──────────────────┐
                  solved?   │cartridge with  │                     │Refer to 5.4 Repair│
                     │ NO──▶│new one and     │                     │of the printer-    │
                     │YES   │perform self-   │                     │mechanism.         │
                     │      │test.           │                     └────────┬─────────┘
                     │      └───────┬────────┘                          ◇ Is the
                     │              │                                     problem
                     │         ◇ Is the                                   solved?
                     │           problem    NO                    NO ──┐    │
                     │ ◀── YES── solved?                               │    │ YES
                     │              │                                  │
                     │              │ NO                          ┌──────────┐
                     │      ┌────────────────┐                    │Replace   │
                     │      │Refer to 5.4    │                    │the Main  │
                     │      │Repair of the   │                    │board     │
                     │      │printer-mechanism│                   └────┬─────┘
                     │      └───────┬────────┘                         │
                     │          ◇ Is the                               │
                     │            problem                              │
                     │ ◀── YES──  solved?  NO ──┐                      │
                     │              │           │                      │
              ┌──────▼────┐    ┌────▼────┐  ┌────▼────┐
              │   END     │    │  END    │  │  END    │
              └───────────┘    └─────────┘  └─────────┘
```

Figure 5-4.Flow Chart 3

5.2.4 Printer does not feed the paper correctly

```
                        ┌─────────┐
                        │  START  │
                        └─────────┘
                             │
                             ▼
                          ╱Are╲
                      ╱papers set╲      NO
                     ◀in the ASF ▶──────────────┐
                      ╲correctly?╱               ▼
                          ╲╱            ┌──────────────────────┐
                      YES │             │ Set the paper correctly│
                          │             └──────────────────────┘
                          ▼◀──────────────────────┘
                        ╱Does╲
                    ╱the PF roller╲    NO
                   ◀ and platen   ▶──────────────────────┐
                    ╲   rotate? ╱                          ▼
                        ╲╱                              ╱Is the╲
                    YES │                            ╱ PF motor ╲   NO
                        │                           ◀ running?  ▶────────┐
                        ▼                            ╲          ╱         ▼
          ┌──────────────────────┐               YES ╲╱          ┌──────────────────┐
          │Remove any obstruction│                    │          │Check the PF motor.│
          │in the paper path if  │                    │          │If there is no problem,│
          │there is any.         │                    │          │replace the main board.│
          └──────────────────────┘                    │          └──────────────────┘
                        │                              │                   │
                        ▼                              │                   │
          ┌──────────────────────┐                    │                   │
          │Perform cleaning for  │                    │                   │
          │the roller of paper path.│                 │                   │
          └──────────────────────┘                    │                   │
                        │                              │                   │
                        ▼                              │                   │
                     ╱Is the╲                         │                   │
                  ╱ problem  ╲      NO                 │                   │
                 ◀  solved?  ▶───────────────┐        │                   │
                  ╲          ╱                 ▼        ▼                   │
               YES ╲╱             ┌──────────────────────┐                 │
                   │              │Refer to 5.4.Repair   │                 │
                   │              │of the printer        │                 │
                   │              │mechanism.            │                 │
                   │              └──────────────────────┘                 │
                   ▼◀──────────────────────────┘                          │
                 ╲     ╱                                               ╲     ╱
                  ╲END╱                                                 ╲END╱
                   ╲ ╱                                                   ╲ ╱
                    ▽                                                     ▽
```
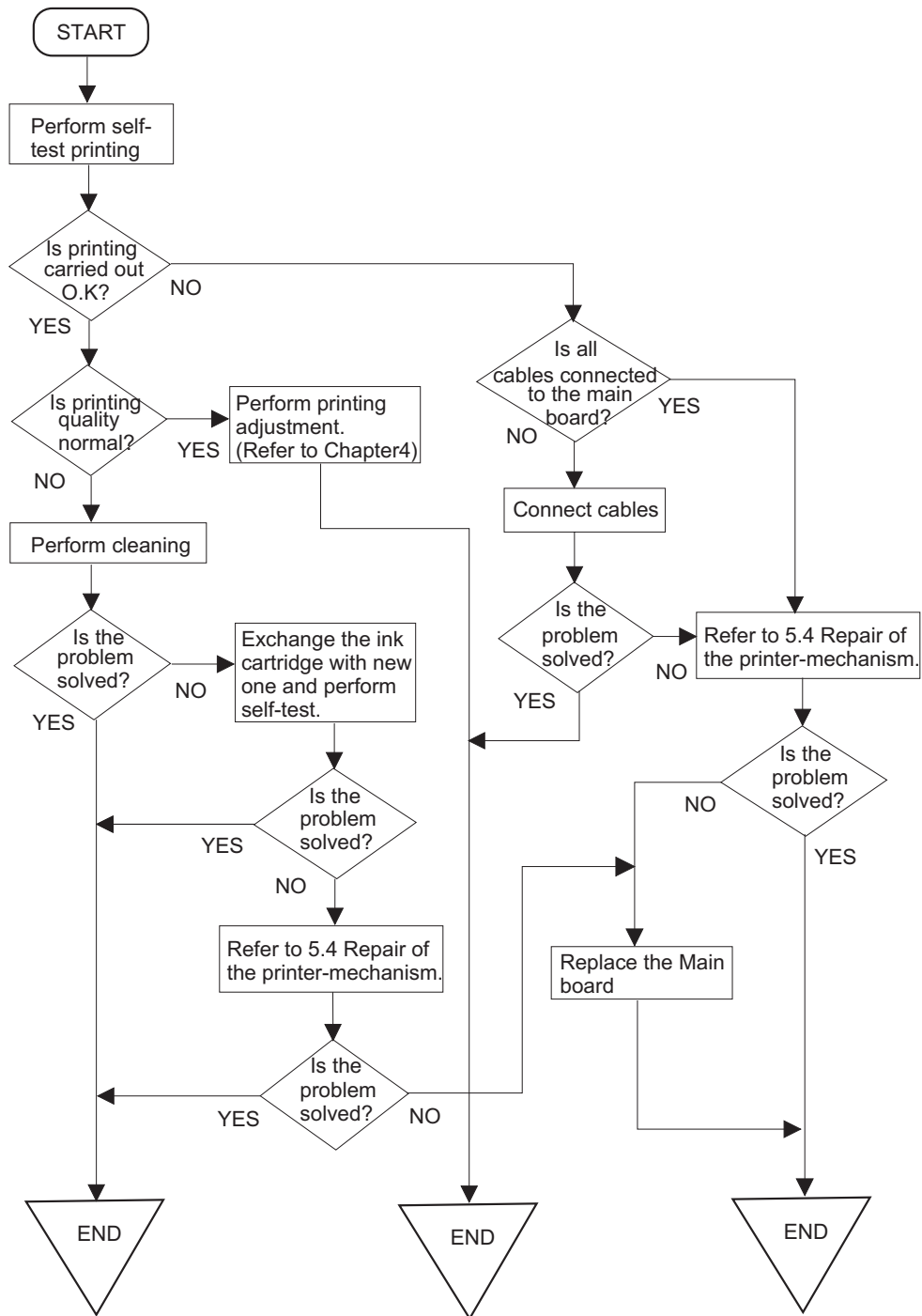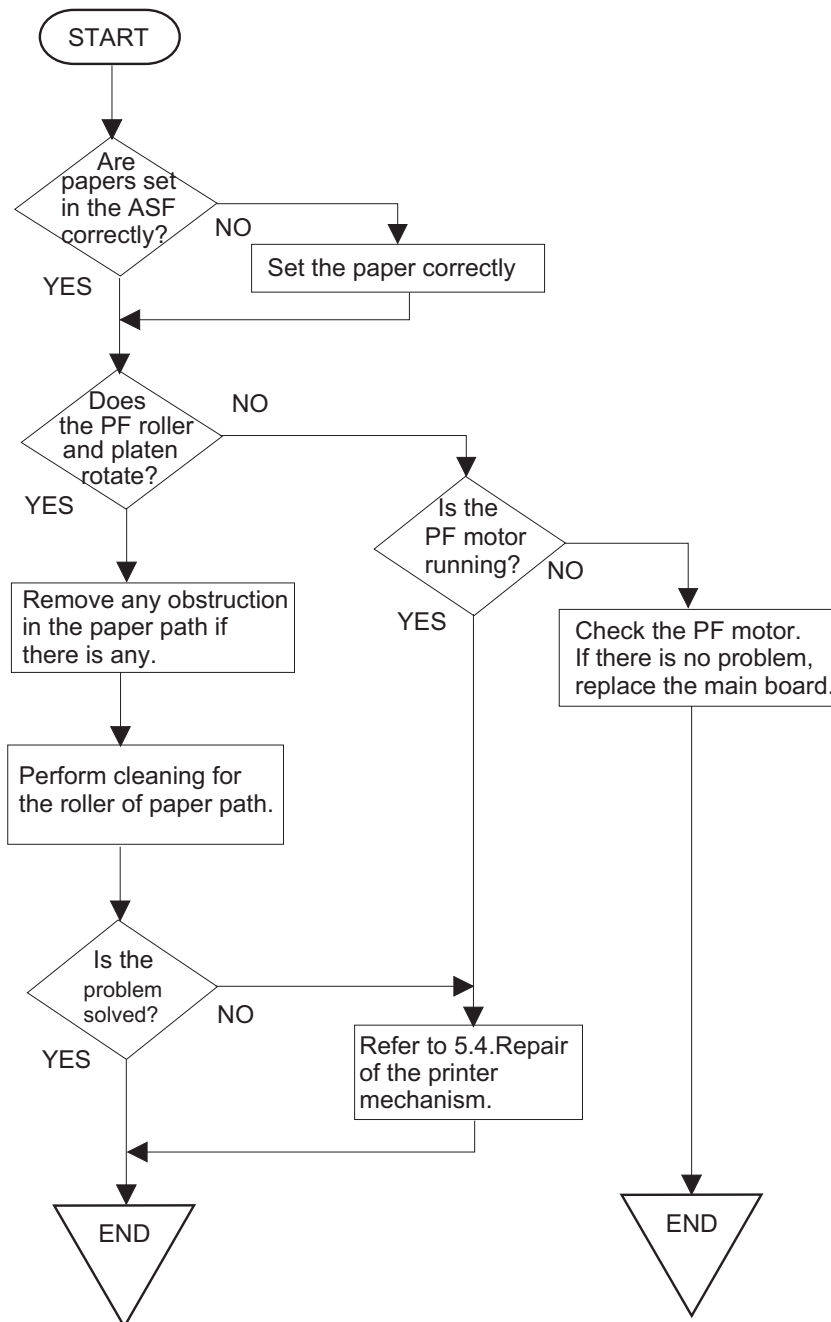
Figure 5-5. Flow Chart 4
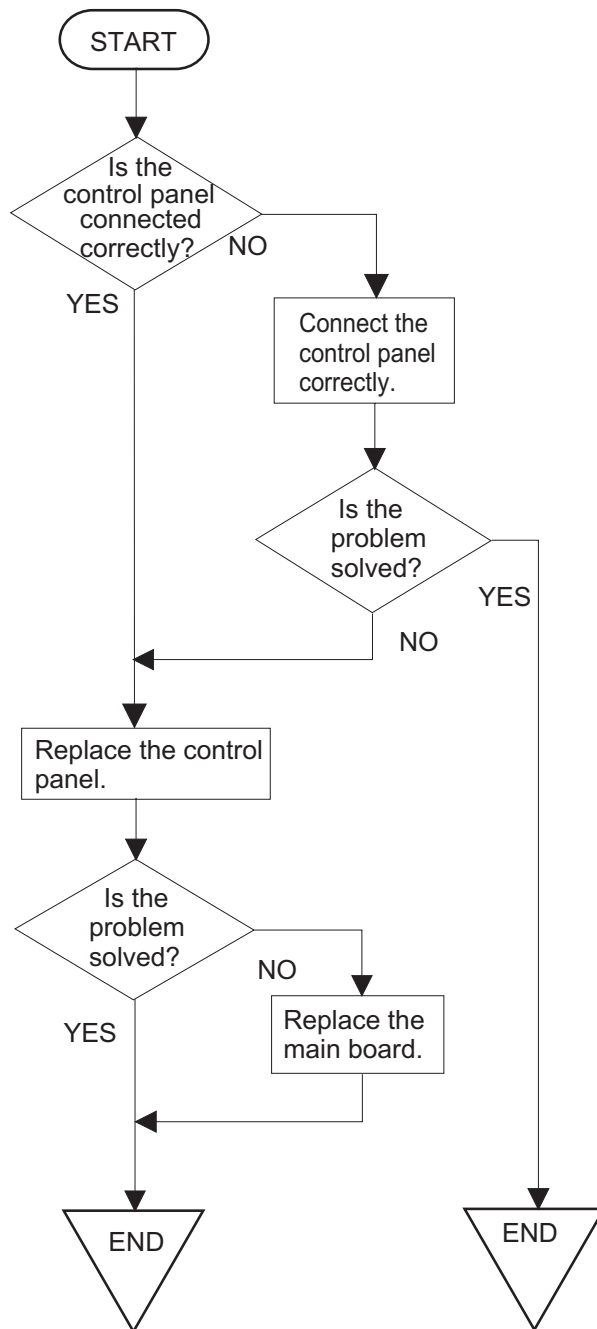
5.2.5 Control panel operation is abnormal

Figure 5-6. Flow Chart 5

5.3 Unit Repair C206 PSB/PSE Board

This section describes the problems related to the power supply board(C206 PSB/PSE). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints refer to waveforms, resistance, and other values to be checked to evaluate the operation of each component.
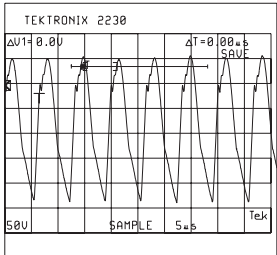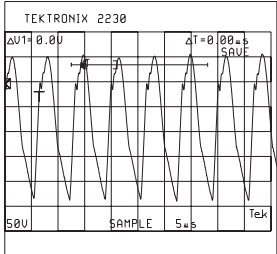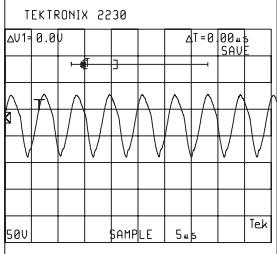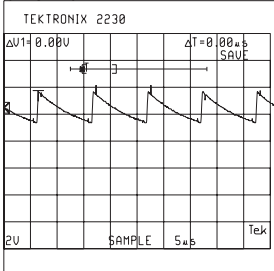
Table 5-5. C206PSB Power Supply Borad
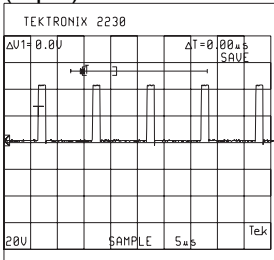
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	+42V line is dead.	F1 is open.	Check F1 by using a tester.	Replace F1.
		Transformer coils are open.	Check the waveform at the drain of Q1.	Replace T1.
		Switching FET (Q1) is dead.	Check drain side.	Replace Q1.
		Feed back transistor(Q2, Q3) are dead.	Check corrector side.	Replace Q2 or Q3.
		+42 V line is abnormal.	Check following parts. • ZD87,ZD83 • ZD51,ZD81 • `ZD86 • PC1	Replace suitable parts.

Table 5-6. C206PSB Power Supply Board (Continued)

Symptom	Condition	Cause	Checkpoint	Solution
	+5V line is dead.	IC51 (L4962E) is dead.	Check the oscillation(5 -pin) and switching (7-pin) waveform of IC51. (5-pin) (7-pin)	Replace IC51.

5.3.1   Unit Repair C209 MAIN Board

This section describes the problems related to the main controller board(C209 MAIN). The table below provides various symptoms, likely causes, and checkpoints. The check points refer to waveforms, resistance, and other values to be checked to evaluate the operation of each component.
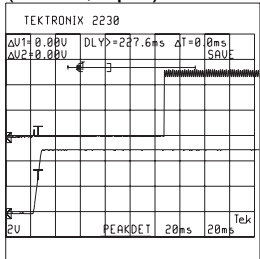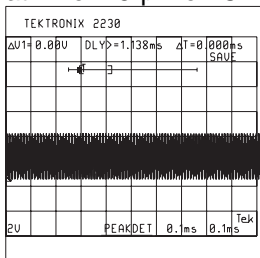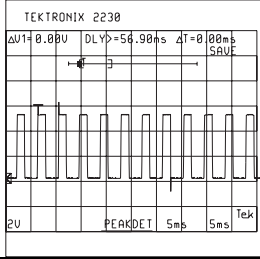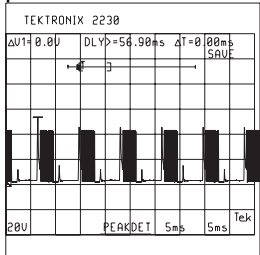
Table 5-7. Repair of the C209 MAIN Board
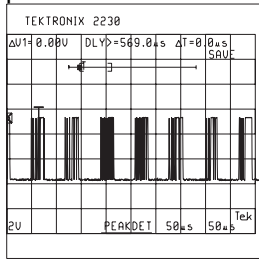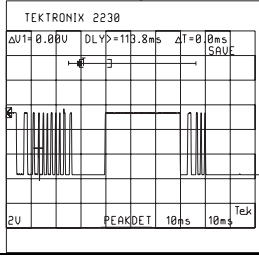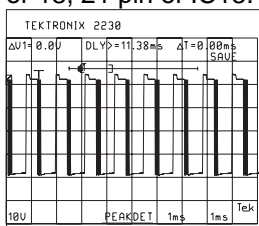
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	CPU does not operate.	The reset circuit is defective.	Check the waveform of the +5V and /Reset signal (IC8=5,1-pin)	Replace IC8
		Control ROM is not selected correctly or it's dead.	Check if the signal waveform at 11 pin of the IC3 can be reversed High or Low.	Replace IC3.
		RAM is defective.		Replace RAM.
		CPU is defective.	Check the clock waveform at 27 or 28-pin of IC1.	Replace IC1 if the oscillation waveform is normal, if it is abnormal, replace the oscillator CR1.
The carriage does not operate normally.	Carriage motor does not operate at all.	IC2 is defective.	Check the signal waveform at 1, 2, 23 and 24 pin of IC14.	Replace IC2.
		IC14 is defective.	Check the signal waveform at 3, 6,or 18, 21 pin of IC14.	Replace IC14.

Table 5-8.Repair of the C209 MAIN Board (Continued)

Symptom	Condition	Cause	Checkpoint	Solution
Printing is abnormal	Printing is not executed or, black specks or dots appears on the printing.	IC2 is defective.	Check the output waveform at 7, 9 and 11 pin of CN8.	Replace IC2.
Paper feed operation is abnormal.	Paper feed motor does not work.	IC2 is defective.	Check the output waveform of at 1, 2pin and 23, 24 pin of IC15.	Replace IC2
		IC15 is defective.	Check the output waveform of at 3, 6 pin or 18, 21 pin of IC15.	Replace IC15

5.4 Repair of the Printer Mechanism

This section provides instruction for repairing the printer mechanism. It describes various problems, symptom, likely causes, checkpoints, and solutions. Select appropriate symptom from the table and check each parts and its function as described in the checkpoint.

Table 5-9. Repair of the Printer Mechanism

Symptom	Condition	Cause	Checkpoint	Solution
Abnormal pump mechanism operation	Abnormal PF motor operation when the power is turned on.	Foreign substances are loaded in the PF gears.	Manually drive the PF drive gear and check if it rotates normally.	Remove any foreign objects.
		The PF motor is defective. (Refer to Table5-1)	Check the inner coil resistance and see if there is any disconnection of the coil.	Exchange the PF motor.
Ink is not absorbed or is poorly absorbed.	Used ink does not go through the waste ink tube.	The pump tube is crashed.	Check the tube visually.	Fix the crashed part by the airgun.
		Capping rubber is damaged or deformed.	Check the capping rubber visually.	Replace the cap mechanism.
		The tube is out of the cap.	Check if the tube is out of the cap visually.	Connect the tube properly.
		Pump bulb is not closed at absorption.	Check the bulb operation visually.	Replace the cap mechanism.
Abnormal carriage operation.	Abnormal carriage operation at power on.	Foreign substance in the CR drive gear.	Check visually if there is any substances or not.	Remove any foreign substances.
		CR motor is defective.	Check the inner coil resistance and see if there is any disconnection of the coil.	Replace the CR motor.
	Abnormal carriage operation during printing.	Carriage movement is not smooth.	Check whether the carriage moves smoothly when moved manually.	Clean and lubricate the carriage guide axis.
			Check tension of the timing belt.	Adjust tension mechanism or exchange it.
			Check if there is any foreign substances in the carriage path.	Remove any foreign substances.
Printing is not performed.	The carriage moves, but no printing is performed.	Head FFC is out of connection.	Check if the head FFC on the board or carriage is connected surely.	Connect the FFC properly.
		The FFC is disconnected inside.	Check the FFC by using a tester.	Replace the FFC.
		I/C is defective.	Install a new I/C and perform the self-test.	Replace I/C.
		Head unit is defective.	If the condition does not improve even after 2or 3 times cleaning operation, replace the head unit and perform the self-test.	Replace the head unit.

Table 5-10. Repair of the Printer Mechanism (Continued.)

Symptom	Condition	Cause	Check-point	Solution
Abnormal printing	Only a particular dot causes abnormal printing.	Print head surface is not clean. (dot missing)	Perform the cleaning operation several times and check printing.	Perform the cleaning.
		The head unit is defective.	Perform the cleaning operation several times and check printing.	If condition does not improve even after the cleaning, replace the head.
		Absorber in the cap is touching the head surface.	Check the absorber in the cap visually.	Replace the absorber in the cap if it is deformed.
	A dot is not printed occasionally.	Print head surface is not clean. (dot-missing)	Perform the cleaning operation several times and check printing.	Perform the cleaning.
		The head FFC is disconnected inside.	Check the FFC by using a tester.	Replace the head FFC.
		The head FFC is out of connection.	Check if the head FFC on the board or carriage is connected surely.	Connect the FFC properly.
		The head unit is detective.	Perform the cleaning operation several times and check printing.	If condition does not improve even after the cleaning, replace the head.
		I/C is defective.	Install the new I/C and perform self-test.	Replace I/C.
	Black specks or dots.	The head FFC is out of connection.	Check if the head FFC on the board or carriage is connected surely.	Connect the FFC properly.
		The head unit is detective.	Check connection with the head FFC.	Replace the head if there is no connection problem with the FFC.
	A vertical line is not aligned.	Bi-directional alignment is not adjusted.	Perform Bi-D adjustment.	Refer to Chapter4.
	White line appears in the image data.	Head angle is not correct.	Perform head angle adjustment.	Refer to Chapter4.
		Paper feed assembly adjustment is not correct.	Perform paper feed assembly adjustment	Refer to Chapter4.
		Dot shooting direction is tilted because head surface is not clean	Perform the cleaning operation several times and check printing.	Perform the cleaning operation.
		I/C is defective.	Install a new I/C and perform the self-test.	Replace I/C.
		Head unit is defective.	Perform the cleaning operation several times and check printing.	Replace the head unit.

Table 5-11. Repair of the Printer Mechanism (Continued)

Symptom	Condition	Causes	Checkpoint	Solution
Abnormal paper feeding.	Paper is not fed.	Friction of the PF roller.	Check if the PF roller rotates when paper is not fed.	Clean the PF roller by the cleaning sheet. Replace the PF roller if it does not recover.
		Abnormal operation of the hopper.	Check movement of the ASF hopper visually.	Replace ASF.
		Malfunction of ASF drive change-over.	Check if the ASF gear rotates visually.	Replace gears of the ASF drive change-over.
	Printing start point is not right.	Friction of the PF roller.	Check if the PF roller slips during paper feeding.	Clean the PF roller by the cleaning sheet. Replace the PF roller if it does not recover.
Printer stops during initialization.	Fatal error appears.	ASF sensor is defective.	Check the signal level of the ASF sensor.(Refer to Table 5-2)	Replace ASF sensor.
		PE sensor is defective.	Check the signal level of the PE sensor.(Refer to Table 5-2)	Replace PE sensor.
		HP sensor is defective.	Check the signal level of the HP sensor .(Refer to Table 5-2.)	
		Head FFC is disconnected.	Check if the head FFC is connected.	Connect the head FFC.
		CR motor is defective.	Check the CR motor cable is connected.	Replace the CR motor if there is no problem in the cable connection.
		PF motor is defective.	Check if the PF motor cable is connected.	Replace the PF motor if there is no problem in the cable connection.

Chapter 6
Maintenance

6.1 OVERVIEW

This section describes the points and the procedures for maintaining the printer in its optimum condition.

6.1.1 Cleaning

This printer has no mechanical components requiring regular cleaning. Therefore, the points described below are suggested to be checked for any dirt and make an appropriate cleaning if necessary.

<div style="text-align:center">⚠ **CAUTION**</div>

> ☑ *Never use the chemical solvents, such as thinner, to clean the printer. These chemicals can damage the components of the printer.*
>
> ☑ *Be careful not to damage the components when you attempt to clean the inside of the printer.*
>
> ☑ *Do not scratch surface of "ROLLER, ASSEMBLY, PF".*
>   *(Use soft brush to wipe off any dusts, or use soft cloth moistened with alcohol)*

❑ Housing: Use clean soft cloth moistened with water and wipe off any dirt. If the housing stained with an ink, use a cloth moistened with a neutral detergent to wipe it off.

❑ Inside the printer: Use a vacuum cleaner to remove any paper dust.

6.1.2 Service Maintenance

If the print irregularity (missing dot, white line, etc.) has occur or the printer indicates "MAINTENANCE ERROR", perform the following operation to clear the error.

❑ **Head Cleaning**
1. The printer has a built-in head cleaning function and is executable from the control panel.
2. Confirm that the printer is in stand-by state (the POWER indicator is not blinking), and hold down the cleaning button on the control panel for more than 3 sec.
3. The printer perform the built-in cleaning sequence. (during cleaning operation, the POWER indicator is blinking)

❑ **Maintenance Error Clear**
Since the printer consumes the ink, not only for printing but also for another operation like cleaning, certain amount of ink are wasted. Therefore, the printer counts the amount of waste ink and they are collected at the waste ink pad, and once the amount of waste ink reaches the predefined limit, the printer indicates "MAINTENANCE ERROR" and the waste ink pad should be replaced as follows:

1. Replace the waste ink pad to new one.
2. After re-assemble the printer, turn the printer on while holding down the following buttons on the control panel:
    "LOAD/EJECT" button
    "CLEANING" button
3. Press "LOAD/EJECT" button again while "PAPER END" indicator is blinking. This clears the maintenance error condition and the waste ink counter value stored in EEPROM of the main board.

6.1.3 Lubrication

The type and amount of oil and grease used on this printer are determined based on the results of internal evaluations. Therefore, specified type and amount of oil and grease must be applied at specified part of the printer mechanism when servicing the printer.

⚠ **CAUTION**

> ☑ *Never use the oil and the grease other than those specified in this manual and using different type of lubricant can damage the printer and the components.*
>
> ☑ *Never apply oil or grease exceeding the amount specified in this manual.*

Table 6-1. Specified Lubricants

Type	Name	EPSON Code	Supplier
Grease	G-26	B702600001	EPSON
Oil	O-8	1019753	EPSON

Table 6-2. Lubrication Points

No.	Standard	Remarks
1	<Lubrication Point> Contact between "ROLLER, PF" and "PAPER GUIDE, REAR" <Lubricant Type> G-26 <Lubrication Amount> A half turn of "ROLLER, PF"	● Apply grease while rotating "GEAR, 67.2". ● Do not put grease around the paper path. ● Use a syringe to apply it.
2	<Lubrication Point> "Contact between "PAPER GUIDE, FRONT" and each rollers: 1) "ROLLER, PF" (1 point) 2) "ROLLER, EXIT" (2 points) <Lubricant Type> G-26 <Lubrication Amount> 1) 10mm long 2) 2mm long	● Apply to the contact of a hook of "PAPER GUIDE, FRONT" and each roller. ● Do not put grease around the paper path. ● Use a syringe to apply it.
3	<Lubrication Point> Contact between the carriage assembly and "FRAME, UPPER" <Lubricant Type> G-26 <Lubrication Amount> From the HP sensor installation point to the point where "GUIDE PLATE, CABLE" is attached.	● Verify that the carriage moves smoothly after lubricating it. ● Use a syringe to apply it.
4	<Lubrication Point> Gears: 1) "GEAR, 67.2" 2) "COMBINATION GEAR, 8, 14.4" 3) "GEAR, 23.2" <Lubricant Type> G-26 <Lubrication Amount> 1) 1/4 of gear tooth 2) 1/3 of gear tooth 3) 1/3 of gear tooth 4) 1/3 of gear tooth	● Rotating the gears after applying grease to evenly distribute it. ● Use a syringe to apply it.

Table 6-3. Lubrication Points (Continued)

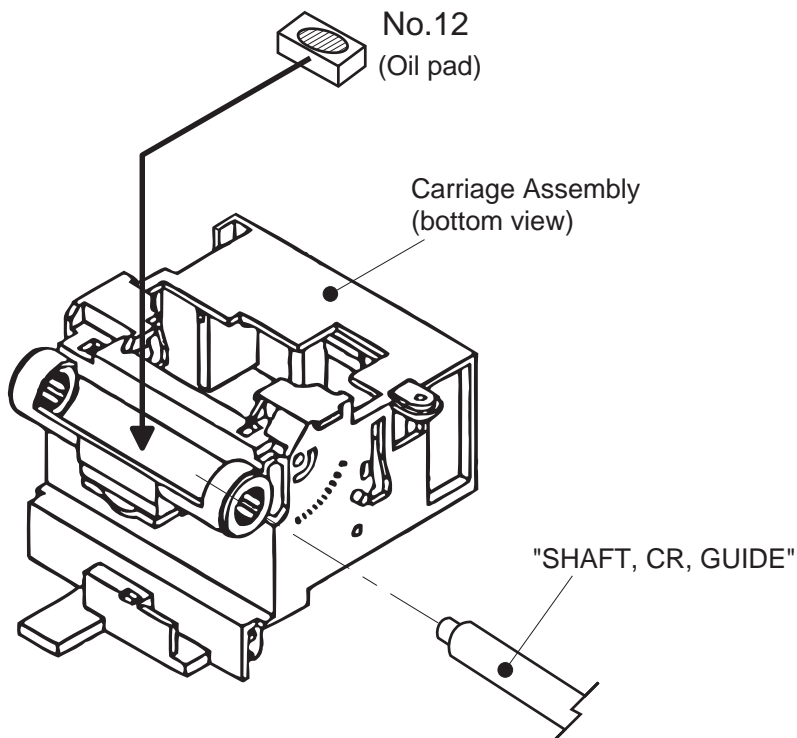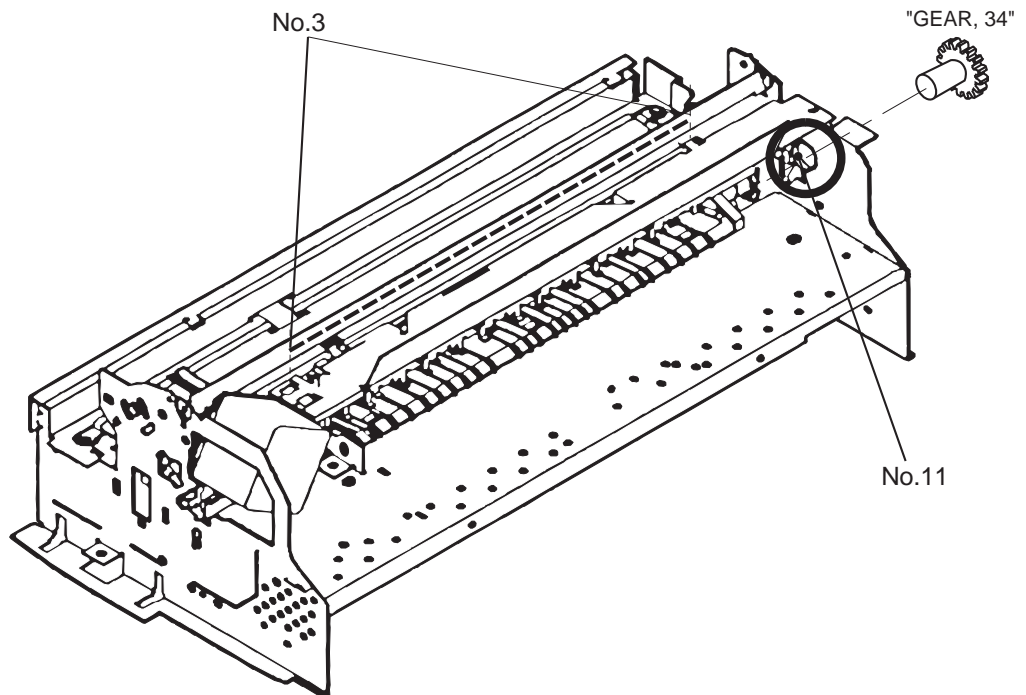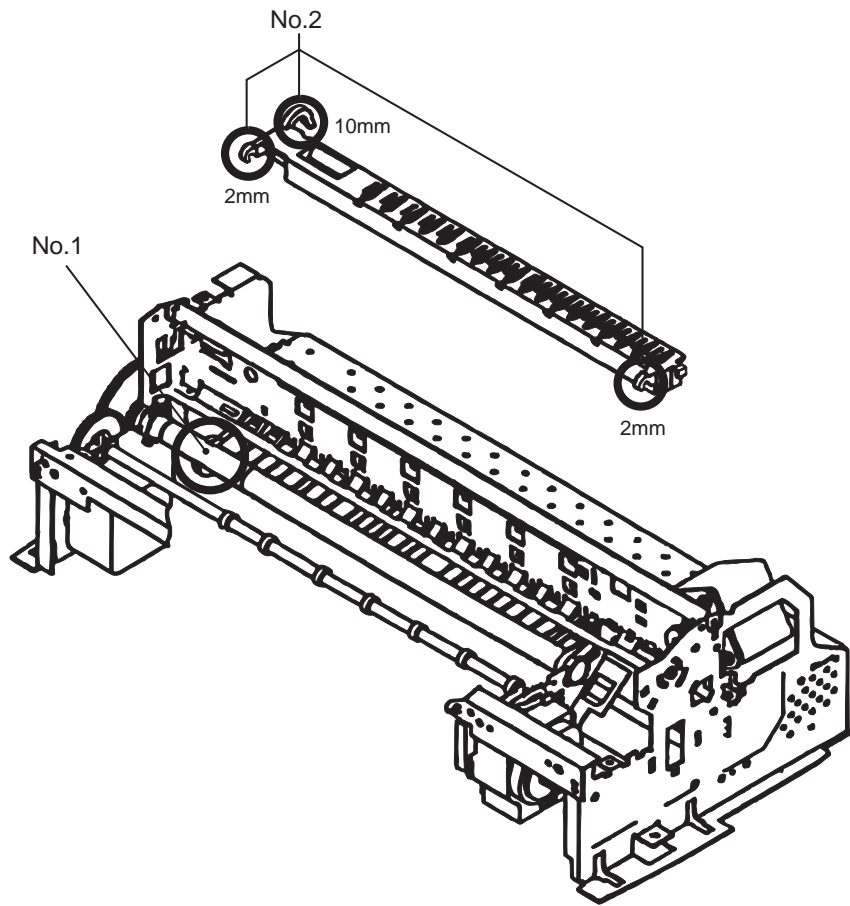| No.	Standard	Remarks
5	<Lubrication Point> The shaft for "GEAR, 16, 40.8" at "FRAME, LEFT" <Lubricant Type> G-26 <Lubrication Amount> Approx. 5mm long	● Use a syringe to apply it.
6	<Lubrication Point> Bush for "ROLER, PF" 1) Left: Inside the bush 2) Right: Inside the bush (near the pump assembly) <Lubricant Type> G-26 <Lubrication Amount> Approx. 3mm diametrically	● When applying to the right bush, apply it from the side of the paper path and wipe off any grease stick out to the cap assembly side. ● Rotate "ROLLER, PF" after applying the grease to evenly distribute it in the bush. ● Use a syringe to apply it.
7	<Lubrication Point> Both Left/Right Bush for "ROLLER, EXIT" <Lubricant Type> G-26 <Lubrication Amount> Evenly apply inside the bush	● Do not put grease around the paper path. ● Use a syringe to apply it.
8	<Lubrication Point> Contact between "HOLDER, PULLEY, DRIVEN" and "FRAME, UPPER" <Lubricant Type> G-26 <Lubrication Amount> 2mm long at each specified point	● Verify that the holder slides only with a spring force after applying the grease. ● Use a syringe to apply it.
9	<Lubrication Point> ASF; A round hole of the right frame of ASF (to hold the roller shaft) <Lubricant Type> G-26 <Lubrication Amount> Evenly apply inside the hole	● Do not put grease to "ROLLER, ASSEMBLY, LD".
10	<Lubrication Point> ASF; Contact between "HOPPER" and "LEVER, HOPPER, RELEASE" <Lubricant Type> G-26 <Lubrication Amount> Evenly apply to the contact	● Completely wipe off any grease stack out to inner side of ASF.

Table 6-4. Lubrication Points (Continued)

No.	Standard	Remarks
11	<Lubrication Point> A round hole of the left frame of ASF ("GEAR, 34" is inserting to this hole) <Lubricant Type> G-26 <Lubrication Amount> Evenly apply inside the hole	● Completely wipe off any grease stack out to inner side of ASF.
12	<Lubrication Point> Oil pad of carriage assembly <Lubricant Type> O-8 <Lubrication Amount> 0.6cc *Note that This is an amount to be applied new oil pad when replacing it.*	● This application must be made only when; *Replacing the carriage assembly *Replacing oil pad ● Use a precise syringe to apply it. If accidentally apply too much oil to oil pad, thrown it away and take a new oil pad again. ● Leave oil pad for a while to wait until oil is evenly infiltrate and install it on the carriage assembly.

⚠ **WARNING**

☑ *Never apply oil to the CR guide shaft directly or additionally to the oil pad. This may cause fatal damage to the components of the printer.*

*Never apply the oil exceeding 0.6cc.

No.12
(Oil pad)

Carriage Assembly
(bottom view)

"SHAFT, CR, GUIDE"

No.2

10mm

2mm

2mm

No.1

No.3

"GEAR, 34"

No.11

No.5

No.4
"GEAR, 23.2"

"GEAR, 16, 40.8"

No.4
"GEAR, 67.2"

No.4
"COMBINATION GEAR,
8, 14.4"

No.6

No.7

"HOLDER, PULLEY, DRIVEN"

No.8

"HOPPER, ASSEMBLY"

No.10

"FRAME, ASF"

No.9
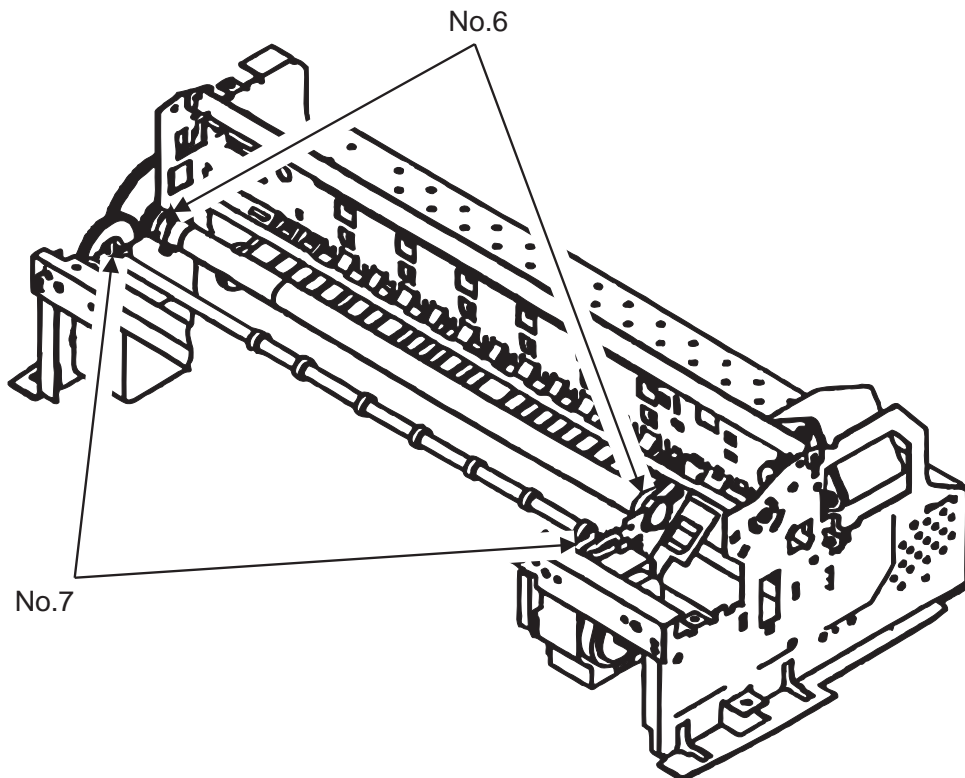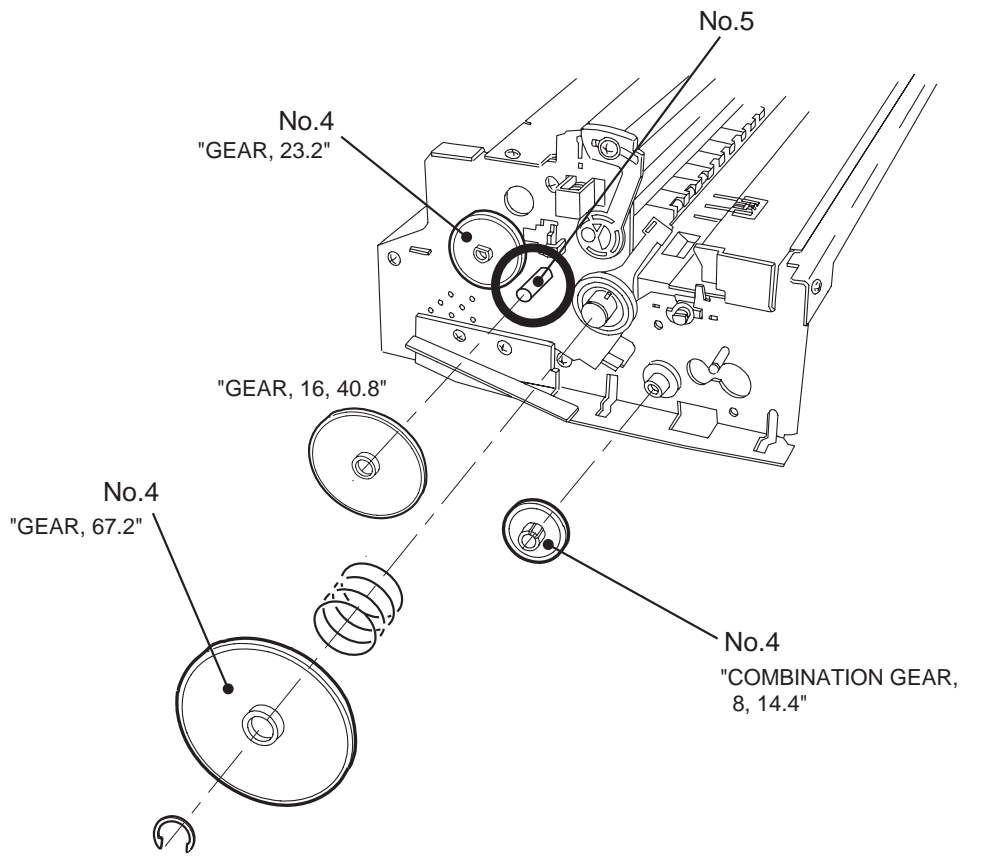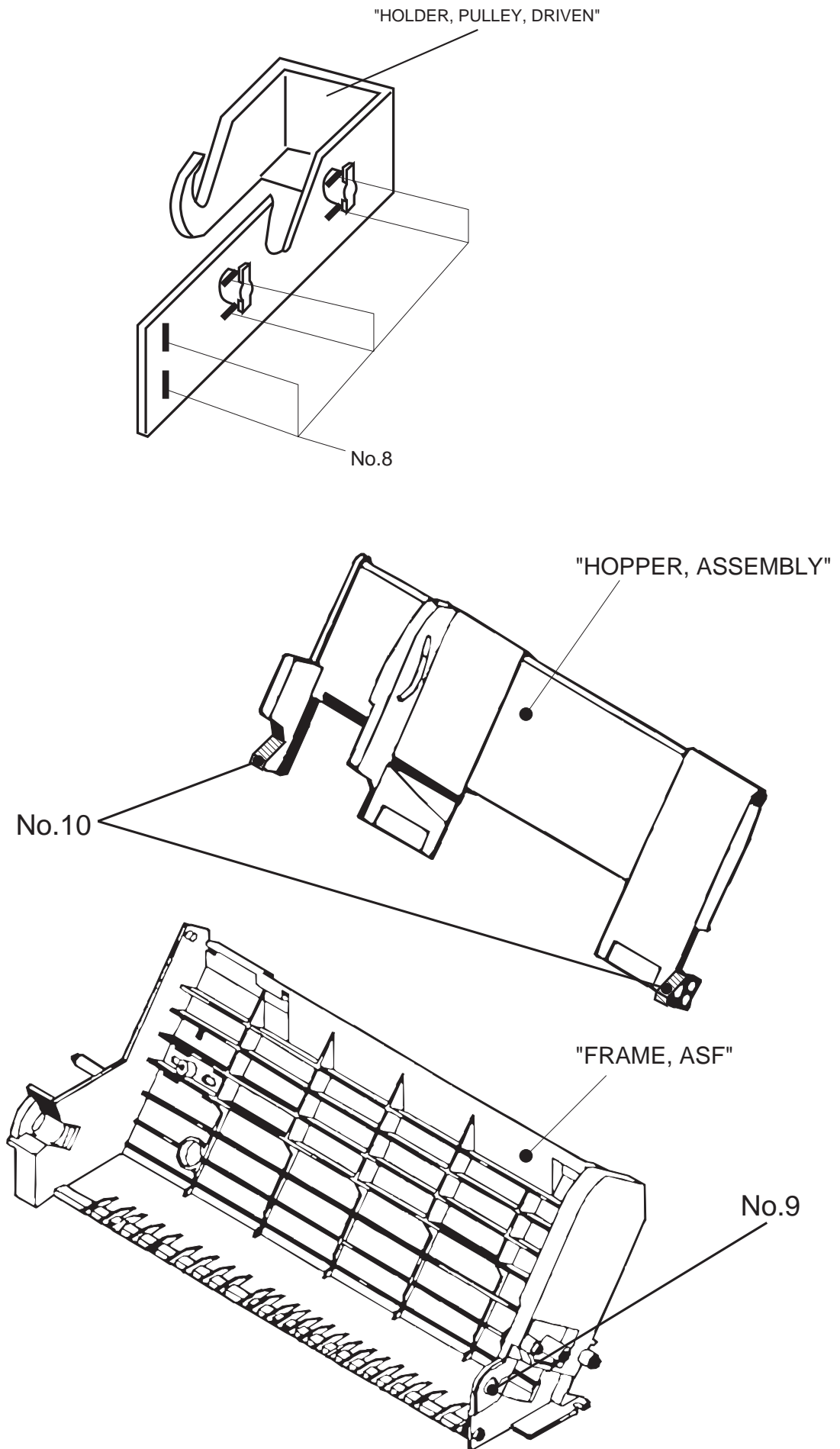
Appendix

A.1 Connector Summary

EPSON Stylus Photo has the following primary component units;

- Main Board(C209 Main)

- Power Supply Board (C206 PSB/PSE)

- Printer Mechanism

Figure A-1 below illustrates how these component units are connected.

Figure A-1. Cable Connection

A.2 Connector Summary

Following tables show connector pin assignment of the C209 main board.

Table A-1. Connector summary of the C209 Main board

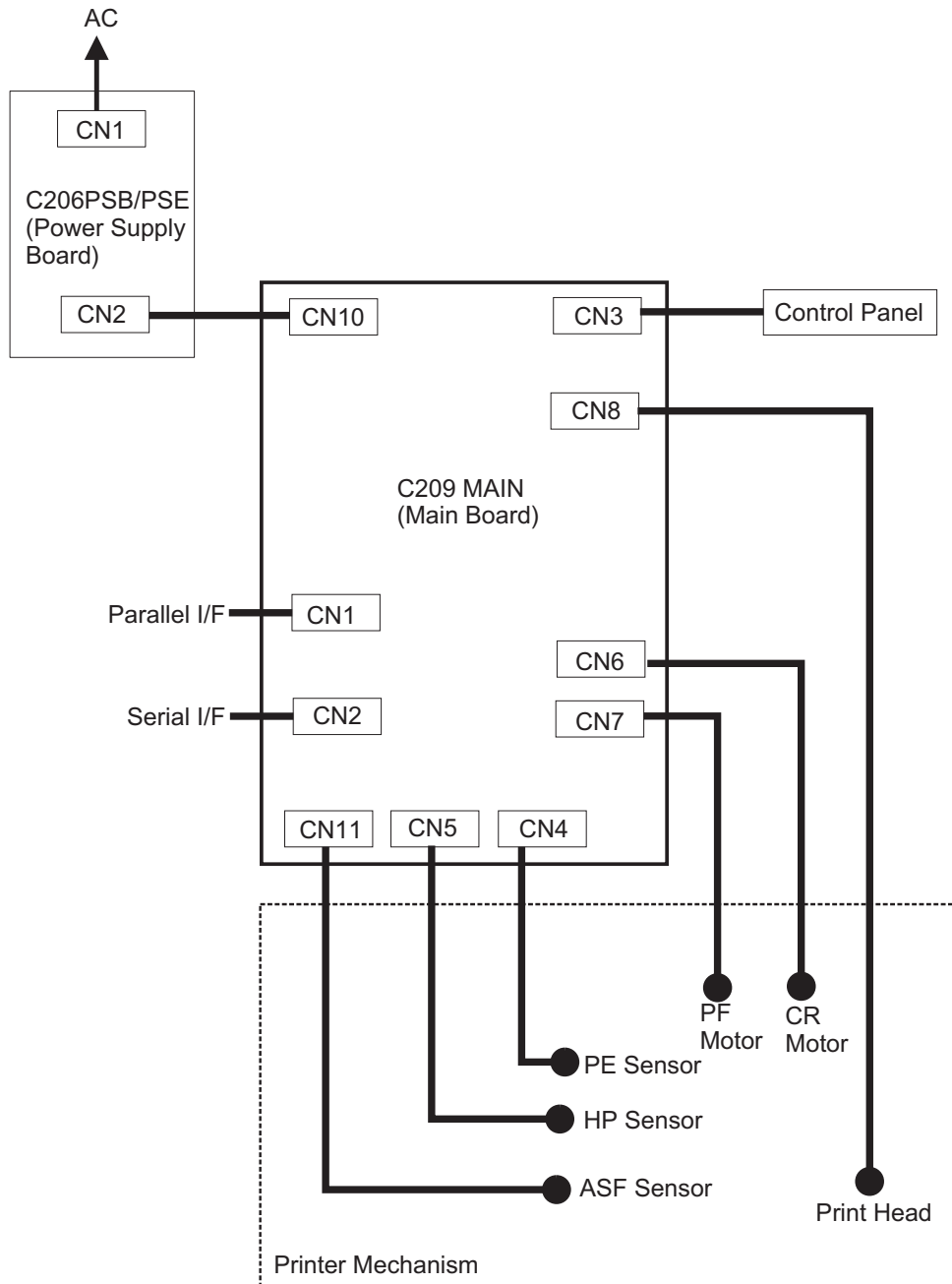| Connector	Function	Table to refer
CN1	Parallel I/F connector	Chapter1/Table 1-9
CN2	Serial I/F connector	Chapter1/Table 1-15
CN3	⇒Control panel	Table A-2
CN4	⇒PE sensor	Table A-3
CN5	⇒HP sensor	Table A-4
CN6	⇒CR motor	Table A-5
CN7	⇒PF motor	Table A-6
CN8	⇒Print head	Table A-7
CN10	⇒Power supply board (C206 PSB)	Table A-8
CN11	⇒ASF sensor	Table A-9

Table A-2. Connector CN3

Pin	Signal Name	I/O	Function
1	LED0	Out	LED drive signal (0)
2	GND	----	Ground
3	LED1	Out	LED drive signal (1)
4	GND	----	Ground
5	LED2	Out	LED drive signal (2)
6	+5V	----	Logic power supply
7	+5V	----	Logic power supply
8	LED4	Out	LED drive signal (4)
9	SW1	In	Panel switch input (1)
10	PSC	In	Power on/off switch
11	SW0	In	Panel switch on/off (0)
12	SW2	In	Panel switch on/off (2)

Table A-3. Connector CN4

Pin	Signal Name	I/O	Function
1	PE	In	Sensor detect signal
2	GND	---	Ground
3	PEV	---	Sensor power supply(+5V)

Table A-4. Connector CN5

Pin	Signal Name	I/O	Function
1	HP	In	Sensor detect signal
2	GND	---	Ground
3	HPV	---	Sensor power supply(+5V)

Table A-5. Connector CN6

Pin	Signal Name	I/O	Function
1	CRA	Out	Phase drive signal(A)
2	CR-A	Out	Phase drive signal (-A)
3	CRB	Out	Phase drive signal (B)
4	CR-B	Out	Phase drive signal(-B)

Table A-6. Connector CN7

Pin	Signal Name	I/O	Function
1	PFA	Out	Phase drive signal (A)
2	PF-A	Out	Phase drive signal (-A)
3	PFB	Out	Phase drive signal (B)
4	PF-B	Out	Phase drive signal(-B)

Table A-7. Connector CN8

Pin	Signal Name	I/O	Function
1	BCO	In	Black ink cartridge detect signal
2	CCO	In	Color ink cartridge detect signal
3	THM	In	Thermistor detect signal
4	GND	---	Ground
5	LAT	Out	Head data latch pulse output
6	GND	---	Ground
7	SI3	Out	Head data output (3)
8	GND	---	Ground
9	SI2	Out	Head data output (2)
10	GND	---	Ground
11	SI1	Out	Head data output (1)
12	GND	---	Ground
13	CLK	Out	Clock pulse for head data transfer
14	GND	---	Ground
15	NCHG	Out	Head all on pulse output
16	GND	---	Ground
17	VDD	---	Logic power supply (+5V)
18	GND2	---	Ground
19	GND2	---	Ground
20	GND2	---	Ground
21	COM	---	Head drive power supply
22	COM	---	Head drive power supply
23	COM	---	Head drive power supply
24	VHV	---	Head drive voltage control signal
25	VHV	---	Head drive voltage control signal

Table A-8. Connector CN10

Pin	Signal Name	I/O	Function
1	+42V	---	Mechanism drive power supply
2	+42V	---	Mechanism drive power supply
3	GND	---	Ground
4	GND	---	Ground
5	PSC	Out	Power supply switch output signal
6	GND	----	Ground
7	GND	---	Ground
8	+5V	---	Logic power supply

Table A-9. Connector CN11

Pin	Signal Name	I/O	Function
1	ASF	In	Sensor detect signal
2	GND	---	Ground
3	ASFV	---	Sensor power supply (+5V)

A.3 EEPROM Address Map

Address	Explanation	Setting	QPIT Settings	Factory Settings
00H	Password 0		54H	-
01H			0FH	-
02H	Market	0: World / 1:Japan 2: Custom(MJ-) ∗∗ 3: Custom(Stylus Color) ∗∗ 4: Custom (other name) ∗∗	00H	(∗1)(∗3)
03H	1st dot adjustment	-40≤ n ≤40 (by 1/1440 inch)	00H	(∗1)
04H	Bi-D adjustment data	-36≤ n ≤36 (by 1/1440 inch)	00H	(∗1)
05H	Uni-D adjustment	-36≤ n ≤36 (by 1/1440 inch)	00H	(∗1)
06H	Reserved		00H	-
07H	Reserved		00H	-
08H	Carriage speed adjustment data	-4≤ n ≤4 (by G.A timer unit)	00H	(∗1)
09H	Reserved		00H	-
0AH	Head actuator rank ID for VhN		12H	(∗1)
0BH	Head actuator rank ID for Twh2		01H	(∗1)
0CH	Head actuator rank ID for VhM		10H	(∗1)
0DH	Reserved		00H	-
0EH	Reserved		00H	-
0FH	Reserved		00H	-
10H	Password 1		5AH	-
11H			0FH	-
12H	Custom EEPROM sub number		00H	00H
13H			00H	00H
14H			00H	00H
15H			00H	00H
16H	Reserved		00H	-
17H	Reserved		00H	-
18H	CPSI password		00H	00H
19H			00H	00H
1AH			00H	00H
1BH			00H	00H
1CH	CPSI flags	bit7: CPSI license 0:Disable 1:Enable bit6: CPSI Font license 0:Disable 1:Enable	00H	00H
1DH	Reserved		00H	-
1EH	Reserved		00H	-
1FH	EEPROM Revision		42H	-
20H	Password 2		5AH	-
21H			0FH	-
22H	Interface selection	0: Auto / 1: Parallel 2: Serial	00H	00H∗2

Note) ∗∗: Change model name for IEEE1284 device ID return.

∗1: Adjusted at factory.

∗2: Initialized after performed panel initialization of EEPROM.

∗3: Factory setting for Korean version is mentioned in the page A-7.

Address	Explanation	Setting	QPIT settings	Factory settings
23H	Interface wait time	0 to 255 (by second)	0AH	0AH
24H	Parallel I/F speed	0:High speed 1:Normal	00H	00H
25H	Reserved		00H	-
26H	Reserved		00H	-
27H	Print direction control	0: Bi-D 1: Uni-D 2: Auto	02H	02H
28H	CG table	0: PC437 1: PC850	00H	(∗1)
29H	Reserved		00H	-
2AH	Auto LF/Network I/F mode	bit1: Network I/F mode (0=off, 1=on) bit0: Auto line feed (0=off, 1=on)	00H	00H
2BH	Panel mask function	bit5: Extended settings bit2: Cleaning bit1: Replace I/C bit0: Load/Eject	00H	00H∗3
2CH	Reserved		00H	-
2DH	Reserved		00H	-
2EH	Reserved		00H	-
2FH	Reserved		00H	-
30H	Password 3		5AH	-
31H			0FH	-
32H	Reserved		00H	-
33H	Reserved		00H	-
34H	Top margin	42 to 44X360 (by 1/360 inch)	78H	78H∗3
35H			00H	00H∗3
36H	Reserved		00H	-
37H	Reserved		00H	-
38H	Reserved		00H	-
39H	Reserved		00H	-
3AH	Reserved		00H	-
3BH	Reserved		00H	-
3CH	Reserved		00H	-
3DH	Reserved		00H	-
3EH	CR-phase of Home		00H	00H
3FH	ERROR Number		00H	00H
40H	Password 4		5AH	-
41H			0FH	-
42H	Ink flags	bit7: reserved bit6: black "one time" bit5: color "one time" bit4: Initial charge required bit3: reserved bit2: in cleaning sequence bit1: black CL required bit0: color CL required	00H	10H
43H	Ink flags 2	bit2: YMC cartridge changed and cleaned 0: first cartridge 1: changed bit1: Black cartridge changed and cleaned 0: first cartridge 1: changed bit0: Black cartridge changed and cleaned 0: with YMC cartridge 1: alone	00H	00H

Address	Explanation	Settings	QPIT settings	Factory settings
44H	Ink Counter Cb(total) 1count=100(ng)		00H	00H
45H			00H	00H
46H			00H	00H
47H			00H	00H
48H	Ink counter CY(total) 1count=100(ng)		00H	00H
49H			00H	00H
4AH			00H	00H
4BH			00H	00H
4CH	Ink counter Cm(total) 1count=100(ng)		00H	00H
4DH			00H	00H
4EH			00H	00H
4FH			00H	00H
50H	Password 5		5AH	-
51H			0FH	-
52H	Ink counter Cc(total) 1count=100(ng)		00H	00H
53H			00H	00H
54H			00H	00H
55H			00H	00H
56H	Ink counter Csm(total) 1count=100(ng)		00H	00H
57H			00H	00H
58H			00H	00H
59H			00H	00H
5AH	Ink counter Csc(total) 1count=100(ng)		00H	00H
5BH			00H	00H
5CH			00H	00H
5DH			00H	00H
5EH	Reserved		00H	-
5FH	Reserved		00H	-
60H	Password 6		5AH	-
61H			0FH	-
62H	Ink counter Rb		00H	00H
63H			00H	00H
64H	Ink counter Ry		00H	00H
65H			00H	00H
66H	Ink counter A		00H	00H∗2
67H			00H	00H∗2
68H	power off time		00H	00H∗2
69H			00H	00H∗2
6AH	CL time		00H	00H∗2
6BH			00H	00H∗2
6CH	accumulated printing time		00H	00H
6DH	1 count = 1 minute		00H	00H
6EH	Reserved		00H	-
6FH	Reserved		00H	-

Address	Explanation	Setting	QPIT settings	Factory settings
70H	Password 7		5AH	-
71H			0FH	-
72H	customized model name	strings counter strings of model field for Device ID	00H	00H
73H			00H	00H
74H			00H	00H
75H			00H	00H
76H			00H	00H
77H			00H	00H
78H			00H	00H
79H			00H	00H
7AH			00H	00H
7BH			00H	00H
7CH			00H	00H
7DH			00H	00H
7EH			00H	00H
7FH			00H	00H

[∗3: Specifications for Korean Version]

1) EEPROM factory setting for Korean version.

Address	Explanation	Korea Factory Settings
02H	Market	80H
2BH	Panel mask function	80H
34H	Top margin	2AH
35H		00H

2) IEEE1284 Device ID

```
[00H] [56H]
MFG:EPSON;
CMD:ESCPL2, BDC;
MDL:Stylus[SP]Photo;
CLS:PRINTER;
DES:EPSON/TriGem[SP]Stylus[SP]Photo;
```

3) BCD-ID command reply

```
@EJL<SP>ID<CR><LF>
MFG:EPSON;
CMD:ESCPL2,BDC;
MDL:Stylus[SP]Photo;
CLS:PRINTER;
DES:EPSON/TriGem[SP]Stylus[SP]Photo;
<FF>
```

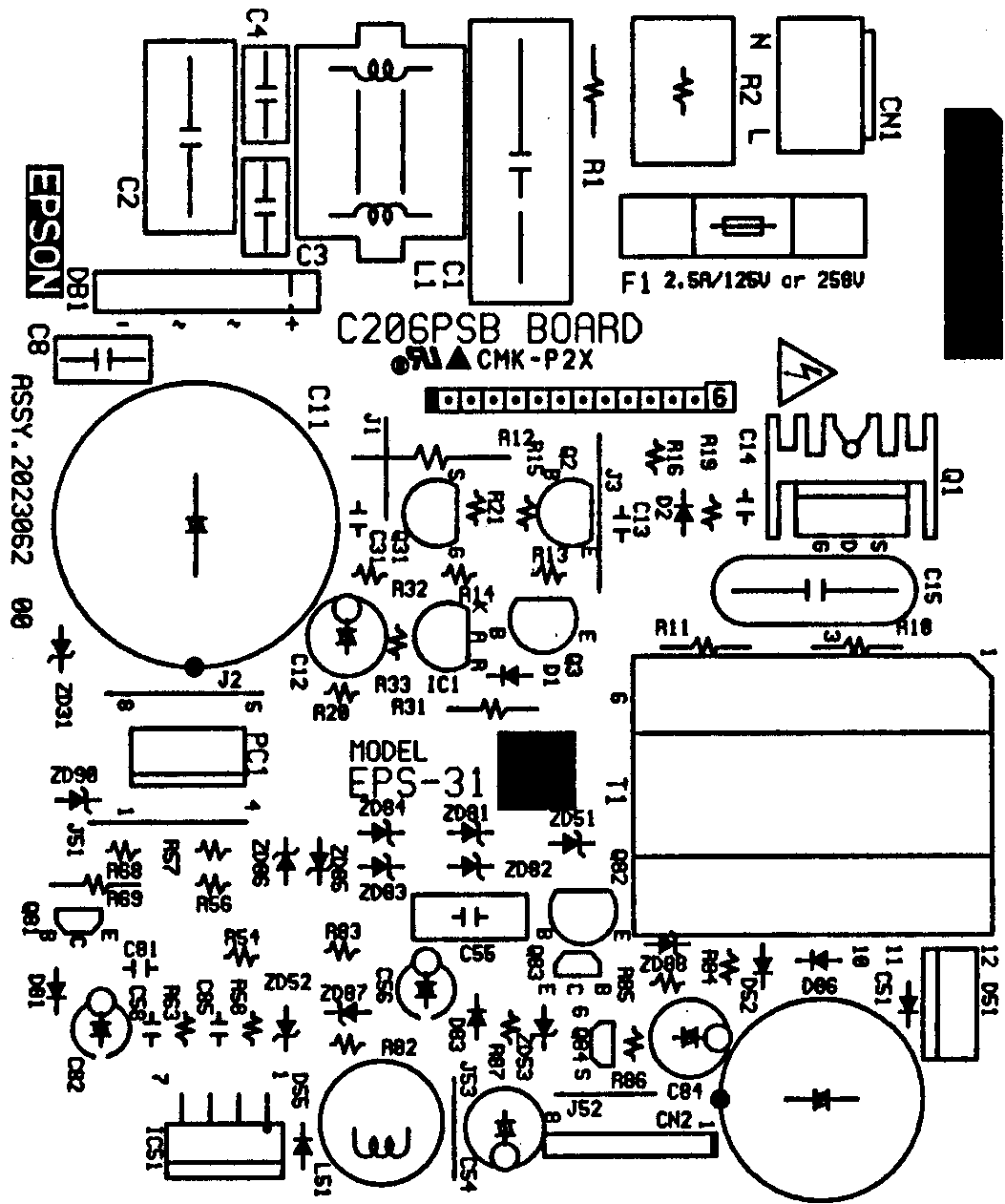# A.4 Circuit Board Component Layouts
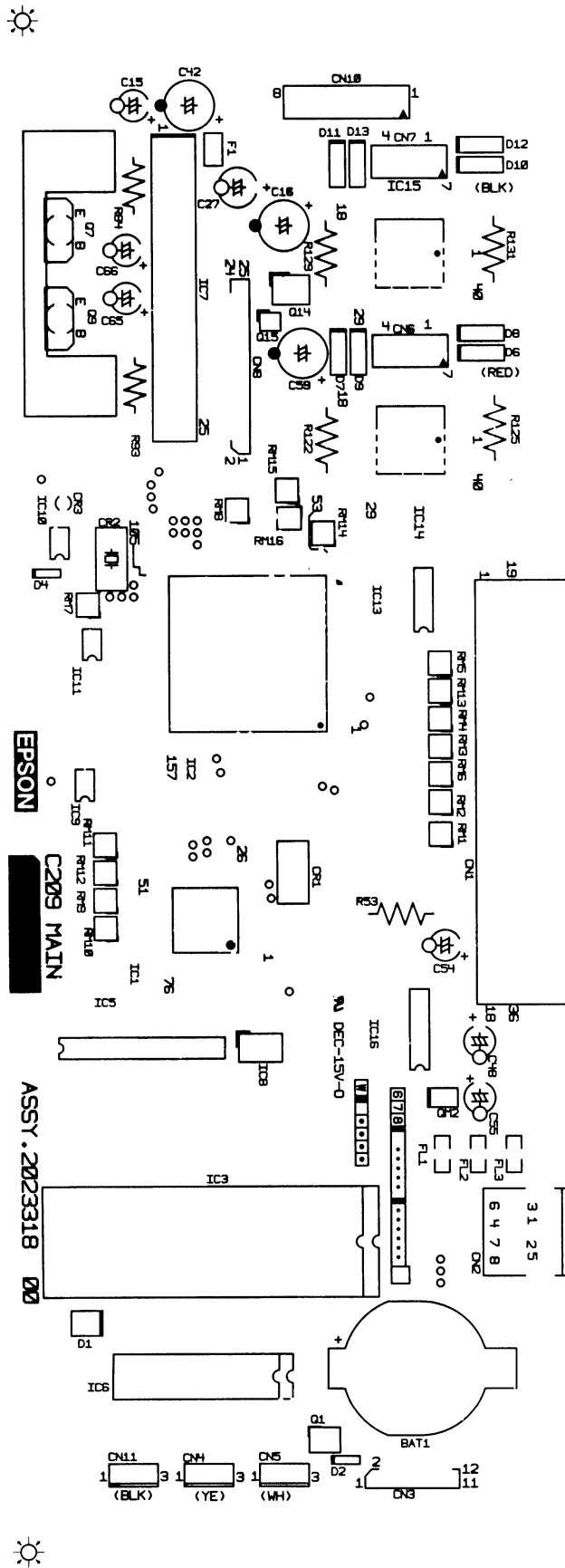
Figure A-2.C209 Component Layout
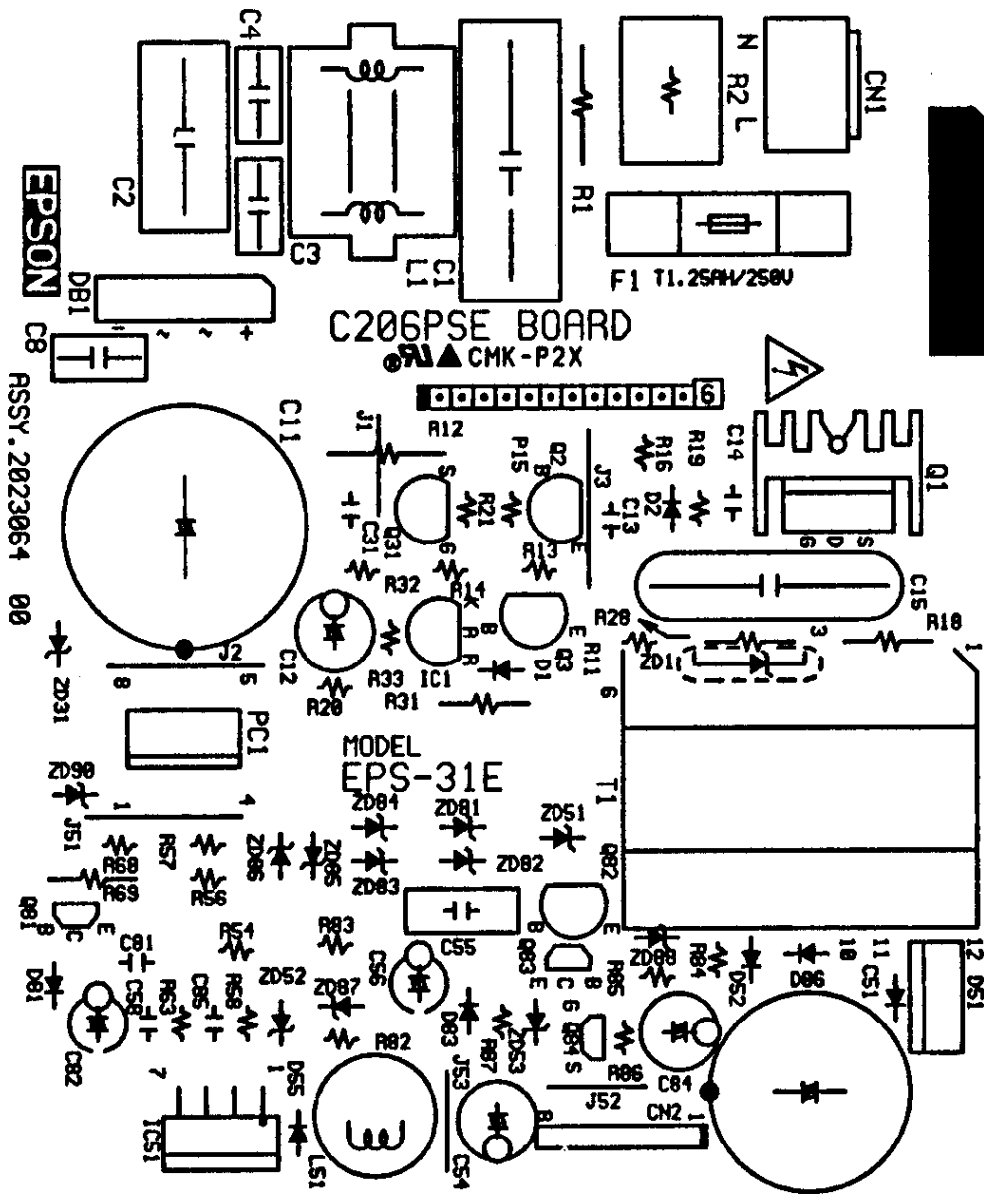
Figure A-3. C206PSB Component Layout

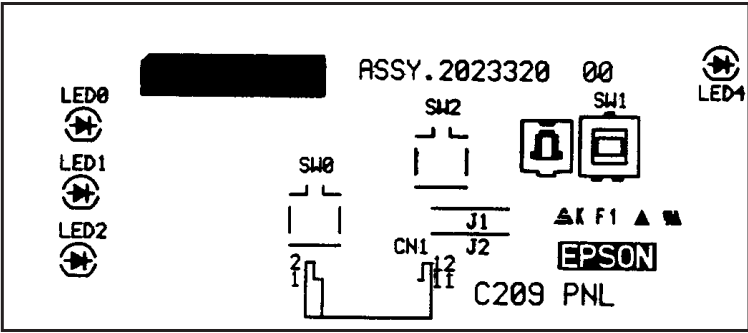**Figure A-4. C206PSE Board Component Layout**

Figure A-5. C209 PNL Component Layout
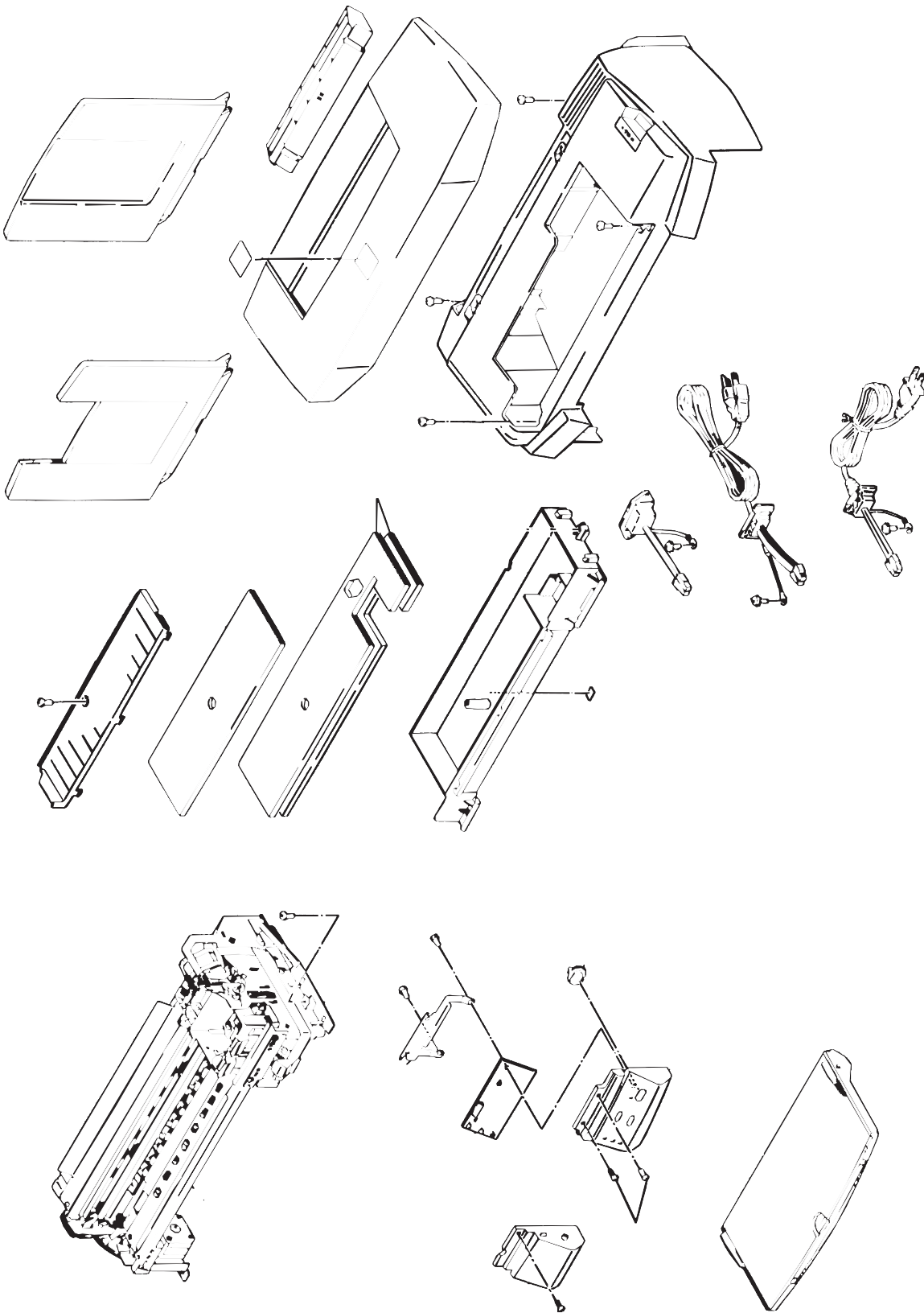
A.5 Exploded Diagrams

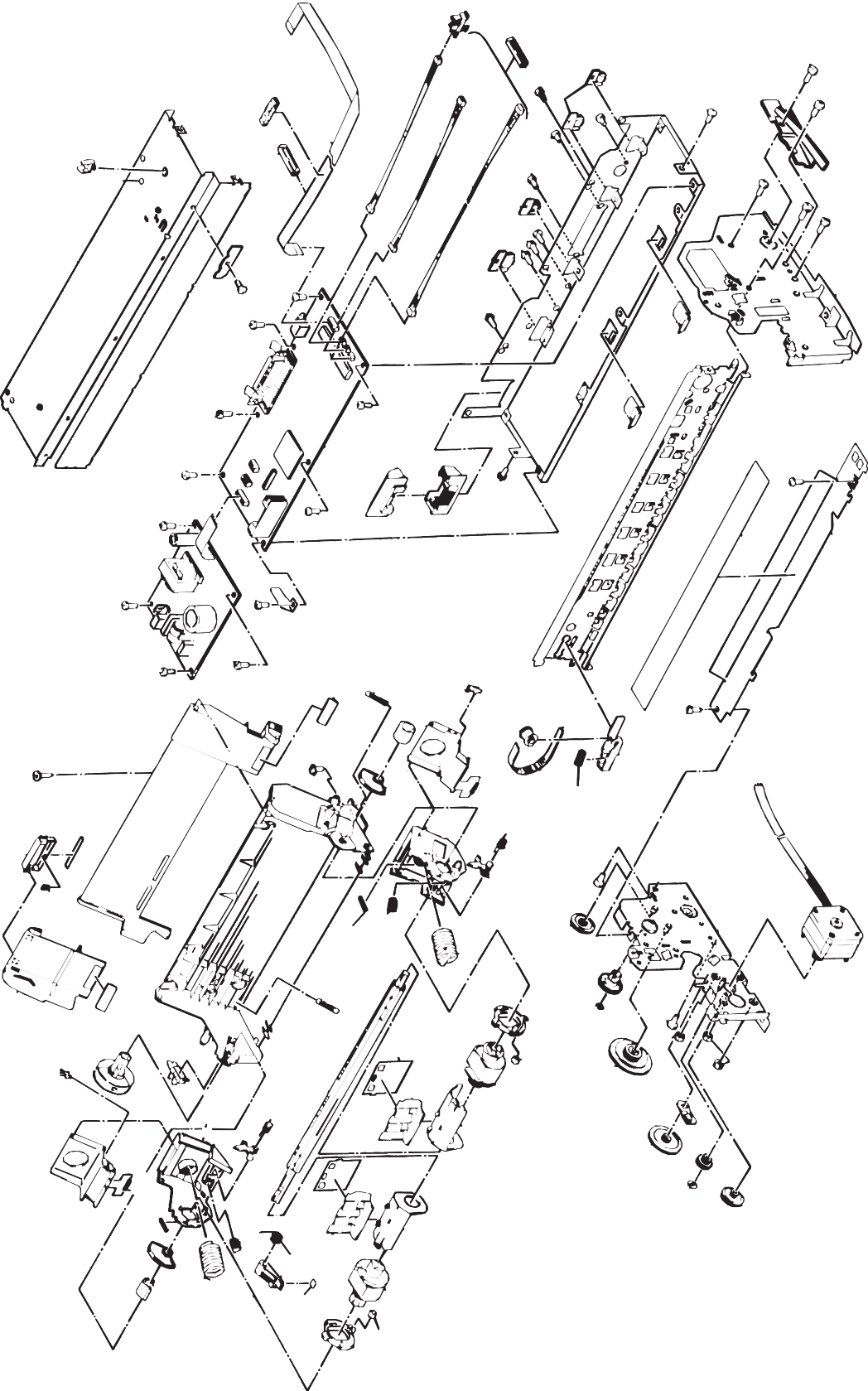**Figure A-6. EPSON Stylus Photo Exploded Diagram (1)**
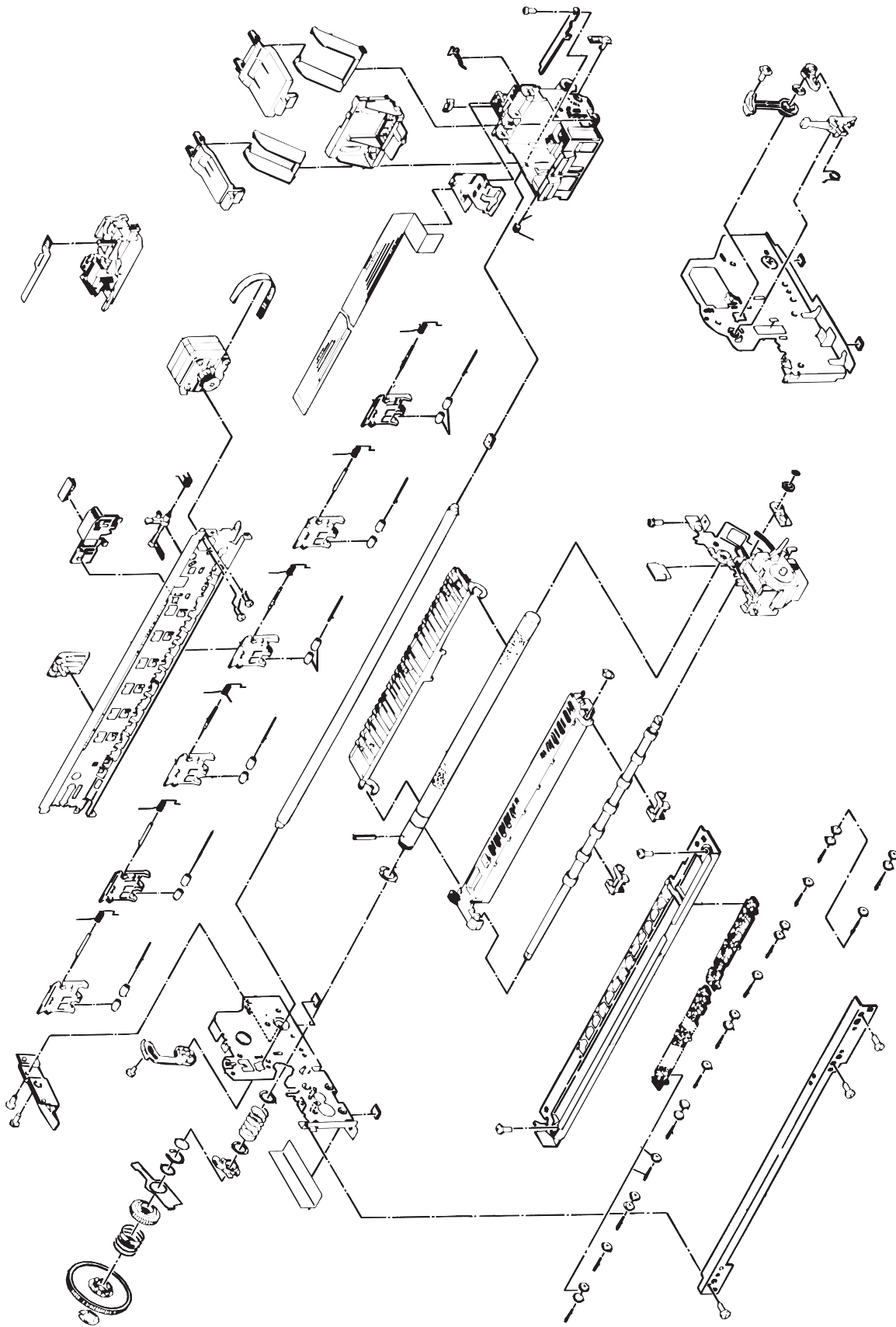
Figure A-7. EPSON Stylus Photo Exploded Diagram (2)

Figure A-8. EPSON Stylus Photo Exploded Diagram (3)
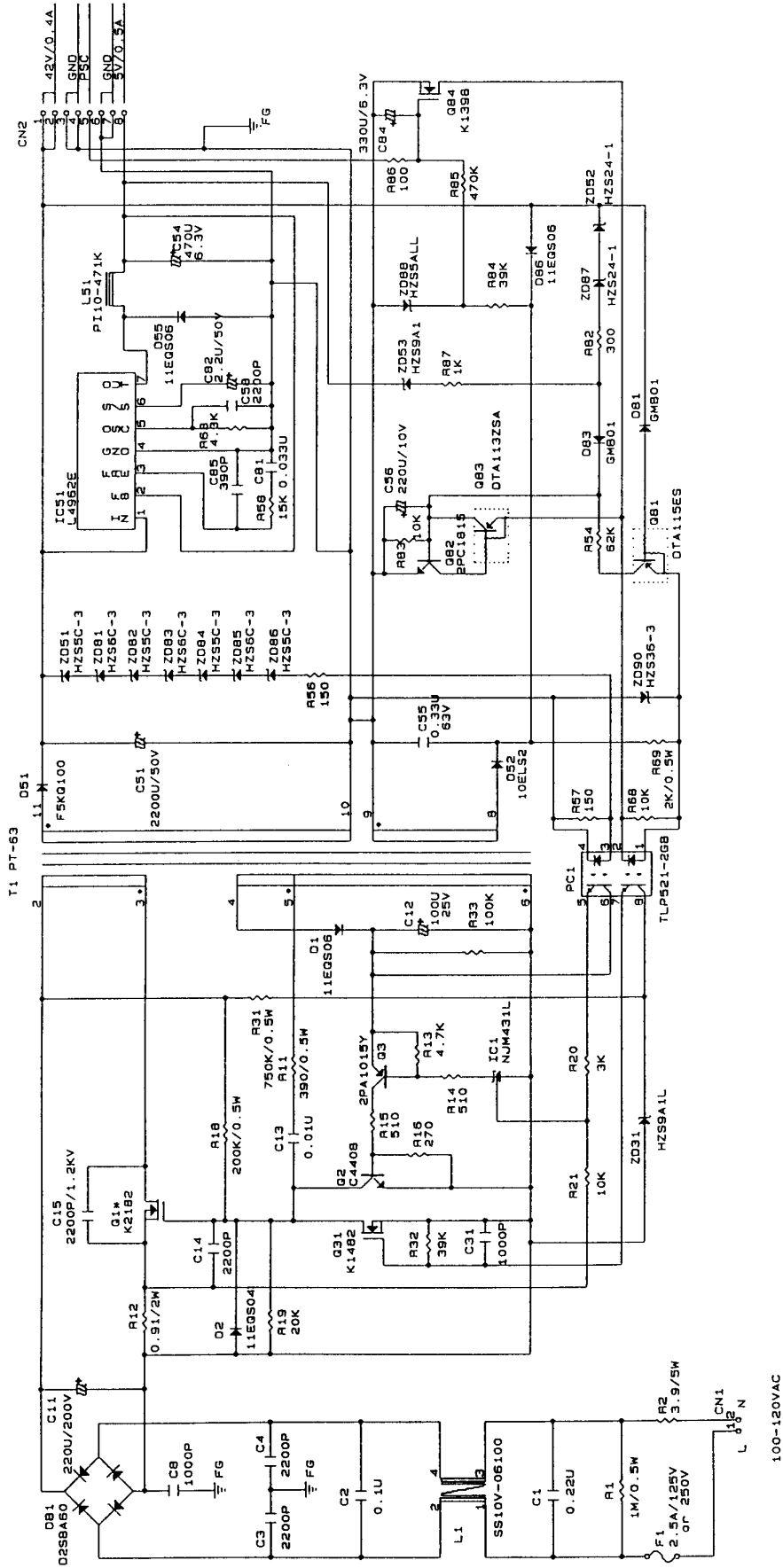
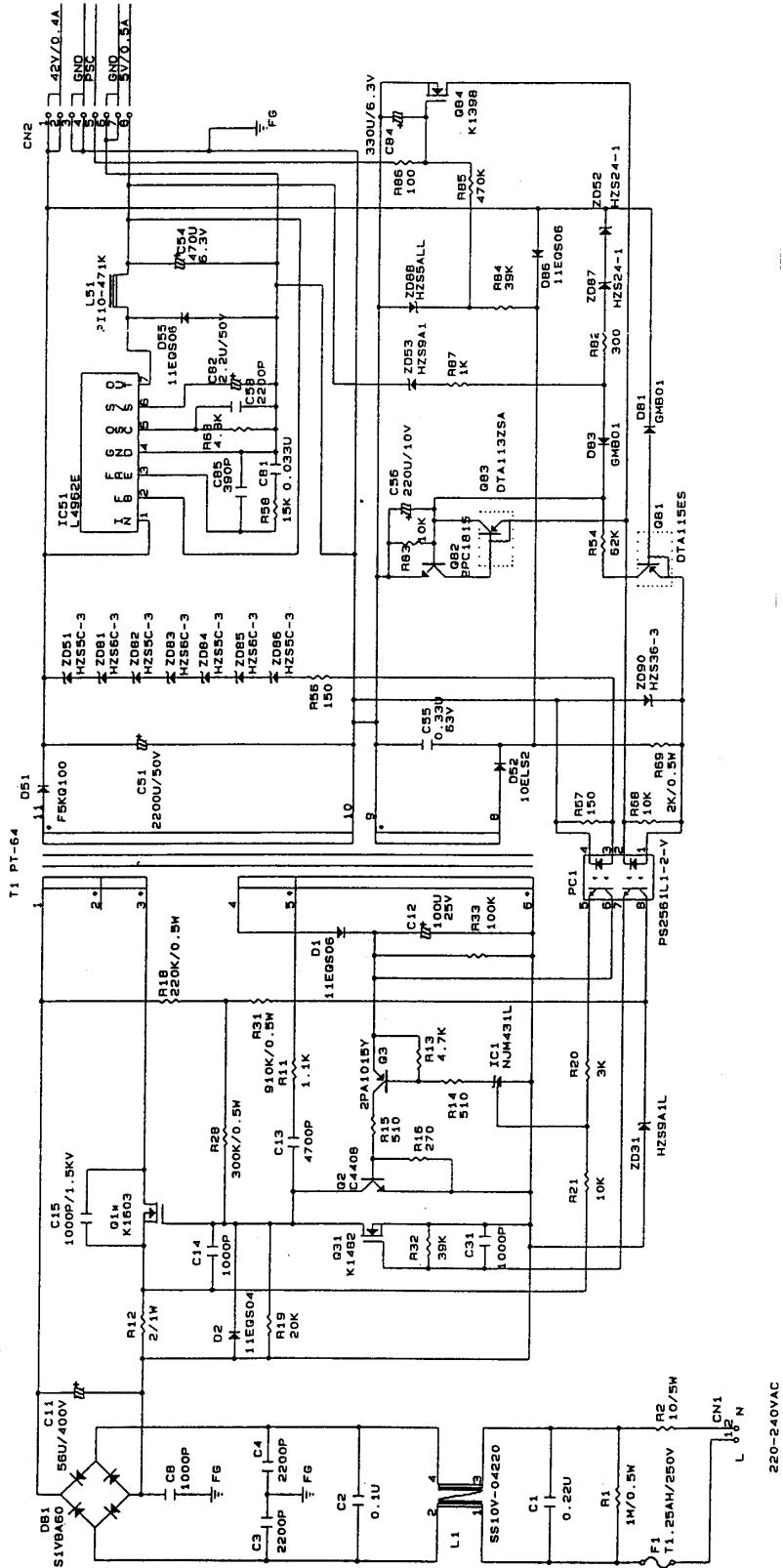# A.6 Circuit Diagrams

Figure A-9. C206PSB Board Circuit Diagram

Figure A-10. C206PSE Board Circuit Diagram

EPSON OVERSEAS MARKETING LOCATIONS

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As of September, 1996

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