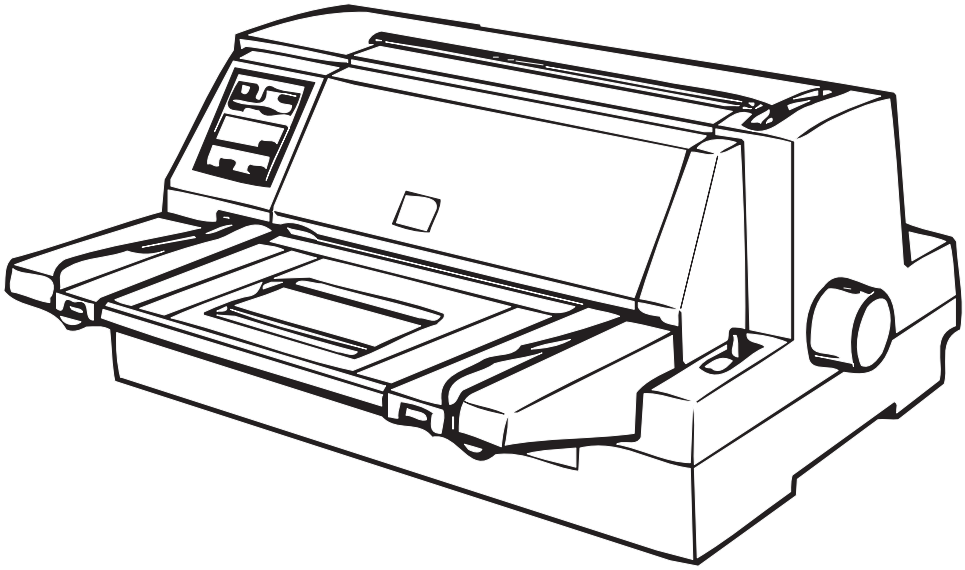
EPSON

IMPACT DOT MATRIX PRINTER

EPSON LQ-670

SERVICE MANUAL



SEIKO EPSON CORPORATION

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PRECAUTIONS

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

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

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

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

WARNING

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL. DO NOT CONNECT THE UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

CAUTION

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGE IS THE SAME AS THE RATED VOLTAGE, LISTED ON THE SERIAL NUMBER/RATING PLATE. IF THE EPSON PRODUCT HAS A PRIMARY AC RATING DIFFERENT FROM AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE ICs OR OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of EPSON LQ-670.

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	May 28, 1997	First issue

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1.1 Specifications

This specifications provide characteristics of the serial impact dot matrix printer LQ-670.

1.1.1 Features

LQ-670 is a 24pin serial impact dot matrix printer for the VAR(value added reseller) market.
The major features of this printer are;

❑ Columns	:106 columns (10cpi)	
❑ Printing Speed	:High speed draft	300cps
	:Draft	250cps
	:LQ	83cps at 10cpi
❑ Feeding Method	:Friction feed	(front manual, rear CSF)
	:Push tractor feed	(rear)
❑ Feeder	:Rear push tractor	
	CSF Bin1/Bin2	(Option)
	Roll paper holder	(Option)
❑ Paper/Media	:Single sheet, Continuous paper, Multi part paper, Envelope, Card, Label and Roll paper.	
❑ Fonts	:9LQ & 1 Draft Bitmap and 4 Scarable typefaces	
	:8 Bar code fonts	
❑ Character tables	:Standard version	11 tables
	NLSP version	20 tables
❑ Input buffer	:64 Kbytes	
❑ Acoustic noise	:55dB(A) (ISO7779 pattern)	
❑ Reliability	:Total print volume	6.5 million lines(except print head)
	:(MTBF)	5000 POH
	:Print head life	200 million strokes/wire
	:Ribbon life	2 million characters
❑ Interface	:Bi-directional parallel interface (IEEE-1284 nibble mode supported) Type B/I/F level 2 (Option)	
❑ Control code	:ESC/P 2 and IBM 2390 Plus emulation	
❑ Copy capability	:1 original + 4 copies	
❑ Control panel functions	:Font, Condensed, Pause, Tear off, Bin, LF/FF, Load/Eject, Micro Adjust and the default settings	
❑ Printable area	:70 lines are available at A4. (Top margin 0 mm setting and Bottom margin 0 mm setting are available)	

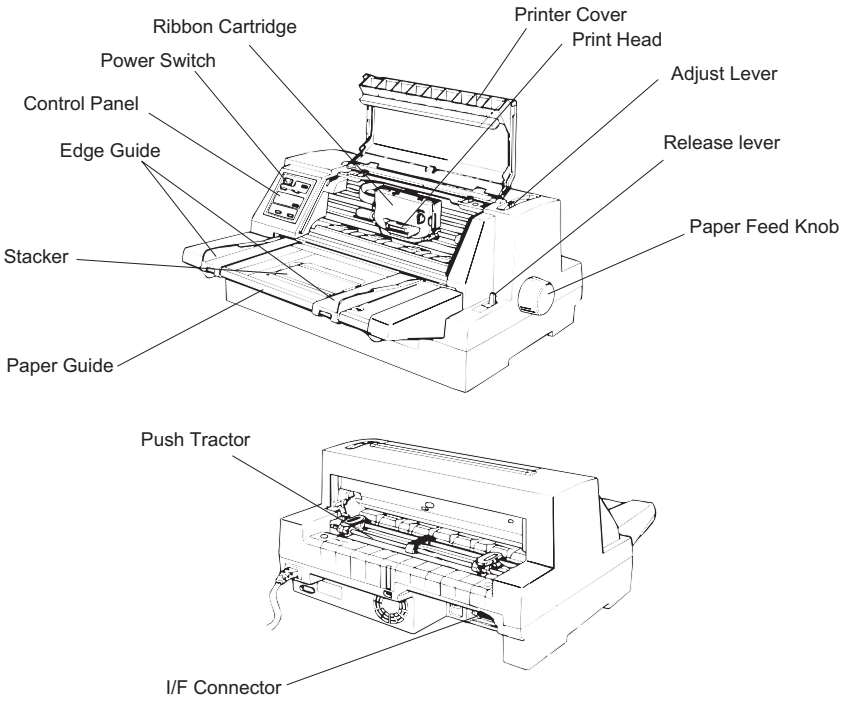

Figure 1-1. Exterior of LQ-670

- Consumables and optional units

Table 1-1. Consumables and Optional Units

Name	Part Number
Ribbon cartridge	S015016
High capacity cut sheet feeder (Bin1)	C806781 (EAI version)
High capacity cut sheet feeder (Bin1)	C806782 (Non-EAI version)
Second bin cut sheet feeder (Bin2)	C806791 (EAI version)
Second bin cut sheet feeder (Bin2)	C806792 (Non-EAI version)
Roll paper holder	#8310
Serial I/F card	C82305* / C82306*
32KB intelligent serial I/F card	C82307* / C82308*
32KB intelligent parallel I/F card	C82310* / C82311*
Local Talk I/F card	C82312*
32KB IEEE-488 I/F card	C82313*
Coax I/F card	C82314*
Twinax I/F card	C82315*
Ethernet I/F card	C82331*
IEEE-1284 parallel I/F card	C82345*
Multi Protocol Ethernet I/F card	C82346*

Note)*: The number represented by an asterisk varies, depending on the country.

1.2 Hardware Specifications

This section describes hardware specification for the LQ-670.

1.2.1 Printing Method

- ❑ Printing Method : Impact dot matrix
- ❑ Number of pins : 24 pins
- ❑ Print pin arrangement : 12x2 staggered
- ❑ Print pin diameter : 0.0079 inch (0.20 mm)
- ❑ Color : Black
- ❑ Print direction : Bi-direction with logic seeking

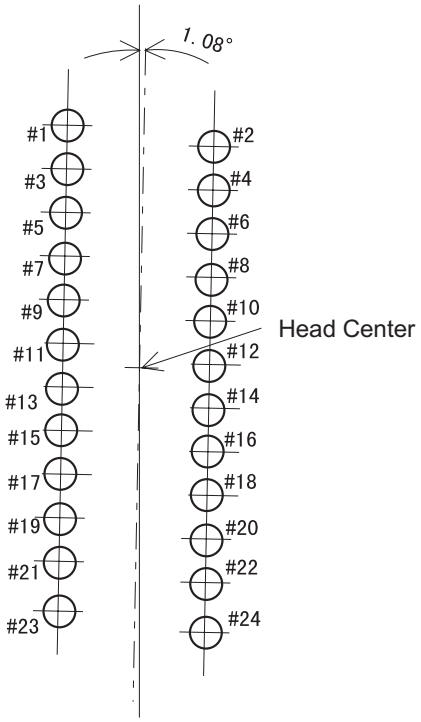

Figure 1-2. Pin Configuration

1.2.2 Printing Specifications

- ❑ Copy capability :1 original + 4 copies
- ❑ Print speed and printable columns

Table 1-2. Print Speed and Printable Columns

Printing Mode	Character Pitch	Printable Columns	Print Speed(cps)	
			Normal	Copy
High speed Draft	10cpi	106	300	200
Draft	10cpi	106	250	167
	12cpi	127	300	200
	15cpi	159	375	250
Draft condensed	17cpi	181	214	143
	20cpi	212	250	167
LQ	10cpi	106	83	70
	12cpi	127	100	83
	15cpi	159	125	104
LQ condensed	17cpi	181	143	119
	20cpi	212	167	139

Note) When the power supply voltage drops to the lower limit, the printer stops printing and then starts printing the rest of that line again but at the slower speed than before.

Note) When the head temperature rises to the upper limit, the printer stops printing. When the head temperature falls to the normal level, the printer starts printing again but slower than before.

- ❑ Resolution

Table 1-3. Resolution

Printing Mode	Horizontal density	Vertical density	Adjacent dot print
High speed draft	90dpi	180dpi	No
Draft	120dpi	180dpi	No
Draft condensed	240dpi	180dpi	No
LQ	360dpi	180dpi	N0
8 pins bit image	60, 80, 90 or 120dpi	60dpi	Yes
	120 or 240dpi	60dpi	No
24 pins bit image	60,90,120 or 180dpi	180dpi	Yes
	360dpi	180dpi	No
Raster graphics	180 or 360dpi	180 or 360dpi	Yes

- ❑ Control code : ESC/P 2 and IBM 2390 Plus emulation (Refer to control code)

1.2.3 Paper Handling Specifications

- ❑ Feeding method :Friction feed (front manual, rear CSF)
  Push tractor feed (rear)
- ❑ Feeder :Rear push tractor
  CSF Bin1/Bin2 (Option)
  Roll paper holder(Option)
- ❑ Paper path :Manual Insertion Front in, front out
  CSF Rear in, front out
  Tractor Rear in, front out
- ❑ Line Spacing :1/6 inch or programmable in increments of 1/360 inch
- ❑ Feed speed :Refer to the table 1-4.
- ❑ Release Lever :The release lever must be set according to the table 1-5.
- ❑ Paper thickness lever :The paper thickness lever must be set at the proper position according to the table 1-6.

Table 1-4. Feeding Speed

	Normal mode	Copy mode
1/6 inch feed	60 msec	70 msec
Continuous feed	0.127MPS(m/sec) 5.0 IPS(inches/sec)	0.092 MPS(m/sec) 3.6 IPS(inches/sec)

Table 1-5. Release Lever Position

Lever Position	Paper path/Feeder	Paper/Media
Friction	Manual insertion(front)	Cut sheet(Single sheet& Muti part) Card
	CSF Bin1	Cut sheet(Single sheet & Multi part) Envelope, Card
	CSF Bin2	Cut sheet(Single sheet)
	Roller paper holder	Roll paper
Tractor	Push tractor feed(rear)	Continuous paper(Single sheet & Multi part)

Table 1-6. Paper Thickness Lever Position

Lever Position	Paper thickness (inch)		Paper thickness (mm)	
	Minimum	Maximum	Minimum	Maximum
0	0.0024	0.0047	0.065	0.12
1	0.0047	0.0075	0.12	0.19
2	0.0075	0.0102	0.19	0.26
3	0.0102	0.0126	0.26	0.32
4	0.0126	0.0142	0.32	0.36
5	0.0142	0.0157	0.36	0.40
6	0.0157	0.0205	0.40	0.52

1.2.4 Paper Specification

This section describes printable area and types of paper that can be used in this printer.

- ❑ Cut Sheets
  The following table shows specification for cut sheets.

Table 1-7. Cut Sheet (Single sheet, Not Multi Part)

	Front Entry(Manual Insertion)		Rear Entry(CSF bin1)		Rear Entry(CSF bin2)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Width (inch)	3.6	11.7	3.9	11.7	3.9	11.7
(mm)	91	297	100	297	100	297
Length (inch)	3.5	16.5	3.6	16.5	8.3	16.5
(mm)	90	420	92	420	210	420
Thickness(inch)	0.0025	0.0055	0.0025	0.0055	0.0025	0.0055
(mm)	0.065	0.14	0.065	0.14	0.065	0.14
Weight (g/m^2)	52	90	52	90	52	90
(lb)	14	24	14	24	14	24
Quality	Plain paper, Reclaimed paper, Not curled, not folded, not crumpled.					

Note): Printing on reclaimed paper is available only under the normal temperature and humidity condition.

Table 1-8. Cut Sheet (Multi Part)

	Front Entry (Manual Insertion)		Rear Entry (CSF)	
	Minimum	Maximum	Minimum	Maximum
Width (inch)	3.6	11.7	3.9	11.7
(mm)	91	297	100	297
Length (inch)	3.5	16.5(11.7)	3.6	16.5
(mm)	90	420(297) ( ):Value of line glue one side of form.	92	420
Copies	1 original + 4 copies		1 original + 4 copies	
Total thickness (inch)	0.0047	0.015	0.0047	0.015
(mm)	0.12	0.39	0.12	0.39
Weight (g/m^2)	40	58	40	58
(one sheet of multi part) (lb)	12	15	12	15
Quality	Plain paper, Reclaimed paper Not curled, not folded, not crumpled		Plain paper, Reclaimed paper Not curled, not folded, not crumpled	
Jointing	Line glue at the top or one side of form		Line glue at the top of form	

*Note):*Printing on multi part. Don't use CSF 2nd bin.

❑ Envelope

Table 1-9. Envelope Specification

		Front Entry (Manual Insertion)		Rear Entry (CSF)	
		Minimum	Maximum	Minimum	Maximum
Envelope (No.6)	Width (inch)	6.5		6.5	
	(mm)	165		165	
	Length (inch)	3.6		3.6	
	(mm)	92		92	
Envelope (No.10)	Width (inch)	9.5		9.5	
	(mm)	241		241	
	Length (inch)	4.1		4.1	
	(mm)	105		105	
Total thickness	(inch)	0.0063	0.0197	0.0063	0.0197
	(mm)	0.16	0.52	0.16	0.52
		The difference of thickness at the printable area is within 0.0098 inch (0.25mm)		The difference of thickness at the printable area is within 0.0098 inch (0.25mm)	
Weight	(g/m^2)	45	91	45	91
	(lb)	12	24	12	24
Quality		BOND paper, PLANE paper or AIR MAIL. No glue at a flap, Not curled, not folded, not crumpled		BOND paper, PLANE paper or AIR MAIL. No glue at a flap, Not curled, not folded, not crumpled	

Note1): Printing on envelope is available only under normal temperature and humidity conditions.
Note2): Set the longer side of envelope horizontally.
Note3): Don't use CSF 2nd bin.

❑ Card

Table 1-10. Card Specification

		Front Entry (Manual Insertion)		Rear Entry(CSF)	
		Minimum	Maximum	Minimum	Maximum
Width	(inch)	4.1	5.8	4.1	5.8
	(mm)	105	148	105	148
Length	(inch)	4.1	5.83	4.1	5.8
	(mm)	105	148	105	148
Thickness	(inch)	0.0087		0.0087	
	(mm)	0.22		0.22	
Weight	(g/m^2)	192		192	
	(lb)	51		51	
Quality		Plain paper, Reclaimed paper Not curled, not folded, not crumpled		Plain paper, Reclaimed paper Not curled, not folded, not crumpled	

Note1): Printing card is available only under normal temperature and humidity conditions.
Note2): Don't use CSF 2nd bin.

❑ Continuous paper (Single sheet and Multi part)

Table 1-11. Continuous Paper (Single Sheet and Multi Part)

		Rear Entry (Tractor)	
		Minimum	Maximum
Width	(inch)	4	12
	(mm)	101.6	304.8
Length(one page)	(inch)	4	22
	(mm)	101.6	558.8
Copies		1 original + 4 copies	
Total thickness	(inch)	0.0025	0.015
	(mm)	0.065	0.39
Weight	(g/m^2)	52	82
(not multi part)	(lb)	14	22
Weight	(g/m^2)	40	58
(one sheet of multi part)	(lb)	12	15
Quality		Plain paper, Reclaimed paper Carbonless multi part paper	
Jointing		Point glue or paper staple(both side)	

❑ Continuous paper with Labels

Table 1-12. Continuous Paper with Labels

		Rear Entry (Tractor)	
		Minimum	Maximum
Label size		See the figure below.	
Base sheet width	(inch)	4	12
	(mm)	101.6	304.8
Base sheet length	(inch)	4	22
(one page)	(mm)	101.6	558.8
Base sheet	(inch)	0.0028	0.0035
Thickness	(mm)	0.07	0.09
Total thickness	(inch)	0.0063	0.0075
		0.16	0.19
Label weight	(g/m^2)	68	
	(lb)	17	
Quality		A VERY CONTINUOUS FORM LABELS, A VERY MINI-LINE LABELS or the same quality labels	

Note): Printing on label is available only under the normal temperature and humidity conditions.
Note): The base sheet of labels must be continuous paper.

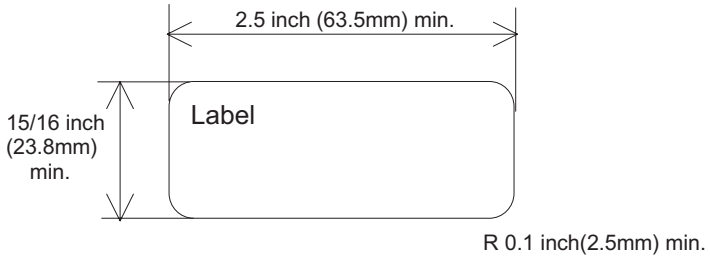

Figure 1-3. Label Size

- Roll paper

Table 1-13. Roll Paper Specification

		Rear Entry (Roll paper holder)	
		Minimum	Maximum
Width	(inch) (mm)	8.5 216	
Length	(inch) (mm)	-----	
Thickness	(inch) (mm)	0.0028 0.07	0.0035 0.09
Weight	(g/m^2) (lb)	52 14	82 22
Quality		Plain paper, Reclaimed paper. Not curled, not folded, not crumpled.	

1.2.5 Printable Area

❑ Cut sheets

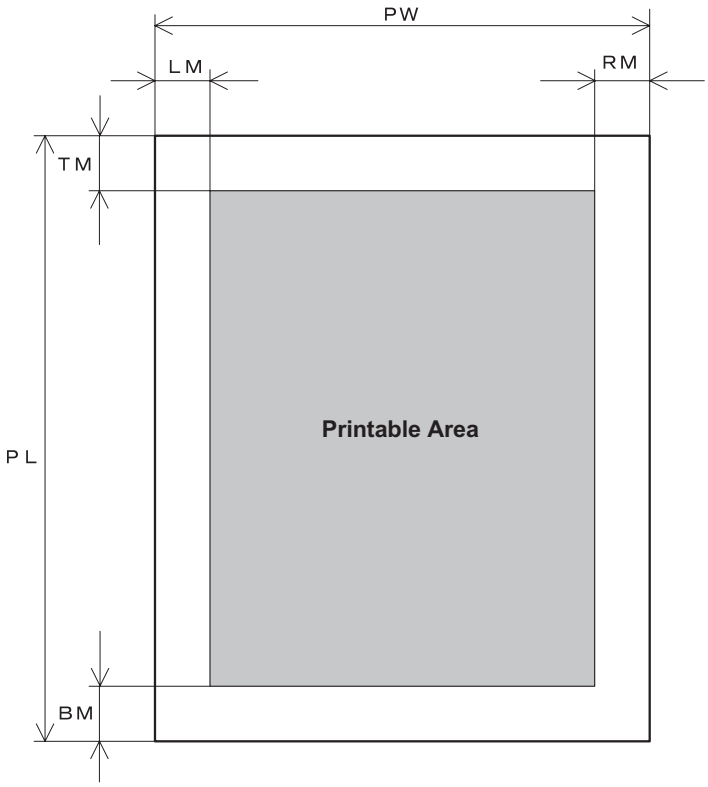

Figure 1-4. Printable Area for Cut Sheet

Table 1-14. Printable Area for Cut Sheet

		Single sheet	Multi part
PW	(Width)	(Refer to section 1.2.4)	(Refer to section 1.2.4)
PL	(Length)	(Refer to section 1.2.4)	(Refer to section 1.2.4)
LM	(Left margin)	3 mm or more(PW<=297mm)	3 mm or more(PW<=297mm)
RM	(Right margin)	3 mm or more(PW<=297mm)	3 mm or more(PW<=297mm)
TM	(Top margin)	0.0mm or more	0.0mm or more
BM	(Bottom margin)	0.0mm or more	0.0mm or more

❑ Envelope and card

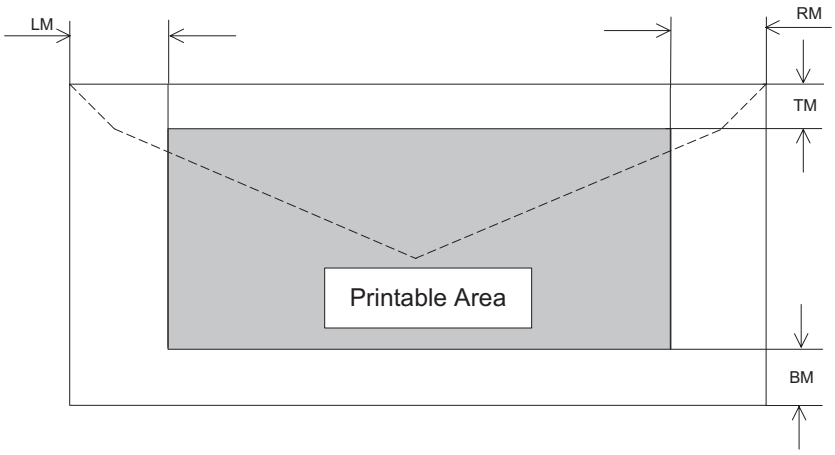

Figure 1-5. Printable Area for Envelope

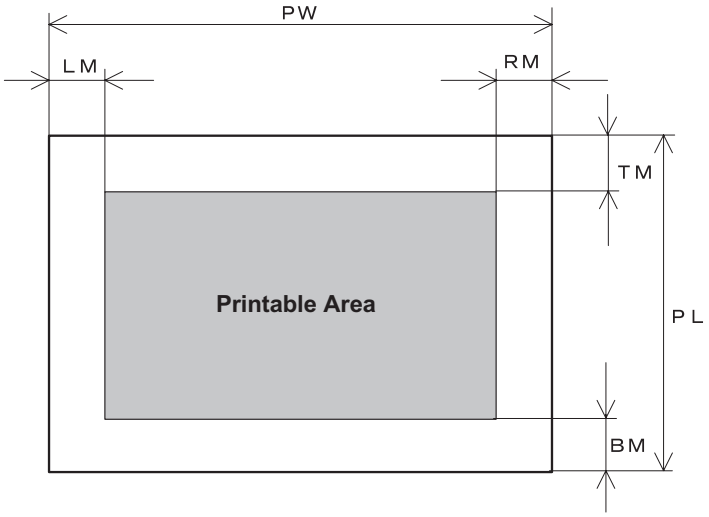

Figure 1-6. Printable Area for Card

Table 1-15. Printable Area for Envelope and Card

		Envelope	Card
PW	(Width)	(Refer to section 1.2.4)	(Refer to section 1.2.4)
PL	(Length)	(Refer to section 1.2.4)	(Refer to section 1.2.4)
LM	(Left margin)	3 mm or more	3 mm or more
RM	(Right margin)	3 mm or more	3 mm or more
TM	(Top margin)	0.0mm or more *1	0.0mm or more *1
BM	(Bottom margin)	0.0mm or more	0.0mm or more

*Note *1)*: When loading the paper from CSF, TM(Top margin) is 4.2 mm or more.

❑ Continuous paper

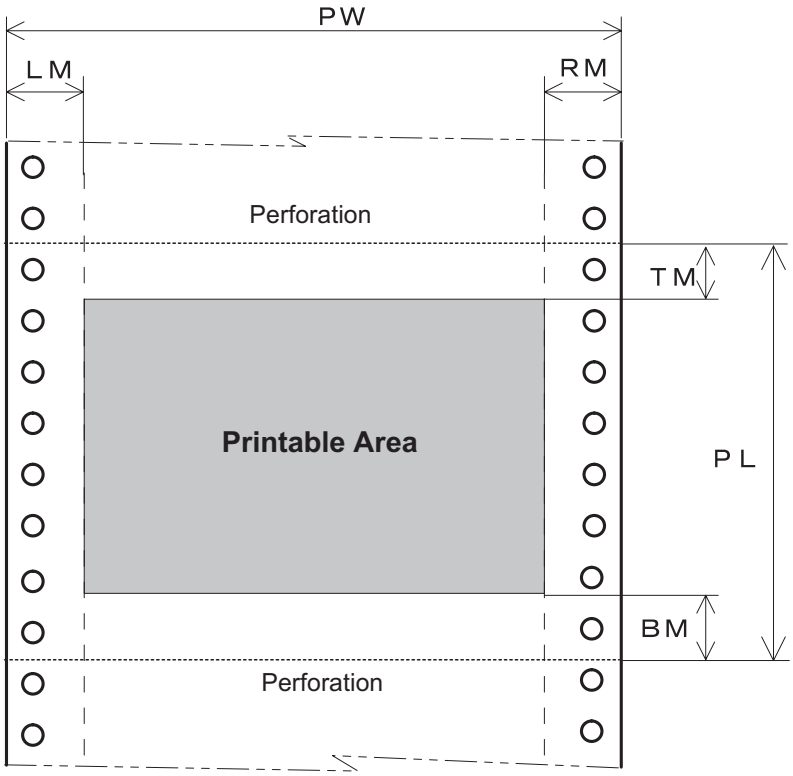

Figure 1-7. Printable Area for Continuous Paper

Table 1-16. Printable Area for Continuous Paper

		Continuous paper
PW	(Width)	(Refer to section 1.2.4)
PL	(Length)	(Refer to section 1.2.4)
LM	(Left margin)	13mm or more
RM	(Right margin)	13mm or more
TM	(Top margin)	4.2mm or more
BM	(Bottom margin)	4.2mm or more

❑ Roll paper

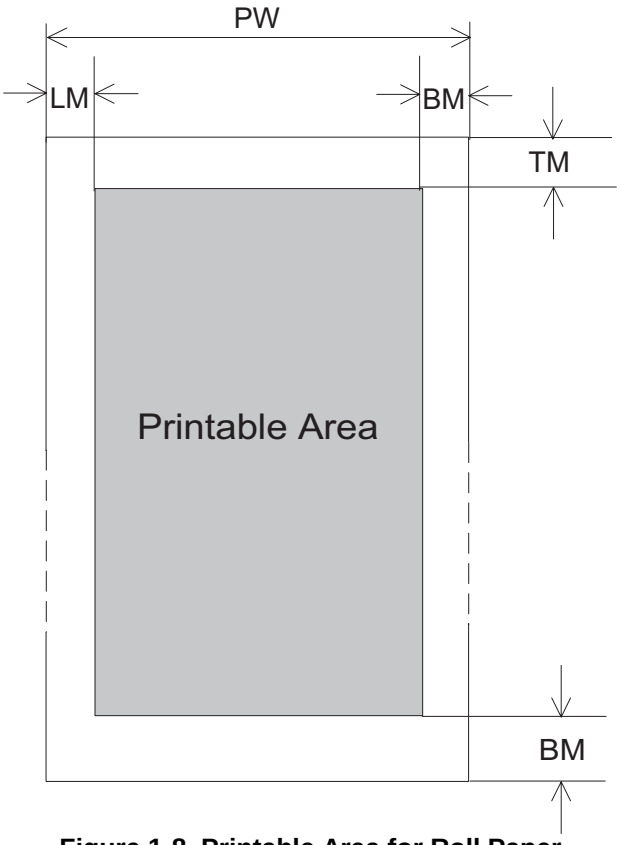

Figure 1-8. Printable Area for Roll Paper

Table 1-17. Printable Area for Roll Paper

		Continuous paper
PW	(Width)	(Refer to section 1.2.4)
PL	(Length)	(Refer to section1.2.4)
LM	(Left margin)	3mm or more
RM	(Right margin)	3mm or more
TM	(Top margin)	0.0mm or more
BM	(Bottom margin)	0.0mm or more

1.2.6 Ribbon Cartridge

- ❑ Type : Fabric
- ❑ Color : Black
- ❑ Ribbon life : 2 million characters (LQ 10cpi, 48 dots/character)
- ❑ Dimensions :120.5mm(W) x 101.5mm(D) x 23.5mm(H)

1.2.7 Input data buffer

- ❑ 0 Kbyte or 64 Kbyte*

Note)*: Depends on default settings.

1.2.8 Electrical Specification

- ❑ 120V version
  - ■ Rated voltage : AC120V
  - ■ Input voltage range : AC103.5 to 132V
  - ■ Rated frequency range : 50 to 60 Hz
  - ■ Input frequency range : 49.5 to 60.5 Hz
  - ■ Rated current : 0.7A(max.2.2A)
  - ■ Power consumption : Approx.30W (ISO/IEC10561 Letter pattern)
    Energy Star Compliant
  - ■ Insulation resistance : 10 MΩ min.(between AC line and chassis, DC 500V)
  - ■ Dielectric strength : AC1000 Vrms. 1min.or
    AC1200 Vrms. 1 sec.(between AC line and chassis)
- ❑ 230 V version
  - ■ Rated voltage : AC220 to 240V
  - ■ Input voltage range : AC198 to 264V
  - ■ Rated frequency range : 50 to 60Hz
  - ■ Input frequency range : 49.5 to 60.5Hz
  - ■ Rated current : 0.4A (max.1.1A)
  - ■ Power consumption : Approx.30W (ISO/IEC10561 Letter pattern)
    Energy Star Compliant
  - ■ Insulation resistance : 10MΩ min. (between AC line and chassis, DC 500V)
  - ■ Dielectric strength : AC1500 Vrms. 1min.(between AC line and chassis)

1.2.9 Reliability

- ❑ Total print volume : 6.5 million lines (except print head)
- ❑ (MTBF) : 5000 POH
- ❑ Print head life : 200 million strokes/wire
- ❑ Ribbon life : 2 million characters

1.2.10 Environmental Condition

- Temperature
  - Operating : 5 to 35 °C(without condensation)
    : 15 to 25 °C (without condensation and during printing on multi part paper, envelope, card or label)
  - Non-operating : –30 to 60 °C

- Humidity
  - Operating : 10 to 80% RH (without condensation)
    : 30 to 60% RH (without condensation and during printing on multi part paper, envelope, card or label)
  - Non-operating : 0 to 85% RH (without condensation)

- Resistance to shock
  - Operating : 1G, within 1ms
  - Non-operating : 2G, within 2ms

- Resistance to vibration
  - Operating : 0.25G,10 to 55 Hz
  - Non-operating : 0.50G,10 to 55 Hz

1.2.11 Safety Approvals

- 120V version
  - Safety standards : UL1950 with D3
    CSA C22.2 No.950 with D3
  - EMI : FCC part15 subpart B class B
    : CSA C108.8 class B

- 230V version
  - Safety standards : EN60950(VDE, NEMKO)
  - EMI : EN55022(CISPR pub.22) class B
    : AS/NZS 3548 class B

1.2.12 CE Marking

- 230V 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

1.2.13 Acoustic Noise

- Level : Approx. 55 dB(A) (ISO 7779 pattern)

1.3 Firmware Specification

This section provides detailed information about LQ-670 firmware.

1.3.1 Control Codes and Fonts

- Control codes: :ESC/P 2 and IBM 2390 Plus emulation

- Typefaces :Bit map font

EPSON Draft	10CPI, 12CPI, 15CPI
EPSON Roman	10CPI, 12CPI, 15CPI, Proportional
EPSON Sans Serif	10CPI, 12CPI, 15CPI, Proportional
EPSON Courier	10CPI, 12CPI, 15CPI
EPSON Prestige	10CPI, 12CPI
EPSON Script	10CPI
EPSON OCR-B	10CPI
EPSON Orator	10CPI
EPSON Orator-S	10CPI
EPSON Script C	Proportional
EPSON Draft(Arabic)	10CPI, 12CPI
EPSON Draft(Hebrew)	10CPI, 12CPI
EPSON Miriam	10CPI, Proportional
EPSON David	10CPI, Proportional
EPSON Naskh	10CPI, Proportional
EPSON Kufi	10CPI, Proportional

:Scalable font

EPSON Roman	10.5pt., 8pt.-32pt.(every 2pt.)
EPSON Sans Serif	10.5pt., 8pt.-32pt.(every 2pt.)
EPSON Roman T	10.5pt., 8pt.-32pt.(every 2pt.)
EPSON Sans Serif H	10.5pt., 8pt.-32pt.(every 2pt.)

:Bar code

Ean-13
EAN-8
Interleaved 2 of 5
UPC-A
UPC-E
Code 39
Code 128
POSTNET

- International character sets :14 countries and legal
  U.S.A, France, Germany, U.K., Denmark 1, Sweden,
  Italy, Spain 1, Japan, Norway, Denmark 2, Spain 2,
  Latin America, Korea, Legal

*Note)*The international and legal characters are these 12 codes;
23H, 24H, 5BH, 5CH, 5DH. 5EH, 60H, 7BH, 7CH, 7DH, 7EH.

❑ Character tables :The standard version has 11 character tables and the NLSP version has 20 charater tables, as shown in the following table.

Table 1-18. Character Tables

	Character table	Bitmap font	Scalable font
Standard version	**Italic table** **PC437(US Standard Europe)** **PC850(Multilingual)** **PC860(Portuguese)** **PC861(Icelandic)** **PC863(Canadian-French)** **PC865(Nordic)** **Abicomp** **BRASCII** Roman 8 ISO Latin 1	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script EPSON OCR-B EPSON Orator EPSON Orator-S EPSON Script C	EPSON Roman EPSON Sans Serif EPSON Roman T EPSON Sans Serif H
NLSP version	**Italic table** **PC437(US, Standard Europe)** **PC850(Multilingual)** **PC860(Portuguese)** **PC861(Icelandic)** **PC865(Nordic)**	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script EPSON OCR-B EPSON Orator EPSON Orator-S EPSON Script C	EPSON Roman EPSON Sans Serif EPSON Roman T EPSON Sans Serif H
	PC864(Arabic)	EPSON Draft EPSON Roman	(Not supported)
	PC437 Greek PC852(East Europe) PC853(Turkish) PC855(Cyrillic) PC857(Turkish) PC866(Russian) PC869(Greek) MAZOWIA(Poland) Code MJK(CSFR) ISO 8859-7 (Latin/Greek) ISO Latin 1T(Turkish) Bulgaria(Bulgarian) Estonia(Estonia) PC744(LST 1283:1993) ISO 8859-2 PC866 LAT.(Latvian)	EPSON Draft EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script	(Not supported)
	PCAPTEC(Arabic) PC708(Arabic) PC720(Arabic) PCAR864(Arabic)	EPSON Draft(Arabic) EPSON Naskh EPSON Kufi	(Not supported)
	Hebrew7 *1 Hebrew8 *1 PC862(Hebrew) *1	EPSON Draft(Hebrew) EPSON Miriam EPSON David	(Not supported)

Note *1) These fonts are not selected in the default setting mode.
Note) ESC R command is effective on the character tables with bold weight.

1.3.2 Interface Specification

This printer provides bi-directional 8-bit parallel interface and Type-B optional interface slot as standard.

1.3.2.1 Parallel interface (Forward channel)

[Transmission mode] : 8 bit parallel, IEEE-1284 compatibility mode
[Adaptable connector] : 57-30360 (Amphenol) or equivalent
[Synchronization] : /STROBE pulse
[Handshaking] : BUSY and /ACKNLG signals
[Signal level] : TTL compatible (IEEE-1284 level 1 device)

Table 1-19. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out *	Function description
1	/STROBE	19	In	Stroke pulse. Input data is latched at falling edge of the signal.
2~9	DATA1~8	20~27	In	Each signal represents information of parallel data from 1 bit to 8 bit. The data is 1 at “HIGH” and is 0 at “LOW”.
10	/ACKNLG	28	Out	This signal (negative pulse) indicates that the printer has received data and is ready to accept next one. The pulse width is 5μs.
11	BUSY	29	Out	This signal’s “HIGH” level indicates that the printer is not ready to accept data. On the other hand, “LOW” means the printer can take data. (Refer to the next page for conditions when this signal becomes high level)
12	PE	28	Out	This signal’s “HIGH” level indicates that the printer is in a state of paper-out error.(Refer to the next page for the condition when this signal becomes high level.)
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	/AFXT	30	In	Not used.
31	/INIT	30	In	This signal’s negative pulse initializes printer.
32	/ERROR	29	Out	This signal’s low level means the printer is in a state of error. (Refer to the next page for conditions when the signal becomes low level)
36	/SLIN	30	In	Not used.
18	Logic H	----	Out	This line is pulled up to +5V through 3.9 kΩ resistor.
35	+5V	---	Out	This line is pulled up to +5V through 1.0 kΩ resistor.
17	Chassis	---	---	Chassis GND.
16,33 19-30	GND	---	---	Signal GND.
15,34	NC	---	---	Not connected.

*Note)**In/Out shows the direction of signal flow from the printer's point of view.
*Note)*If the signal is “LOW” and active state, the signal is marked with “/”.

BUSY signal is active (high level) under the following conditions.

- ☐ In the process of receiving data.
- ☐ In the condition of being input buffer full
- ☐ In the condition of being /INIT signal active(low level)
- ☐ During hardware initialization
- ☐ In the condition of being /ERROR or PE signal active(low level, high level, respectively)
- ☐ In the self test mode
- ☐ In the adjustment mode
- ☐ In the default-setting mode

/ERROR signal is active(low level) under the following conditions.

- ☐ In the condition of the release lever error
- ☐ In the condition of the paper-out error
- ☐ In the condition of the paper-jam error

PE signal is active(high level) under the following condition.

- ☐ In the condition of paper-out error

*Note)*It becomes possible to input the data without outside equipment by setting appropriate connecting.

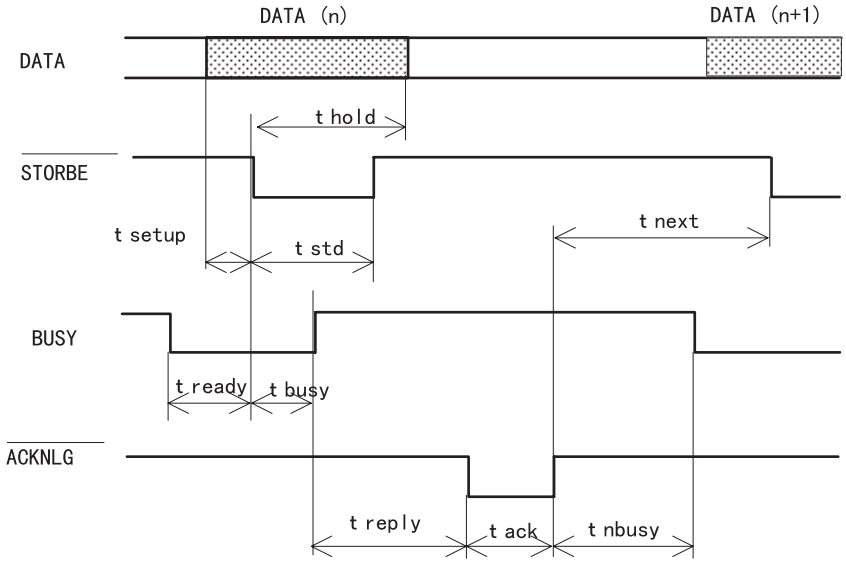

Figure 1-9. Data Transmission Timing

Table 1-20. Maximum and Minimum Timings for Data Transmission

Parameter	Minimum	Maximum
tsetup	500 nsec	---
thold	500 nsec	---
tstb	500 nsec	---
tready	0	---
tbusy	---	500 nsec
treply	---	---
tack	500 nsec	10 us
tnbusyt	0	---
tnext	0	---
ttout*	---	120 nsec
ttin**	---	200 nsec

Note) * Rise and fall time of output signals.
** Rise and fall time of input signals.

1.3.2.2 Parallel Interface (Reverse channel)

[Transmission mode] : IEEE 1284 nibble mode
[Adaptable connector] : 57-30360(Amphenol) or equivalent
[Synchronization] : /STROBE pulse
[Handshaking] : BUSY and /ACKNLG signals
[Signal Level] : IEEE-1284 level 1 device
TTL compatible
[Data transmission timing] : Refer to the IEEE-1284 specification
[Extensibility request] : The printer responds to the extensibility request in the affirmative, when the request is 00H or 04H, which mean;
00H:Request nibble mode of reverse channel transfer
04H:Request device ID in nibble mode of reverse channel transfer.
[Device ID] : [00H] [3AH]
MFG: EPSON;
CMD:ESCPL2,PRPXL24, BDC;
MDL;LQ-670;
CLS:PRINTER;

Table 1-21. Connector Pin Assignment and Signals

Pin No.	Signal Name	Return GND Pin	In/Out*	Function description
1	HostClk	19	In	Host clock signal
2~9	DATA1~8	20~27	In	Parallel input data to the printer.
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy, DataBit-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 bit1 or 5.
14	HostBusy	30	In	Host busy signal.
31	/INIT	30	In	Not used.
32	/Data Avail, DataBit-0, 4	29	Out	Data available signal and reverse channel transfer data bit0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	---	Out	A high signal indicates that all other signals sourced by the peripheral are in a valid state.
35	+5V	---	Out	This line is pulled up to +5V through 1.0 kΩ resistor.
17	Chassis	---	---	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.

1.3.2.3 Optional Interface

Type-B optional interface cards are available.

Table 1-22. Optional Interface

Reply message	ESC/P2	IBM 2390 Plus
Main-Type	MT24p,PW106cl10cpi,PRG(W0xxxx)rev	MT24p,PW106c110cpi,PRG(W0xxxx)rev
Product-Name	LQ-670	LQ-670
Emulation-Type	ESCPL2-00	PRPXL24-01
Entity-Type	EPSONLQ2	EPSONPRPXL24

1.3.2.4 Interface Selection

The printer has 2 interfaces; the parallel interface and Type B optional interface. These interfaces are selected manually by Default setting or selected automatically.

1.3.2.5 Manual selection

Out of 2 interfaces can be selected by Default Setting.

1.3.2.6 Automatic selection

The automatic interface selection is enabled by Default Setting. 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 that receives data first is selected. When the host stops data transfer and the printer is in stand-by state for the seconds specified by Default Setting, 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.

1.3.2.7 Interface state and interface selection

When the parallel interface is not selected, the interface gets into a busy state. When the Type-B serial interface card is installed and it is not selected, the interface sends XOFF and sets the DTR signal MARK. When the optional interface is not selected, the printer sends disable commands to the optional interface. When the printer is initialized or returned to the idle state, the parallel interface gets into a ready state, the serial interface sends XON and sets the DTR SPACE and the printer sends enable commands to the optional interface. Caution that the interrupt signal such as a /INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.3 Prevention Hosts from Data Transfer Timeout

Generally, hosts abandons data transfer to peripherals when a peripheral is in busy state for dozens of seconds continuously. To prevent hosts from this kind of timeout, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slowdown is started when the rest of the input buffer becomes several hundreds of bytes. At last, when the input buffer is full, the printer is in busy state continuously.

1.4 Operation

1.4.1 Control Panel

There are 7 switches and 8 LEDs on the panel as shown below.

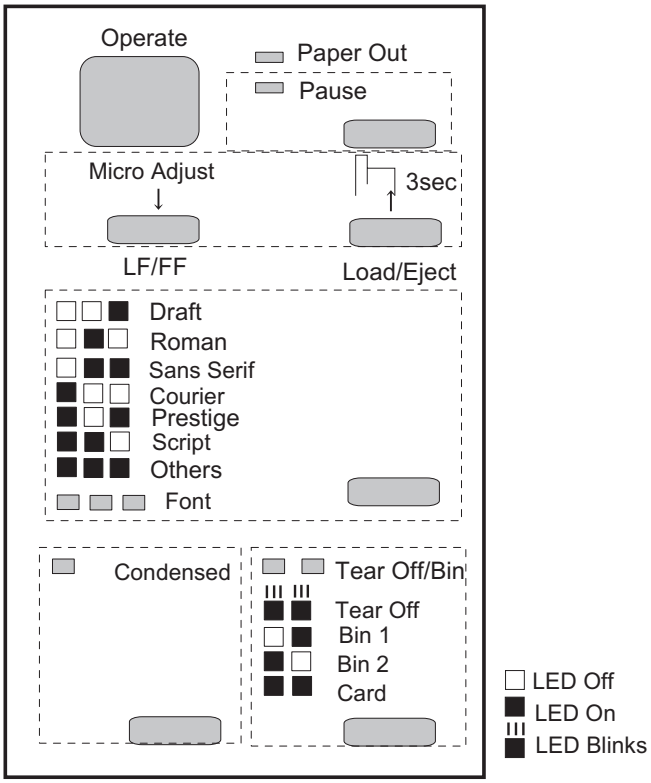

Figure 1-10. Control Panel

1.4.1.1 Usual Operation

- Operate
  This switch turns the printer on and off. It is the secondary switch.

- Pause
  This switch alternates printer activity between printing and non-printing.
  Holding it down over 3 seconds when the printer is in the stand by state, the Micro Adjust function is enabled. Pressing it again, this function is disabled.

- Load/Eject
  Pressing it loads cut sheet or continuous paper when the printer is out of paper.
  Pressing it ejects cut sheet to the stacker or continuous paper to the paper park.

- LF/FF
  Pressing it shortly executes line feed.
  Holding it down for a few seconds executes form feed when continuous paper is used, or ejects cut sheet to the stacker when cut sheet is used.

- Tear Off
  When continuous paper is used, pressing it moves a page to the Tear-off position. And pressing it again moves a next page to the TOF position.

- Bin
  Pressing it selects CSF bin number or the Card mode* when cut sheet is used.
  Note)* Card mode is for using post card or envelope.

- Font
  Pressing it selects one of following fonts.
  Draft, Roman, Sans serif, Courier, Prestige, Script and Others *.
  Note)* Others means the font selected in the Default Setting Mode.

- Condensed
  Pressing it alternates condensed and non-condensed mode.

- Micro Adjust
  Micro Adjust ↑/↓ switches is effective when the Micro Adjust function is enabled by Pause switch.
  Pressing the Micro Adjust ↑/↓ switches execute micro feed backward and forward by 1/80 inch.
  The TOF adjustment is enabled in the TOF position after loading, and the Tear-off adjustment is enabled in the Tear-off position.

1.4.1.2 Switches

- Operation in normal mode
  In normal mode, pressing panel switches executes following function.

Table 1-23. Operation in Normal Mode

Switch	Function
Operate	Turn the printer on and off.
Pause	Alternates printing and no-printing status. Enables Micro Adjust function, holding it down for 3 seconds.
Load/Eject	Loads or ejects the paper. Executes micro feed forward, when this function is enabled.
LF/FF	Executes line feed, pressing it shortly. Executes form feed, holding it down for a few seconds. Executes micro feed backward, when this function is enabled.
Tear Off/Bin	Advances continuos paper to the Tear-off position. Selects CSF bin ½ or Card mode.
Font	Selects font.
Condensed	Alternates condensed mode and non-condensed mode.

- Operation at power on
  Turning the printer on while pressing panel switches executes the function shown below.

Table 1-24. Operation in Power On

Switch	Function
Load/Eject	LQ self test
LF/FF	Draft self test
Font	Default setting
Load/Eject & LF/FF	Data dump
Condensed &Tear Off/Bin	Clear EEPROM
Pause	Bi-d adjustment
Font & Condensed	Quiet mode
The others	Not available

- Operation in default setting mode
  The switches are used in default setting mode as follows:

Table 1-25. Operation at Default Setting Mode

Switch	Function
Font	Selects the Menu
Tear Off/ Bin	Changes the setting
The others	Not available

1.4.1.3 Indicators(LED)

This printer displays present conditions and errors on the indicators.

- ❑ Indication in normal mode

Table 1-26. LED Indicators

LED Printer Status	Pause *1	Paper Out *2	Tear Off/Bin	Condensed	Font
Pause	On	---	---	---	---
Paper out error	On	On	---	---	---
Paper jam error	On	Blink	---	---	---
Paper eject error	On	Blink	---	---	---
Head hot	Blink	---	---	---	---
Micro Adjust	Blink	---	---	---	---
Tear off	---	---	*3	---	---
Bin selection	---	---	*3	---	---
Condensed	---	---	---	On	---
Font selection	---	---	---	---	*4
Fatal error	Blink	Blink	Blink	Blink	Blink

- ❑ *1 Pause (Orange)
  It is on when the printer is paused, and it is off when the printer is not paused.
  It blinks when the Micro Adjust function is enabled or the printer is in the head hot status.

- ❑ *2 Paper Out (Red)
  It is on when the printer is in the paper out status, and it is off when the printer is out of this status.

- ❑ *3Tear Off/Bin (Green)
  2 LEDs display the status of CSF bin selection when cut sheet is used. Only a right LED is on when Bin1 is selected, only a left LED is on when Bin2 is selected, and both LEDs are on when the Card mode is selected.
  Both LEDs blinks when continuous paper is in the Tear-off position and both LEDs are off when continuous paper is out of the Tear-off position.

- ❑ *4Font (Green)
  The status of Font selection is displayed by 3 Font LEDs.

1.4.1.4 Buzzer

When the printer detects errors, it displays errors on the LEDs and also the buzzer beeps as warning sign.

Table 1-27. Buzzer

Warning sign	Beeper sounds
Paper out error	❍ ❍ ❍
Paper jam error	● ● ● ● ●
Paper eject error	❍ ❍ ❍
Release lever operation error	● ● ● ● ●
Illegal panel operation	❍

Note) ❍ : Beeper sounds approx. 100ms and interval is approx.100ms.
● : Beeper sounds approx. 500ms and interval is approx.100ms.

1.4.2 Default Setting

❑ Setting Method
Several printer settings loaded at each power-on can be changed in this operation. The method is described in the guidance sheets (language selection sheet and printer setting sheet) which are printed out at first in the setting mode if desired.
User is requested to operate 2 switches watching 6 LEDs on the control panel. The lights turn on and off, and blink in one of the patterns described in the guidance sheets.

This setting mode uses the menus of 3 types as follows;

- Language menu: : List of the languages to be used for the printer setting sheet
- Main menu : List of items to be set(ex. “CG table”, “Auto line feed”)
- Submenus : Lists of value/setting of the each item(ex. “PC437”, “ON”)

1) Language selection sheet is printed out. The sheet describes how to select a language among the five; English, French, German, Italian and Spanish in all languages.
2) Font LEDs indicate the top item on “Language menu”.
3) The selection can be changed with Font switch.
4) When Tear off/Bin switch is pressed, the setting sheet is printed out in the language.
5) Font LEDs indicate the top item on “main menu”.
6) The selection can be changed with Font switch.
7) When Tear off/Bin switch is pressed, printer changes the indication to the “submenu” of the selected item.
8) Condensed & Tear off/Bin LEDs indicate the current setting/value on the submenu.
9) The setting/value can be changed with Tear off/Bin switch.
10) When Tear off/Bin switch is pressed, printer memorizes the last setting/value, and changes its indication to the main menu.(Back to (5)).
11) The other items can be changed in the same manner.

❑ Setting Mode (Factory setting)

Table 1-28. Setting Menu

Item	Setting/Value
Character table	Standard version: Italic, **PC 437**, PC850, PC860, PC863, PC865, PC861, BRASCII, Abicomp, ISO Latin1, Roman8
	NLSP version: Italic, **PC437**, PC437 Greek, PC850, PC852, PC853, PC855, PC857, PC864, PC866, PC869, ISO Latin 1T, ISO8859-7 MAZOWIA, Code MJK, Bulgaria, Estonia, PC774, ISO 8859-2, PC866LAT. PCAPTEC*5, PC708*5, PC720*5, PCAR864*5, PC860*5, PC861*5, PC865*5
International character set for Italic table *4	**Italic U.S.A**, Italic France, Italic Germany, Italic U.K., Italic Denmark, Italic Sweden, Italic Italy, Italic Spain
Font *1	OCR-B, Orator, Orator-S, Script C, **Roman T**, Sans serif H
Page Length for tractor	3 inch, 3.5 inch, 4 inch, 5.5 inch, 6 inch, 7 inch, 8 inch, 8.5 inch,**11 inch**, 70/6 inch, 12 inch, 14 inch, 17 inch
High speed draft	**On**, Off
Print Direction	Auto, **Bi-d**, Uni-d
Software	**ESC/P2**, IBM2390 Plus
I/f mode	**Auto,** Parallel I/F, Option I/F
Auto I/F wait time	**10sec**., 30sec.
Input buffer	**On**, off
Skip over perforation	On, **Off,** Others
Auto tear off	On, **Off**
Auto line feed	On, **Off**
Auto CR (IBM 2390 Plus)*2	On, **Off**
A.G.M (IBM 2390 Plus)*2	On, **Off**
0 slash	On, **Off**
Buzzer	**On**, Off

* Refer to the next page for *Notes.*

*Note*1):* One of these fonts selected in the default setting is corresponding to others(=other fonts) on the control panel. Following fonts are not selected in the default setting mode.
Draft, Roman, Sans serif, Courier, Prestige and Script
*Note*2)*: These settings are effective when IBM 2390 Plus emulation is selected.
*Note*3*): Settings with bold weight mean the standard factory settings.
*Note*4*): "Italic Denmark" is as same as "Italic Denmark 1", and "Italic Spain" is as same as "Italic Spain 1".
*Note*5):* Hebrew7, Hebrew8, PC862 are not selected in the default setting mode.

1.4.3 Bi-d Adjustment

Bi-d adjustment can be adjusted by users. By using this mode, the gap of lines; line for right printing direction and line for left printing direction can be adjusted. The setting value is stored in the EEPROM of the main control board and retained even after the power is turned off. Bi-d adjustment method is as follows.

1) Turning the printer on while pressing Pause switch.
   The guide to adjust Bi-d alignment in this mode is printed and first alignment pattern is printed.
2) Select most closely aligned number by pressing LF/FF(↓) and Load/Eject(↑) switches.
   Font LEDs show the pattern number which is selected at that time. The selection is advanced one by one as the switch is pressed, and the combination of On/Off/ Blink of those three LEDs is also changed by according to the selection.
3) Fix the selected number by pressing Font switch.
   Selected number is fixed and next alignment pattern is printed.
4) Repeat 2)-3) until finishing Bi-d. adjustment for LQ mode.
   Following adjustment is executed.
   1. Bi-d adjustment for draft mode
   2. Bi-d adjustment for draft copy mode
   3. Bi-d adjustment for LQ mode
5) Turn the printer off.

Note) The setting values are stored into non-volatile memory and retained even if EEPROM is reset.

1.4.4 Initialization

- Power-On initialization
  The initialization of this level is activated by power-on or cold reset command(remote RS command). This initialization is;
  - to initialize the printer mechanism.
  - to execute Operator initialization.

- Operator Initialization
  The initialization of this level is activated by /INIT signal(negative pulse). This initialization is;
  - to clear the all buffers of data.
  - to cancel the download character definition.
  - to make the printer stand-by state, if no errors occur.
  - to execute Software initialization.

- Software Initialization
  The initialization of this level is activated by the control code ESC @. This initialization is;
  - to clear the unprinted data.
  - to make the printer's setting defaults.

1.4.5 Errors

This printer goes to the error state when the following condition is detected, and changes ERROR signal to "LOW" and "BUSY" signal to "HIGH" , and stops taking data. Also, the printer goes unprintable condition automatically.

- Fatal errors is detected.
- Paper out error or paper jam error is detected.
- Paper eject error is detected.
- When the present paper path and the position of release lever do not match. (Release lever operation error)

- Fatal errors
  Carriage control error, Power supply voltage error and CG access error.

- Paper out error
  When printer fails to load a sheet, it goes paper out error.

- Paper eject error
  When printer fails to eject a sheet, it goes paper eject error.

- Paper jam error
  When printer fails to feed a sheet, it goes paper jam error.

1.5 Main Components

This printer consists of the following components.

- ❑ C214MAIN Board
- ❑ C214 PSB/PSE Board
- ❑ C214 PNL Board
- ❑ Printer Mechanism(M-5060)
- ❑ Housing

1.5.1 C214 Main Board

This main board consists of 16bitCPU TMP96C041AF (IC11) which is driven by 17.20MHz clock drive frequency, Gate array E05B42(IC10), 2/4M Flash-EPROM(IC7), or 8M PROM(IC8), 4/8/32M MROM (IC4) for CG, 8M PROM (IC5), 1MPSRAM (IC6), EEPROM 93C46(IC9), Reset IC RST592D (C12), PF Motor drive circuit, CR motor drive circuit and print head drive circuit.

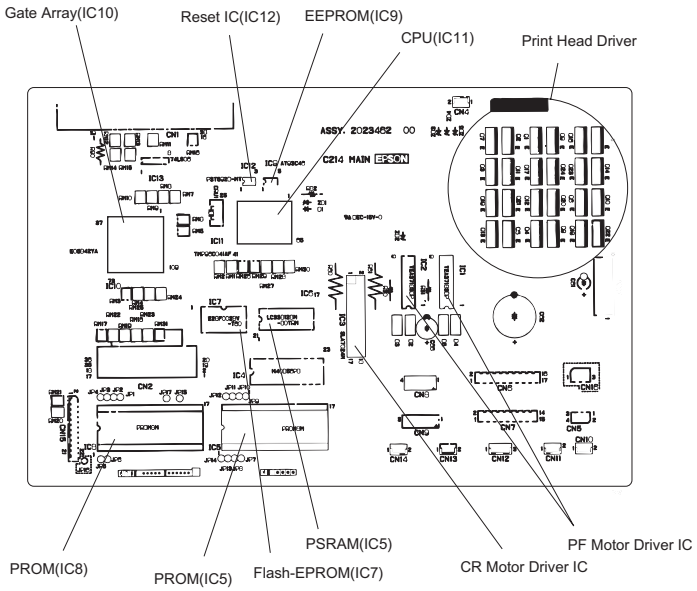

Figure 1-11. C214 Main Board

1.5.2 C214PSB Board

This board consists of fuse, filter circuit, primary side diode bridge, switching FET, transformer and chopper IC for +5V generation. Also, the secondary switch is used for power and is operated by On/Off of the power switch on the operation panel of the printer.

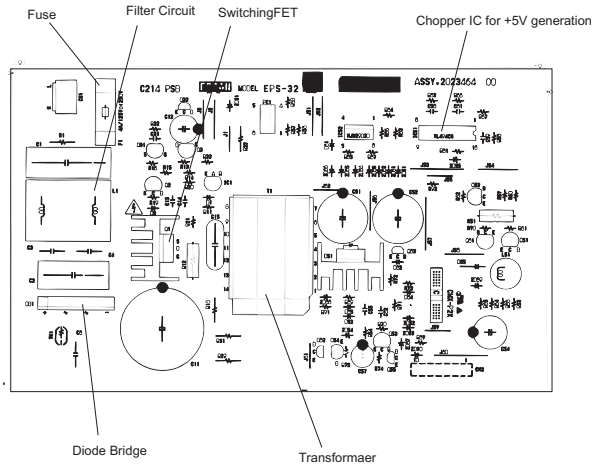

Figure 1-12. C214 PSB Board

1.5.3 C214 PNL Board

This panel board consists of one switch as power switch, 6 non lock type switches and 8 LEDs.

1.5.4 Printer Mechanism

This unit consists of carriage mechanism, paper feed mechanism, cut sheet/transformer change over mechanism, platen gap adjustment mechanism and print head.

1.5.5 Housing

The housing of this printer consists of upper housing, printer cover, front sheet guide, rear sheet guide and lower housing.

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Operating Principles

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2.1 Printer Mechanism Operation

This section describes the printer mechanism(M-5060) and explains how it works.

2.1.1 Printing Mechanism

The printing mechanism of this printer is composed of head, ink ribbon and ribbon mask.
The print head is an 24-pin(12pins X 2) head for impact dot printing.(Refer to Chapter 1)
Each wire has its own drive coil.

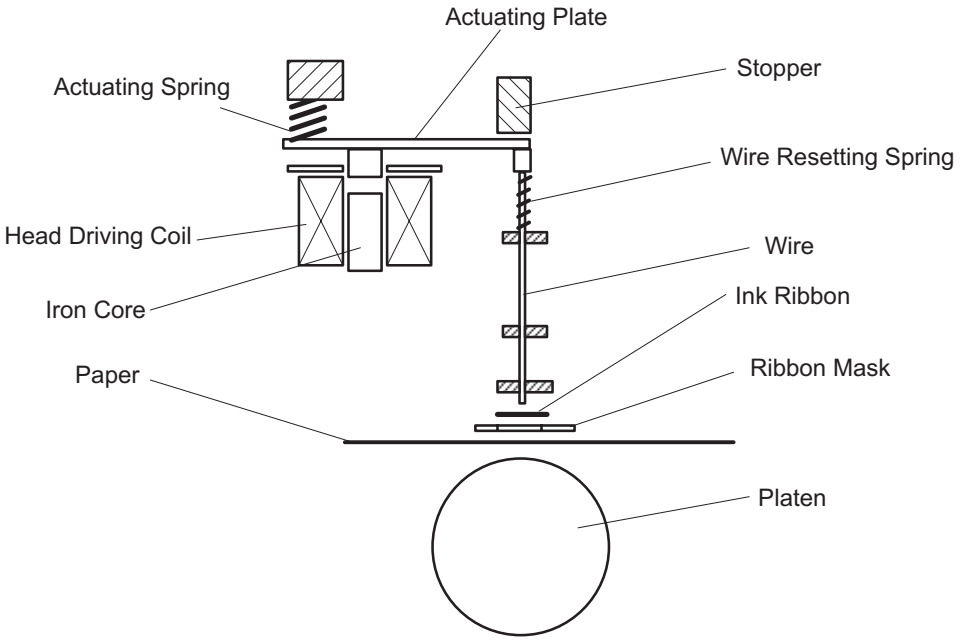

Figure 2-1.Print Head Operation Principles

1. A drive signal, transmitted from the control circuit to the prinhead drive circuit, is converted to the proper printhead driving voltage, which energizes a corresponding coil. The energized coil then causes the iron core to become magnetized.
2. The magnetic force draws the actuating plate toward the core, and the dot wire, which is connected to the core, rushes toward the platen.
3. When the dot wire impacts the platen, pressing against the ribbon and paper, it prints a dot.
4. When the driving voltage stops energizing the coil, the magnetic force vanishes from the iron core. The actuating plate returns to its original position (the position before coil was energized) with spring action. The dot wire also returns to its original position.

The mechanism is equipped with a built-in thermistor for head temperature detection. The temperature detected by the thermistor is converted to an electric signal and fed back to the control circuit. In order to keep the same print quality, the drive mode of the print head is changed over according to the paper type and head temperature. This drive mode minimizes the degradation or damage to the dot wires in the print head, which is caused by temperature rise of the print head from continuous printing, and also keeps print quality when the surrounding temperature is extremely low. (Refer to section 1.2.2 for the changes of print speed by the temperature of the head)
The next page shows print head specification.

Table 2-1. Print Head Specification

Category	Specification
Print Method	Impact dot matrix
Number of pin wires	24-pin (12X2)
Wire diameter	0.20mm
Print head life	200 million strokes/wire
Weight	115 ± 12g
Coil direct current resistance	39.3 ± 2.7 Ω (at 25 °C)
Response Frequency	Normal Mode : 1500Hz Buzzer : 1.5KHz
Drive Voltage	42 ± 3V
Drive Condition	• Normal Drive • Thick paper (using multipart or thick papers) • Buzzer function
Environmental condition	Temperature : 5~55 °C Humidity : 10~85%
Print drive method	Constant voltage drive method

2.1.2 Carriage Mechanism

Carriage Mechanism consists of the carriage movement mechanism and platen gap adjustment mechanism.

- Carriage Movement Mechanism
  The figure below shows carriage mechanism. The top of the carriage is supported by the CR guide frame, and down side is by the CR guide shaft. Since the carriage motor is stepping motor, the carriage moves freely, and the rotation of the motor is conveyed to the timing belt pulley and drive the timing belt.
  A part of the timing belt is attached to the head carriage, which is moved right and left on the carriage guide shaft by the rotation of the carriage motor. The timing belt is pre-pressed by the spring and adjust the elastic motion of the belt which is caused by temperature changes, and keep a certain belt strength and tension.
  The carriage home position detector uses photo coupler method and is located on the right edge of the mechanism. The detector is detected when the carriage flag interrupts the light emitted from the photo coupler. The carriage home position control performs open loop control after the HP detector detects standard position. After the location is determined for the carriage to move by the printing data, the control circuit calculates the pulse of the motor phase corresponding to the distance to move, and outputs that information to the motor. Therefore, the detection of mis-location is detected when the home signal is detected during printing or initialization and the printer goes to the error state.
  Also, the moving speed of the carriage is controlled by carriage motor drive frequency according to the printing data.

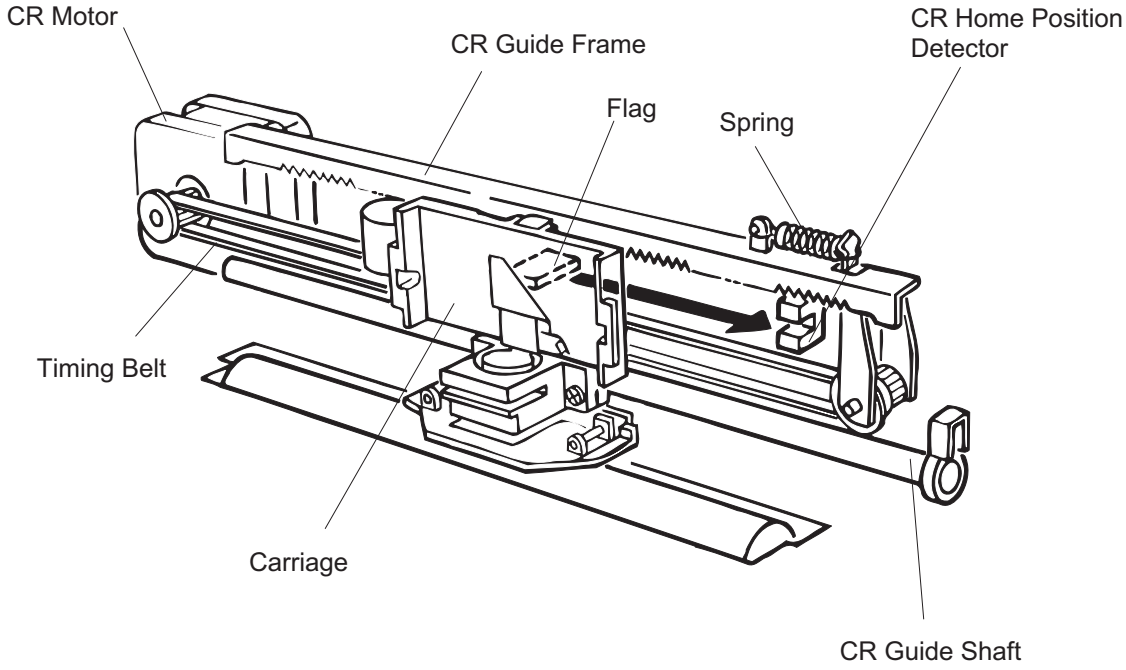

Figure 2-2. Carriage Mechanism

Table 2-2. Specification of the Carriage HP Detector

Category	Specification
Method	Photoelectric transfer method
Voltage	5VDC ± 5%
Switch Mode	Open : In the detector range Close : Out of the detector range

Table 2-3. CR Motor Specification

Category	Specification
Type	200-pole, HB-type Stepping motor
Coil Resistance	3.5Ω ± 10%
Drive Voltage	42V±5%
Drive Resolution	0.106mm/step (1-2 phase)
Drive Method	Constant current drive 1-2 phase, W1-2 phase
Current Consumption	Rated speed : 0.68A/phase At the waiting mode : 0.2A/phase
Drive Frequency	667~7200Hz

2.1.3 Ribbon Advance Mechanism

The ribbon advance mechanism consists of the rack mounted on the carriage guide frame, the pinion mounted on the carriage unit, planetary gear, combination gear and ratchet RD. When the carriage unit is moved right and left on the carriage guide shaft by the CR motor, the pinion is rotated by the rack and the motive power is conveyed to the planetary gear. When the carriage unit moves to left, the pinion is rotated by the rack, and the motive force is conveyed to the planetary gear. Also, when the carriage unit moves to the right side, the driving force from the planetary gear is once conveyed into the combination gear, and the combination gear drives the ratchet RD. Then the ratchet RD rolls up the ribbon.

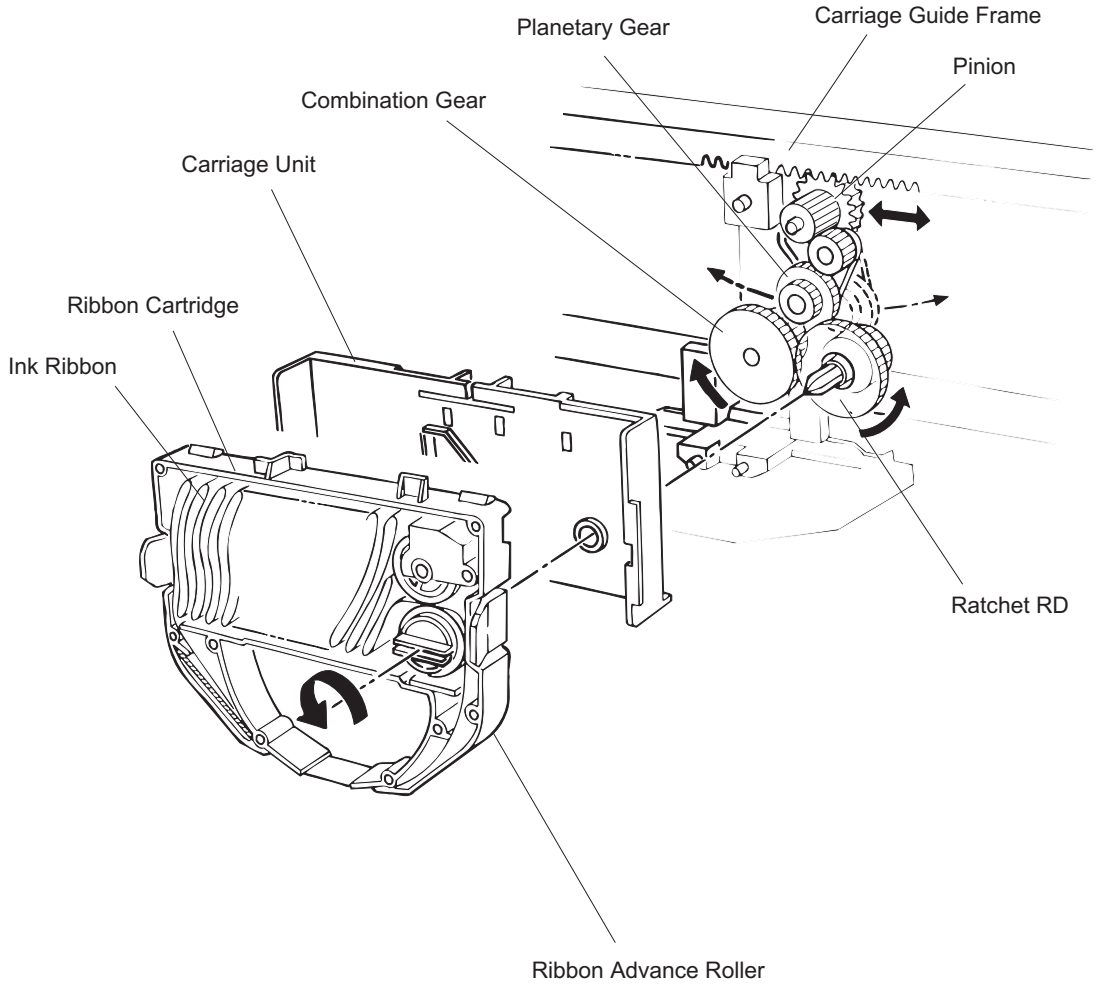

Figure 2-3. Ribbon Advance Mechanism

2.1.4 Paper Advance Mechanism

The paper feed mechanism of this printer consists of the platen roller, paper feed roller, paper eject roller, PF motor, tractor unit, PW detector, PE (rear/front) detectors, release detector, and CSF mechanism(option). This printer performs paper advance by moving the paper horizontally.

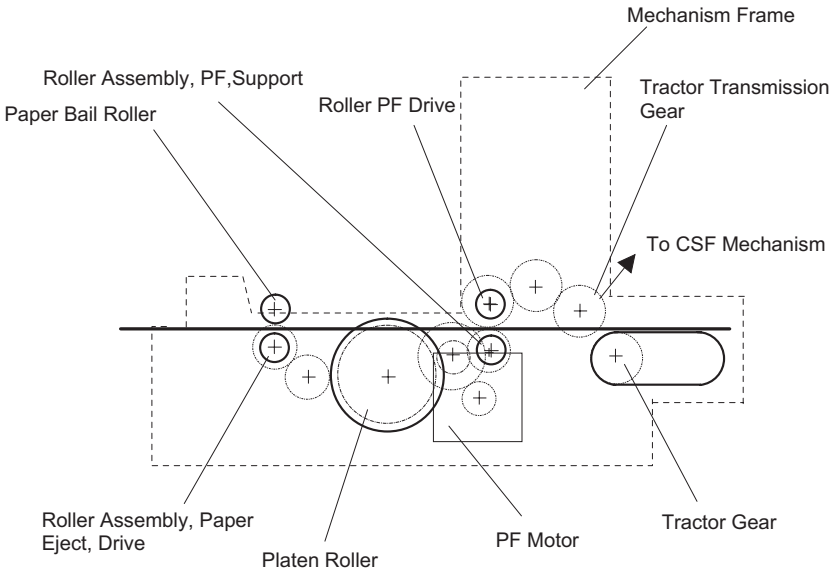

Figure 2-4. Paper Advance Mechanism

2.1.4.1 Paper Advance Mechanism

Driving force of the PF motor is conveyed through the paper feed gears to roller assembly, paper eject drive, paper bail roller, platen roller, roller assembly, PF support and roller, PF drive, and advances paper. The driving force conveyed to the tractor gear is sent to the CSF drive gear in case the CSF is mounted. Also, the tractor transmission gear conveys driving force to the tractor gear by the release mechanism and enables the push tractor to feed the paper.

- ❑ Friction Advance Mechanism
  The paper is held between paper eject and the roller assemblies located under the carriage guide shaft (2 for each up and down; total 4)
  - ■ Paper Load : Front automatic feed (manual feed), paper load from the CSF
  - ■ Paper Eject : Front paper eject

- ❑ Push tractor Mechanism
  By changing the release lever from the cut sheets position to the continuous paper position manually, the mode is changed from friction mode to tractor mode. In the tractor mode, the driving force for paper load is conveyed to the tractor side, and the contact to the roller is lost by the release mechanism.
  - ■ Paper Load : Tractor
  - ■ Paper Eject : Front paper eject

Table 2-4. Paper Advance Specification

Category	Specification
Type	2-phase 96 poles Hybrid type Stepping Motor
Coil Resistance	16.0Ω ± 10% (at 25 °C, per phase)
Drive Voltage	42V ± 5%
Drive Method	Bi-pola constant current drive 1-2, 2-2 phase, W1-2 phase,
Micro paper sending	1/360 inch(1-2 phase)
Drive Frequency	600~7000Hz
Rated Current	0.535A (constant speed)

2.1.4.2 Paper Advance Detector Mechanism

Paper advance detector mechanism consists of PW detector and PE (rear/front) detectors.
The function of this mechanism is to feedback information about monitoring paper edges, paper width and paper jam, and to control paper advance. The detector's reading operation is constantly performed. The timing to feedback the red signals is necessarily selected by CPU according to the operation of PF motor and CR motor. The table below shows specification of the detectors and their functions.

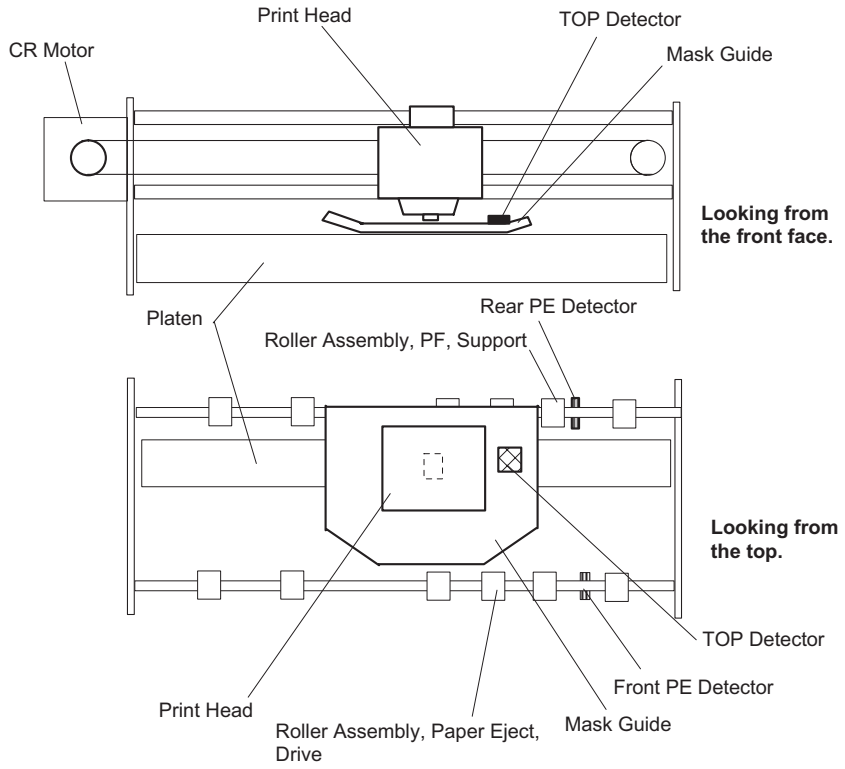

Figure 2-5. Paper Advance Detector Mechanism

Table 2-5. Detector Function and Operation

Detectors	Operation	Function
PW detector	Paper width measurement (detects right and left edges)	Determines right and left margin
	Paper top edge detector(detects top and bottom edges)	Determines top and bottom margin
	Detects if there is any paper or not	Detects paper jam after checking paper loading and ejecting.
PE detectors (Rear/Front)	Detects top and bottom margin	Determines top and bottom margin
	Detects if there is any paper or not	Detects paper jam and paper out (if PW detector does not detect the paper out) after checking paper loading and ejecting.
Front paper detector only	Detects paper top margin	Front entry in case of cut sheet auto feed

Table 2-6. Front Paper End Detector

Category	Specification
Type	Mechanism type
Switch Rating	0.6~1.0mA, 5VDC ± 5%
Switch Mode	Paper in : Open Paper out : Close

Table 2-7. Rear Paper End Detector

Category	Specification
Type	Mechanism type
Switch Rating	0.6~1.0mA, 5VDC ± 5%
Switch Mode	Paper in : Open Paper out : Close

Table 2-8. TOP Detector Specification

Category	Specification
Type	Photoelectric transfer method
Voltage	5VDC ± 5%
Switch Mode	Paper in : Short Paper out : Close

2.1.4.3 Release Lever Mechanism

Release lever mechanism consists of the release lever, tractor transmission gear and the release detector. The setting of the release lever enables to add or release the pressure to the paper advance rollers and also to change over the tractor drive(continuous paper mode) which can be done by releasing or conveying the driving force of the PF motor to the tractor transmission gear and tractor gear, and the friction drive(cut sheet mode).
The release lever moves the rink release lever through the lever release support, and presses the roller assembly, PF support to the paper strongly or weakly. In the cut sheet mood, the driving force of PF motor is conveyed to the paper feed(advance) mechanism.
The roller assembly, PF support press the cut sheet actively, and paper advance is performed.
In the continuous paper mode, the paper advance is performed by conveying the driving force of PF motor to the tractor gear through the tractor transmission gear. In this mode, the roller assembly, PF support is just to push the paper lightly.
The release detector detects if the release mechanism is set for cut sheet mood or for continuous paper mood. According to the detector, the main control recognizes an appropriate mode. The table below shows specification of the release detector.

Table 2-9. Specification of the Release Detector

Category	Specification
Type	Mechanism type
Switch Rating	0.6~1.0mA, 5VDC±5%
Switch mode	Friction mode :Open Tractor mode :Close

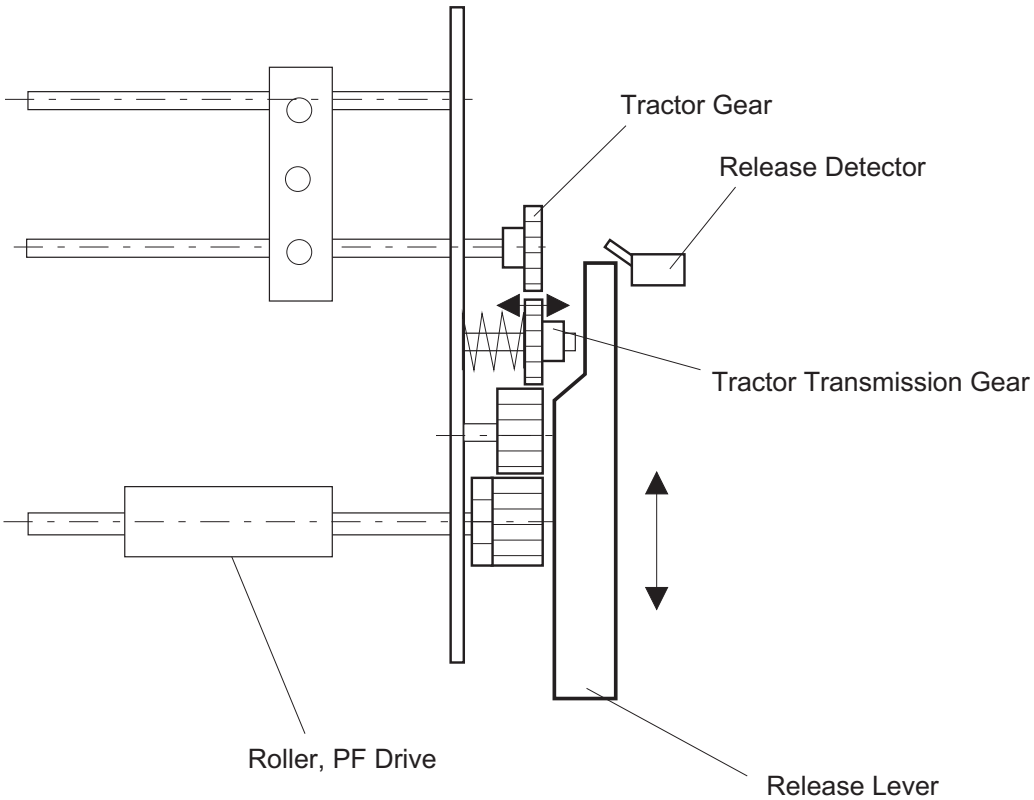

Figure 2-6. Release Mechanism

2.1.5 Platen Gap Adjustment

Platen gap (the gap between platen surface and print head) allows the printer to use different thickness of paper by setting appropriate gap so that the different thickness of paper can avoid getting printing dirt or picking the ribbon accidentally. Adjustment mechanism consists of the CR guide shaft, parallelism adjustment bush, adjust lever and PG detector.
The rotating center of the CR guide shaft is angled to the rotating center of the adjust lever. Rotating the adjust lever enables the print head to get closer to or away from the platen surface. The parallelism adjustment bush should set the CR guide shaft parallel to the platen surface. The PG detector detects the position of the adjust lever and changes the printing speed to the copy mode when using the thick paper and setting the adjust lever more than 2 levels.

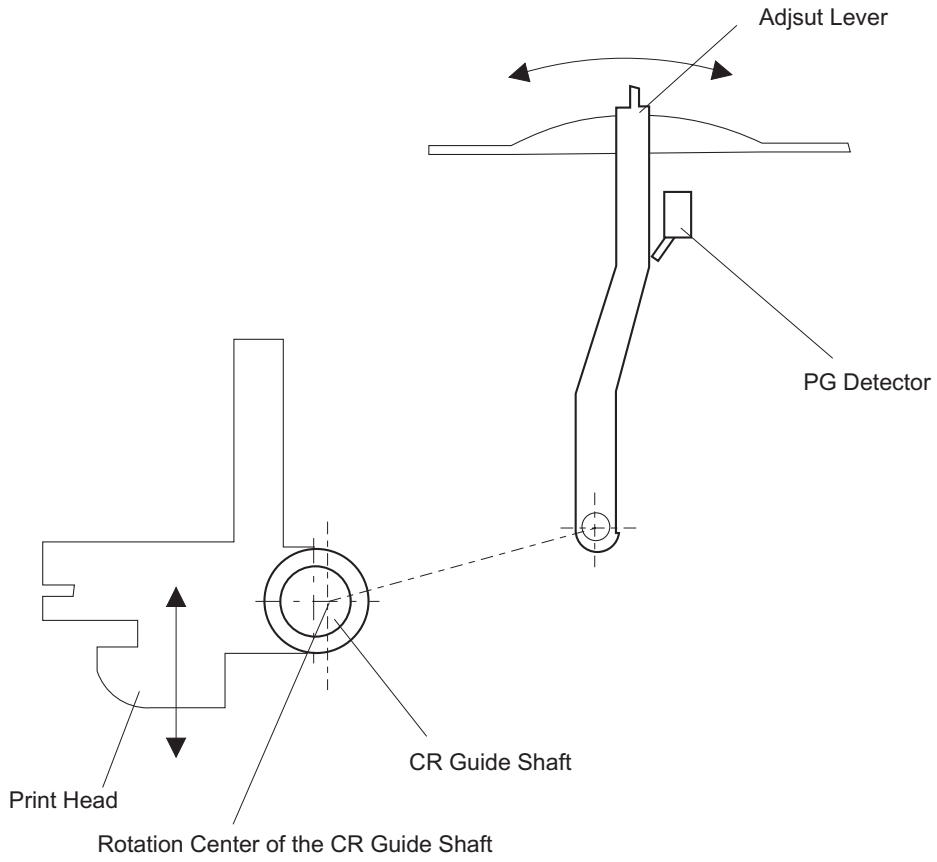

Figure 2-7. Platen Gap Adjustment Mechanism

Table 2-10. PG Detector Specification

Category	Specification
Type	Mechanism Type
Switch Rating	0.6~1.0mA, 5VDC±5%
Switch Mode	Normal Mode : Open Copy Mode : Short (more than 2 levels)

2.2 Power Supply Operation

2.2.1 Power Supply Circuit

The power supply part of this printer consists of AC cable and power supply board. The power supply board provides CD current, which is necessary for the printer mechanism and control circuit. There are two kinds of board according to the input voltage; C214PSB(100-120VAC) and C214PSE(220-240VAC). Refer to the table below.

Table 2-11. Power Supply Board

Board	Input voltage	Input frequency range	Fuse F1 Rating
C214PSB	85-138VAC	47-63Hz	4A/125V, 250V
C214PSE	187- 276VAC		T2.0A/250V

2.2.1.1 Power Supply Overview

The power supply board has two power outputs for use by various control circuits and drive mechanisms. The table below shows the output voltages and applications for the two DC output supply voltages.

Table 2-12. Output Voltages and Application

Output voltage	Range of the output voltage	Rated output current	Range of output current	Applications
+42V	39.9~441.V	0.8A	0~3.0A	•Print head drive •CR motor drive •PF motor drive
+5V	4.75~5.25V	0.7A	0~0.7A	•Logic line •Detector •Operation panel LEDs

2.2.1.2 Power Supply Circuit Operation

In the power supply circuit, at first, the input AC power goes to the filter circuit, where removes the noise, and goes to the diode bridge for full-wave rectification and is smoothed by the electrolytic capacitor. Then it goes to the switching regulator on the primary side. This regulator uses ZC-RCC (ringing choke converter) type and effectively generates +42VDC in the secondary side. Also, +42VDC generates +5VDC by the DC-DC converter(chopper IC).
Power supply switch is mounted on the operation panel, and the PSC(power supply control signal) turns ON/OFF the switching FET through the photo coupler in the primary side. Therefore, input voltage is in the primary side when the AC cable is plugged in. When it is off, the current consumption is less than 1W. Also, since C11 is constantly charged, current does not come in suddenly. PSC turns on the power in the open state and turn off at the GND level. If the harness connecting with the operation panel is broken or disconnected and the PSC is in the open state, the power will be always on.

- ❑ +42, +5V Lines Over voltage Protection Circuit
  When the output level of the +42V exceeds 55V, the switching FET in the primary side goes off via the Zener diode (ZD52, ZD87), Transistor Q55, Q54, Q82 and photo coupler PC1.
  When the output level of the +5V exceeds 10V, the switching FET in the primary side goes off via the Zener diode (ZD53) Transistor Q55, Q54, Q82 and photo coupler PC1.
  In order to recover from this, plug off the AC cable and leave the C11 about 5 minutes in order to let it discharge electricity, and remove the cause of the over voltage and turn the power on again.

- ❑ Over Current Protection Circuit
  When the output current drops to 11Ω in case of +42V, and 4.2Ω in case of +5V, and lasted longer than 1 second, over current is detected and the switching FET in the primary side goes off via transistor Q53, Q54 Q82 and photo coupler PC1. However, if +42V or +5V shorts just before the Over current protection circuit works, peripheral elements of Q1 are destroyed in case of +42V.
  In case of +5V, peripheral elements of Q5 are destroyed. In order to recover from this, plug off the AC cable and leave the C11 about 5 minutes in order to let it discharge electricity, and remove the cause of the over voltage and turn the power on again.

- ❑ Power Down Detector
  When the output voltage of +42V becomes low and unable to maintain stable voltage, the power down signal (PWDN) is output to the control circuit by OP. AMP (IC52B).

- ❑ Output Voltage Stabilization
  +42V is fed back to the primary side via Zener diode(ZD51, ZD81~86 and photo coupler PC1) and stabilizes the output voltage. +5V stabilizes the output voltage by chopper IC.

The figure below shows power supply circuit block diagram.

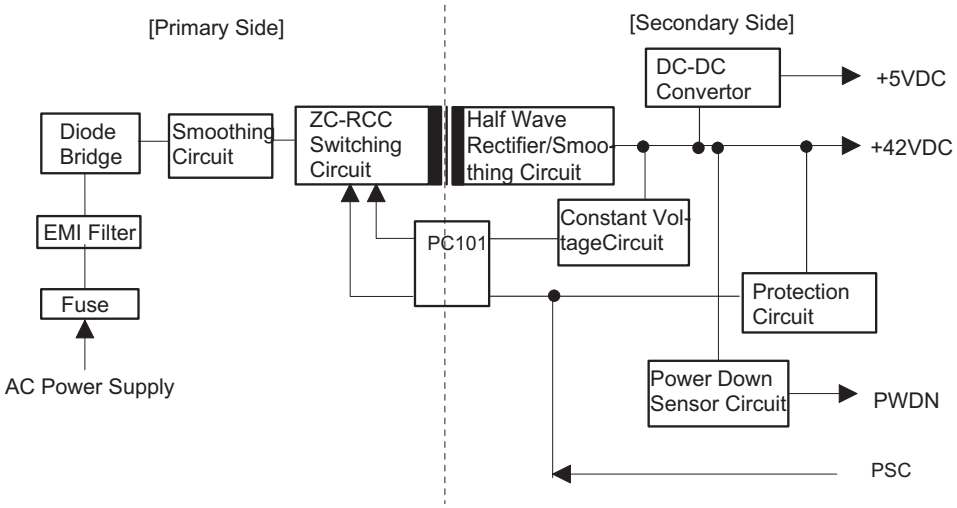

Figure 2-8. Power Supply Circuit Block Diagram

2.2.2 Control Circuit

This section describes main function of the control circuit. The main circuit is mounted on the C214 main board.

2.2.2.1 Operating Principles of the Control Circuit

This printer's control circuit includes a TM96C041AFCPU that runs at 17.20MHz, an E05B42 gate array, a 8M PROM, or 2M/4M Flash-ROM, 1M PS-RAM, 32M MROM, EEPROM, Reset IC and various drive elements. The table below shows each function of the main components of the main board.

Table 2-13. Functions of the Main Board

Component	Address	Function
TMP96C041AF	IC11	As CPU, controls C214 main. •Detects analog signal by A/D converter •Controls CR motor and PF motor •Controls EEPROM •Outputs Address/Data
E05B42	IC10	Gate array •Address latch of the address/data bus from the CPU •Generation of printing data, control of pulse width, the delay of the printing timing •Interface control Parallel/Type-B •Operation panel control •PF motor control, CR motor current change over
8Mbit PROM	IC8	•Registers control program
2/4M bit Flash ROM	(IC7)	If this is installed instead of IC8, •Registers control program
8Mbit MROM	IC5	Character generate (CG)
1Mbit PS-RAM	IC6	Various buffers
PST592D	IC12	Reset IC •System reset
93C46	IC9	3 wires system; serial In/out put EEPROM •Backup of the setting values •Backup of threshold •Backup of Bi-D value, default setting and Maintenance data, such as the starting year, month, etc.
SLA7024M	IC3	CR motor drive
TEA3718SDP	IC1,2	PF motor drive

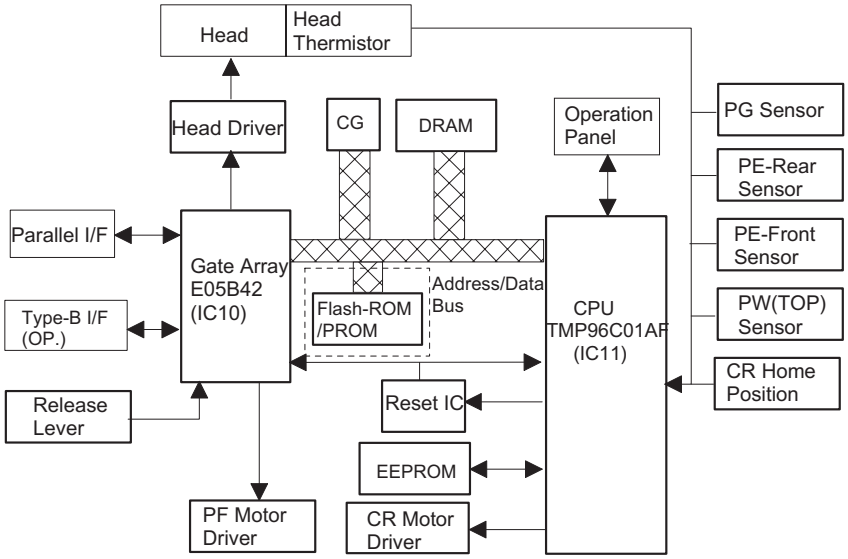

Figure 2-9.Control Circuit Block Diagram

2.2.2.2 EEPROM Control Circuit

EEPROM(IC9) uses three lines serial in/output 1kbit EEPROM and records default setting values and destination parameter. Control signals of EEPROM; CS,CK,DO, DI are attached in the CPU port P70~73 and, are controlled. When the power off is detected, the CPU writes the necessary data to the EEPROM before the +5V line drops out of the normal range. The other CPU access is done during power supply, but the access for safety is not done when the CPU is in the reset state.

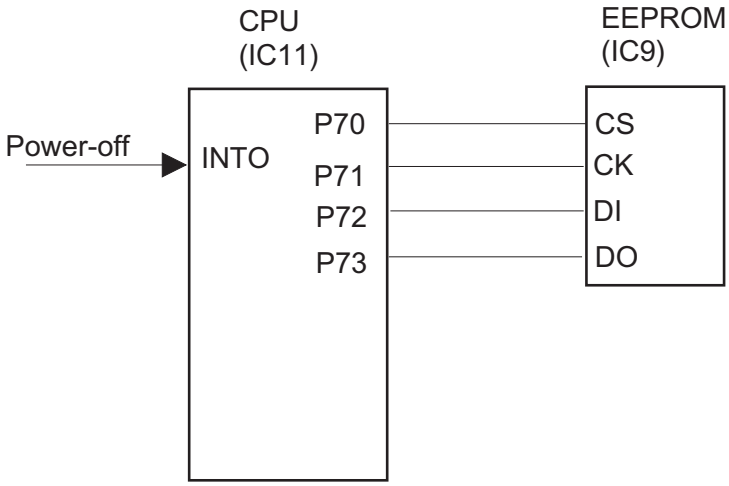

Figure 2-10. EEPROM Circuit

2.2.2.3 System Reset Circuit

The reset IC(IC12) of this printer sends reset signal to the CPU and gate array until +5V line for control stabilizes after the power is turned on, and prevents the printer from going to mis-operation.

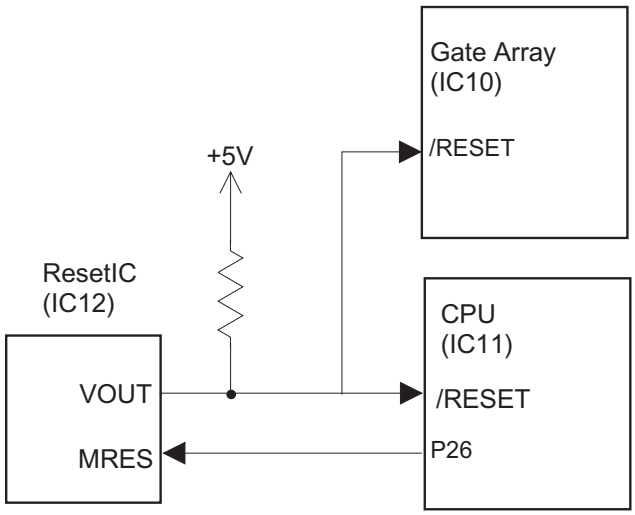

Figure 2-11. Reset Circuit

2.2.2.4 Power Off Detector Circuit

Power-Down signal from the power supply board is sent to the port INTO of the CPU. The CPU initializes the port P26 and sends a signal to the manual reset port MRES in the Reset IC(IC12) in order to let IC12 to output the reset signal.(Refer to Figure 2-9) When the Power Down signal breaks into during the waiting mode, the CPU considers it as POWER-OFF immediately and performs POWER-OFF operation. If Power Down signal breaks into during the printing operation, the CPU stops printing immediately and checks if the Power Down signal is output after a certain time passed, which is about 10ms. If the Power-Down signal is output, the CPU considers it as POWER OFF and performs POWER OFF operation.
After the POWER OFF is detected, the CPU holds at least 32 bite writing time for the EEPROM. After writing is completed, the CPU reset the whole circuit system by setting the port P26 “HIGH”.

2.2.2.5 Print Head Driver Circuit

The print head driver circuit of this printer consists of the gate array, NPN transistor with Zener Diode built in and print head. Also, this circuit outputs the print signal from the port HD1~HD24 in the gate array to the transistor and drives the print head. The built in Zener Diode absorbs back electromotive force, which is caused by the coil of the print head.

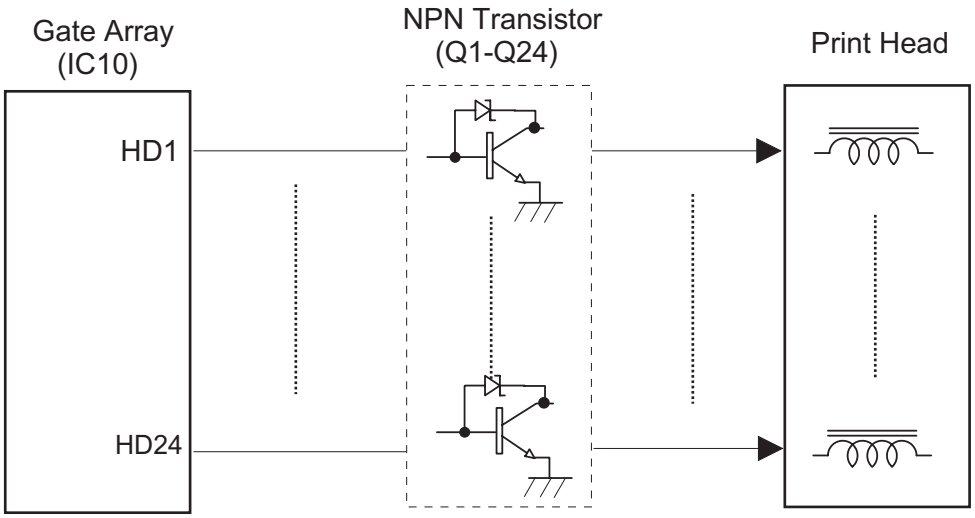

Figure 2-12. Print Head Driver Circuit

2.2.2.6 CR Motor Driver Circuit

The CR motor driver circuit of this printer consists of CPU, gate array, CR motor drive IC SLA7024M (IC3) and CR motor. The CPU sends phase data; INA, /INA, INB and/INB from the port PGO0-3 to the CR motor IC. The current setting is de-coded in the CRFA0-3 and CRFB0-3 of the gate array by the CPU and is output to the CR motor drive IC. The CR motor driver IC outputs phase signals; CRA, /CRA, CRB, /CRB to the CR motor. The CR motor is driven at open loop control uni-pola rated current type by the drive IC.

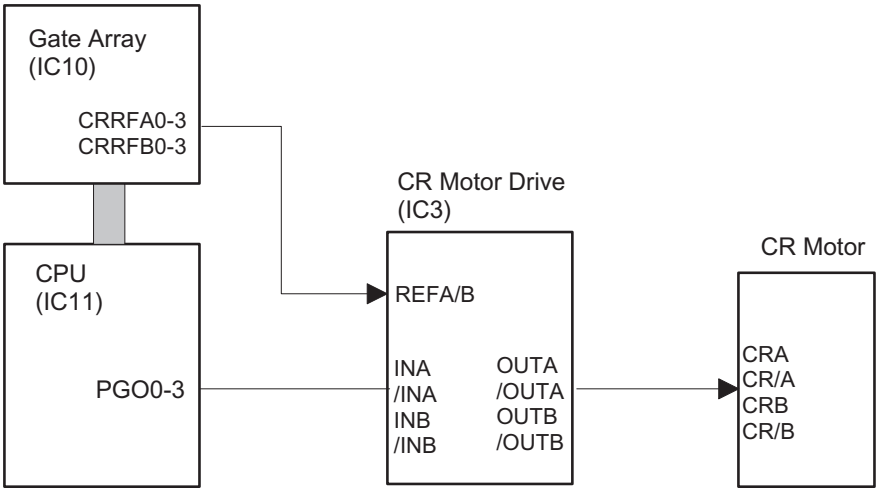

Figure 2-13.CR Motor Driver Circuit

2.2.2.7 PF Motor Driver Circuit

The PF motor driver circuit of this printer consists of CPU, gate array, PF motor drive IC(IC1, IC2) and PF motor. The CPU sends phase data(PFPHASEA/B) to the PF motor drive IC via the gate array. Also, the current control signals;PF10A/1A, PF10B/1B are outputs to the PF motor drive IC via gate array for current setting. The PF motor drive IC outputs phase signals; PFA, /PFA, PFB, /PFB to the PF motor. The CR motor is driven at open loop control bi-pola rated current type by the driver ICSLA7024M(IC3). Also, the current is controlled by the /PFHOLD signal from the gate array when the reset is performed.

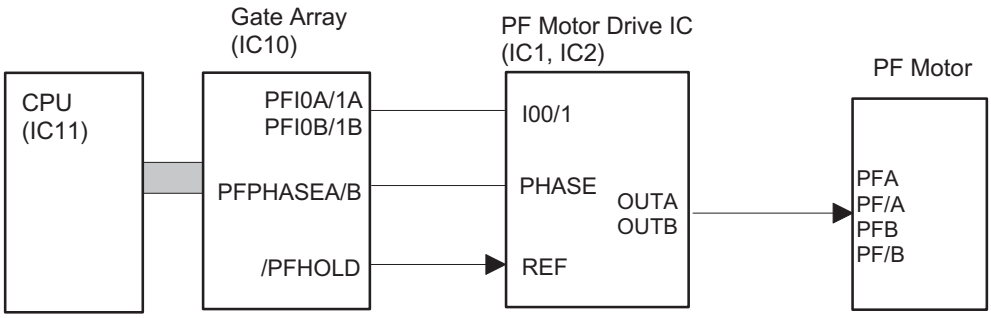

Figure 2-14.PF Motor Driver Circuit

2.2.2.8 Operation Panel Control Circuit

The panel control circuit consists of panel switches and gate array. The gate array detects the switch condition by the port SW0-SW5 and controls LED by LED0-9. Also, the POWER OFF signal(PSC) by the power switch on the operation panel is directly sent to the power supply circuit.

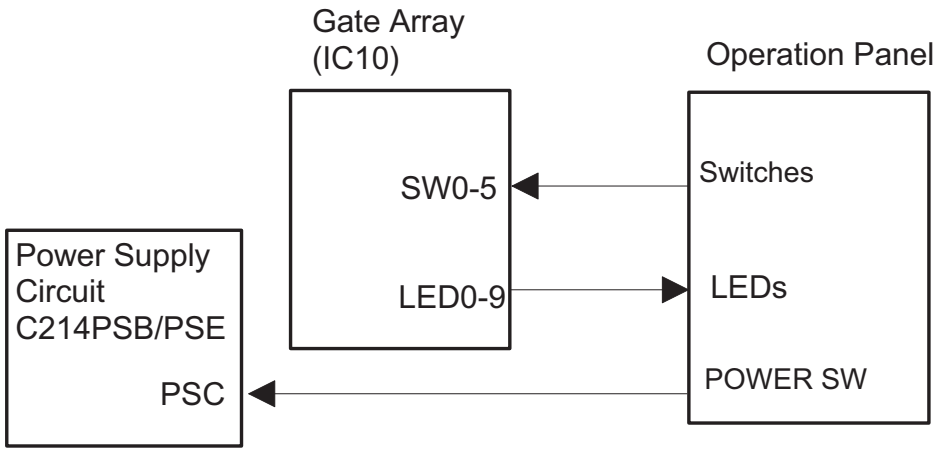

Figure 2-15. Operation Panel Control Circuit

2.2.2.9 Interface(I/F) Circuit

The interface of this printer consists of gate array, parallel I/F connector and optional type-B I/F connector. Input of parallel I/F is pulled up by 3.3KΩ resistance and goes to 10Ω resistance, which is serially connected to the port DIN0-7 of the gate array. The output is done from the port in the gate array via LS06. The input signal of Type-B I/F; /CMREQ, /WRRDY, /RDREQ and output signal INH are connected to the gate array via 100Ω resistance which is connected serially. The input signals are pulled up by 1KΩ resistance, and are connected to the gate array serially. The output signals are output from the gate array via serially connected 100Ω resistance.

2.2.2.10 Head Temperature Detector Circuit

This printer has the thermistor in the print head, which monitors the head temperature in order to prevent the head coil from being degraded or worn out by the continuous high duty printing.
The head temperature signal HTMP measures the resistance value of the thermistor as voltage in the A/D converter of the CPU port AN0 by sending the current to the 1.21KΩ±1% resistor, which is connected serially to the thermistor.

2.2.2.11 Head Drive Voltage Measurement Circuit

The head voltage drive circuit consists of the partial pressure resistance and CPU. Drive voltage is pressured 1/9 by resistance and is input to the port of CPU as VREF signal, and is measured by A/D converter in the CPU inside.

2.2.2.12 Rear and Front Paper End Detector Circuit

The PE detector circuit of this printer consists of PE detectors(each at front and rear) by micro-switch and CPU. Each detector opens when there is a paper, and shorts when there is no paper.

2.2.2.13 Paper Width Detector Circuit

The paper width detector circuit consists of the paper width detector on the mask holder and CPU. The paper width detector uses photoelectric transfer method and detects top and bottom of the paper and paper width. The signal of the paper width detector is input to the port P52 of CPU, and is detected its level by the A/D converter. When there is a paper, the paper width detector shorts and opens when there is no paper.

2.2.2.14 Carriage Home Position (HP) Detector Circuit

The HP detector circuit of this printer consists of photoelectric transfer method type detector and CPU. The HP detector detects the carriage home position. The output of the HP detector is input to the port P53 of CPU and is detected its level by the A/D converter which is built inside. When the carriage is in the home position, the detector opens, and shorts when the carriage is out of home position.

2.2.2.15 Release Lever Detector Circuit

The release lever detector circuit consists of the release lever detector micro switch and gate array. The release lever detector signal(RELEASE) is detected in the port of the gate array. The detector opens at the friction mode and shorts at the tractor mode.

2.2.2.16 Adjust Lever Detector Circuit

The adjust lever detector circuit of this printer consists of the micro switch detector and CPU. The detector shorts, and printing speed becomes copy mode when the adjust level is more than 2 levels. The detector opens, and printing speed becomes normal when the adjust level is less than 1 level.

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Disassembly and Assembly

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3.1 Overview

This section describes procedures for disassembling the main components of EPSON LQ-670. Unless otherwise specified, disassembled 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 and assembling EPSON LQ-670.

⚠ WARNING

- ***Disconnect the AC power cable before disassembling or assembling the printer.***
- ***Be careful with the printhead when you handle it, as it may be very hot just after the printing.***
- ***Leave the printer for five minutes or more after disconnecting the AC cable, to completely discharge high electric charge remains in the electrolyte capacitor on the power supply board.***
- ***Do not touch the heat sink, attached to the switching FET (Q1) on the power supply board, just after power off as it may be very hot.***
- ***Never touch the heat sink attached to the switching FET (Q1) while the AC cable is connected to the AC outlet, as it is not electrically isolated.***

⚠ CAUTION

- ***Use only specified tools for disassembly and assembly of the printer.***
- ***Use only specified lubricants and adhesives with the printer. (See Chapter 6 for details)***
- ***Follow the instructions only described in this manual when you perform an adjustment. (See Chapter 4 for details)***

3.1.2 Tools

The table below lists the tools and the instruments required for disassembling, assembling or adjusting the printer. Use only tools that meets these specifications.

Table 3-1. Tool and Instrument List

Name	Specification	EPSON Part No.
Phillips Screwdriver	No.2	B743800200
Box Driver	7.0mm diagonal	B741700200
Tweezers		B741000100
E-Ring Holder	Size : #2.5	B740800400
E-Ring Holder	Size : #4	B740800600
Soldering Iron		B740200100
Thickness Gauge	t = 0.42 mm	B776702201
Digital Multi-Meter	OHM/Voltage/Current	-----
Oscilloscope	Min. 50MHz	-----

Note) All tools and instruments listed above are commercially available.

3.1.3 Service Check After Repair

After completing repair of the product, use the check list shown below, to verify status of repaired product and all the repair work performed before returning the product to the users. This list can be used as a record of all service work performed with the product.

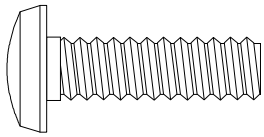
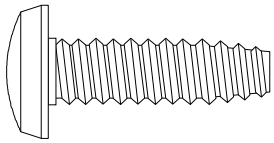
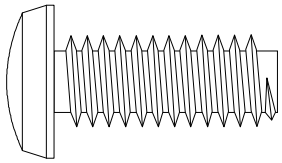
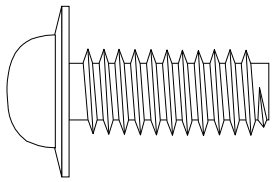
Table 3-2. Repair Status Check List

Category	Component	Item to Check	Status
Printer Mechanism	Printhead	Are all wires print properly?	☐Checked, OK ☐Not necessary
	Carriage Mechanism	Does the carriage move smoothly? ●Noisy? ●Any dirt or excessive oil?	☐Checked, OK ☐Not necessary
		Is the Carriage motor at the normal temperature? (Not too hot?)	☐Checked, OK ☐Not necessary
	Paper Feed Mechanism	Is paper advance smoothly? ●Noisy? ●Paper is jamming?	☐Checked, OK ☐Not necessary
		Is the paper-feed motor at the normal temperature? (Not too hot?)	☐Checked, OK ☐Not necessary
	Paper Path	Are all types of paper advance smoothly?	☐Checked, OK ☐Not necessary
		Is the tractor feeding paper smoothly?	☐Checked, OK ☐Not necessary
		Are all paper paths clear of an obstructions?	☐Checked, OK ☐Not necessary
		Is the platen free of damage?	☐Checked, OK ☐Not necessary
	Ribbon Mask	Is the ribbon mask free of damage?	☐Checked, OK ☐Not necessary
Operation	Self-Test	Was the self-test printing successful?	☐Checked, OK ☐Not necessary
	On-line Test	Was the on-line printing successful?	☐Checked, OK ☐Not necessary
Adjustment	Platen-Gap	Is the gap adjusted correctly? (PG =	☐Checked, OK ☐Not necessary
	Bi-D Alignment	Is the bi-directional alignment made properly?	☐Checked, OK ☐Not necessary
ROM	Version	Latest version = ( )	☐Checked, OK ☐Not necessary
Packing	Ribbon Cartridge	Has the ribbon cartridge been removed from the printer?	☐Checked, OK ☐Not necessary
	Attachments	Have all relevant attachments been packed together with the printer?	☐Checked, OK ☐Not necessary

3.1.4 Specifications for Screws

The table below lists the abbreviations used in this manual for small parts, such as screws and washers.

Table 3-3. Abbreviations and Screw Type

Abbreviation	Description	Screw Type
CB	**C**ross-recessed **B**ind-head Screw	
CBS	**C**ross-recessed **B**ind-head **S**-Tight Screw	
CBB	**C**ross-recessed **B**ind-head **B**-Tight Screw	
CP	**C**ross-recessed **P**an-head	

3.2 Printer Disassembly and Assembly

This section describes procedures for disassembling the main components of the printer. Since re-assembling the printer can be done by simply performing the disassembly procedures in reverse order, this chapter does not describe the assembly procedures. If necessary, special notes on re-assembling or adjusting a component are given at the end of each procedure.

⚠CAUTION

- ***Before disassembling any part of the printer, note the warnings in Section 3.1.1.***
- ***Make sure to remove any cables and the accessories attached to the printer; such as the ribbon cartridge, the sheet guide, the platen knob, from the printer before disassembly.***

Note) Exploded diagrams in APPENDIX show you how each component fit together. Refer to them as necessary.

The flowchart below show you the basic order for disassembly.

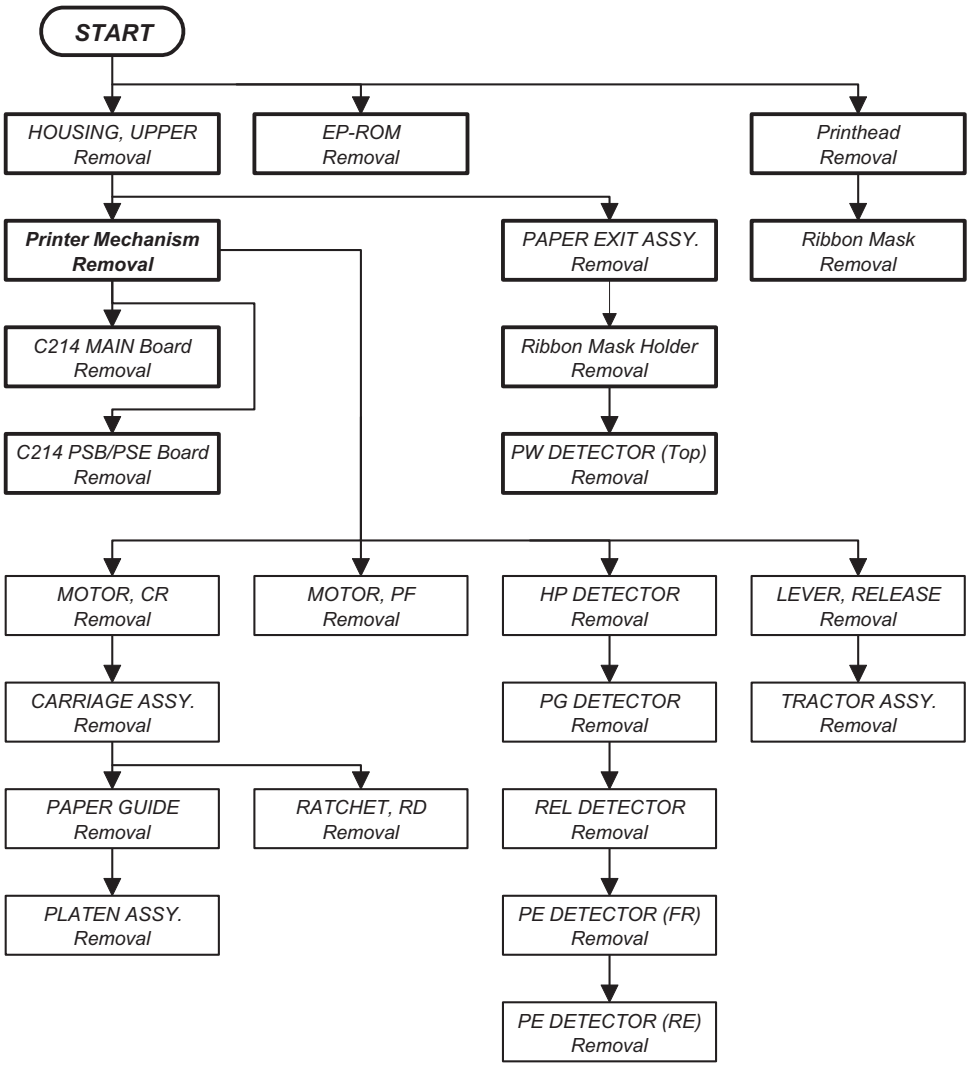


Figure 3-1. Disassembly Flowchart

3.2.1 HOUSING, UPPER Removal

1. Remove the platen knob from the printer.
2. Remove two screws (CBB/M4x14) fixing [COVER, WIRE] and remove it.
3. Disconnect the cable of the control panel from a connector CN15 on C214 MAIN board.
4. Remove two screws (CBB/M4x14) fixing [HOUSING, UPPER].
5. Unhook two tabs fixing [HOUSING, UPPER] to lower housing, at both front and rear, and remove it by lifting it upward.

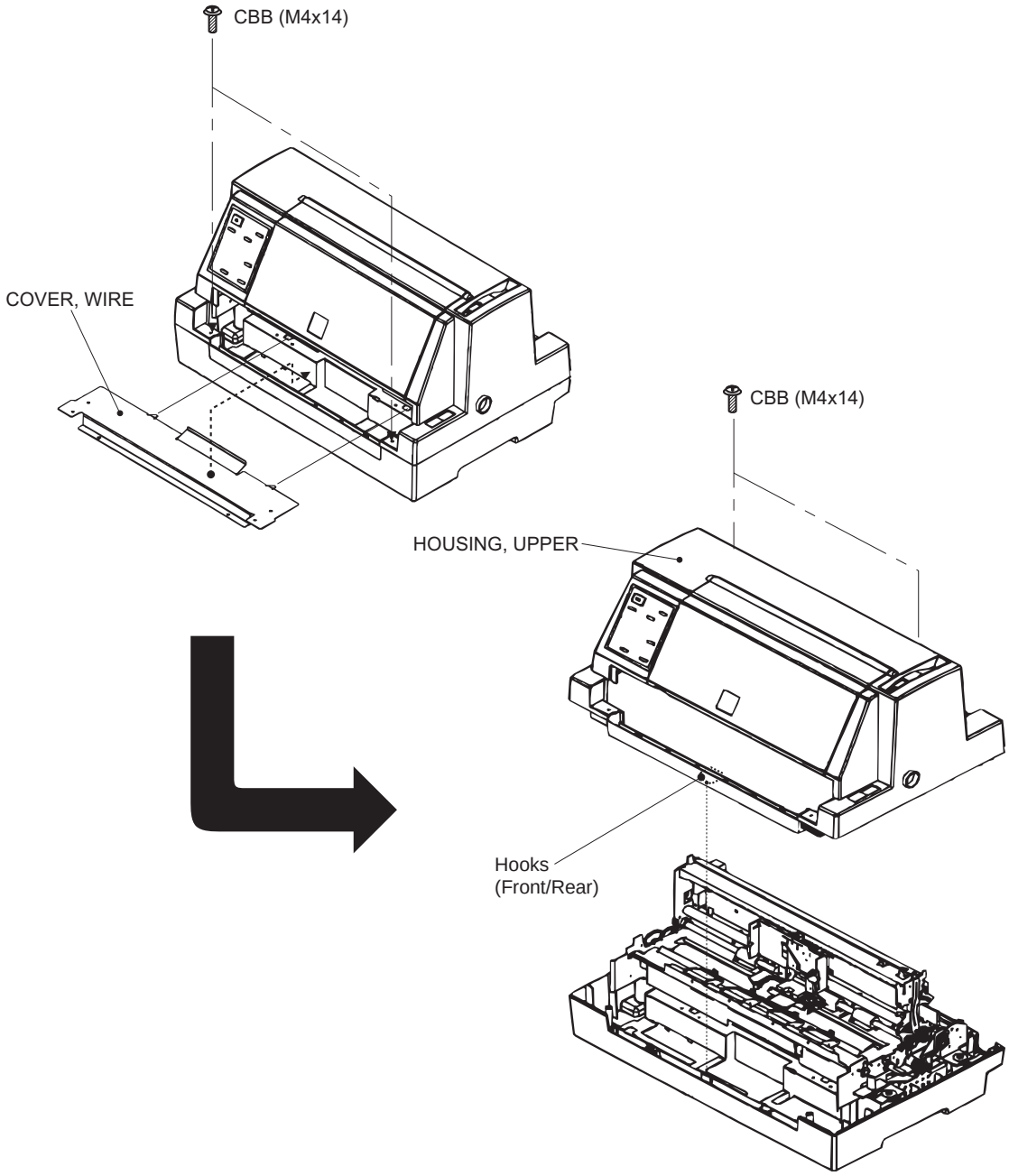


Figure 3-2. HOUSING UPPER Removal

3.2.2 Printer Mechanism Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Disconnect all cables of the Printer Mechanism from the C214 MAIN board:
   - ●CN5 (⇦PW Detector (Top))
   - ●CN6 (⇦Printhead (Front))
   - ●CN7 (⇦Printhead (Rear))
   - ●CN8 (⇦PF Motor)
   - ●CN9 (⇦CR Motor)
   - ●CN10 (⇦REL Detector)
   - ●CN11 (⇦PG Detector)
   - ●CN12 (⇦HP Detector)
   - ●CN13 (⇦PE Detector (Rear))
   - ●CN14 (⇦PE Detector (Front))
3. Remove four screws (Mechanism fixing screw) and take out the Printer Mechanism from the lower housing.

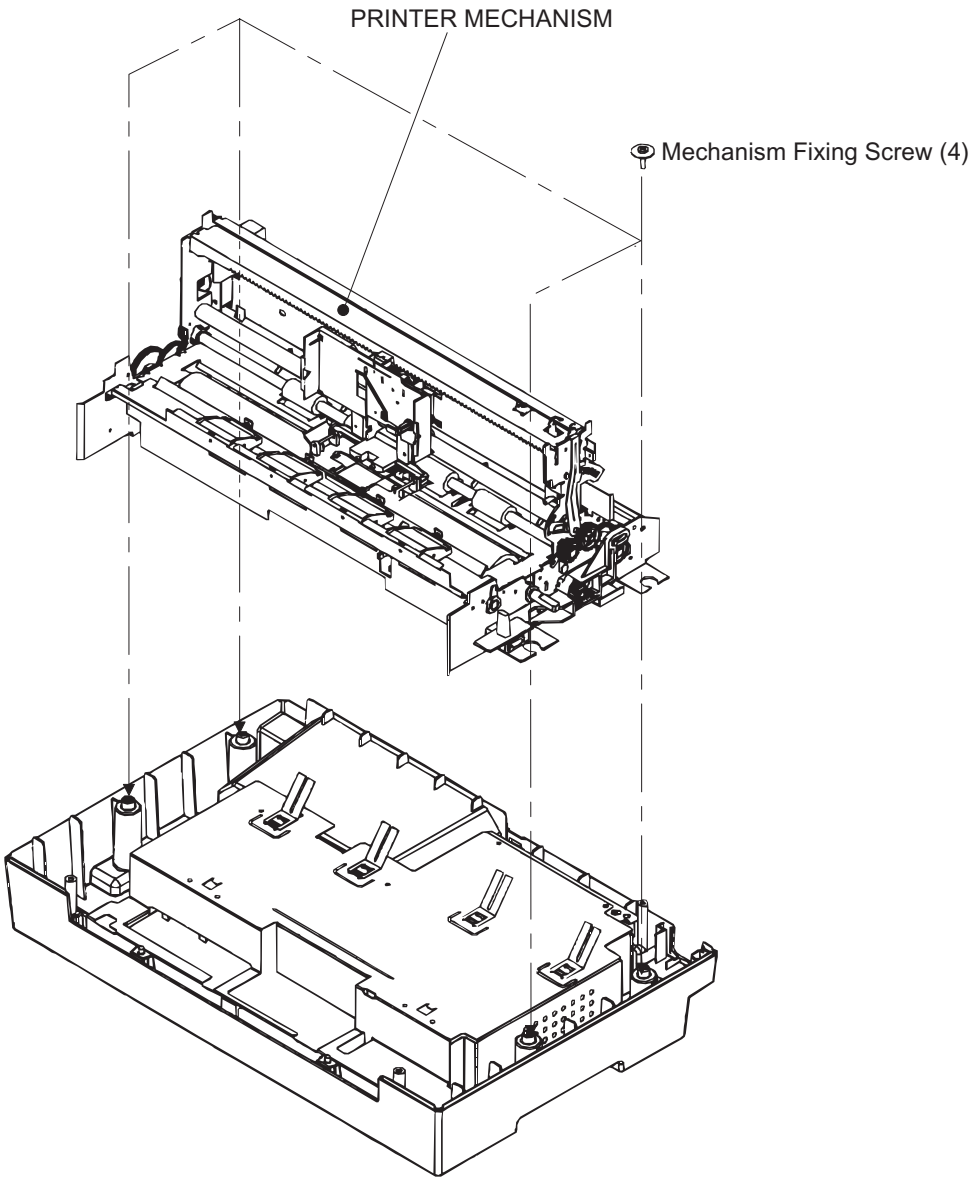


Figure 3-3. PRINTER MECHANISM Removal

3.2.3 C214 MAIN Board Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Remove Printer Mechanism (See Section 3.2.2)
3. Remove seven screws (5: CBB/M3x12, 2: CBS/M3x4) fixing the shield plate, and remove the shield plate.
4. Remove two screws (CBS/M3x12) fixing [COVER, CONNECTOR, UPPER], and remove [COVER, CONNECTOR, UPPER].
5. Disconnect the cable of power supply unit from a connector CN3 on C214 MAIN board.
6. Remove four screws (CBB/M3x12) fixing C214 MAIN board, and remove C214 MAIN board together with [GROUND PLATE, I/F, UPPER].
7. Remove [GROUND PLATE, I/F, UPPER] from C214 MAIN board.
8. Remove [GUIDE, I/F BOARD;B] from C214 MAIN board by unhooking two tabs.
9. Remove two screws (CP/M3x12) fixing [GROUND PLATE, I/F] and remove it from C214 MAIN board.

⚠CAUTION

- ***Be careful with the edges of the shield plate, as they are very sharp.***
- ***Make sure to match a RED marking on the cable of the motors, to pin 1 of connector on C214 MAIN board when you re-connect them.***

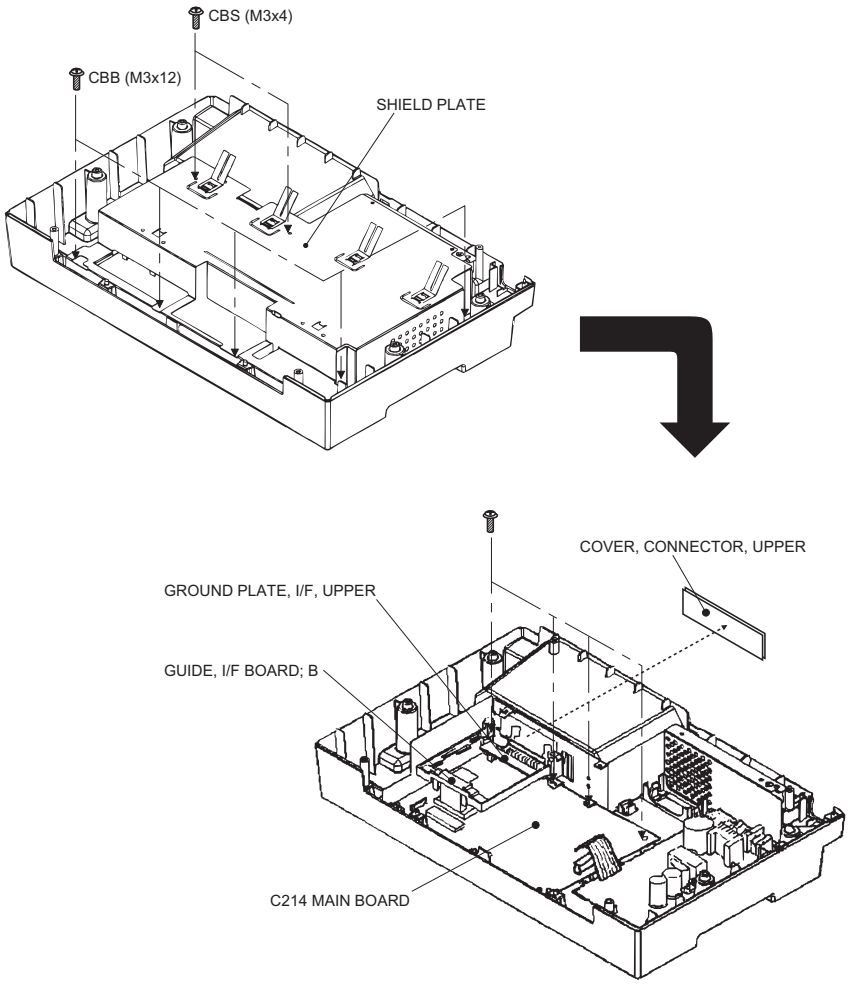


Figure 3-4. C214 MAIN Board Removal

3.2.4 C214 PSB/PSE Board Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Remove the Printer Mechanism (See Section 3.2.2)
3. Remove the shield plate (See Section 3.2.3 at step 3)
4. Disconnect the cable of C214 PSB/PSE board from a connector CN3 on C214 MAIN board.
5. Remove the AC inlet assembly from a connector CN1 on C214 PSB/PSE board.
6. Remove three screws (CBB/M3x12) and one plane-washer fixing C214 PSB/PSE board to the lower housing, and take out C214 PSB/PSE board.

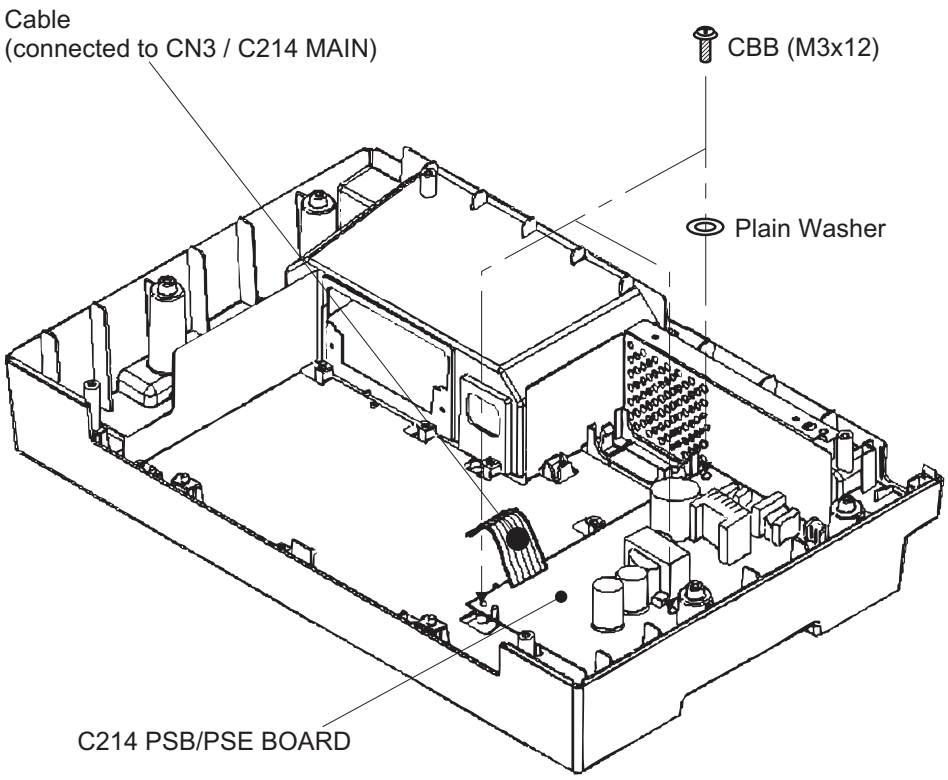


Figure 3-5. C214 PSB/PSE Board Removal

3.2.5 EP-ROM Replacement

When the program ROM (EP-ROM) on C214 MAIN board need to be replaced (for program version-up), follow the instruction below.

1. Remove two screws (CBB/M4x14) fixing [COVER, WIRE] and remove it.
2. Remove the EP-ROM from the IC socket IC8 on C214 MAIN board.

CHECK POINT

When you remove or re-install the EP-ROM, be careful not to damage the lead terminals of the IC.

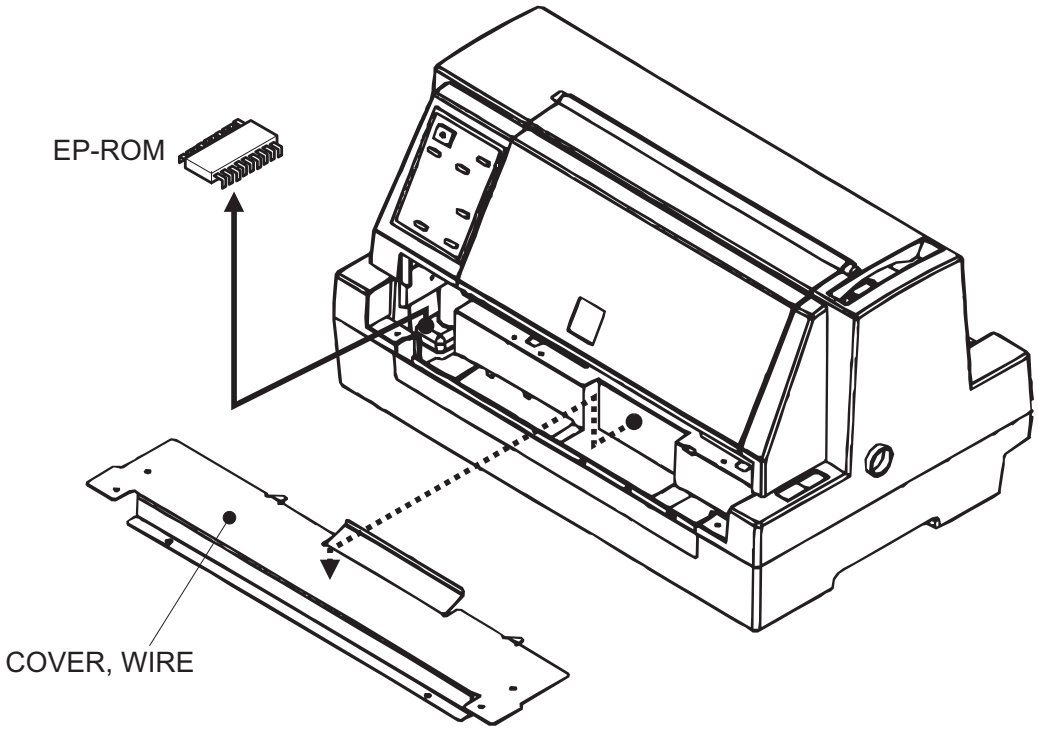


Figure 3-6. EP-ROM Removal

3.2.6 Printhead Removal

1. Open the printer cover.
2. Remove two screws (CBS/M3x10) fixing the printhead to the carriage assembly, and remove the printhead.
3. Disconnect the cables connected to the printhead.

⚠CAUTION

Make sure that C214 MAIN board operates correctly, before replacing the printhead to new one. Otherwise, it may be damaged again if C214 MAIN board is defective.

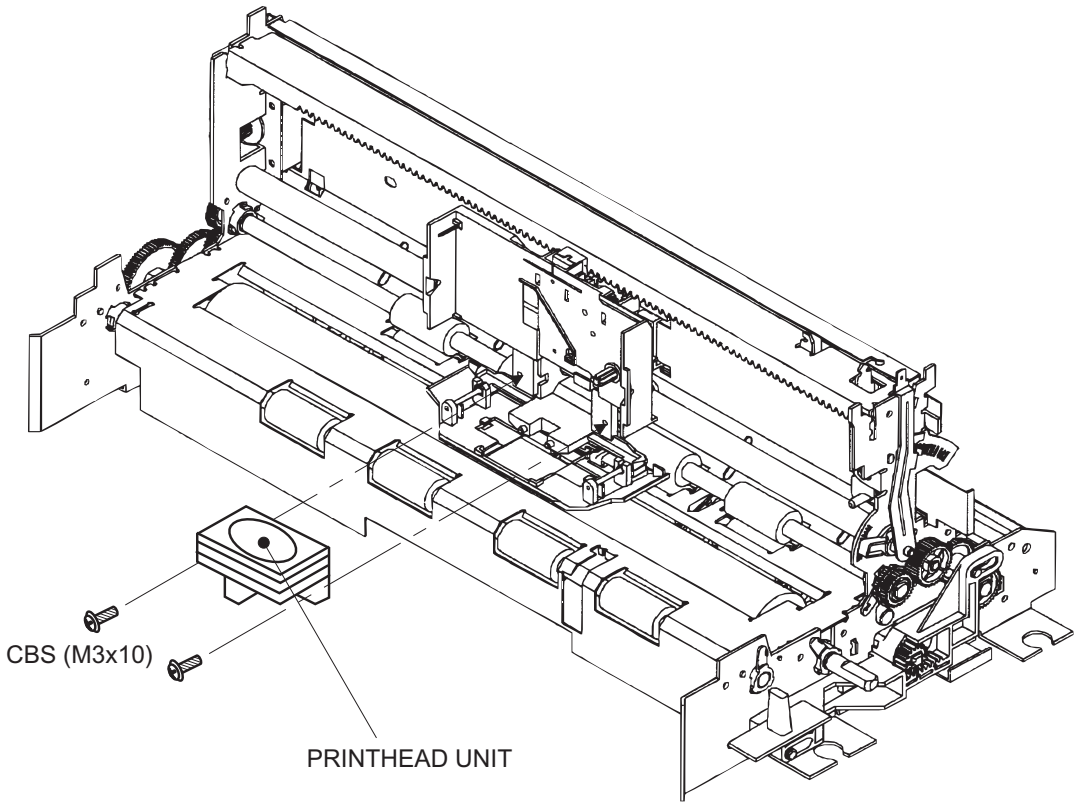


Figure 3-7. PRINTHEAD Removal

REQUIRED ADJUSTMENT

■ ***PG Adjustment (See Chapter 4, Section 4.2.1)***

3.2.7 Ribbon Mask Removal

1. Remove the printhead (See Section 3.2.6)
2. Remove the ribbon mask from the ribbon mask holder, by unhooking the tabs that hold the ribbon mask in place.

CHECK POINT

Be careful not to damage or deform the ribbon mask when you handle it.

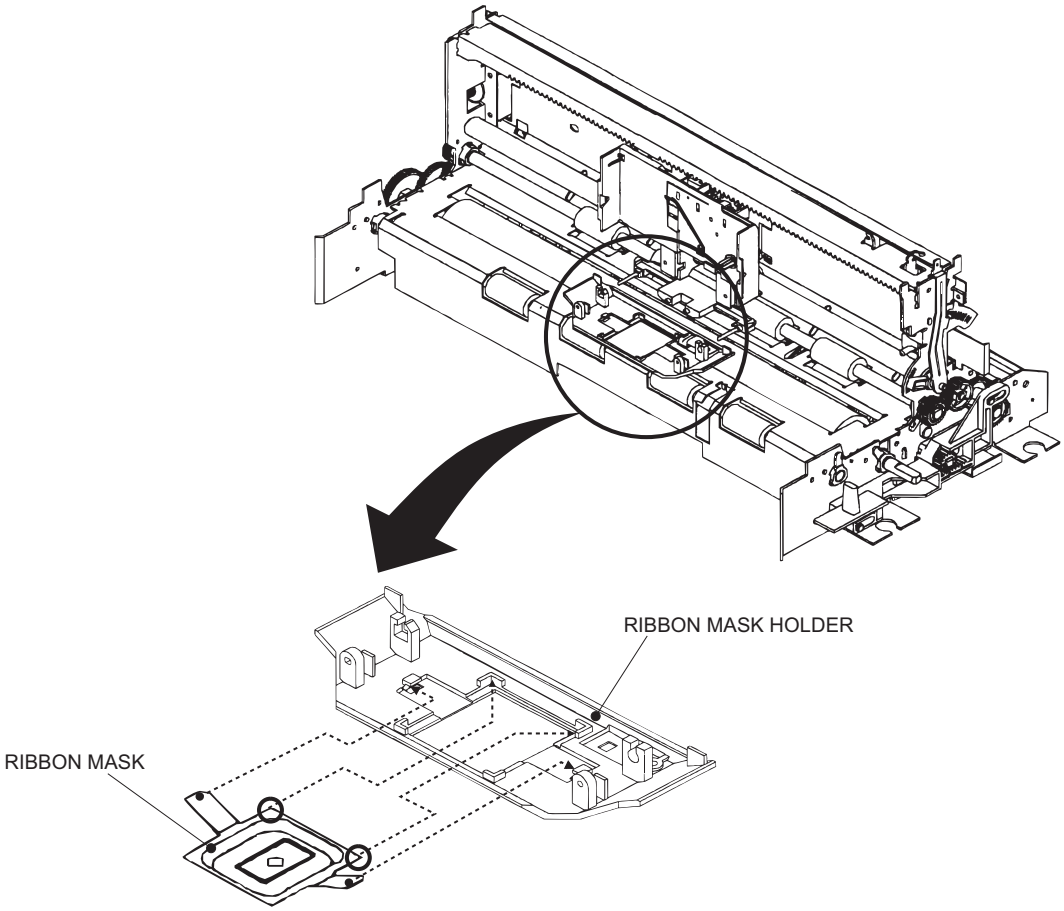


Figure 3-8. RIBBON MASK Removal

3.2.8 PAPER EXIT ASSY. Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Remove two screws (CBS/M3x6) fixing the Paper Exit Assy. to the Printer Mechanism.
3. First, slightly pulling the Paper Exit Assy. toward you, then lifting it upward to remove it.

CHECK POINT

When re-installing the Paper Exit Assy., fix it while pushing it against the Printer Mechanism.

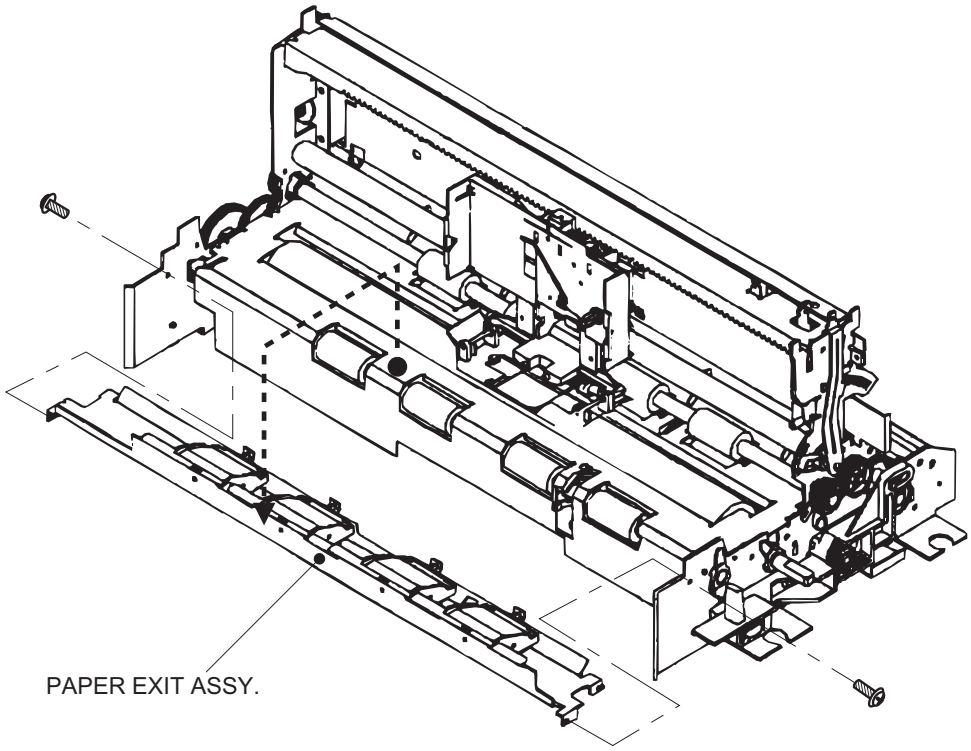


Figure 3-9. PAPER EXIT ASSY. Removal

3.2.9 Ribbon Mask Holder Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Remove the Printhead (See Section 3.2.6)
3. Remove the Paper Exit Assy.(See Section 3.2.8)
4. Unhook the cables (to Printhead / PW Detector) from a cable hook on the Carriage Assy.
5. Unhook two tabs fixing the Ribbon Mask Holder to the Carriage Assy., and slightly pulling it forward.
6. Disconnect the cable from PW Detector attached on the Ribbon Mask Holder, and remove the Ribbon Mask Holder.

CHECK POINT

When re-assembling the Ribbon Mask Holder, make sure that the cable of PW Detector is correctly guided at the back of the Carriage Assy., as shown below, and is not contacting the CR guide shaft and the paper feed roller assembly.

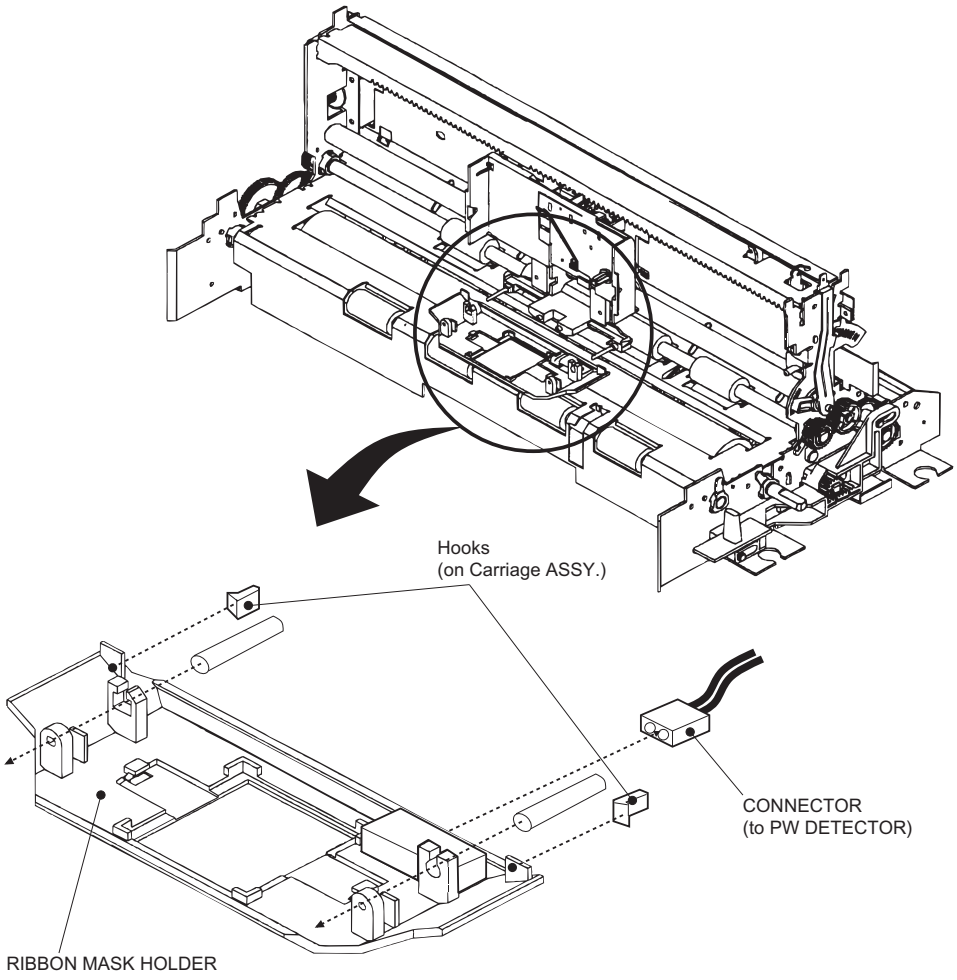


Figure 3-10. RIBBON MASK HOLDER Removal

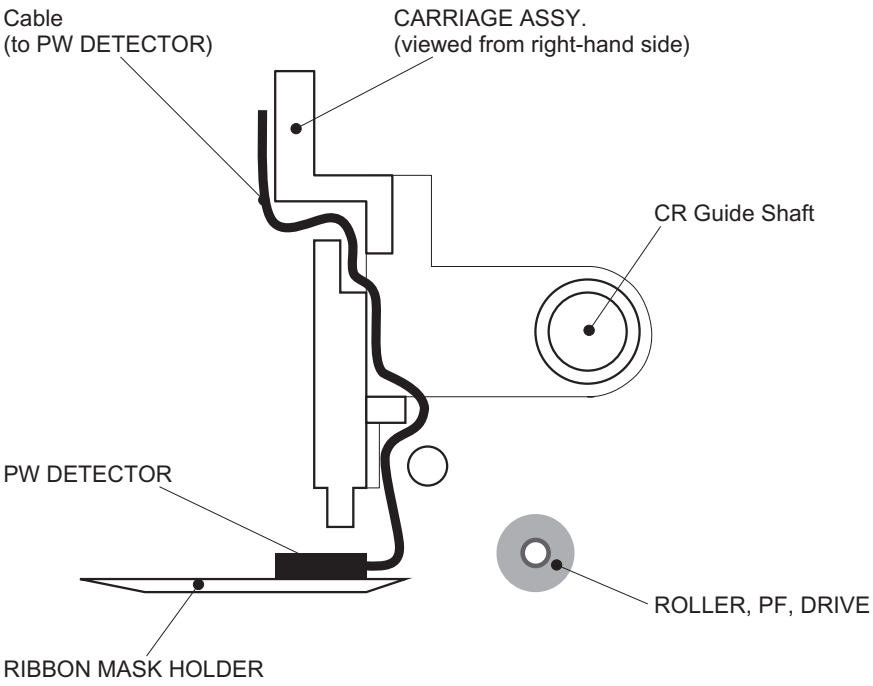


Figure 3-11. Cable Rooting

3.2.10 PW Detector (Top) Removal

1. Remove [HOUSING, UPPER] (See Section 3.2.1)
2. Remove the Printhead (See Section 3.2.6)
3. Remove the Paper Exit Assy. (See Section 3.2.8)
4. Remove the Ribbon Mask Holder (See Section 3.2.9)
5. Remove one screw (CB/M2.5x6) fixing the PW Detector (Top) and remove it.

⚠CAUTION

When you fixing the PW Detector (Top) to the Ribbon Mask Holder, be careful not to damage a screw hole on the Ribbon Mask Holder.
●Tightening Torque: 0.1±0.02Nm (1.0±0.2Kgf-cm)

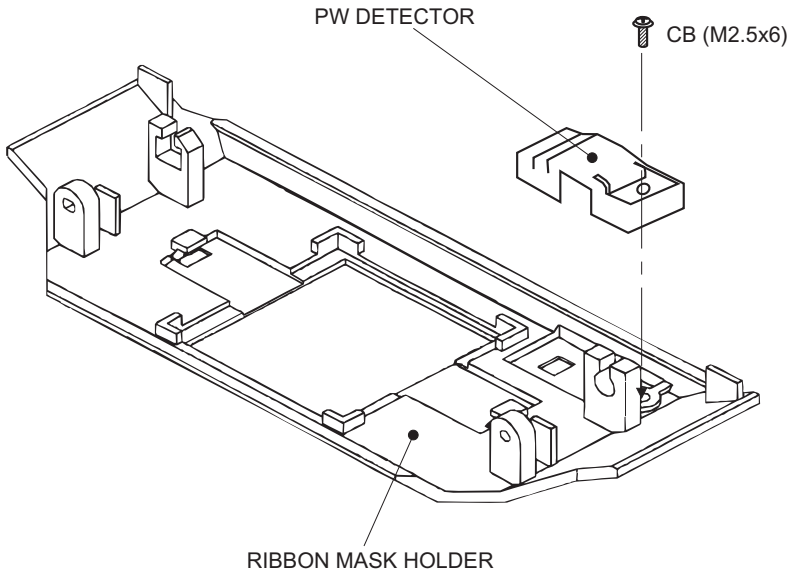


Figure 3-12. PW DETECTOR Removal

3.2.11 MOTOR, CR Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Unhook the cable of [MOTOR, CR] from a cable hook at the bottom of the Printer Mechanism.
3. Remove [TENSION SPRING, 14.5] attached at the top right of the Printer Mechanism, to loosen the timing belt.
4. Remove four screws (CBS/M3x6) fixing the CR motor assembly to the Printer Mechanism, and remove it.
5. Remove two screws (CBS/M3x6) and remove [MOTOR, CR] from [MOUNTING PLATE, MOTOR, CR].

REQUIRED ADJUSTMENT

■ ***Bi-D Alignment Adjustment (See Chapter 4 Adjustment)***

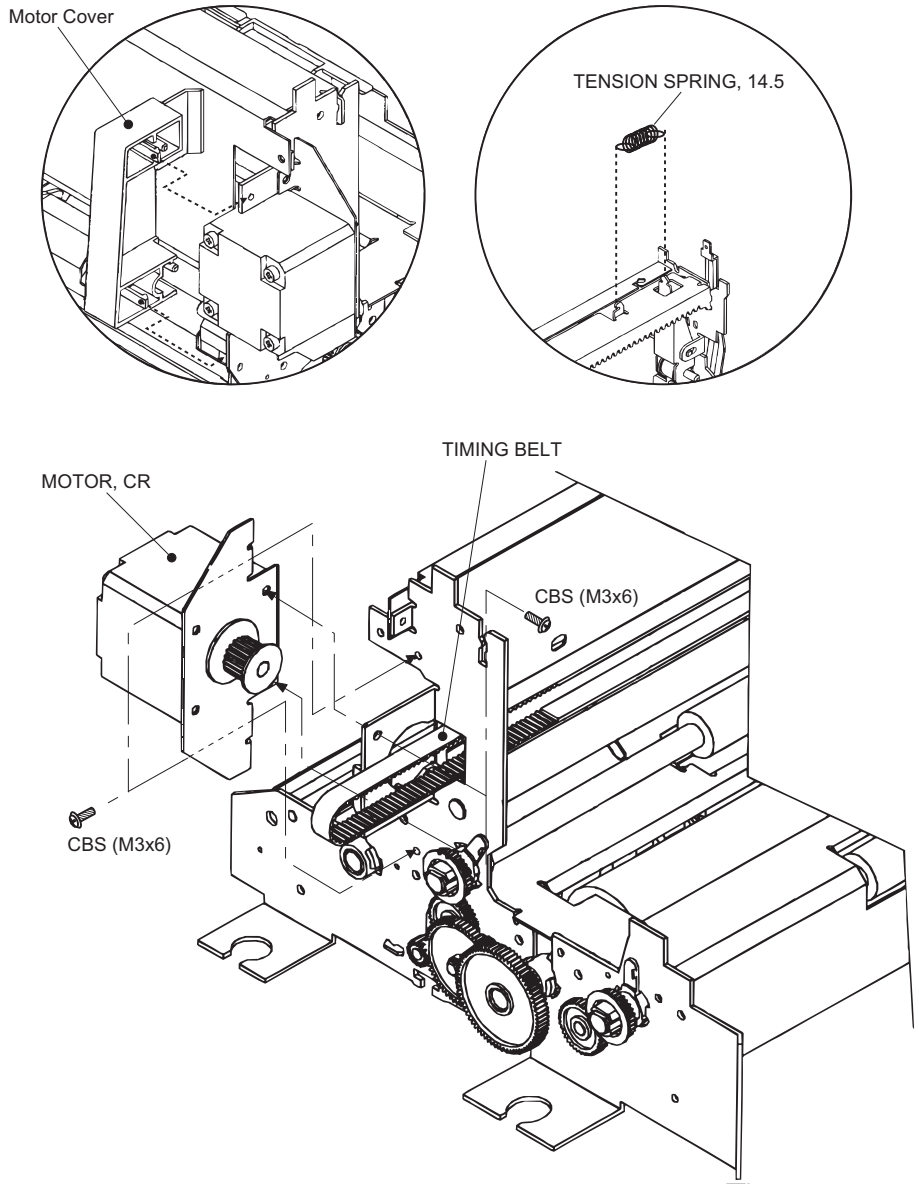


Figure 3-13. MOTOR, CR Removal

3.2.12 Carriage Assy. Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Remove [TENSION SPRING, 14.5] attached at the top right of the Printer Mechanism, to loosen the timing belt.
3. Remove [CAP, LEVER] and [HOLDER, ADJUST, LEVER].
4. Remove an hexagonal nut which fixing the adjust lever to the carriage guide shaft, and remove the adjust lever.
5. Take out the head FFC from the cable holder at the bottom of the Printer Mechanism.
6. Remove [HOLDER, CABLE, UPPER] from [FRAME, CR], by slightly slide it to right while unhooking a locking tab.
7. Remove two screws (CBS/M3x6) fixing [GUIDE, CR] at both ends and remove it.
8. Remove [LEVER, PULLEY, DRIVEN], [SHAFT, LEVER, PULLEY, DRIVEN] and the driven pulley.
9. Remove [BUSH, PARALLELISM] by rotating it to match the tabs and a hole of the frame.
10. Remove [CR GUIDE SHAFT] together with the carriage ASSY. and remove the [CR GUIDE SHAFT] from the carriage ASSY.

⚠ CAUTION

Be careful not to lose the oil pad and a pressure spring in the carriage ASSY., as it can easily come off when removing [CR GUIDE SHAFT].

CHECK POINT

- ***Remove the printhead, before reinstalling the oil pad and a pressure spring into the carriage ASSY.***
- ***When attaching the timing belt to the carriage ASSY., be sure to attach it as shown in figure below.***

REQUIRED ADJUSTMENT

- ***Platen-Gap Adjustment (See Section 4 Adjustment)***
- ***Bi-D Alignment Adjustment (See Section 4 Adjustment)***

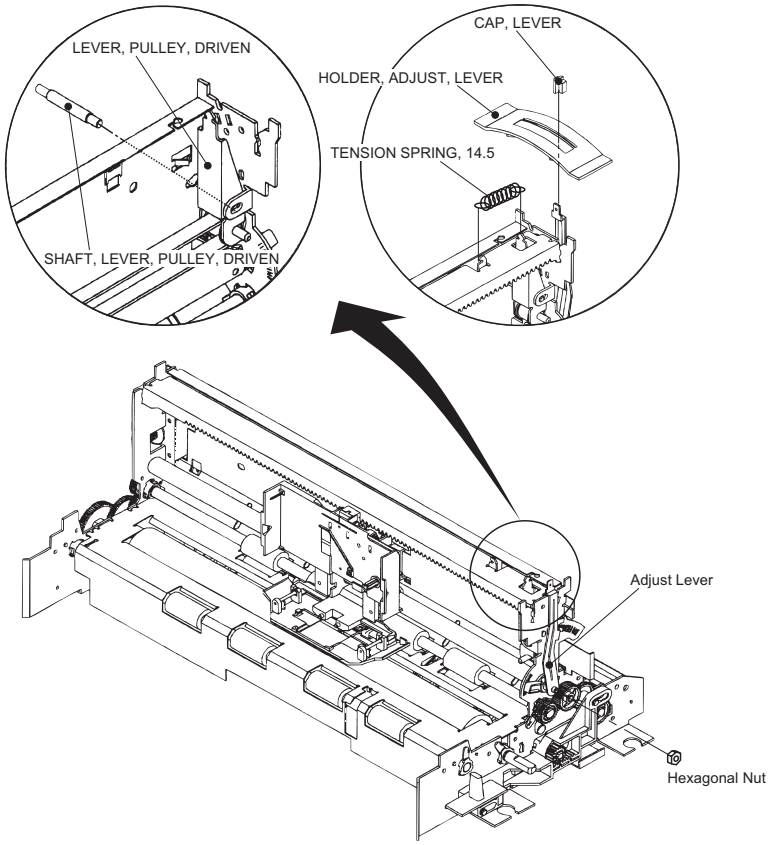


Figure 3-14. CARRIAGE ASSY. Removal (1)

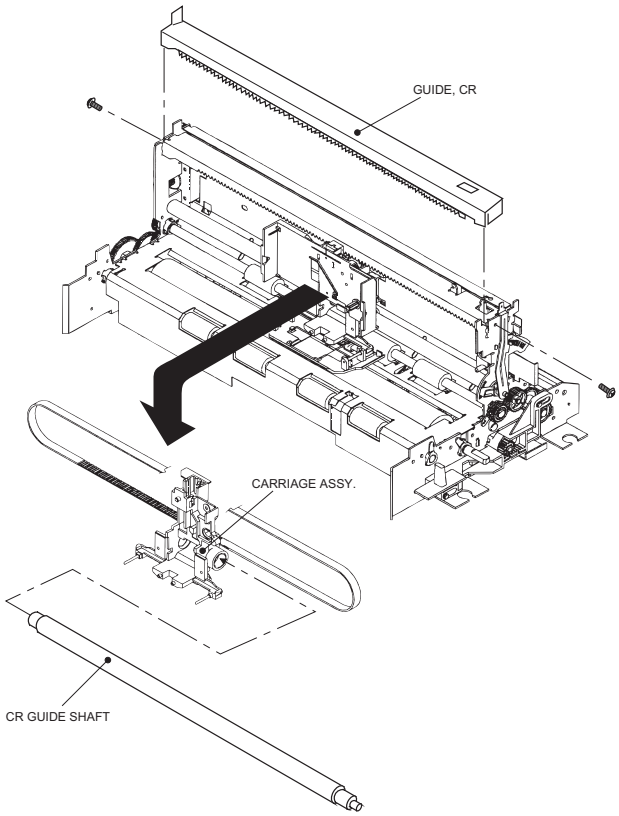


Figure 3-15. CARRIAGE ASSY. Removal (2)

3.2.12.1 RATCHET, RD Removal

1. Remove the Carriage ASSY. (See Section 3.2.12)
2. Remove the Ribbon Cartridge Holder from the Carriage ASSY., by unhooking three tabs.
3. Take out [RATCHET, RD] from the Ribbon Cartridge Holder.

CHECK POINT

When re-installing the Ribbon Cartridge Holder to the Carriage ASSY., first, hook the bottom part of the Ribbon Cartridge Holder to the Carriage ASSY. and hold it. Then, turn up the upper side of the Ribbon Cartridge Holder to the Carriage ASSY. to fix it.

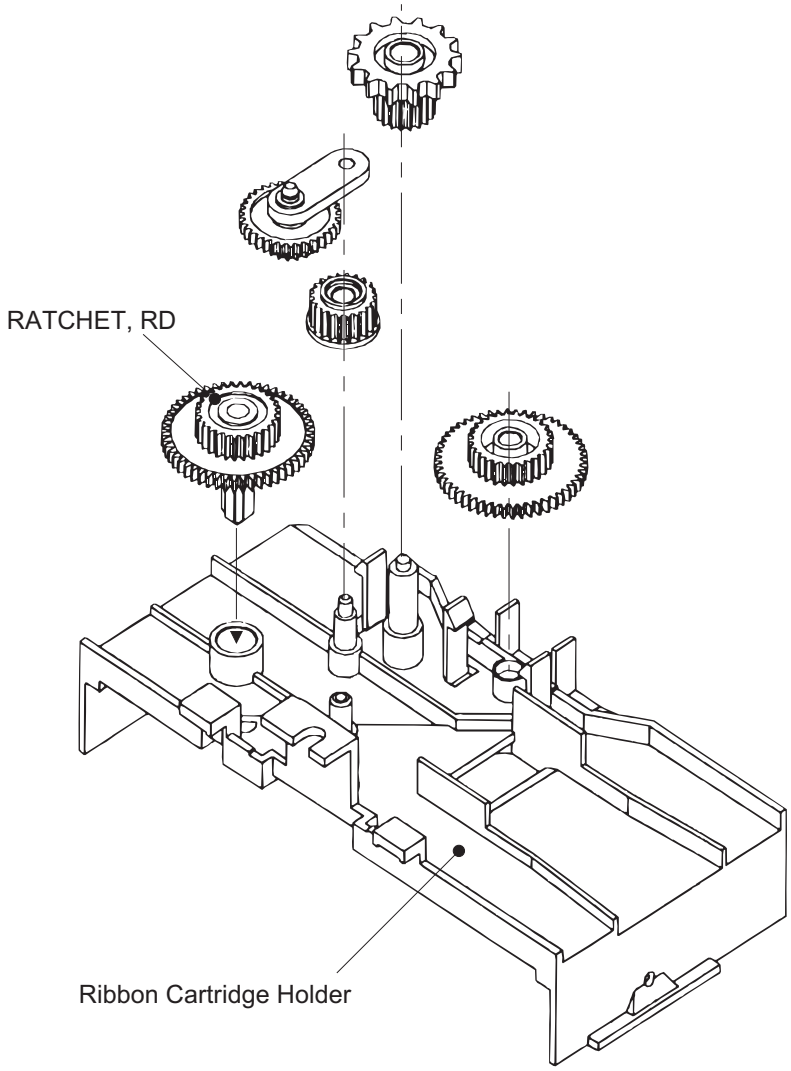


Figure 3-16. RATCHET, RD Removal

3.2.13 PAPER GUIDE Removal

1. Remove the Printer Mechanism. (See Section 3.2.2)
2. Remove the paper exit ASSY. (See Section 3.2.8)
3. Remove the carriage ASSY. (See Section 3.2.12)
4. Remove the CR motor cover from [FRAME, CR] and [MOTOR, CR].
5. Remove [DETECTOR, HP] and [DETECTOR, PG].
6. Remove [GEAR, 20] from [FRAME ASSY., RIGHT] by unhooking a tab.
7. Remove four screws (CBS/M3x6) fixing [FRAME,CR] to the frame assembly RIGHT and LEFT, and remove [FRAME, CR].
8. Remove [GEAR, 14] and [COMBINATION GEAR, 16, 16] from the both ends of [ROLLER, PF, DRIVE].
9. Remove an E-shaped retaining ring (#2) from the left end of [ROLLER, PF, DRIVE].
10. Remove the shaft holder at the both end of [ROLLER, PF, DRIVE].
11. Remove a screw (CBS/M3x6) fixing the CR motor frame to [FRAME ASSY., LEFT].
12. Take out [DETECTOR, PF, FRONT] from the paper guide.
13. Slide [ROLLER, PF, DRIVE] to right once to dismount the one end of the shaft from [FRAME ASSY., LEFT], then slide it to left to remove it.
14. Remove an E-shaped retaining ring (#4) fixing [COMBINATION GEAR, 8, 30], and remove [COMBINATION GEAR, 8, 30] and [GEAR, 36] from [FRAME ASSY., LEFT].
15. Remove four screws (CBS/M3x6) fixing the paper guide and remove it.

⚠CAUTION

Be careful not to damage the actuator of [DETECTOR, PE, REAR] while removing [ROLLER, PF, DRIVE].

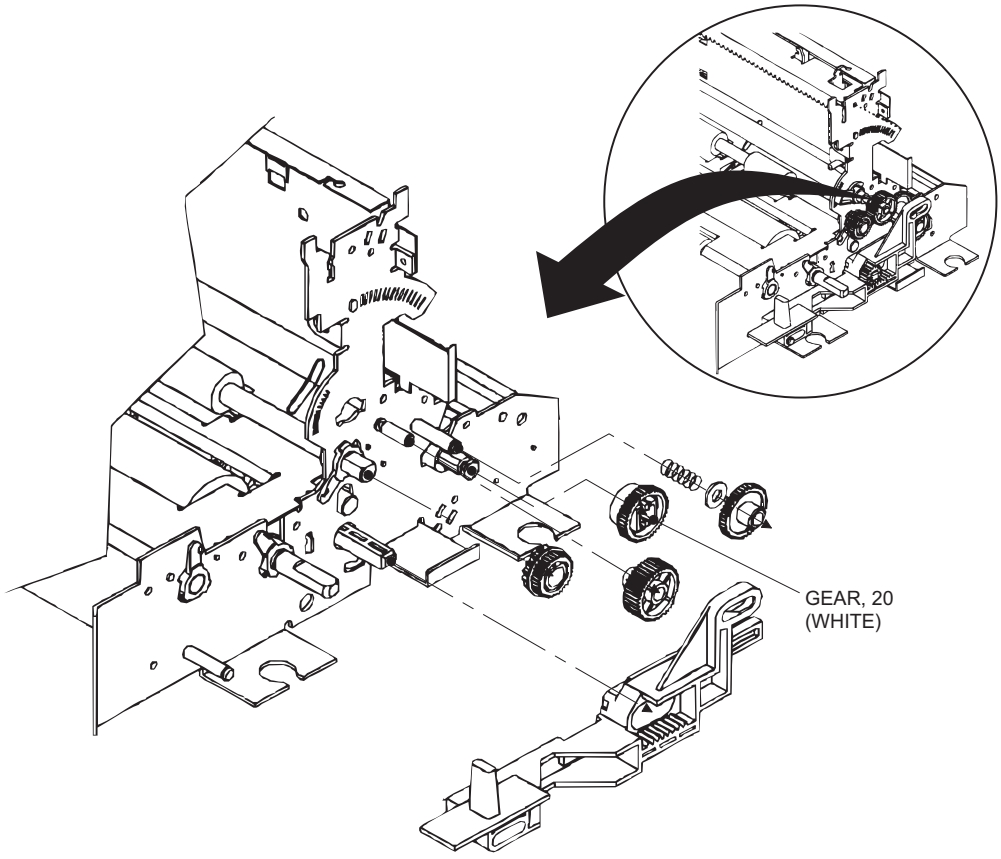


Figure 3-17. PAPER GUIDE ASSY. Removal (1)

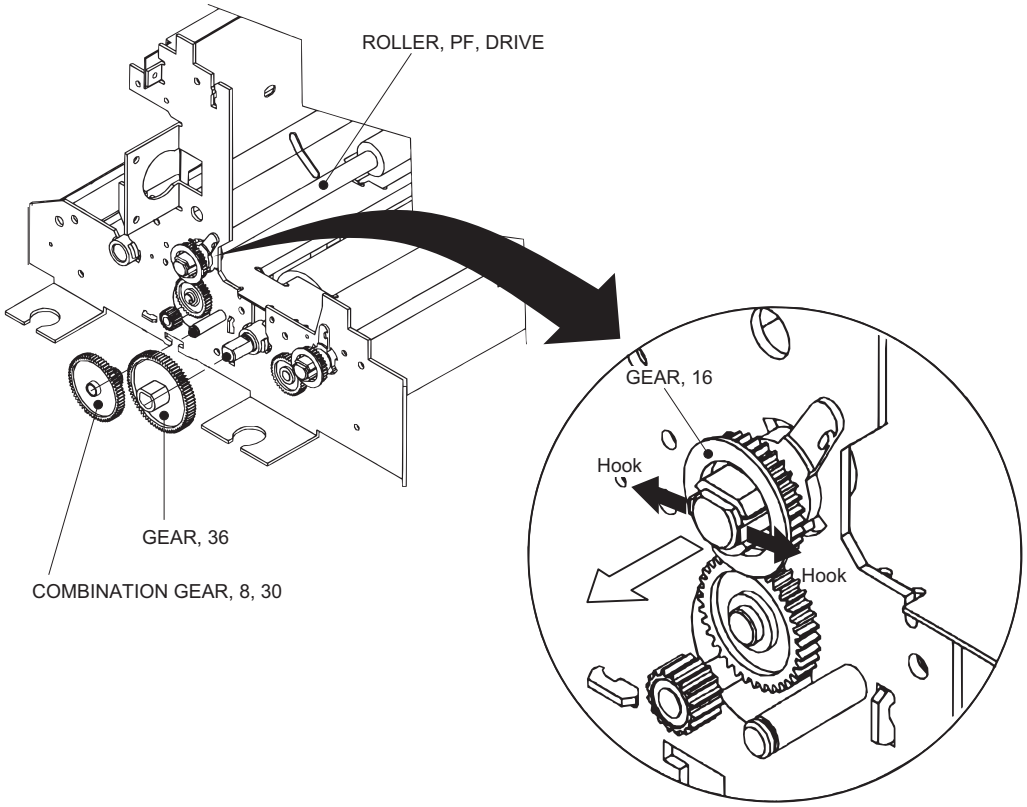


Figure 3-18. PAPER GUIDE ASSY. Removal (2)

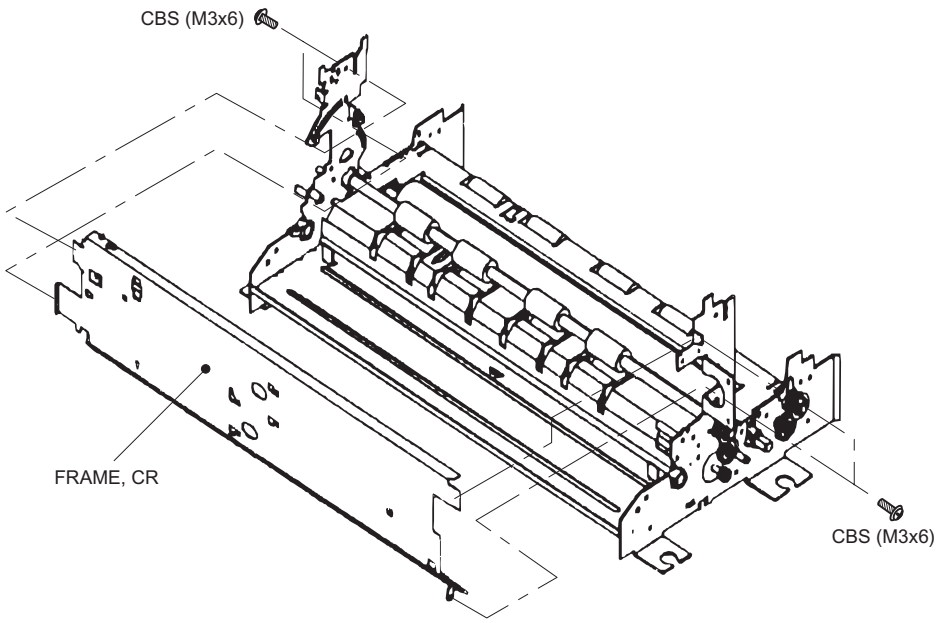


Figure 3-19. PAPER GUIDE ASSY. Removal (3)

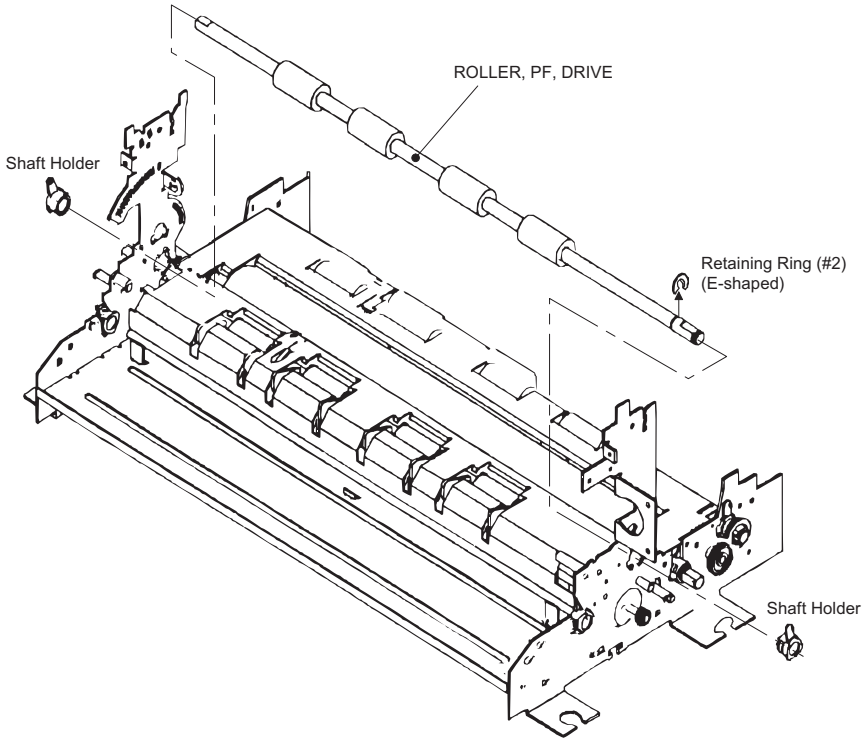


Figure 3-20. PAPER GUIDE ASSY. Removal (4)

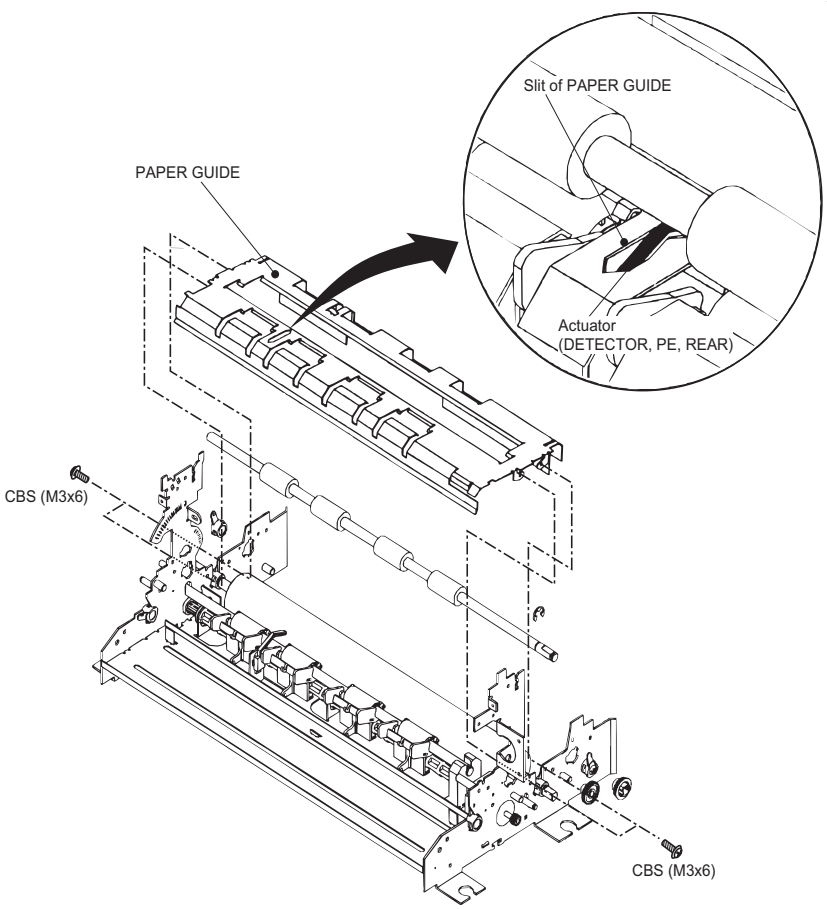


Figure 3-21. PAPER GUIDE ASSY. Removal (5)

3.2.14 Platen Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Remove the Paper Exit ASSY. (See Section 3.2.8)
3. Remove the Carriage ASSY. (See Section 3.2.12)
4. Remove the Paper Guide (See Section 3.2.13)
5. Rotate the platen shaft holder at the both ends of the platen, to match a tab to a cutout of the frame assembly.
6. Slide the platen to left once, and remove it to upward.

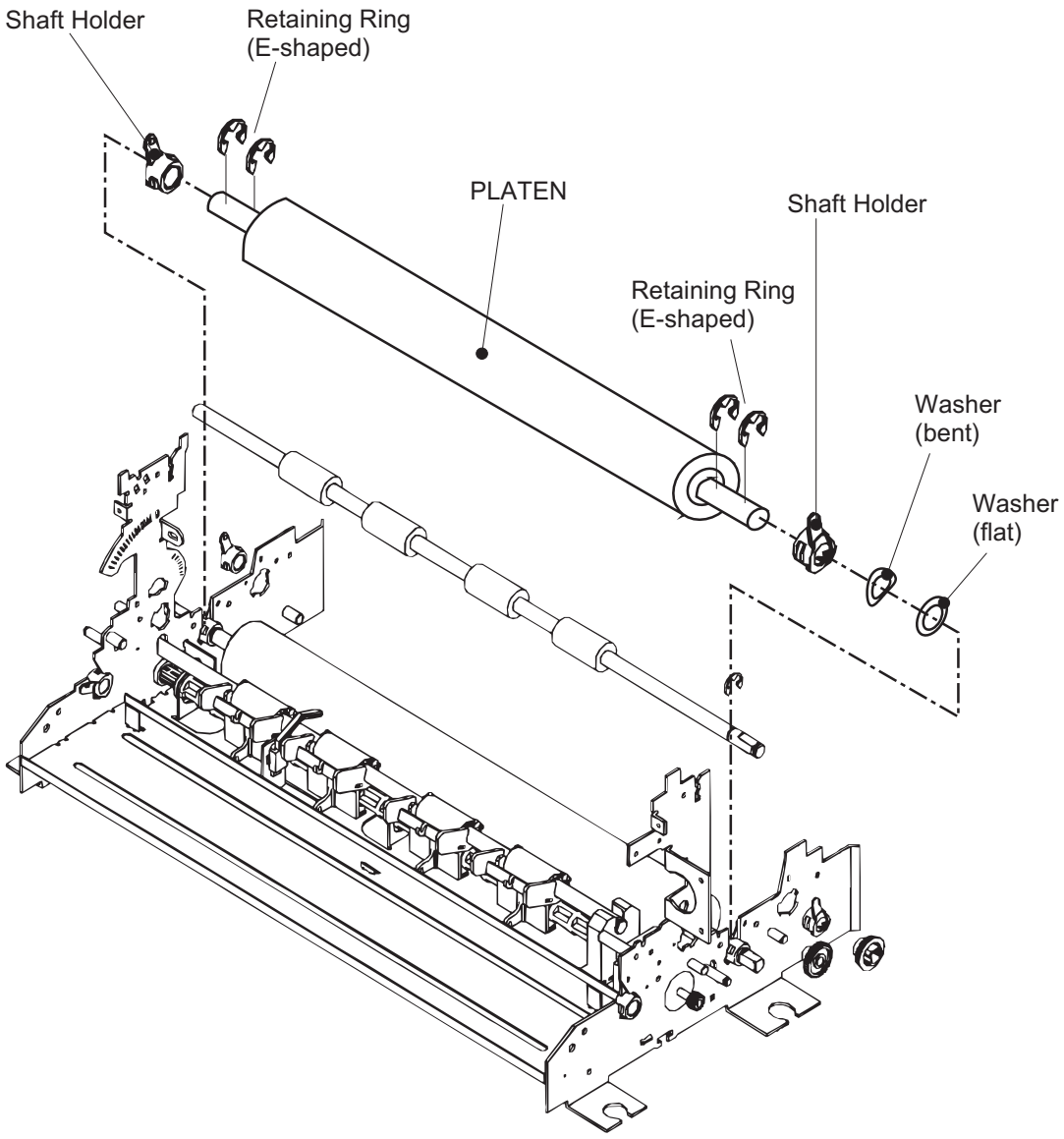


Figure 3-22. PLATEN Removal

3.2.15 MOTOR, PF Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Take out the cable of [MOTOR, PF] from the cable holder at the bottom of Printer Mechanism.
3. Remove tow screws (CBS/M3x6) fixing [MOTOR, PF] to [FRAME ASSY., LEFT] and remove it.

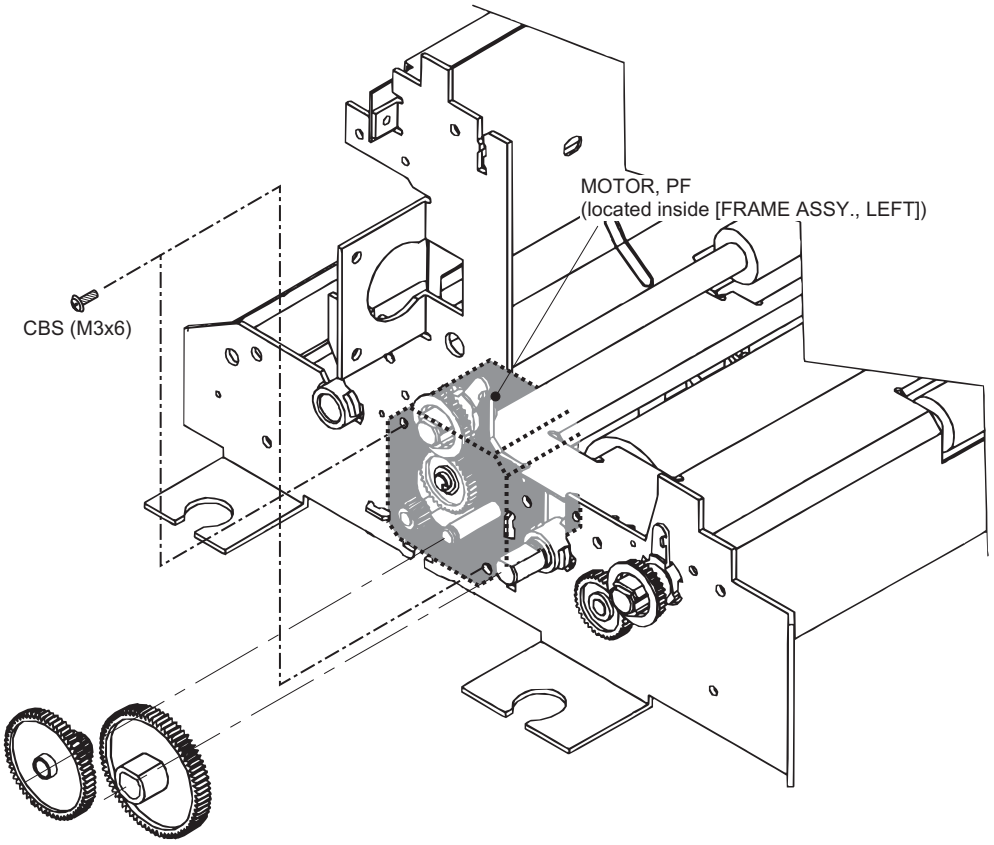


Figure 3-23. MOTOR, PF Removal

3.2.16 DETECTOR, HP Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Unhook [DETECTOR, HP] form [FRAME, CR] and remove it.
3. Disconnect the cable from [DETECTOR, HP].

3.2.17 DETECTOR, PG Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Unhook [DETECTOR, PG] from [FRAME ASSY., RIGHT] and remove it.
3. Disconnect the cable from [DETECTOR, PG].

3.2.18 DETECTOR, REL Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Unhook [DETECTOR, REL] from [FRAME ASSY., RIGHT] and remove it.
3. Disconnect the cable from [DETECTOR, REL].

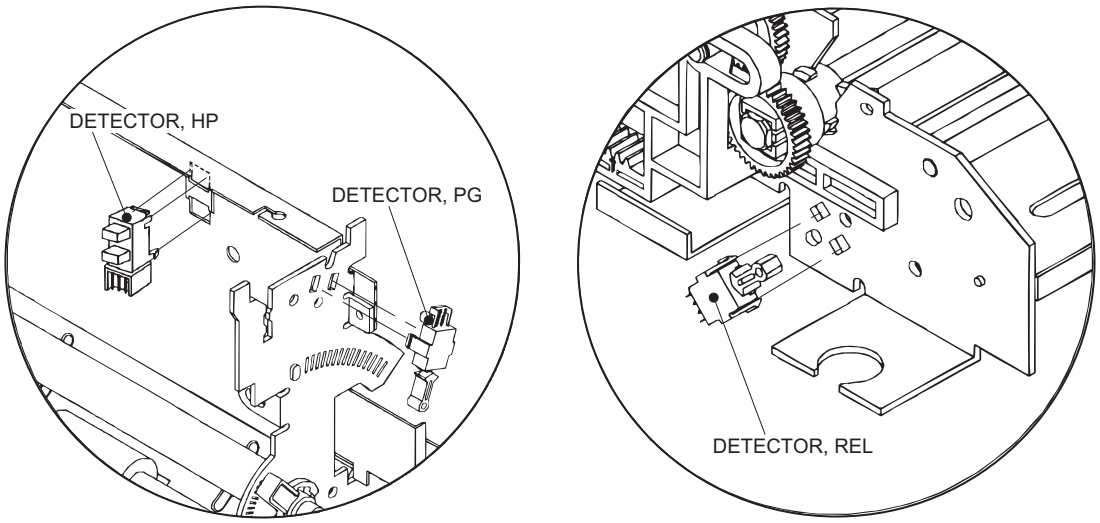


Figure 3-24. DETECTOR HP / PG / REL Removal

3.2.19 DETECTOR, PE, FRONT Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Remove the Paper Exit ASSY. (See Section 3.2.8)
3. Unhook the detector holder from both the Paper Guide Frame and a shaft of [ROLLER, PF, DRIVE].
4. Unhook [DETECTOR, PF, FRONT] from the holder and remove it.

CHECK POINT

Make sure to hook the detector holder to [ROLLER, PF, DRIVE] when reinstalling it.

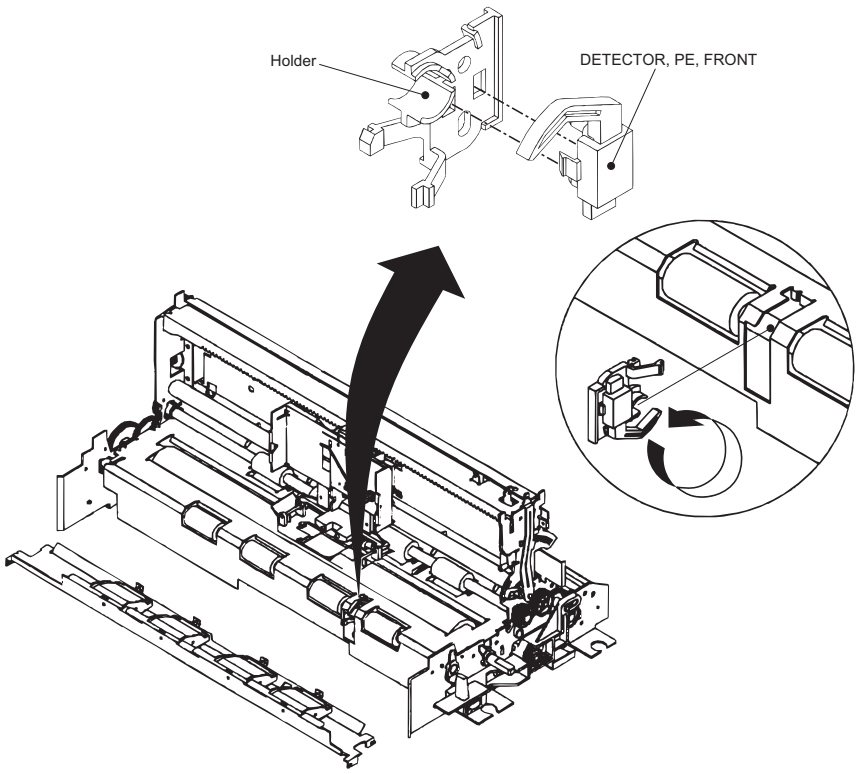


Figure 3-25. DETECTOR, PE, FRONT Removal

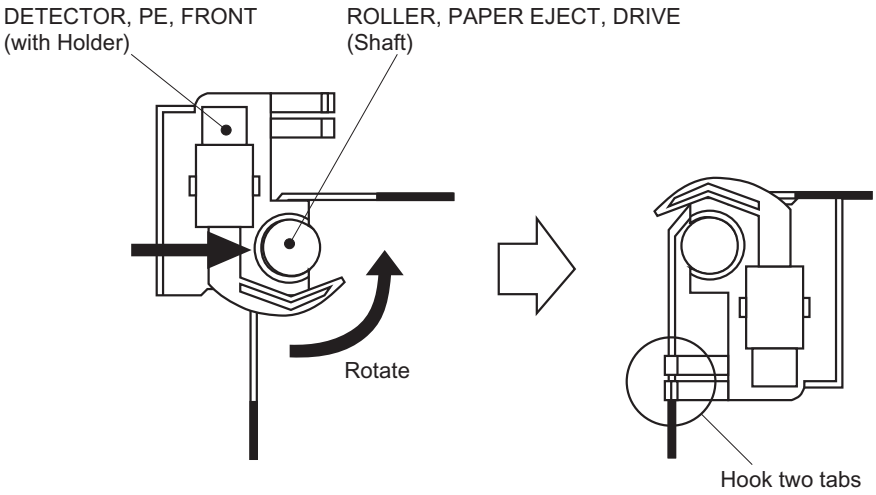


Figure 3-26. DETECTOR, PE, FRONT Installation

3.2.20 DETECTOR, PE, REAR Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Unhook three tabs of [HOLDER, CABLE, LOWER] at the bottom of the Printer Mechanism, and remove it from the Printer Mechanism.
3. Remove a screw (CBS/M3x6) fixing [DETECTOR, PE. REAR].
4. Remove the detector holder from [FRAME, BASE] by unhooking the fixing tabs and remove it.
5. Unhook [DETECTOR, PF, REAR] from the holder and remove it.

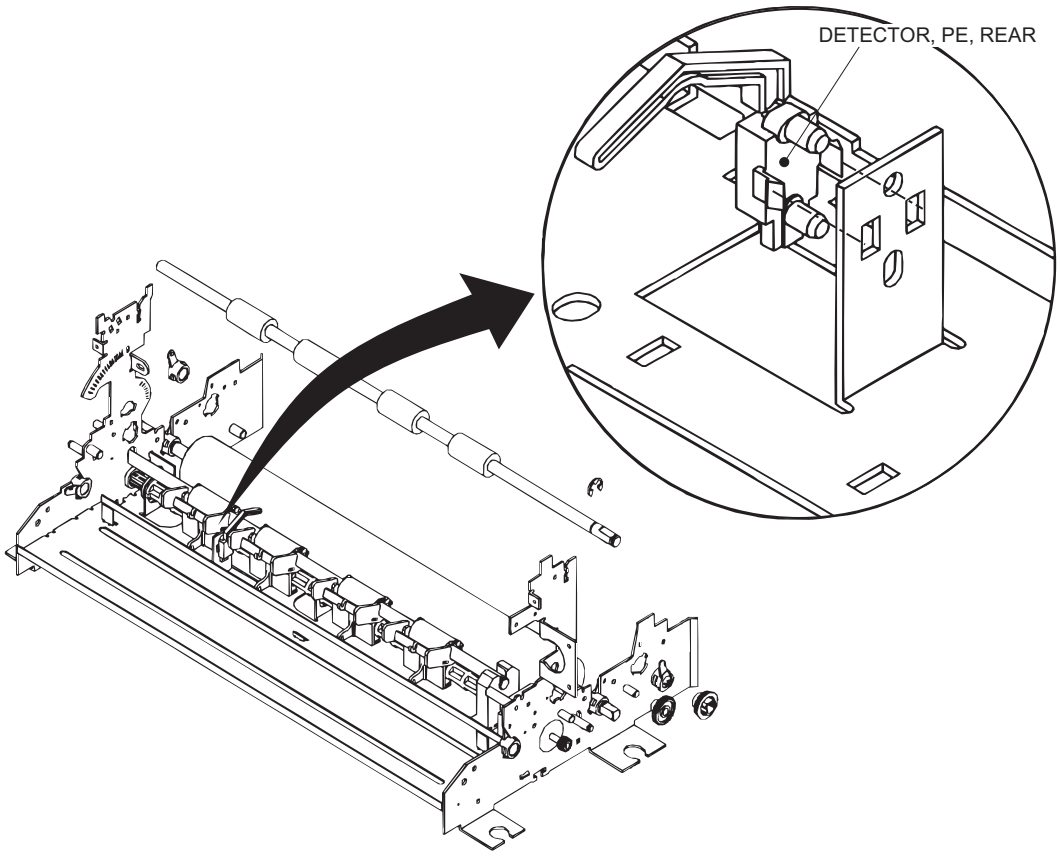


Figure 3-27. DETECTOR, PE, REAR Removal

3.2.21 LEVER, RELEASE Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Remove two E-shaped retaining rings (#4) that fixing [LEVER, RELEASE] to [FRAME ASSY., RIGHT].
3. Remove [LEVER, RELEASE] from [FRAME ASSY., RIGHT], together with [COMBINATION GEAR, 16, 16].

CHECK POINT

- ***Be careful not to lose [GEAR, 20] and a washer when removing [LEVER, RELEASE] as they may be popped out by [COMPRESSION SPRING, 20].***
- ***Make sure that [GEAR, 20] moves smoothly when moving [LEVER, RELEASE].***
- ***Make sure to match the position marking on [LEVER, RELEASE] and [COMBINATION GEAR, 16, 16], as shown in figure below, when reinstalling [LEVER, RELEASE].***

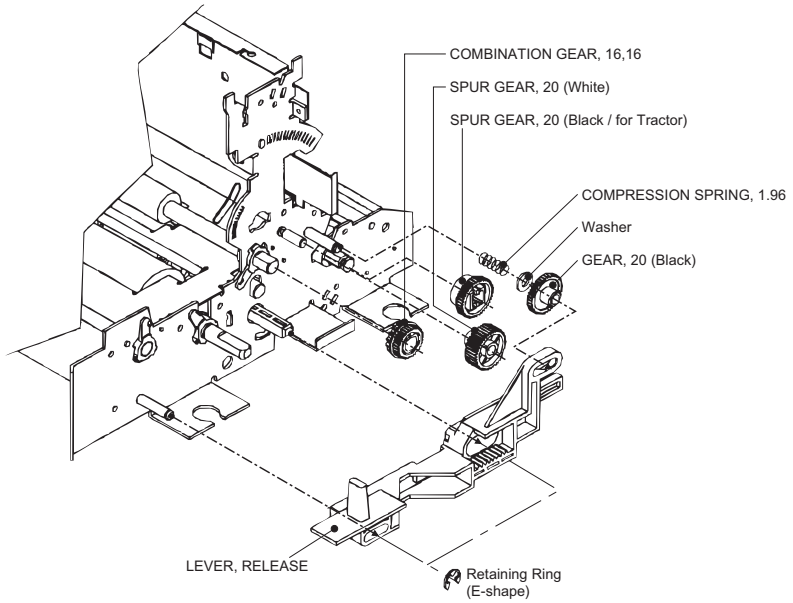


Figure 3-28. LEVER, RELEASE Removal

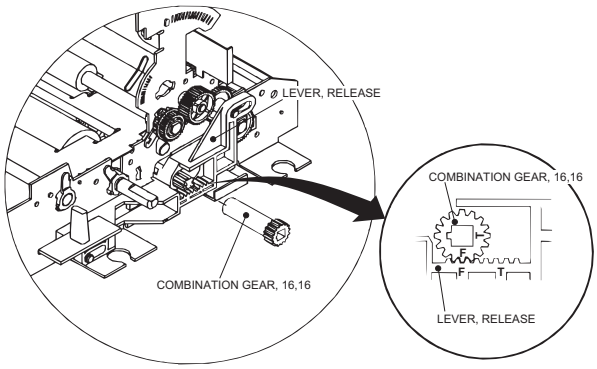


Figure 3-29. LEVER, RELEASE Installation

3.2.22 Tractor ASSY. Removal

1. Remove the Printer Mechanism (See Section 3.2.2)
2. Remove two hexagonal nuts fixing [SHAFT, TR, GUIDE] at the both side of the mechanism.
3. Rotate the shaft holder attached to the right end of [SHAFT, TR, DRIVE] to match the tabs to a cutout of [FRAME ASSY., RIGHT], and remove it.
4. Remove the Tractor ASSY. from the Printer Mechanism.

CHECK POINT

When re-assemble the Tractor ASSY., make sure to match the position marking on [TRACTOR, RIGHT] and [TRACTOR, LEFT], as shown in figure below, while inserting [SHAFT, TR, DRIVE] into them.

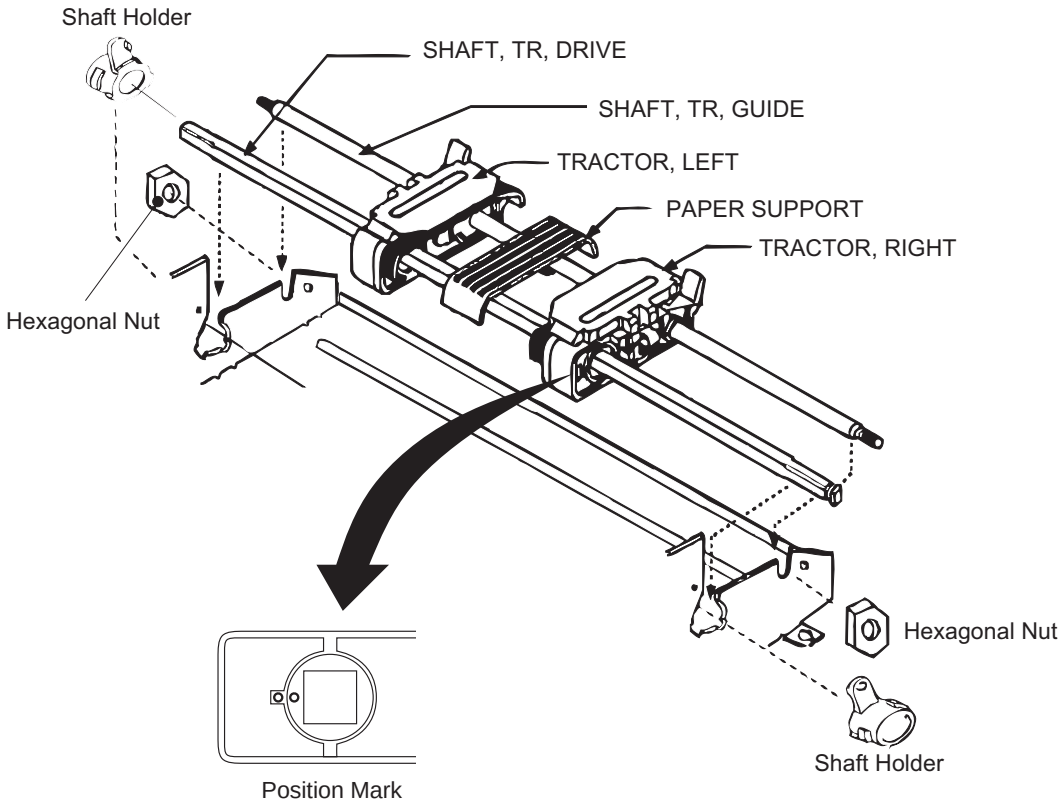


Figure 3-30. TRACTOR ASSY. Removal

Chapter 4
ADJUSTMENTS

4.1 Adjustment Overview 4-1

4.1.1 Required Adjustments 4-1

4.1.2 Required Adjustment Tools 4-1

4.2 Adjusting and Resetting the Printer 4-2

4.2.1 Platen Gap Adjustment 4-2

4.2.2 Factory Settings 4-3

4.2.3 Bi-d Adjustment 4-5

4.1 Adjustment Overview

4.1.1 Required Adjustments

This section describes what adjustments are required after any part is removed or replaced. The following table shows the relationship between the repaired item and the adjustment.

Table 4-1. Required Adjustments

Required / Adjustment	Platen Gap	Bi-d Print Alignment	Factory Settings
Print Head Removal or Replacement	❍ (*2)	---(*1)	---
Printer Mechanism Replacement	---	❍	❍
Main Board Replacement	---	❍	❍
Timing Belt Replacement	❍	❍	---
Platen Roller Replacement or Removal	❍	---	---
CR Unit Replacement or Removal	❍	❍	---
CR Motor Removal or Replacement	---	❍	---
PW(TOP) Detector Replacement	---	---	❍
EEPROM Initialization	---	❍	❍

*Note*1)*: --- means adjustment is not required.
*Note*2)*: ❍ means adjustment is required.

4.1.2 Required Adjustment Tools

The following table shows the tools required for each adjustment.

Table 4-2. Required Adjustment Tools

Adjustment	Required Tool	Page
Platen Gap	Thickness Gauge	4-2
Factory Settings	Settings Diskette	4-3
Bi-d Print Alignment	Settings Diskette	4-3

4.2 Adjusting and Resetting the Printer

4.2.1 Platen Gap Adjustment

This adjustment consists of platen parallelism adjustment and platen gap adjustment. Parallelism adjustment is to adjust parallelism of track(CR guide shaft) that platen roller and print head moved. Since the core of parallelism adjustment bushing is tilted to the CR guide shaft, it is possible to move the CR guide shaft closer to or away from the platen roller by rotating the bushing. Parallelism adjustment is performed by equalizing the gap between the platen roller and CR guide shaft in the right and left edges of the printable area.
On the other hand, the platen gap adjustment is to set the gap between the platen roller side and print head at the specified value. Since the core of the CR guide shaft is also tilted, it is possible to move the print head closer to or away from the platen roller by rotating the shaft.

1. Remove the upper housing. (Refer to section 3.2.4)
2. Remove the paper eject unit. (Refer to section 3.2.5)
3. Remove the print head. (Refer to section 3.2.2)
4. Remove the ribbon mask. (Refer to section 3.2.3)
5. Install the print head.
6. Set the adjust lever to the “0” column position.
7. Loosen a little bit the hexagon nut securing the PG adjust lever and CR guide shaft.
8. Rotate the CR guide shaft so that the big hole of the countersinking located on the right edge of the CR guide comes towards you.
9. Move the carriage unit to the left edge.
10. Set the thickness gauge to 0.43mm and insert it vertically between the print head and platen roller.
11. Insert the screwdriver into the hole of the countersinking located on the right edge of the CR guide shaft and rotate the screwdriver until the platen roller and print head touches each other lightly.
12. Move the carriage unit to the right edge.
13. Insert the thickness gauge between the print head and platen roller.
14. Continue performing adjustment steps 8 to 12 rotating the parallelism adjustment bushing until the parallelism gap of right and left becomes under 0.02mm.
15. When the parallelism gap of right and left becomes less than 0.02mm, move the carriage unit to the center position of the printable area.
16. Insert the thickness gauge between the print head and platen roller, and rotate the CR guide shaft so that the platen gap becomes 0.435 ± 0.015mm.
17. After the adjustment is over, tighten the hexagon nut securing the adjust lever.
18. Install the ribbon mask.

⚠ CAUTION

☑ *Do not rotate the platen roller during this adjustment.*

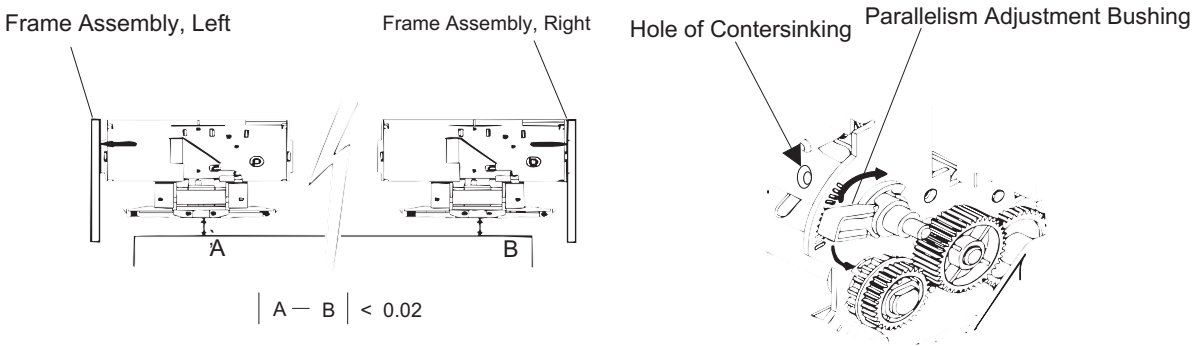


Figure 4-1. Platen Gap Adjustment

4.2.2 Factory Setting

1. Unplug the cable of the printer from the AC socket.
2. Connect the printer and the PC by the parallel interface cable.
3. Plug in the cable of the printer and turn on the printer.
4. Set the release lever at the tractor side and also set the 12-inch continuous paper (1p).
5. Load “GWBASIC” and execute the adjustment program. Following menu will be displayed.

```
Program: LQ670a          Setting :
    VR 0= 0  VR 1= 0  VR 2= 0
    ** * *
[Print select]
    (1)  9 pins
>   (2)24 pins
```

6. In this menu, select **24 pins** by moving the cursor with the ↑ or ↓ and press ENTER key. After 24 pins is selected, the following Setting file menu for default setting is shown.

```
Program :LQ670a          Setting :
24 pins  VR 0= 0  VR 1 = 0  VR 2= 0
                    ** * *
[ Setting file ]
>   (1)DEFSTD                (6) ITALIC
    (2)USASTD
    (3)EURSTD
    (4)NLSP
    (5)RUSSIAN
```

7. In this Menu, select **DEFSTD** by moving the cursor with the ↑or ↓ and press ENTER key. After the default setting, following menu will be displayed.

```
Program : LQ670a             Setting: DEFSTD
24 pins     VR 0= 0  VR 1= 0  VR 2= 0
                      ** * *
[ Process select ]
>   (1) In line
    (2) Out-Going
```

Table 4-3. Destination Setting

Destination	Destination Code	Destination	Destination Code
EUL(Middle East), Japan	DEFSTD	EDG(NLSP)	NLSP
EAI, EAI(Latin), EAL, ESP, EHK, ETT	USASTD	--	RUSSIA
Europe Standard, EDG, EUL(Nordic), EFS, EIS, EBS	EURSTD	--	ITALIC

8. In this Menu, select **In line** by moving the cursor with the ↑or ↓ and press ENTER key. After the selection is made, the following menu is displayed.

```
Program : LQ670a          Setting: DEFSTD
24 pins    VR 0= 0  VR 1= 0  VR 2= 0
                    ** In-line **
[ Carriage Width ]
>   (1)106 column
    (2)136 column
```

9. In this menu, Select **106 column** by moving the cursor with the ↑or ↓ and press ENTER key. After the selection is made, the following menu is displayed.

```
Program : LQ670a          Setting: DEFSTD
24 pins    VR 0= 0  VR 1= 0  VR 2= 0
                      **  In-line  **
[ Main MENU ]
  (1) Bi-D Adjust                (6) Envelope
>(2) FF paper                    (7) — SUB MENU
  (3) A4 Horizontal
  (4) 1P Cut sheet
  (5) A4 6P Cut sheet
```

10. In this menu, select **FF paper** by moving the cursor with the ↑or ↓ and press ENTER key. Perform the test printing for one sheet of the continuous paper.
11. After setting, go to Bi-D adjustment or complete the program regularly and turn off the printer.

⚠ CAUTION

- ☑ *Since the setting values are registered in EEPROM of the main board after the test printing, make sure to perform test printing after adjustment program is completed.*
- ☑ *If the wrong destination is input, the correct printer performance can not be guaranteed.*
- ☑ *Since this printer uses the secondary switching and AC voltage is charged on the primary side, make sure to plug off the AC cable when you pull in or out the interface.*
- ☑ *Since GWBASIC system and all other necessary files are included in the disk of the adjustment program, load from the disk when you perform adjustment.*
- ☑ *In the adjustment program, other items which is not necessary for this adjustment are also included. However, we can not guarantee the normal printer operation if the item, which is not on the manual, is selected.*

4.2.3 Bi-d Adjustment

Bi-d adjustment can be done either by the panel operation or adjustment program.
This section describes Bi-d adjustment by the program.

1. Plug off the cable of the printer from the AC socket.
2. Connect the printer and the PC by the parallel interface.
3. Plug in the cable of the printer and turn on the printer.
4. Set the release lever to the tractor side and set the 12-inch continuous paper(1p).
5. Load “GWBASIC” and execute the adjustment program. After setting destination and printing, following main menu is displayed.

```
Program : LQ670a        Setting: DEFSTD
24 pins   VR 0= 0  VR 1= 0  VR 2= 0
                ** In-line **
[ Main MENU ]
>(1)Bi-D Adjust              (6) Envelope
  (2) FF paper               (7) — SUB MENU
  (3) A4 Horizontal
  (4) 1P Cut sheet
  (5) A4 6P Cut sheet
```

6. Select **Bi-D Adjust** by moving the moving the cursor with the ↑or ↓ and press ENTER key. After the selection is made, the following menu is displayed.

```
< Bi-D Adjustment >

    Mode 1 = 0
    Mode 2 = 0
    Mode 4 = 0

Cancel  Print  Speed  Value  Write  Default
 [ESC] [SPACE] [↑ ↓] [← →] [RET] [HOME]
```

7. Select **Mode 1** by moving the cursor with the ↑or ↓ and press SPACE key. 4 lines of Bi-D pattern will be printed.

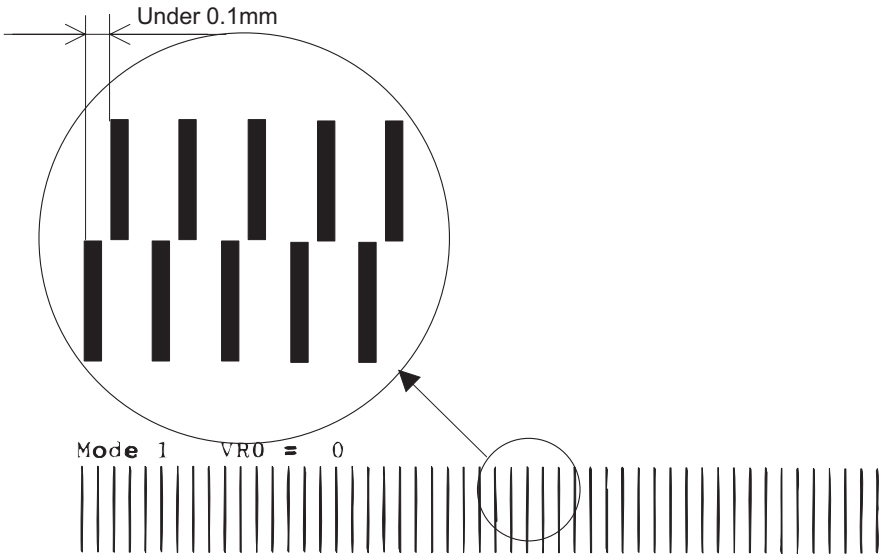


Figure 4-2. Bi-D Adjustment

8. If 4 lines are not straight vertically, you can adjust by changing setting values with ← or→ key.

   - If the second and fourth lines are printed right side, compared with the first and third lines, change the setting value by pressing ← key. Then, printing pattern with the new setting will be printed by pressing SPACE key.
   - If the second and fourth lines are printed left side, compared with the first and third lines, change the setting value by pressing → key. Then, printing pattern with the new setting will be printed by pressing SPACE key.
     Repeat the procedure until the 4 lines line up vertically and Bi-d dispersion becomes under 0.1mm. After adjustment of Mode 1 is completed, repeat the same procedure for Mode 2 and Mode 4.

9. After adjustment is completed at each mode, the setting value is registered by pressing ENTER key.
10. To exit the program, press ESC and complete the program regularly and turn off the printer.

⚠ CAUTION

- ☑ *Since the setting values are registered in EEPROM of the main board when the printer is turned off, make sure to turn off the printer after adjustment program is completed.*
- ☑ *Since this printer uses the secondary switching and AC voltage is charged on the primary side, make sure to plug off the AC cable when you pull in or out the interface.*
- ☑ *Since GWBASIC system and all other necessary files are included in the disk of the adjustment program, load from the disk when you perform adjustment.*
- ☑ *In the adjustment program, other items which is not necessary for this adjustment are also included. However, we can not guarantee the normal printer operation if the item, which is not on the manual, is selected.*

Chapter 5
Product Descriptions

5.1 Overview.....5-1
5.2 Unit Level Troubleshooting 5-2
5.3 Repairing the Power Supply Circuit Board 5-11
5.4 Repairing the Main Board 5-14
5.5 Repairing the Printer Mechanism.....5-17

5.1 Overview

This chapter contains flowcharts and checkpoint tables to help you troubleshoot the printer. Flowcharts let you isolate a faulty unit based on abnormal symptoms. The checkpoint tables let you identify the faulty part or unit by checking the values or ranges listed for each component.

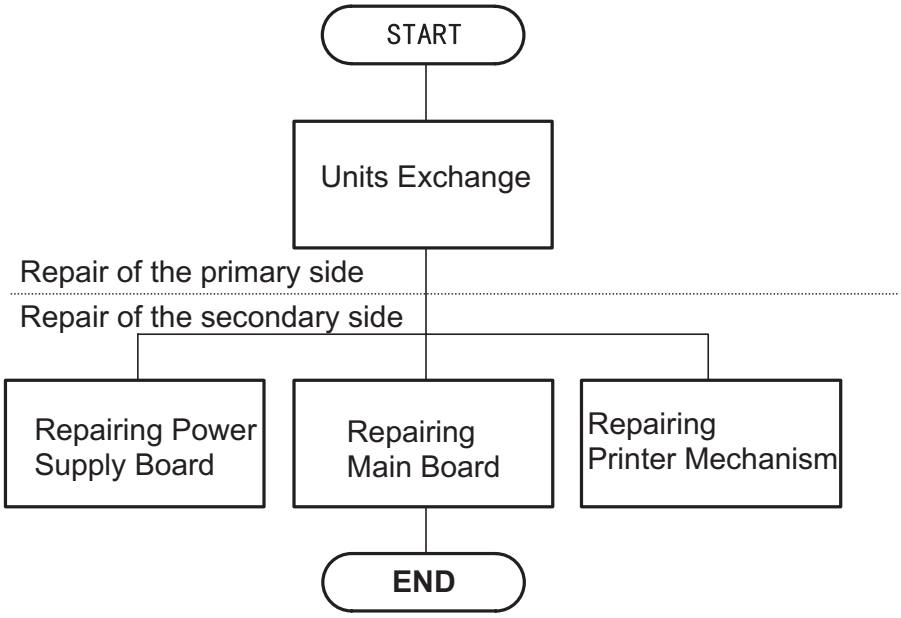


Figure 5-1. Troubleshooting Process Flowchart

The first step of repairing is the unit exchange. Servicemen need to find defective units and replace them. After repairing, it is necessary to perform appropriate adjustments (Refer to Chapter 4 for Adjustment) and Lubrication (Refer to Chapter 6 for Maintenance). The table below shows tools required for the troubleshooting.

Table 5-1. Tools Required for the Troubleshooting

Name	Specification
Oscilloscope	Recommended more than 50MHz
Multimeter	Analog is OK, but Digital multimeter is recommended.

Also, this printer has self-diagnosis function which beeps when the printer detects error conditions. Following table shows error conditions and buzzer sounds to indicate errors.

Table 5-2. Indicators and Buzzer

Error Condition	Indicator					
	Pause	Paper Out	Tear Off/ Bin	Condensed	Font	Buzzer
Paper out error	On	On	---	---	---	❍X3
Paper Jam error	On	Blink	---	---	---	●X5
Paper eject error	On	Blink	---	---	---	❍X3
Head Hot	Blink	---	---	---	---	---
Fatal error	Blink					---

Note) ❍ indicates that the beep sounds for 100ms with an interval of 100ms.
● indicates that the beep sounds for 500ms with an interval of 100ms.

5.2 Unit Level Troubleshooting

You may be able to identify the defective unit just from the symptom displayed. The table below provides the symptoms for a number of failures. Once you identify the problem, refer to the flowchart listed in the right-hand column of the table below to determine the cause of the problem.

Table 5-3. Symptoms and Problem Descriptions

Symptom	Problem Description	Flowchart No.
The printer does not operate even when the power is turned on.	•LED of the control panel does not indicate. •Mechanism does not perform the initialization.	Flowchart 1
Printer goes to the error state when the power is turned on.	•One or more than two LEDs are on or blinking, indicating error. •After initialization, the printer goes to error state.	Flowchart 2
Abnormal printing during the self-test	•No printing operation. •One or more than two dots are missing. •Poor printing quality.	Flowchart 3
Abnormal paper feed	•Printer does not feed a paper at all. •Abnormal printing area. •Paper Jam often occurs.	Flowchart 4
Control panel does not work correctly	•The printer does not response to the switch operation correctly. •Panel buttons do not work. •Abnormal indication on the control panel	Flowchart 5
Abnormal operation when the power is on.	•Self test is normal, but the data from the PC is not printed correctly. •Printer does not print. •PC indicates error when the printer operates.	Flowchart 6

[Printer does not work when the power is turned on]

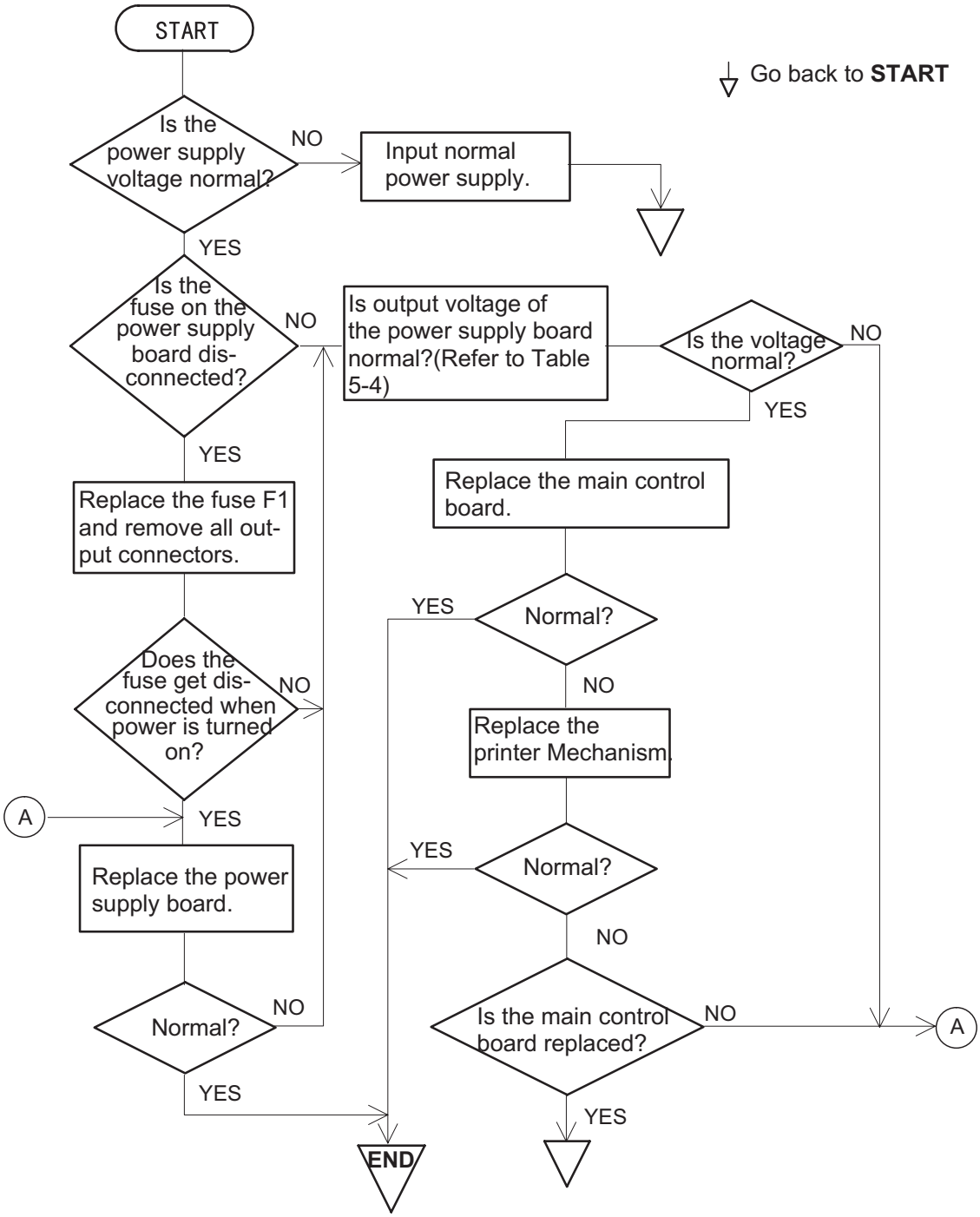


Figure 5-2. Flowchart 1

[Printer goes error conditions when the power is turned on]

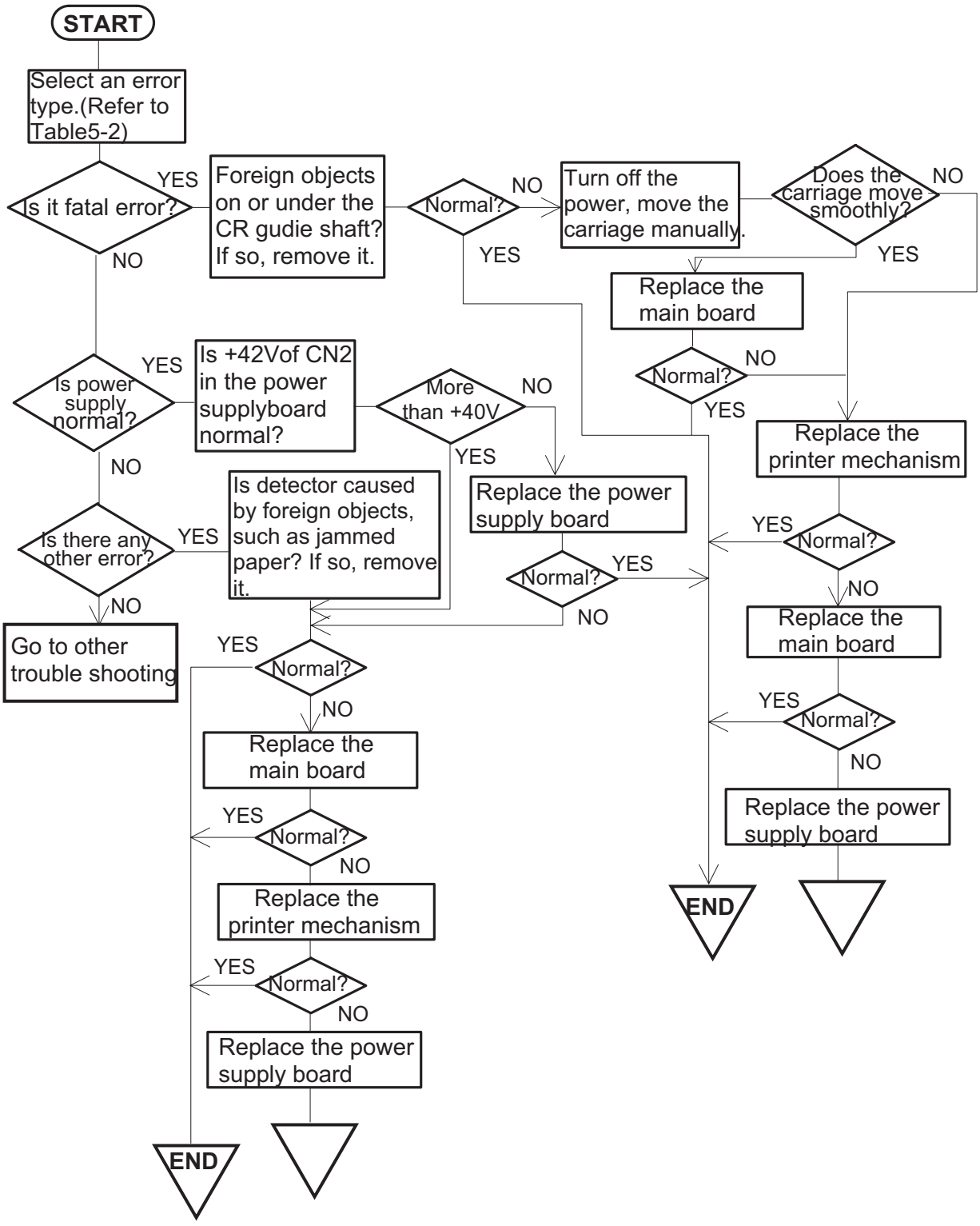


Figure 5-3. Flowchart 2

[Abnormal printing during the self-test]

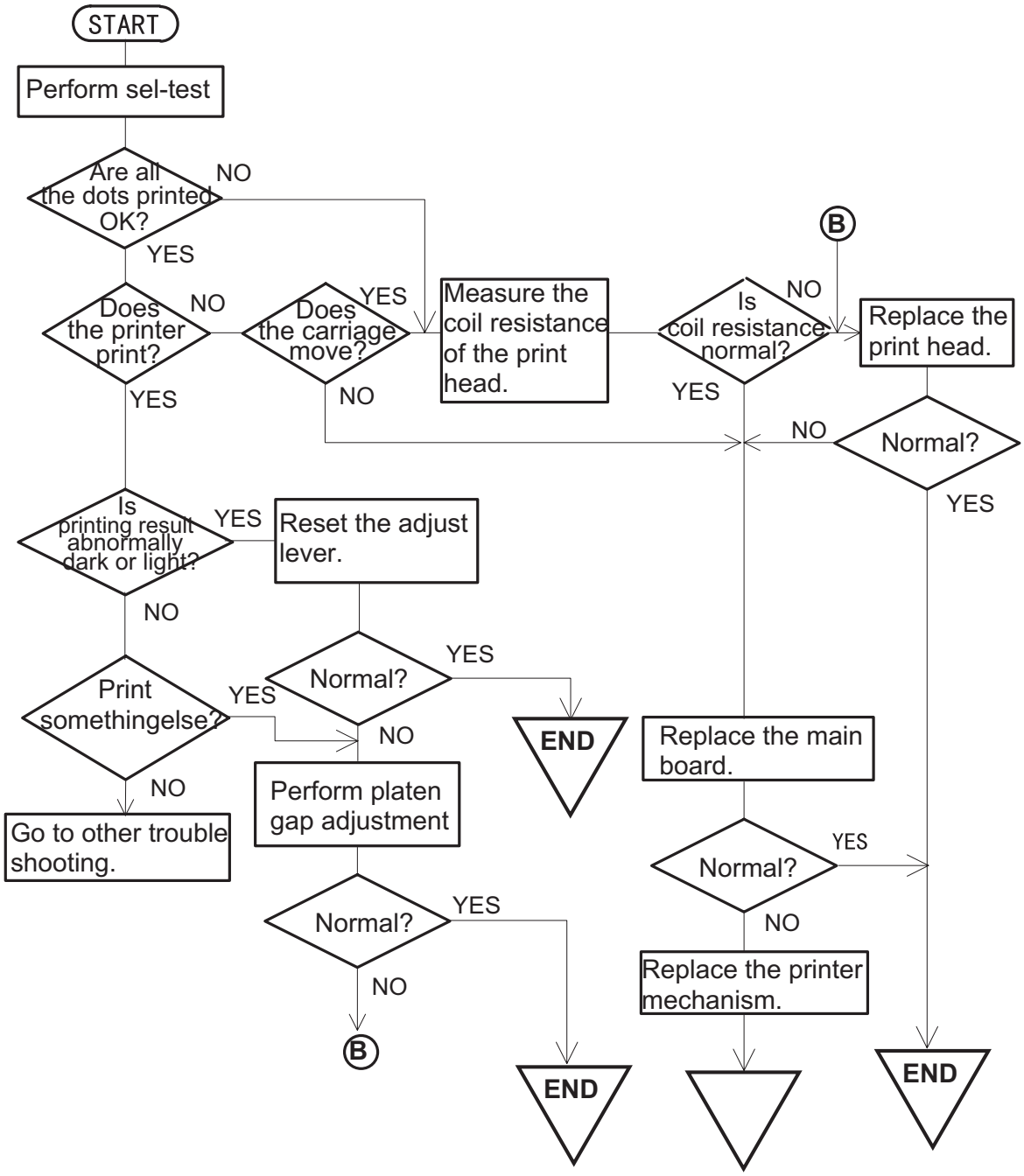


Figure 5-4. Flowchart 3

[Abnormal paper feed]

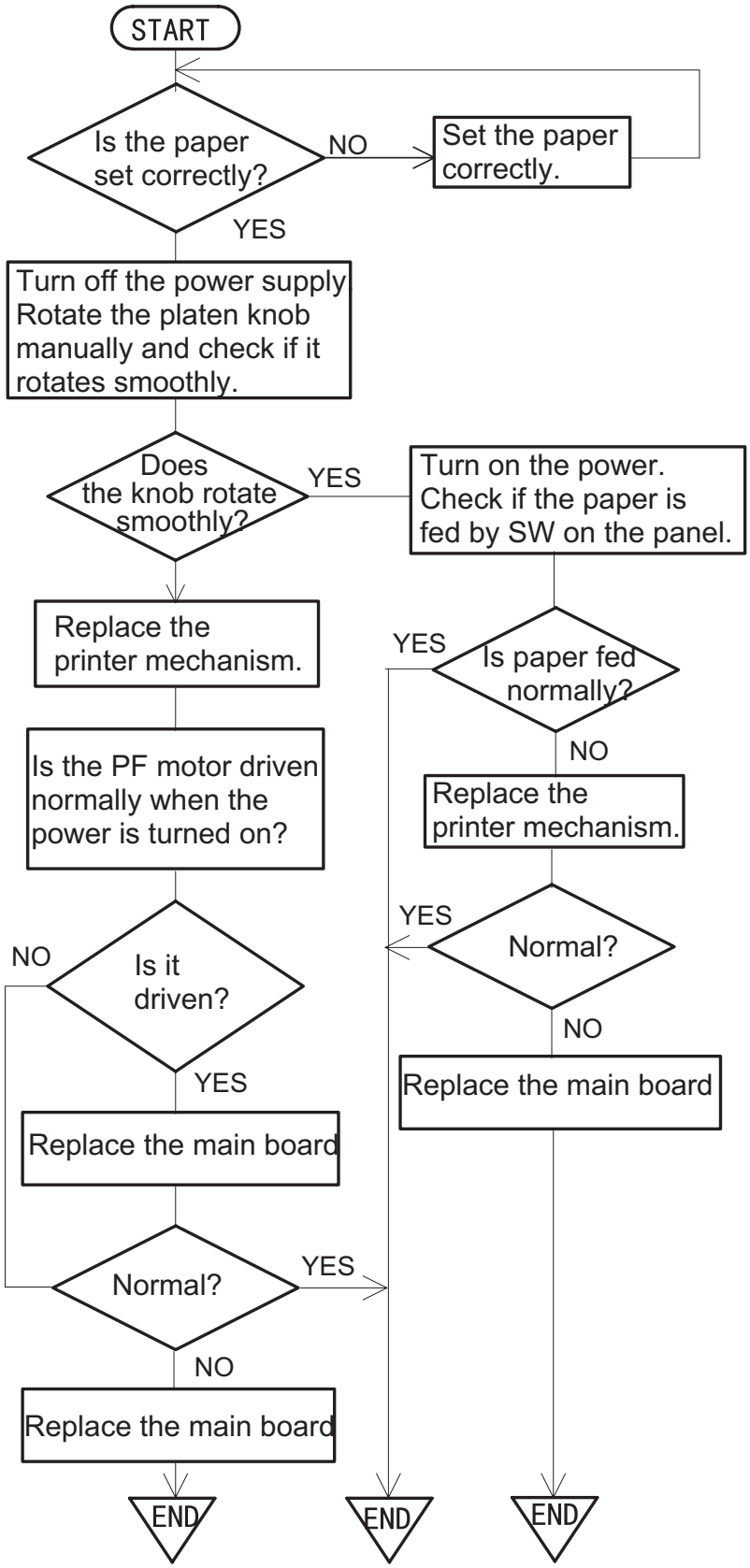


Figure 5-5. Flowchart 4

[Abnormal control panel operation]

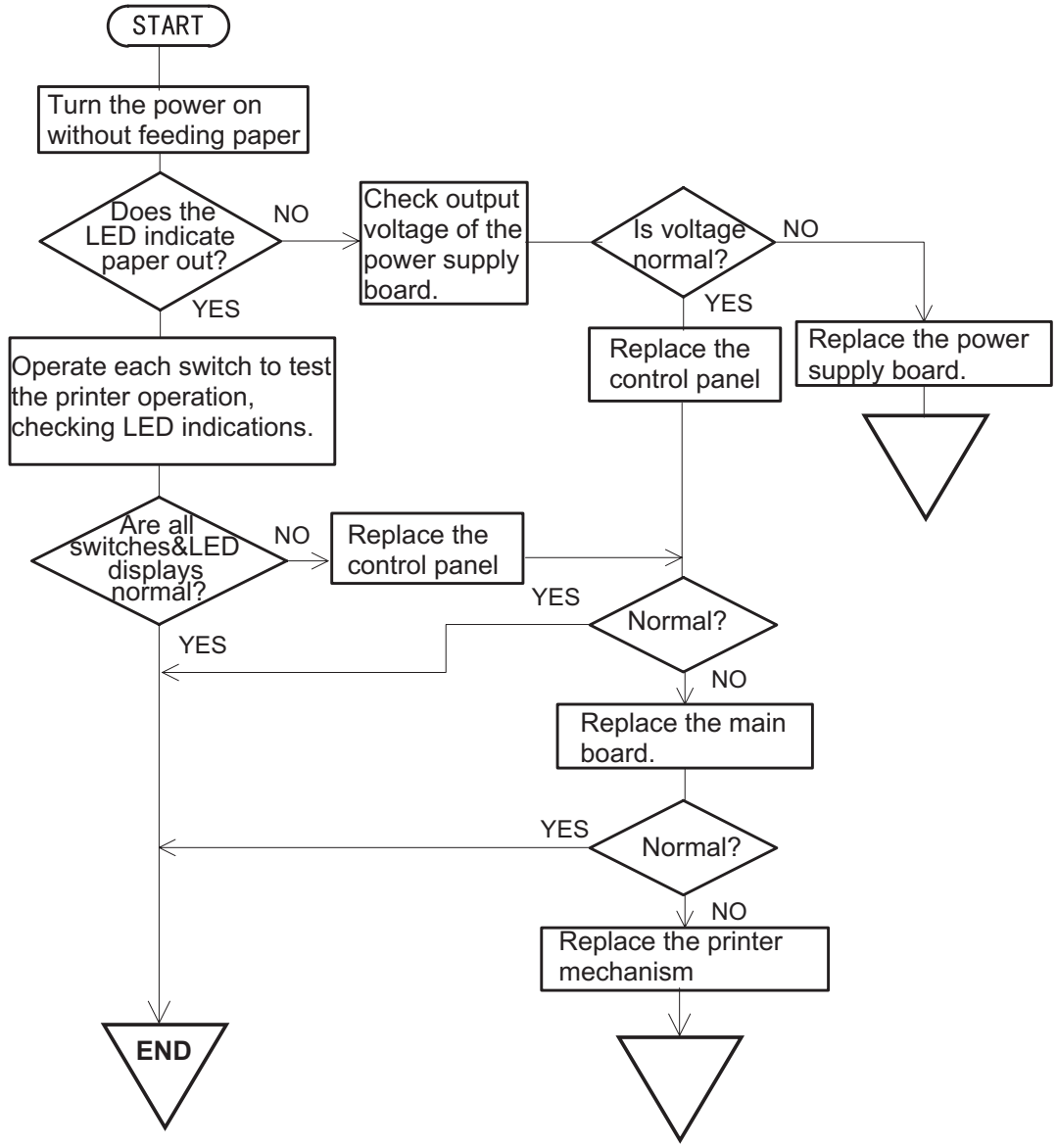


Figure 5-6. Flowchart 5

[Abnormal operation at power on]

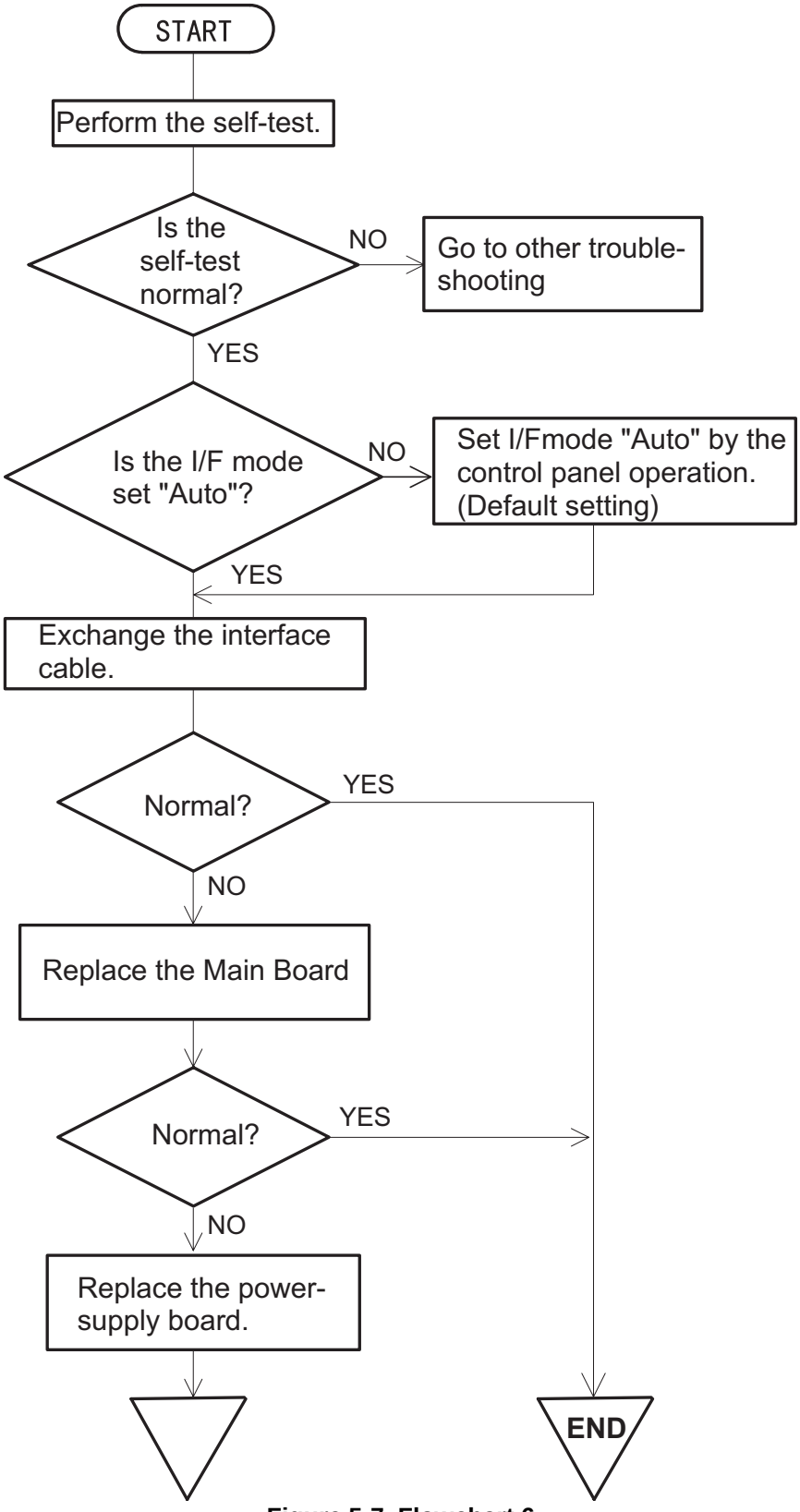


Figure 5-7. Flowchart 6

Table 5-4. Output Voltage of the Power Supply Board

Connector No.	Pin No.	Output voltage
CN2	1.2	GP
	3,4	+42V
	5.6	GL
	7,8	+5V

Note) Each head coil resistance can be measured between the number of each common terminal and the same wire number.
Direct current resistance: 39.3±2.7Ω (at 25 °C)

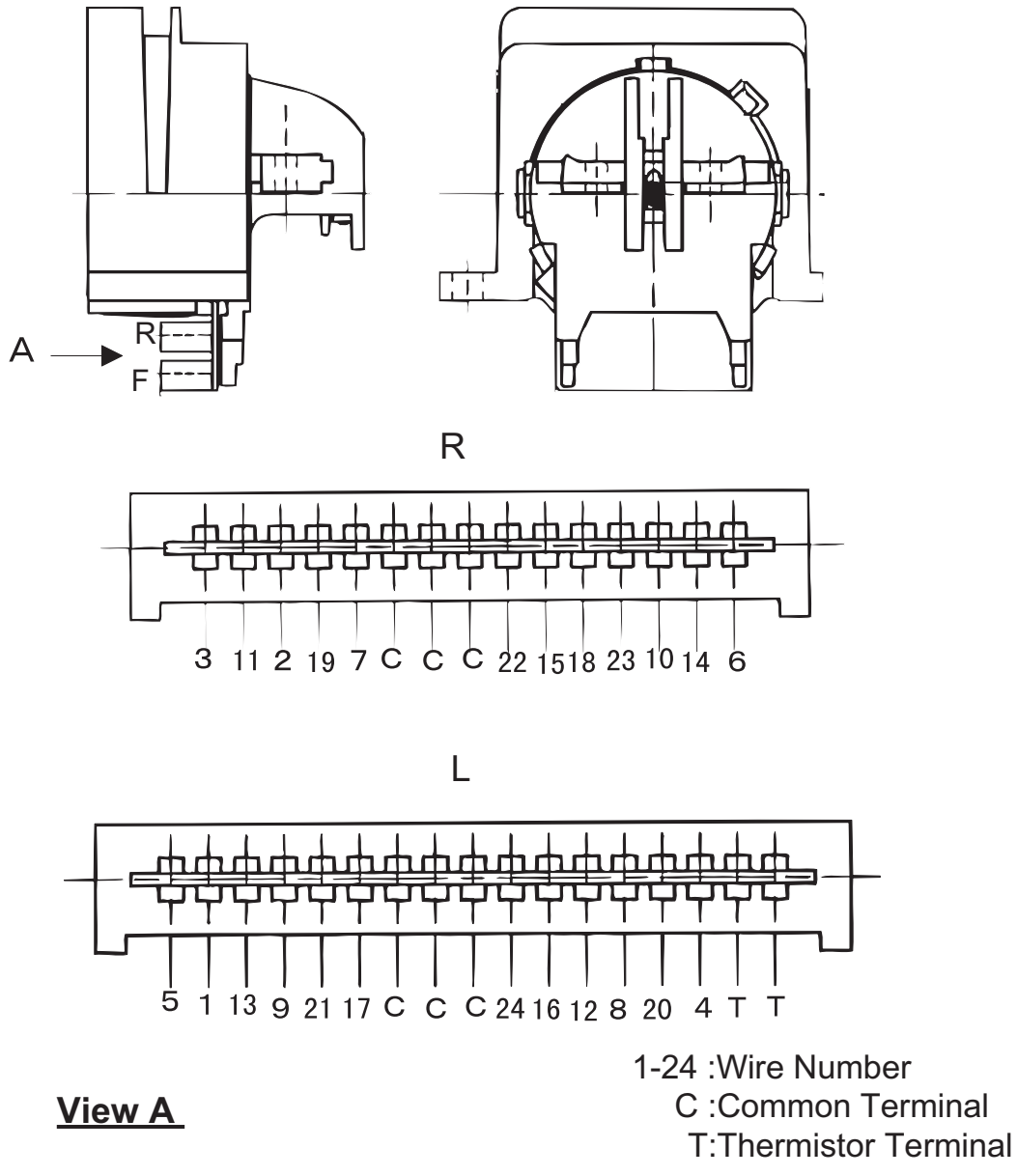


Figure 5-8. Print Head Connector Pin Alignment

Refer to the tables below and it can be easily determined if a particular part is defective or not by checking the coil resistance of the motor or continuity of the transistor using multimeter.

Table 5-5. Coil Resistance of the Motor

Connector No.	Common pin No.	Test pin No.	Test method	Meter Reading
CN9 (CR motor)	5	1,2,3,4	Place one lead of the multimeter on pin 5 and the other lead on each terminal of 4-phase.	3.5Ω±10% (At 25 °C)
CN8 (PF Motor)	--	1,2,3,4	Place one lead of the mulimeter on one pin and the other lead on each pin.	16Ω±10% (At 25 °C)

Table 5-6. Test Points of the Print Head Driver

Transistor No.	Test Method*	Meter Reading
Q1~Q24	Connect the lead of the multimeter between the base of the transistor and collector or between the base and the emitter. Also, reverse + and – and check it.	It is normal as long as it is not completely opened or not completely closed.

Note)*Turn off the printer and set the multimeter for measuring resistance or diode checking mode.

Table 5-7. Test Points of the Detectors

Detector Connector No.	Test Method	Normal Values
CN14 (Front PE detector)	Connect one lead of the multimeter on the pin 1 and, the other side to the pin2 and change over the actuator of the detector.	Change over Open/Short
CN13 (Rear PE detector)	Connect one lead of the multimeter on the pin 1 and, the other side to the pin2 and change over the actuator of the detector.	Change over Open/Short
CN10 (Release detector)	Connect one lead of the multimeter on the pin 1 and, the other side to the pin2 and change over the actuator of the detector.	Change over Open/Short
CN5 (PG switch)	Connect one lead of the multimeter on the pin 1 and, the other side to the pin2 and change over the actuator of the detector.	Change over Open/Short

5.3 Repairing the Power Supply Circuit Board

This section explains problems related to the power supply circuit board(C214PSB). Since the table below lists likely causes according to the order of frequently seen symptoms, find an appropriate symptom and check the checkpoint.

Table 5-8. Repairing the C214PSB Board

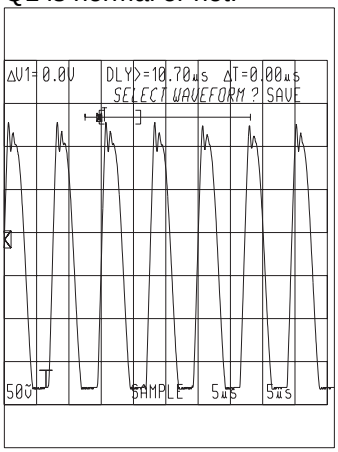
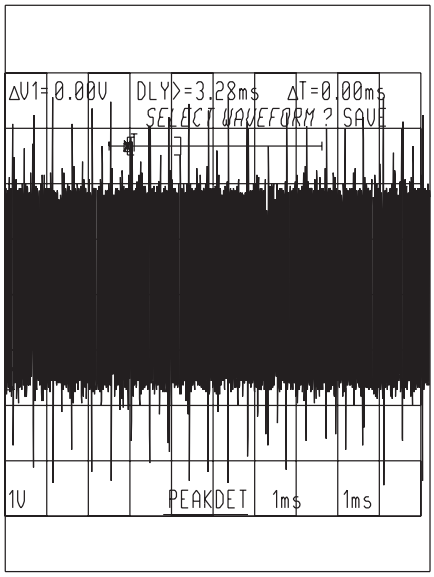
Symptom	Condition	Cause	Checkpoint	Solution
Normal voltage is not output.	Even the fuse F1 is replaced, it shorts soon.	Line filter circuit is broken.	Check if C4 or L1 from C1 is connected to the AC line.	Replace appropriate parts.
		Rectifier/smoothing circuit is defective.	•Check if DB1 is connected to AC line or not. •Check all elements on the + side of the primary side such as C11 and T1. If DB1 shorts, there is a possibility that it happened because of short circuit occurred in the end of the circuit.	Replace the power supply board, DB1 or appropriate parts.
	All output voltage is defective. •If +42V is not output normally, other voltages become abnormal.	Diode bridge DB1 is defective.	Check if DC voltage(about 170V in case of 124PSB) is output between + terminal (pin 3) and – terminal(pin 4) of CB1. •There is a possibility that output voltage of DB1 is not output because of the defective elements in the end of the circuit.	Replace the power supply board, DB1 or appropriate parts.
		Switching FET Q1 is defective.	Check the waveform (pin 11) of the coil in the T1 on the primary side and also if the switching operation of Q1 is normal or not.  **Figure 5-9. Waveform of the Switching**	Replace the power supply board, Q1 or appropriate parts.

Table 5-9. Repairing C214PSB Board (Con.)

Symptom	Condition	Cause	Checkpoint	Solution
Normal voltage is not output.	All output voltage is defective. •If +42V is not output normally, other voltages become abnormal.	T1 is defective.	Check the voltage (pin 6, 7)which is charged to the coil of the primary side. Also, check the output voltage on the secondary side. •It is possible that output voltage of T1 is not out because of defective elements on the end of the secondary side.	Replace the power supply board, T1 or appropriate parts.
		Diode D51 is defective.	Check if +42V is output between C51/C51.	Replace the power supply board,C51/51 or appropriate parts.
		Power supply control signal line(PSC) is shorted.	Check is PSC line, CN2; or harness of 10-pin is not fell down to GND.	Replace the power supply board, harness or appropriate parts.
	All the output voltage is defective	Over current protection circuit is defective.	Check if the transistor Q28 is On.(Collector is Gp level) •If the transistor is Off, elements in the end of PC2 circuit or main switching circuit(Q1, Q31) is defective. •If it is on, elements around Q53 or Q54 are defective.	Replace the power supply board, Q82, Q53, Q54 or appropriate parts.
		Over voltage protection circuit is defective.	❑Check if the transistor Q82 is On or not. (Collector is Gp level) •If it is Off, elements in the end of PC2 circuit or main switching circuit(Q1, Q31) is defective. •If it is On, the elements around Q54, Q55, ZD52, ZD87 or Q82 are defective. ❑If +5V is too high, Q82 becomes On. •If it is Off, elements in the end of PC2 circuit or main switching circuit(Q1, Q31) is defective. •If it is on, elements around Q54, Q55, ZD53 or Q82 are defective. Since the PC2 is photo thylistor, once it becomes on, it does not become Off until electric is discharged from C11. Therefore, it takes sometime until electricity goes through again.	Replace the power supply board, Q82, Q54, Q55 or appropriate parts.

Table 5-10. Repairing the C214PSB Board (Con.)

Symptom	Condition	Cause	Checkpoint	Solution
Normal voltage is not output.	All the output voltage is defective	+42V stabilization circuit is defective.	Check the waveform of 1pin in the Photo coupler PC1. If it is unloaded, the waveform with periodical pattern can be seen. •If the waveform is abnormal, the elements around PC1, ZD51, ZD81~85, or peripheral elements are defective. •If the wavaform is normal, check the switching waveform of Q1, Q2, Q3 and also check the operation of peripheral elements and Q1/Q2/Q3.  **Figure 5-10. Waveform of PC1**	Replace the power supply board or appropriate parts.
	+5V output is abnormal, +35V output is normal.	IC51 is defective.	Check output voltage at 9,10 pin of IC51. •If output is abnormal, IC51 is defective.	Replace the power supply board, IC51 or peripheral elements.
		Smoothing circuit is defective.	Check if the normal voltage (about+5V) is provided between +/– terminals of C54. If there is no output, L51 or C54 is defective.	Replace the power supply board, L51 or C54.

5.4 Repairing the Main Board

Refer to the following table for repairing the main board.

Table 5-11. Repairing the C214 Main Board

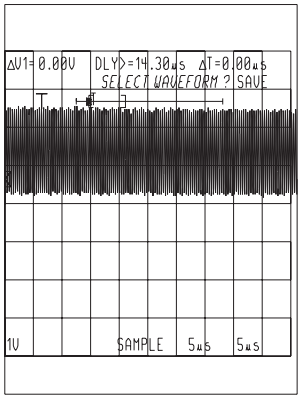
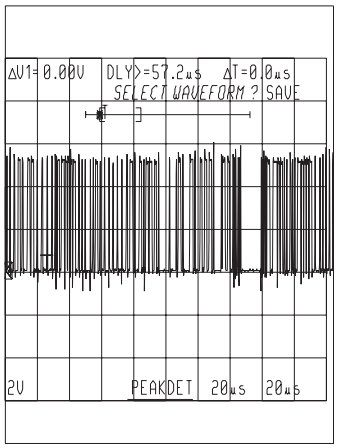
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not work at all.	Reset signal is not canceled.	Defective operation of the reset circuit	After the power is turned on, check 1pin of IC12 stays LOW for a while. •Reset signal is generated in the IC21 and sent to the CPU and gate array.	Replace the main board.
		VOUT signal is output.	Check if +5V is normal and also check pin 7 and pin 8 of CN3.	Replace the power supply board
	CPU does not work.	Clock signal is not generated.	Check the signal of pin 26 and 27 in the IC11 (clock signal of CPU)  **Figure 5-11.Clock Signal of CPU**	Replace the main board or CRU1.
		PROM(IC8) or Flash ROM(IC7) is defective.	Check the waveform of 22 pin of IC 7 or IC8. •If there is no waveform, gate array(IC10) is defective.  **Figure 5-12. Chip Select Signal**	Replace the main board.

Table 5-12. Repairing C214 Main Board (Con.)

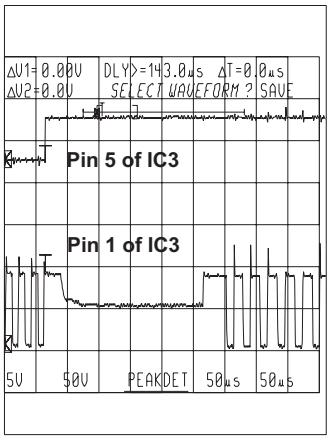
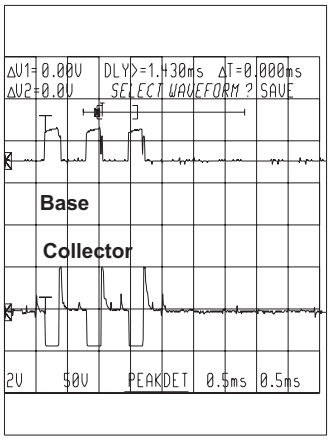
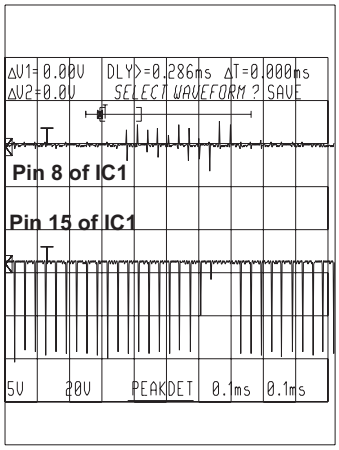
Symptom	Condition	Cause	Checkpoint	Solution
Printer goes to error state.	Fatal error.	+42V monitor circuit is defective.	Check the voltage of 3 or 4 pin in CN3. •If the voltage is normal, CPU is defective.	Replace the main board or power supply circuit board.
		Carriage control circuit is defective.	Check the output signal of pin 1, 8,11,18 and input signal of pin 5, 6,16,17 of IC3. •If the phase signal of the motor is not input, gate array IC25 is defective. •If the drive waveform is not output, IC7 is defective.  **Figure 5-13. Waveform of the Carriage Motor Drive**	Replace the main board or IC3.
Abnormal printing	Print head control is abnormal.	Print head control circuit is defective.	Measure the base voltage of Q1~Q24 and collector voltage. •When the input signal is not detected on the base side, gate array is defective. •If the output waveform is not detected in the collector, driver transistor is defective.  **Figure 5-14. Head Drive Signal**	Replace the main board or corresponding transistor.

Table 5-13. Repairing the C214 Main Board (Con.)

Symptom	Condition	Cause	Checkpoint	Solution
Paper feed operation is abnormal.	PF motor control is abnormal.	PF motor control circuit is defective.	Check the phase signal of pin 8 and output signal of pin 1 and pin 15 of IC1 or IC2. •If phase signal of the motor is not input, gate array IC10 is defective. •If the drive wave form is not output, IC1 or IC2 is defective.  **Figure 5-15. Waveform of the PF Motor Drive**	Replace the main board, IC1 or IC2.
Control panel is abnormal.	Switch, LED or LCD is abnormal.	Control panel circuit is defective.	Check the connection between the harness of the control panel and main board. •Check if the harness is broken or not. If harness is broken, CPU(IC10) or gate array IC25 is defective.	Replace the main board or control panel.
Data from the host computer is not received correctly.	Indication of Data communication error or data turns out be unidentified.	Interface elements are defective.	Replace the interface cable. •If self-test is performed normally, interface elements are defective.	Replace the main board.
		CPU is defective.	---	Replace the main board.
Power can not be turned off.		Signal line(PSC) of the power supply board shorts.	Check if pin 20 of the operation panel becomes GND level when the power is turned off.	Replace the main board, power supply board or control panel.
Default setting values can not be stored.		EEPROM is defective or defective writing	---	Replace the main board.

5.5 Repairing the Printer Mechanism

This section provides instruction for repairing the printer mechanism. It describes various problems, symptom, likely causes, checkpoints, and solutions.

Table 5-14. Repairing the Printer Mechanism

Symptom	Condition	Cause	Checkpoint	Solution
CR motor is abnormal	CR does not move even the power is turned on.	Foreign objects are attached to mechanism.	Move the timing belt manually and check if the motor rotates or not.	Remove the foreign objects.
		CR motor is defective	Measure the coil resistance of the motor. 3.5Ω±10%. (Refer to Table 5-5) •If the motor gets short-circuit, check if the driver circuit also got short-circuit.	Replace CR motor or main board.
Carriage does not move even after the power is turned on.	CR motor rotates, but carriage does not move.	The pulley drive is defective.	Check if the pulley is broken or worn out.	Replace the pulley drive.
		Timing belt is defective.	Check if the timing belt is installed on the carriage, also, the notched part of the timing belt is worn out or not.	Replace the timing belt or re-install again.
	Carriage moves to left side a little bit, but stops.	Carriage does not move smoothly.	Check if carriage moves smoothly by hand.	Clean CR guide shaft and lubricate it, or replace the CR motor.
	Carriage stops after moving to the right or left edges.	HP sensor is defective.	---	Replace the HP sensor.
Printing is abnormal.	Carriage moves but no image is printed.	Head FFC is disconnected or there is no continuity.	Check if head FFC is connected or bent.	Replace the FFC.
		Print head is defective	Measure head coil resistance. 39.3±2.7Ω	Replace the print head(If necessary replace the driver)
	The printer does not print a particular dot.	Print head is defective.	Check if the head wire is broken or not.	Replace the print head.
	Printing result is uneven or too light.	Print head is defective	Check if the head wire is broken or not.	Replace the print head.
Abnormal paper feed.	Printing is performed, but no paper feed, or paper feed is not done smoothly.	Foreign objects are in the paper path.	Check the paper path visually.	Remove the foreign objects.
		PF motor is not driven correctly.	Check if foreign objects are attached to the motor or drive gear, or gears are damaged or worn out.	Remove the foreign objects or replace the gears.

Table 5-15. Repairing the Printer Mechanism (Con.)

Symptom	Condition	Cause	Checkpoint	Solution
Paper feed is abnormal.	Printing is performed, but no paper feed, or paper feed is not done smoothly.	PF motor is defective.	Measures coil resistance of PF motor. 16Ω±10% (Refer to the Table 5-5) •If the coil is short circuit, check the driver too .	Replace the PF motor (If necessary, replace the driver)
Ribbon feed is abnormal.	The ribbon is not fed.	The ribbon cartridge is defective.	Remove the ribbon cartridge. Then rotate the ribbon feed roller manually to check if the ribbon is fed normally.	Replace the ribbon cartridge.
		Ribbon is caught or stuck by the ribbon mask.	Check if the ribbon is fed normally by self-test.	Replace the Ribbon mask.
		Ribbon feed mechanism of the carriage unit is defective.	Check if foreign objects are caught in the ribbon feed mechanism, or parts are worn out.	Replace the parts of the printer mechanism or carriage unit.
Printing result is dirty.	Ink spots or dirt are seen around the printing area.	Hole of the ribbon mask is defective.	Check if the ribbon mask is broken.	Replace the ribbon mask.
		Platen gap adjustment is not done correctly.	Check the platen gap.	Perform the platen gap adjustment. (Refer to Chapter4)
False printing	Printing is performed even if there is no paper.	PE sensor is defective.	Check PE detector. (Refer to the Table 5-7)	Replace the PE sensor.
		PW(TOP) detector is defective.	---	Replace the PW(TOP) detector.

Chapter 6
Maintenance

6.1 Preventive Maintenance.....6-1

6.1 Preventive Maintenance

Preventive Maintenance is important to keep the printer in the best condition and to prevent troubles in advance. Use the denatured alcohol to clean the exterior case and use the vacuum cleaner if necessary, to remove dust and paper debris in the printer inside.

⚠ CAUTION

- ☑ *Do not use thinner, trichloroethylene, or ketone-based solvents on the plastic components of the printer.*
- ☑ *Never use the oil and the grease other than those specified in this manual, and using different type of lubrication can damage the printer and the components.*
- ☑ *Disconnect the printer from the AC socket before performing maintenance.*

The influence that grease and oil give is great and especially in low temperature. Therefore, EPSON has been tested and analyzed various grease and oil extensively and chooses the best one for that printer.

Table 6-1. Lubrication

Type	Name	Quantity	Availability	Part No.
Grease	G-26	40g	EPSON	B702600001
Oil	O-8	40cc	EPSON	1019753

Table 6-2. Lubrication Points

Ref. No.	Lubrication Points	Lubricant
1	Contact area of the frame, base, shaft and release	G-26(3-5mg)
2	Contact area around the gear 20 of the release lever	G-26(3-5mg)
3	Contact area of ratchet and RD carriage unit (2points)	G-26(3-5mg)
4	Side of shafts for sending ribbon in the carriage unit (3points)	G-26(3-5mg)
5	Oil pad	O-8 (0.3cc)
6	The platen gap adjustment slots on the right frame	G-26(2mm width)
7	Contact area of carriage unit guide, CR	G-26(3-5mg)
8	60mm from the left edge of CR guide rack	G-26(2mm width)
9	Rack parts of the CR guide (3 points)	G-26(3-5mg)
10	Gear teeth of the gear18 and 36	G-26(3-5mg)

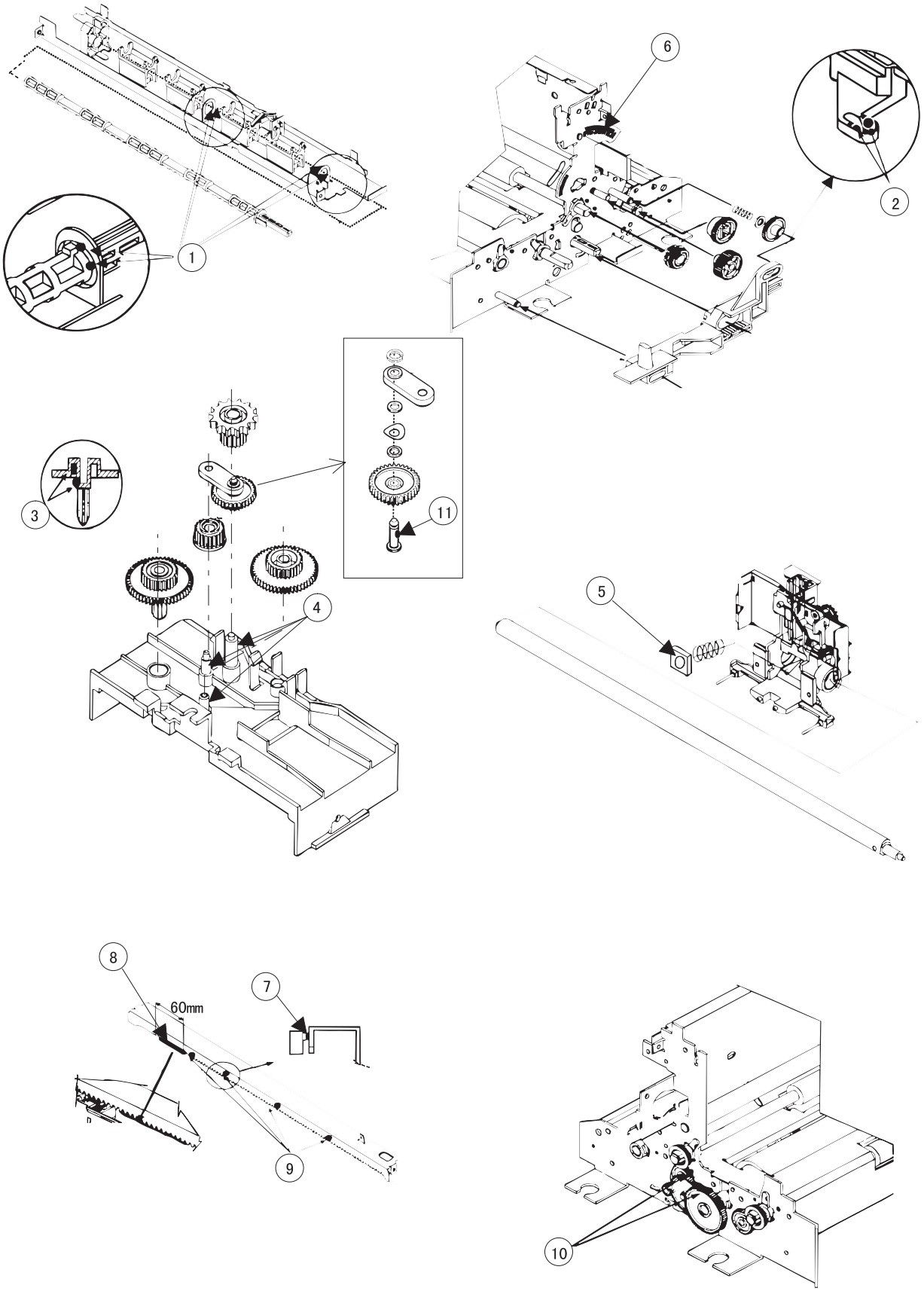


Figure 6-1. Lubrication Points

Appendix

A.1 Connector Summary A-1
A.2 Circuit Diagram A-5
A.3 Component Layout A-8
A.4 Exploded Diagram A-10
A.5 Dimension and Weight A-16

A.1 Connector Summary

Figure A-1 illustrates how primary components are connected. Table A-1 summarizes functions and sizes of the connectors.

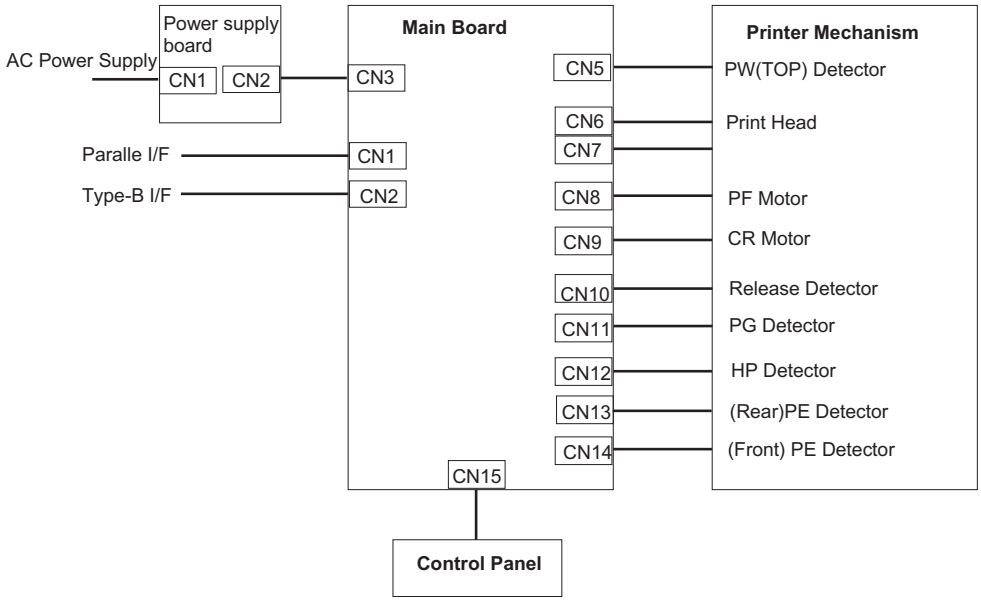


Figure A-1. Cable Connections

Table A-1. Connector Summary

Board	Connector No.	Pin	Description
Main Board	CN1	36	Parallel I/F (Refer to Chapter 1 for pin alignment)
	CN2	36	Type-B I/F (Refer to Chapter 1 for pin alignment)
	CN3	10	Power On input, Power Off output
	CN5	4	PW (TOP) Detector
	CN6	17	Print Head, Thermistor
	CN7	15	Print Head
	CN8	4	PF Motor
	CN9	5	CR Motor
	CN10	2	Release Detector
	CN11	2	PG Detector
	CN12	3	HP Detector
	CN13	2	(Rear) PE Detector
	CN14	2	(Front) PE Detector
	CN15	22	Control Panel
Power Supply Board	CN1	2	AC line input
	CN2	10	DC output, Power off signal

Table A-2. Connector Pin Assignment-CN3

Pin	I/O	Signal	Function
1	---	GP	Ground
2	---	GP	Ground
3	---	+42V	+42VDC
4	---	+42V	+42VDC
5	---	GND	Ground
6	---	GND	Ground
7	---	+5V	+5VDC
8	---	+5V	+5VDC
9	O	PWDN	Power-down signal
10	I	PSC	Power switch

Table A-3. Connector Pin Assignment-CN5

Pin	I/O	Signal	Function
1	---	A	+5VDC
2	---	+5V	+5VDC
3	---	GND	Ground
4	I	E	PW(TOP) Detector

Table A-4. Connector Pin Assignament-CN6

Pin	I/O	Signal	Function
1	O	HD5	Pin 5 drive signal
2	O	HD1	Pin 1 drive signal
3	O	HD13	Pin 13 drive signal
4	O	HD9	Pin 9 drive signal
5	O	HD21	Pin 21 drive signal
6	O	HD17	Pin 17 drive signal
7	---	+42V	+42VDC
8	---	+42V	+42VDC
9	---	+42V	+42VDC
10	O	HD24	Pin 24 drive signal
11	O	HD16	Pin 16 drive signal
12	O	HD12	Pin 12 drive signal
13	O	HD8	Pin 8 drive signal
14	O	HD20	Pin 20 drive signal
15	O	HD4	Pin 4 drive signal
16	---	+5V	+5VDC
17	I	HTMP	Thermistor signal

Table A-5. Connector Pin Assignmen-CN7

Pin	I/O	Signal Name	Function
1	O	HD3	Pin 3 drive signal
2	O	HD11	Pin 11 drive signal
3	O	HD2	Pin 2 drive signal
4	O	HD19	Pin 19 drive signal
5	O	HD7	Pin 7 drive signal
6	---	+42V	+42VDC
7	---	+42V	+42VDC
8	---	+42V	+42VDC
9	O	HD22	Pin 22 drive signal
10	O	HD15	Pin 15 drive signal
11	O	HD18	Pin 18 drive signal
12	O	HD23	Pin 23 drive signal
13	O	HD10	Pin 10 drive signal
14	O	HD14	Pin 14 drive signal
15	O	HD6	Pin 6 drive signal

Table A-6. Connector Pin Assignment-CN8

Pin	I/O	Signal Name	Function
1	O	PFA	PF motor A -phase signal
2	O	PFB	PF motor B-phase signal
3	O	PF-A	PF motor/A-phase signal
4	O	PF-B	PF motor / B-phase signal

Table A-7. Connector Pin Assignment-CN9

Pin	I/O	Signal Name	Function
1	O	CRA	CR motor A phase signal
2	O	CR-A	CR motor / A-phase signal
3	O	CRB	CR motor B phase signal
4	O	CR-B	CR motor /B-phase signal
5	---	CRCOM	CR motor common

Table A-8. Connector Pin Assignment-CN10

Pin	I/O	Signal Name	Function
1	I	RELEASE	Release Lever Signal
2	---	GND	GND

Table A-9. Connector Pin Assignment-CN11

Pin	I/O	Signal Name	Function
1	I	PG	PG Detector signal
2	---	GND	GND

Table A-10. Connector Pin Assingment-CN12

Pin	I/O	Signal Name	Function
1	I	PG	PG Detector signal
2	---	GND	GND
3	---	+5V	+5VDC

Table A-11. Connector Pin Assignment-CN13

Pin	I/O	Signal Name	Function
1	I	PE[REAR]	(Rear) PE detector signal
2	---	GND	GND

Table A-12. Connector Pin Assignment-CN14

Pin	I/O	Signal Name	Function
1	I	PE[FRONT]	(Front) PE detector signal
2	---	GND	GND

Table A-13. Connector Pin Assignment-CN15

Pin	I/O	Signal Name	Function
1	---	---	GND
2	O	LED9	LED 9 drive signal
3	O	LED2	LED 2 drive signal
4	O	LED3	LED 3 drive signal
5	O	LED5	LED 5 drive signal
6	O	LED4	LED 4 drive signal
7	O	LED8	LED 8 drive signal
8	O	LED7	LED 7 drive signal
9	O	LED6	LED 6 drive signal
10	---	+5V	+5VDC
11	I	SW4	SW4 signal
12	I	SW3	SW3 signal
13	I	SW5	SW5 signal
14	---	---	GND
15	---	---	GND
16	I	SW1	SW1 signal
17	I	SW0	SW0 signal
18	I	COPEN	---
19	I	SW2	SW2 signal
20	I	PSC	Power On signal
21	O	LED1	LED 1 drive signal
22	O	LED0	LED 0 drive signal

A.2 Circuit Diagram

Figure A-2. C214Main Board Circuit Diagram

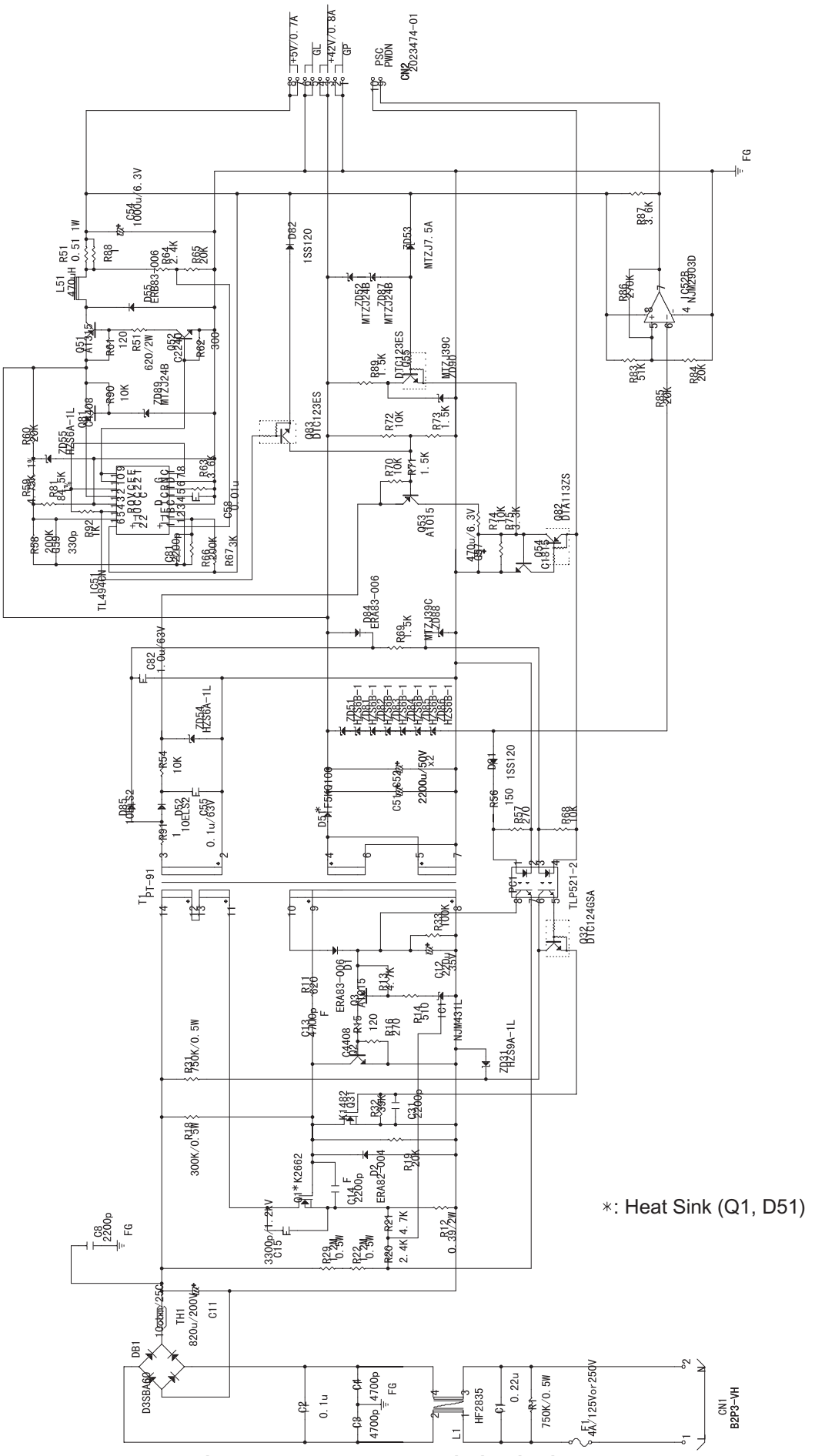


Figure A-3. C214PSB Board Circuit Diagram

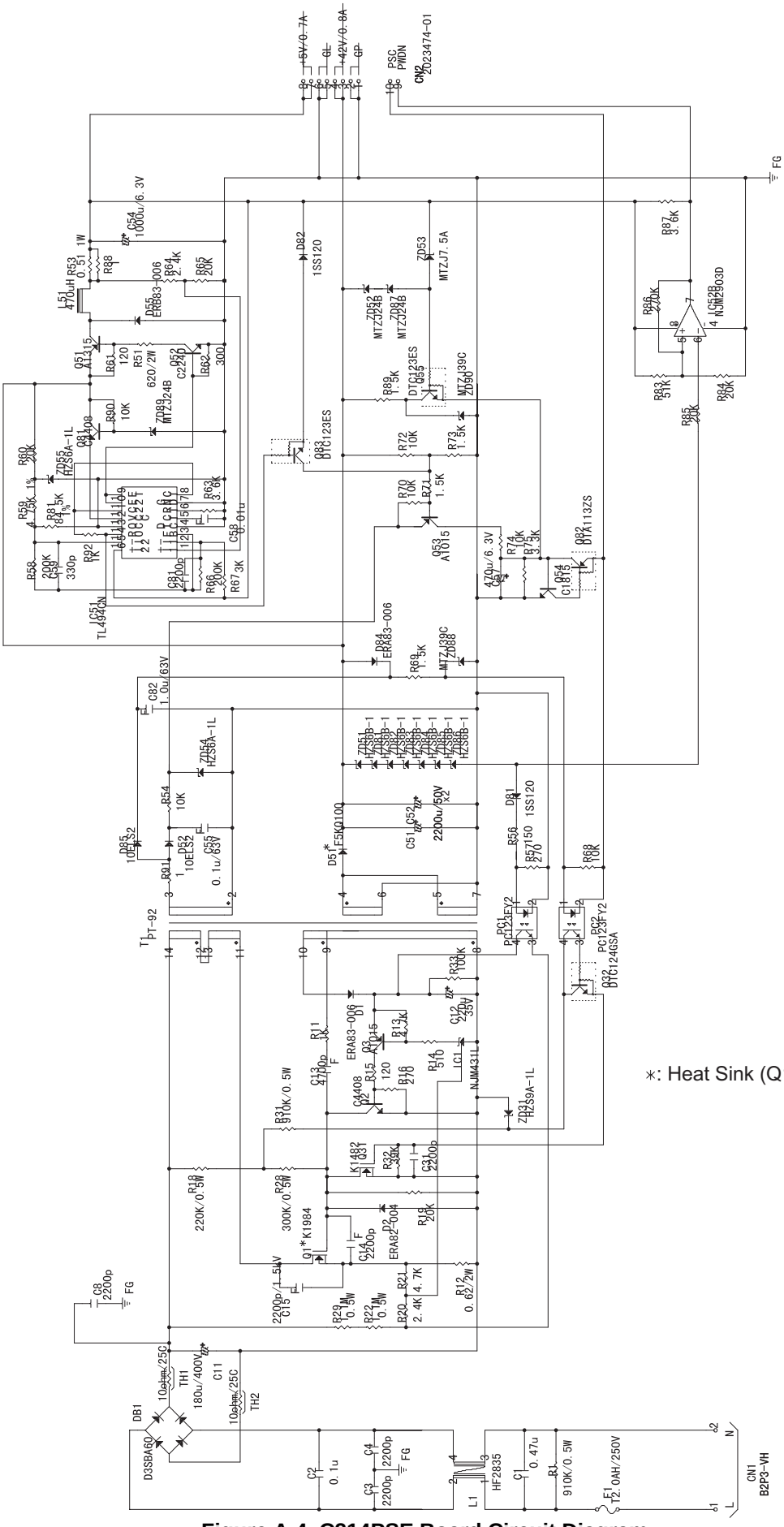


Figure A-4. C214PSE Board Circuit Diagram

A.3 Component Layout

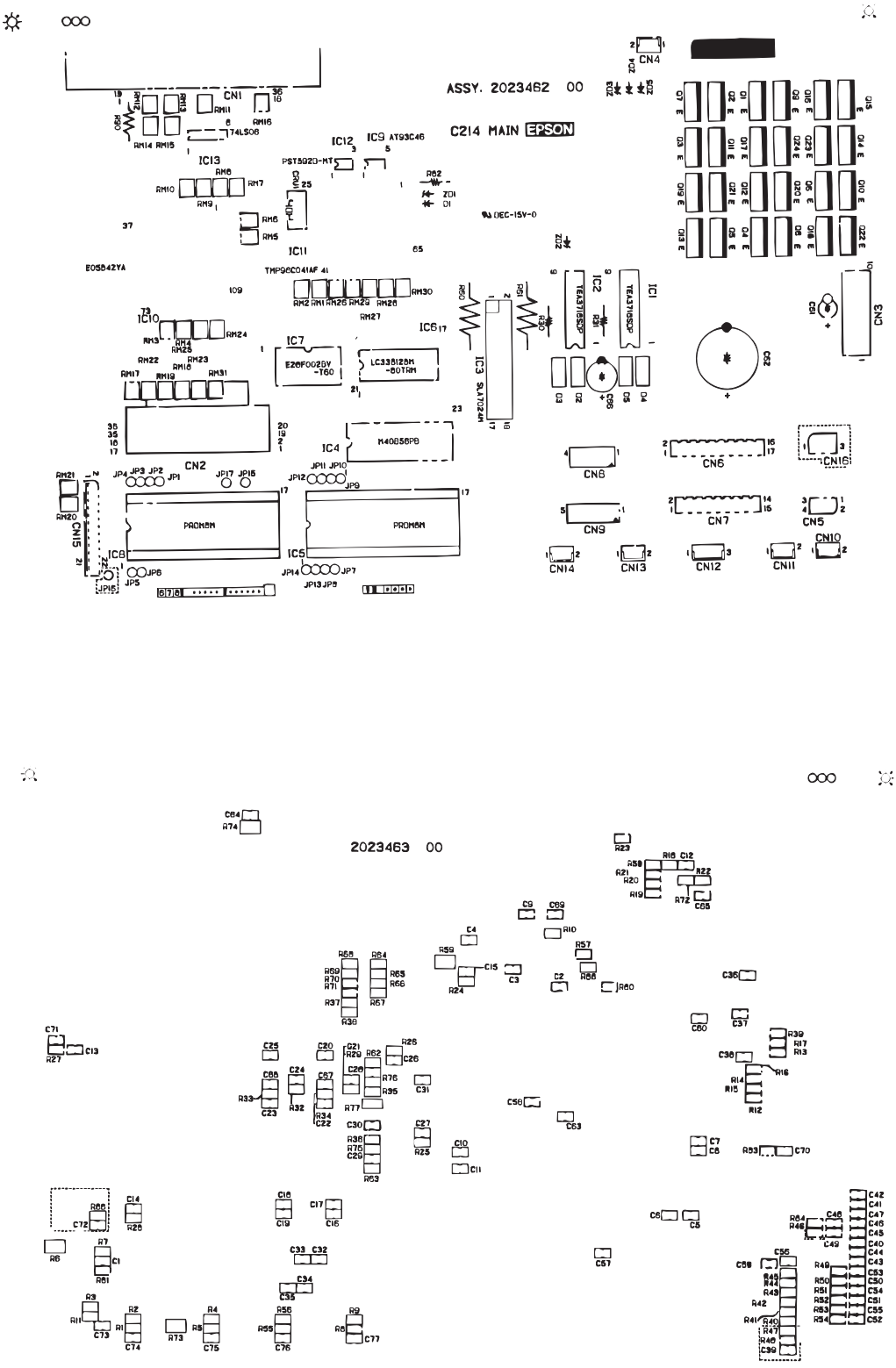


Figure A-5. C214 Main Board Component Layout

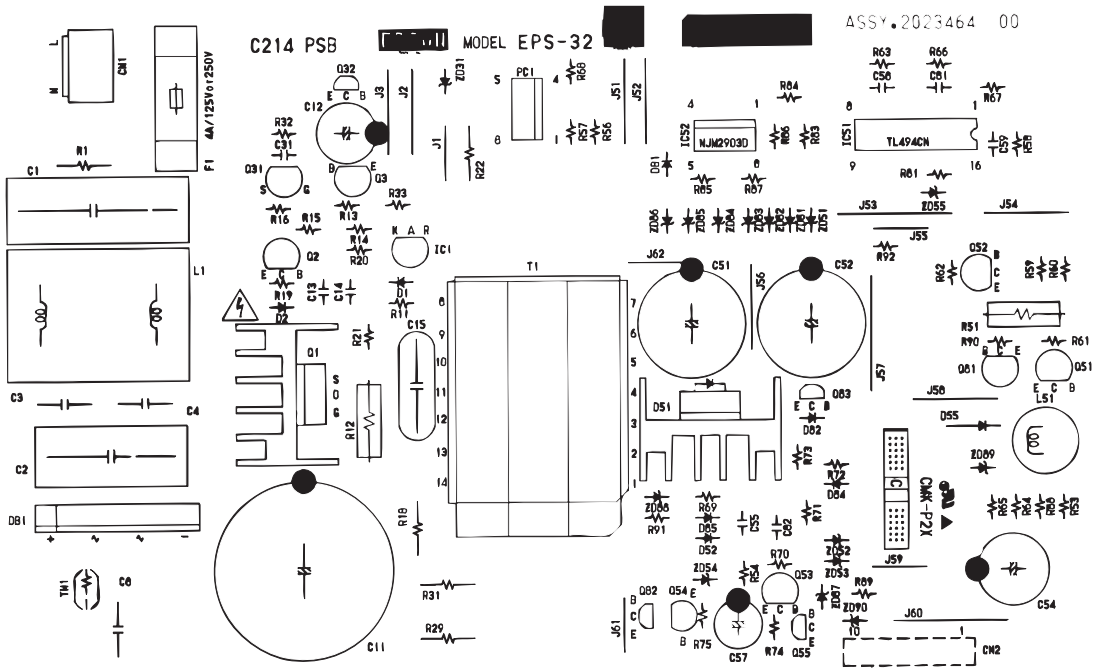


Figure A-6. C214 PSB Board Component Layout

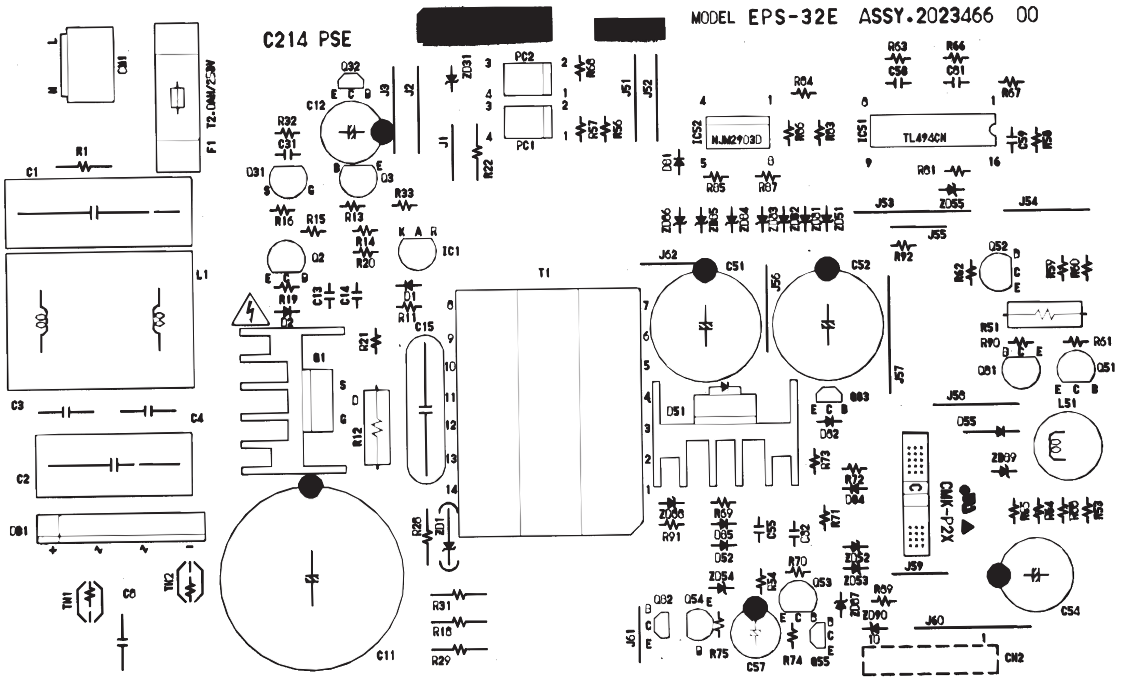


Figure A-7. C214 PSE Board Component Layout

A.4 Exploded Diagram

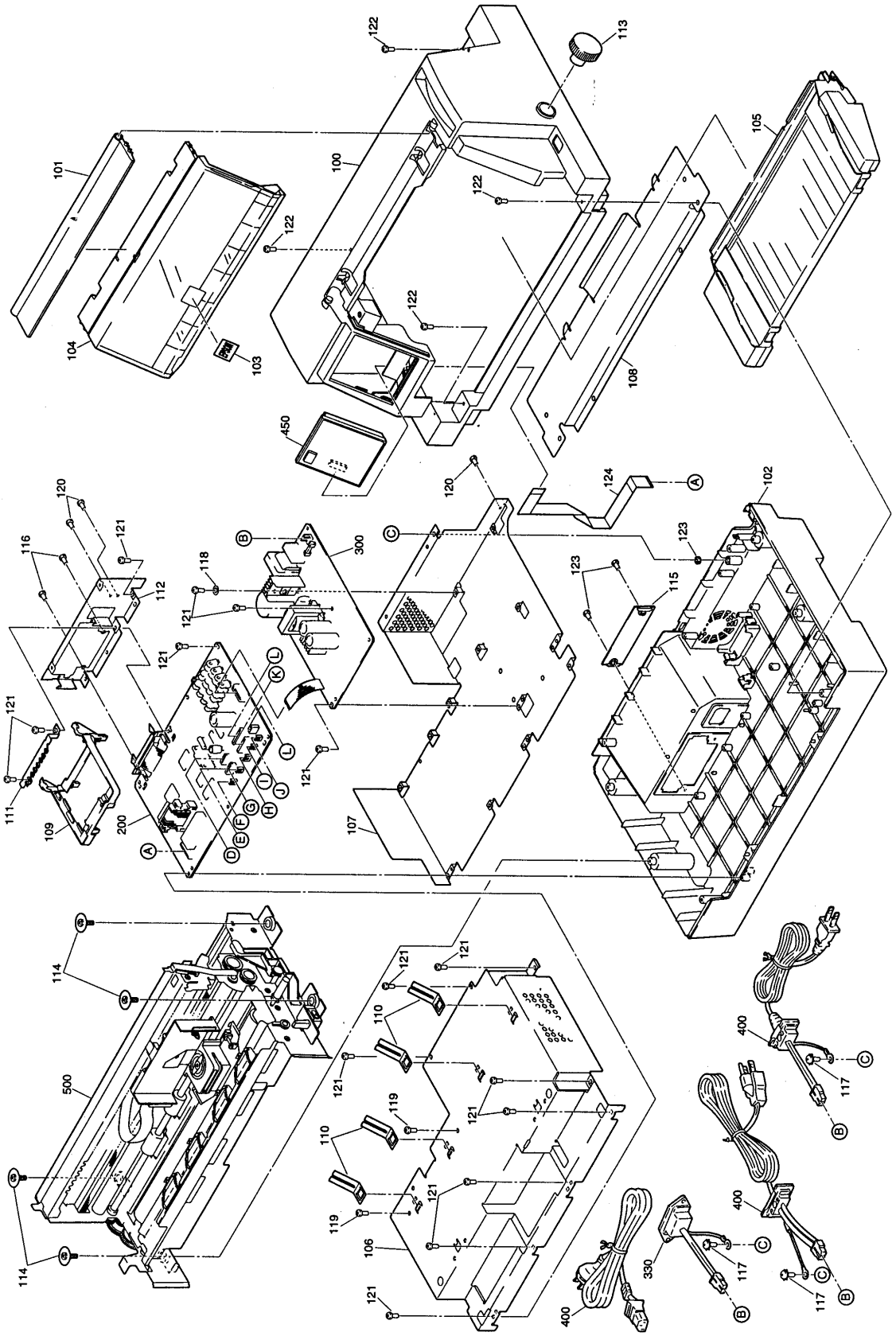


Figure A-8. Exploded Diagram

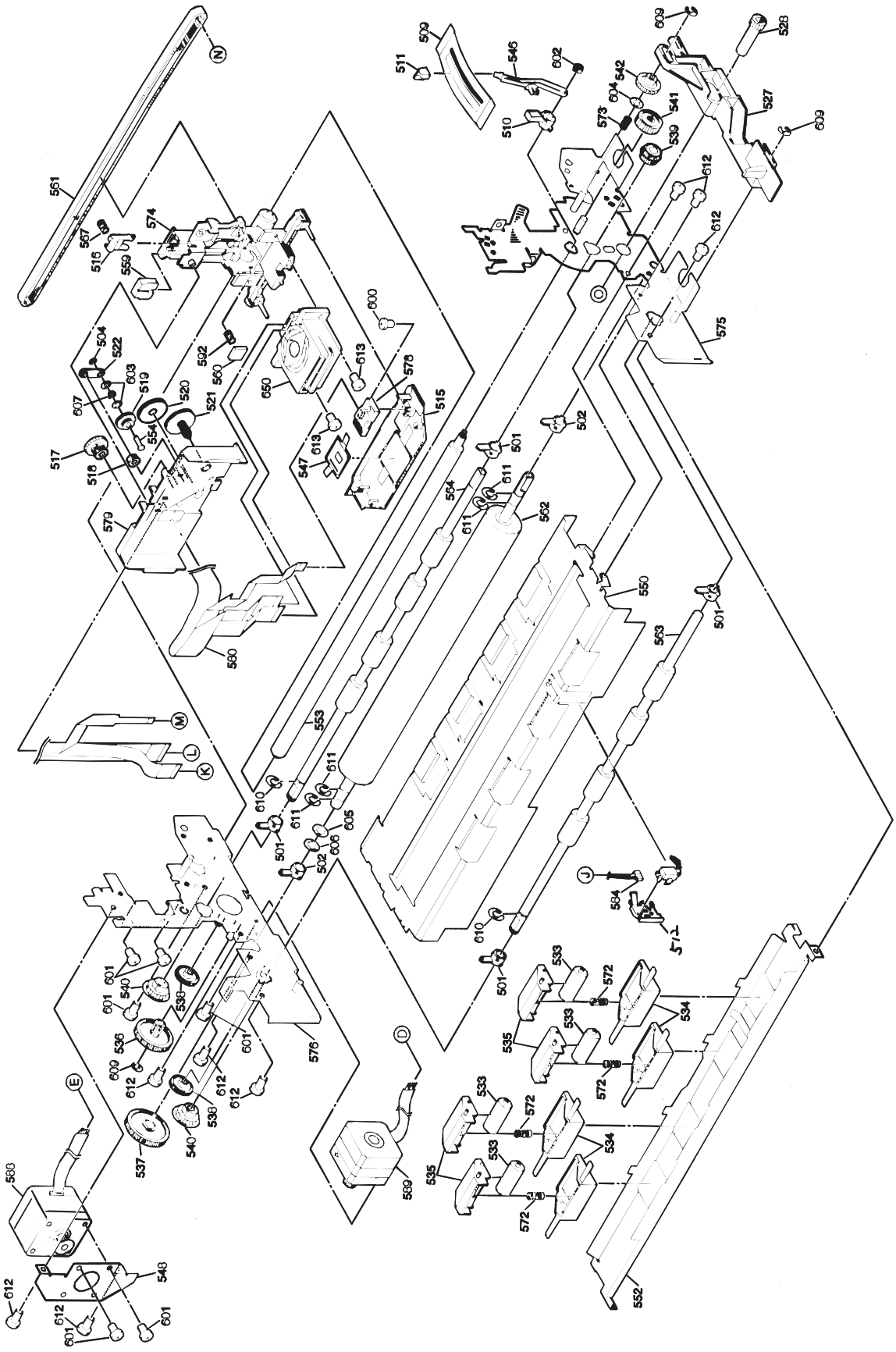


Figure A-9. Exploded Diagram

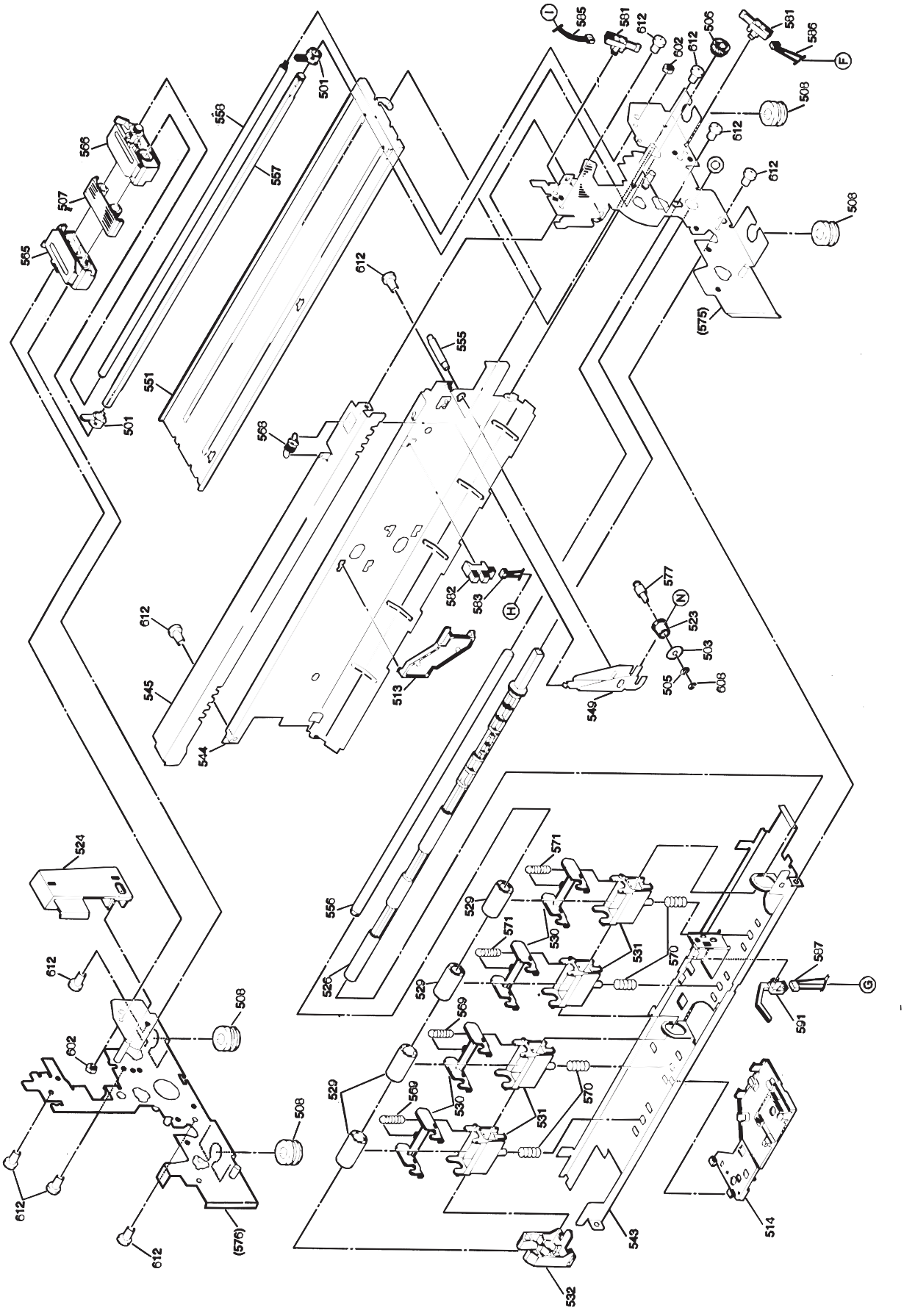


Figure A-10. Exploded Diagram

Table A-14. Parts Reference Table

Ref. No.	Description	Parts Price List Name
100	Upper Housing	Housing, Upper
101	Front Cover	Cover, Printer
102	Lower Housing Assembly	Housing, Assembly, Lower
103	Logo Plate	Logo Plate
104	Printer Cover Assembly	Cover Assembly, Printer; B
105	Front Edge Guide Assembly	Sheet, Guide Assembly
106	Upper Shield Board	Shield Plate, Upper
107	Shield Plate	Shield Plate
108	Wire Cover	Cover, Wiring
109	I/F Guide Board	Guide, I/F Board
110	Grounding Plate	Grounding Plate
111	Upper I/F Grounding Plate	Grounding Plate, I/F, Upper
112	I/F Grounding Plate	Grounding Plate, IF
113	Knob	Knob
114	Mechanism Fixing Screw	Printer Mechanism Mounting Screw
115	Upper Cover Connector	Cover, Connector, Upper
116	C.P. Screw M3X4	C.P. Screw M3X4
117	C.B.(O) Screw M4 X8	C.B.(O) Screw M4 X8 F/ZG
118	Plain Washer 3X0.5X8	Plain Washer 3X0.5X8
119	C.B.S. Screw M3X4	C.B.S. Screw M3X4
120	C.B.S. Screw M3X6	C.B.S. Screw M3X6
121	C.B.B. Screw M3X12	C.B.B. Screw M3X12
122	C.B.B Screw M4X14	C.B.B Screw M4X14
123	Hexagon Nut M4	Hexagon Nut M4
124	Harness	Harness
200	Main Board Assembly	Board Assembly, Main
300	Power Supply Board Assembly	Board Assembly, Power Supply
330	Harness	Harness
400	Power Cable	Power Cable
450	Panel Unit	Panel Unit
500	Printer Mechanism	Printer Mechanism, M-5060-100
501	Platen Shaft Holder	Platen Shaft Holder
502	Platen Shaft Holder(Gray)	Platen Shaft Holder (Gray)
503	Belt Drive Pulley F	Belt Driven Pulley F
504	Cut Washer	Cut Washer
505	Plain Washer 4.2X0.3X8	Plain Washer 4.2X0.3X8, L/NA
506	Spur Gear 20	Spur Gear, 20
507	Paper Support	Paper Support
508	Base Rubber	Base Rubber
509	Adjust Lever Holder	Holder, Adjust Lever
510	Parallelism Adjust Bushing	Bushing, Parallelism, Adjust
511	Lever Cap	Cap, Lever
512	(Front) PE Detector Holder	Holder, Detector, PE, Front
513	Upper Cable Holder	Holder, Cable, Upper
514	Lower Cable Holder	Holder, Cable, Lower
515	Ribbon Mask Holder	Holder, Ribbon, Mask
516	Rear Slider	Slider, Rear
517	Combination Gear 10, 17.5	Combination Gear, 10, 17.5
518	Spur Gear 11	Spur Gear, 11

Table A-15. Parts Reference Table (Con.)

Ref. No.	Description	Parts Price List Name
519	Combination Gear 9.17	Combination Gear, 9.17
520	Combination Gear 14,26	Combination Gear, 14,26
521	Ratchet, RD	Ratchet, RD
522	RD Platen Lever	Lever, RD, Platen
523	Driven Pulley	Pulley, Driven
524	CR Motor Cover	Cover, Motor, CR
526	Release Shaft	Shaft, Release
527	Release Lever	Lever, Release
528	Release Gear	Release Gear
529	PF Roller Driven	Roller, Paper Load, Driven
530	Paper Guide Lever Change	Lever, Paper Guide, Change
531	PF Holder Driven	Holder, Paper Load, Driven
532	PF Bearing Driven	Bearing, Paper Load, Driven
533	Paper Eject Roller Driven	Roller, Paper Eject, Driven
534	Paper Eject Holder Lever	Holder, Lever, Paper Eject
535	Paper Eject Lever Driven	Lever, Paper Eject, Driven
536	Combination Gear 8,30	Combination Gear, 8,30
537	Spur Gear 36	Spur Gear,36
538	(Spur) Gear 18	Spur Gear,18
539	Combination Gear, 16,16	Combination Gear, 16,16
540	Spur Gear 16	Spur Gear,16
541	Spur Gear 20	Spur Gear, 20
542	Spur Gear 20	Spur Gear, 20
543	Base Frame	Frame, Base
544	CR Frame	Frame, CR
545	CR Guide	Guide, CR
546	Gap Adjustment Lever	Lever, Gap, Adjust
547	Ribbon Mask	Ribbon Mask
548	CR Motor Mounting Plate	Mounting Plate, Motor, CR
549	Driven Pulley Lever	Lever, Pulley, Driven
550	Paper Guide	Paper Guide
551	Tractor Cover	Cover, Tractor
552	Paper Eject Frame	Frame, Paper Eject
553	CR Guide Shaft	Shaft, CR Guide
554	Planetary Shaft RD	Shaft RD, Planet
555	Driven Pulley Shaft Lever	Shaft, Lever, Pulley, Driven
556	PF Drive Shaft	Shaft, Paper Load, Driven
557	TR Drive Shaft	Shaft, TR Drive
558	TR Drive Shaft	Shaft, TR, Guide
559	Front Slider	Slider, Front
560	Oil Pad	Oil Pad
561	Timing Belt	Timing Belt
562	Platen	Platen
563	PF Drive Roller	Roller, PF, Drive
564	Paper Eject Drive Roller	Roller, Paper Eject, Drive
565	(Left) Push Tractor	Tractor, Left
566	(Right) Push Tractor	Tractor, Right
567	Compression Spring 1.96	Compression Spring, 1.96

Table A-16. Parts Reference Table (Con.)

Ref. No	Description	Parts Price List Name
568	Tension Spring 14.5	Extension Spring, 14.5
569	Compression Spring 1.47	Compression Spring, 1.47
570	Tension Spring 0.55	Extension Spring, 0.55
571	Compression Spring 1.96	Compression Spring, 1.96
572	Compression Spring 1.47	Compression Spring,1.47
573	Compression Spring 1.96	Compression Spring, 1.96
575	Right Frame Assembly	Frame Assembly, Right
576	Left Frame Assembly	Frame Assembly, Left
577	Bushing Assembly Driven	Bushing Assembly, Driven
578	PW P.C.B Assembly	P.C.B Assembly, PW
579	Ribbon Cartridge Holder Assembly	Holder Assembly, Ribbon Cartridge
580	Head Cable Assembly	Cable Assembly, Head
581	Leaf Detector B2	Detector Leaf; B2
582	HP Detector	Detector, HP;D
583	HP Harness	Harness, HP
584	(Front) PF Harness	Harness, PE Front
585	PG Harness	Harness, PG
586	RE Harness	Harness, RE
587	(Rear) PE Harness	Harness, PE, Rear
588	CR Motor	Motor, CR
589	PF Motor	Motor, PF
590	(Front)PE Detector	Detector, PE, Front
591	(Rear) PE Detector	Detector, PE, Rear
592	Compression Spring 0.049	Compression Spring, 0.049
600	C.B. Screw M2.5X5	C.B. Screw M2.5X5
601	C.B. Screw M3X6	C.B. Screw M3X6
602	Hexagon Nut M4	Hexagon Nut M4
603	Plain Washer 3X0.5X8	Plain Washer 3X0.5X8
604	Plain Washer 5.2X0.3X10	Plain Washer 5.2X0.3X10
605	Plain Washer 8X0.5X15	Plain Washer 8X0.5X15
606	Leaf Spring 8.2X0.25X15	Leaf Spring 8.2X0.25X15
607	Leaf Spring	Leaf Spring
608	E-Shaped Retaining Ring (#3)	Retaining Ring ETWJ-3
609	E-Shaped Retaining Ring (#4)	Retaining Ring ETWJ-4
610	E-Shaped Retaining Ring (#6)	Retaining Ring ETWJ-6
611	Crescent Retaining Ring	Retaining Ring
612	C.B.S. Screw M3X6	C.B.S. Screw M3X6
613	C.B.S. Screw M3X10	C.B.S. Screw M3X10
650	Print Head	Print Head, DH24-0C0

A.5 Dimension and Weight

- Exterior Dimension
  - Body only : 469mm (W) X 390mm (D) X 256mm (H)
  - Body including CSF 1 bin : 469mm (W) X 620mm (D) X 446mm (H)
  - Body including CSF1 & 2 bins : 469mm (W) X 693mm.(D) X 446mm (H)

- Weight
  - Body only : About 9.1Kg
  - Body including CSF 1bin : About 10.9Kg
  - Body including CSF 1& 2 bins : About 11.7Kg

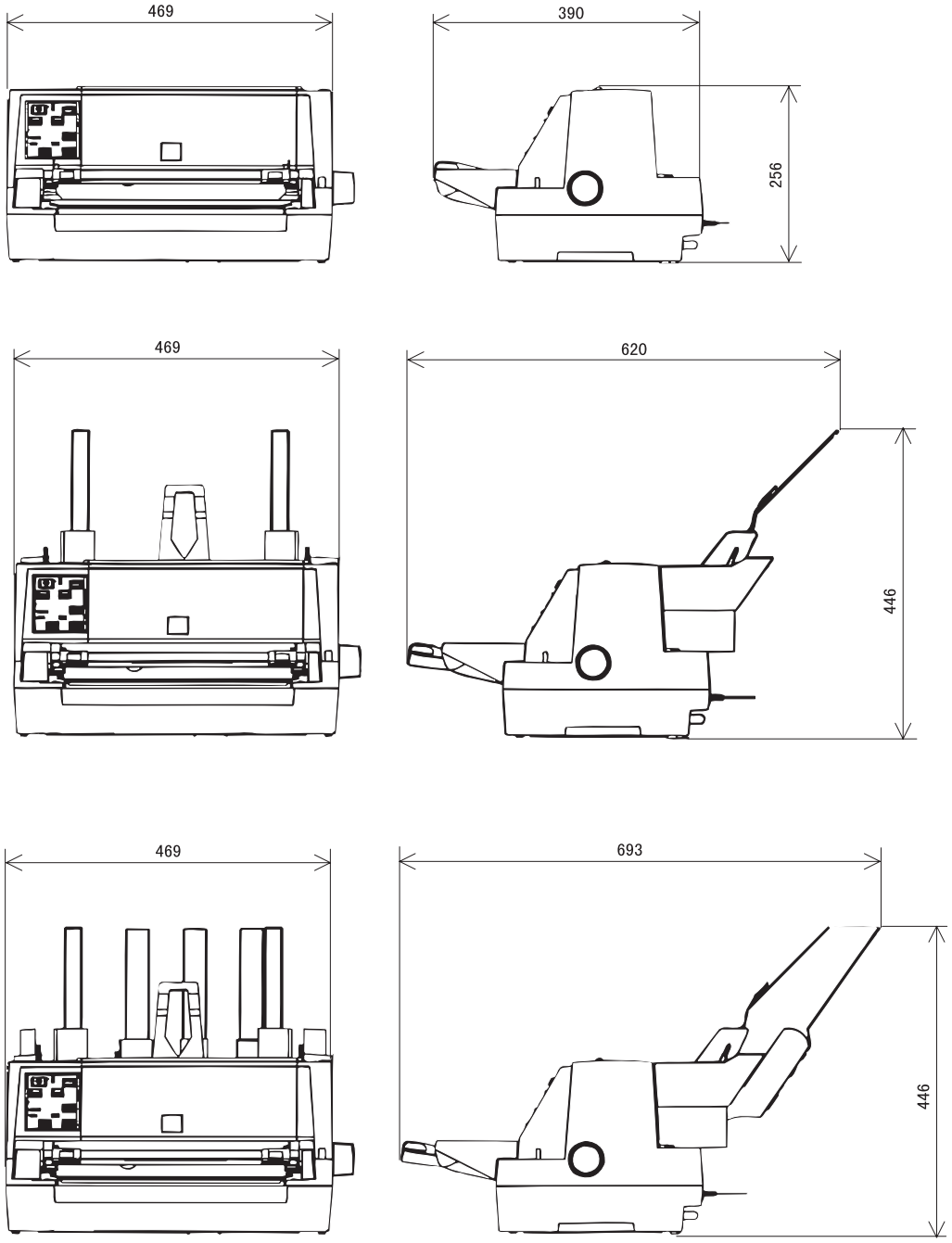


Figure A-11.Dimension of LQ-670

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