

# EPSON

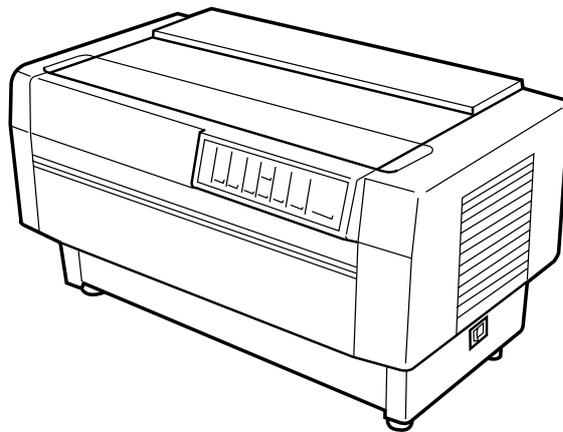
*IMPACT SERIAL DOT MATRIX PRINTER*

## **DFX-8500**

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# **SERVICE MANUAL**

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**SEIKO EPSON CORPORATION**

4009310

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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 DFX-8500.

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 18, 1998/	First issue
Rev. B	June 25, 1998	Second issue due to minor correction on the manual contents.

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# CHAPTER 1

## GENERAL DESCRIPTION

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## 1.1 FEATURES

The DFX-8500 is a 18-pin, serial, dot matrix printer with a maximum speed of 1120 characters per second (cps). It is designed for business use and provides high-speed, high-volume printing and continuous-sheet handling. The main features of the printer are:

- ❑ Maximum printing speeds:
  - 1120 cps (high-speed draft mode)
  - 840 cps (draft mode)
  - 210 cps (NLQ mode) at 10 cpi
- ❑ Advanced paper handling:
  - 10 inches per second (ips) paper feeding
  - Paper jam detection
  - Paper width detection
  - Front and rear two-way push tractors
  - Optional pull tractor
  - Automatic paper back-out and loading from another paper path and paper park
  - Automatic platen gap adjustment for paper thickness
  - Automatic tear off
  - Paper memory function
  - Automatic paper path changing
  - Auto cut mode enables the optional perforation cutter to cut the paper at the perforation.
- ❑ Bi-directional parallel interface (IEEE-1284 nibble) and RS-232C serial interface standard
- ❑ EPSON ESC/P (upper compatible with DFX-8000) and IBM/LEXMARK 2381Plus emulation
- ❑ 35 character tables in the NLSP (National Language Support) version and 11 character tables in the standard version
- ❑ 2 NLQ and 1 draft bit-map type faces and 8 barcode fonts are supported.
- ❑ Optional paper cutter and perforation cutter
- ❑ Upgraded data handling
  - 128 KB input buffer
  - Automatic interface selection
  - Type-B optional I/F cards

The figure below shows the DFX-8500.

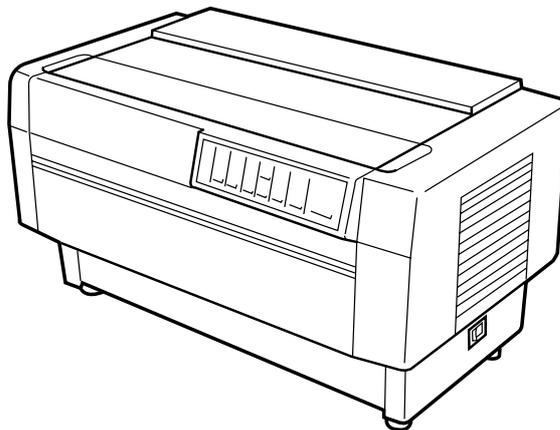


Figure 1-1. DFX-8500 Exterior View

**DFX-8500**

The following table shows options.

**Table 1-1. Option**

<b>Code</b>	<b>Name</b>
#8766	Ribbon cartridge
#8767	Ribbon pack
#8309	Pull tractor unit
C81500X	Paper cutter
C81507X	Perforation cutter
C82305*	Serial interface card (inch screw)
C82306*	Serial interface card (mm screw)
C82307*	32-KB intelligent serial I/F card (inch screw)
C82308*	32-KB intelligent serial I/F card (mm screw)
C82310*	32-KB intelligent parallel I/F card (inch screw)
C82311*	32-KB intelligent parallel I/F card (mm screw)
C82312*	Local Talk I/F card
C82313*	32KB IEEE-488 I/F card
C82314*	Coax I/F card
C82315*	Twinax I/F card
C82357*	Ethernet I/F card
C82345*	IEEE-1284 parallel I/F card
C82362	Ethernet I/F card
C82364	Ethernet I/F card

## 1.2 SPECIFICATIONS

This section describes the specifications for DFX-8500.

### 1.2.1 Printing Specification

- Print method : Impact dot matrix
- Number of pins : 18-pin (Refer to Figure 1-2.)
- Print pin arrangement : 9 x 2
- Print pin diameter : 0.0114 inches (0.29 mm)
- Color : Black
- Print direction : Bi-directional with logic seeking
- Print speed and printable columns: Refer to Table 1-2.

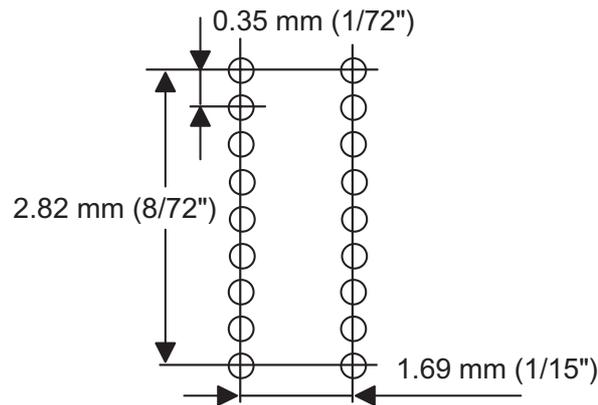


Figure 1-2. Printhead Pin Configuration

Table 1-2. Print Speed and Printable Columns

Print Mode	Character Pitch	Printable Columns	Print Speed (cps)	
			Normal	High Duty
High speed draft	10 cpi	136	1120	1066
Draft	10 cpi	136	840	800
	12 cpi	163	1008	960
	15 cpi	204	630	630
Draft condensed	17 cpi	233	720	685
	20 cpi	272	840	800
Draft emphasized	10 cpi	136	420	400
NLQ	10 cpi	136	210	200
	12 cpi	163	252	240
	15 cpi	204	200	200
NLQ condensed	17 cpi	233	171	171
	20 cpi	272	200	200

**Notes 1:** The line including graphic B0h - FFh or download characters or bit image data will be printed by "High duty" mode.

**Notes 2:** The line including special high duty download characters or bit image data will be printed by one third speed of "High duty" mode.

**Notes 3:** When the print head temperature rises to the upper limit, the printer stops printing. And when the print head temperature falls to the normal level, then the printer starts printing again.

Resolution: Refer to Table 1-3.

**Table 1-3. Resolution**

Print Mode	Horizontal Density	Vertical Density	Adjacent Dot Print
High speed draft	90 dpi	72 dpi	No
Draft	120 dpi	72 dpi	No
Draft condensed	240 dpi	72 dpi	No
Draft emphasized	120 dpi	72 dpi	Yes
NLQ	240 dpi	144 dpi	No
Bit image	60, 72, 80, 90, 120 or 144 dpi	72 dpi	Yes
	120 or 240 dpi	72 dpi	No

Control code: ESC/P and IBM 2381 Plus emulation

Character tables:

■ Standard version (11 character tables):

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC860 (Portuguese)
PC861 (Icelandic)	PC863 (Canadian-French)
PC865 (Nordic)	Abicomp
BRASCII	Roman 8
ISO Latin 1	

■ NLSP version (35 character tables):

Italic table	PC437 (US, Standard Europe)
PC850 (Multilingual)	PC437 Greek
PC852 (East Europe)	PC853 (Turkish)
PC855 (Cyrillic)	PC857 (Turkish )
PC866 (Russian)	PC869 (Greek)
MAZOIWA (Poland)	Code MJK (CSFR)
ISO 8859-7 (Latin / Greek)	ISO Latin 1T (Turkish)
Bulgaria (Bulgarian)	Estonia (Estonia)
PC 774 (LST 1283:1993)	ISO 8859-2 (ISO Latin 2)
PC 866 LAT. (Latvian)	PC866 UKR
PC 860	PC 861
PC 865	PC APTEC
PC 708	PC 720
PC AR864	PC 863(Canadian French) *
Abicomp*	BRASCII*
Roman 8*	ISO Latin 1*
Hebrew 7*	Hebrew 8*
PC862*	

**Note: These tables can not be selected by DIP switch.**

■ International character sets : 13 countries

USA	France	Germany
U.K	Denmark 1	Sweden
Italy	Spain 1	Japan
Norway	Denmark 2	Spain 2
Latin America		

**Note : The international and legal characters are these 12 codes; 23h, 24h, 40h, 5Bh, 5Ch, 5Dh, 5Eh, 60h, 7Bh, 7Ch, 7Dh, 7Eh.**

Typeface:

■ Bit map font:

EPSON Draft	10 CPI, 12 CPI, 15 CPI
EPSON Roman	10 CPI, 12 CPI, 15 CPI, Proportional
EPSON Sans Serif	10 CPI, 12 CPI, 15 CPI, Proportional

■ Bar code:

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

- Character tables and type faces: Refer to Table 1-4.

**Table 1-4. Character tables and type faces**

	Character Table	Bitmap 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 Italic table	EPSON Draft EPSON Roman EPSON Sans Serif
NLSP version	Italic Table PC437 (US, Standard Europe) PC850 (Multilingual)      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) PC 774(LST 1283:1993)      ISO 8859-2 (ISO Latin 2) PC 866 LAT.( Latvian)      PC 866 UKR PC 860                      PC 861 PC 865                      PC APTEC PC 708                      PC 720 PC AR864                  PC 863* <sup>1</sup> Abicomp* <sup>1</sup> BRASCII* <sup>1</sup> Roman 8* <sup>1</sup> ISO Latin 1 Hebrew 7* <sup>1</sup> Hebrew 8* <sup>1</sup> PC 862* <sup>1</sup>	EPSON Draft EPSON Roman EPSON Sans Serif

**\*1) These tables can not be selected by DIP switches.**  
**Note : ESC R command is effective on all the character tables.**

- Input data buffer: 0K byte or 128 K bytes (depend on DIP switch settings)

## 1.2.2 Paper Feeding

- Feeding method: Push tractor feed (front / rear)  
Push and pull tractor feed (front / rear)
- Feeder: Front push tractor, rear push tractor, pull tractor (option)
- Paper insertion side alignment :  
Left
- Paper path: Tractor (front in, rear in, top out)
- Line spacing: 1 / 6 inches or programmable in increments of 1 / 216 inches.
- Feed speed:
  - 1/ 6-inch feed: 26.5 ms
  - Continuous feed: 0.251 mps (m/s).  
9.9 ips (inch/sec)

**Note :** *The feeding speed will be reduced to 0.152 mps (6.0 ips) when the pull tractor is mounted.*

## 1.2.3 Electrical Specification

- 120 V version:
  - Rated voltage : 120 V AC
  - Input voltage range : 99 to 132 V AC
  - Rated frequency range : 50 to 60 Hz
  - Input frequency range : 49.5 to 60.5 Hz
  - Rated current : 3.5 A (max.7.5 A)
  - Power consumption : Approx.160 W (ISO/IEC10561 Letter pattern)  
Energy Star compliant
  - Insulation resistance : 10 M ohms min. (between AC line and chassis, 500 V DC)
  - Dielectric strength : 1000 AC Vrms. 1 min. or  
1200 AC Vrms. 1 sec. (between AC line and chassis)
- 220 - 240 V version:
  - Rated voltage : 220 to 240 V AC
  - Input voltage range : 198 to 264 V AC
  - Rated frequency range : 50 to 60 Hz
  - Input frequency range : 49.5 to 60.5 Hz
  - Rated current : 1.4 A (max.3.5 A)
  - Power consumption : Approx.160 W (ISO/IEC10561 Letter pattern)  
Energy Star compliant
  - Insulation resistance : 10 M ohms min. (between AC line and chassis, 500 V DC)
  - Dielectric strength : 1500 AC Vrms. 1 min. (between AC line and chassis)

## 1.2.4 Environmental Condition

- Temperature : 5 to 35 °C (operating)  
-30 to 60 °C (non-operating)
- Humidity : 10 to 80 % RH (operating) \*1)  
5 to 85 % RH (non-operating) \*1)
- Resistance to shock : 1 G, within 1 ms (operating)  
2 G, within 2 ms (non-operating) \*2)
- Resistance to vibration : 0.25 G, 10 to 55 Hz (operating)  
0.50 G, 10 to 55 Hz (non-operating) \*2)

**\*1: Without condensation**

**\*2: With shipment container**

## 1.2.5 Reliability

- Total print volume : 26 million lines (except print head)
- MTBF : 10,000 POH (25 % duty)
- Print head life : 400 million characters at 14 dots/character
- Ribbon life : 15 characters at 14 dots /character

## 1.2.6 Safety Approvals

- 120 V version:
  - Safety standards :
    - UL1950 with D3
    - CSA C22.2 No.950 with D3
  - EMI :
    - FCC part 15 subpart B class B
    - CSA C108.8 class B
- 230 V version:
  - Safety standards :
    - EN60950 (VDE, NEMKO)
  - EMI :
    - EN55022 (CISPR pub.22) class B
    - AS / NZS 3548 class B

## 1.2.7 CE Marking

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

## 1.2.8 Acoustic Noise

- Level: 58 dB(A) (ISO 7779 pattern)

## 1.2.9 Ribbon Cartridge

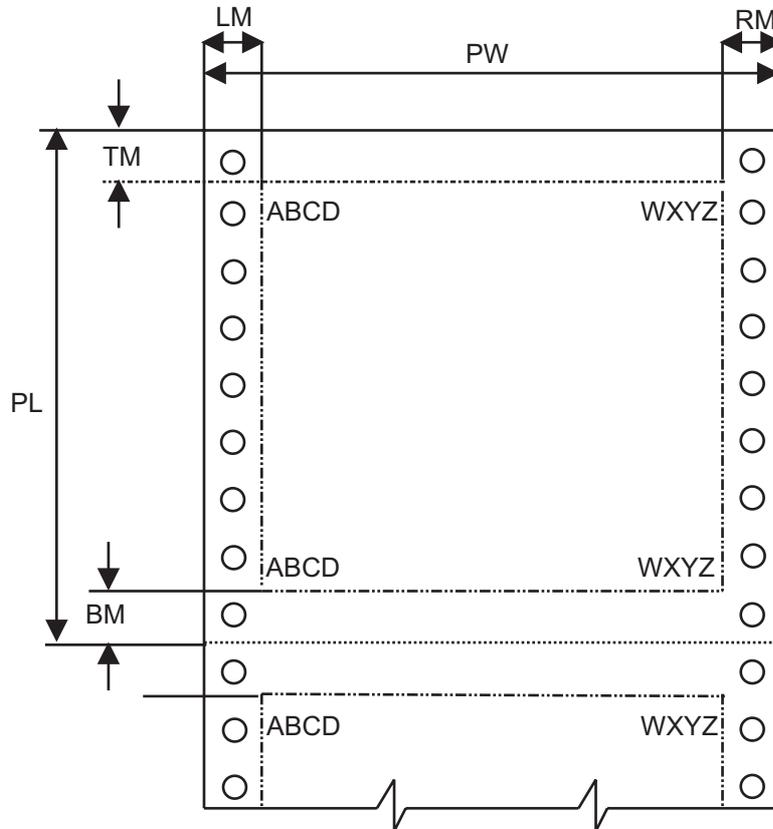
- Type : Fabric
- Color : Black
- Ribbon life : 15 million characters (draft 10 cpi, 14 dots / character)
- Dimensions : 506.0 mm (W) x 123.5 mm (D) x 23.0 mm (H)

## 1.2.10 Physical Specifications

- Dimensions : 700 mm (W) x 382 mm (D) x 369 mm (H)
- Weight : APPROX. 29 Kg

### 1.2.11 Printable area

□ Continuous paper : Refer to Figure 1-3.



Continuous Paper	
PW (width)	Refer to Section 1.2.12.
PL (length)	Refer to Section 1.2.12.
LM (left margin)	13 mm to 31mm
RM (right margin)	13 mm or more
TM (top margin)	2.6 mm or more
BM (bottom margin)	4.2 mm or more

**Notes 1:** In the top 75 mm area, the paper feeding pitch may be irregular.

**Notes 2:** If the optional pull tractor is used, the top 120 mm area should not be printed.

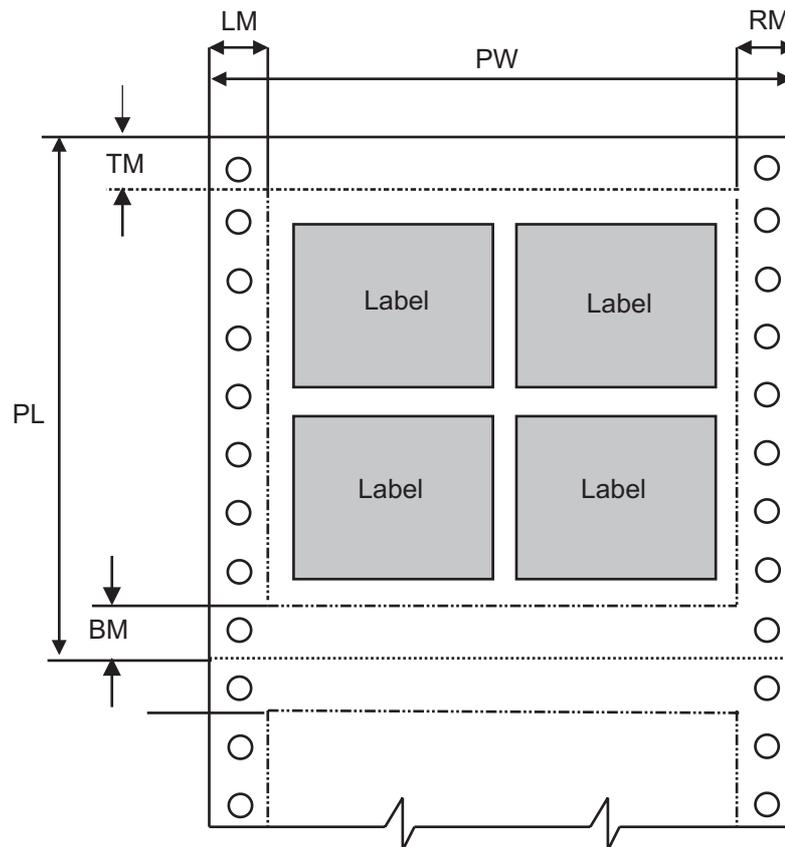
**Notes 3:** Forms-override printing is available 20 lines after the paper end.

(Paper feeding pitch is not guaranteed.)

The end of the printable area is 9 to 15 mm apart from the bottom edge of the paper.

Figure 1-3. Continuous Paper Printable Area

□ Labels : Refer to Figure 1-4.



	Continuous Paper
PW (width)	Refer to Section 1.2.12.
PL (length)	Refer to Section 1.2.12.
LM (left margin)	13 mm to 31mm
RM (right margin)	13 mm or more
TM (top margin)	2.6 mm or more
BM (bottom margin)	4.2 mm or more

**Notes 1:** Feeding backward or paper (PATH) selection are prohibited.

**Notes 2:** If In the top 75 mm area, the paper feeding pitch may be irregular.

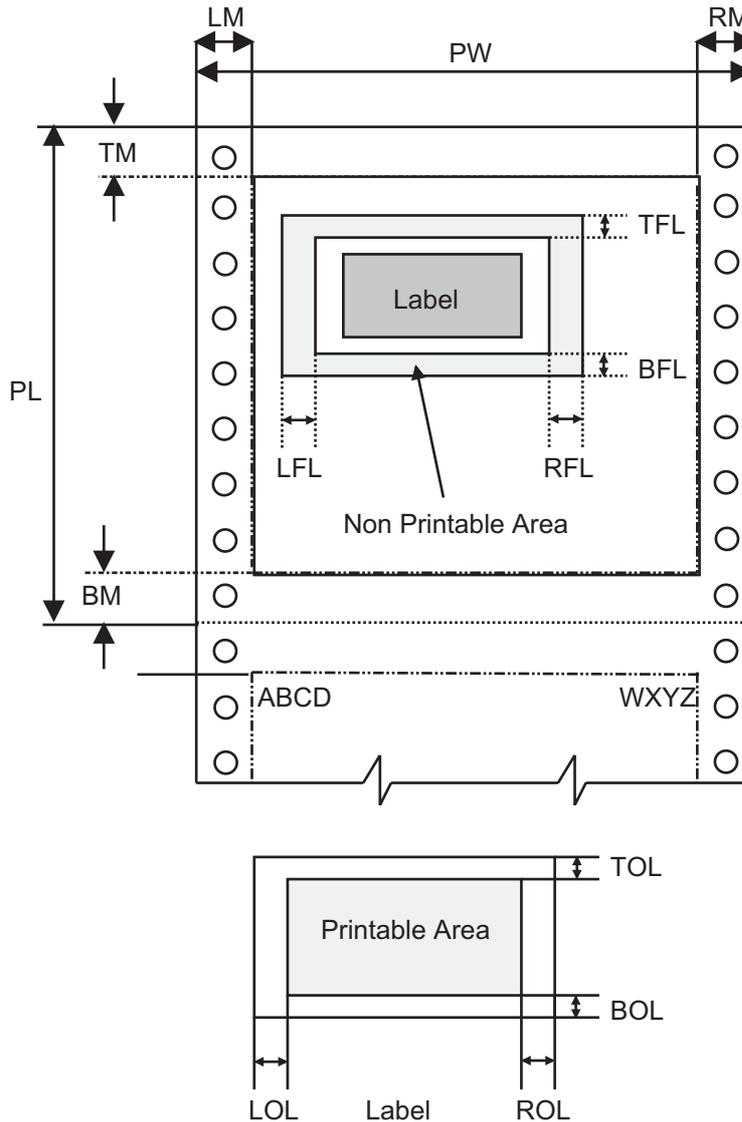
**Notes 3:** If the optional pull tractor is used, the top 120 mm area should not be printed..

**Notes 4:** Forms-override printing is available 20 lines after the paper end.  
(Paper feeding pitch is not guaranteed.)

The end of the printable area is 9 to 15 mm apart from the bottom edge of the paper.

Figure 1-4. Label Printable Area

□ Continuous forms with labels : Refer to Figure 1-5.

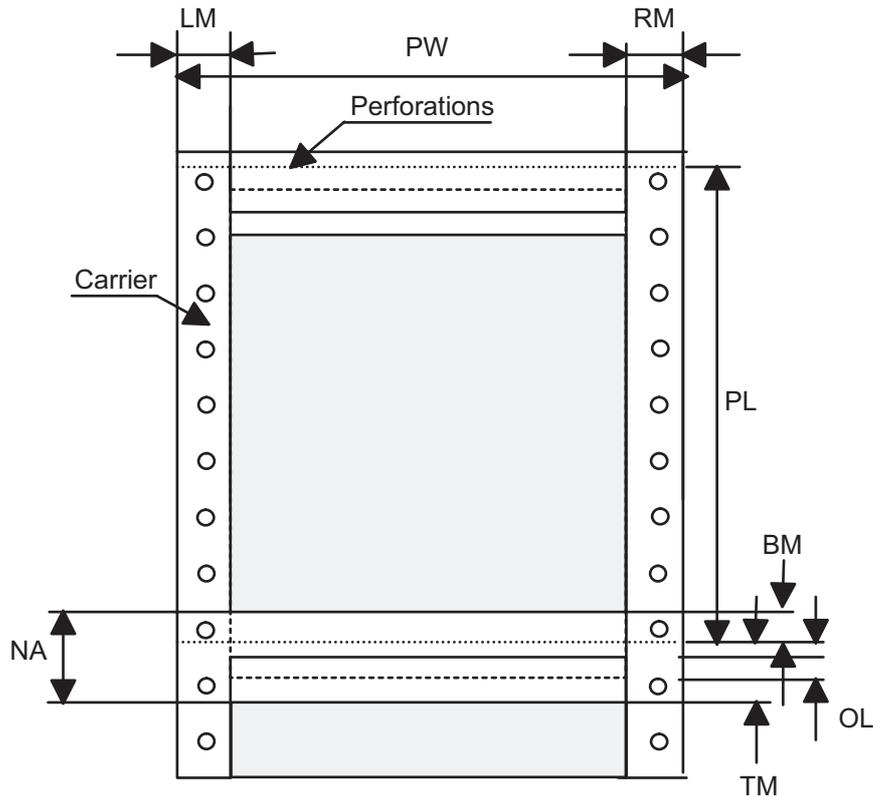


	Continuous Paper
PW (width)	Refer to Section 1.2.12.
PL (length)	Refer to Section 1.2.12.
LM (left margin)	13 mm to 31mm
RM (right margin)	13 mm or more
TM (top margin)	2.6 mm or more
BM (bottom margin)	4.2 mm or more
LFL (left margin from label)	65 mm or more
RFL (right margin from label)	65 mm or more
TFL (top margin from label)	12.5 mm or more
BFL (bottom margin from label)	12.5 mm or more
LOL (left margin on label)	5 mm or more
ROL (right margin on label)	5 mm or more
TOL (top margin on label)	2 mm or more
BOL (bottom margin on label)	2 mm or more

- Notes 1:** Feeding backward or paper (PATH) selection are prohibited.
- Notes 2:** If In the top 75 mm area, the paper feeding pitch may be irregular.
- Notes 3:** If the optional pull tractor is used, the top 120 mm area should not be printed..
- Notes 4:** Forms-override printing is available 20 lines after the paper end.  
 (Paper feeding pitch is not guaranteed.)  
 The end of the printable area is 9 to 15 mm apart from the bottom edge of the paper.

Figure 1-5. Continuous Forms with Labels Printable Area

- Overlapping multi-part forms : Refer to Figure 1-6.



	<b>Continuous Paper</b>
PW (width)	Refer to Section 1.2.12.
PL (length)	Refer to Section 1.2.12.
LM (left margin)	19 mm to 31mm
RM (right margin)	19 mm or more
TM (top margin)	21.2 mm or more
BM (bottom margin)	4.2 mm or more
OL (overlapping length)	Less than 13.3 mm
NA (non printable area)	25.4 mm or more

- Notes 1:** Feeding backward or paper (PATH) selection are prohibited.
- Notes 2:** If in the top 75 mm area, the paper feeding pitch may be irregular.
- Notes 3:** If the optional pull tractor is used, the top 120 mm area should not be printed..
- Notes 4:** Forms-override printing is available 20 lines after the paper end.  
(Paper feeding pitch is not guaranteed.)  
The end of the printable area is 9 to 15 mm apart from the bottom edge of the paper.

Figure 1-6. Overlapping Multi-part Form Printable Area

## 1.2.12 Paper and Media

### 1.2.12.1 Continuous paper (Single sheet and multi-part)

Table 1-5. Continuous Paper

		Front Entry		Rear Entry	
		Minimum	Maximum	Minimum	Maximum
Width	(inch)	4.0	16.0	4.0	16.0
	(mm)	101	406	101	406
Length	(inch)	4.0	17.0	4.0	17.0
	(mm)	101	431	101	431
Copies		1 original + 6 copies		1 original + 5 copies	
Total Thickness	(inch)	0.0025	0.021	0.0025	0.018
	(mm)	0.065	0.53	0.065	0.46
Weight (not multi-part)	(g/m <sup>2</sup> )	52.6	82.7	52.6	82.7
	(lb)	14	22	14	22
Weight (one sheet of multi-part)	(g/m <sup>2</sup> )	41.4	56.4	41.4	56.4
	(lb)	11	15	11	15
Quality		Plain paper, Reclaimed paper, Carbonless multi-part forms			
Multi-part binding		<ul style="list-style-type: none"> <li>• Rough bindings of multi-part paper cause paper jam.</li> <li>• The each sheet of multi-part paper should normally be put together by spot-gluing, paper-stapling, tape stitching. Spot-gluing is recommended for the better printing quality.</li> <li>• Spot-gluing must be applied on both sides of paper (Refer to Figure 1-7.).</li> <li>• The spot-glued parts must be pressed flat. There must be no creases in the paper.</li> <li>• The paper-stapling must be applied from the front of paper and the paper must be flat (Refer to Figure 1-8.).</li> <li>• Paper-stapling must be applied for both feeding directions (Refer to Figure 1-9.).</li> <li>• The paper-stapling should be flat (Refer to Figure 1-10.).</li> <li>• Never use metal staples.</li> <li>• The position of binding must be outside of printable area.</li> <li>• Multi-part paper should be bound firmly to each other and the binding must not be too large.</li> </ul>			
Perforation		Refer to Section 1.2.12.5.			
Notes		Refer to Section 1.2.12.6.			

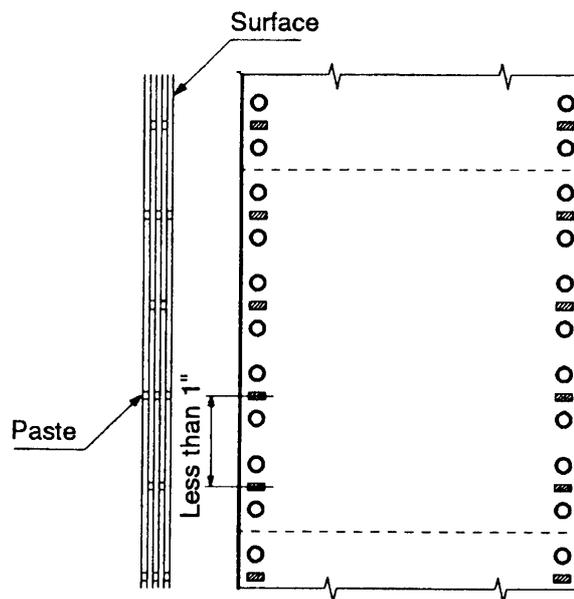


Figure 1-7. Dotted Paste Positions

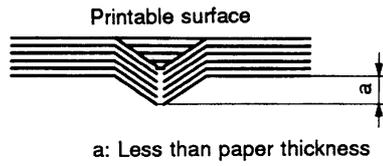


Figure 1-8. Paper-stapling Height

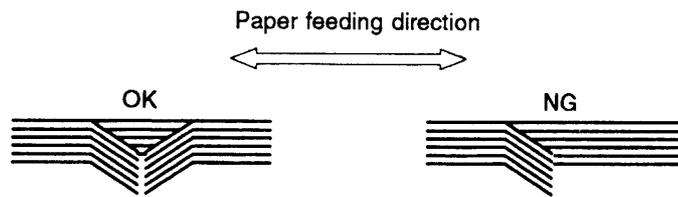


Figure 1-9. Paper-stapling Method 1

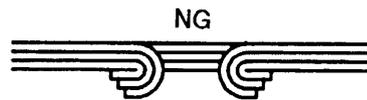


Figure 1-10. Paper -stapling Method 2

1.2.12.2 Labels

Table 1-6. Labels

	Front Entry		Rear Entry	
	Minimum	Maximum	Minimum	Maximum
Label Size	Refer to Figure 1-11.			
Backing Sheet Width	(inch) 4.0 (mm) 101	16.0 406	-	-
Backing Sheet Length	(inch) 3.5 (mm) 89	17.0 431	-	-
Label Thickness	(inch) 0.0 (mm) 0.0	0.0047 0.12	-	-
Total Thickness	(inch) 0.0025 (mm) 0.065	0.0075 0.19	-	-
Quality	AVERY CONTINUOUS FORM LABELS, AVERY MINI-LINE LABELS, or the same quality labels		-	
Perforation	Refer to section 1.2.12.5.			
Notes	<ul style="list-style-type: none"> <li>• The easy-cone-off label should not be used.</li> <li>• Every label must be put on the carrier.</li> <li>• Each corner of those labels must be rounded.</li> <li>• Each label and backing sheet should not have any folds or creases.</li> <li>• Between each label, there should be the same sheet as those labels.</li> <li>• The backing sheet must be continuous paper.</li> <li>• Labels should be inserted from front entrance.</li> </ul> <p>Refer to Section 1.2.12.6.</p>			



Width		Height	
Inch	mm	Inch	mm
2.5	63.5	15/16	23.8
4.0	101	15/16	23.8
4.0	101	17/16	27.0

Figure 1-11. Label Size

## 1.2.12.3 Continuous Forms with Labels

Table 1-7. Continuous Forms with Labels

	Front Entry		Rear Entry	
	Minimum	Maximum	Minimum	Maximum
Label Size	Refer to Section 1.2.12.2.		-	
Width (inch)	4.0	16.0	-	-
(mm)	101	406		
Length (inch)	4.0	17.0	-	-
(mm)	101	431		
Weight (not multi-part) (g/m <sup>2</sup> )	52.6	82.7	-	-
(lb)	14	22		
Weight (one sheet of multi-part) (g/m <sup>2</sup> )	41.4	56.4		
(lb)	11	15		
Label Thickness (inch)	0.0	0.0047		
(mm)	0.0	0.12		
Total Thickness (inch)	0.0025	0.021	-	-
(mm)	0.065	0.53		
Quality (Multi-part forms)	Plain paper, reclaimed paper, carbonless multi-part forms			
Quality (Label)	AVERY CONTINUOUS FORM LABELS, AVERY MNI-LINE LABELS, or the same quality labels			
Multi-part binding	<ul style="list-style-type: none"> <li>• Rough bindings of multi-part paper cause paper jam.</li> <li>• The each sheet of multi-part paper should normally be put together by spot-gluing, paper-stapling, tape stitching. Spot-gluing is recommended for the better printing quality.</li> <li>• Spot-gluing must be applied on both sides of paper (Refer to Figure 1-7.).</li> <li>• The spot-glued parts must be pressed flat. There must be no creases in the paper.</li> <li>• The paper-stapling must be applied from the front of paper and the paper must be flat (Refer to Figure 1-8.).</li> <li>• Paper-stapling must be applied for both feeding directions (Refer to Figure 1-9.).</li> <li>• The paper-stapling should be flat (Refer to Figure 1-10.).</li> <li>• Never use metal staples.</li> <li>• The position of binding must be outside of printable area.</li> <li>• Multi-part paper should be bound firmly to each other and the binding must not be too large.</li> </ul>			
Perforation	Refer to Section 1.2.12.5.			
Notes	<ul style="list-style-type: none"> <li>• The easy-cone-off label should not be used.</li> <li>• Every label must be put on the carrier.</li> <li>• Each corner of those labels must be rounded.</li> <li>• Each label and backing sheet should not have any folds or creases.</li> <li>• Between each label, there should be the same sheet as those labels.</li> <li>• The backing sheet must be continuous paper.</li> <li>• Continuous forms with labels should be inserted from front entrance.</li> </ul> <p>Refer to Section 1.2.12.6.</p>			

### 1.2.12.4 Overlapping Multi-part Form

**Table 1-8. Overlapping Multi-part Form**

	Front Entry		Rear Entry	
	Minimum	Maximum	Minimum	Maximum
Width (inch) (mm)	4.0 101	16.0 406	-	-
Length (inch) (mm)	4.0 101	17.0 431	-	-
Weight (not multi-part) (g/m <sup>2</sup> ) (lb)	52.6 14	82.7 22	-	-
Weight (one sheet of multi-part) (g/m <sup>2</sup> ) (lb)	41.4 11	56.4 15	-	-
Copies	1 original + 5 copies + 1 backing sheet		-	
Total Thickness (print area) (inch) (mm)	0.0025 0.065	0.021 0.53	-	-
Total Thickness (overlap area) (inch) (mm)	0.005 0.13	0.028 0.70	-	-
Overlapping Length (inch) (mm)	more than 0 more than 0	0.39 10	-	-
Quality (multi-part forms)	Plain paper, reclaimed paper, carbonless multi-part forms		-	
Multi-part binding	<ul style="list-style-type: none"> <li>Multi-part paper must be bound at the top side by spot-gluing (Figure 1-12.).</li> <li>The bindings must not be too hard. And there should not be any spilt glue.</li> <li>The position of binding must be outside of printable area.</li> <li>Multi-part paper should be bound firmly to each other and the binding must not be too large.</li> </ul>			
Perforation	Refer to Section 1.2.12.5.			
Notes	<ul style="list-style-type: none"> <li>Overlapping multi-part form should be inserted from front entrance. Refer to Section 1.2.12.6.</li> </ul>			

### 1.2.12.5 Perforation

- Weak horizontal and vertical perforations cause paper jams.D
- The length ratio of the cut part and uncut part of perforations must be more than 3 to 1 and less than 5 to 1 (Refer to Figure 1-13.).
- Horizontal perforations must have an uncut part in each end of the paper (Refer to Figure 1-14.).
- At the intersection of horizontal and vertical perforations, the cut part of the perforations must not cross each other (Refer to Figure 1-15.).
- The raised part at the perforation must be less than 1 mm when the bottom layer kept by force (Refer to Figure 1-16.).

### 1.2.12.6 Notes

- Clean paper (with no folds, creases, tears) should be used (Refer to Figure 1-17.).
- The sprocket hole must be circular. The hole may have teeth (Refer to Figure 1-18.).
- The sprocket hole of each layer must not be shifted (Refer to Figure 1-19.).
- The litter of sprocket holes must be removed from the paper.
- Paper should be fan-folded at horizontal perforations. Never use one that is not fan-folded property (Refer to Figure 1-20.).
- No hole is acceptable in the printable area.
- Paper must be torn off accurately along perforations.

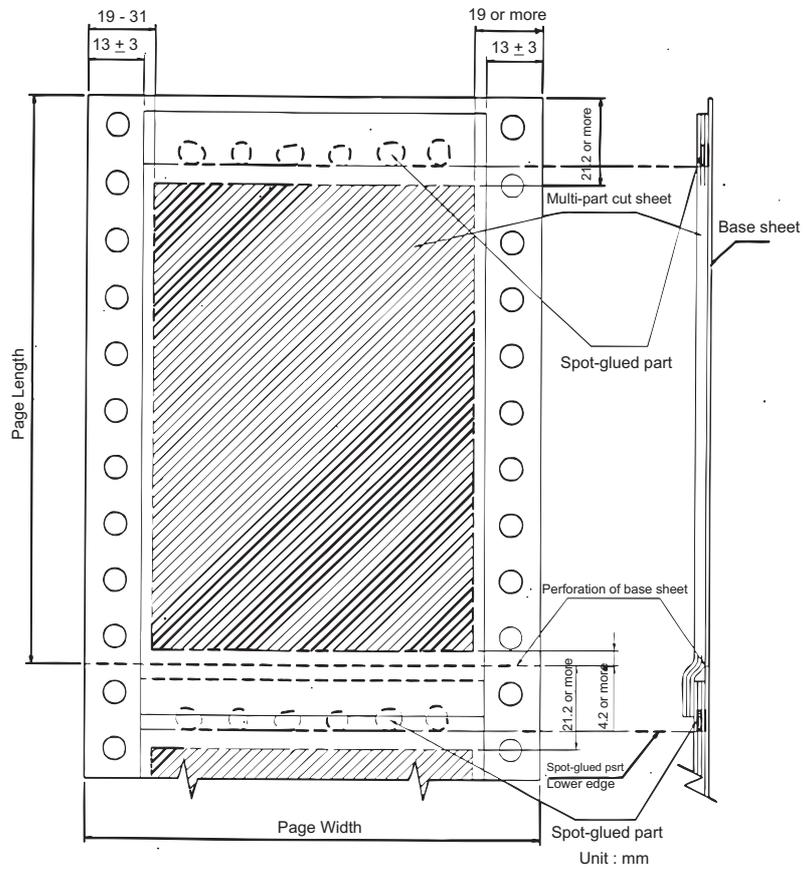


Figure 1-12. Paper Width Overlapping Area

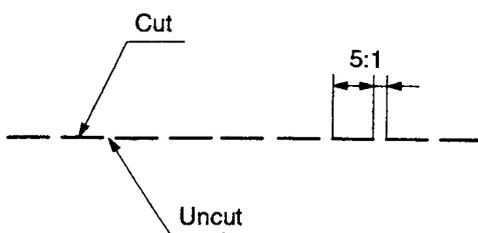


Figure 1-13. Perforations 1

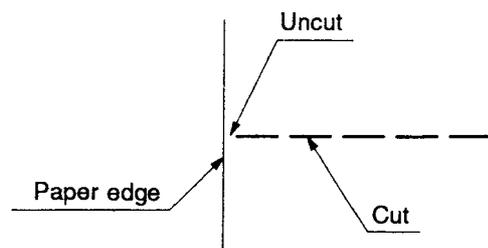


Figure 1-14. Perforations 2

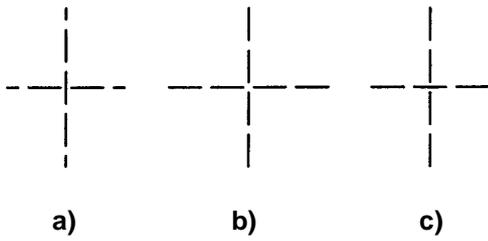


Figure 1-15. Perforations 3

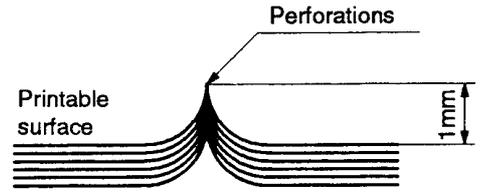


Figure 1-16. Raised Portion at a Perforation

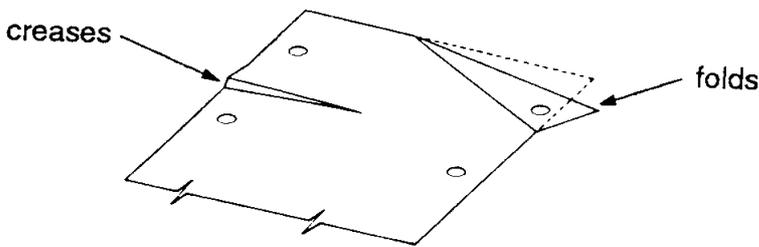
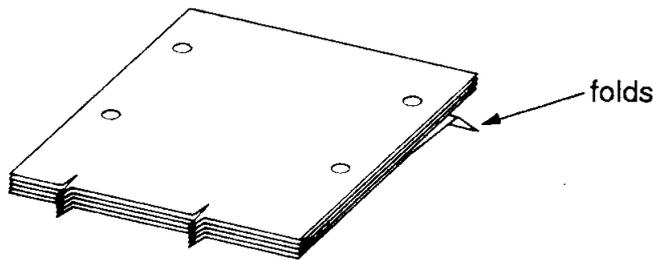
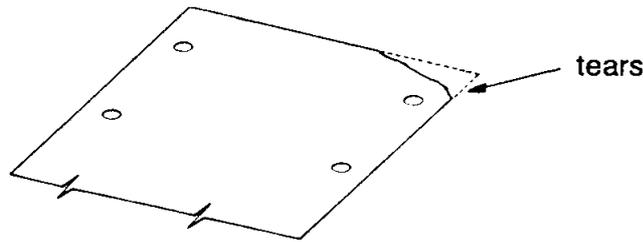


Figure 1-17. Unsuitable Paper



Figure 1-18. Sprocket Hole 1

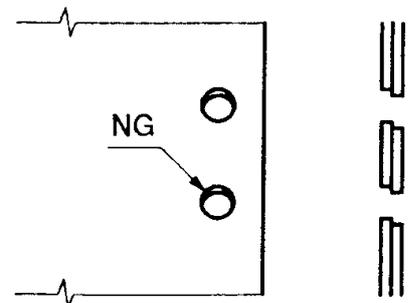


Figure 1-19. Sprocket Hole 2

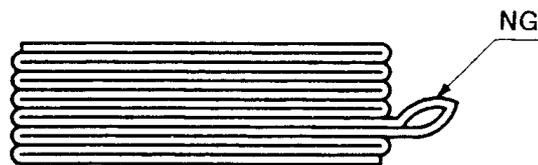


Figure 1-20. Bad Folded Paper

## 1.3 INTERFACES

The DFX-8500 is equipped with parallel interface, serial interface, and optional Type-B interface card. This section presents the specifications for each interface type.

### 1.3.1 Parallel Interface (Forward channel)

- Data transmission mode: 8-bit parallel, IEEE-1284 compatibility mode
- Synchronization: /STROBE pulse
- Connector type: 57-30360 (AMPHENOL) 36-pin plug or equivalent
- Handshaking: BUSY and /ACK handshaking

**Notes 1:** *BUSY signal is set high before setting either /ERROR low or PE high and held high until all these signals return to their inactive state. BUSY signal is at a high level in the following cases.*

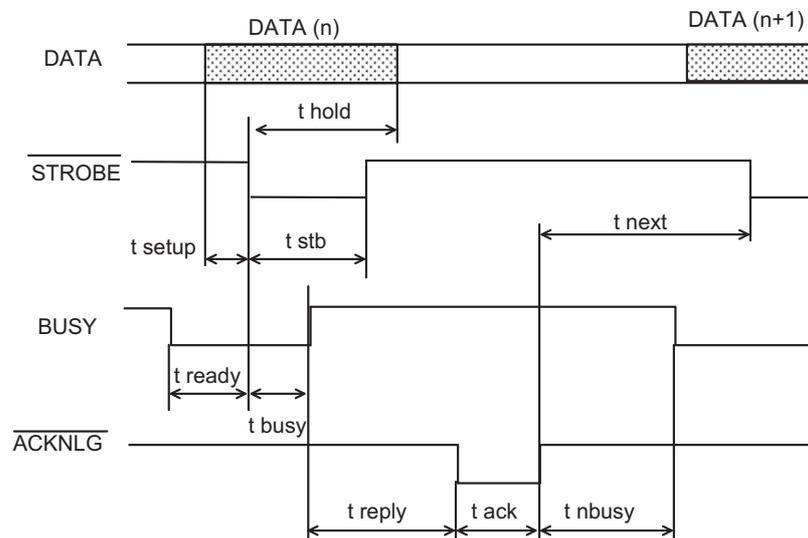
- During data entry (see data transmission timing)
- When input data buffer is full.
- During /INIT signal is at a low level or during hardware initialization
- During printer error (see /ERROR signal)
- During test printing or during setting printing
- During Selectype
- When the parallel interface is not selected.

**Notes 2:** */ERROR signal is at a low level when the printer is in one of the following states.*

- Printer hardware error (fatal error)
- Paper out error
- Paper jam error
- Cover open status
- Incomplete paper change
- Paper size error
- Ribbon jam error

**Notes 3:** *PE signal is at a high level during paper out error.*

- Data transmission timing: Refer to Figure 1-21.



Parameter	Minimum	Maximum	Parameter	Minimum	Maximum
t setup	500 ns	---	t ack	500 ns	10 us
t hold	500 ns	---	t nbusy	0	---
t stb	500 ns	---	t next	0	---
t ready	0	---	tt-out*	---	120 ns
t busy	---	500 ns	tt-in**	---	200 ns
t reply	---	---			

**Note:** \* Rise and fall time of output signals

\*\* Rise and fall time of input signals.

Figure 1-21. Data Transmission Timing

- Signal Level: TTL-level compatible, IEEE-1284 level 1 device  
Refer to Table 1-9.

**Table 1-9. Signal Level**

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

**Note:** \* A low logic level on the logical high signal is 2.0 V or less when the printer is powered off. And this signal is equal or exceeding 3.0 V when the printer is powered on. The receiver shall provide an impedance equivalent to 7.5 K ohms to ground.

- Connector pin assignments and signals: Refer to Table 1-10.

**Table 1-10. Signal and Connector Pin Assignment (Forward channel)**

Pin No.	Signal Name	Return GND pin	In/Out*	Functional Description
1	/STROBE	19	In	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	DATA 0-7	20-27	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0.
10	/ACKNLG	28	Out	This signal is a negative pulse indicating that the printer can again accept data.
11	BUSY	29	Out	A high signal indicates that the printer cannot receive data.
12	PE	28	Out	A high signal indicates paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	/AFXT	30	In	Not used.
31	/INIT	30	In	The falling edge of a negative pulse or a low signal on this line causes the printer to initialize. Minimum 50 us pulse is necessary.
32	/ERROR	29	Out	A low signal indicates printer error condition.
36	/SLIN	30	In	Not used.
18	Logic H	-	Out	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND.
16,33,19,30	GND	-	-	Signal GND.
15,34	NC	-	-	Not connected.

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

### 1.3.2 Parallel Interface (Reverse channel)

- Data transmission mode: IEEE-1284 nibble mode
- Connector type: 57-30360 (AMPHENOL) 36-pin plug or equivalent
- Synchronization: No Info.
- Handshaking: No info.
- Data transmission timing: No info.
- Signal Level: TTL-level compatible, IEEE-1284 level 1 device
- 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]
MPG:EPSON;
CMD:ESCP9,PRPII9,BDC;
MDL:DFX-8500;
CLS:PRINTER;
```

- Connector pin assignments: Refer to Table 1-11.

**Table 1-11. Signal and Connector Pin Assignment (Reverse channel)**

Pin No.	Signal Name	I/O*	Description
1	/STROBE	IN	HostClk: This signal is a strobe pulse used to read extension request values from the host computer during negotiation.
2-9	DATA 1-8	IN	The signals are data bits of extension request Values during negotiation. This printer supports following values: 0000 0100: Request Device ID (by nibble mode sending) 0000 0000: Request nibble mode
10	/ACKNLG	OUT	PtrClk: Printer data sending clock.
11	BUSY	OUT	PtrBusy: Printer sending data bits 3 and 7 during data transfer to the host computer
12	PE	OUT	AckDataReq: Printer sending data bits 2 and 6 during data transfer to the host computer
13	SLCT	OUT	Xflag: Printer sending data bits 2 and 6 during data transfer to the host computer.
14	/AUTO-FEED	IN	HostBusy: This signal informs the printer of the host computer state. When the signal is HIGH, the host computer cannot accept data.
15	NC	-	Not used.
16	GND	-	Logic ground level
17	CHASSISGND	-	Connected to the printer chassis. The printer chassis GND and the signal GND are connected to each other.
18	NC	-	Not connected.
19-30	GND	-	Ground level for the twisted pair return signal.
31	/INIT	IN	nInIt: High level fixed
32	/ERROR	OUT	nDataAvail: Printer sending data bits 0 and 4 during data transfer to the host computer.
33	GND	-	Same as for ins19to30.
34	NC	-	Not used.
35	+5	-	Pulled up to +5V through 1.0K ohm resistor.
36	/SLCT IN	IN	1284Active: If this signal is set to HIGH, this printer active P1284(reverse mode).

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

### 1.3.3 Serial Interface

- Synchronization : Asynchronous
  - Signal level (ELA-232D) :
    - MARK (logical 1) : -3Vto-25V
    - SPACE (logical 0) : +3Vto+25V
  - Word length :
    - Start bit : 1 bit
    - Data bit : 8 bit
    - Parity bit : Odd, Even, Non, of Ignore
    - Stop bit : 1 bit or more
  - Baud rate : 2400, 4800, 9600 or 19200 bps
  - Handshaking : DTR signal or X-ON / X-OFF
    - DTR=MARK, X-OFF : Indicates that the printer cannot receive data.
    - DTR=SPACE, X-ON : Indicates that the printer is ready to receive data.
- Note:** *The DTR signal is MARK and X-OFF code (DC3, 13h) is transmitted when the rest of the input buffer becomes 256-byte. The DTR signal is SPACE and X-ON code (DC1, 11h) is transmitted when the rest of the input buffer is regained 256-byte.*
- Error handling : When parity error is detected, the received byte is changed to the "\*" character code. Overrun error and framing error are ignored.
  - Connector : 25 pin sub-miniature D-shell connector (female)
  - Connector pin assignment and signals : Refer to Table 1-12.

**Table 1-12. Signal and Connector Pin Assignment (EIA-232D)**

Pin No.	Signal Name	In / Out*	Functional Description
2	TXD	Out	Transmit data.
20	DTR	Out	Indicates that the printer is ready to receive data or not.
11	REV	Out	Connected directly to the DTR signal.
4	RTS	Out	Request to send. always SPACE level when the printer is powered on. Pulled up to +12 V via 4.7K-ohm resistor.
3	RXD	In	Receive data
7	Signal GND	-	Signal GND
1	Chassis GND	-	Chassis GND
Other	NC	-	Not used. Not connected.

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

### 1.3.4 Optional Interface

Type-B and Type-B level 2 optional interfaces are available (Refer to Table 1-1.).

### 1.3.5 Interface Selection

The printer has three interfaces; the parallel interface, serial interface, and optional Type-B interface. These interfaces are selected manually by DIP SW or selected automatically.

- ❑ **Manual selection:**  
One of three interfaces can be selected by DIP SW setting.
- ❑ **Automatic selection:**  
The automatic interface selection is enabled by DIP SW 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 DIP SW 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.
- ❑ **Interface state and interface selection:**  
When the parallel interface is not selected, the interface got into a busy state. When the serial interface is not selected, the interface sends X-OFF 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 got into a ready state, the serial interface sends X-ON 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.

### 1.3.6 Prevention Hosts from Data Transfer Time-out

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 time-out, 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 OPERATING INSTRUCTIONS

This section describes the functions performed through the control panel, such as test print, hexadecimal dump, and paper memory function.

### 1.4.1 Control Panel

The printer control panel gives you easy control over most common printer operations. The panel consists of indicator lights and buttons.

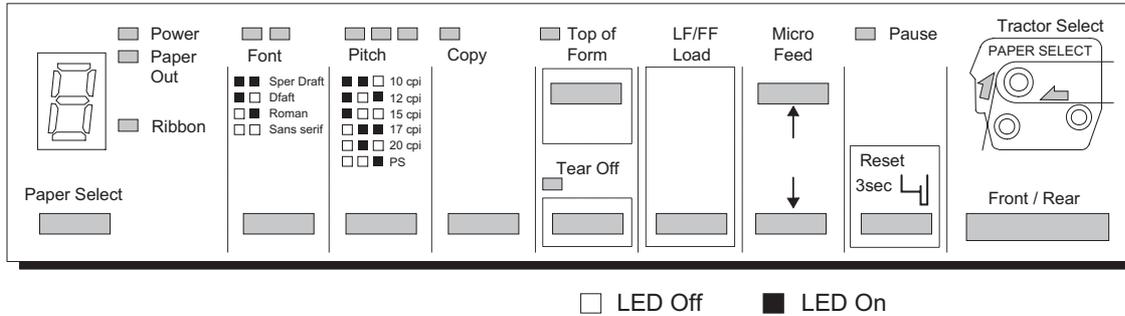


Figure 1-22. Control Panel

### 1.4.1.1 Switches

The control panel contains eleven switches.

#### ❑ Operation in normal mode:

In normal mode, pressing panel switches executes following function. Refer to Table 1-13.

**Table 1-13. Switch Function in Normal Mode**

Switch	Function
Front / Rear	Change the front and rear paper path alternately.
Pause	<ul style="list-style-type: none"> <li>■ Alternates printing and no-printing status.</li> <li>■ Enables reset function, holding it down for three seconds.</li> </ul>
Micro Feed ↑	Executes micro feed forward.
Micro Feed ↓	Executes micro feed backward.
LF / FF Load	<ul style="list-style-type: none"> <li>■ Loads the paper when the paper is empty.</li> <li>■ Executes line feed, pressing it shortly.</li> <li>■ Executes form feed, holding it down for a few seconds.</li> </ul>
TOF (top of form)	<ul style="list-style-type: none"> <li>■ Set current point to top of form when the cover opens.</li> <li>■ Enables loading position adjustment and tear off position adjustment when the cover opens.</li> </ul>
Tear Off	Advances continuous paper to the Tear off position adjustment.
Copy	Alternates copy mode or not.
Pitch	Selects pitch.
Font	Selects font.
Paper Select	Selects paper No.

#### ❑ Operation at power on:

Tuning the printer on while pressing panel switches executes the function shown in Table 1-14.

**Table 1-14. Switch Function at Power On**

Switch	Function
LF / FF Load	Draft self test
Tear off	NLQ self test
Tear off and LF / FF	Data dump
Pause	DIP SW setting print
LF / FF Load and Micro Feed ↓ and Pause*1)	Clear EEPROM at area 2
Pause and Front / Rear*2)	Clear EEPROM at area 1
Copy	Clear driving line count for ribbon change timing
Paper Select	Paper memory
Tear Off, Micro Feed ↑, and Front/Rear	Mechanism adjustment (Refer to Chapter 4.)
Tear Off, Micro Feed ↓, and Front/Rear	Platen gap adjustment (Refer to Chapter 4.)
Micro Feed ↑ and Micro Feed ↓	Measurement seeking (Refer to Chapter 4.)

**Notes1: All of mechanism adjustment values are cleared. Then it requires the printer mechanism adjustment.**

**Notes2: All of user setting value is replaced with the factory setting value.**

### 1.4.1.2 Indicators

The control panel contains fifteen LEDs.

- Rear (2) (Green / Red) :
  - Green LED on when the rear paper path is selected with paper.
  - Red LED on when the rear paper path is selected without paper.
  - Off when the front paper path is selected.
- Front (2) (Green / Red) :
  - Green LED on when the front paper path is selected with paper.
  - Red LED on when the front paper path is selected without paper.
  - Off when the rear paper path is selected.
- Pause (Orange) :
  - The LED on when the printer is paused, and it is off when the printer is not paused.
  - The LED blinks when the printer is in the print head hot status.
- Top of Form (Green) :
  - The LED on when the top of form position is adjustable and tear off position is adjustable.
- Tear Off (Green) :
  - The LED on when the paper is in Tear off position and it is off when the paper is out of the Tear-off position.
- Copy (Green) :
  - The LED is on at copy mode, and it is off at normal mode.
- Pitch (Green) :
  - The status of Pitch selection is displayed by three Pitch LEDs.
    - □ ■ : 10 cpi
    - ■ □ : 12 cpi
    - ■ ■ : 15 cpi
    - □ □ : 17 cpi
    - □ ■ : 20 cpi
    - ■ □ : PS
- Font (Green) :
  - The status of Font selection is displayed by two Font LEDs.
    - □ : Super draft
    - ■ : Draft
    - □ : Roman
    - ■ : Sans Serif
- Power (Green) :
  - The LED is on when the printer is powered on, and it is off when the printer is powered off.
- Paper Out (Red) :
  - The LED is on when the printer is in the paper out status, and it is off when the printer is out of this status.
  - The LED blinks when the printer is in the paper jam status.
- Ribbon (Red) :
  - The LED blinks when the printer is in the ribbon jam status.
- Paper Select (Seven-segment, Green) :
  - The LED indicates selected paper No.

## 1.4.2 Errors and Buzzers

Errors fall into 2 types; normal error/warning and fatal error. See the tables below for detailed information.

**Table 1-15. Error/Warning Buzzer Information**

Error/Warning	PAUSE LED	Paper Out LED	Ribbon LED	Beeper *1)	Description
On Line	Off	Off	Off		
Pause	On	Off	Off		
Head hot	Blinking	Off	Off		
Head Fan hot	Blinking	Off	Off		
Paper out error	On	On	Off	...	When the printer fails to load a sheet, it goes paper out error.
Cover open error	ON	Off	Off	...	When the printer's cover is open, it goes cover open error.
Incomplete changing paper	On	Off	Off	...	When the printer fails to change the paper, it goes incomplete changing paper path error.
Incomplete back-feed paper	On	Blinking	Off	...	
Paper size error	ON	Off	Off	...	When paper width of the setting data and the current paper are different, it goes Paper size error.
Paper jam error	ON	Blinking	Off	-----	When the printer fails to eject a sheet, it goes paper jam error.
Ribbon jam error	On	Off	Blinking	-----	When the ribbon is in a jam status, it goes ribbon jam error.
Measurement seeking error	On	Blinking	Blinking	-----	When carriage breaking length is abnormal, it goes Measurement seeking error.
Illegal panel operation	-	-	-	-	

**Note 1: The descriptions “.” and “-” show how the beeper sounds.**

“.”: Beeper sounds 100 ms and interval is 100 ms.

“-”: Beeper sounds 500 ms and interval is 100 ms.

**Table 1-15a. Fatal Error Information**

Fatal Error	7-segment LED Indication *1)	Beeper *2)	Description *3)
CR motor circuit shortage error	1	-	Auto power off after 12 seconds
Cutter error	2	--	Auto power off after 12 seconds
Platen gap error	3	---	Auto power off after 12 seconds
Carriage lock error	4	----	Auto power off after 12 seconds
Carriage load measurement error	6	-----	Auto power off after 12 seconds
Head fan error	7	-----	Head power off immediately
Head circuit shortage error	8	-----	Head power off immediately
RAM check error	9	-----	Auto power off after 12 seconds
Paper memory setting error	a	-----	
EEPROM data compare error	b	-----	
Tractor change error	c	-----	Auto power off after 12 seconds
Watch dog error	d		Auto power off after 12 seconds

**Note 1: The 7 segment LED indicates error No. and “E” alternately.**

**Note 2: The descriptions “.” and “-” show how the beeper sounds.**

“.”: Beeper sounds 100 ms and interval is 100 ms.

“-”: Beeper sounds 500 ms and interval is 100 ms.

**Note 3: Turn the printer power off while the 7 segment LED are on, or the printer shuts power down automatically. You can't turn the printer back on for 5 minutes after the printer shuts power down automatically**

### 1.4.3 DIP Switch Settings

There are five DIP switches that are located at the front paper entrance of the printer. These DIP switches can set the printer defaults.

When power is applied or the printer is reset, the DIP switch selections are treated as the default setup. If the setup is changed, the power should be cycled or the printer should be reset.

Table 1-16 shows the DIP switch selections for this printer.

**Table 1-16. DIP Switch Settings**

Switch No.	Function	Off	On	Factory Setting
1-1 to 1-6	Character table	Refer to Tables 1-17 or 1-18.		All Off
1-7	Skip over perforation	Inactive	Active	Off
1-8	Print direction	Bi-d.	Uni-d.	Off
2-1 to 2-4	Page length for front tractor	Refer to Table 1-19.		All Off
2-5 to 2-8	Page length for rear tractor	Refer to Table 1-20.		All Off
3-1	Auto tear-off	Inactive	Active	Off
3-2	Zero slash	Inactive	Active	Off
3-3	Auto line feed	Inactive	Active	Off
3-4	Buzzer	Active	Inactive	Off
3-5	Auto CR (IBM 2381 Plus)	Inactive	Active	Off
3-6	IBM character table	Table 2	Table 1	Off
3-7	Auto cut mode	Inactive	Active	Off
3-8	Software	ESC/P	IBM 2381Plus	Off
4-1	Input buffer	Active	Inactive	Off
4-2	Auto I/F wait time	10 sec.	30 sec.	Off
4-3 to 4-4	I/F mode	Refer to Table 1-21.		All Off
4-5 to 4-6	Serial I/F parity	Refer to Table 1-22.		All Off
4-7 to 4-8	Serial I/F baud rate	Refer to Table 1-23.		All Off
5-1	Overlapping multi-part forms	Inactive	Active	Off
5-2	Continuous forms with labels	Inactive	Active	Off
5-3	Skip over binding	Inactive	Active	Off
5-4	Paper memory	Memory a	Memory b	Off
5-5 to 5-8	(reserved)	-	-	Off

Table 1-17. Character Table Setting (Standard)

SW 1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6	Character table
Off	Off	Off	Off	Off	Off	PC437 (US, standard Europe)
Off	Off	Off	Off	Off	On	PC850 (Multilingual)
Off	Off	Off	Off	On	Off	PC860 (Portuguese)
Off	Off	Off	Off	On	On	PC861 (Icelandic)
Off	Off	Off	On	Off	Off	PC863 (Canadian-French)
Off	Off	Off	On	Off	On	PC865 (Nordic)
Off	Off	Off	On	On	Off	Abicomp
Off	Off	Off	On	On	On	BRASCII
Off	Off	On	Off	Off	Off	Roman 8
Off	Off	On	Off	Off	On	ISO Latin 1
Off	Off	On	Off	On	Off	Italic USA
Off	Off	On	Off	On	On	Italic France
Off	Off	On	On	Off	Off	Italic German
Off	Off	On	On	Off	On	Italic U.K
Off	Off	On	On	On	Off	Italic Denmark
Off	Off	On	On	On	On	Italic Sweden
Off	On	Off	Off	Off	Off	Italic Italy
Off	On	Off	Off	Off	On	Italic Spain
					Others	PC437

Table 1-18. Character Table Setting (NLSP)

SW 1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6	Character table
Off	Off	Off	Off	Off	Off	PC437 (US, standard Europe)
Off	Off	Off	Off	Off	On	PC850 (Multilingual)
Off	Off	Off	Off	On	Off	PC437 Greek
Off	Off	Off	Off	On	On	PC852 East Europe
Off	Off	Off	On	Off	Off	PC853
Off	Off	Off	On	Off	On	PC855 (Cyrillic)
Off	Off	Off	On	On	Off	PC857 (Turkish)
Off	Off	Off	On	On	On	PC866 (Russian)
Off	Off	On	Off	Off	Off	PC869 (Greek)
Off	Off	On	Off	Off	On	MAZOWIA (Poland)
Off	Off	On	Off	On	Off	Code MJK (CSFR)
Off	Off	On	Off	On	On	ISO 8859-7 (Latin/Greek)
Off	Off	On	On	Off	Off	ISO Latin 1T (Turkish)
Off	Off	On	On	Off	On	Bulgaria (Bulgarian)
Off	Off	On	On	On	Off	Estonia (Estonia)
Off	Off	On	On	On	On	PC774 (LST 1283:1993)
Off	On	Off	Off	Off	Off	ISO8859-2
Off	On	Off	Off	Off	On	PC866LAT (Latvian)
Off	On	Off	Off	On	Off	PC866 UKR
Off	On	Off	Off	On	On	PCAPTEC
Off	On	Off	On	Off	Off	PC708
Off	On	Off	On	Off	On	PC720
Off	On	Off	On	On	Off	PC AR864
Off	On	Off	On	On	On	PC860(Portuguese)
Off	On	On	Off	Off	Off	PC861(Icelandic)
Off	On	On	Off	Off	On	PC865(Nordic)
Off	On	On	Off	On	Off	Italic USA
Off	On	On	Off	On	On	Italic France
Off	On	On	On	Off	Off	Italic German
Off	On	On	On	Off	On	Italic U.K
Off	On	On	On	On	Off	Italic Denmark
Off	On	On	On	On	On	Italic Sweden
On	Off	Off	Off	Off	Off	Italic Italy
On	Off	Off	Off	Off	On	Italic Spain
					Others	PC437

**Table 1-19. Front Tractor Page Length**

SW2-1	SW2-2	SW2-3	SW2-4	Page length for front tractor
Off	Off	Off	Off	11 inches
Off	Off	Off	On	3 inches
Off	Off	On	Off	3.5 inches
Off	Off	On	On	4 inches
Off	On	Off	Off	5.5 inches
Off	On	Off	On	6 inches
Off	On	On	Off	7 inches
Off	On	On	On	8 inches
On	Off	Off	Off	8.5 inches
On	Off	Off	On	70 / 6 inches
On	Off	On	Off	12 inches
On	Off	On	On	14 inches
On	On	Off	Off	17 inches
On	On	Off	On	Others
			Others	11 inches

**Table 1-20. Rear Tractor Page Length**

SW2-1	SW2-2	SW2-3	SW2-4	Page length for rear tractor
Off	Off	Off	Off	11 inches
Off	Off	Off	On	3 inches
Off	Off	On	Off	3.5 inches
Off	Off	On	On	4 inches
Off	On	Off	Off	5.5 inches
Off	On	Off	On	6 inches
Off	On	On	Off	7 inches
Off	On	On	On	8 inches
On	Off	Off	Off	8.5 inches
On	Off	Off	On	70 / 6 inches
On	Off	On	Off	12 inches
On	Off	On	On	14 inches
On	On	Off	Off	17 inches
On	On	Off	On	Others
			Others	11 inches

**Table 1-21. I/F Selection**

SW4-3	SW4-4	I/F Mode
Off	Off	Auto
Off	On	Parallel I/F
On	Off	Serial I/F
On	On	Optional I/F

**Table 1-22. Serial I/F Parity Setting**

SW4-5	SW4-6	Serial parity
Off	Off	None
Off	On	Odd
On	Off	Even
On	On	Ignore

**Table 1-23. Serial I/F Baud Rate Setting**

SW4-7	SW4-8	Baud rate
Off	Off	19200
Off	On	9600
On	Off	4800
On	On	2400

## 1.4.4 Functions

### 1.4.4.1 Usual operation

#### ❑ Front / Rear:

Changes the front and rear paper path alternately.

#### ■ Normal paper is set and the pull tractor is not used:

The printer feeds the paper to the tear off position and cut the paper by the cutter, and feeds backward to paper park position. If the cutter is not used, it goes incomplete changing paper error. So cut the paper at the top of paper and push Pause switch or Front/Rear switch, and the printer feeds the paper backward. After the paper is out, the printer loads the paper from another path's tractor.

#### ■ Overlapping multi-part forms or continuous forms with labels is set or pull tractor is used:

Incomplete changing paper error is occurred immediately. Cut the bottom of paper at current page and push Pause switch or Front/Rear switch, and the printer feeds the paper forward. After the paper is out, the printer loads the paper from another path's tractor.

#### ❑ Pause:

This switch alternates printer activity between printing and non-printing.

Hold this switch down over 3 seconds, and the printer resets all data.

Push this switch when incomplete changing paper is occurred, then go to the next step.

#### ❑ Micro feed:

Adjusts the paper position including "Top of Form" and "Tear off" positions. The ! switch advances the paper forward by 1/216-inch step, and ↓ switch advances the paper backwards by 1/216-inch step.

#### ❑ LF/FF Load:

Pressing it loads continuous paper when the printer is out of paper.

Pressing it shortly executes line feed.

Holding it down for a few seconds executes form feed.

#### ❑ Top of Form:

Advances the paper so that the characters' base line can be adjusted at the mark of ribbon mask holder, and enters the "Top of form adjustment" mode. The "Top of Form" LED turns on and the TOF position is adjustable with the "Micro Feed" switches in this mode.

When the "Top of Form" switch is pressed again, this mode is terminated. The adjustment position is stored as TOF, and the paper is fed back to the position before this mode.

When TOF adjustment is executed just after loading, the adjusted position will be treated as the loading position.

This switch is only available when the cover opens.

#### ❑ Tear Off:

Advances the paper until its perforation comes to the paper cutting part of the printer cover, and enters the tear off mode. The "Tear off" LED turns on and the Tear off position is adjustable with the "Micro Feed" switches in this mode.

When the "Tear Off" switch is pressed again, this mode is terminated. The adjustment position is stored as the tear off position, and the paper is feed back to the position before this mode.

This mode is terminated also by the data arrival from host computers.

#### ❑ Copy:

Pressing it select copy mode or normal mode.

#### ❑ Pitch:

Pressing it selects one of following pitches;

10 cpi, 12 cpi, 15 cpi, 17 cpi, 20 cpi and PS (proportional spacing).

#### ❑ Font:

Pressing it selects one of following fonts.

Super Draft, Draft, Roman, Sans serif

**□ Paper Select:**

Pressing it selects one of the following paper Numbers.

1,2,3,4,5,6,7,8 : When the printer has the paper information.

0 : Always

a, b : When the printer has the paper memory data.

**■ Normal paper is set and the pull tractor is not used:**

The printer feeds the paper to the tear off position and cut the paper by the cutter, and feeds it backward to the paper park position. If the cutter is not used, it goes incomplete changing paper error. So cut at the top of paper and push Pause switch, then the printer feeds backward. After the paper is put, the printer loads selected paper. If incomplete changing paper error is occurred, set the selected paper and push Pause switch.

**■ Overlapping multi-part forms or continuous forms with labels is set, or pull tractor is used:**

Incomplete changing paper error is occurred immediately. Cut the bottom of paper at current page and push Pause switch, then the printer feeds the paper forward. After the paper is out, the printer loads the selected paper. If incomplete changing paper error is occurred, set the selected paper and push Pause switch.

**Current paper No. is a or b :**

The printer feeds the paper forward. If the printer can't aware out of paper status, it goes incomplete changing paper path error.

If incomplete changing paper path error is occurred, please cut at the bottom of paper and push Pause switch, then the printer ejects the paper forward.

**Current paper No. is not a or b :**

The printer feeds the paper to the tear-off position and cut the paper by cutter and feeds backward to paper park position. If cutter is not used or the printer fails to feed the paper to paper park position, it goes incomplete changing paper path error.

If incomplete changing paper path error is occurred at the tear off position, please cut at the top of paper and push Pause switch, then the printer feeds the paper backward.

### 1.4.4.2 Operation at Power On

**❑ Self test:**

Prints the self test pattern. To cancel it, make printer pause and turn off the power.

**❑ DIP switch setting print:**

Starts the setting printing mode.

**❑ Data dump:**

Starts the data dump mode, in which all the input data are printed as hexadecimal numbers and corresponding characters.

**❑ Clear EEPROM Area 1:**

Resets the printer to the standard factory setting, except mechanism data area.  
(i.e. This function is for emergency.)

**❑ Clear EEPROM Area 2:**

Resets the printer to the standard factory setting, only mechanism data area.  
(i.e. This function is for emergency and service.)

**❑ Clear Driving Line count for ribbon change timing:**

Resets the printer to the standard factory setting, only driving line count for ribbon change timing.

**❑ Paper memory setting:**

This makes it possible to print properly on the forms which contain two areas having different thickness in a form and paper type.

**❑ Mechanism adjustment:**

Starts the mechanism parameter adjustment mode. You can adjust Beta parameter, flight time parameter, and Bi-D parameter through this mode.

**❑ Platen gap adjustment:**

Starts the platen gap parameter adjustment mode. You can input Alpha parameter and adjust Beta parameters through this mode.

**❑ Measurement seeking:**

Starts the measurement seeking automatically. The carriage stopping length is measured and saved in the EEPROM.

### **1.4.4.3 Built-in Detection**

**❑ Cover open detection:**

When the cover is opened, the printer stops printing and enters the pause mode automatically after several beeps. The printer stays at the state until the cover is closed and the "Pause" switch is pressed. Several printer settings loaded at each power-on can be changed in this operation.

**❑ Paper width detection:**

The printer detects the right paper edge and determines the right end of printable area. The print patterns which exceed that end won't be printed.

**❑ Automatic paper thickness adjustment:**

This printer measures the paper thickness after every paper loading. The distance between print head and the platen is automatically adjusted for proper printing according to the paper thickness.

**❑ Skip over binding:**

This function is used to print on a multi-part form with the binding which scratches the print head during paper feeding.

If this function is used, the print head parks apart from those bindings during paper feeding to avoid paper jam. This function can be selected by DIP switch and the through-put will be reduced at that time.

**❑ Auto cut mode:**

The printer cuts the paper at the perforation position automatically while data is printing.

This function is valid when the perforation cutter is used, selected by DIP SW 3-7, and the paper length is more than 4-inch. The setting of the printer driver has priority over DIP SW 3-7.

Do not use this mode for labels, continuous forms with labels, and overlapping multi-part forms.

**❑ Automatic TOF position setting:**

When TOF position is different from loading position with the printer power on, the printer feeds the paper to the next TOF position automatically.

## 1.4.5 Paper Memory Function

You can get better printing quality when you print on overlapping multi-part forms or on continuous forms with labels by using the paper memory function.

When you use this function, you have to write the information of paper thickness to the printer using DIP switches and the control panel in advance.

This function is available only with the front paper path.

### □ How to recall memories :

You can recall paper memories which you have already written some information in advance when you selects paper No. a or No. b by paper select switch.

No. a : recall the memory a

No. b : recall the memory b

- Notes:**
1. **1-inch skip perforation area is automatically included for the overlapping multi-part forms.**
  2. **ESC C, ESC (C, ESC (c is valid while the paper memory function is used.**
  3. **ESC N is valid while the paper memory function is used, but if the skip length is less than 1-inch, the setting will be ignored when overlapping multi-part forms is used.**
  4. **ESC 0 is invalid while the paper memory function for overlapping multi-part forms is used.**
  5. **The loading position must be adjusted for overlapping multi-part forms at every loading.**
  6. **If paper position doesn't correspond with TOF when turn on the printer, paper is advanced to the top of the next page automatically.**

### □ How to write the information of a paper except "Continuous forms with labels" :

- 1) Make sure the printer is turns off.
- 2) Select the memory you want to write the information (See DIP SW setting.).
- 3) Select the page length (See DIP SW setting.).
- 4) Select the paper type (See DIP SW setting.).
- 5) Turn the printer on while both sides of Paper Select switch are depressed.
- 6) The printer writes the information in the memory you selected, and beeps.

### □ How to write the information of "Continuous forms with labels" :

- 1) Make sure the printer is turn off.
- 2) Select the memory you want to write the information (See DIP SW setting.).
- 3) Select the page length (See DIP SW setting.).
- 4) Select the paper type (See DIP SW setting.).
- 5) Turn the printer on while both sides of Paper Select switch are depressed.
- 6) Point the label position when you use the paper with a label.
  - a) Open the printer cover.
  - b) Move the pointer (Refer to Figure 1-23.) to one of the label's corner.  
up / down ... Feed the paper by "Micro Feed" switches  
right / left ... Move the printing head by manually.
  - c) Press "Top of Form" switch.
  - d) Move the pointer to the diagonal corner of the label.
  - e) Press "Top of Form" switch.
  - f) Close the printer cover.
- 7) Confirm the writing sequence was done correctly by beep sounds.  
Once or twice: The information are written to the memory a or b correctly.  
3 times : The sequence was not correct, and it was ignored.

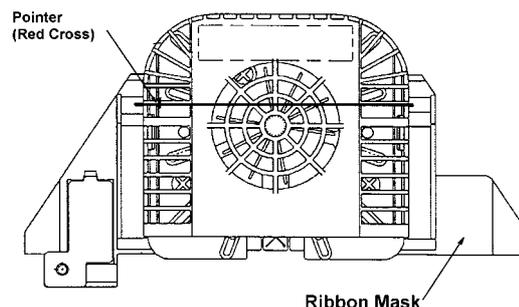


Figure 1-23. Pointer

## 1.4.6 Initializations

### 1.4.6.1 Power-on Initialization

The initialization of this level is activated by power-on or /INIT signal (negative pulse) or cold-reset command (remote RS command). This initialization is:

- to initialize the printer mechanism.
- 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.

### 1.4.6.2 Software Initialization

The initialization of this level is activated by the control code ESC @ for ESC/P or ESC [K for IBM/LEXMARK2381 Plus. This initialization is:

- to make the printer setting to default.

### 1.4.6.3 Panel Initialization

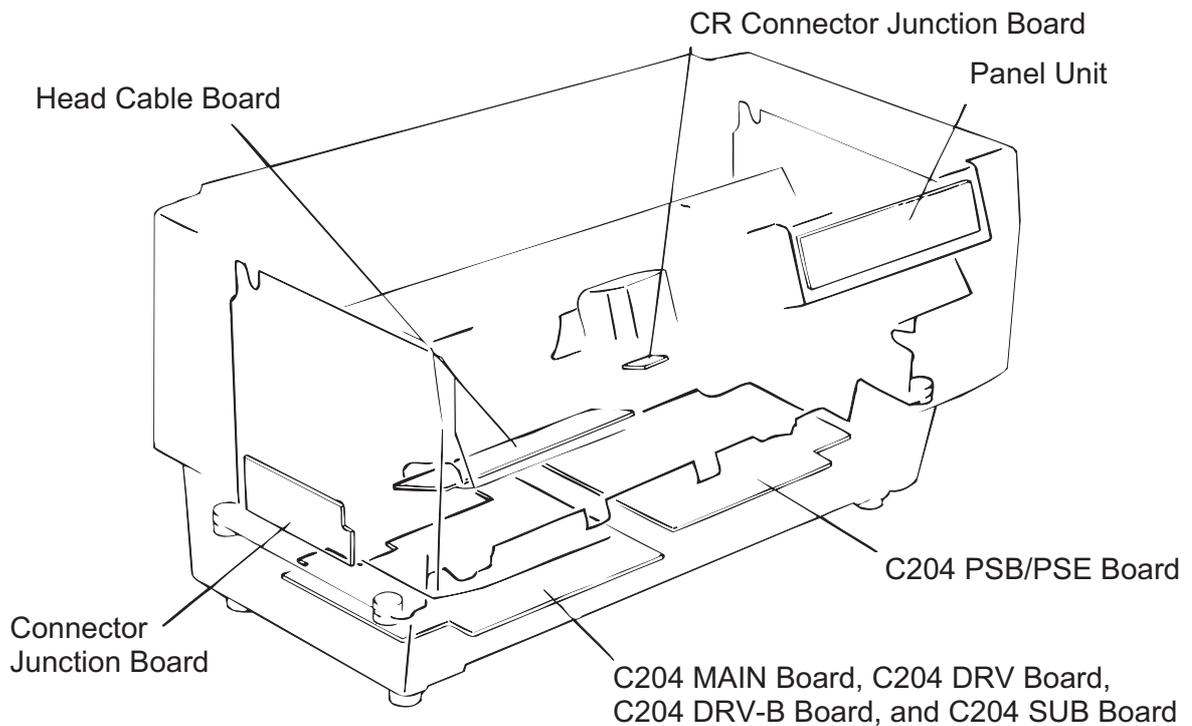
The initialization performed by the control panel operation. This initialization is:

- to clear all data in the buffer.
- to execute software initialization.

## 1.5 MAIN COMPONENT

The main components of the DFX-8500 are as follows:

- Printer mechanism: M-3160
- Main control board: C204 MAIN board
- Mechanism driver board: C204 DRV board
- ½ Printhead driver board: C204 DRV-B board
- DIP SW. board: C204 SUB board
- Power supply board: C204 PSB/PSE board unit
- Control Panel: Panel unit
- Housing:



**Figure 1-24. Main Components**

### 1.5.1 M-3160 Printer Mechanism

The M-3160 printer mechanism is a 18-pin (9-pin two lows), serial impact dot matrix printer mechanism developed for the DFX-8500. It is designed to provide high-speed, high-volume printing, and is especially heavy and durable when compared with existing terminal printer mechanisms, Its paper feeding mechanism uses several kinds of fan-fold paper, and an automatic mechanism is included to provide enhanced paper handling.

The structural differences between the DFX-8500 and the DFX-8000 are:

- DFX-8500 includes a CR motor isolation resistance sensor.
- DFX-8500 includes a paper jam sensor.
- DFX-8500 includes a ribbon jam sensor.
- To prevent paper jams, the DFX-8500 includes a tractor wire at the front and rear tractors.
- The detection method of the carriage encoder sensor has been changed. In the DFX-8000, the encoder plate was attached to the rotor of the CR motor, while the DFX-8500 uses a belt-type encoder.
- DFX-8500 does not include a carriage home position sensor.

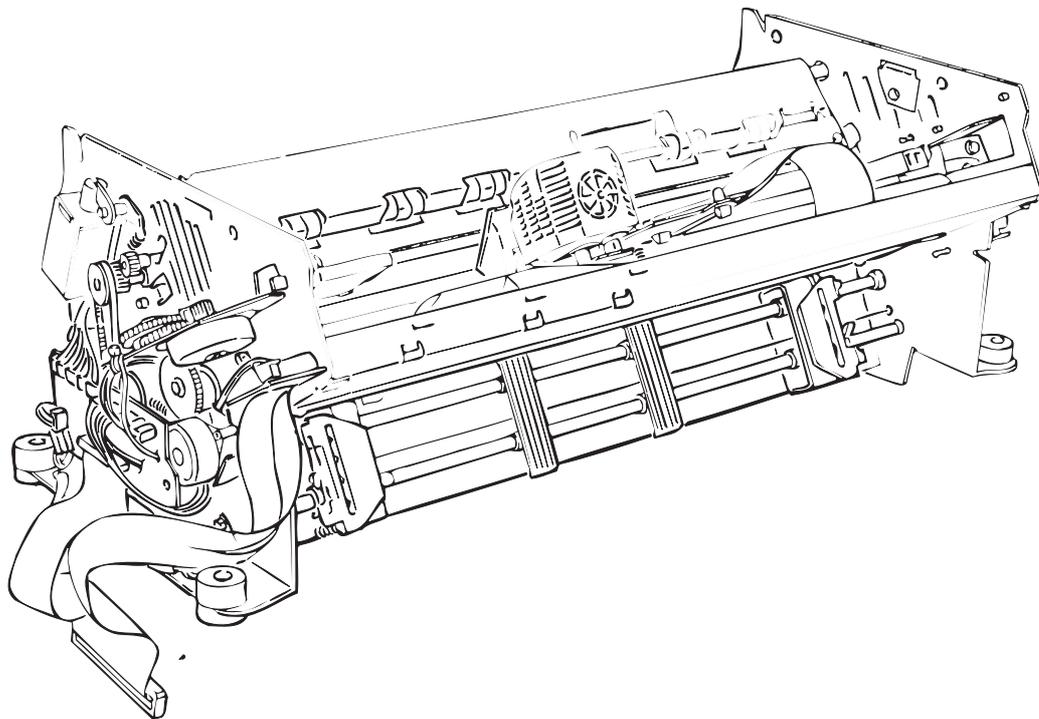


Figure 1-25. M-3160 Printer Mechanism

## 1.5.2 Main Control Board (C204 MAIN Board)

The C204 MAIN board is a main controller board. The board contains following ICs:

- |                          |                         |                               |
|--------------------------|-------------------------|-------------------------------|
| <input type="checkbox"/> | 16-bit CPU:             | TMP95C051A; 24.57 MHz (IC2)   |
| <input type="checkbox"/> | Gate array:             | E05B36 (IC1)                  |
| <input type="checkbox"/> | PROM (including C.G.) : | 2M-bit (IC5)                  |
| <input type="checkbox"/> | RAM                     | 4M-bit (IC14)                 |
| <input type="checkbox"/> | ADM232L                 | RS-232C level converter (IC9) |
| <input type="checkbox"/> | RESET IC                | PST391D(IC13)                 |
| <input type="checkbox"/> | EEPROM                  | 93C66 (IC11)                  |

There are two types of C204 MAIN board used as after service parts. The following Table shows differences between them.

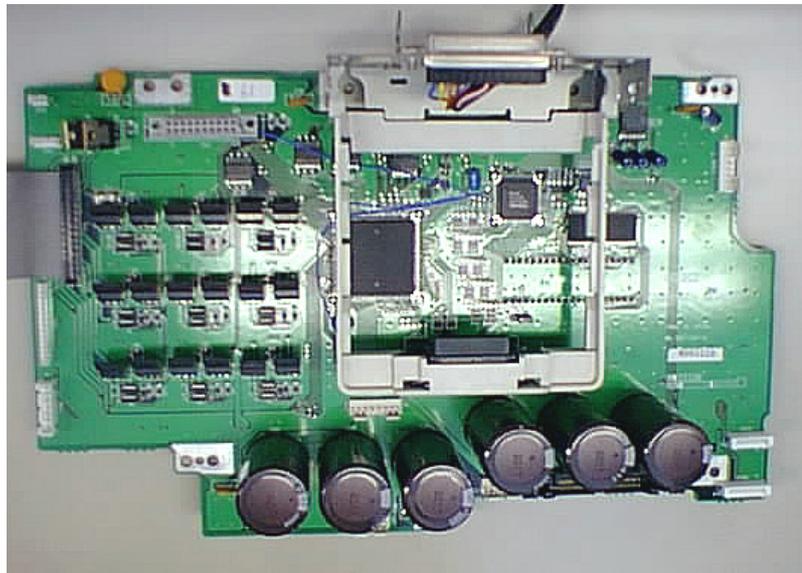


Figure 1-26. C204 MAIN Board

Table 1-24. Color Attribute

	For USA and Pacific	For Europe
Serial I/F Hexagonal-head screw type	Inch	Metric

### 1.5.3 C204 DRV Board

The C204 DRV board is the driver board specially for the printer mechanism. The ½ printhead, printhead fan, plunger, PF (paper feed) motor, CR (carriage) motor, CR fan, PG (platen gap) motor, and RF (ribbon feed) motor drive circuits are located on the driver boards.

Sensor signals from the printer mechanism are connected to the main board via these boards.

Major ICs on the DRV are as follows:

- CR motor drive IC: STK561 (IC1)
- PF motor drive IC: STK5713B (IC2)
- Comparator IC: uPC393C (IC3)

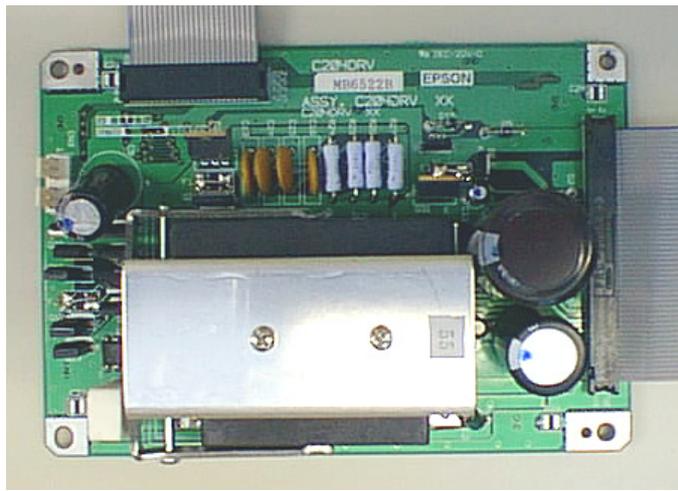


Figure 1-27. C204 DRV Board

### 1.5.4 C204 DRV-B Board

The C204 DRV-B board is the ½ printhead driver board. The drive part is mainly consists of the discrete bipolar FETs.

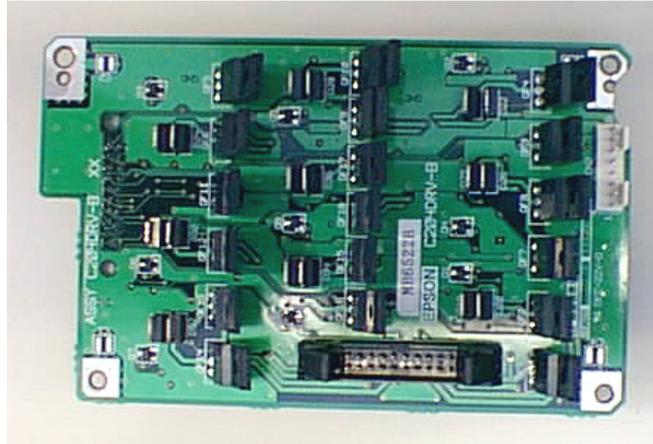


Figure 1-28. C204 DRV-B Board

### 1.5.5 C204 SUB Board

The C204 SUB board consists of five DIP switch units. It is located behind the front paper cover.

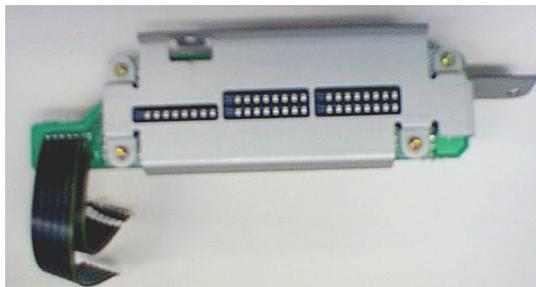


Figure 1-29. C204 SUB Board Unit

## 1.5.6 C204 PSB/PSE Board

C204 PSB/PSE board is a power supply circuit board which generates the power for the control circuit (main control board) and printer mechanism drive circuit (driver board). It contains cooling fan on the top. The PSB board is a 100-120 V AC version, and the PSE board is for 220-240 VAC.

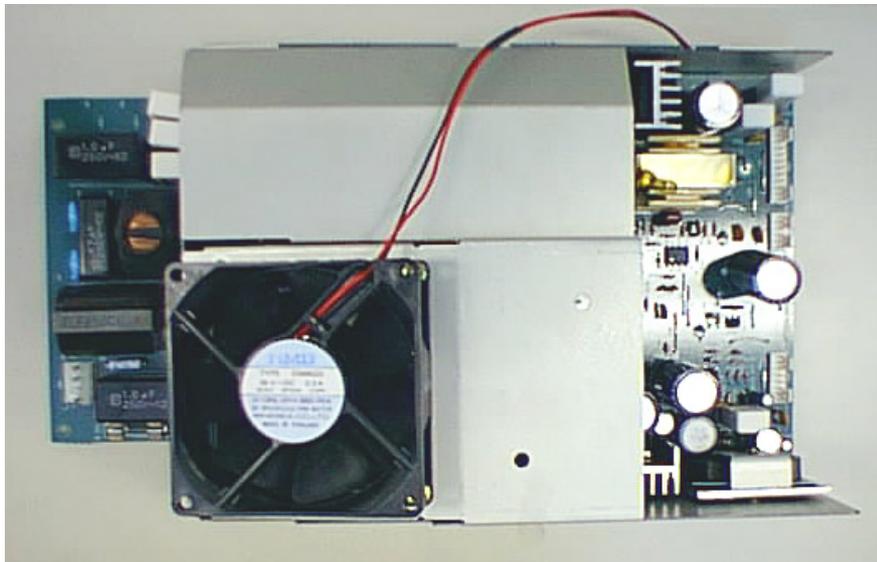


Figure 1-30. C204 PSB/PSE Board

### 1.5.7 Control Panel

The control panel for this printer consists of switches, LEDs, and buzzers (Refer to Figure 1-22 on page 1-23.).

### 1.5.8 Housing

The housing used in the DFX-8500 consists of many more components than previous designs. The lower case is used as the main frame which holds the mechanism and circuits, and they are covered by the upper case, bottom plate and side cover, each of which has various covers. The housing large openings in both the front and rear for paper entrance and exit. It also has a lid on the both plate to enable the PROM on the main board to be easily replaced.

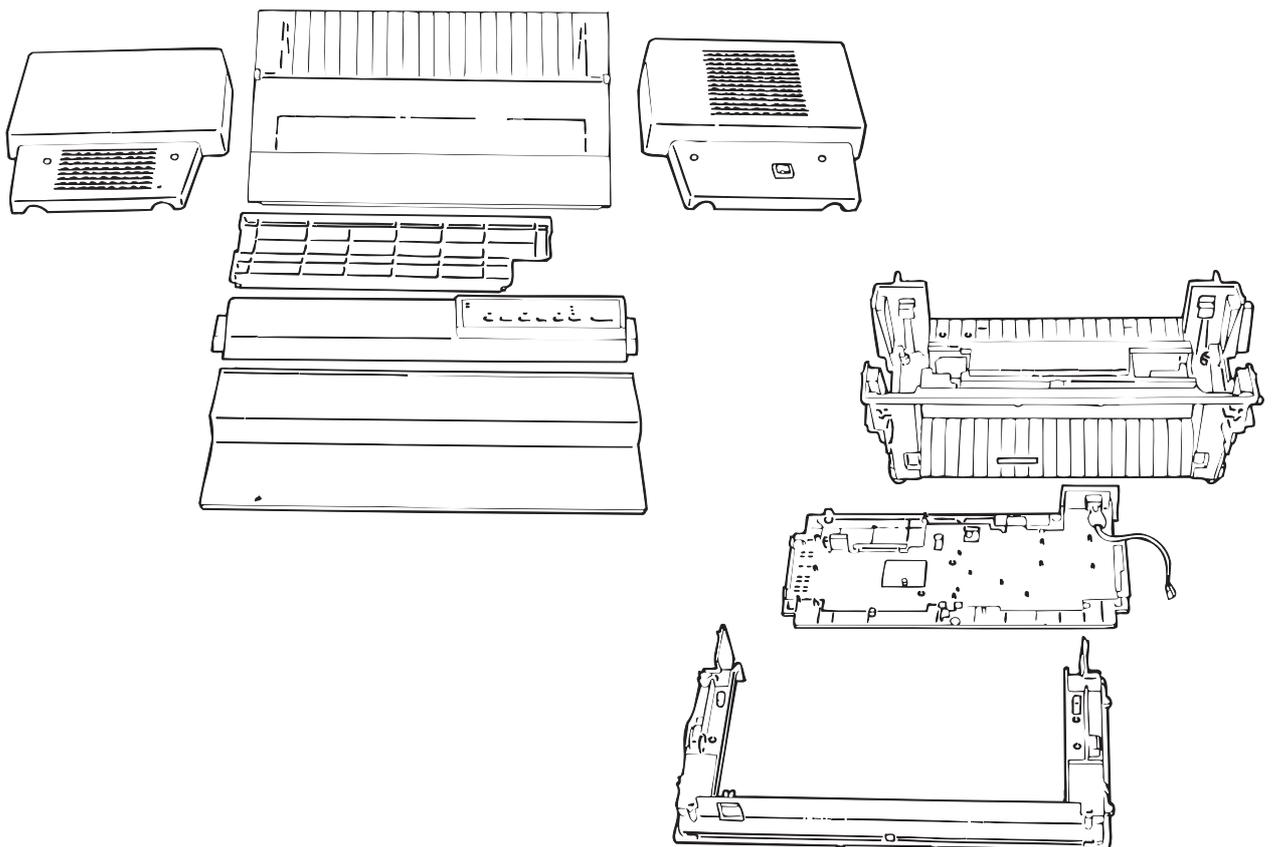


Figure 1-31. Housing



# CHAPTER 2

## OPERATING PRINCIPLES

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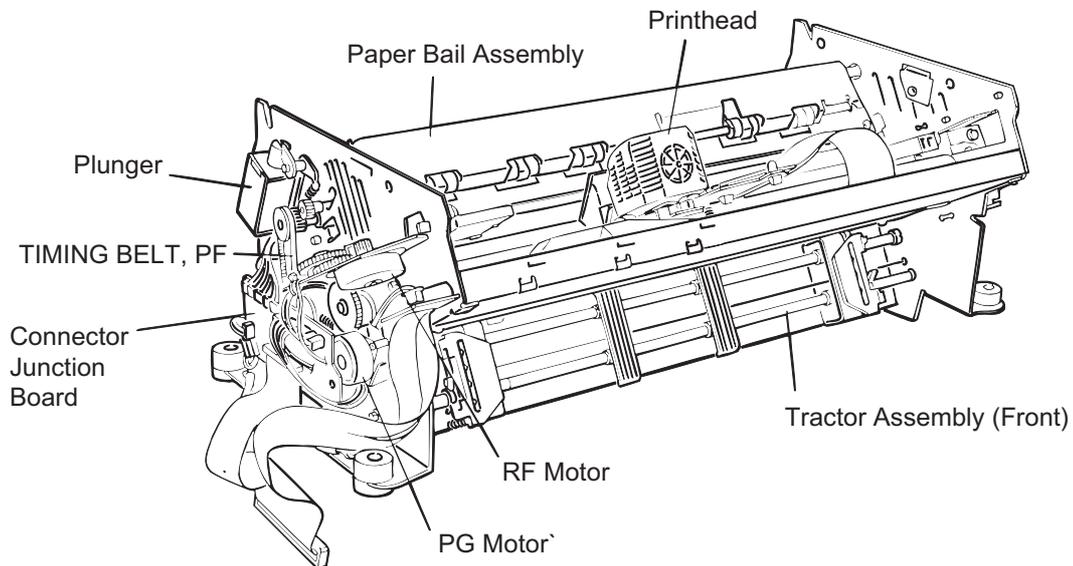
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## 2.1 PRINTER MECHANISM OPERATION

This section describes the Model 3160 printer mechanism and explains how the printer works. The Model 3160 printer mechanism features a 18-pin, impact dot printhead for serial printing. The printer mechanism is the main component of the printer and is supported by the other components (the power supply and control circuits). Figure 2-1 shows the Model 3160 printer mechanism.



**Figure 2-1. M-3160 Printer Mechanism**

The printer mechanism consists of the following main components:

**□ Printhead :**

The printhead is the component that actually prints characters (dot matrix patterns). Printing is performed by striking the pins (arranged in a vertical line) against the surface of the paper and the ribbon. A character is printed by repeating this printing operation in the horizontal direction (as the printhead moves). The printhead includes a head fan and temperature sensor. The head fan also has a thermistor. When the printhead or fan is too hot, the printer stops printing until it cools. (Refer to Section 2.3.9 Printhead Drive Circuit.)

**□ Plunger mechanism :**

During printing, the paper bail assembly holds the paper under tension so that it is fed smoothly. When paper is loaded or ejected or when the tear off function is executed, the paper bail assembly needs to move up to prevent a paper jam. The plunger moves the paper bail assembly up.

**❑ Carriage mechanism :**

The carriage mechanism moves the printhead in the horizontal direction. The CR motor drives the carriage, with the printhead on it. The CR encoder sensor detects the CR motor speed and carriage position. The CR motor is closed-loop controlled. Because the CR motor is driven at a very high speed, it includes an isolation resistance sensor to detect abnormal resistance. The sensor detects an error if the resistance is less than 2.2 K ohms. (Refer to Section 2.3.4 CR Motor Drive Circuit.)

**❑ Interlock switch :**

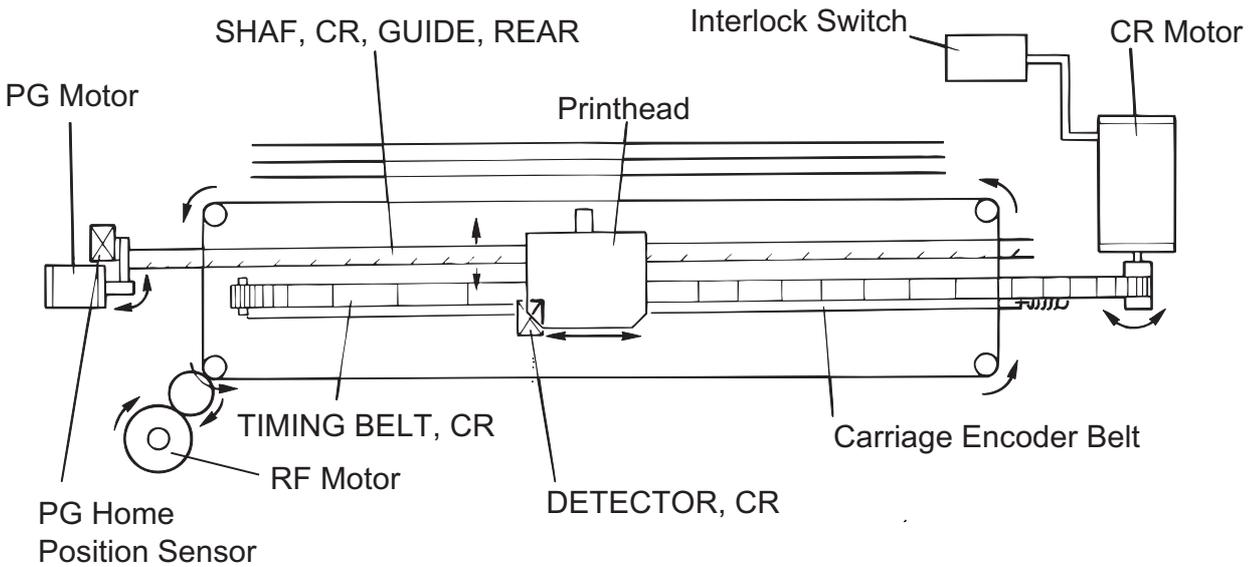
Because the carriage moves at a very high speed, it would be dangerous if a hand or finger were inserted inside the printer mechanism during printing. Therefore, as a safety measure, when the top cover is opened, the interlock switch cuts the drive voltage to the CR motor to slow down the carriage speed and prevent accidents. A control circuit controls CR motor driver deceleration. (Refer to Section 2.3.4 CR Motor Drive Circuit.) Printing resumes when the top cover is closed.

**❑ Auto platen gap adjustment mechanism :**

The printer mechanism has an automatic platen gap adjustment function that measures the thickness of the paper and provides the appropriate gap between the platen and printhead. The platen gap is adjusted by moving the carriage (and printhead) either forward or backward. Because the front and rear carriage guide shafts which hold the carriage are purposely mounted off-center, the carriage moves as the PG motor rotates the shafts. The PG sensor transmits the amount of movement (= gap) to the control circuit.

**❑ Ribbon feed mechanism :**

The printer's ribbon cartridge contains an endless ribbon. The ribbon feed mechanism takes up the ribbon so that the portion hit by the pins is constantly changing. The RF motor drives the ribbon feed mechanism.



**Figure 2-2. Printer Mechanism Operation 1**

**❑ Paper feed mechanism :**

The CR motor controls printing in the horizontal direction, and the paper feed mechanism controls movement in the vertical direction (line feeding and form feeding). The paper feed mechanism feeds paper vertically. The PF motor drives the paper feed mechanism.

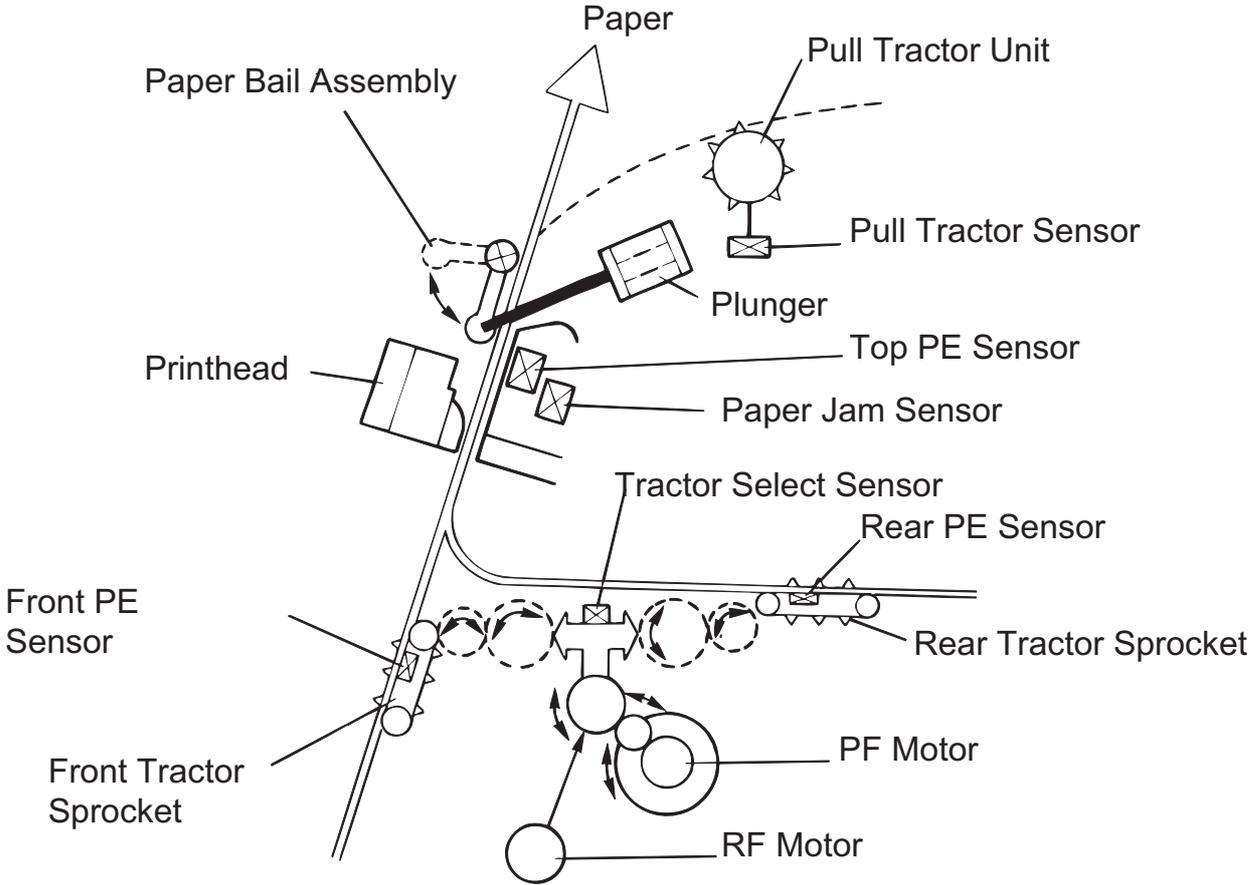
The front, rear, and top PE sensors detect whether paper is present in the paper path, and stop the printer from printing when there is no paper. The printer is equipped with three PE sensors: the front PE sensor at the front tractor, the rear PE sensor at the rear tractor, and the top PE sensor at the paper bail.

The pull tractor sensor detects whether the optional pull tractor unit is installed.

The printer is also equipped with a paper jam sensor. The control circuit reads the signals from the sensors and indicates when an error occurs.

**❑ Tractor select mechanism :**

The printer mechanism has two paper entrances: one at the front tractor and one at the rear tractor. By controlling the RF motor, the tractor select mechanism chooses which tractor to use, and power from the PF motor is conveyed via a series of gears. The tractor select sensor detects the selected tractor and signals that information to the control circuit.



**Figure 2-3. Printer Mechanism Operation 2**

### 2.1.1 Printhead Mechanism

The printhead is a charge-type, impact dot printhead. Figure 2-4 shows its operation. The dot wire is attached to the actuating spring at point A. It is pulled back (left in the figure) by magnetic force when power is applied and during standby. The magnetic force holds back the actuating spring. When current flows through the coil, a counter-magnetic field is induced in the coil. Then, the actuating spring ejects the dot wire forward against the ink ribbon, printing a dot on the paper.

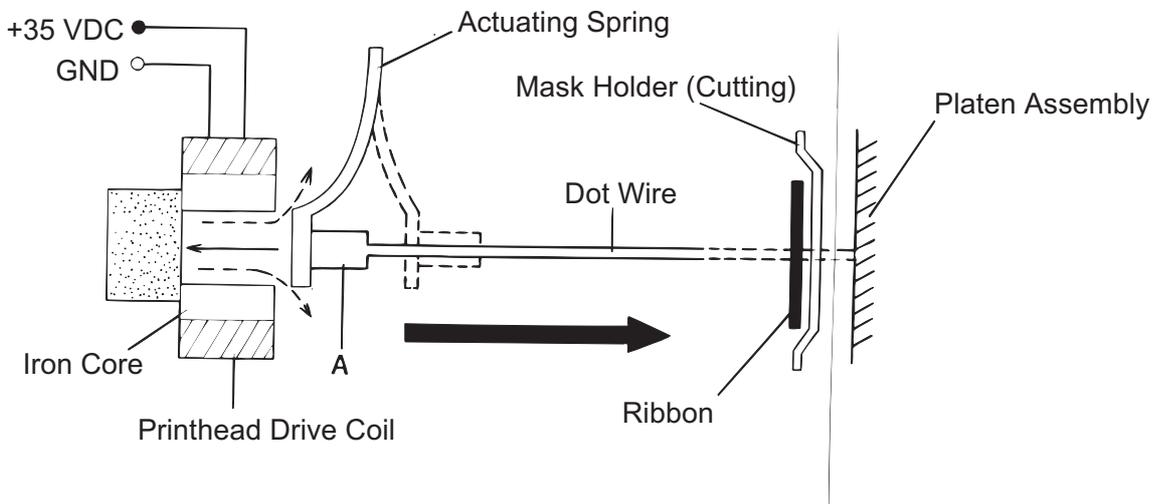


Figure 2-4. Printhead Mechanism

### 2.1.2 Carriage Mechanism

Figure 2-5 shows the carriage mechanism. The front and rear carriage guide shafts support the carriage. The rotation of the CR motor is transmitted to the carriage timing belt through the carriage belt pulleys at the right and left sides. The printhead is mounted on the carriage, which is attached to the carriage timing belt and moves horizontally.

The printer does not have a carriage home position sensor; the home position is detected using disordered pulses of the CR motor and CR encoder sensor (linear, belt-type). The head dumpers are attached to the left and right sides of the frame. These pads are used for the absorbs the carriage hit shock for both side. The control circuit monitors the CR motor's pulse; when it is disordered, the control circuit recognizes the carriage home position.

The encoder belt has equally pitched slits and is mounted under the timing belt. A photo interrupter (CR encoder) surrounds the encoder belt and converts the carriage movement into a pulse train.

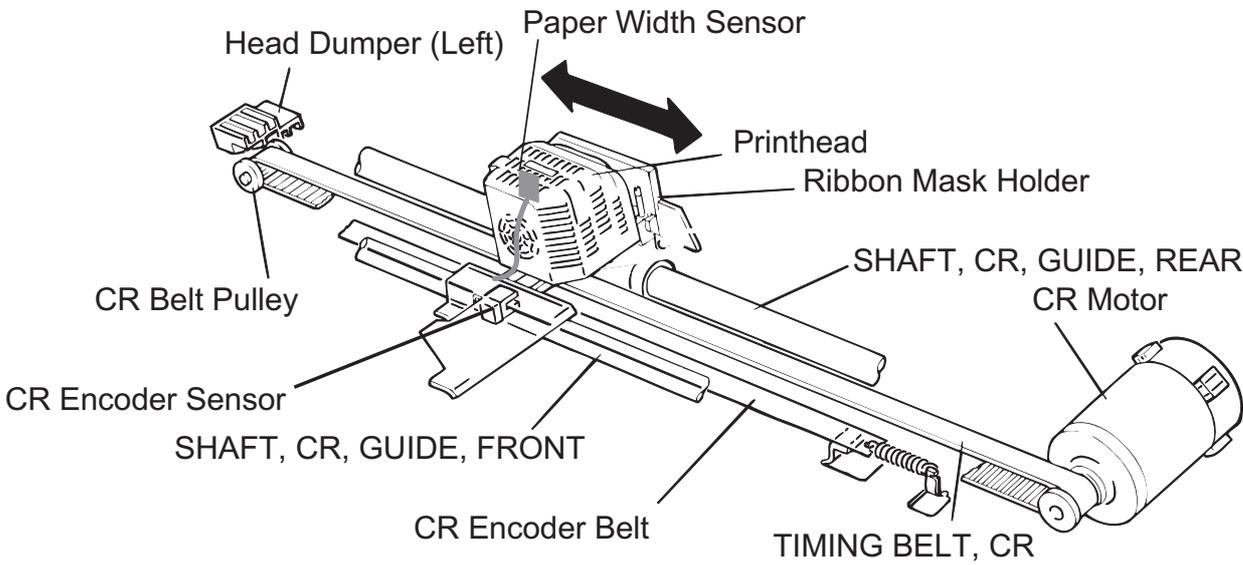


Figure 2-5. Carriage Mechanism

### 2.1.3 Platen Gap Adjustment Mechanism

Figure 2-6 shows the platen gap adjustment mechanism. The front and rear carriage guide shafts supporting the carriage have a vertical section. The rotation of the PG motor is transmitted to the rear carriage guide shaft through the gears. Counterclockwise rotation of the motor expands the platen gap and clockwise rotation reduces it.

The encoder plate with equally pitched slits is attached coaxially to the motor axis. When the motor rotates, the PC sensor detects it and outputs the pulses. Each pulse corresponds to detection of a 0.0025 mm resolution (horizontal distance). The system range is 0.35 to 0.84 mm.

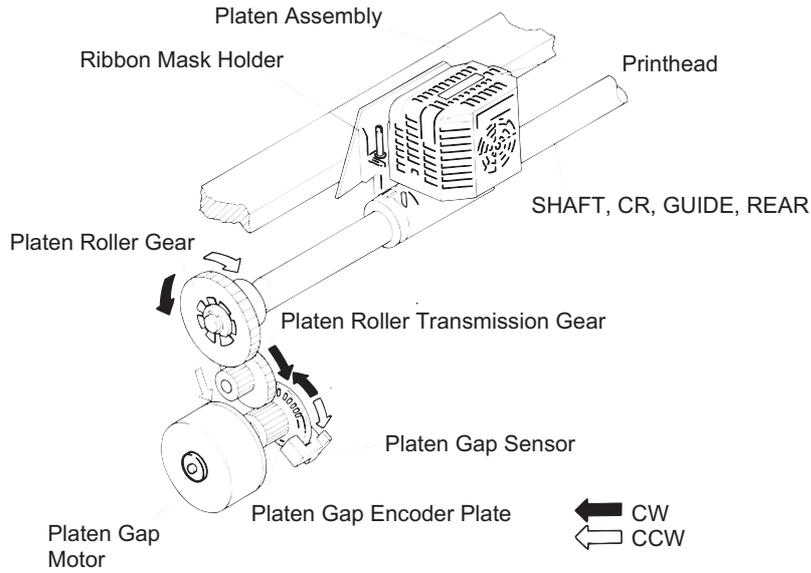


Figure 2-6. Platen Gap Adjustment Mechanism

### 2.1.4 Paper Feed Mechanism

Figures 2-7, 2-8, and 2-9 show the paper feed mechanism. After the printer loads the paper, it is fed by the tension roller, platen roller, and front or rear tractor assembly.

The PF motor rotates the tension roller and tractor select gear (Figures 2-8 and 2-9) and moves either the front or rear tractor assembly. The rotation of the paper feed transmission gear rotates the tractor select gear, which can engage either tractor train. The tractor select mechanism alternates the engagement of the rear tractor assembly gear train and front tractor assembly gear train. (Refer to Section 2.1.5 Ribbon Feed and Tractor Select Mechanisms.)

The front and rear PE sensors are incorporated in the tractor sprocket. When paper is loaded, the paper pushes the leaf spring and blocks the photo interrupter. When no paper is loaded, the photo interrupter is not blocked. The top PE sensor is attached to the upper paper guide and is used with the reflection plate on the paper bail assembly. When there is no paper, the reflection plate reflects the beam; when paper is loaded, the beam is absorbed (not reflected). The Pull tractor sensor monitors whether the pull tractor is installed.

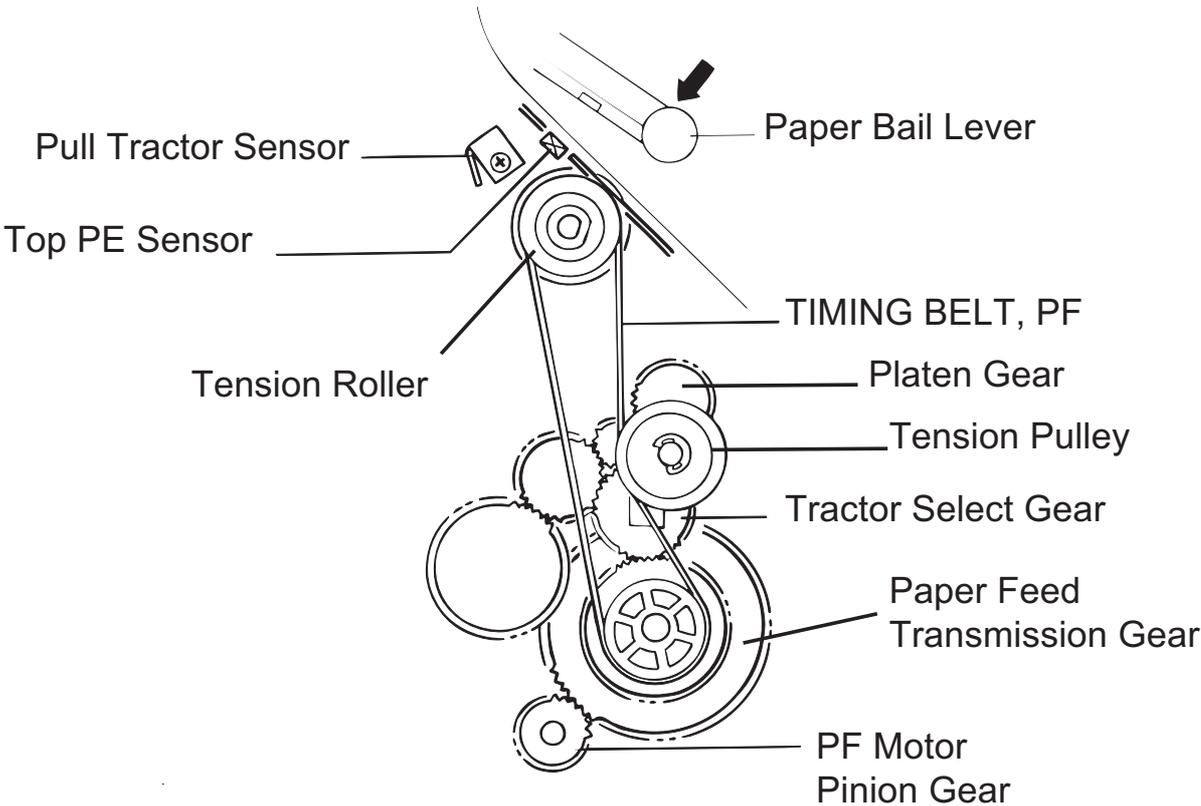


Figure 2-7. Tension Roller and PF Roller Operation

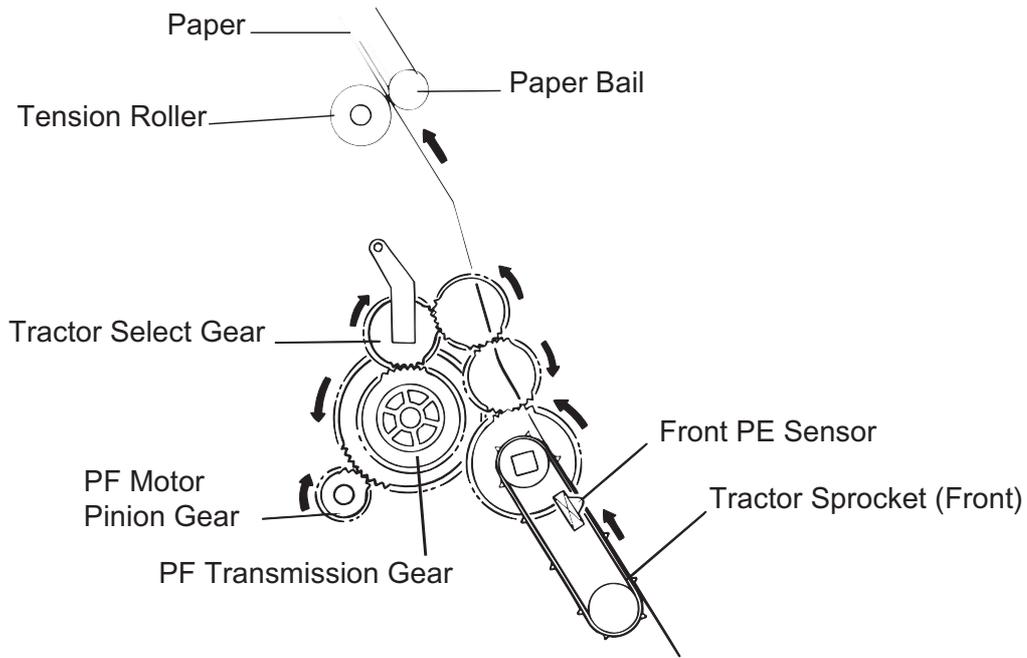


Figure 2-8. Front Tractor Assembly Operation

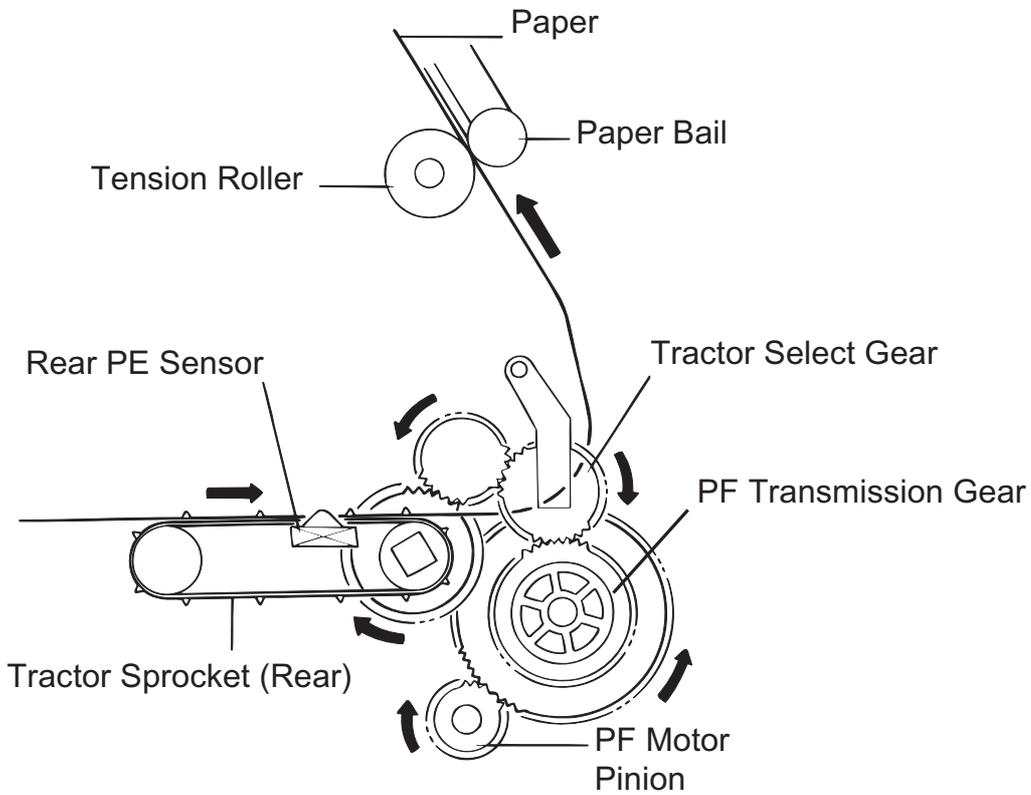


Figure 2-9. Rear Tractor Assembly Operation

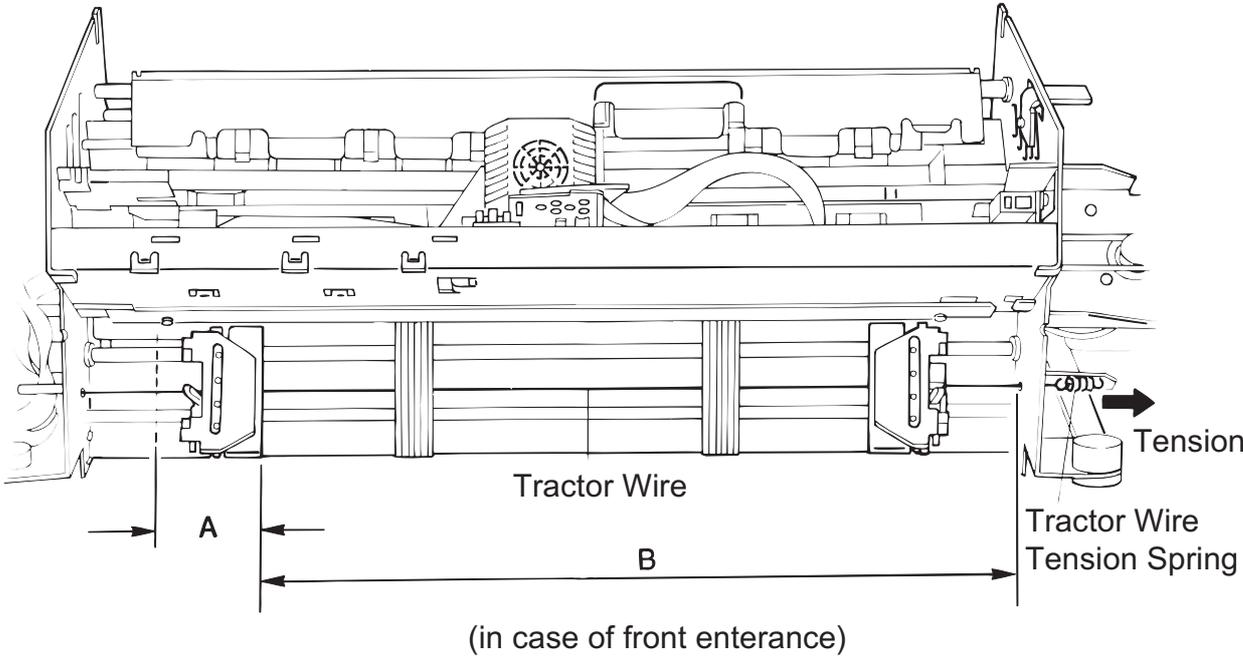
**2.1.4.1 Tractor Wire Operation**

The printer is equipped with a tractor wire (white line) to prevent paper jams when continuous paper is loaded from the front or rear entrance. The tractor tension spring on the right side frame pulls the wire and releases the stress on the continuous paper being fed. Figure 2-10 shows how the tractor wire operates.

The front left tractor sprocket or rear right tractor sprocket is fixed in position by the shape of the bottom frame of the printer mechanism, while the other sprocket (the front right sprocket or rear left sprocket) can move along the tractor shafts. When the tractor release lever is released, the sprocket can move smoothly side to side along the tractor shafts. When the tractor release lever is engaged, the sprocket can move along the tractor shafts, but it cannot move smoothly, because the tractor wire tension is valid.

In the Figure 2-10, point A shows the movement range of the left tractor sprocket when the tractor release lever is released. Point B shows the movement range of the right tractor sprocket when the release lever is engaged or released.

If the paper in the printer becomes bubbled, you can pull the tractor wire to the right to stabilize the paper tension between the left and right tractor sprockets.



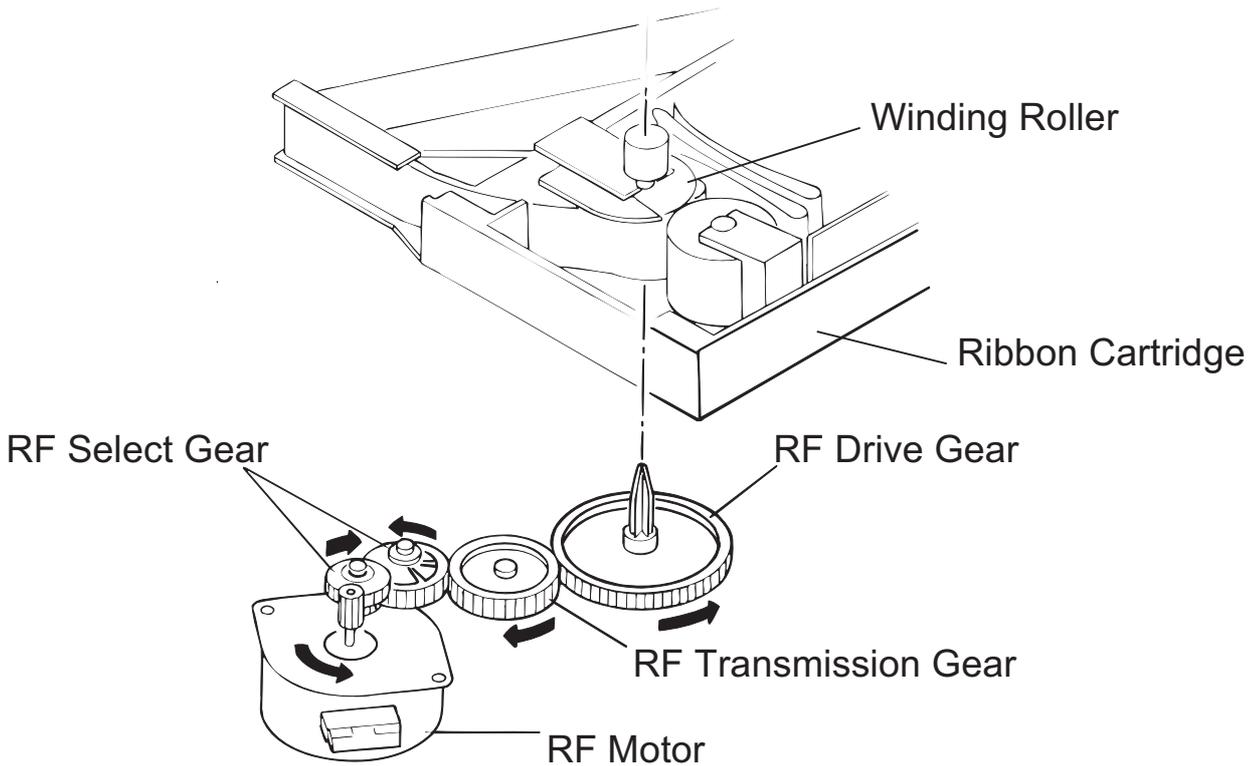
**Figure 2-10. Tractor Wire Operation**

### 2.1.5 Ribbon Feed and Tractor Select Mechanisms

The RF motor supplies power to both the ribbon feed and tractor select mechanisms. The rotation of the RF motor pinion swings the ribbon feed select gear like a pendulum, using the lever axis as a support point. The rotation of the RF motor is transmitted after the gears are engaged. When the RF motor pinion gear rotates counterclockwise, the motor rotates the ribbon feed mechanism; when it rotates clockwise, the motor rotates the tractor select mechanism.

**□ Ribbon feed mechanism :**

Figure 2-11 shows the ribbon feed mechanism. The ribbon is fed in only one direction. Counterclockwise rotation of the RF motor is transmitted to the ribbon feed gear through the ribbon feed select gear and ribbon feed transmission gear. The ribbon feed drive gear engages the winding roller on the ribbon cartridge to feed the ribbon.



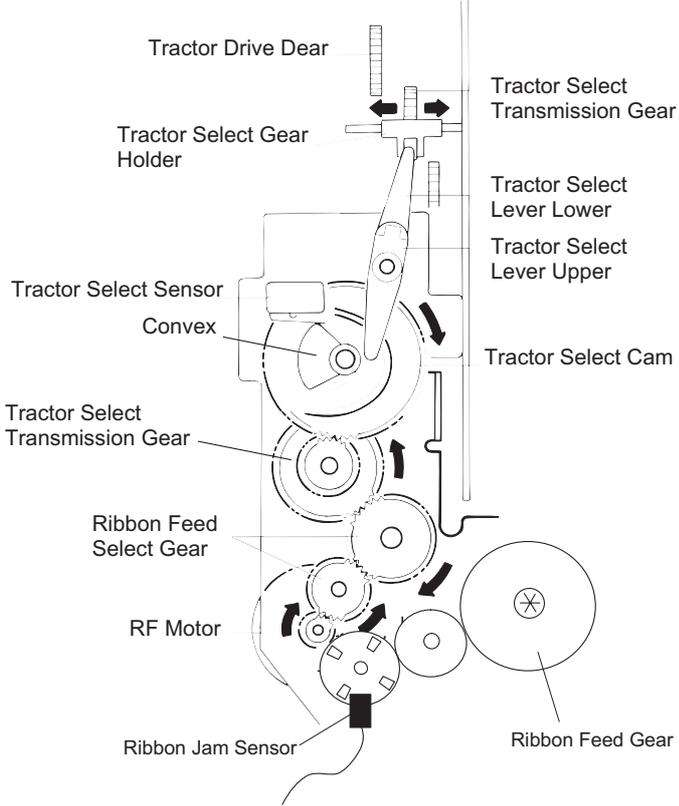
**Figure 2-11. Ribbon Feed Mechanism**

**Tractor select mechanism :**

Figure 2-12 shows the operation of the tractor select mechanism. Clockwise rotation of the RF motor is transmitted to the tractor select cam through the ribbon feed select gear and tractor select transmission gear, and rotates the tractor select cam clockwise. The tractor select lever contacts the inside curve of the cam due to the spring force; when the cam rotates, the tractor select lever moves horizontally along the curve.

When the tractor select lever is set to the left, the tractor select gear engages the rear tractor assembly train, and the PF motor rotates the rear tractor assembly. When the tractor select lever is set to the right, the tractor select gear engages the front tractor assembly. The tractor Select sensor contacts the cam and closes when it reaches the convex portion.

The ribbon jam sensor is used to detect ribbon jam condition and to count ribbon life.



**Figure 2-12. Tractor Select Mechanism**

### 2.1.6 Plunger Mechanism

Figure 2-13 shows the plunger mechanism. The paper bail assembly is attached to the end of the plunger's iron core. The paper bail assembly axis is connected to the frame. When the plunger coil is energized, the force of the paper bail spring returns the paper bail assembly to its original position.

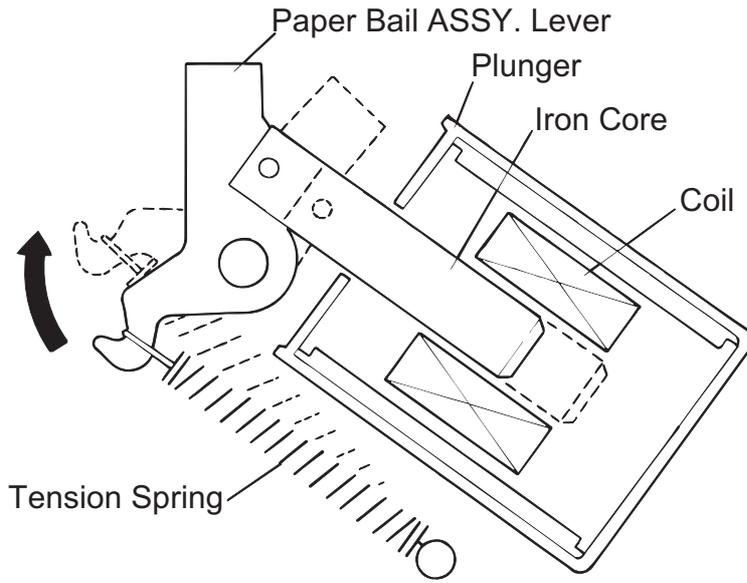


Figure 2-13. Plunger Mechanism

## 2.2 POWER SUPPLY OPERATION

The printer can be powered by either of two power supply boards: the 120 V C204 PSB board or the 220/240 V C204 PSE board. The only difference in the operation of these two boards is in the primary circuitry. They supply power to the printer in the same way. The power supply board outputs the DC current required to drive the control circuits and printer drive mechanism. Table 2-1 shows the input voltages and fuse ratings of the boards and Table 2-2 shows the PSB/PSE board output specification.

**Table 2-1. Power Supply Boards Input**

Board	Input Voltage	Fuse Ratings
C204 PSB board	120 VAC	12 A /125 VAC
C204 PSE board	220-240 VAC	6.3 A / 250 VAC

**Table 2-2. Power Supply Board Output Specification**

Item	+37 VDC Line			+5V DC Line
	VP1	VP2	VP3	
Rating Output Voltage	+37.0 VDC			+5.0 VDC
Available Output Voltage Fluctuation	35.5 - 37.5 VDC			4.75 - 5.25 VDC
Rating Output Current	1.5 A			2.0 A
Available Output Current Fluctuation	0.0 - 4.5 A*1)		0.0 - 5.0 A*1)	0.0 - 2.0 A
Over Current Protection	Yes			Yes
Over Current Protection Reset Method	Turn the power switch off, then turn it again. Or controlled by C204 MAIN board with /PD signal.			Automatically recovered.
Short Circuit Current	Less than 1.0 A			Less than 1.0 A
Over Voltage Protection	Yes			Yes
Over Voltage Protection Reset Method	Turn the power switch off, then turn it again.			Automatically recovered.
Over Voltage Limit Value	42 VDC			7 VDC

\*1): +37 V DC line Maximum in total is 13.0 A.

## 2.2.1 Power Supply Overview

Figure 2-14 shows a block diagram of the C204 PSB/PSE board.

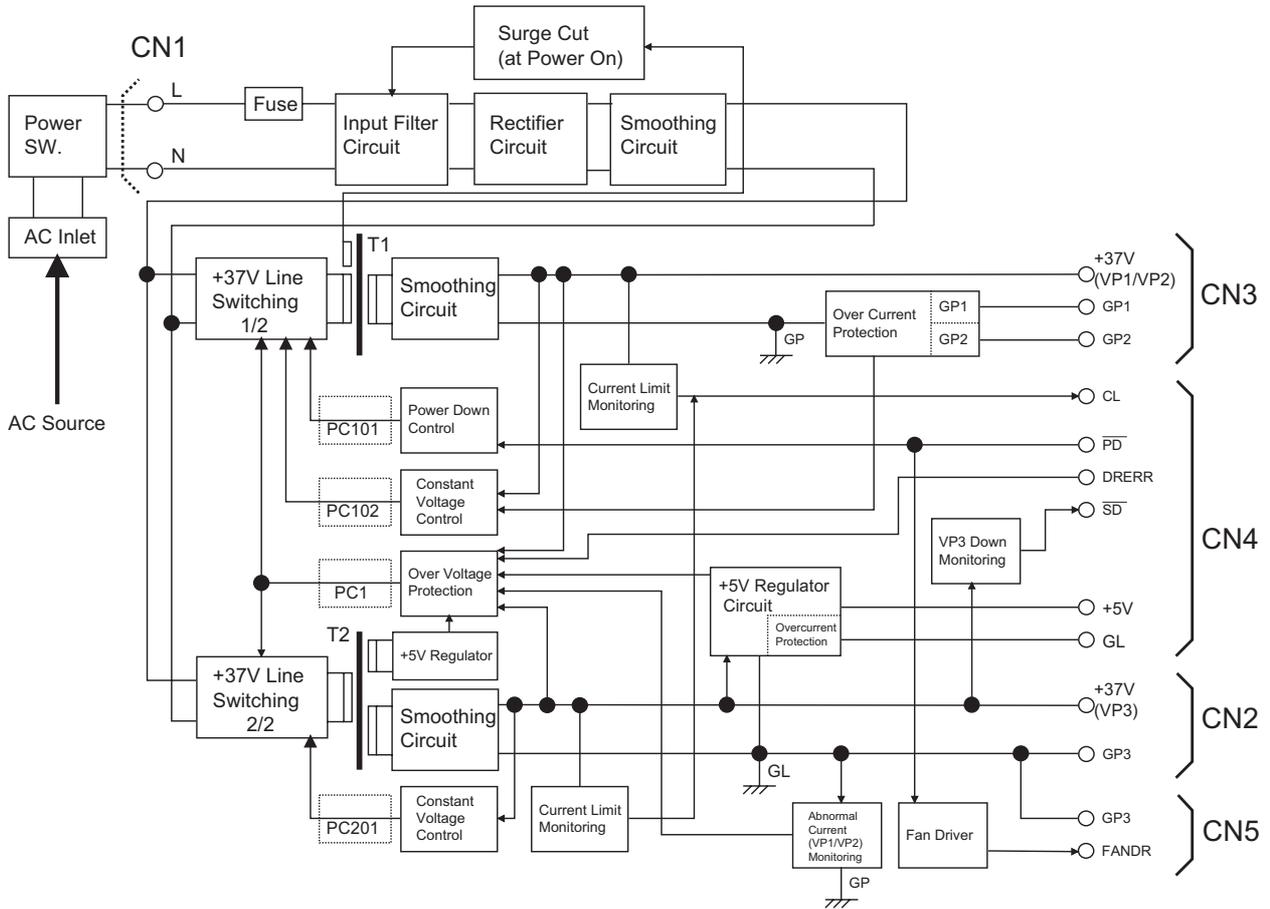


Figure 2-14. Power Supply Board Block Diagram

**❑ General :**

The power supply board converts the AC input voltage to the DC voltages required to operate the printer. The AC voltage is input to the AC inlet, and is supplied to the C204 PSB/PSE board via the power switch and a fuse.

Two main switching regulator circuits consist of two blocks, +37 V Lines 1/2 and 2/2. The one convert the AC voltage to the +37 VDC specially for the print head coils drive requirement. The other convert the AC voltage to the +37 VDC for the printer mechanism drive power requirement (motors, solenoid, etc.) and for the source of +5 V DC regulator circuit requirement (Refer to Table 2-3.).

**❑ 37V line block 1/2 :**

The generated +37 VDC is divided into two destinations; nine of the eighteen printhead pins (pins 1, 2, 7, 9, 10, 11, 12, 15, and 17); the other to nine of the eighteen printhead pins (pins 3, 4, 5, 6, 8, 13, 14, 16 and 18).

**❑ 37V line block 2/2 :**

The generated +37 VDC is supplied to the motors and plunger on the printer mechanism, it also supplied to the +5VDC regulator circuit and it output. +5V DC is supplied to the logic circuit on the main circuit.

**❑ Cooling fan :**

The C204 PSB/PSE board includes a cooling fan that is driven by the +37 VDC. The fan lowers the temperature of the PSB/PSE board circuit components, and it also lowers the CR motor temperature because the motor locates on the way of an air exhaust channel of the fan.

**Table 2-3. PSB/PSE Board Output DC Voltages**

<b>Voltage</b>	<b>Board</b>	<b>Application</b>
+37V (VP1-GP1)	C204 DRV-B	<ul style="list-style-type: none"> <li>• Printhead drive 1/2</li> </ul>
+37 V (VP2-GP2)	C204 MAIN	<ul style="list-style-type: none"> <li>• Printhead drive 2/2</li> </ul>
+37 V (VP3-GP3)	C204 DRV	<ul style="list-style-type: none"> <li>• CR motor drive</li> <li>• PF motor drive</li> <li>• PG motor drive</li> <li>• RF motor drive</li> <li>• HF drive</li> <li>• CR fan drive</li> <li>• Plunger drive</li> <li>• Optional Cutter's motor drive</li> </ul>
	C204 PSB/PSE	<ul style="list-style-type: none"> <li>• Cooling fan on the PSB/PSE unit</li> </ul>
+5 V -GL	C204 MAIN C204 DRV C204 DRV-B C204 PNL	<ul style="list-style-type: none"> <li>• All logic systems operating voltage</li> <li>• PF motor hold voltage</li> <li>• Plunger hold voltage</li> <li>• PG motor hold voltage</li> <li>• Power for all the sensors</li> </ul>
VX-GL	C204 MAIN C204 DRV C204 DRV-B	<ul style="list-style-type: none"> <li>• Voltage for power system pull-up. It is switched by VXCNT signal of the CPU (IC2).</li> </ul>

**❑ Protection circuits :**

These +37VDC line blocks perform voltage control, and they have over-current limiting and over voltage protection circuits for each.

**❑ Control and status signals :**

The PSB//PSE board receives two control signal from the C204 MAIN board and outputs two status signals to the MAIN board. Refer to Table 2-3 for the each signal and the printer status relationship.

**❑ Fatal error recovery :**

When the printer detects the fatal error, the PSB/PSE board cannot recover for APPROX.10 minutes by the DRERR signal of the C204 MAIN board, after the power is turned off. Therefore, you must wait more than 10 minutes turn the power on again.

**Table 2-4. PSB/PSE Board Control Signals**

Signal	In / Out*1)	Signal Level	Logic	Function	
				Block 1*2)	Block 2*3)
<b>/PD (Power Down)</b>	In	TTL	High	37 VDC	37 VDC, 5 VDC
			Low	0 VDC	37 VDC, 5 VDC
<b>DRERR (Head coil/driver error)</b>	In	TTL	High	0 VDC	0 VDC, 0 VDC
			Low	37 VDC	37 VDC, 5 VDC
<b>/SD (Source Down)</b>	Out	TTL	High	Indefiniteness	≥ 30 VDC, 5VDC
			Low		< 30 VDC, 5VDC
<b>CL (Current Limit*4)</b>	Out	TTL	High	37 VDC	37 VDC, 5 VDC
			Low	≤ 35 VDC	≤ 35 VDC, 5 VDC

\*1): From the view of the PSB/PSE board.

\*2): VP1-GP1 and VP2-GP2

\*3): VP3-GP3 and +5V-GL

\*4): Due to high duty printing

## 2.3 CONTROL CIRCUIT

---

Figure 2-15 shows a block diagram of the control circuit with the C204 MAIN board at the center.

### 2.3.1 Control Circuit Operation Overview

The core of the control circuit is the TMP95C061AF CPU (IC2). This CPU is driven using a 24.57 MHz external clock (CRU1). The CPU executes programs stored in the PROM (IC5). The CPU starts executing a program upon receiving the reset signal from an external device (IC13) via the gate array E05B36 (IC1). The CPU accesses the internal RAM and external RAM (IC14). The CPU also controls the EEPROM (IC11) used to store the parameters, such as the tear off position, while the printer is turned off.

The CPU controls all the printer operations via the peripheral IC E05B36 (IC1) and controls the printer mechanism. The main functions of the E05B36 (IC1) are: /CS (Chip Select) signal creation, address decoding, printhead driver control, carriage driver control, encoder pulse circuit control, PG and HF phase signal creation, interface control, CR and PF motor driver abnormal sensor circuit monitoring, reset signal creation, control of the PSB/PSE board, control of the panel unit, and reading the DIP switch settings on the C204 SUB board.

Signals, such as DRERR (driver error) and PD (power down), are connected to the C204 PSB/PSE board to provide back-up control of the EEPROM (when the printer is turned off) and control of the power supply voltage. When the POFF signal informs the CPU that the power has been turned off (or CL that the power supply voltage has dropped), the CPU turns off the power supply voltage of the C204 PSB/PSE board by outputting the PD signal.

The reset circuit outputs the reset signal when the printer is turned on or off, the voltage level drops, or a reset signal is input from an external device. It resets the control circuit for a certain period directly or via the E05B36.

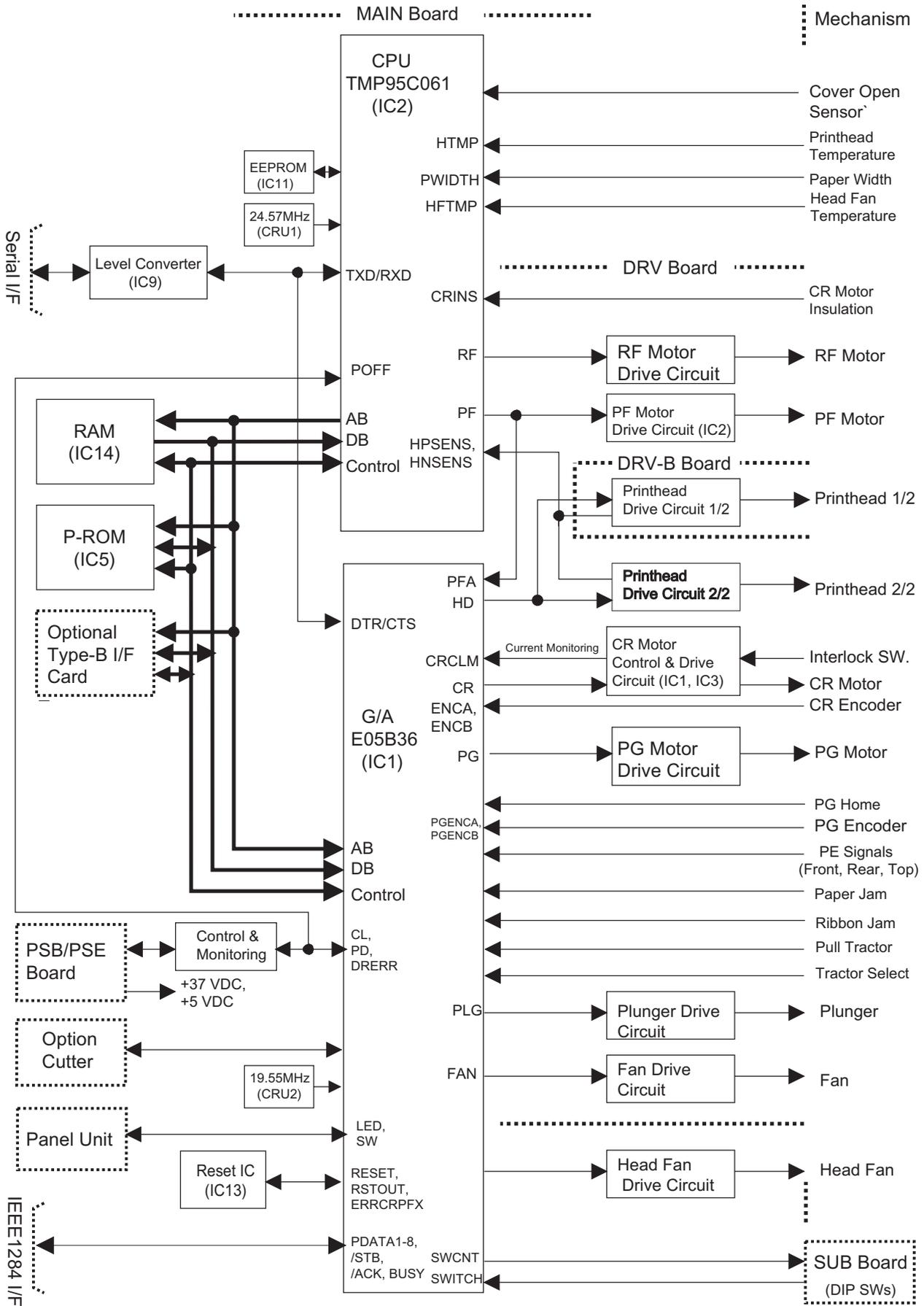


Figure 2-15. Control Circuit Block Diagram

Table 2-5 describes the functions of the main components on the C204 MAIN and C204 DRV board.

**Table 2-5. Main IC Functions**

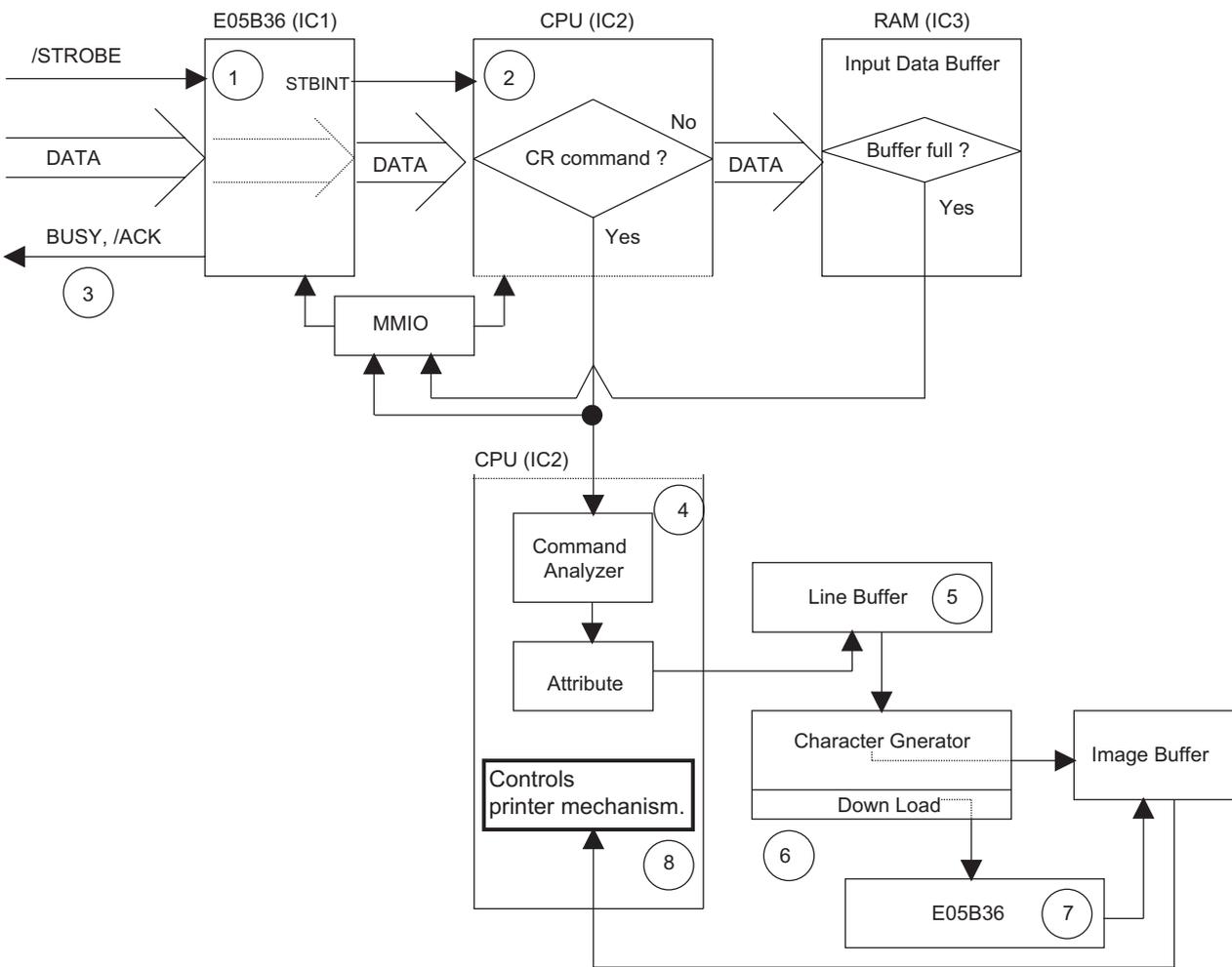
Board	IC Name	Location	Functions
C204 MAIN	TMP95C061 (CPU)	IC2	Receives data from the host computer via the gate array, loads the data to the input buffer in the RAM, and converts the image data to print data.
	E05B36 (Gate Array)	IC1	The main features are: <ul style="list-style-type: none"> <li>• /CS (Chip Select) signal creation</li> <li>• Address decoding</li> <li>• Address latching</li> <li>• Clock pulse creation</li> <li>• Printhead driver control</li> <li>• CR motor driver control</li> <li>• CR and PG motor pulse encoder I/O (input/output)</li> <li>• Encoder pulse I/O</li> <li>• Phase signal creation for the motors</li> <li>• I/O port control</li> <li>• Interface control</li> <li>• Abnormal CR and PF motor detection</li> <li>• /RESET signal creation</li> </ul>
	PROM	IC5	Contains the program that runs the CPU.
	RAM	IC14	Holds the CPU working area and buffers (input,, line,, and image buffers).
	EEPROM	IC11	Memorizes the printer unique parameter during the power is off.
	ADM232	IC9	EIA to Logic level voltage level converter
	PST591D	IC13	System reset IC
C204 DRV	STK681-050	IC1	Drives the CR motor.
	STK67138MK4	IC2	Drives the PF motor.
	uPC393C	IC3	Detects the current in the CR motor driver and feeds it back to the gate array on the C204 MAIN board.

**DFX-8500**

Figure 2-16 shows the data flow for data input via the parallel interface. Although various circuits perform data processing, the control core is the CPU and all operations are executed via the CPU. In this circuit, the E05B36 IC (IC1) provides the interface between the external host computer and the CPU, and all data processing is performed by read/write operations to MMIO (Memory Mapped Input / Output). Data from the host computer is latched by repeating steps 1 through 3 below.

1. Upon receiving the /STROBE pulse, IC1 latches the data into ports PDATA 1 - 8 and sets the BUSY signal to HIGH.
2. The CPU reads the latched data from the MMIO port, checks whether the data is a print command (CR code), and stores it in the input data buffer if it is not.
3. After checking the data, the CPU makes IC1 clear the BUSY signal and output the /ACKNLG signal, via the MMIO accesses. When either a CR code is received or the input data buffer becomes full, the CPU sets the BUSY signal to HIGH and executes printing.
4. The CPU reads the data from the input data buffer, analyzes each byte to determine whether it is a character or a command, and converts it to print data. The print data consists of 1-byte character codes and 2-byte attributes. Character data is stored as character codes and commands or character types are stored as attributes.
5. The print data is stored in the line buffer in units of one line of data.
6. The CPU reads the print data stored in the line buffer byte by byte, accesses the CG (Character Generator), and expands the data in the image buffer (in the case of download characters, in the download CG). A row of expanded data is output to the printhead control circuit as printhead data.

**Note :** *The data flow from the Type-B I/F card is the same as the data flow from the parallel interface, described above, except the signal names and data access method differ.*



**Figure 2-16. Parallel Interface Data Flow**

### 2.3.2 Reset Circuit

This section describes the hardware reset circuit. When the hardware reset signal is input, all ICs in the control circuit are reset, and the CPU executes the program from the starting address. Figure 2-17 shows the reset circuit block diagram.

The circuit is equipped with a reset IC: PTS591(IC13) is used for resetting the + 5 VDC line. The reset operation is described below.

**❑ Power On/Off Reset:**

Reset IC PTS591 (IC13) monitors the +5 VDC line on the C204 MAIN board. If it drops to 4.2 VDC or smaller, the reset IC outputs a LOW signal to the CPU (IC2) and E05B36 (IC1) gate array.

**❑ Forced Reset:**

The gate array outputs the RSTOUTX or ERRCRPFX signals to the XRESET of the CPU, and also to the gate array itself.

**❑ /INIT Signal Reset:**

When the gate array receives the /INIT signal from the host computer, the signal is transferred to the INT4 of the CPU, then CPU performs the /INIT reset operation.

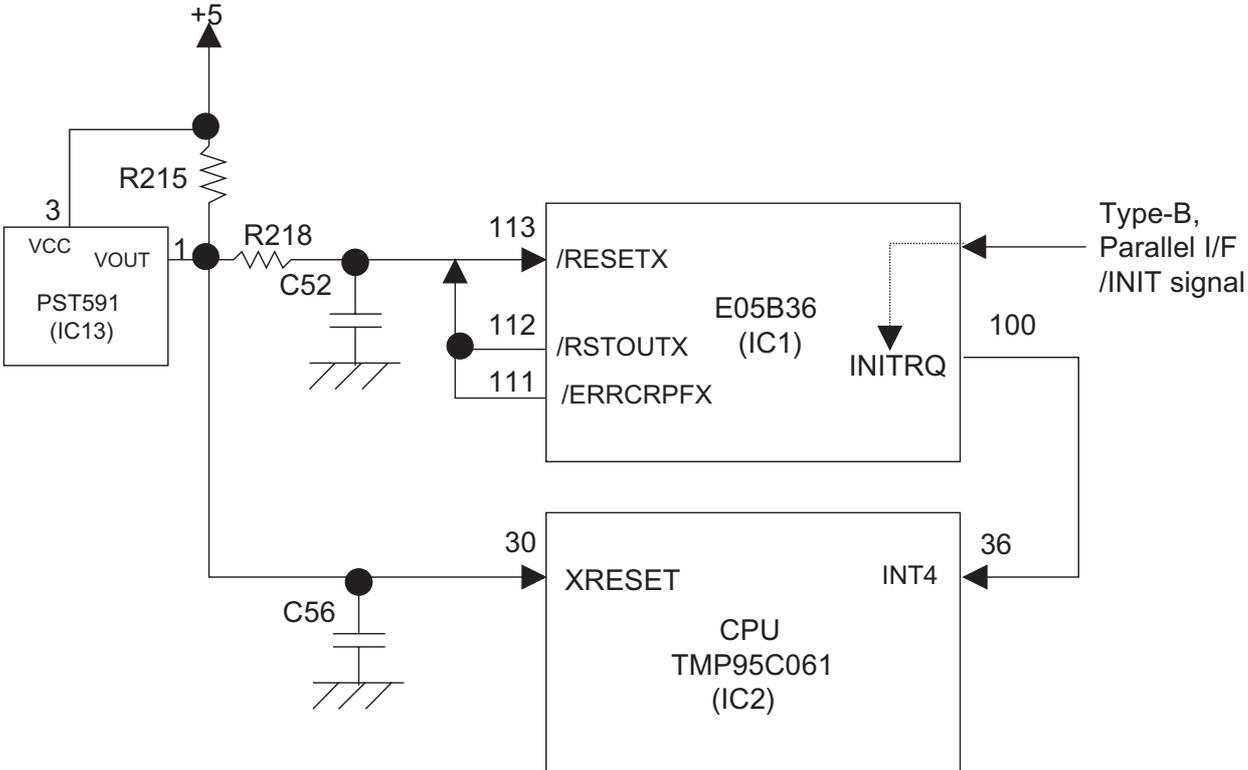


Figure 2-17. Reset Circuit Block Diagram

### 2.3.3 Sensor Circuits

Figure 2-18 shows the sensor circuits in block diagram form. The printer is equipped with the following sensors:

1. Front and rear PE sensors (use a photo interrupter)
2. Top PE sensor (to detect the TOF position, uses a photo interrupter)
3. Paper jam sensor (uses a magnetic transistor)
4. Tractor select sensor (uses a micro mechanical switch)
5. Pull tractor sensor (uses a micro mechanical switch)
6. CR encoder sensor (uses a photo interrupter)
7. PG encoder sensor (uses a photo interrupter)
8. PG home sensor (uses a micro mechanical switch)
9. Ribbon jam sensor (uses a photo interrupter)
10. Cover open sensor (uses a micro mechanical switch)
11. Printhead temperature sensor (uses a thermistor)
12. Head fan temperature sensor (uses a thermistor)
13. Paper width sensor (uses a photo reflector)
14. CR motor isolation resistance sensor (monitored by the analog port of the CPU)
15. PSB/PSE board power off sensor (signal interface)

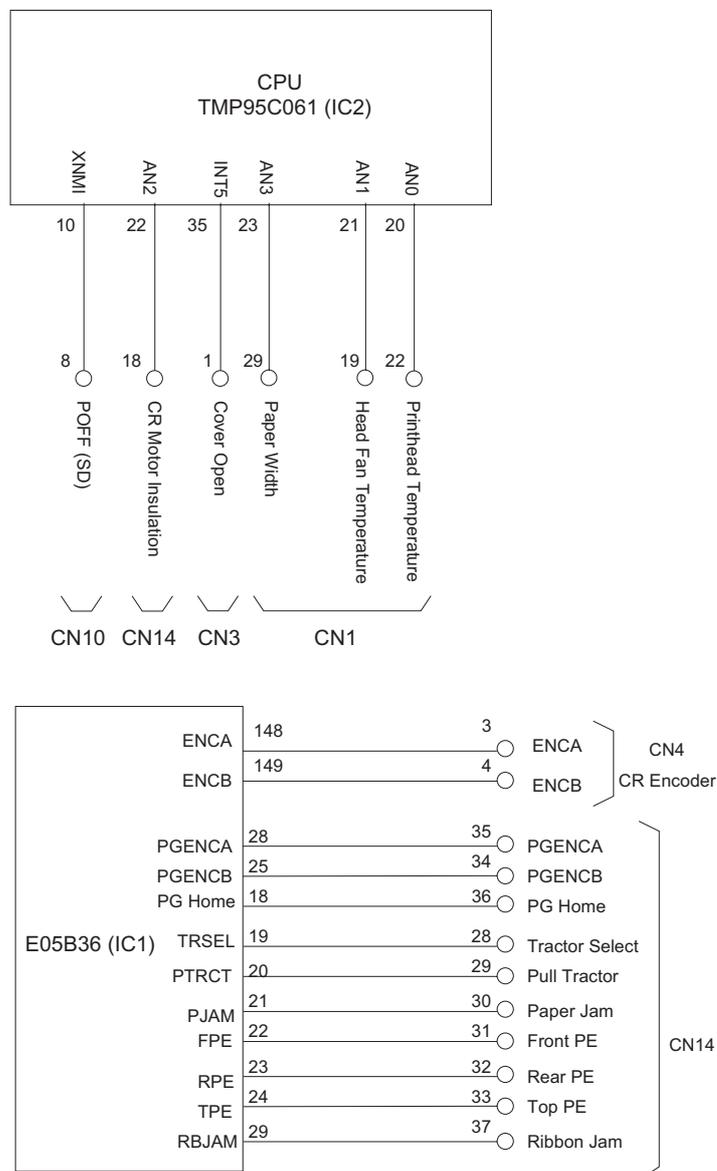


Figure 2-18. Sensor Circuit Block Diagram

Each sensor is described below.

1. Front and rear paper end sensors

- Detection form: Photo interrupter
- Output form: Open collector (pulled up to 10 K ohms resistor)
- Logical: Paper present: LOW  
Paper out: HIGH

2. Top paper end sensor (to detect the TOF position)

- Detection form: Photo reflector
- Output form: Open collector
- Logical: Paper present: LOW  
Paper out: HIGH

3. Paper jam sensor

- Detection form: Magnetic transistor
- Output form: Rectangle wave (1 channel, TTL level)
- Logical: Paper feed: Level changes continuously.  
Paper jam: Level remains the same.
- Supplement: The magnetic transistor is attached to the tension roller on the paper tension unit.

4. Tractor select sensor

- Detection form: Micro mechanical switch
- Logical : Front tractor: LOW (closed)  
Rear tractor: HIGH (open)

5. Pull tractor sensor

- Detection form: Micro mechanical switch
- Logical : Pull tractor installed: LOW (closed)  
Pull tractor not installed: HIGH (open)

6. Carriage encoder sensor

- Detection form: Photo reflector
- Transaction: Rectangle wave, A and B phases respectively.

7. Platen Gap encoder sensor

- Detection form: Photo interrupter
- Output form: Rectangle wave, 2 channel
- PG ability:  $T = 0.015 \text{ mm / pulse}$
- Available range:  $0 \leq T \leq 0.7 \text{ mm}$

8. Platen Gap home position sensor

- Detection form: Micro mechanical switch
- Logical:: Home: LOW (closed)  
Out of home: HIGH (open)

9. Ribbon jam sensor

- Detection form: Photo interrupter
- Function: : The main board monitors signal change during ribbon feed.

10. Cover open sensor

- Detection form: Micro mechanical switch
- Logical:: Cover closed: LOW  
Cover open: HIGH

11. Printhead temperature sensor (uses a thermistor)

The thermistor is included on the printhead.

12. Head fan temperature sensor (uses a thermistor)

The thermistor is included on the head fan.

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13. Paper width sensor

- Detection form: Photo reflector
- Output form : Emitter follower
- Judgemwnt : No paper present: Standard voltage level.  
Paper present: The voltage level is double the standard voltage level.

14. CR motor isolation resistance sensor (monitored by port AN2 of the CPU)

To provide information about the CR motor life, the analog port (AN2) of the CPU checks the isolation resistance every time the printer is turned on. If the isolation resistance is equal or less than 2.2 K ohms, a carriage error is detected and the printer beeps.

15. PSB/PSE Board power off sensor (signal interface)

When the +37 VDC line voltage drops, the PSB/PSE board sends a HIGH POFF signal to the C204 MAIN board.

### 2.3.4 CR Motor Drive Circuit

Figure 2-19 shows the internal circuit for the CR motor, Table 2-6 provides the CR motor specification, and Figure 2-20 shows a block diagram for the CR motor drive circuit.

An STK681-050 (IC1) bipolar driver IC drives the CR motor. It has built-in bipolar switching transistors and a current limiter. A comparator IC uPC393C (IC3) monitors the current in the CR motor driver IC (IC1). If the current exceeds the set value, it is fed back to the gate array (E05B36), and then the gate array outputs the signal for the current setting transistors (Q5, Q6, and Q7).

When the printer is turned on, CPU analog port AN2 measures the isolation resistance in the CR motor. If the isolation resistance is equal or less than 2.2 K ohms, the printer change the status to the carriage error.

If the printer cover is open during power on, the CR motor driver power is cut by the interlock switch.

The ENCA pulse that the carriage encoder outputs is input to general purpose port CRENCA of the gate array, and the ENCB pulse that the carriage encoder outputs is input to general purpose port CRENCB of the gate array. The gate array counts these pulses using the internal counter and determines the amount and direction of motor rotation.

Table 2-6. CR Motor Specifications

Specification	Description
Form	DC servo motor
Supply Voltage	37 VDC
Internal Coil Resistance	1.66 ohms (± 10 %)
Current Consumption*1)	Accerelation / Deceraration: 4.6 A (AV.) Constant Speed: 2.5 A (AV.)

\*1): at Super draft printing, ± 10 %

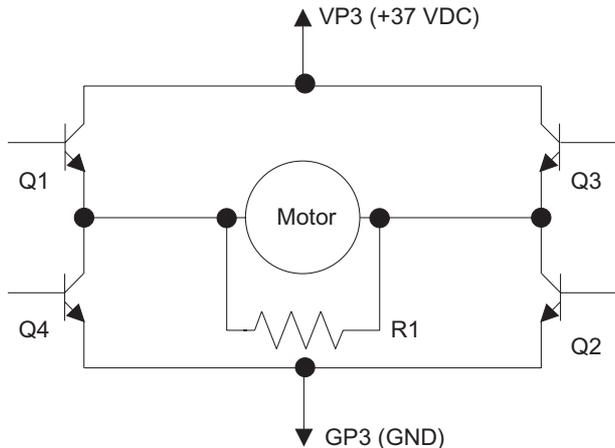


Figure 2-19. CR Motor Internal Circuit

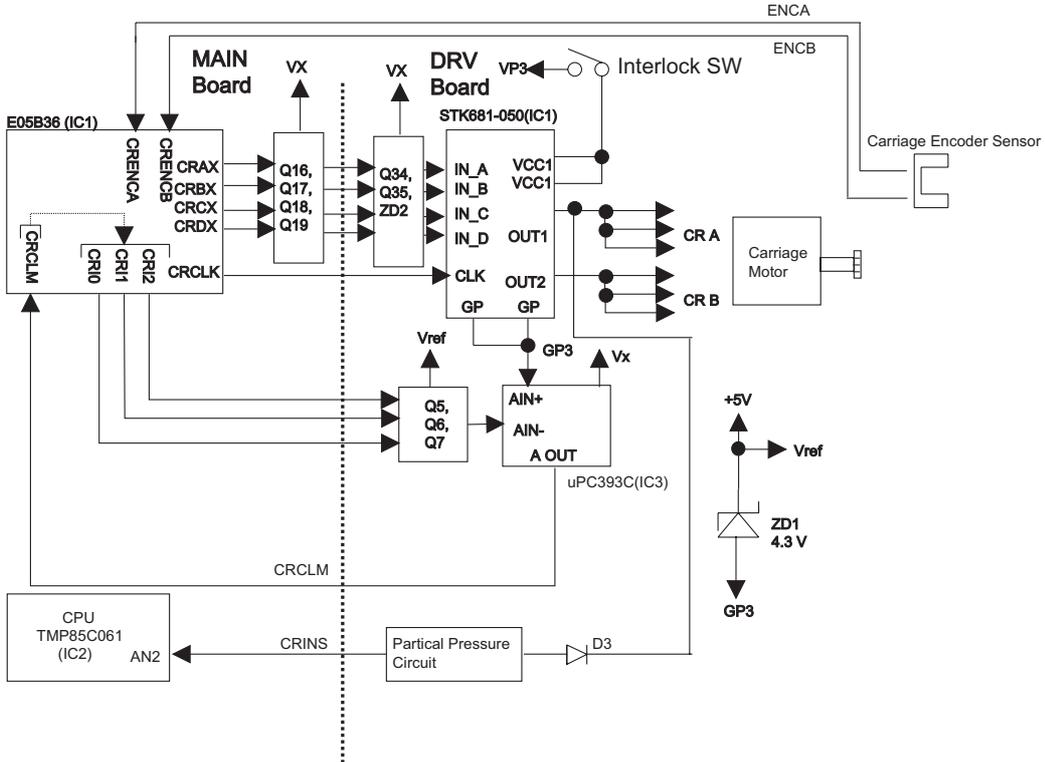


Figure 2-20. CR Motor Drive Circuit Block Diagram

Table 2-7 lists the CR motor drive modes.

**Table 2-7. CR Motor Drive Modes**

Division	Drive Mode	CR Motor Speed (rpm)	Acceleration / Deceleration Control Curve Note1)	Constant Speed Control
Carriage moves with printing. Note 2)	Super Draft	2800	Acceleration and Deceleration 1	PI control
	Super Draft HD	2666		
	Draft	2100		
	Draft HD	2000		
	Bit image 1	1050	Acceleration and Deceleration 3	
	Bit image 2	1050		
	Bit image 3	1050		
	NLQ	1050		
	NLQ HD	1000		
	Super Draft X 1/3	888		
	Bit image 4	933		
	Draft X 1/3	666		
	Bit image 1 X 1/3	555		
	Bit image 2 X 1/3	500		
	Bit image 3 X 1/3	444		
	NLQ X 1/3	333		
	Draft X 1/6	333		
	Bit image 4 X 1/3	277		
Bit image 3 X 1/6	222			
Carriage moves without printing Note 3)	Home position seek	500		
	Paper width detection seek	500		
	Logical seek 0	2100		
	Logical seek 1	1050		
	Logical seek 2	333		
	Measurement seek	-		

**Notes 1:** Refer to Table 2-8.

**Notes 2:** This division applies to all printing modes. PI control oversees the constant speed. (Refer to page 2-27 for more information on PI control.) For increased throughput, the division Super Draft to Draft HD allows printing during acceleration and deceleration.

**Notes 3:** This division increases throughput when the carriage is moving and the printer is not printing.

The printer has three deceleration control modes. The degree of deceleration is determined by how the CR motor transistors are driven. Table 2-8 describes how the transistors are driven for each mode.

**Table 2-8. CR Motor Drive Sequence**

Carriage Transfer Direction	Driving Mode	Driver (Refer to Figure 2-19.)			
		Q1	Q2	Q3	Q4
Left -> Right	Acceleration			ON	ON
	Deceleration 1		ON		ON
	Deceleration 2				
	Deceleration 3	ON	ON		
Right -> Left	Acceleration	ON	ON		
	Deceleration 1		ON		ON
	Deceleration 2				
	Deceleration 3			ON	ON

❑ **PI Control :**

PI control keeps the CR motor speed constant using the encoder pulses ENCA and ENCB with the gate array E05B36. The E05B36 generates the PWM (pulse width modulation) signal according to the CR motor speed to the PWM port of the gate array and determines the duty of the carriage drive timing. CR ports I0, I1, and I2 output the drive signal for the CR motor.

❑ **Acceleration control :**

Until the carriage speed reaches the constant speed set by PI control, acceleration control determines the speed of the carriage. The printer can print while the carriage is accelerating. The carriage speed moves to constant control speed smoothly to prevent the CR motor from exceeding the constant control speed. The E05B36 gate array controls the motor driver (STK681-050), which performs the current chopping. Figure 2-21 shows the acceleration control curve.

**Speed 0 - SP1**

1. It causes the carriage to accelerate.
2. Because the control circuit measures time periods with the encoder signal, when the carriage speed reaches SP1, it changes to the next sequence (SP1 - SP2).

**SP1 - SP2**

1. When the carriage speed reaches SP1, the printer uses the acceleration driving mode, based on the duty data, and the rest of the time, it uses Deceleration driving mode 2.
2. During this time the control circuit measures time periods using the encoder signal, and controls the following:
  - When duty data becomes  $Duty_{min}$  before the carriage speed reaches SP2. Then, when the carriage speed reaches SP2, the next sequence (SP2-) takes effect.
  - When the carriage speed reaches SP2 before duty data becomes  $Duty_{min}$ , the next sequence (SP2-) takes effect.

**SP2 -**

When the carriage speed reaches SP2, PI control oversees the carriage speed.

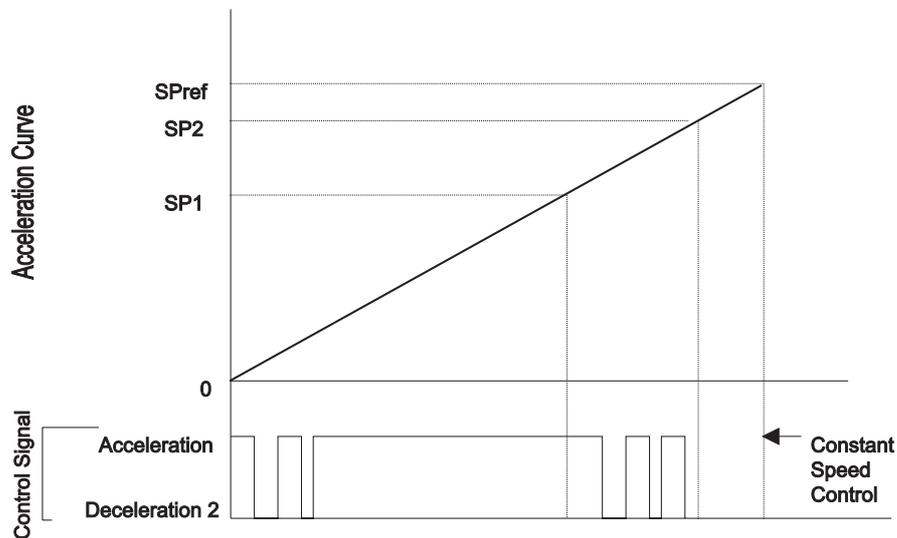


Figure 2-21. CR Motor Drive Circuit Block Diagram

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**Deceleration control:**

Deceleration control provides smooth deceleration and prevents rapid vibration.

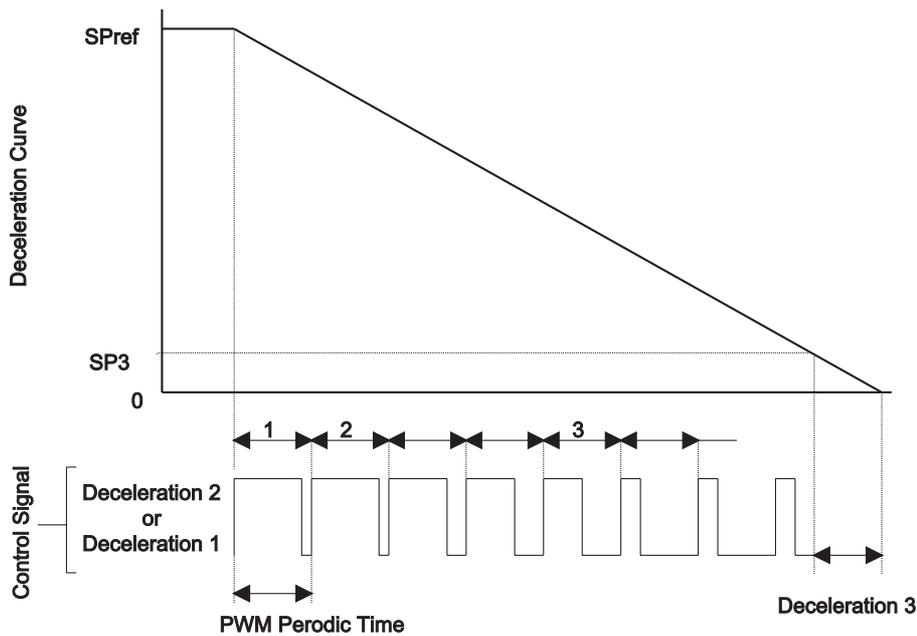
The duty data for deceleration control is determined for each printing mode. Pulse width modulation (PWM) determines each printing mode.

**Current speed - SP3**

1. The printer uses Deceleration driving mode 2, based on the duty data, and the rest of the time, it uses Deceleration driving mode 1.
2. During this time the control circuit measures time periods using the encoder signal, and controls the following:
  - When duty data becomes  $Duty_{min1}$  before the carriage speed reaches SP3.
  - When the carriage speed reaches SP3 before duty data becomes  $Duty_{min1}$ , the next sequence (SP3 - Speed 0) takes effect.

**SP3 - Speed 0**

1. When the carriage speed reaches SP3, Deceleration driving mode 3 takes effect. This control method is the inverse-continuity break method.
2. During this time, the control circuit measures time periods using the encoder signal. When the rising edge of next pulse is not detected after 1.5 seconds, Deceleration driving mode 1 takes effect and the control circuit controls short-break.



**Note:** 1, 2, and 3 indicate the PWM control section number.

**Figure 2-22. CR Motor Drive Circuit Block Diagram**

### 2.3.5 PF Motor Drive Circuit

Stepping motor driver STK6713BMK4 (IC2) drives the PF motor. Figure 2-22 shows the PF motor drive circuit block diagram, and Table 2-9 provides the PF motor specifications.

Table 2-9. PF Motor Specifications

Specification	Description
Form	4-phase, 200-pole, HB* pulse motor
Supply Voltage	37 VDC (applied to the drive circuit)
Internal Coil Resistance	2.8 ohms $\pm$ 10 % per phase at 25 °C
Frequency	4274 pps** (normal mode,, constant driving): 9.9 ips*** 2610 pps (middle speed mode,, constant driving): 6 ips
Current Consumption	Driving: 1.75 A, $\pm$ 0.20 A per phase (average) Holding: 0.26 A, $\pm$ 0. 2 A per phase (average)

- \*HB .... Hybrid
- \*\*pps .... pulses per second
- \*\*\*ips .... inches per second

The motor pulse switching signals are transmitted from CPU ports PG00 to PG03. The PF motor is controlled using open-loop phase switching based on the specified time data, and the phase driving method is 1-2 phase excitation. (When the PF motor is held, the phase driving method is 1 phase excitation.) The CPU selects the most suitable driving mode from the modes below according to conditions such as the paper feed length and the pull tractor condition.

- Micro feed (adjust) mode : < 20 / 432 inches
- Middle speed mode:  $\geq$  20 / 432 inches and < 60 / 432 inches, or with optional pull tractor
- Normal speed mode:  $\geq$  60 / 432 inches

Each phase switching FET in driver IC2 is an open collector. When the phase switching data is HIGH, the motor is turned on. The PFA port of the gate array monitors the phase A signal of the PF motor and checks whether it is operating normally. The PFA port is used as the WDT (watch dog timer). If PF motor operation is abnormal, the gate array outputs the /RSTOUT (reset request) signal to the system reset IC (IC13). Refer to Section 2.3.2 Reset Circuit.

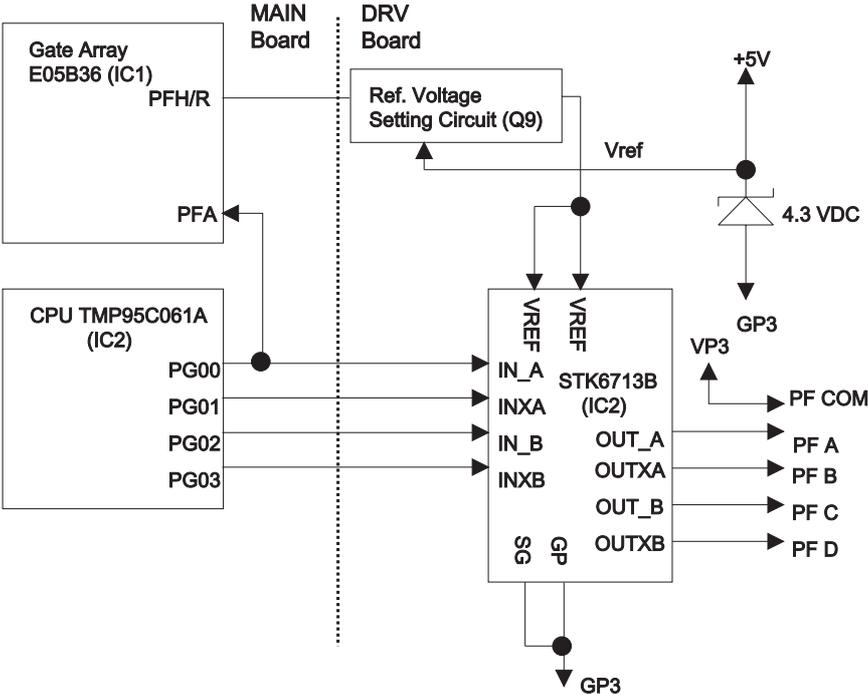


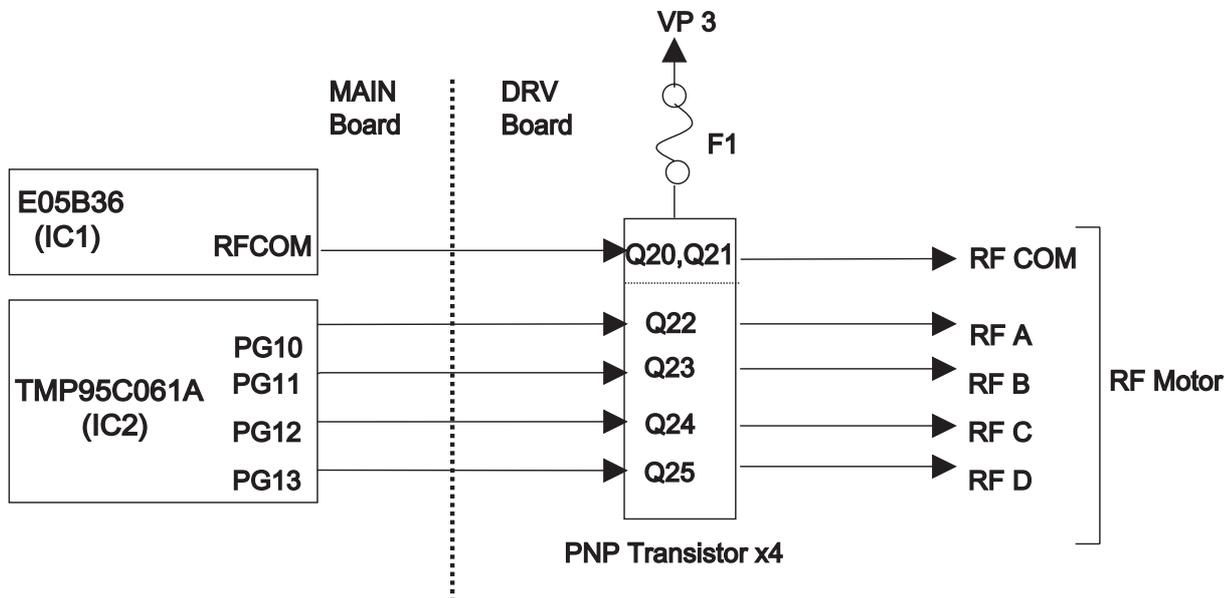
Figure 2-23. PF Motor Drive Circuit Block Diagram

### 2.3.6 RF Motor Drive Circuit

Figure 2-24 shows a block diagram of the RF motor drive circuit, and Table 2-10 provides the RF motor specifications. The RF motor is a stepping motor. The control circuit performs open-loop phase switching control according to the timing data for acceleration, constant speed, and deceleration. CPU ports PG10 to PG13 output the motor phase switching signals. The control method is not equipped with a hold circuit for changing the motor phase. The RF motor rotates when the carriage moves.

**Table 2-10. RF Motor Specifications**

Specification	Description
Form	4-phase, 48-pole, PM pulse motor
Supply Voltage	37 VDC (applied to the drive circuit)
Internal Coil Resistance	150 ohms + 10 % per phase at 25 °C
Frequency	720 pps
Current Consumption	Driving: 0.10 A (average)
Driving Method	Constant voltage driving, 2-2 phase drive



**Figure 2-24. RF Motor Drive Circuit Block Diagram**

### 2.3.7 PG Motor Drive Circuit

Figure 2-25 shows a block diagram of the PG motor drive circuit, and Table 2-11 provides PG motor specifications.

The PG motor is a stepping motor. The motor phase switching signals are output from the E05B36 ports PGA to PGD. The motor common voltage (PGCOM) alternates between drive mode (+37 VDC) and hold mode (+5 VDC) using the PG H/R signal of E05B36. The phase driver circuit is made by discrete transistors Q12 to Q15.

The phase A output pulse from the platen gap encoder (ENCA) is input to port ENCA of E05B36 and the phase B output pulse from the platen gap encoder (ENCB) is input to port ENCB of E05B36. The E05B36 counts these pulses using the internal counter and determines the amount and direction of motor rotation.

Table 2-11. PG Motor Specifications

Specification	Description
Form	4-phase, 48-pole, PM pulse motor
Supply Voltage	37 VDC (applied to the drive circuit)
Internal Coil Resistance	250 ± 18 ohms per phase at 25 °C
Current Consumption	Driving: 0.20 A (average) Holding: 0.02 A ± 5 mA
Frequency	285 pps
Driving Method	Constant voltage driving, 2-2 phase drive

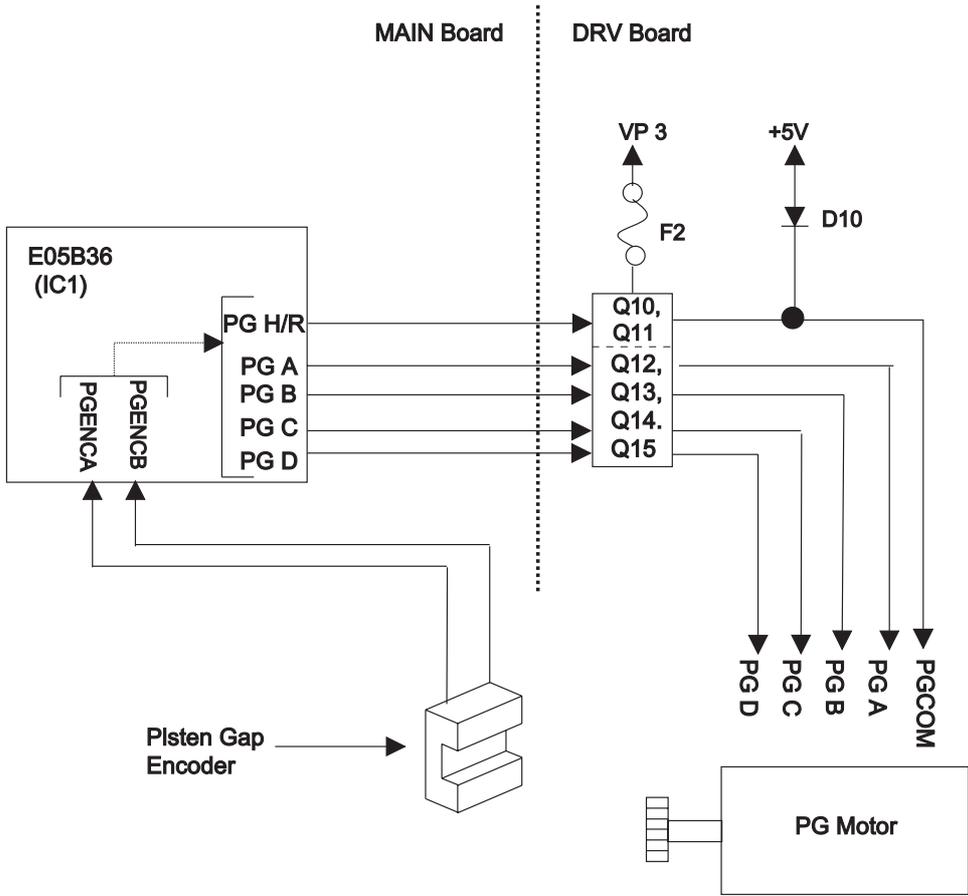


Figure 2-25. PG Motor Drive Circuit Block Diagram

### 2.3.8 Plunger Drive Circuit

Figure 2-26 shows a block diagram of the plunger drive circuit, Table 2-12 provides the plunger specification, and Table 2-13 provides the plunger switching pattern.

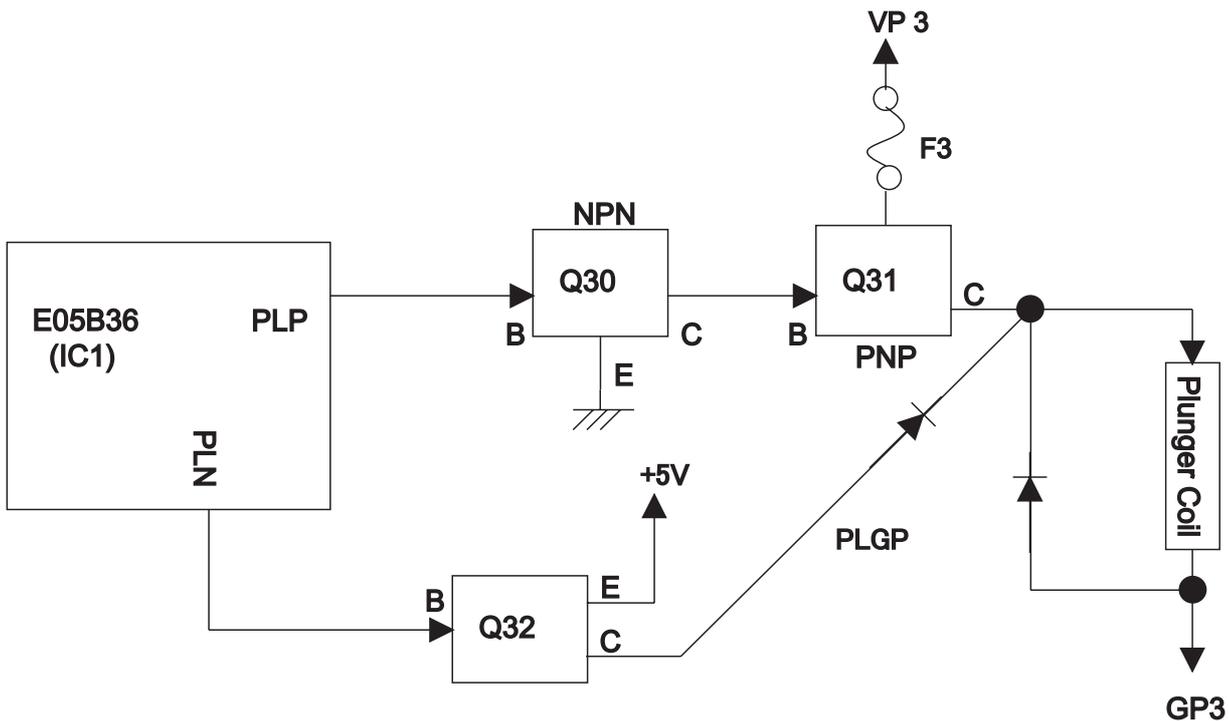
The plunger is driven using three switching patterns. Gate array E05B26 ports PLP and PLN output the plunger coil drive signals. When the PNP port of the gate array turns on switching transistors Q30 and Q31 are turned on and the supply voltage (VP3) flows into the plunger coil. When switching transistor Q30 is turned off, Q31 is turned off and the hold voltage (+5 V) flows into the plunger coil via Q32, using the port PLN of the E05B36.

**Table 2-12. Plunger Specifications**

Specification	Description
Form	DC solenoid
Supply Voltage	37 VDC (applied to the drive circuit)
Internal Coil Resistance	9 ohms $\pm$ 5 % at 25 °C
Current Consumption	Driving: 3.7 A (MAX.) Holding: 0.4 A

**Table 2-13. Plunger Switching Pattern**

Suspension Roller Status	Q30 and Q31	Q32
Closed	Off	Off
Closed -> Opened	On	Off
Closed with holding voltage	Off	On



**Figure 2-26. Plunger Drive Circuit Block Diagram**

### 2.3.9 Printhead Drive Circuit

Figure 2-27 shows a printhead drive circuit block diagram.

**General :**

The print data lines from IC1 are active when they are HIGH. When ports HDR1 (HDL1) to HDR9 (HDL9) of IC1 go HIGH, the FET gates are biased, and the FETs are turned on to apply the current to the printhead coil. At the same time, ports HDRS1 (HDLS1) to HDRS9 (HDLS9) of IC1 go HIGH, the FET gates are biased, and the FETs are turned on because the each printhead coil is driven by bipolar drive method. When the HD port of IC1 goes LOW, the FET is turned off and the printhead coil current is cut.

Two +37 VDC lines (VP1-GP1 on the C204 DRV-B board and VP2-GP2 on the C204 MAIN board) assign the common voltage for the printhead coil. Pins #1, #2, #7, #9, #10, #11, #12, #16, and #17 are supplied by the VP2-GP2 line (CN1 on the C204 MAIN board). Pins #3, #4, #5, #6 #8, #13, #14, #15, and #18 are supplied by the VP1-GP1 line (CN1 on the C204 DRV-B board).

The CPU monitors the printhead temperature and head fan (HF) temperature. When the temperature rises abnormally, printing stops at once until the temperature cools.

The CPU also monitors the printhead driver status, P-channel and N-channel FET respectively. If the printhead driver FET shorts, CPU (IC2) port PDRERR (P-channel) / NDRERR (N-channel) detects HIGH level and the E05B36 (IC1) sends the DRERR (Driver Error) signal to the C204 PSB/PSE board. When the C204 PSB/PSE board receives this signal, it stops the output voltage and the printer beeps.

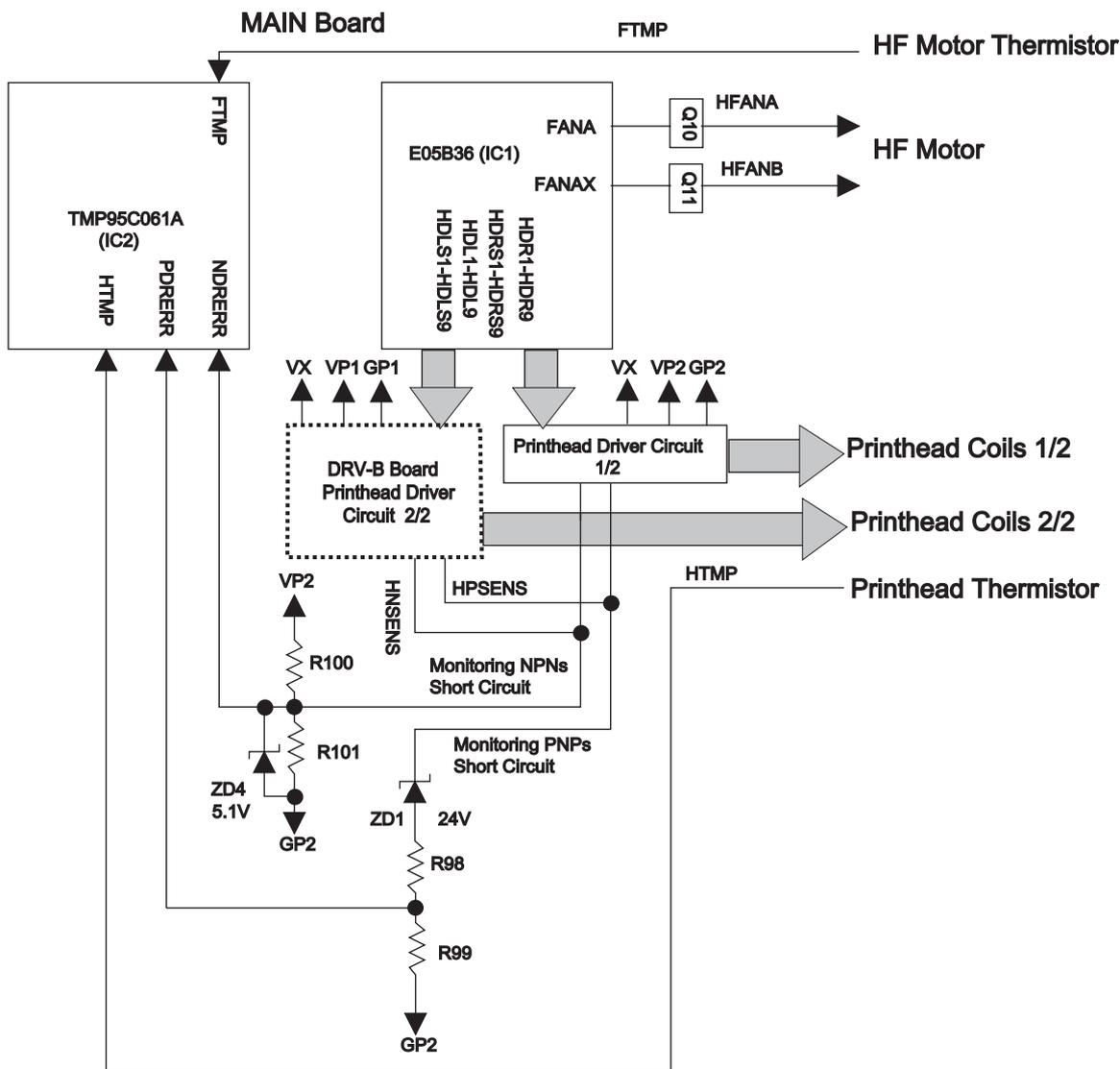


Figure 2-27. Printhead Drive Circuit Block Diagram

**□ Printhead high temperature feedback operation :**

The printer supports the printhead temperature detection sequence, which consists of the following steps:

1. When the printhead temperature is less than 110 °C, the printer performs normal printing.
2. When the printhead temperature exceeds equal or more than 110 °C, the printer performs interval printing (Carriage rest time at the sides is little bit longer than the normal.)
3. When the printhead temperature exceeds equal or more than 120 °C, the printer stops printing until the temperature goes down to 100 °C or less.
4. When the printhead temperature returns less than 100 °C, the printer performs normal printing again.

**□ HF temperature feedback operation :**

The printer supports the printhead fan (HF) temperature detection sequence, which consists of the following steps:

1. When the printhead fan temperature is less than 65 °C, the HF fan stops.
2. When the printhead fan temperature exceeds equal or more than 65 °C, the HF rotates.
3. When the printhead temperature goes down to 50 °C or less, the HF stops again.

# CHAPTER 3

## DISASSEMBLY AND ASSEMBLY

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## 3.1 OVERVIEW

---

This chapter describes the disassembly/assembly procedures to be used for replacing the main assemblies of the DFX-8500.

### 3.1.1 Precautions for Disassembly and Assembly

Read this section before you disassemble, assemble, or transport the printer.

#### **WARNING**

- ☑ *Because the DFX-8500 weighs 29.0 kg (63.8 lb) and is much larger and heavier than most printers, you must be careful when handling it. Whenever it needs to be moved, two or more persons must carry it, supporting it from the bottom. Never lift the printer by holding the front cover, because it may come off.*
- ☑ *Disconnect the power cord before disassembling or assembling the printer.*
- ☑ *Disconnect the interface cable before disassembling or assembling the printer.*
- ☑ *The printhead reaches very high temperatures, and if you place your hand on it, it could burn you. Always be sure that the printhead is cool when you handle it.*
- ☑ *Wear gloves to protect your hands when handling the printer.*

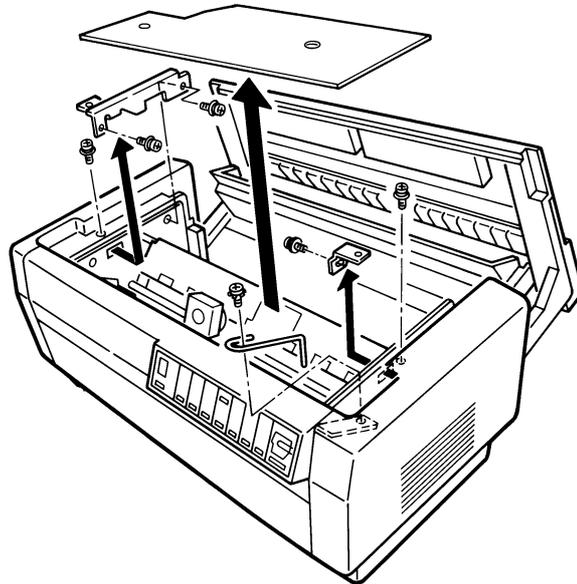
#### **CAUTION**

- ☑ *Handle frame edges with care since this printer has a considerable amount of metal materials.*
- ☑ *To prevent damage to ICs from static electricity, do not touch the ICs on the circuit board or the terminals of peripheral electrical components with your hands.*
- ☑ *Use only the recommended tools to ensure safe and efficient maintenance work. Inappropriate tools may damage the printer.*
- ☑ *This printer must be properly packed in the correct container for transportation as described on next page. If the unit is not properly packed, it could be damaged during transportation.*
- ☑ *The paper and ribbon cartridge should be removed before transportation or disassembly.*
- ☑ *Because you may need to turn the printer while you disassemble or assemble it, place it on a clean, thick cloth, such as a blanket, before starting*
- ☑ *After finishing the assembly, do not forget to lubricate and reassemble the unit following the instructions in CHAPTER 6, because a considerable amount of oil may be removed during maintenance or repair work. Also, be sure to clean the unit as described in CHAPTER 6.*

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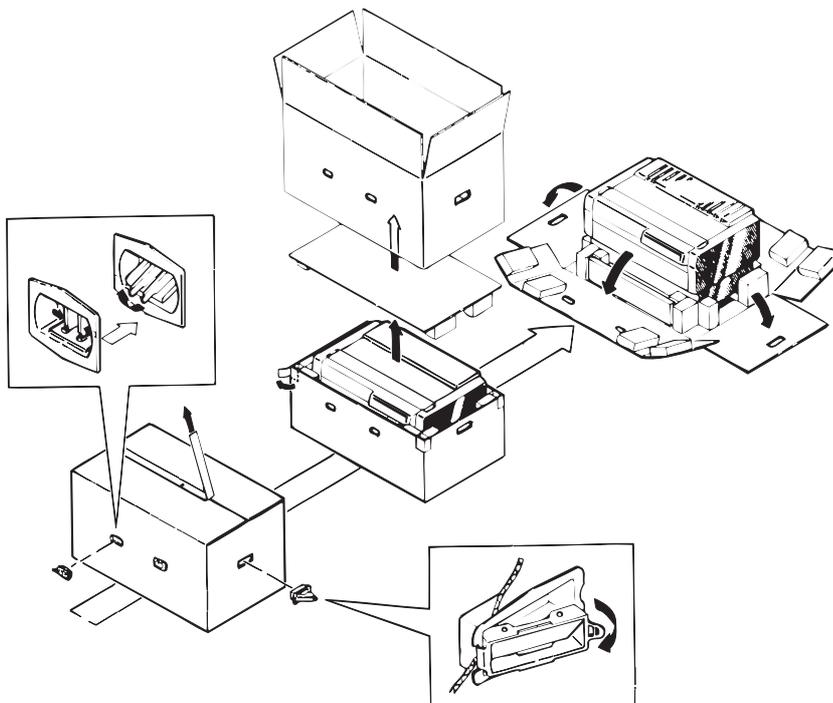
Before transporting the printer, remove the paper and ribbon cartridge. Then attach the following packing materials, as shown in Figure 3-1:

- Transport locking bracket
- Carriage guide shaft support bar
- Printhead protector
- Foam packing for paper bail



**Figure 3-1. Packing Material Attaching**

After attaching the packing materials, pack the printer in its container as shown in Figure 3-2.



**Figure 3-2. DFX-8500 Packing**

### 3.1.2 Tools

This section describes the tools required for assembling, disassembling, or adjusting the printer.

**Note :** Refer to CHAPTER 4 for adjustment tools, CHAPTER 5 for troubleshooting tools, and CHAPTER 6 for tools for maintenance, lubrication, and adhesives.

**Table 3-1. Recommended Tools**

Tool	Type	Class	Code	Reference
(+) Driver No.2 (20 mm or more shaft length with magnetization is recommended.)	o	A	B743800200	-
(+) Driver No.1	o	A	B743800400	-
Box screw driver (7 mm / 0.28 inches across)	o	A	B741700200	-
E-ring holder No. 3	o	A	B740800500	-
E-ring holder No. 6	o	A	B740800800	-
Round nose pliers	o	A	B740400100	-
Diagonal wire cutters	o	A	B740500100	-
Tweezers	o	A	B741000100	-
Electric soldering iron	o	A	B740200100	-
Tension gauge (7000 g)	o	A	B777200301	-
Tension gauge (200 g)	o	A	B765114601	-
Lift handles #E656	E	A	B765111001	-
Dial gauges #F610	E	A	B101946600	Figure 3-3
Dial gauge base #F611	E	A	B101946700	Figure 3-4
Dial gauge master #F612	E	A	B101946800	Figure 3-5
Thickness gauge (t=0.43mm)	o	A	-	Figure 3-6
Thickness gauge (t=0.80mm)	o	A	-	-
Motor screwdriver (Phillips head, torque adjustable)	o	B	-	-

- o: Commercially available
- E: EPSON exclusive
- A: Mandatory
- B: Recommended

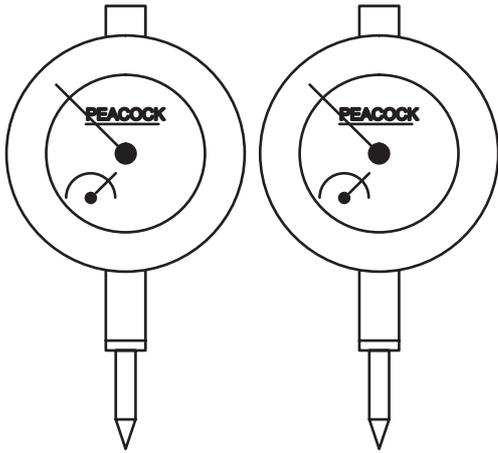


Figure 3-3. Dial Gauges

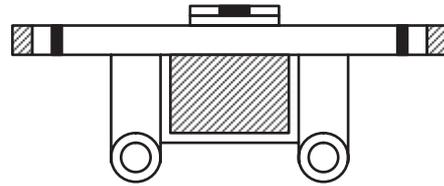


Figure 3-4. Dial Gauge Base

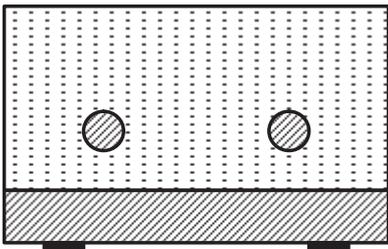


Figure 3-6. Dial Gauge Master



Figure 3-5. Thickness Gauge

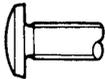
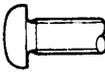
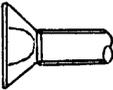
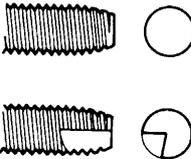
### 3.1.3 Specification for Screws

In the following sections, abbreviations are used for small parts such as screws and washers. Table 3-2 lists these abbreviations. Table 3-3 lists screw and washer types.

**Table 3-2. Screw Abbreviations**

Abbreviation	Part Name
CBB	Cross-Bind head,, B-tight screw
CBS (O)	Cross-Bind head,, S-tight screw with Outside-toothed lock washer
CBS (SP)	Cross-Bind head,, S-tight screw with Spring lock washer + Plane washer
CFS	Cross-Flat head,, S-tight screw
CP (SP)	Cross-Pan head with Spring lock washer + Plane washer
CP (PS)	Cross-Pan head with Plane washer + Spring lock washer
CPB	Cross-Pan head B-tight screw
CPB (O)	Cross-Pan head B-tight screw with Outside toothed lock washer
CPS	Cross-Pan head S-tight screw
CPS (P)	Cross-Pan head S-tight screw with Plain washer
CPS (SP)	Cross-Pan head S-tight screw with Spring lock washer + Plain washer
CPN	Cross-Pan head screw
CPN (O)	Cross-Pan head screw with Outside toothed lock washer
CPN (SP)	Cross-Pan head screw with Spring lock washer + Plain washer
CPT (O)	Cross-Pan head Tapping screw with Outside toothed lock washer

**Table 3-3. Screw Names and Illustrations**

Head		Body	Washer
Top	Side		
1. Cross-recessed head 	1. Bind  2. Pan  3. Flat 	1. Normal  2. S-tight  3. B-tight  4. Tapping 	1. Plain washer  2. Outside toothed lock washer  3. Spring washer 

### 3.1.4 Service Checks After Repair

Before returning the printer after service, use the check list in Table 3-4, which provides a record to make servicing and shipping more efficient.

**Table 3-4. Inspection Check List for the Repaired Printer**

Category	Item to check	Is Check required?
Maintenance	Are all necessary adjustments completed? Are the results of the adjustments within the specified tolerances? (Refer to CHAPTER 4.)	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Check that lubrication and adhesion are correct. (Refer to CHAPTER 6.)	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
Operation	At the operate switch turns on, does the printer perform power-on initialization correctly ?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Does the printer work exactly with using the attached utility program?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
ROM Grade-up	What it the ROM version up-dated?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
Cleaning	Is any dust removed from the inside of the printer?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Is the exterior housing clean?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
Return to customer	Is the operate switch turned off?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Is the ribbon cartridge removed?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
Attached goods	Attachments (power cord, optional units, etc.) are inserted?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary

## 3.2 DISASSEMBLY AND ASSEMBLY

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- Before you disassemble or assemble the printer, be sure to read and follow the instructions in Section 3.1, "OVERVIEW."*
- Before you disassemble the printer, be sure to turn the printer power off and disconnect AC cable.*

This section describes how to disassemble the printer. See the APPENDIX for an exploded diagram of the printer. Use this diagram for simple disassembly procedures not described here. To assemble the printer, follow the disassembly instructions in this chapter in reverse. Any extra information you need to assemble printer components is provided in notes labeled "ASSEMBLING POINT." Adjustments required before assembly are described in notes labeled "ADJUSTMENT REQUIRED." Be sure to follow the instructions in these notes.

### 3.2.1 ROM Replacement



- ✔ It is best to remove the top cover before you tilt back the printer as described in the steps below. Refer to Section 3.2.3.1 for instructions on removing the top cover.
- ✔ If you tilt back the printer with the top cover attached, be careful not to put too much weight on the top cover or any other printer components.
- ✔ Spread a thick, soft cloth under the printer before you follow the steps below.
- ✔ Remove the ROM carefully to avoid damaging the board.
- ✔ Before you install a new ROM, check the INDEX mark on the socket to be sure the ROM is oriented correctly. Insert the ROM carefully to avoid damaging the ROM pins and the board.
- ✔ When transporting the printer a long distance, pack it using the original packing material.

Step 1: Tilt back the printer and lay it on its back. Hold the top cover closed if it is not removed.  
Step 2: Remove the CBB (M3x10) screw securing the ROM cover, remove the cover, and replace the ROM using the ROM holder.

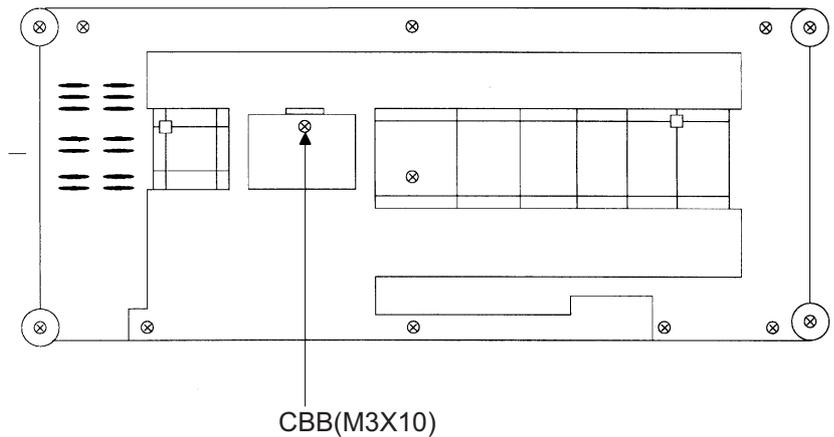
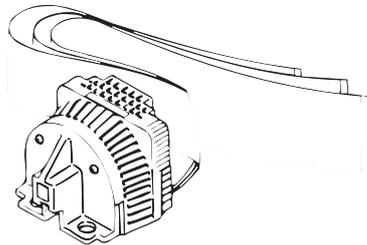


Figure 3-7. ROM Replacement

### 3.2.2 Printhead and Ribbon Mask Assembly Removal

The printhead can be changed without disassembling the entire unit.

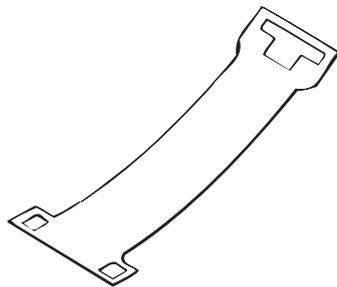
Use the exclusive printhead kit for printhead exchange on the DFX-8500. When you receive the kit, check that all of the following are included.



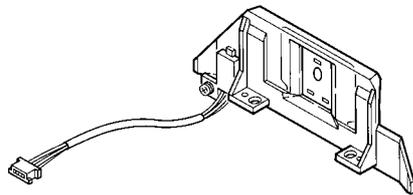
Printhead Unit



Oil (O-2)



Head Cable Protection Sheet



Ribbon Mask Assembly

**Figure 3-8. Printhead Kit**

The description hereafter is the same as the above instruction Manual, so you may refer to this section or to the Instruction Manual.



- ☑ When you remove the connector cover, be careful not to break the tabs.
- ☑ When you remove the printhead cable holder, be careful not to break the printhead holder latch. Use a slotted screwdriver if necessary.

Step 1: Open the top cover and remove the ribbon cartridge.

Step 2: Remove the two CBS (M3x8) screws securing the FPC cover to the bottom plate of the printer mechanism.

Step 3: Disconnect the three printhead cables and a ground cable from the FPC board on the bottom plate.

**Note 1. When disconnect the cables, hold the cable close to the connector.**

**Note 2. When disconnect the cable, hold the connector to prevent it from being pulled off the board.**

**Note 3. When disconnect the cable, pull it slowly and horizontally to the right, as viewed from the front side.**

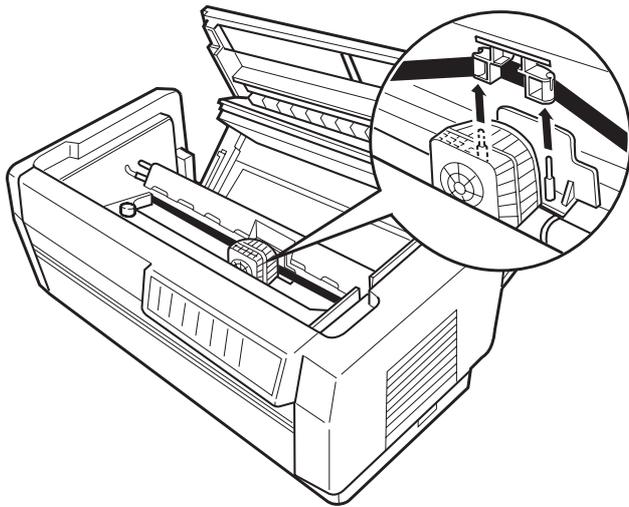


Figure 3-9. Ribbon Cartridge Removal

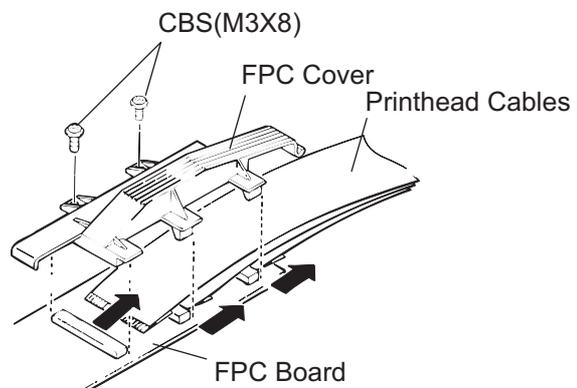


Figure 3-10. Head Cable Removal

Step 4: Unlock the two head cable cover latches by pressing them with your fingers, then remove the cover by sliding it to the right. Remove the cable protection sheet, too.

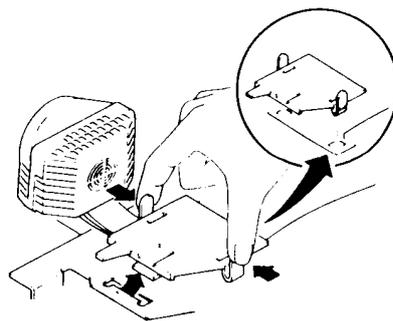
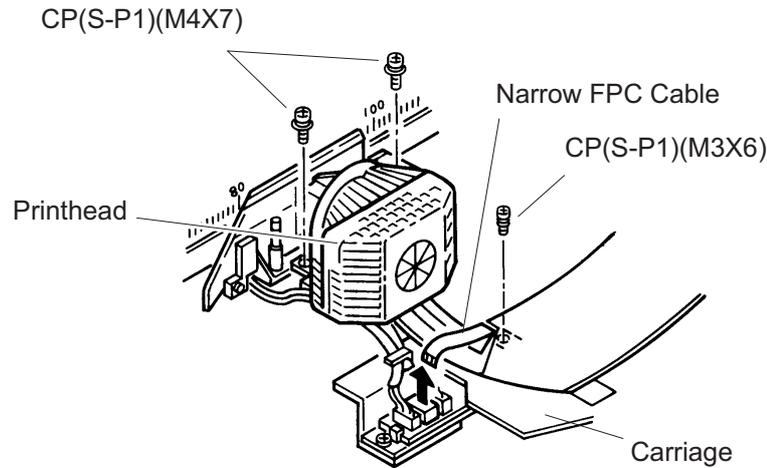


Figure 3-11. Head Cable Cover Removal

Step 5: Disconnect the narrow FPC cable from white connector (lock-type).

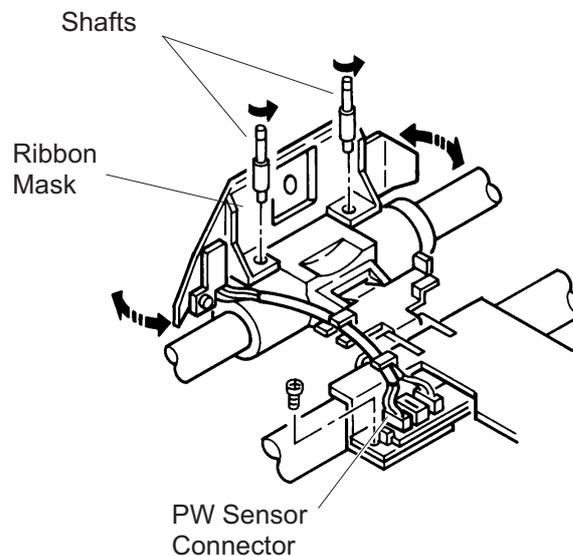
Step 6: Move the carriage to around 90<sup>th</sup> column, remove the two CP(S-P1)(M4X7) screws securing the printhead and remove the CP(S-P1)(M3X6) screw securing the ground FPC, then remove the printhead.



**Figure 3-12. Printhead Removal**

Step 7: Disconnect the white connector for the paper width (PW) sensor on the ribbon mask.

Step 8: Remove the two shafts securing the ribbon mask to the carriage using a hexagon head screw wrench, then remove the ribbon mask.



**Figure 3-13. Ribbon Mask Removal**

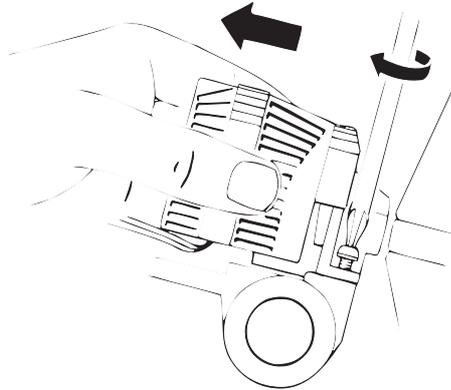
Step 9: Install the new printhead, ribbon mask, and cable protection sheet by following Steps 1 to 9 in the reverse order.

Step 10: Replace the ribbon mask with a new one. Set the cable of the paper width sensor as shown in Figure 3-13. After installation, check that the ribbon mask is a little loose.

Step 11: Install the new printhead (torque the screws to  $12 \pm 1$  kg cm). Replace the head cable protection sheet with a new one, then connect the head cables to the connector.

## ASSEMBLING POINT

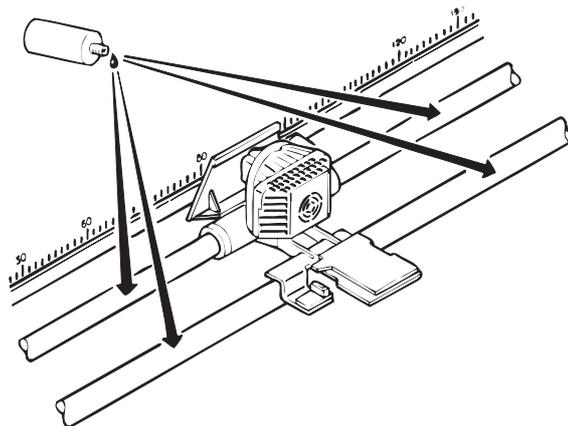
- *Confirm that the cables are connected correctly. (Refer to Figures 3-12 and 5-3..)*
- *Tighten the screws while pulling the printhead as shown below to secure the printhead firmly.*



**Figure 3-14. Printhead Installation**

Step 12: Install the cable cover and the FPC cover.

Step 13: Wipe off any stains from the carriage guide shaft, lubricate both ends of the carriage guide shaft with the included oil (0-2), and spread the oil over the shaft by moving the carriage manually.



**Figure 3-15. Lubricating to Carriage Guide Shafts**

## ADJUSTMENT REQUIRED

- *When you install the printhead, perform the platen gap motor value adjustment (ALPHA value write operation) described in Section 4.1.7).*

### 3.2.3 Housing Removal

This section describes how to remove the housing.

#### 3.2.3.1 Top Cover Removal



*Two people are required to remove the top cover; one person must hold the top cover while the other person removes the screws. If the top cover is not supported while the screws are removed, the weight of the top cover may damage the rear hinges.*

Step 1: Open the top cover.

Step 2: While someone supports the top cover, remove the four screws (two on the right and two on the left) securing the top cover to the hinges and remove the cover.

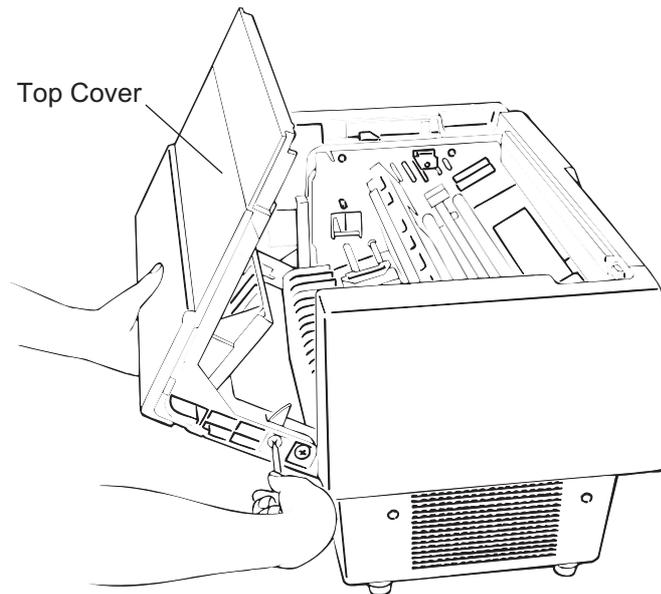


Figure 3-16. Top Cover Removal

### 3.2.3.2 Left, Right, and Front Covers Removal and Fuse Replacement

- Step 1: Remove the four CBB (M4x16) screws securing the left side cover and remove the cover.  
 Step 2: Remove the right side cover in the same way as you removed the left side cover. Also remove the four cables from the main switch on the right side cover.

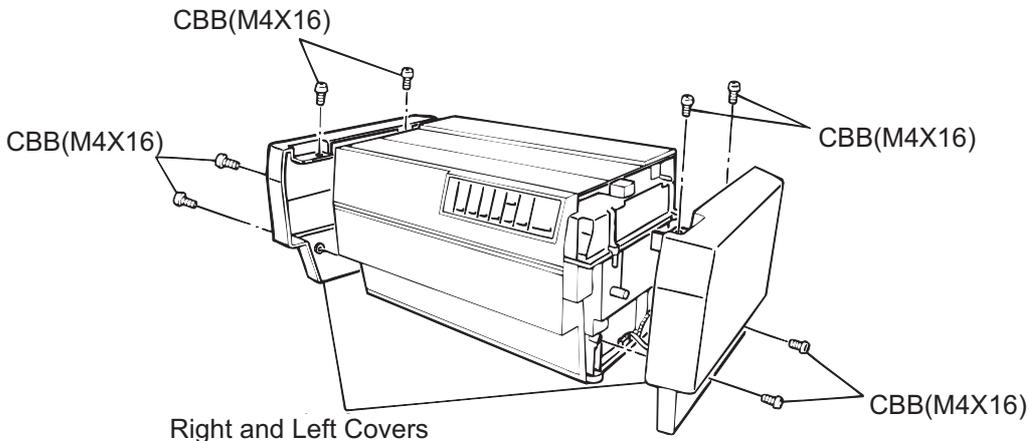


Figure 3-17. Left and Right Side Covers Removal

### ASSEMBLING POINT

- When you attach the right side cover, connect the cable from connector CN1 on the C204 power supply board unit and the cable from the AC inlet to the main switch on the right side cover, as shown below.

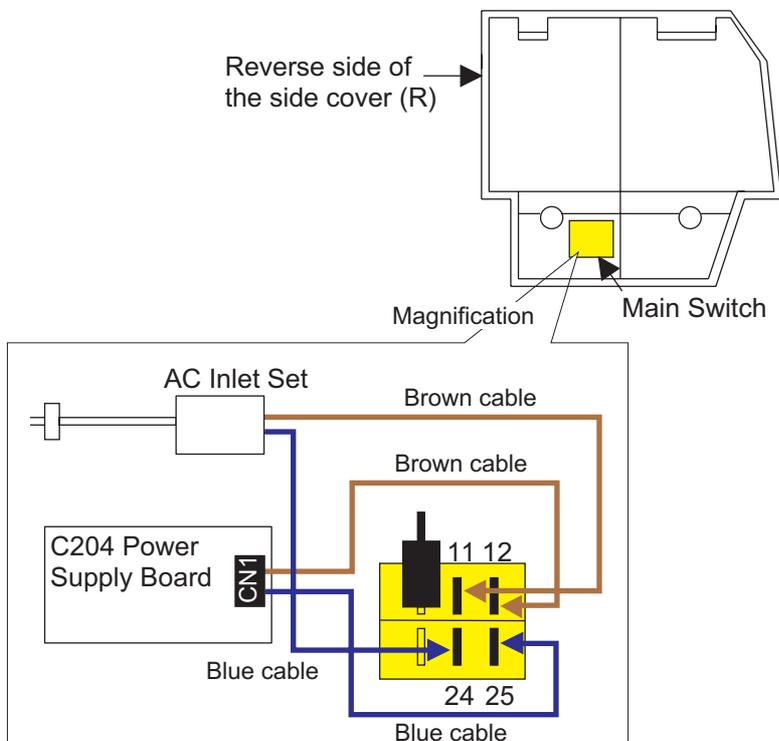
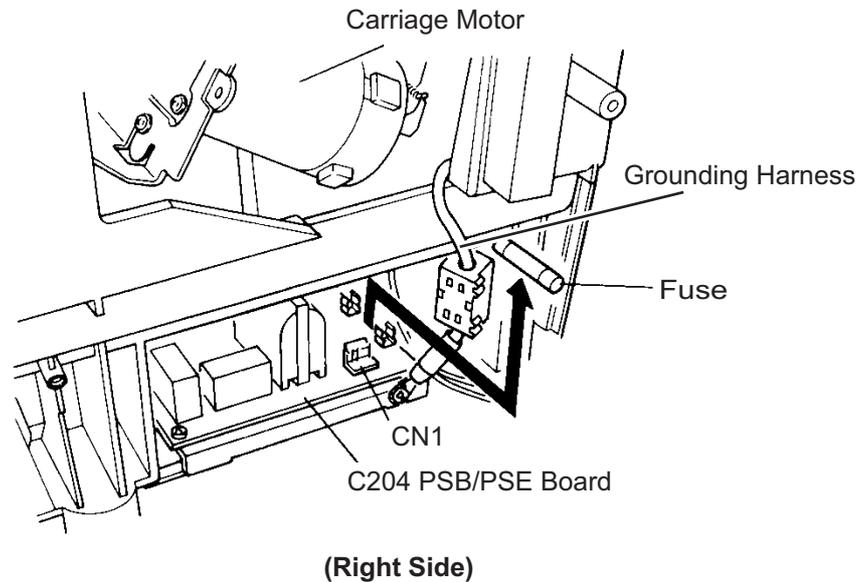


Figure 3-18. Cabling for the Main Switch

Step 3: After you remove the right side cover, you can replace the input fuse for the C204 power supply board unit.

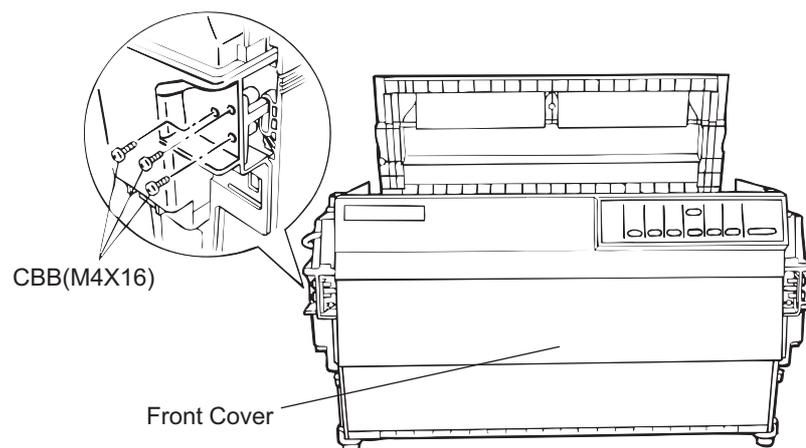
## ⚠ WARNING

☑ Make sure the new fuse meets the printer's AC power specifications.



**Figure 3-19. Fuse Removal**

Step 4: Remove the three CBB (M4x16) screws securing the left side of the front cover to the lower cover. Then remove the front cover along the left hinge.



**Figure 3-20. Front Cover Removal**

### 3.2.3.3 Front Panel Unit Removal

- Step 1: Remove the left and right side covers. (Refer to Section 3.2.3.2)
- Step 2: Open the top cover and disconnect connector CN5 (the panel unit connector).
- Step 3: Remove the two CBB (M4x16) screws from the front panel unit and remove the panel unit along with the panel connector cable.

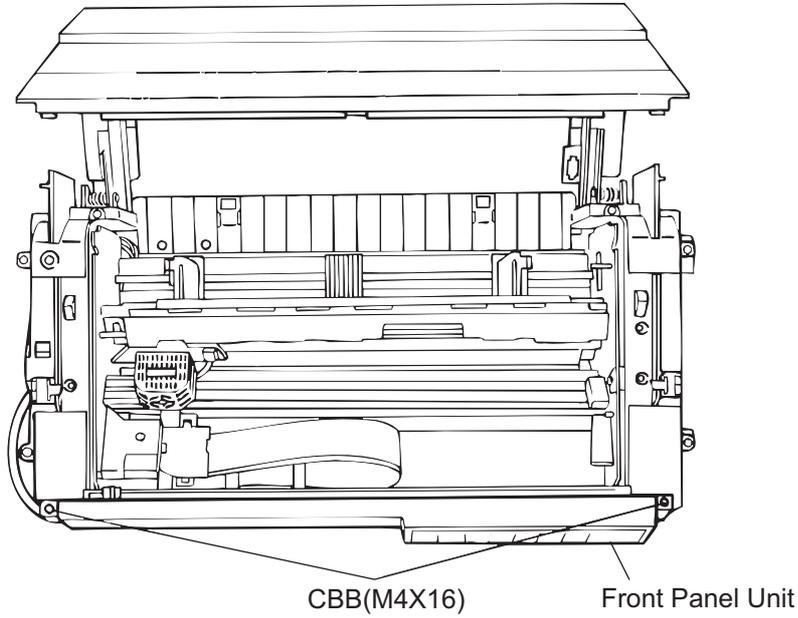


Figure 3-21. Front Panel Removal

### 3.2.3.4 Upper Case Removal

Step 1: Remove the front panel unit. (Refer to Section 3.2.3.3)

Step 2: Remove the six CBB (M4x16) screws, and two CBB (M3x10) screws from the upper case. Then remove the upper case.

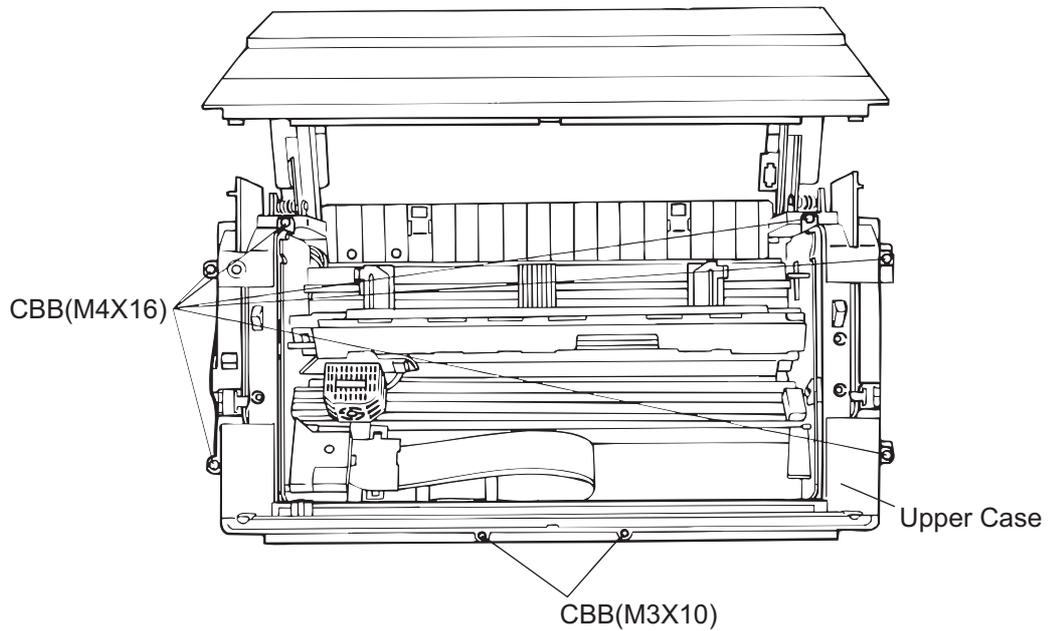


Figure 3-22. Upper Case Removal

### 3.2.4 Circuit Boards Removal

This section describes how to remove the circuit boards.

#### 3.2.4.1 Bottom Panel Assembly Removal



- ☑ It is best to remove the top cover before you tilt back the printer as described in the steps below. Refer to Section 3.2.3.1 for instructions on removing the top cover.
- ☑ If you tilt back the printer with the top cover attached, be careful not to put too much weight on the top cover or any other printer components.
- ☑ Spread a thick, soft cloth under the printer before you follow the steps below.
- ☑ When you attach the bottom panel, make sure the parallel interface cable latch is not caught between the lower case and bottom panel.

Step 1: Remove the left and right side covers. (Refer to Section 3.2.3.2)  
Step 2: On the right side of the printer mechanism, remove the CBS (O) screw securing the green and yellow earth cable and the earth plate together.

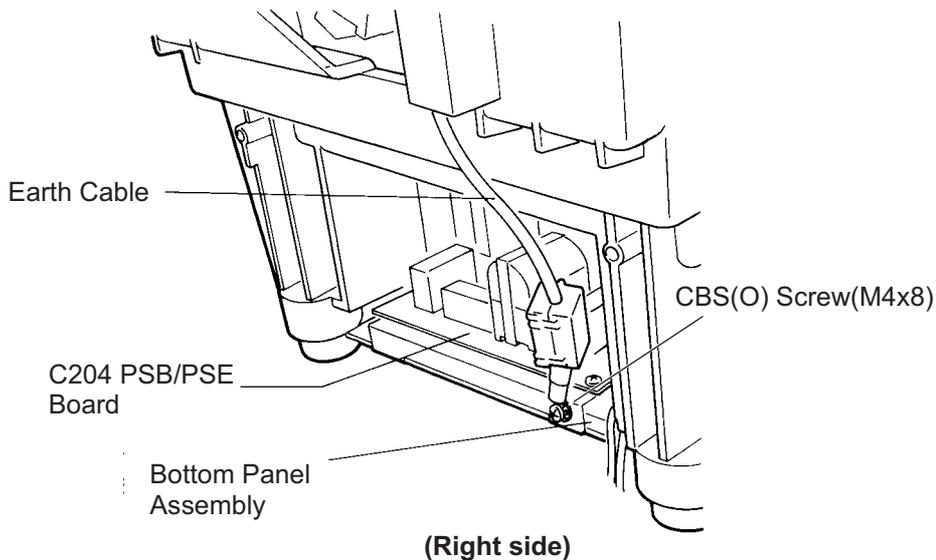


Figure 3-23. Connector and Earth Cable Removal (right side)

Step 3: From the left side, remove the two CPB(O)(M4X8) screws securing the green and yellow earth cables between the bottom plate of the printer mechanism and the earth on the bottom panel assembly.

Step 4: Disconnect the 6 connectors, (1) through (6) as shown in Figure 3-24.

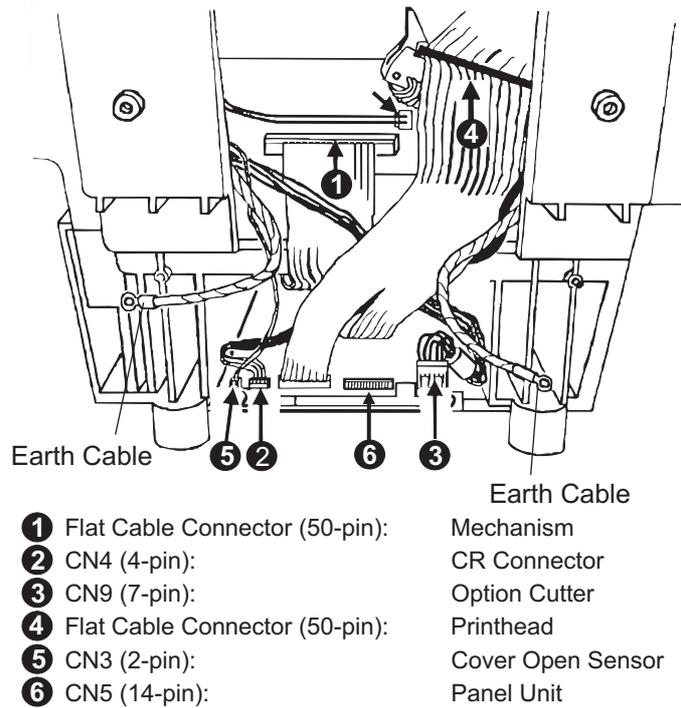


Figure 3-24. Connector and Earth Cable Removal (left side)

Step 5: Open the rear cover. Remove the four CBB (M3x12) screws and two CB(M3x12) screws securing the interface cover and remove the cover.

Step 6: Remove the 2 CB(M3x12) screws securing the optional interface cover and remove the cover.

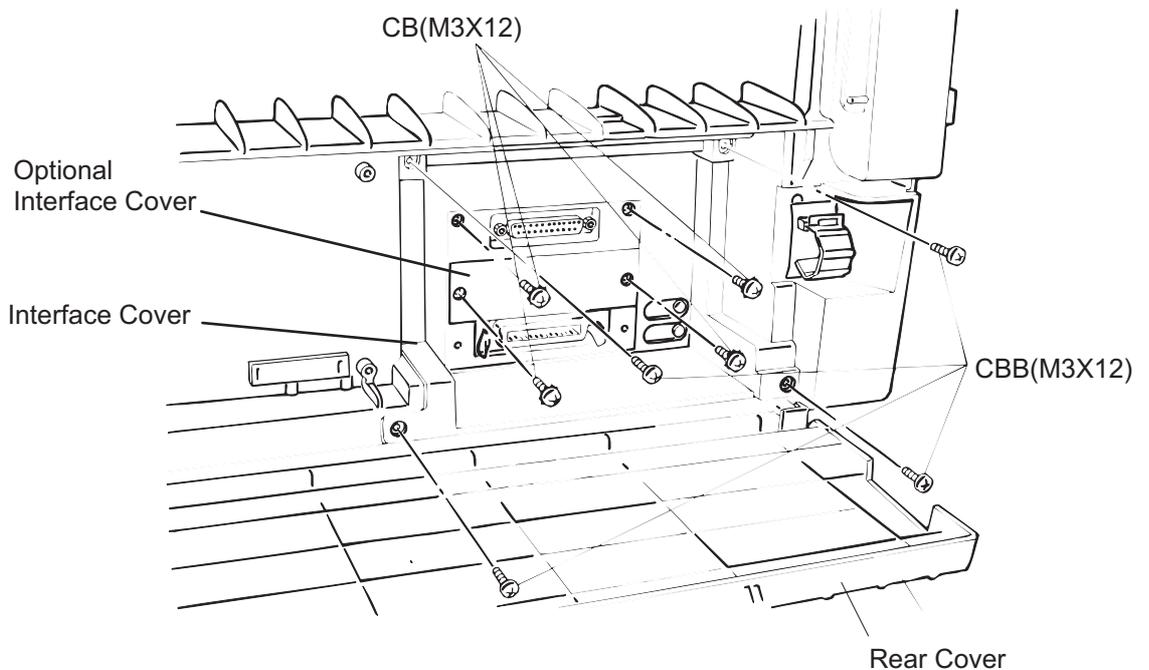
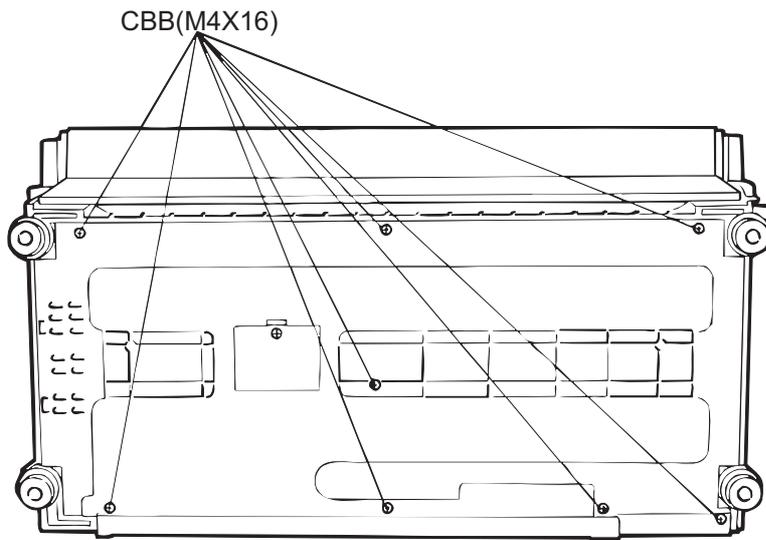


Figure 3-25. Interface Cover Removal

- Step 7: While supporting the top cover to protect it from scratches, tilt back the printer and lay it on its back.
- Step 8: Remove the eight CBB (M4x16) screws securing the bottom panel assembly, and slowly remove the bottom panel unit assembly.



**Figure 3-26. Bottom Panel Assembly Removal**

### 3.2.4.2 Cooling Fan and C204 Power Supply Board Unit Removal

Step 1: Remove the bottom panel assembly. (Refer to Section 3.2.4.1)

Step 2: If you need to remove the cooling fan, disconnect connector CN5 and remove the four CCN (M3x30) screws securing it, and remove the fan.

Step 3: Disconnect connectors CN2, CN3, and CN4.

Step 4: Remove the six CBB (M3x12) screws and CPN (O) (M3x8) screw securing the C204 power supply board unit and remove the board.

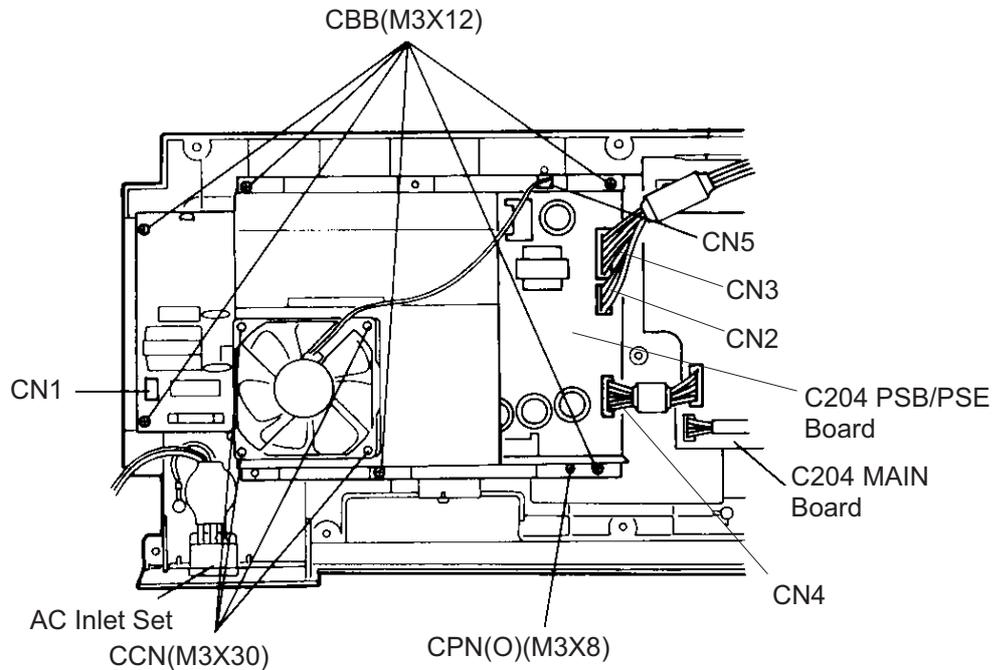


Figure 3-27. C204 PSE/PSB Board Removal

### 3.2.4.3 C204 SUB Board Unit Removal

- Step 1: Remove the bottom panel assembly. (Refer to Section 3.2.4.1)
- Step 2: Disconnect connectors CN15 and CN16 on the C204 MAIN board.
- Step 3: Remove the CBB (M3x8) screw and the CBB (M3x12) screw securing the C204 SUB board assembly and remove the board.

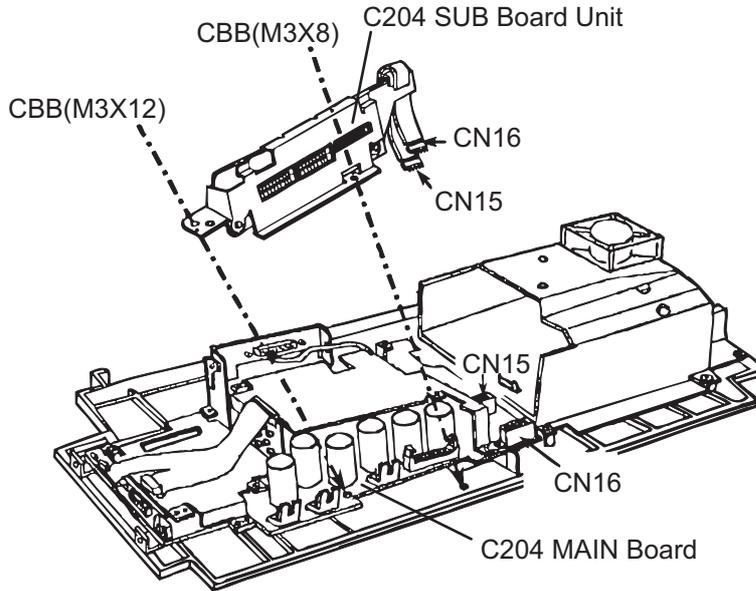


Figure 3-28. C204 SUB Board Unit Removal

### 3.2.4.4 C204 DRV-B and C204 DRV Board Units Removal

Step 1: Remove the bottom panel assembly. (Refer to Section 3.2.4.1)

Step 2: Disconnect connector CN3 and cable connector CN14 for the C204 DRV board.

Step 3: Disconnect connectors CN1 and CN2 on the C204 DRV-B board.

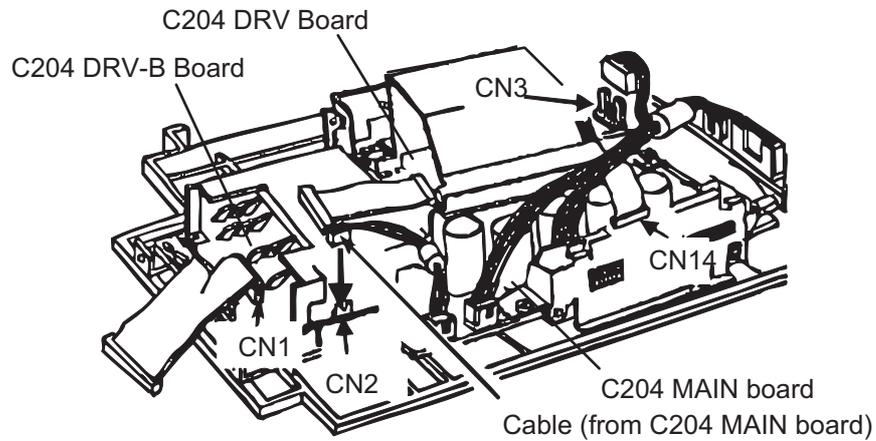


Figure 3-29. C204 DRV/DRV-B Boards Removal 1/2

Step 4: Remove the eight CBS (M3x8) screws securing the C204 DRV-B board and C204 DRV board via shielding plate respectively.

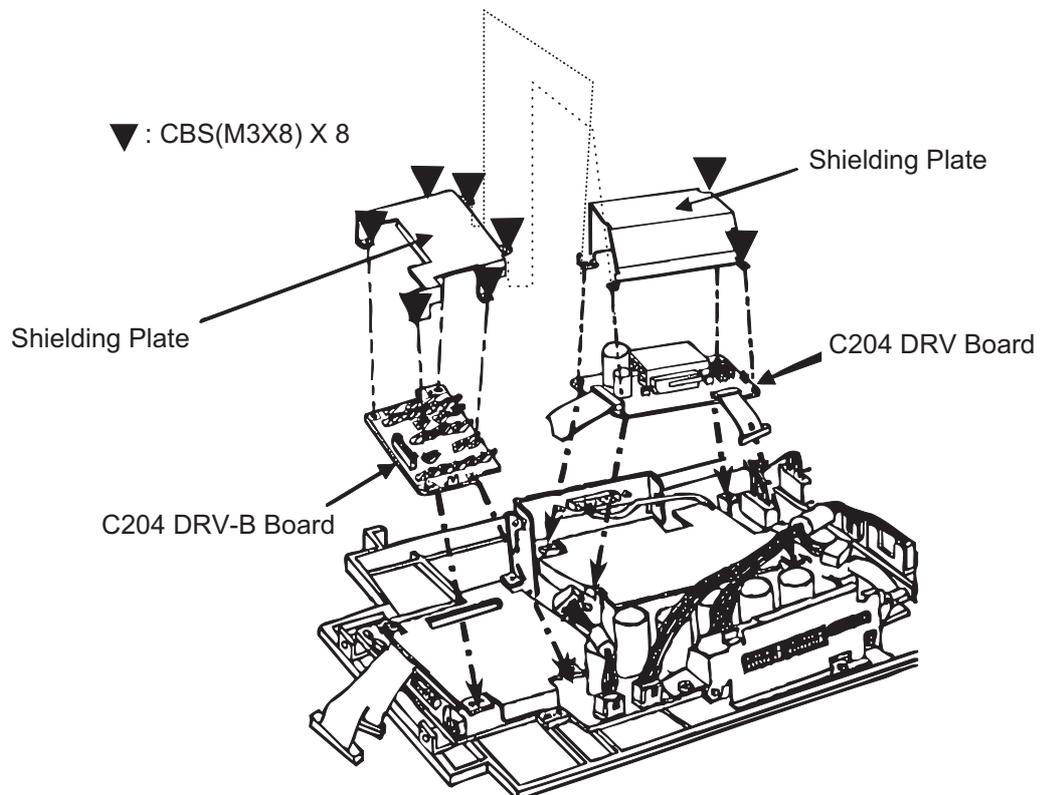


Figure 3-30. C204 DRV/DRV-B Boards Removal 2/2

### 3.2.4.5 C204 MAIN Board Unit Removal

- Step 1: Remove the bottom panel assembly. (Refer to Section 3.2.4.1)
- Step 2: Remove the C204 SUB board unit (Refer to Section 3.2.4.3.)
- Step 3: Remove the C204 DRV-B board and C204 DRV board units (Refer to Section 3.2.4.4.)
- Step 4: Disconnect connectors CN6, CN7, CN8, and CN10.

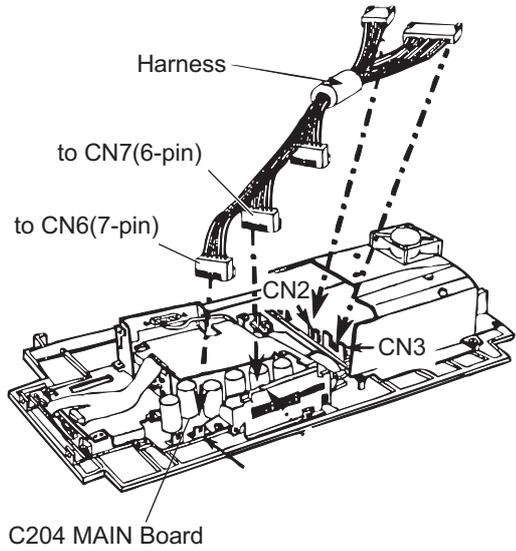


Figure 3-31. C204 MAIN Board Removal 1/4

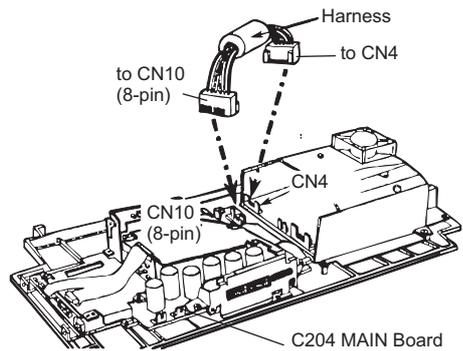


Figure 3-32. C204 MAIN Board Removal 2/4

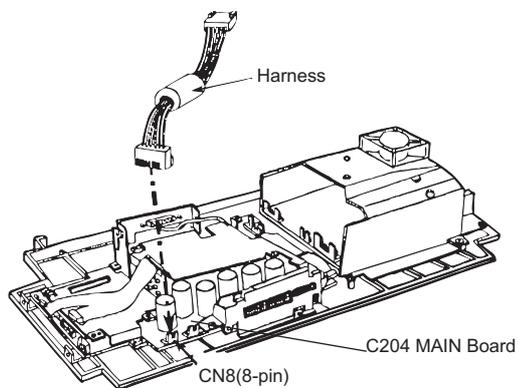


Figure 3-33. C204 MAIN Board Removal 3/4

Step 5: Remove the four CBB (M3x12) screws and two CBS (O) (M3x8) screws securing the C204 MAIN board unit and remove the board.

↓ : CBS(O)(M3X8) X 2

↓ : CBB(M3X12) X 4

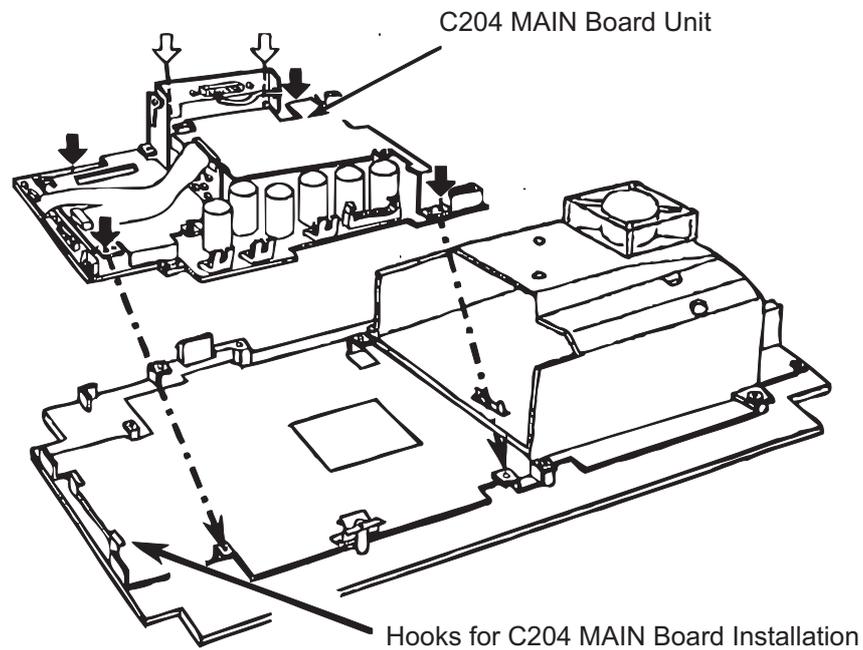


Figure 3-34. C204 MAIN Board Removal 4/4

### ADJUSTMENT REQUIRED

When you install the C204 MAIN board assembly, perform the following adjustments:

- Platen gap motor value (platen gap) adjustment (described in Section 4.1.7).
- Bidirectional printing adjustment (described in Section 4.1.8).

### 3.2.4.6 AC Inlet Removal

- Step 1: Remove the C204 power supply board assembly. (Refer to Section 3.2.4.2)
- Step 2: Remove the C204 MAIN board assembly. (Refer to Section 3.2.4.5)
- Step 3: Remove the three CBB (M3x8) screws and one CB (O) (M4x6) screw securing the grounding plate to the bottom panel assembly and remove the grounding plate.

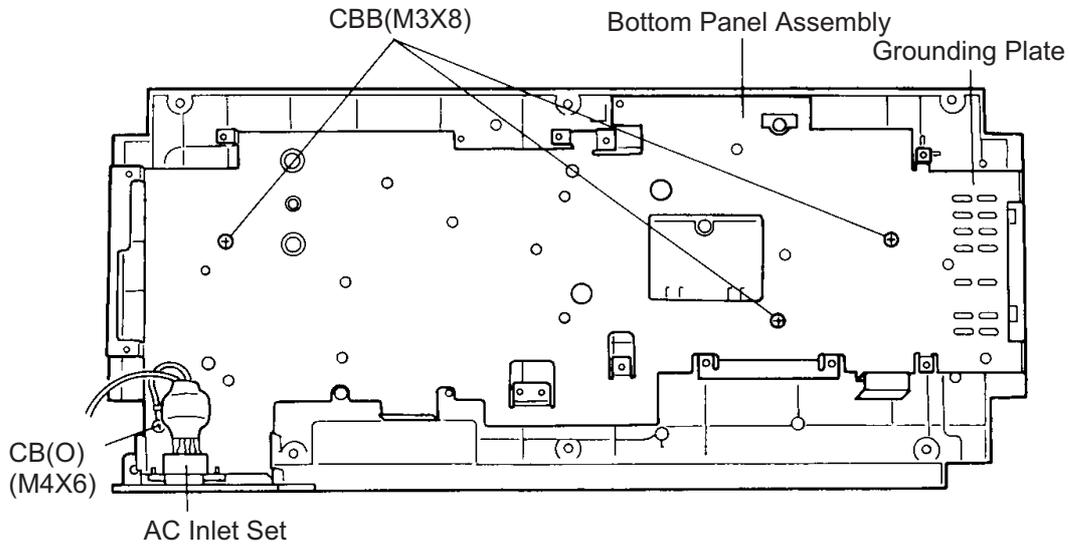


Figure 3-35. Grounding Plate Removal

- Step 4: Remove the two CFS (M3x10) screws securing the AC inlet to the grounding plate and remove the AC inlet.

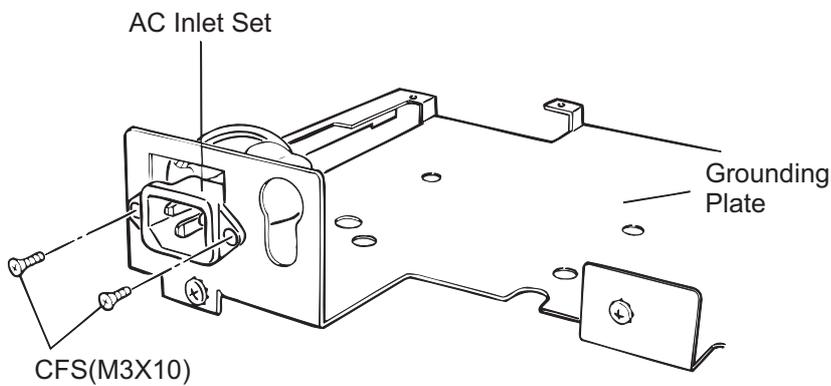


Figure 3-36. AC Inlet Removal

### 3.2.4.7 C204 PNL Board Removal

Step 1: Remove the front panel unit. (Refer to Section 3.2.3.3)

Step 2: Disconnect connectors CN1 and CN2 on the C204 PNL board.

Step 3: Remove the CBB (M4x10) screw securing the C204 PNL board to the front panel unit and remove the board.

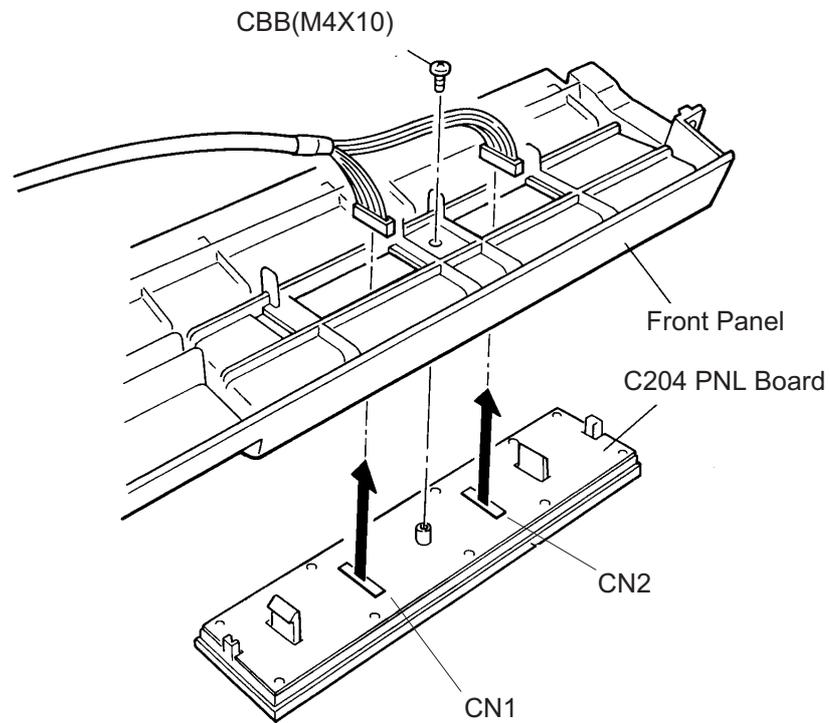


Figure 3-37. C204 PNL Board Removal

### 3.2.5 Interlock Switch and Cover Open Sensor Assembly Removal

- Step 1: Remove the upper case. (Refer to Section 3.2.3.4)
- Step 2: Disconnect the interlock switch cable and the cover open sensor cable from the junction board respectively.

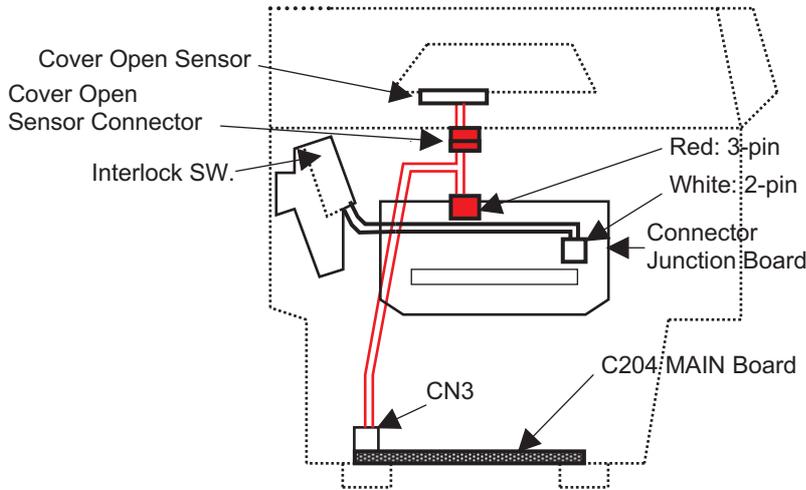


Figure 3-38. Interlock Switch Assembly Removal

- Step 3: Remove the CBB (M4x10) screw securing the interlock switch assembly to the lower case, and remove it.
- Step 4: Remove the CBB (M3x10) screw securing the cover open sensor to the upper case, and remove it.

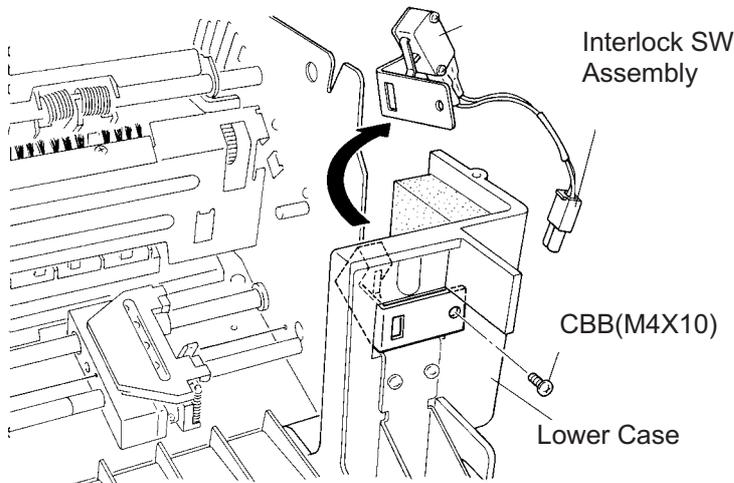


Figure 3-39. Interlock Switch Assembly Removal

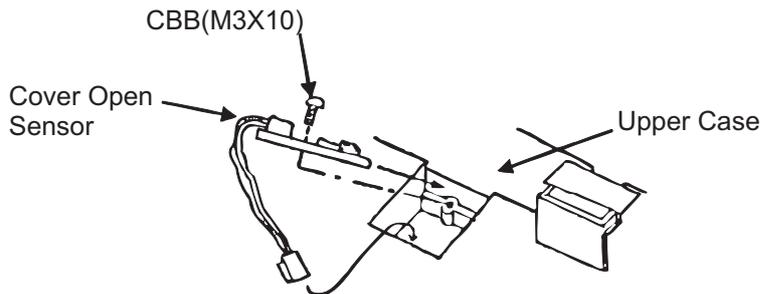


Figure 3-40. Interlock Switch and Cover Open Sensor Removal

### 3.2.6 Printer Mechanism Removal

This section describes how to remove and disassemble the printer mechanism. Before following the steps in this section, remove the printer mechanism from the printer as described in Section 3.2.6.



*Because the printer mechanism is large and heavy, you must be careful when you remove it. When you lift or lower the printer mechanism, follow these precautions:*

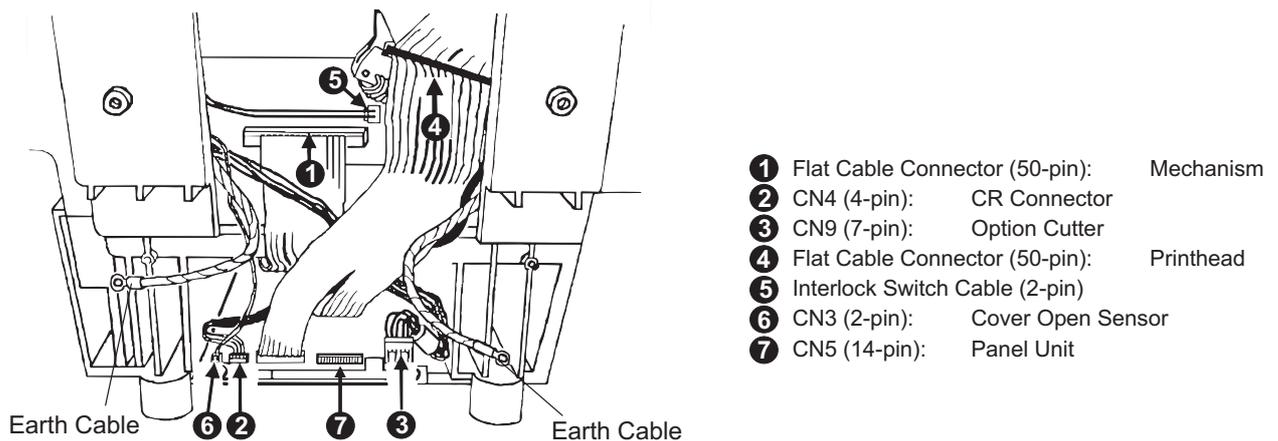
- ☑ *Two people are required to remove or install the printer mechanism.*
- ☑ *Use the lift handles (#E656, part number B765111001) designed for lifting or lowering the printer mechanism when you remove or install it.*
- ☑ *To avoid straining your waist, hands, or feet, place the printer on a low table before following the steps below.*

Step 1: Remove the upper case. (Refer to Section 3.2.3.4.)

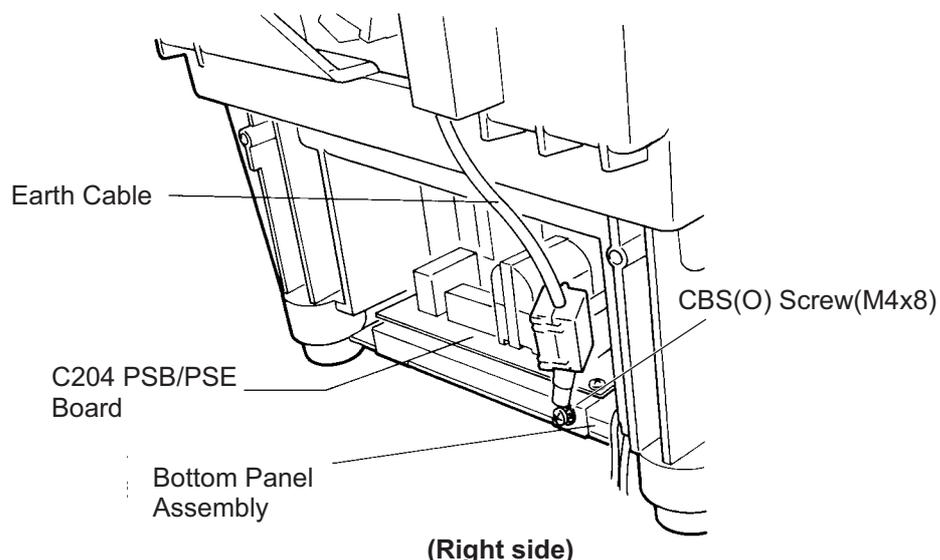
Step 2: Remove the interlock switch assembly. (Refer to Section 3.2.5)

Step 3: Remove the two CBS (O) (M4x8) screws securing the green and yellow earth cables to the grounding plate. Then disconnect connectors (1) through (4) as shown in Figure 3-41. (Ensure all connectors (1) through (7) indicated in the figure are disconnected.)

Step 4: Remove the CBS (O) (M4x8) screw securing the earth cable as shown in Figure 3-42.



**Figure 3-41. Connector Removal (left side)**



**Figure 3-42. Connector Removal (right side)**

Step 5: Remove the four screws securing the printer mechanism to the lower case.

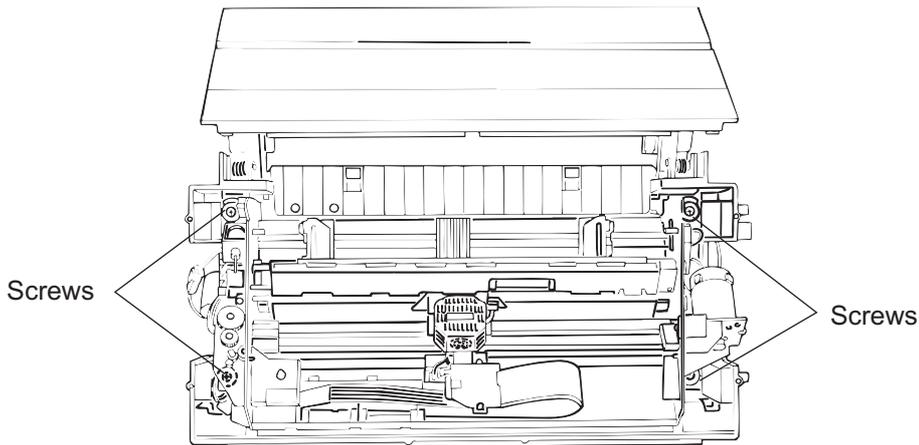


Figure 3-43. Printer Mechanism Removal 1/2

Step 6: Install the lift handles from the inside of the printer mechanism. Insert each handle through the two holes in the side frames of the printer mechanism. Then slowly lift up the printer mechanism using the handles and remove it from the lower case.

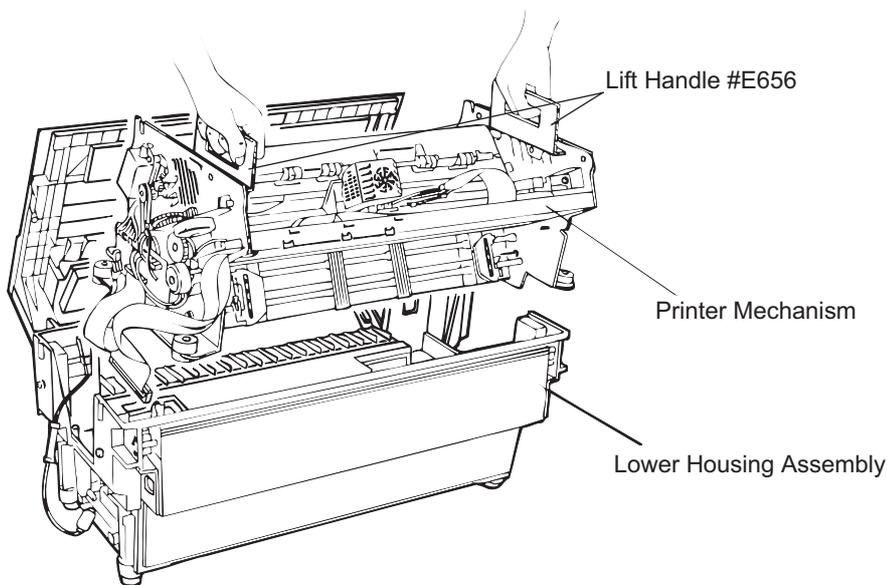


Figure 3-44. Printer Mechanism Removal 2/2

**ASSEMBLING POINT**

When you install the printer mechanism, route the cables as shown in Figures 3-41 and 3-42. Make sure the cables do not get caught between the printer mechanism and lower case.

**ADJUSTMENT REQUIRED**

When you install the printer mechanism, perform the following adjustments:

- Platen gap motor value (platen gap) adjustment (described in Section 4.1.7)
- Bidirectional printing adjustment (described in Section 4.1.8)

### 3.2.6.1 Fan Removal

- Step 1: Remove the upper case unit. (Refer to Section 3.2.3.4.)  
Step 2: Remove the right cover. (Refer to Section 3.2.3.2.)  
Step 3: Disconnect the connector for the fan from the relay connector.  
Step 4: Remove the CP(O) screw securing the fan duct to the left frame and the CC screw securing the fan and the fan duct to the shaft on the left frame. Then remove the fan along with the fan duct.

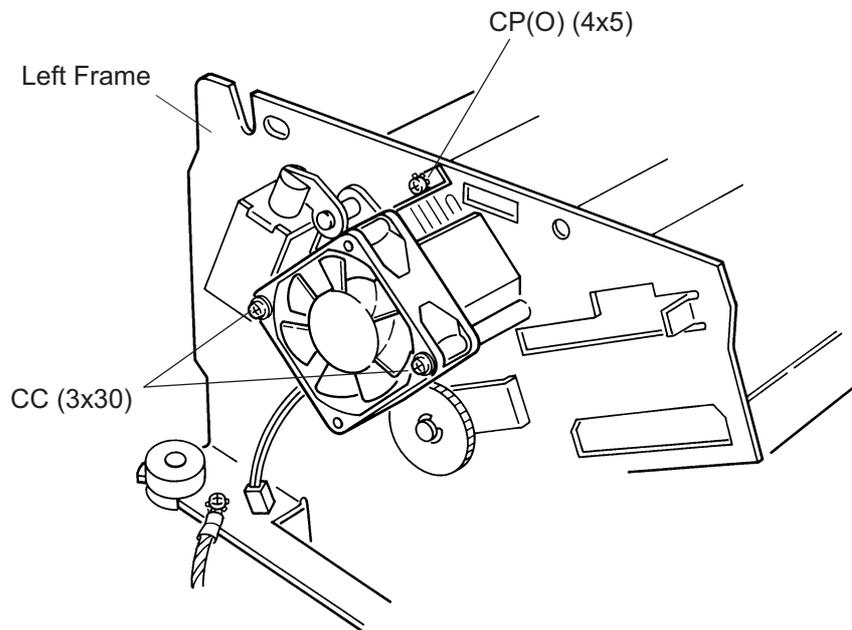


Figure 3-45. Fan Removal

### 3.2.6.2 Ribbon Feed Change Lever Unit Removal

- Step 1: Release the three hooks securing the ribbon feed gear cover to the ribbon feed motor frame and remove the cover and the ribbon feed gear.
- Step 2: Disconnect the three connectors for the ribbon feed motor, tractor select sensor, and the ribbon jam sensor from the connector junction board, as shown in Figure 3-47 and Figure 3-48.
- Step 3: Remove the head dumper from the left side frame.
- Step 4: Remove the fan on the left frame. (Refer to Section 3.2.6.1.)

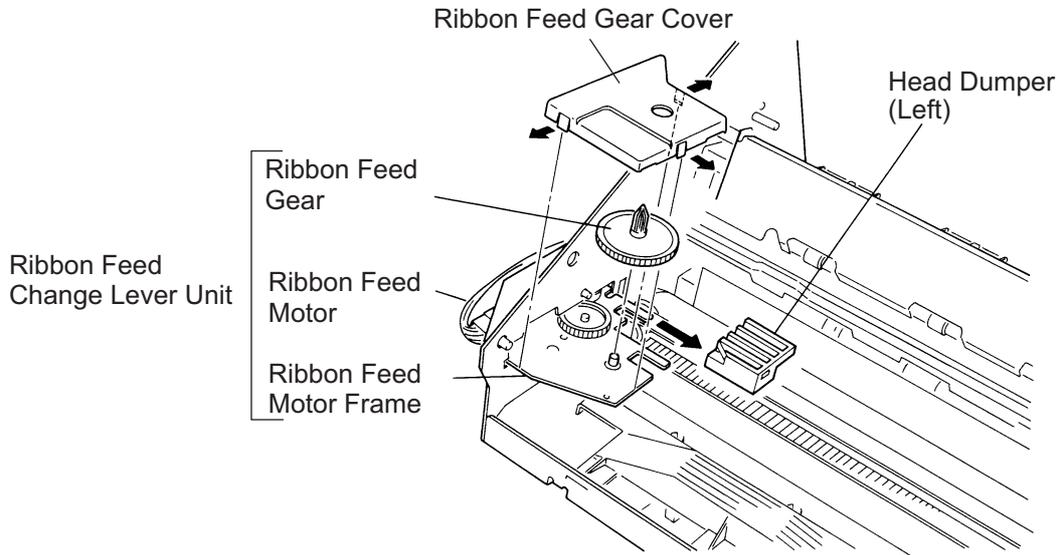


Figure 3-46. Ribbon Feed Change Lever Unit Removal (1/2)

- Step 5: Remove the two CBS (M3x6) screw securing the ribbon feed change lever unit to the left side frame, then remove the ribbon feed change lever unit.

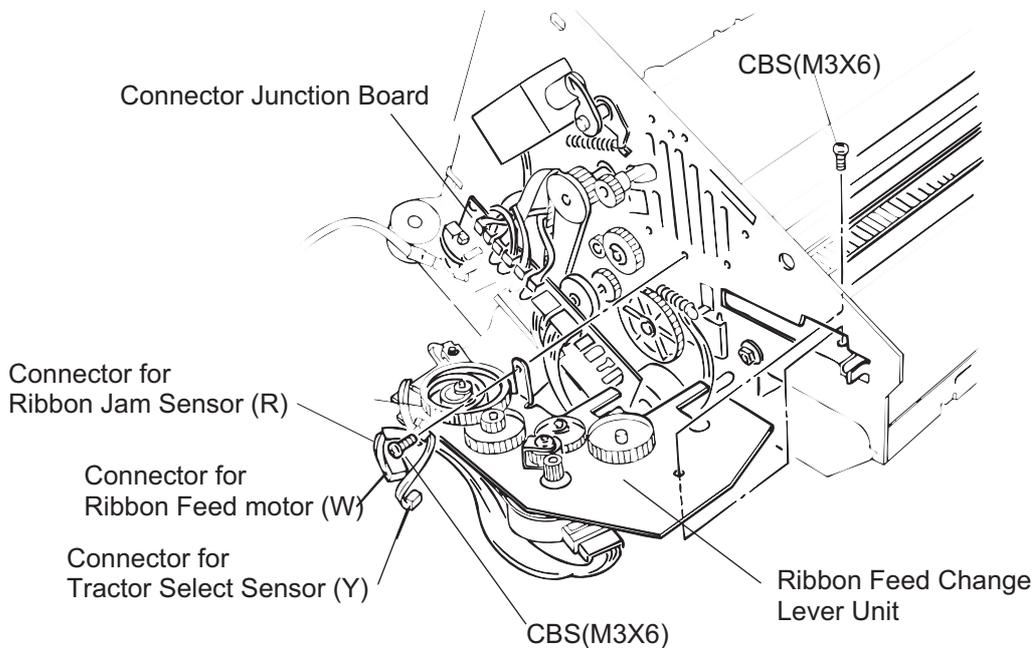


Figure 3-47. Ribbon Feed Change Lever Unit Removal (2/2)

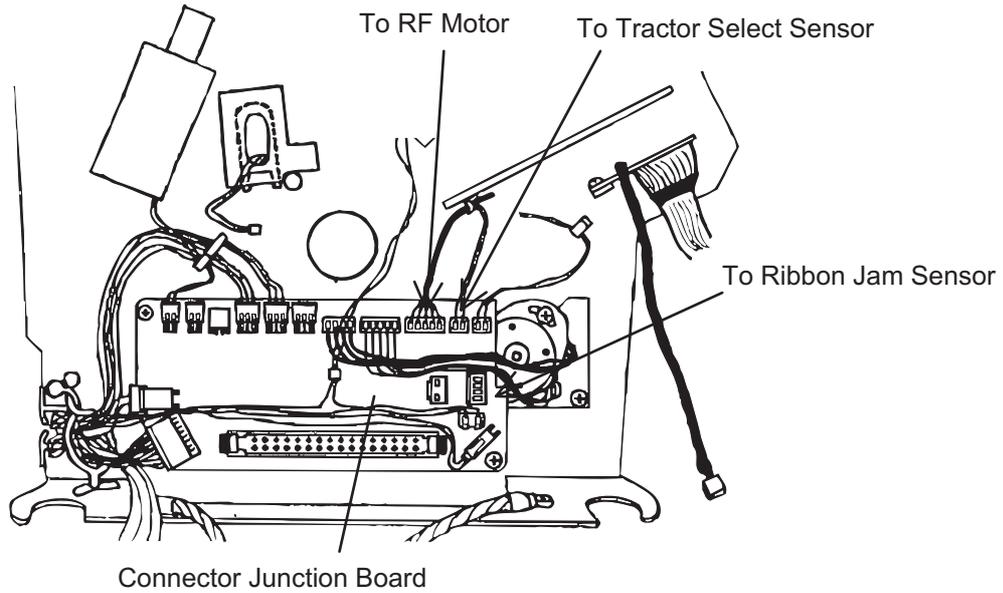


Figure 3-48. Removing Connectors

**ASSEMBLING POINT**

*When you install the ribbon feed change lever unit, join the tip of the tractor select lever and the tractor select gear holder correctly. (Refer to Figure 2-12.)*

### 3.2.6.3 Tractor Select Lever (Upper and Lower) Assembly Disassembly

This section describes how to disassemble the tractor select lever assembly, including how to remove the ribbon feed motor and tractor select sensor.

- Step 1: Remove the ribbon feed change lever unit. (Refer to Section 3.2.6.2.)
- Step 2: Remove the two CP(S-P1)(M3x6) screws, leaf springs, and washers securing the ribbon feed motor to the ribbon feed motor frame and remove the motor.
- Step 3: Remove the E ring (# 3) securing the upper/lower tractor select levers and remove the levers.
- Step 4: Remove the E ring (# 3) securing the tractor select cam and remove the cam.
- Step 5: Remove the CPS(P1)(M2x10) screw securing the tractor select sensor and remove the sensor.
- Step 6: Using wire cutters, cut the wire band securing the ribbon feed motor and tractor select sensor cables to the ribbon feed motor frame.

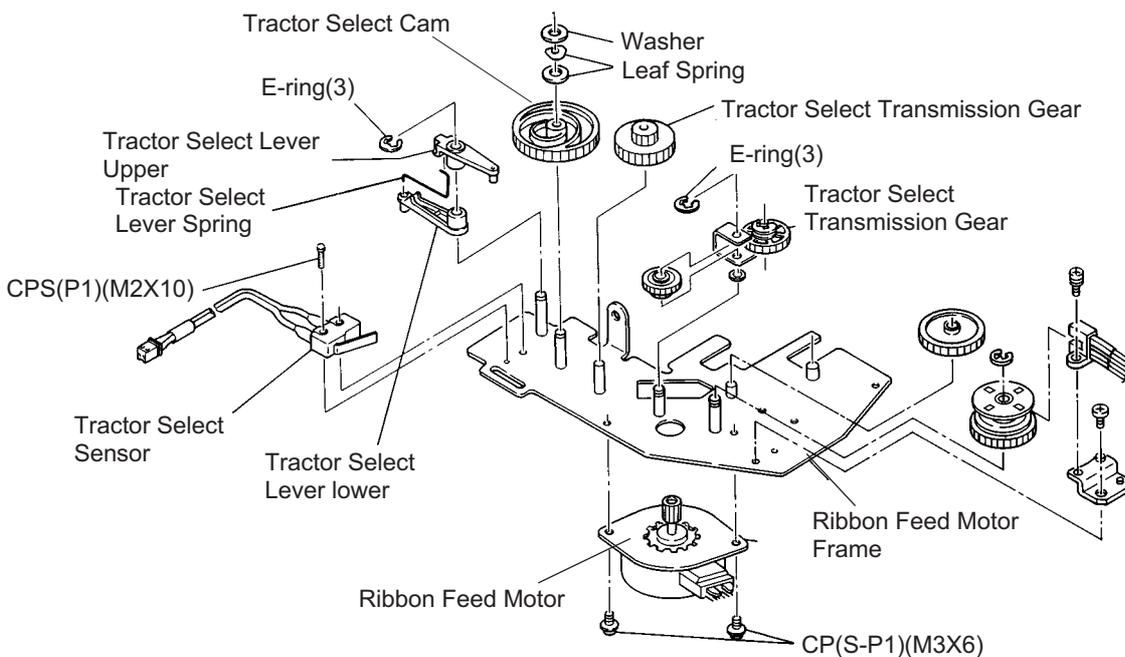


Figure 3-49. Tractor Select Lever Disassembly

### ASSEMBLING POINT

- Attach the tractor select levers to the tractor select cam as shown in Figure 3-50.

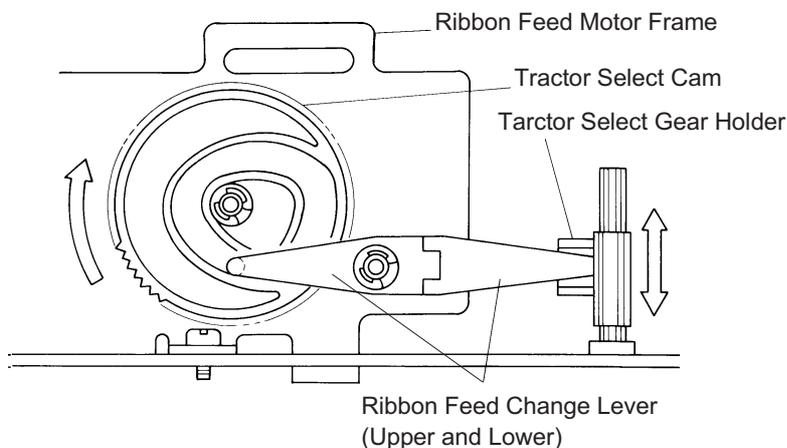


Figure 3-50. Tractor Select Lever Installation

### 3.2.6.4 Ribbon Jam Sensor Removal

Step 1: Remove the right cover. (Refer to Section 3.2.3.2)

Step 2: Disconnect the connector for the sensor from the connector junction board.

Step 3: Remove the CP(S-P1) (M3x6) screw securing the sensor to the bracket, and remove the sensor.

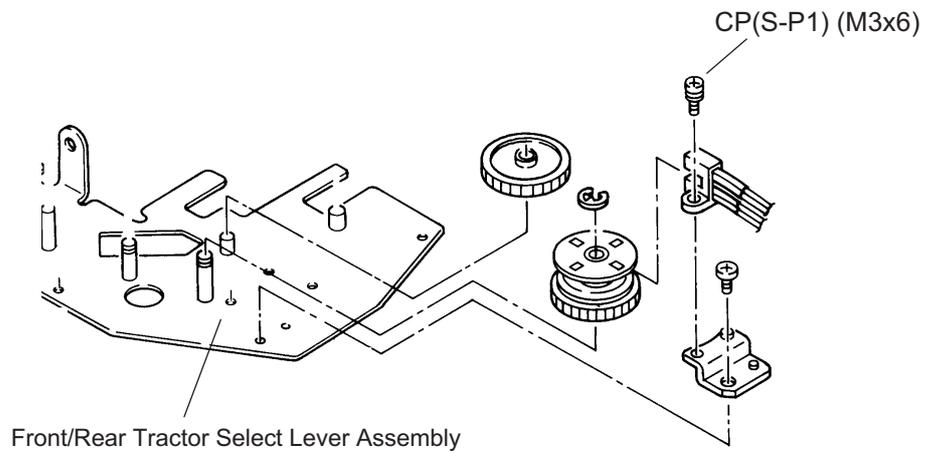


Figure 3-51. Ribbon Jam Sensor Removal

### 3.2.6.5 Connector Junction Board Assembly and FPC Board Assembly Removal

This section describes how to remove the connector junction board assembly and FPC board assembly.

- Step 1: Remove the left side cover. (Refer to Section 3.2.3.2)
- Step 2: Disconnect all the cables from the connector junction board assembly. Remove the two CP (S-P1) (M3x6) screws securing the connector junction board assembly to the printer mechanism and then remove the connector junction board assembly.
- Step 3: Remove the front/rear tractor select lever assembly. (Refer to Section 3.2.6.2)
- Step 4: Disconnect the connector for the CR sensor (encoder) from the FPC board assembly.
- Step 5: Remove the 2 CBS (M3x8) screws securing the FPC cover and remove the cover (Refer to Figure 3-10). Then remove the CPS(P-1) (M3x6) screw securing the FPC board assembly to the printer mechanism and remove the FPC board assembly.

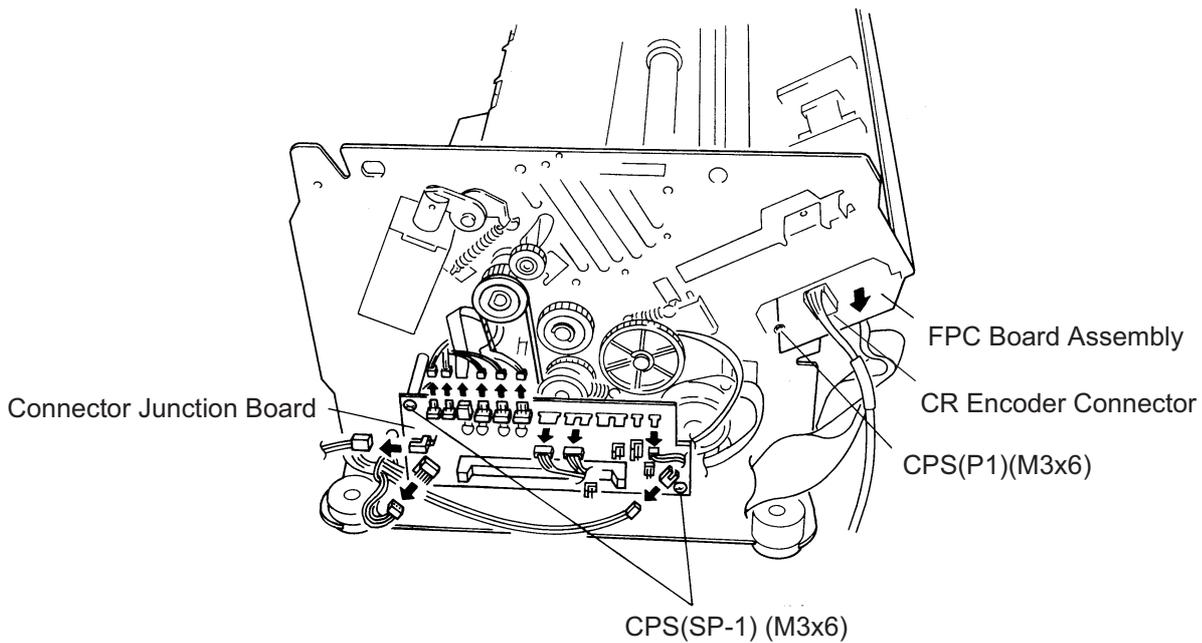


Figure 3-52. Connector Junction Board Removal

#### ASSEMBLING POINT

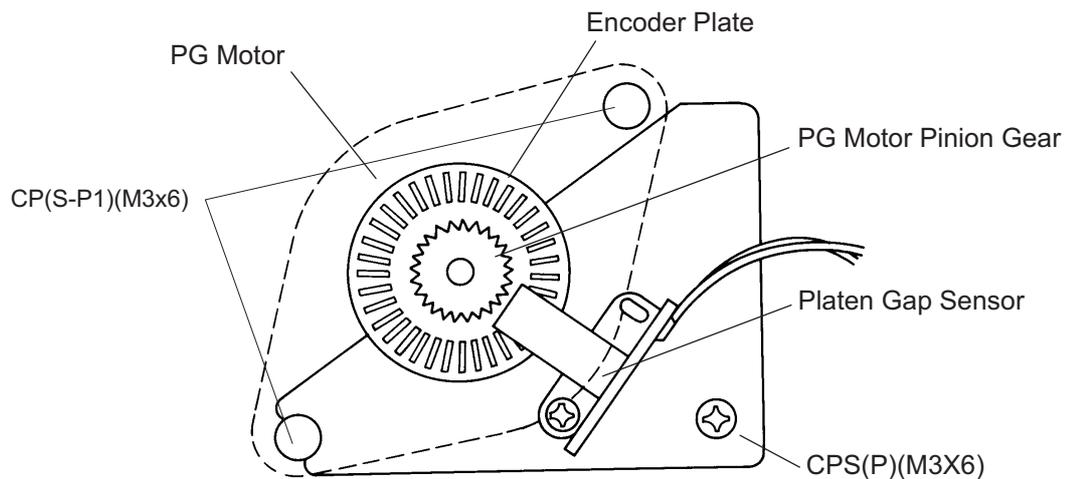
*When you connect the cables to the connector junction board assembly, note that the matching connectors have the same color and number of pins (Refer to APPENDIX Figure A-15.).*

## 3.2.6.6 PG Sensor and PG Motor Removal

**CAUTION**

*When you remove or install the PG sensor, be careful not to bend the PG motor encoder plate.*

- Step 1: Remove the connector junction board assembly. (Refer to Section 3.2.6.5)  
 Step 2: Remove the CBS screw (3X6) securing the PG sensor unit to the left frame. Then take out the unit to the front and remove it.  
 Step 3: Remove the screw securing the PG sensor to the unit, and remove the sensor.  
 Step 4: Remove two CP (S-P1) (M3x6) screws securing the PG motor and remove the motor.



**Figure 3-53. PG Sensor and PG Motor Removal**

**ASSEMBLING POINT**

- *When you install the PG motor, make sure the backlash between the PG motor and PG motor transmission gear is between 0.05 and 0.15 mm (almost no backlash).*
- *When you install the PG sensor unit, align the C-cut portion of the unit with the lower shaft securing the PG motor to the frame.*

**ADJUSTMENT REQUIRED**

*When you install the PG sensor or PG motor, perform the platen gap motor value (platen gap) adjustment, as described in Section 4.1.7.*

### 3.2.6.7 Plunger and Paper Bail Assembly Removal

This section describes how to remove the plunger (loading solenoid) and paper bail assembly.

- Step 1: Disconnect the black, 2-pin plunger connector from the connector junction board assembly, and remove the plunger cable from the connector junction board assembly.
- Step 2: Remove the two CP(S-P1) (M3x6) screws securing the plunger to the left side frame and remove the plunger.
- Step 3: Remove the iron core of the plunger from the paper bail shaft.

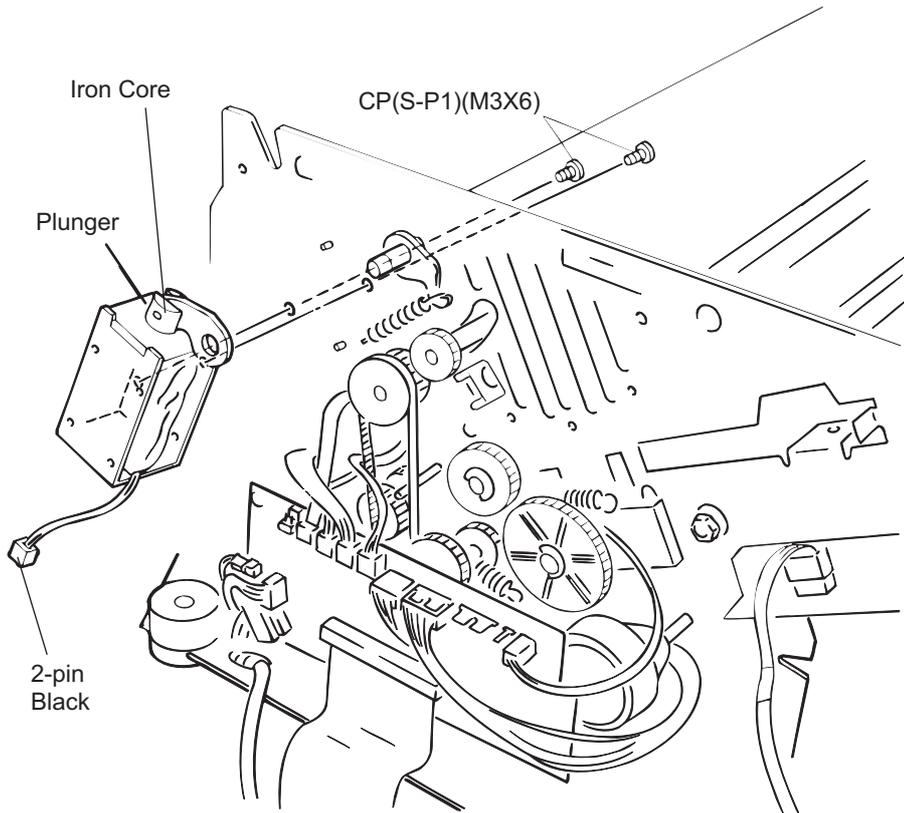
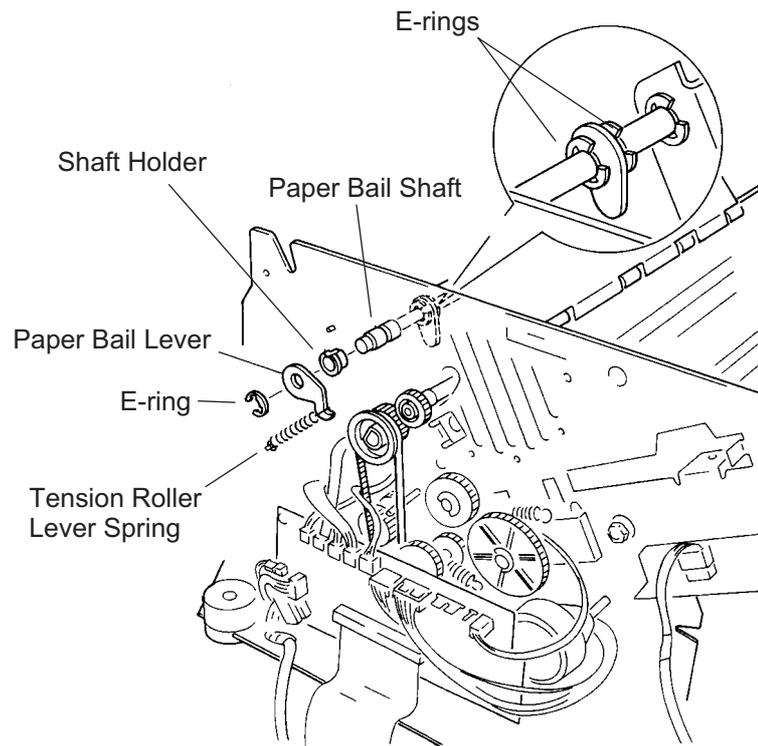


Figure 3-54. Plunger Removal

Step 4: Remove the left tension roller lever spring.

Step 5: Remove the E-ring (6) securing the paper bail shaft to the left frame and remove the platen roller shaft holder and paper bail lever.



**Figure 3-55. Paper Bail Assembly Removal 1/2**

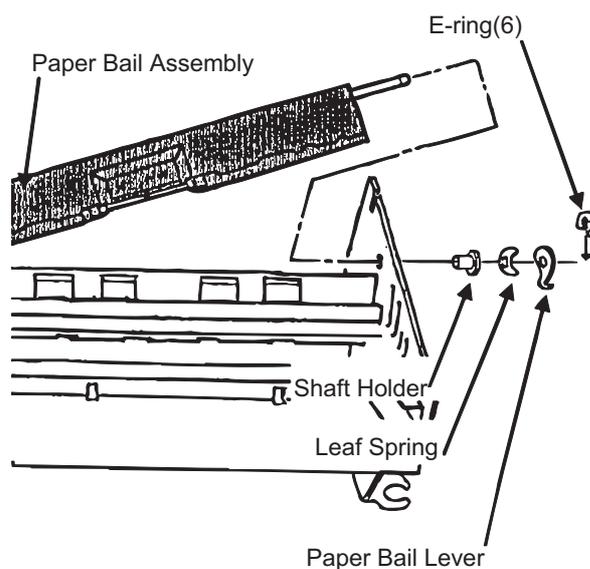
Step 6: Disconnect 2 fan harnesses and remove 2 screws (CPS-P1) securing the CR fan duct. Then remove the CR fan duct along with the CR fan. (Refer to Section 3.2.6.1.)

Step 7: Remove the right tension roller lever spring.

Step 8: Remove 2 E-rings to release the release tension lever at the inner side of the left frame.

Step 9: Remove the E-ring (6) at the right end of the paper bail shaft. Then remove the paper bail lever, leaf spring and shaft holder.

Step 10: Slide the shaft left to release the right end of the shaft from the right frame. Then lift up the shaft by the right end and remove it along with the release tension lever.



**Figure 3-56. Paper Bail Assembly Removal 2/2**

### 3.2.6.8 Upper Paper Guide and Top PE Sensor Removal

Step 1: Remove the paper bail assembly. (Refer to Section 3.2.6.7)

Step 2: Disconnect the red, 3-pin, top PE sensor connector from the connector junction board assembly.

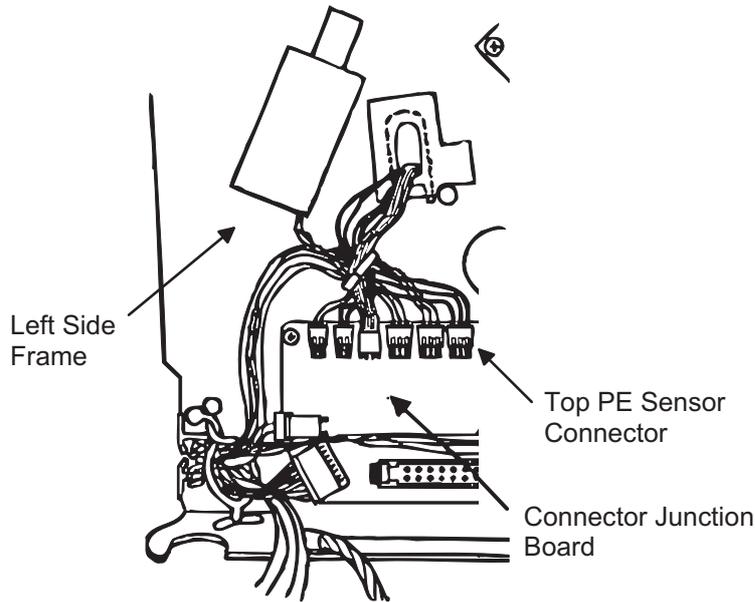


Figure 3-57. Top PE Sensor Connector Removal

Step 3: Remove the two CBS (M4x6) screws securing the upper paper guide to both frames and remove the paper guide.

Step 4: Remove the two CPS(SP) (M3x8) screws securing the top PE sensor to the upper paper guide and remove the sensor.

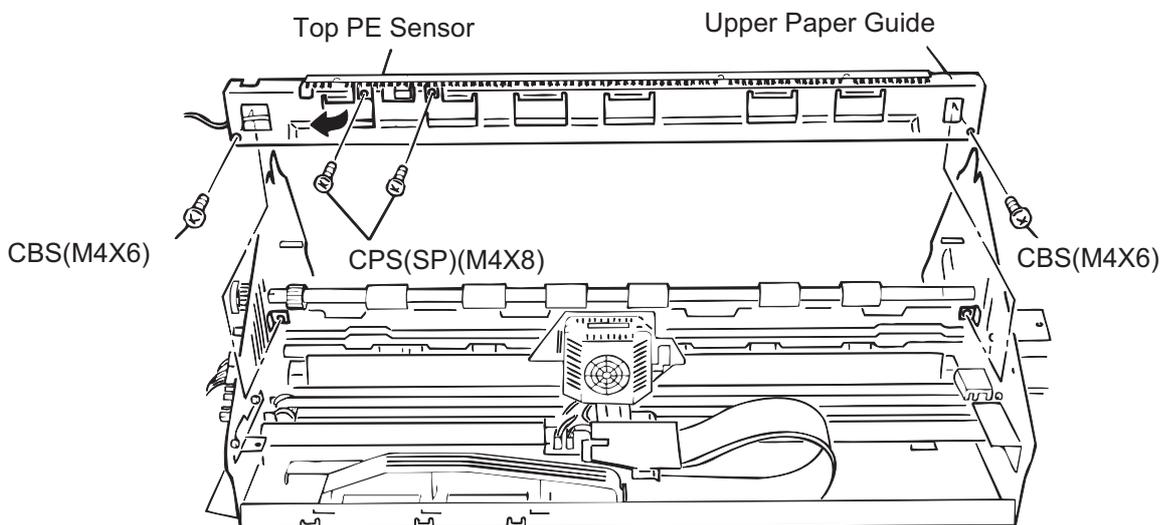


Figure 3-58. Top PE Sensor Removal

### 3.2.6.9 Tension Roller Shaft Removal

This section describes how to remove the tension roller shaft. It is better to remove the tension roller shaft with the paper bail assembly removed; however, removing it is not required. (Refer to Section 3.2.6.7.) for instructions on how to remove the paper bail assembly.)

- Step 1: Remove the connector junction board assembly. (Refer to Section 3.2.6.5.)
- Step 2: Remove the paper bail assembly. (Refer to Section 3.2.6.7.)
- Step 3: While pushing the tension pulley to the front, remove the CR timing belt.
- Step 4: Remove the upper paper guide. (Refer to Section 3.2.6.8.)
- Step 5: Using tweezers, unlock the locking tab of the tension roller gear at the left end of the tension roller shaft, and remove the gear.
- Step 6: Remove the E-ring (6) on the left end of the tension roller shaft and remove the shaft holder.

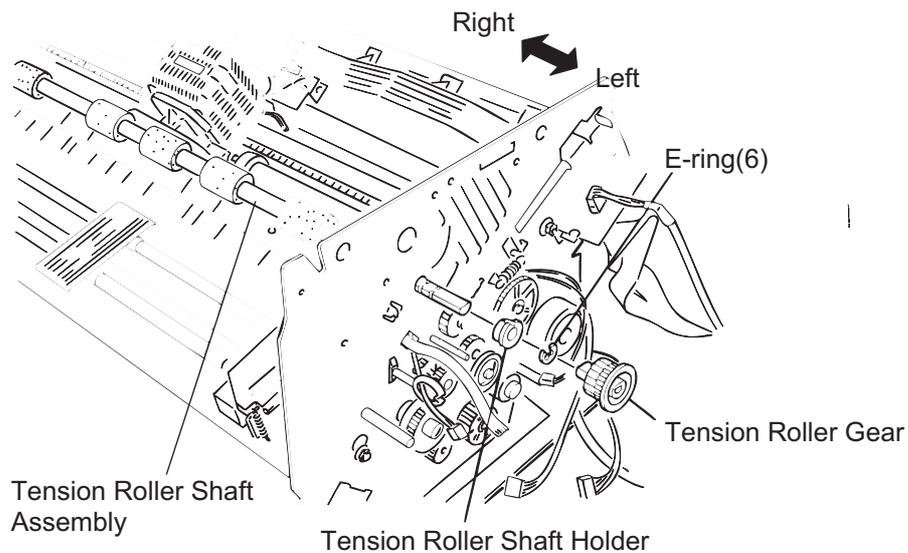
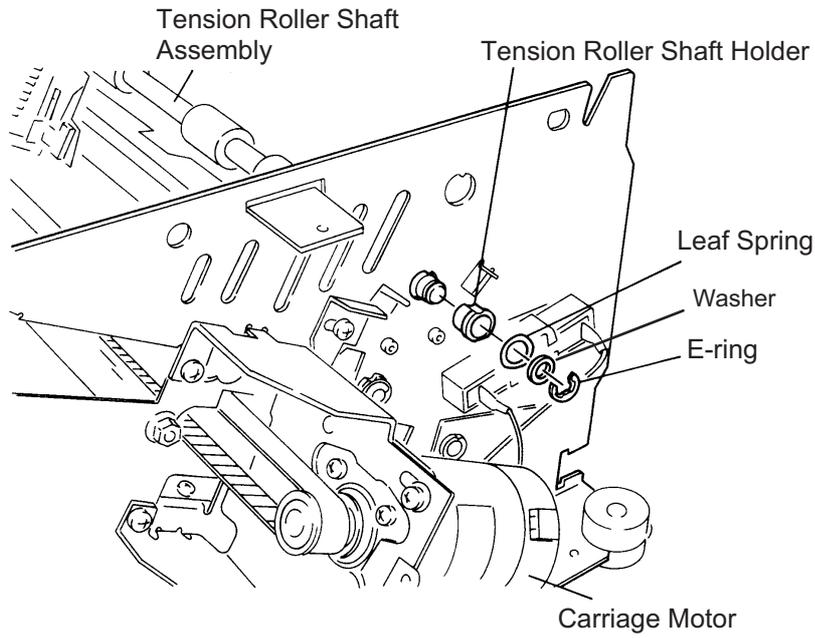


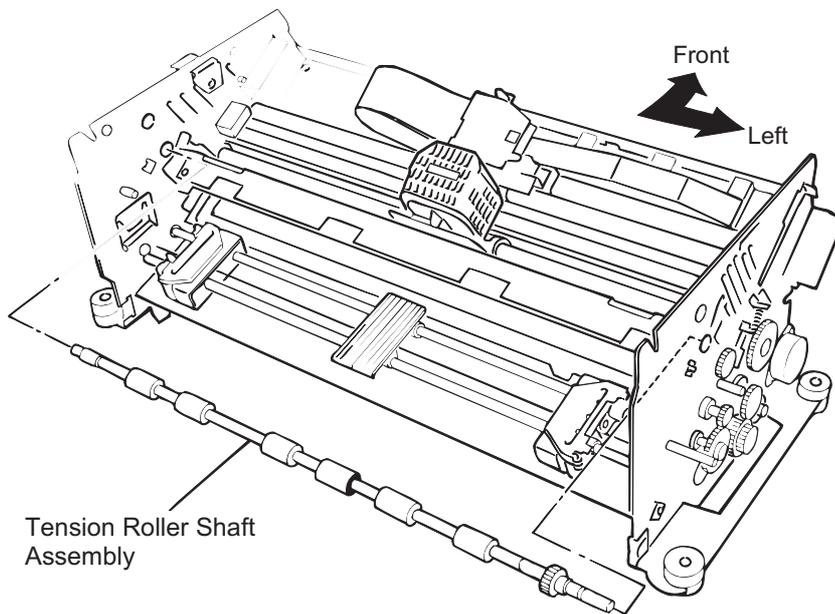
Figure 3-59. Tension Roller Gear Removal

**DFX-8500**

- Step 7: Remove the CR motor fan. (Refer to Section 3.2.6.19.)
- Step 8: Remove the E-ring (6) at the right end of the tension roller shaft and remove the tension roller shaft holder along with the leaf spring and the washer.
- Step 9: Remove the tension roller shaft by taking it out from the right frame.



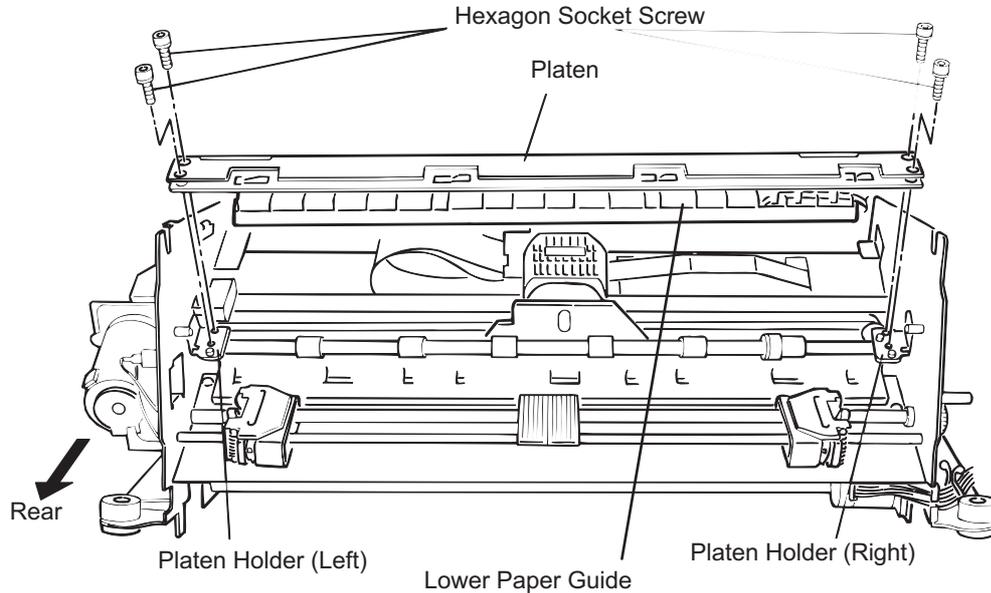
**Figure 3-60. Shaft Holder Removal**



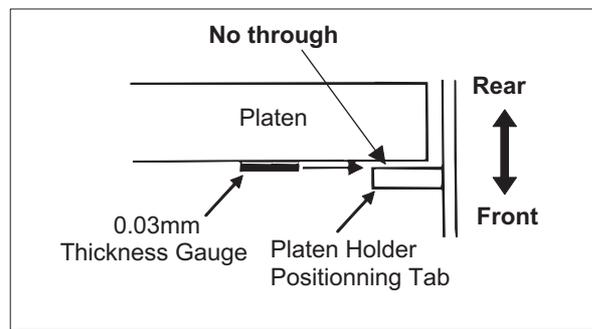
**Figure 3-61. Tension Roller Shaft Removal**

### 3.2.6.10 Platen Removal

- Step 1: Remove the paper bail assembly. (Refer to Section 3.2.6.7.)
- Step 2: Remove the upper paper guide. (Refer to Section 3.2.6.8.)
- Step 3: Remove the four hexagon socket screws securing the platen to the platen holders. Then remove the platen with the lower paper guide composed of 3 parts in it.
- Step 4: Slide the 3 parts of the lower paper guide to release the notches and remove them one by one from the platen.



**Figure 3-62. Platen Removal**



**Figure 3-63. Platen Positioning**

#### ASSEMBLING POINT

- When you attach the 3 parts of the lower paper guide to the platen, start with the one at the right end and work toward the left.
- When you mount the platen to the platen holders, space between the platen and positioning tab on the both sides must be less than 0.03mm. (Refer to Figure 3-63.)

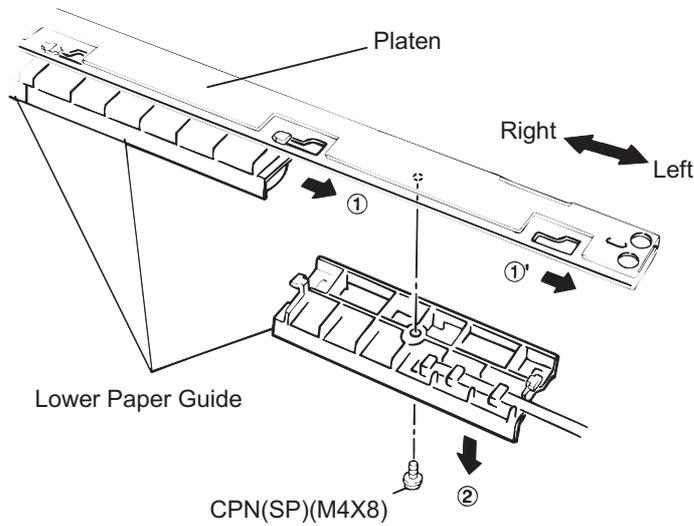
#### ADJUSTMENT REQUIRED

When you install the platen, perform the following adjustments:

- Carriage guide shaft parallelism adjustment (described in Section 4.1.5 and Section 4.1.6)
- Platen angle (right angle) adjustment (described in Section 4.1.6)
- Platen gap motor value (platen gap) adjustment (described in Section 4.1.7)

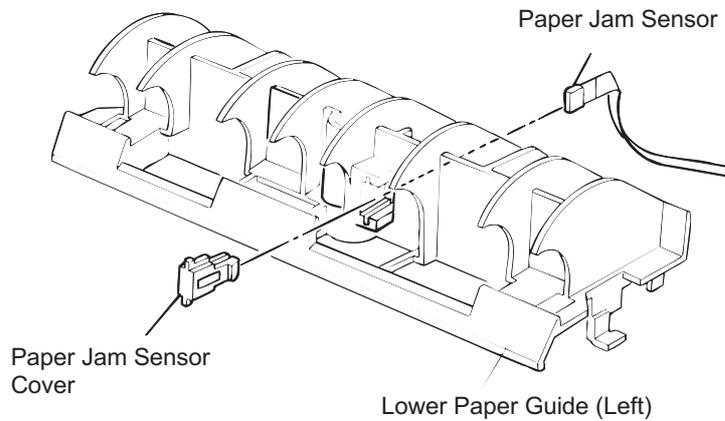
### 3.2.6.11 Paper Jam Sensor Removal

- Step 1: Remove the platen along with the lower paper guide composed of 3 parts. (Refer to Section 3.2.6.10.)
- Step 2: Remove the CPN(SP)(M4x8) screw securing the left part of the lower paper guide to the platen.
- Step 3: Remove the part from the platen.



**Figure 3-64. Lower Paper Guide Left Part Removal**

- Step 4: Unhook the paper jam sensor (magnetic transistor) cover to remove it.
- Step 5: Remove the paper jam sensor.



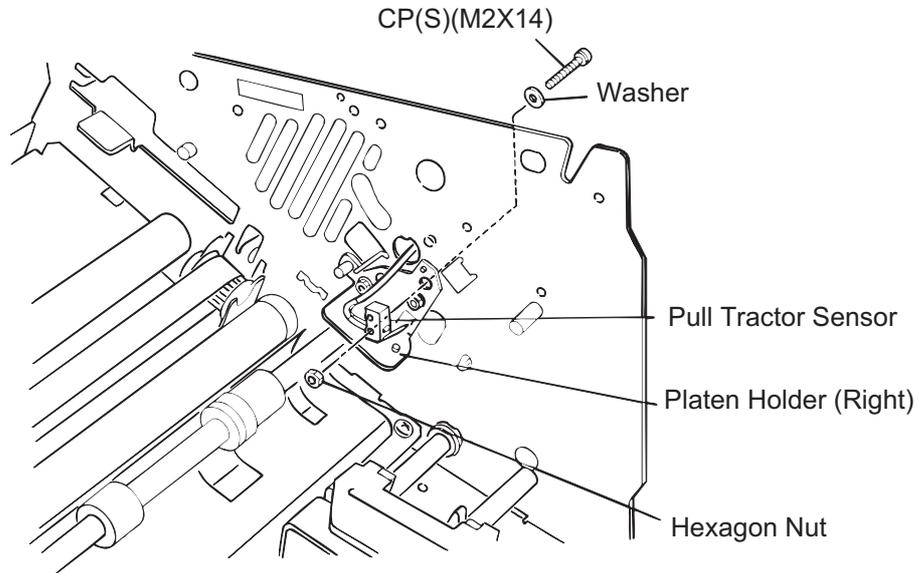
**Figure 3-65. Paper Jam Sensor Removal**

### ASSEMBLING POINT

*When you attach the paper jam sensor, make sure it is oriented correctly (front to back).*

### 3.2.6.12 Pull Tractor Sensor Removal

- Step 1: Remove the upper paper guide. (Refer to Section 3.2.6.8)
- Step 2: Disconnect the red 2-pin pull tractor sensor connector from the connector junction board assembly.
- Step 3: Remove the CP(S) (M2x14) screw securing the pull tractor sensor (a micro-switch type sensor) to the left side frame and remove the sensor.



**Figure 3-66. Pull Tractor Sensor removal**

### 3.2.6.13 Paper Width (PW) Sensor Removal

Step 1: Disconnect the connector for the PW sensor.

Step 2: Remove the CP(S-P1) (M2.5x6) screw securing the PW sensor to the ribbon mask holder.

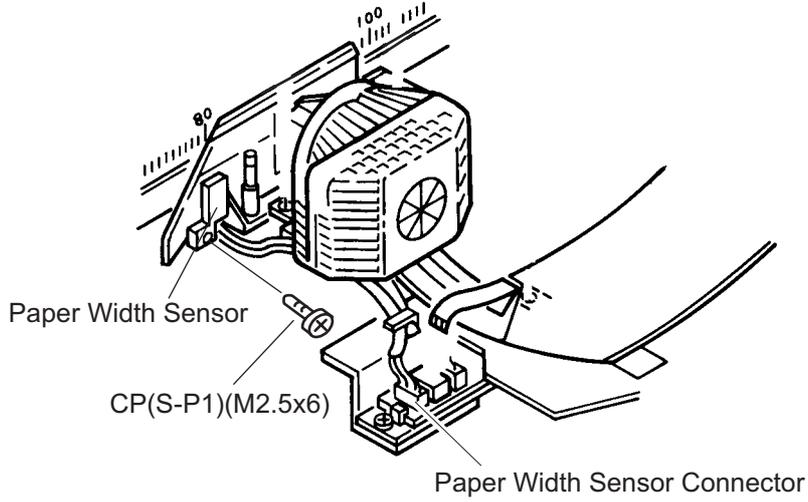
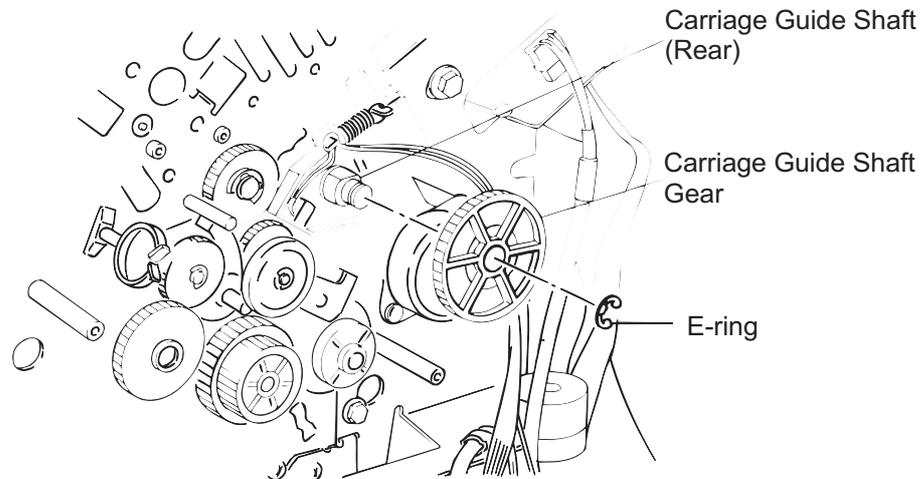


Figure 3-67. PW Sensor Removal

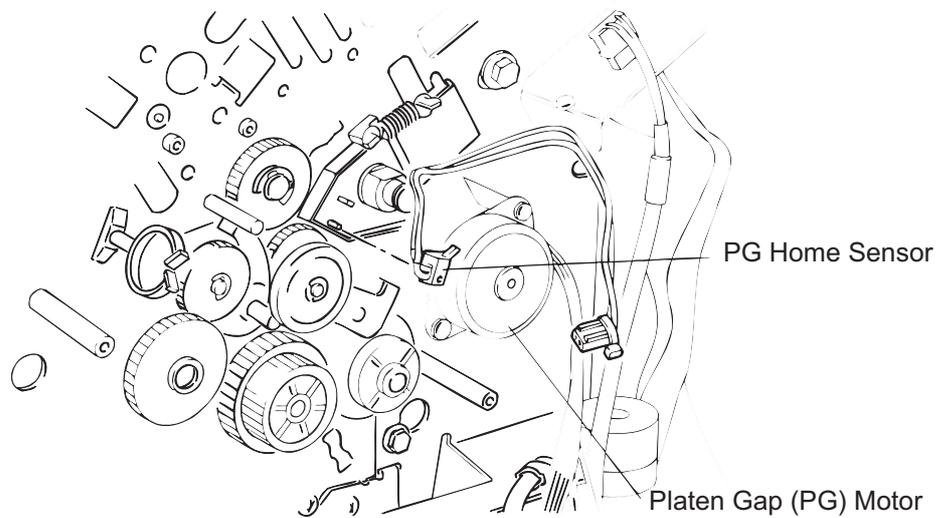
### 3.2.6.14 PG Home Sensor Removal

- Step 1: Remove the front/rear tractor select lever assembly. (Refer to Section 3.2.6.2.)  
 Step 2: Remove the E-ring securing the carriage guide shaft gear to the rear carriage guide shaft.



**Figure 3-68. Carriage Guide Shaft Gear Removal**

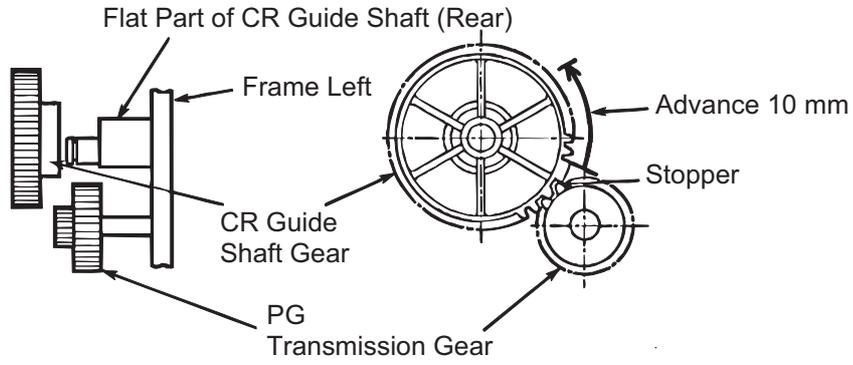
- Step 3: Disconnect the white, 2-pin, PG home sensor connector from the connector junction board assembly.  
 Step 4: Detach the hook securing the PG home sensor and remove the sensor.



**Figure 3-69. PG Home Sensor Removal**

**ASSEMBLING POINT**

*When you install the CR guide shaft gear, align the rib in the CR guide shaft gear with the PG adjustment transmission gear as shown in the figure below, then rotate the CR guide shaft gear 10 mm in CCW.*



**Figure 3-70. CR Guide Shaft Gear Phase Alignment**

### 3.2.6.15 PF Motor Removal

- Step 1: Remove the connector junction board assembly. (Refer to Section 3.2.6.5.)  
Step 2: Remove the three CP (SP-1) (M4x8) screws securing the PF motor to the left side frame.  
Step 3: Remove the PF motor from the inside of the left side frame.

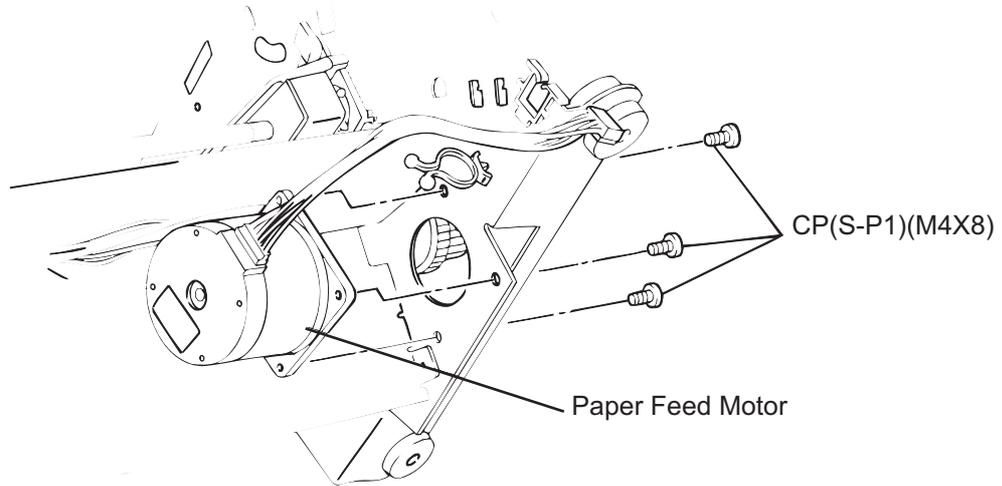


Figure 3-71. PG Home Sensor Removal

### 3.2.6.16 Left Side Frame Gear Removal

- Step 1: Remove the front/rear tractor select lever assembly. (Refer to Section 3.2.6.2.)
- Step 2: Remove the connector junction board assembly. (Refer to Section 3.2.6.5.)
- Step 3: Remove the PG motor. (Refer to Section 3.2.6.6.)
- Step 4: Remove the series of gears in the order indicated by the numbers in Figure 3-72.

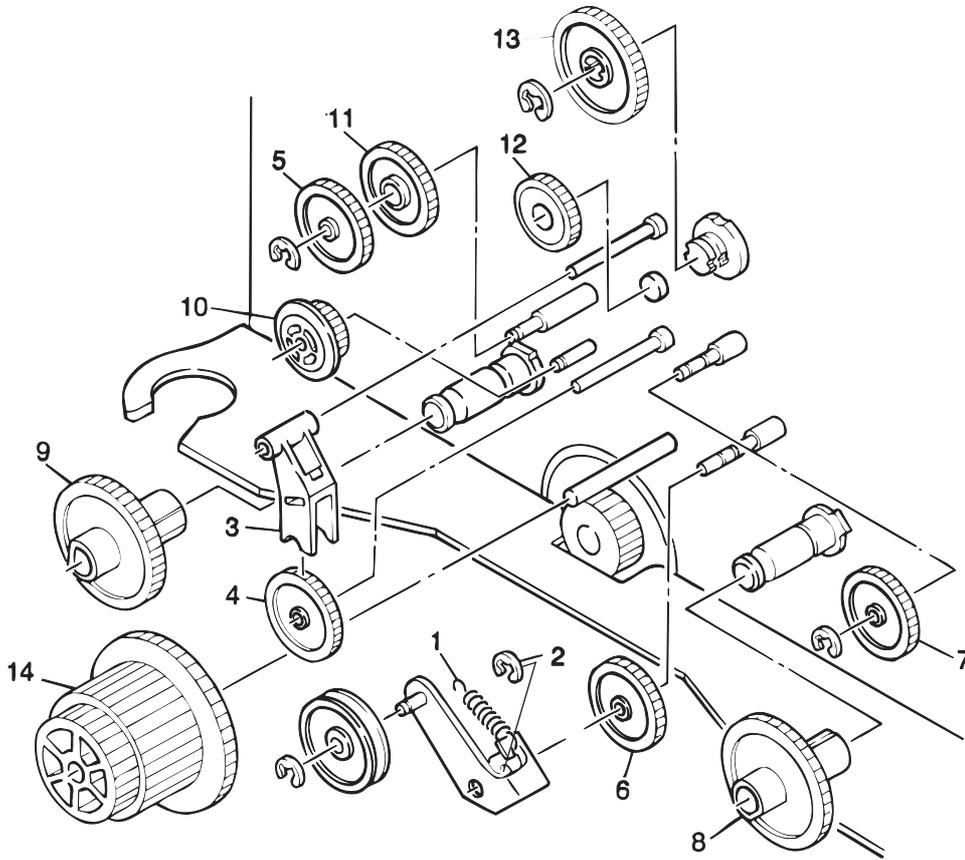


Figure 3-72. Left Side Frame Gear Removal

### 3.2.6.17 Front Tractor Assembly Removal

This section describes how to remove the front tractor assembly.

- Step 1: Disconnect the connector white 3-pin front PE sensor from the connector junction board.
- Step 2: Remove the connector junction board assembly. (Refer to Section 3.2.6.5.)
- Step 3: Lay the mechanism on its back.
- Step 4: Remove the screw securing the tractor wire holder to the left side frame and remove the holder.
- Step 5: Loosen the flange nut securing the front tractor assembly to the left side frame by the left end, and remove the tractor transmission gear.
- Step 6: Remove the flange nut on the right side and remove the right tractor wire spring holder set.
- Step 7: Remove the E-ring (6) securing the rear shaft of the front tractor assembly to the left side frame and remove the shaft holder.
- Step 8: Move the assembly to left to release the right end of the shaft, then release the left side of the shaft from the left side frame and remove the assembly.

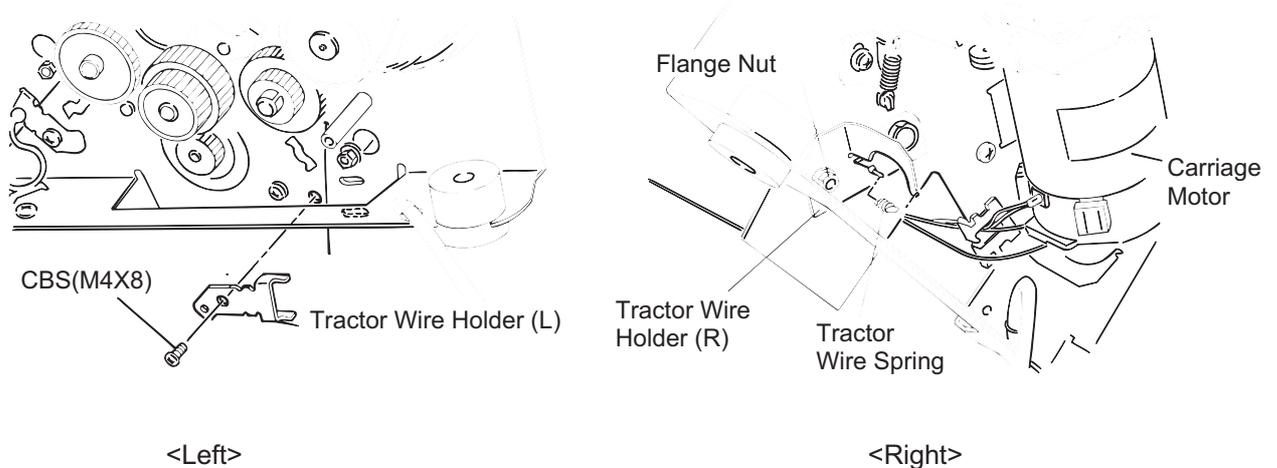


Figure 3-73. Tractor Wire Removal

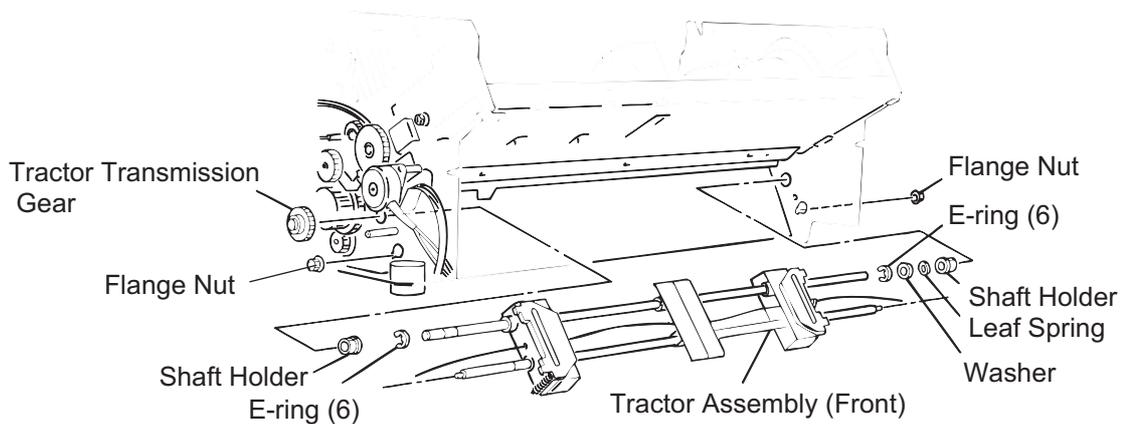


Figure 3-74. Front Tractor Assembly Removal

#### ADJUSTMENT REQUIRED

- When you install the front tractor assembly, perform the tractor wire spring adjustment, as described in Section 4.1.3.

### 3.2.6.18 Rear Tractor Assembly Removal

This section describes how to remove the rear tractor assembly.

- Step 1: Disconnect the connector white 3-pin rear PE sensor from the connector junction board.
- Step 2: Remove the connector junction board assembly. (Refer to Section 3.2.6.5.)
- Step 3: Remove the flange nut securing the wire holder spring set to the right side frame, and remove the set.
- Step 4: Loosen the flange nut securing the rear tractor assembly to the left side frame.
- Step 5: Remove the CBS(M4x8) screw securing the tractor wire holder and remove the holder.
- Step 6: Remove the rear tractor gear.
- Step 7: Remove the E-ring and release the shaft holder from the left side frame.
- Step 8: To remove the rear tractor assembly, first move it to the left to release the right end of the shaft from the right side frame. Then release the left end of the shaft and remove the assembly.

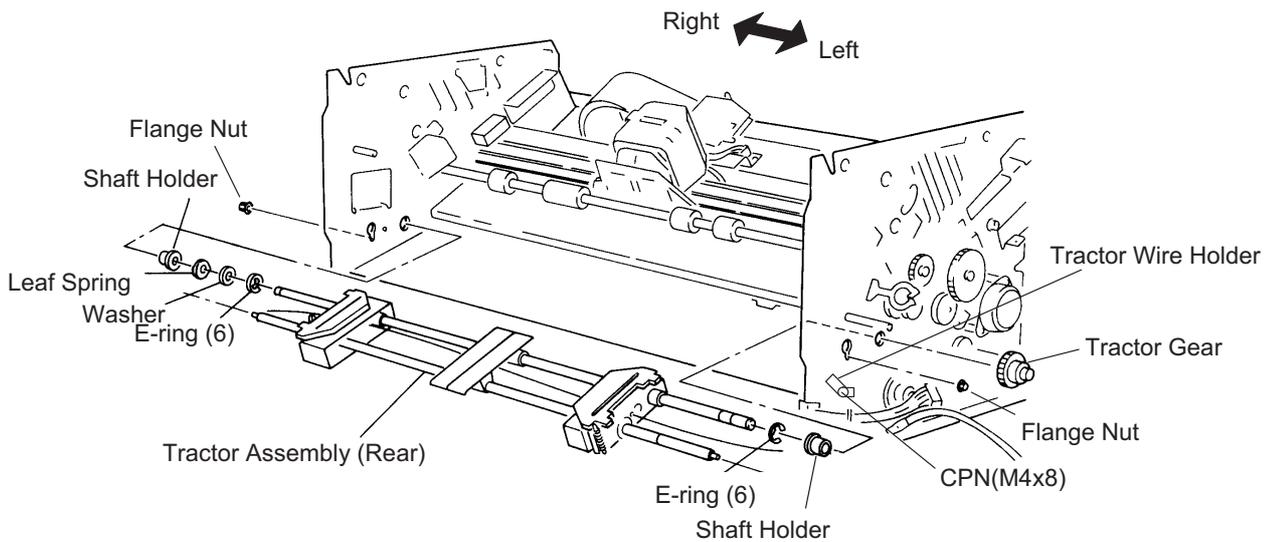


Figure 3-75. Rear Tractor Assembly Removal

**ADJUSTMENT REQUIRED**

*When you install the rear tractor assembly, perform the tractor wire spring adjustment, as described in Section 4.1.3.*

### 3.2.6.19 CR Motor Fan Removal

Step 1: Disconnect the cable for the motor from the relay connector.

Step 2: Remove 2 fan fixing screws and remove the fan.

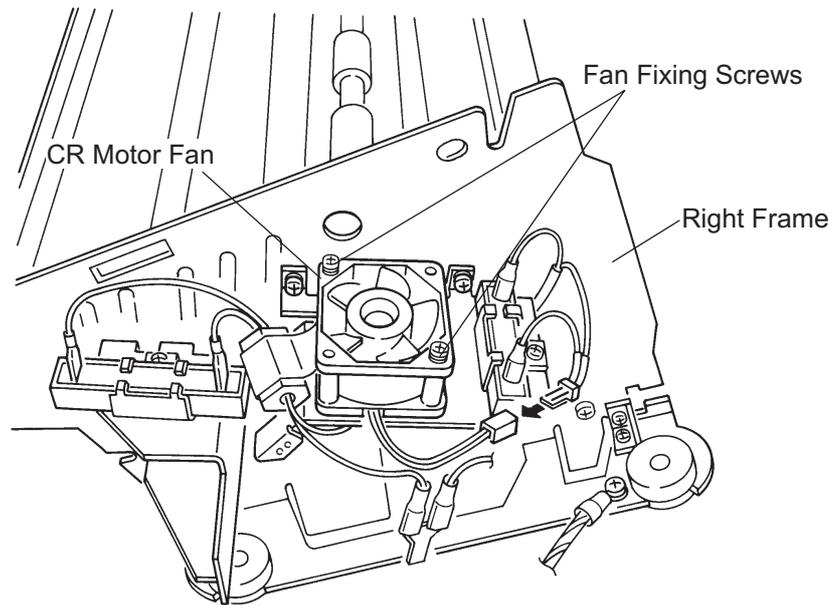


Figure 3-76. CR Motor Fan Removal

### 3.2.6.20 CR Motor Removal

- Step 1: Remove the right cover. (Refer to Section 3.2.3.2.)
- Step 2: Disconnect the red and black cables from the terminals on the CR motor. (two cables for each terminal)
- Step 3: Remove the three CP(S) (M4x10) screws securing the CR motor to the right side frame and remove the motor.

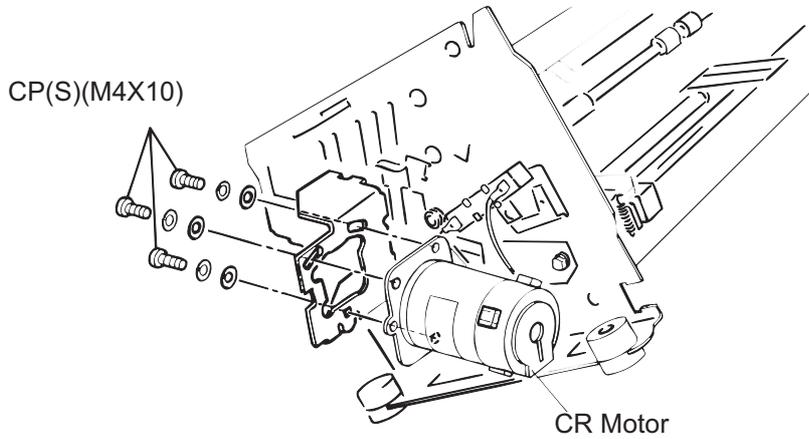


Figure 3-77. CR Motor Removal

#### ADJUSTMENT REQUIRED

- When you install the CR motor, perform the carriage timing belt tension adjustment, as described in Section 4.1.2.
- When you install the printhead, perform the platen gap motor value (platen gap) adjustment, as described in Section 4.1.7.

### 3.2.6.21 CR (Carriage Encoder) Sensor Removal

- Step 1: Remove the printhead. (Refer to Section 3.2.2.)  
 Step 2: Disconnect the red 4-pin CR sensor connector from the carriage connector junction board.  
 Step 3: Remove the two CP(S-P1) (M2.6 x 5) screws securing the CR sensor to the carriage and remove the sensor.

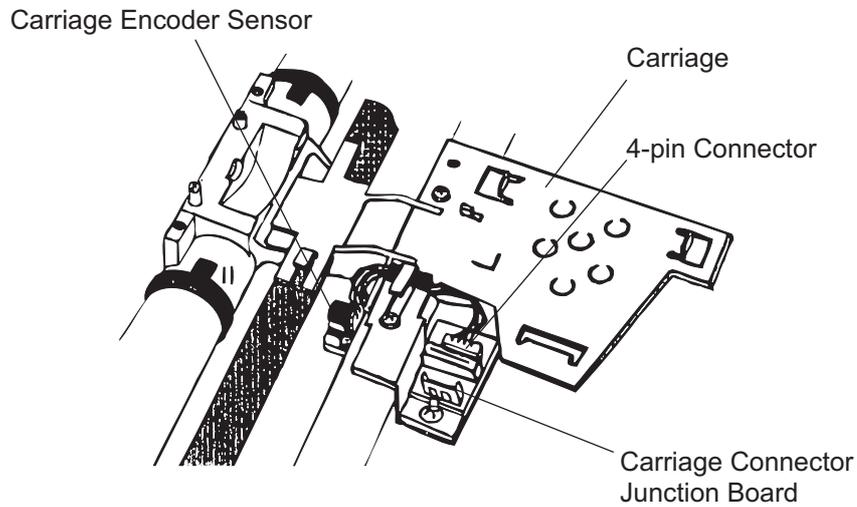


Figure 3-78. CR Sensor Removal 1/2

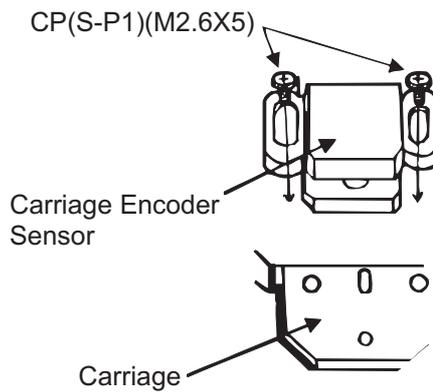


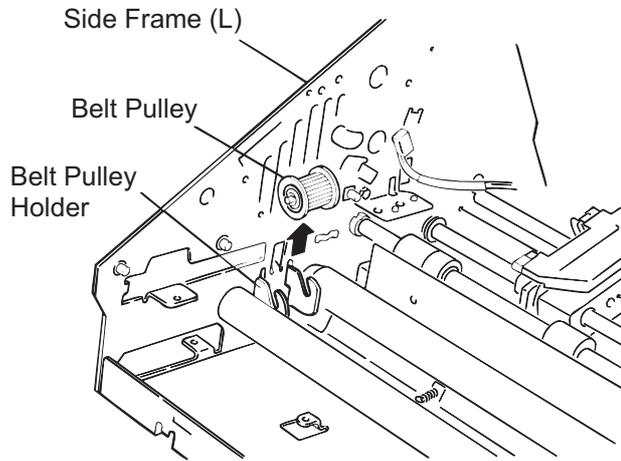
Figure 3-79. CR Sensor Removal 2/2

### 3.2.6.22 Carriage Mechanism Disassembly

This section describes how to disassemble the carriage mechanism, including removing the carriage, CR timing belt, and front and rear carriage guide shafts.

Step 1: Remove the CR motor. (Refer to Section 3.2.6.20.)

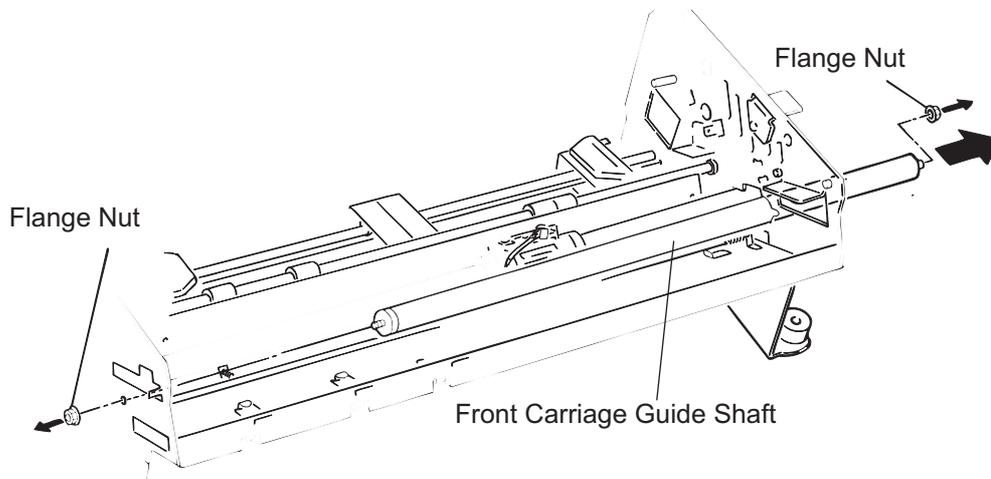
Step 2: Remove the belt pulley from the belt pulley holder.



**Figure 3-80. Belt Pulley Removal**

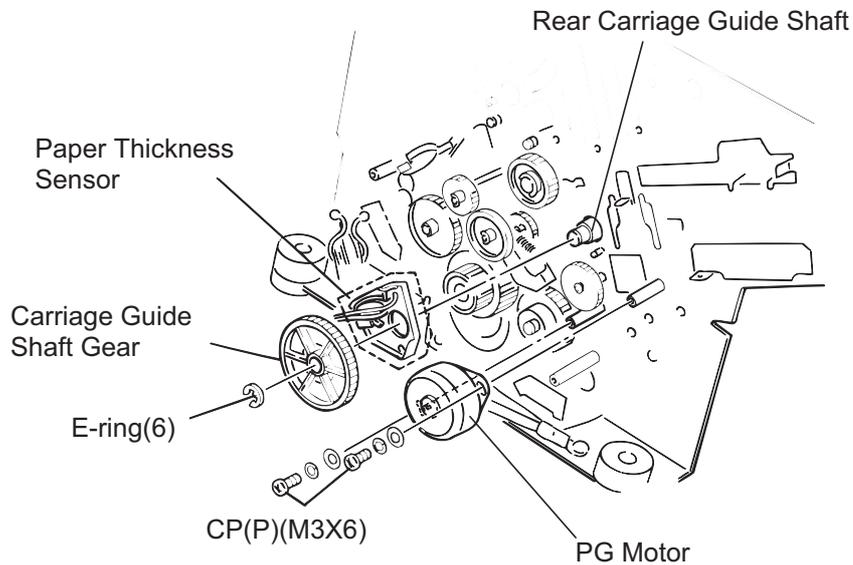
Step 3: Unhook the spring securing the encoder belt to the right side frame. (Refer to Figure 2-5.)

Step 4: Loosen the two flange nuts securing the front carriage guide shaft to the left and right side frames.



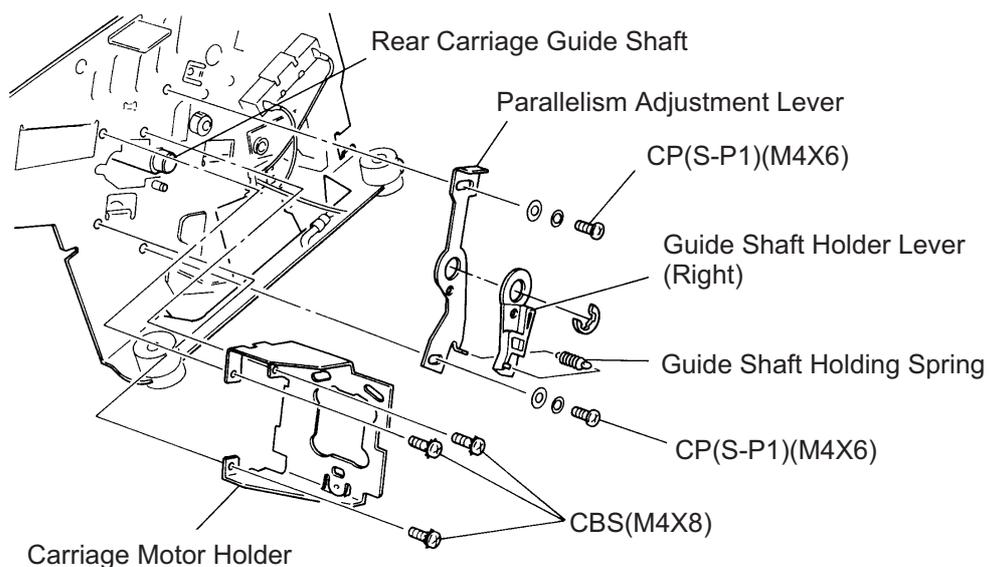
**Figure 3-81. Front Carriage Guide Shaft Removal**

- Step 5: Remove the front carriage guide shaft by pulling it through the hole in the right side frame. (When you remove the front carriage guide shaft, move the carriage to the left side.)
- Step 6: On the left side frame, remove the E-ring (6) securing the carriage guide shaft gear to the rear carriage guide shaft, then remove the carriage guide shaft gear and paper thickness sensor holder.
- Step 7: Unhook the spring securing the paper thickness sensor assembly and remove the sensor assembly.



**Figure 3-82. Rear Carriage Guide Shaft Removal**

- Step 8: Remove the PG motor. (Refer to Section 3.2.6.6.)
- Step 9: Remove the carriage damper (solid rubber) from the inner side of the right side frame, and remove the three CBS (M4x8) screws securing the carriage motor holder to the right side frame.
- Step 10: Remove the guide shaft holding spring and the E-ring, then remove the right guide shaft holder lever.
- Step 11: Remove the two CP(S-P1) (M4x6) screws securing the parallelism adjust lever and remove the lever.
- Step 12: Remove the rear carriage guide shaft with the carriage base from the right side frame.



**Figure 3-83. Right Side Frame Removal**

**ASSEMBLING POINT**

*When you install the front carriage guide shaft, tighten the screws while pushing the shaft toward the platen.*

**ADJUSTMENT REQUIRED**

- When you assemble the carriage mechanism, perform the following adjustments:*
- Carriage timing belt tension adjustment (described in Section 4.1.2)*
  - Carriage guide shaft parallelism adjustment (described in Section 4.1.5 and Section 4.1.6)*
  - Platen gap motor value (platen gap) adjustment (described in Section 4.1.7)*
  - Bidirectional printing adjustment (described in Section 4.1.8)*

### 3.2.6.23 Paper Support Assembly Removal

Step 1: Disassemble the carriage mechanism and remove all the parts related to the carriage. (Refer to Section 3.2.6.22.)

Step 2: Referring to the exploded diagram in the Appendix, remove the paper support assembly.

#### ADJUSTMENT REQUIRED

*When you install the paper support assembly, perform the following adjustments:*

- *Carriage timing belt tension adjustment (described in Section 4.1.2)*
- *Carriage guide shaft parallelism adjustment (described in Section 4.1.5 and Section 4.1.6)*
- *Platen gap motor value (platen gap) adjustment (described in Section 4.1.7)*
- *Bidirectional printing adjustment (described in Section 4.1.8)*

### 3.2.6.24 3.2.6.21 PF Drive Roller Removal

Step 1: Remove the platen. (Refer to 3.2.6.10)

Step 2: Remove the CR motor. (Refer to Section 3.2.6.20)

Step 3: Remove the left side frame gears. (Refer to Section 3.2.6.16)

Step 4: Referring to the exploded diagram in the Appendix, remove the PF driver roller.

#### **ADJUSTMENT REQUIRED**

*When you install the PF drive roller, perform the following adjustments:*

- *Carriage timing belt tension adjustment (described in Section 4.1.2)*
- *Carriage guide shaft parallelism adjustment (described in Section 4.1.5 and Section 4.1.6)*
- *Platen gap motor value (platen gap) adjustment (described in Section 4.1.7)*
- *Bidirectional printing adjustment (described in Section 4.1.8)*

# CHAPTER 4 ADJUSTMENT

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## 4.1 PRINTER MECHANISM ADJUSTMENTS

This section describes the printer mechanism adjustments for the DFX-8500. Whenever the printer is disassembled and the printer parts mentioned in this section are replaced or repaired, perform the appropriate adjustments to ensure proper printer operation. Perform adjustments before assembling the printer.

### 4.1.1 PG Motor Backlash Adjustment

In the PG motor backlash adjustment, the PG motor pinion gear must mesh smoothly with the PG transmission gear cog. If the pinion gear is poorly aligned or the pinion gear and cog are too tight, printer operation is noisy or the character density is incorrect.



☑ If the PG motor backlash is too tight, PG motor doesn't rotate smoothly and the panel indicates "E3."

- Step 1: Loosen the two screws securing the PG motor to the left side frame. (Refer to Section 3.2.6.4)  
 Step 2: Make sure the PG motor pinion gear is properly aligned with the PG transmission gear cog. Move the PG motor until there is 0.05 to 0.15 mm (0.002 to 0.01 inches) between the PG motor pinion gear and PG transmission gear cog. Then tighten the two screws.

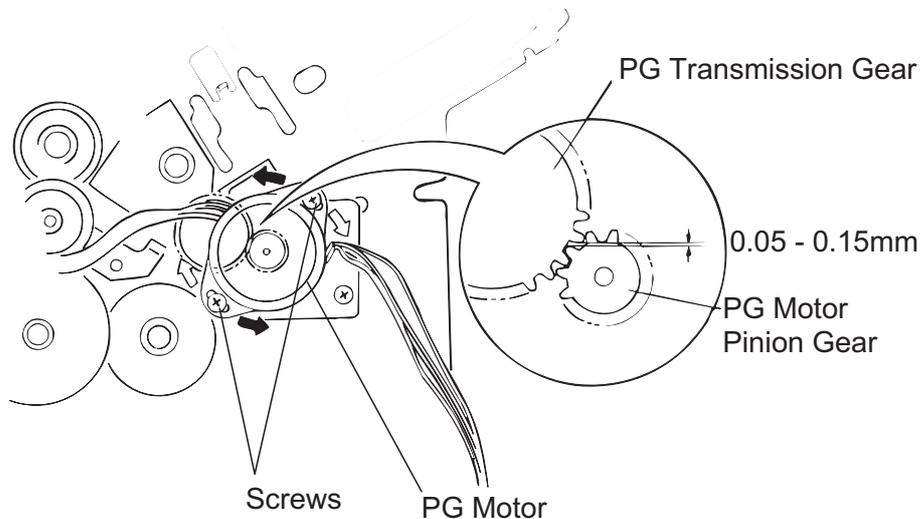


Figure 4-1. PG Motor Mounting Position Adjustment

## 4.1.2 Carriage Timing Belt Tension Adjustment

The carriage timing belt tension must be adjusted when any carriage mechanism part (such as the CR motor, belt pulley, or carriage timing belt) is disassembled. Remove the printer mechanism before performing this adjustment. (Refer to Section 3.2.6)



Before performing this adjustment, carefully secure the printer mechanism because a 7 kg (15.4 lb.) force is applied to it when the tension lever is pulled in the horizontal direction.

- Step 1: Loosen the three tension adjustment screws on the CR motor. Confirm that the carriage timing belt is attached properly and that no load is applied to it.
- Step 2: Insert the tension gauge hook through the hole in the tension lever.
- Step 3: Pull the tension gauge horizontally to apply a 7 kg (15.4 lb.) force.
- Step 4: Move the belt left and right while pulling the tension gauge, and move the motor pulley slightly.
- Step 5: Tighten the three CPS(M4x10) tension adjustment screws and secure them while the 7 kg (15.4 lb.) force is applied.
- Step 6: Finish tightening the three tension adjustment screws with 12 Kg cm torque.

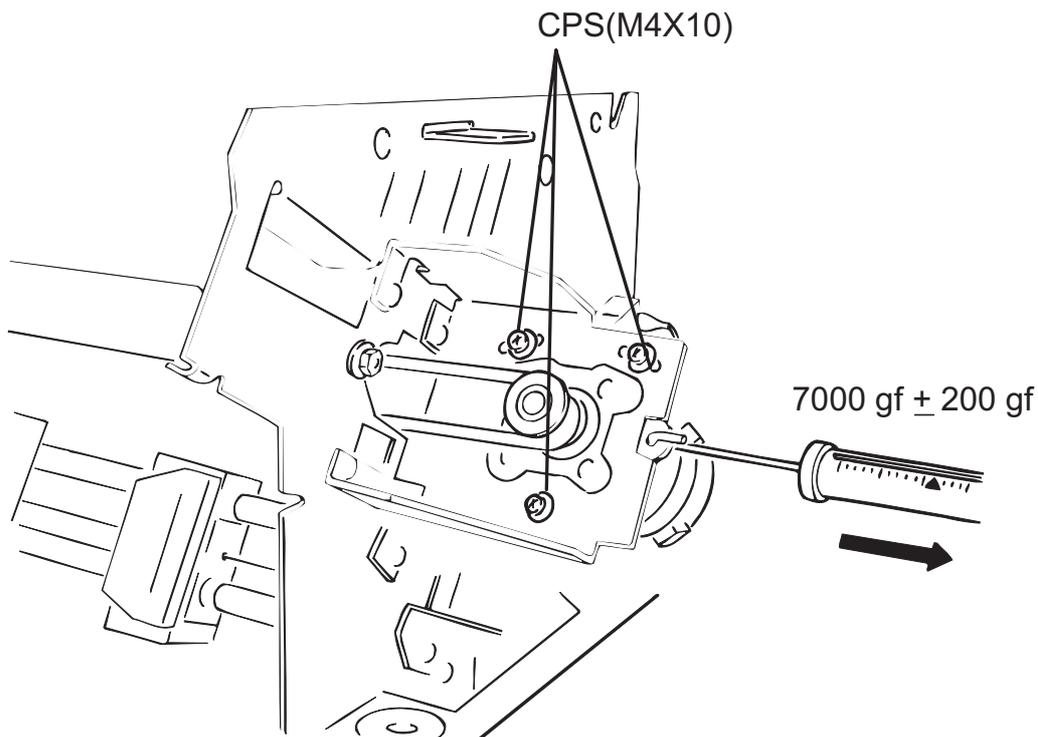


Figure 4-2. Carriage Timing Belt Tension Adjustment

### 4.1.3 Tractor Wire Spring Tension Adjustment

This section describes the tractor wire spring tension adjustment. If the spring is not adjusted properly, paper jams may occur, because the continuous paper tension (in the horizontal direction) is incorrect. When you remove the front or rear tractor assembly, perform this adjustment.

Step 1: Remove the printer mechanism. (Refer to Section 3.2.6)

Step 2: Release the release levers for the tractor sprockets on the front.

Step 3: At the left side frame, loosen the CBS(M4 X 8) screws securing the wire holding plate (L).

Step 4: Pull the tractor wire left to make correct tension to the tractor wire, wire holding plate ( R ) and the tip of the gold seal are 5 mm (0.2 inches) apart.

Step 5: Fix the CBS(M4 X 8) screws on the wire holding plate (L).

Step 6: As the same manner, adjust the tractor spring tension for the rear tractor.

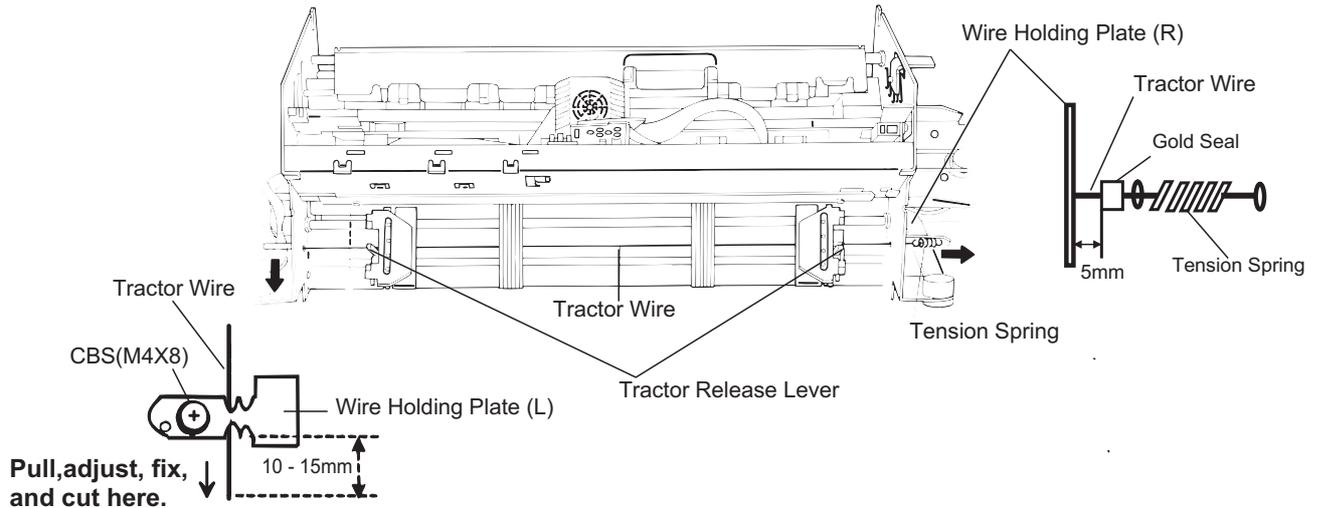


Figure 4-3. Tractor Wire Tension Adjustment (Front)

### 4.1.4 Pull Tractor Sensor Position Adjustment

This section describes the pull tractor sensor position adjustment. If the sensor position is incorrect, the sensor is always on. When you replace or disassemble the platen, rear paper guide, platen roller shaft, tension roller shaft, or pull tractor sensor, perform this adjustment. Figure 4-4 illustrates the pull tractor sensor position adjustment.

When you assemble the pull tractor sensor or rear paper guide, check the following items:

- Verify that the pull tractor sensor lever is touching the rear paper guide frame, but the sensor is off.
- Make sure the distance between the sensor lever and sensor switch is approximately 2 mm (.08 inches).

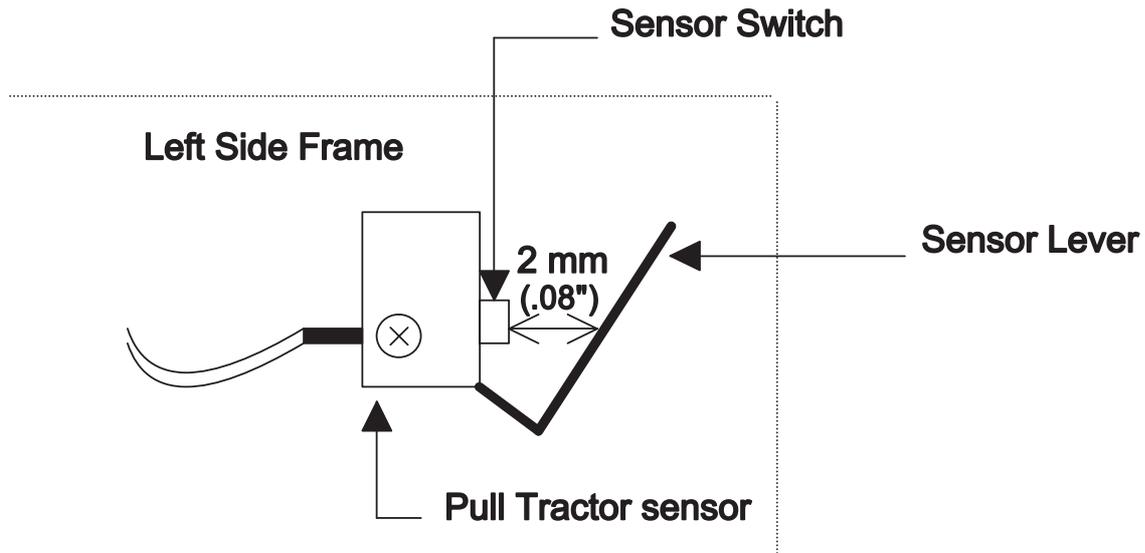


Figure 4-4. Pull Tractor Sensor Position Adjustment

### 4.1.5 Carriage Guide Shaft Parallelism Adjustment

The rear carriage guide shaft must be parallel to the platen. If it is not, printing may be abnormal because paper is not fed evenly at the left and right sides of the platen. A paper jam may occur. This adjustment is required when the rear carriage guide shaft is removed during carriage mechanism disassembly, the parallelism adjust lever is moved, or the platen is removed. Do not remove the printer mechanism (If remove the printer mechanism from the lower case, the adjust value will be out of order when you reassemble the printer mechanism to the lower case.) Also, it is necessary to remove the tension roller shaft before performing this adjustment. (Refer to Section 3.2.6.7.)

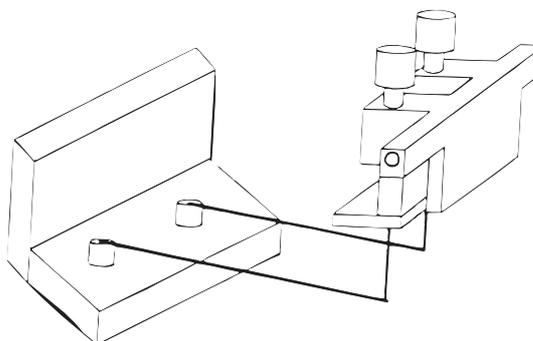


*The parallelism is adjusted so that the difference between the distances (from the rear carriage guide shaft to the platen measured at the two positions shown in Figure 4-5) is less than  $\pm 0.015$  mm. Since this value is extremely small, you must use the two dial gauges, dial gauge base, and dial gauge master supplied by EPSON. Do not adjust the parallelism using any other method.*

- ☑ Dial gauges (x 2) #F610 (Part No. B1019466)
- ☑ Dial gauge base #F611 (Part No. B1019467)
- ☑ Dial gauge master #F612 (Part No. B1019468).

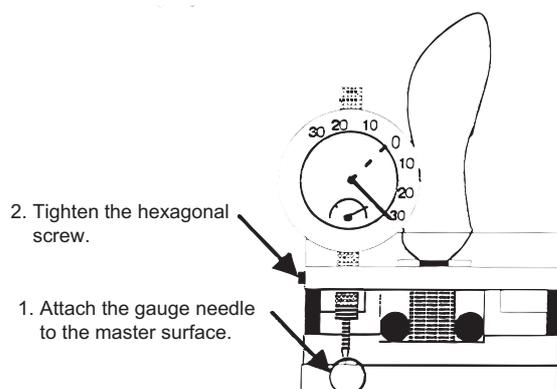
Before performing the carriage guide shaft parallelism adjustment, you must assemble the two dial gauges, dial gauge base, and dial gauge master to form one tool. Follow these steps:

Step 1: Attach the two thumb screws for the dial gauge base to the dial gauge master. To eliminate any play between the dial gauge base and the dial gauge master, pull the tie band to secure the dial gauge base and the dial gauge master before you securing the thumb screws. (Do procedure with two men.)



**Figure 4-5. Set Dial Gauge to Dial Gauge Base**

Step 2: Attach a dial gauge needle to the surface of the dial gauge master (approx. 2.00 mm depth), then tighten the hexagonal screw securing the dial gauge to the dial gauge base.



**Figure 4-6. Dial Gauge Set Up 1**

Step 3: Attach the another needle to the master surface, APPROX. 2.00 mm depth, then correspond to the another gauge measure, and tighten the hexagonal screw.

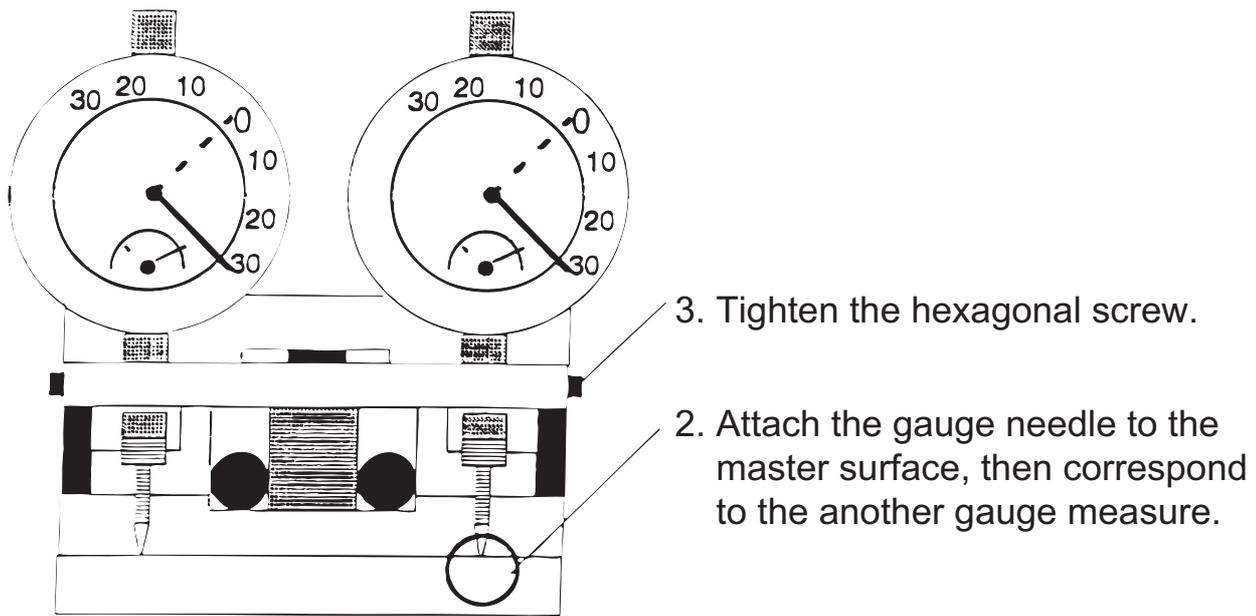


Figure 4-7. Dial Gauge set Up 2

Step 5: Set the black marker to the "0" position.

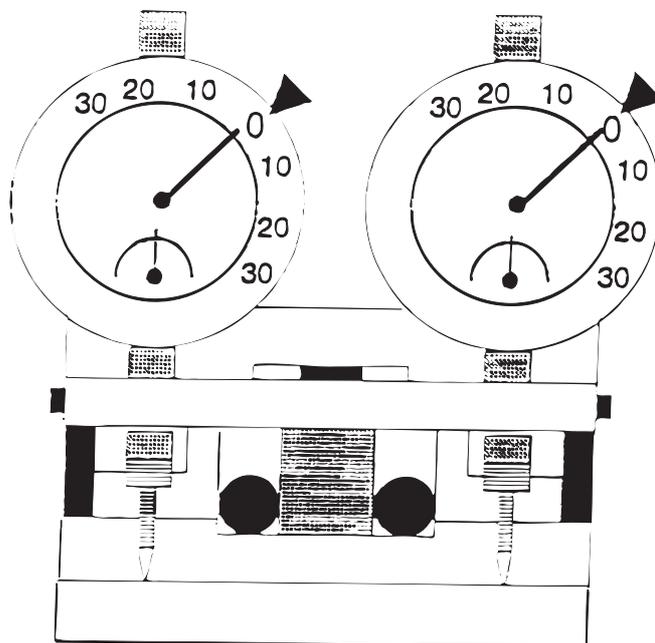
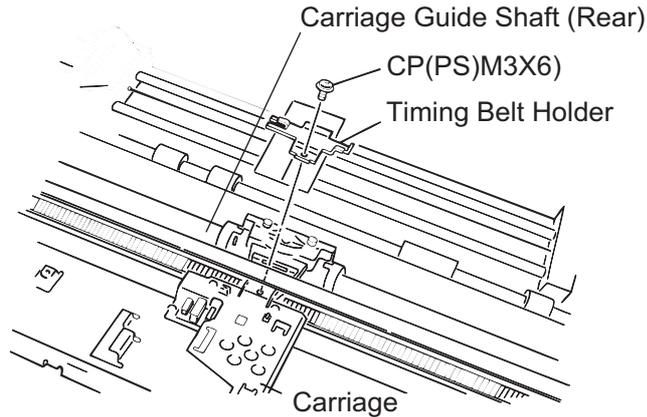


Figure 4-8. Black Marker to "0" Position Setting

Step 6: Remove a CP(PS)(M3X6) screw securing the timing belt holder to the timing belt, then remove the timing belt holder.



**Figure 4-9. Carriage Plate Removal**

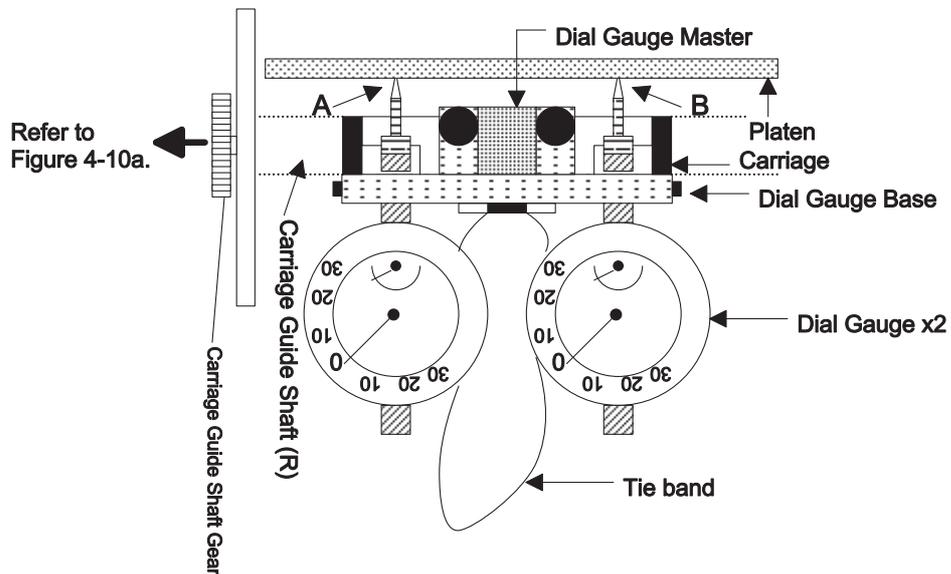
Step 7: Remove the paper bail assembly. (Refer to Section 3.2.6.5.)

Step 8: Remove the tension roller shaft. (Refer to Section 3.2.6.7.)

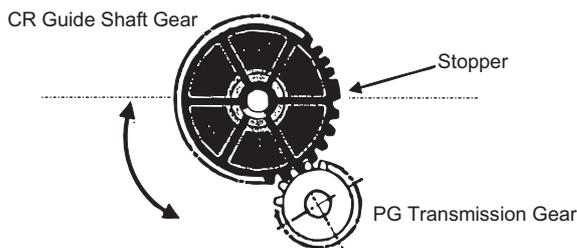
Step 9: Remove the printhead with the mask-less holder. (Refer to Section 3.2.1.)

Step 10: Attach the dial gauge base with the dial gauge in the same way as you attach the print head. Then you attach this tool to the carriage, tighten the two thumb screws while you pulling the dial gage base toward you.

Step 11: Using the carriage guide shaft gear, adjust the gauge mounting position so that the tips of the gauges (portions A and B in the Figure 4-10) are securely attached to the platen.



**Figure 4-10. Dial Gauge Attachment**



**Figure 4-10a. CR Guide Shaft Gear Positioning**

Step 12: Measure the distance between the platen and the carriage guide shaft on the left side. Then measure the distance between the platen and the rear carriage guide shaft on the right side, and compare these values. (Figure 4-11 shows the measurement position and the parallelism adjust lever operation.)

**Note:** When you shift the carriage manually, do not touch the both dial gauges. Rotate the carriage motor pulley.

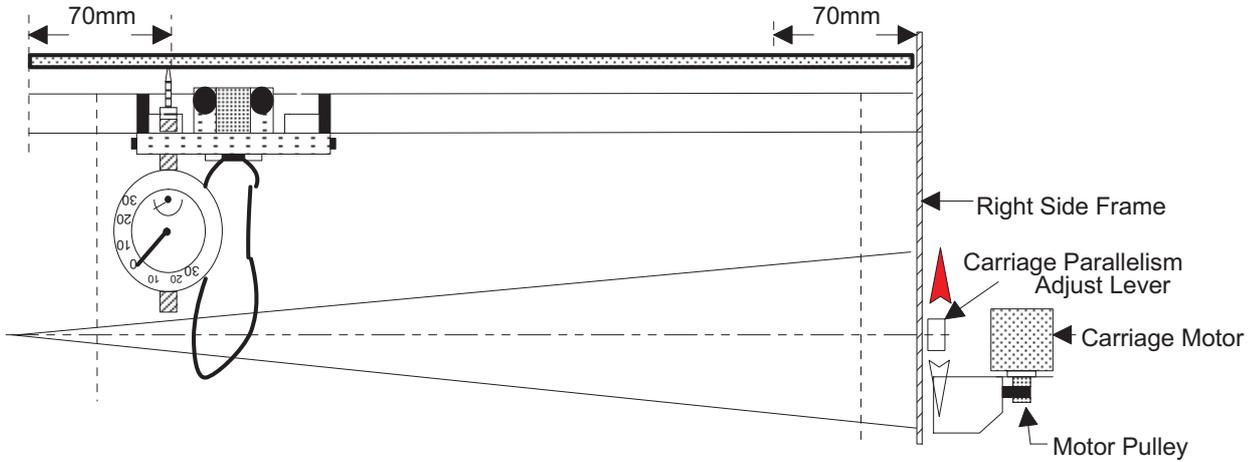


Figure 4-11. Carriage Guide Shaft Parallelism Adjustment

Step 13: If the distance measured at the left side is greater than that measured at the right side, move the parallelism adjust lever in the direction shown by the white arrow in Figure 4-9. If the distance measured at the left side is less than that measured at the right side, move the lever in the direction shown by the black arrow.

**Notes 1:** The carriage guide shaft moves as shown in Figure 4-8. For example, when the parallelism adjust lever is moved in the direction of the black arrow, the distance between the right side of the platen and printhead nose narrows a little bit.

**Notes 2:** The carriage guide shaft moves as shown in Figure 4-8. When the parallelism adjust lever is moved in the direction of the black arrow, the distance between the right side of the platen and print head nose narrows a little bit.

Step 14: Repeat steps 11 and 12 until the distance between the two positions is less than  $\pm 0.015$  mm. (The #F610 dial gauge matches the  $\pm .15$  notches.)

Step 15: When the distance is within the specified range, tighten the two CP(PS)(M4 X 6) screws securing the parallelism adjustment lever. Then measure the distances again, as described in step 11.

Step 16: If the distance between the measured distances is within the specified range, apply screw lock to the two screws. (Refer to Section 6.2 for lubrication and adhesive application instructions.)

Step 17: Go to Section 4.1.6 platen angle adjustment.

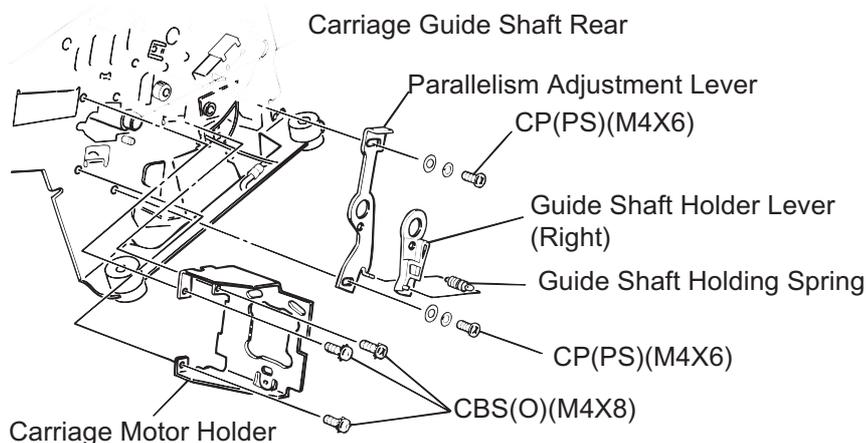


Figure 4-12. Parallelism Adjustment Lever Operation

### 4.1.6 Platen Angle Adjustment

This section describes the platen angle adjustment. The platen must be at a right angle to the carriage assembly. This adjustment is required when the platen is removed or replaced or when the two hexagonal screws securing the platen to both side frames are loosened. Do not remove the printer mechanism from the lower case. (If remove the printer mechanism from the lower case, the adjust value will be out of order when you reassemble the printer mechanism to the lower case.) Also, it is necessary to remove the tension roller shaft before performing this adjustment. (Refer to Section 3.2.6.7)



*The parallelism is adjusted so that the difference between the distances (from the rear carriage guide shaft to the platen measured at the two positions shown in Figure 4-7) is less than  $\pm 0.015$  mm. Since this value is extremely small, you must use the two dial gauges, dial gauge base, and dial gauge master supplied by EPSON. Do not adjust the parallelism using any other method.*

- ☑ Dial gauge #F610 (Part No. B1019466)
- ☑ Dial gauge base #F611 (Part No. B1019467)
- ☑ Dial gauge master #F612 (Part No. B1019468).

Step 1: Perform the carriage guide shaft parallelism adjustment. (Refer to section 4.1.5) After the adjustment is finished, leave the dial gage unit on the carriage.

Step 2: Remove the pull tractor sensor.(Refer to Section 3.2.6.10.)

Step 3: Loosen (but do not remove) the two hexagonal screws securing the platen stay to both side frames.

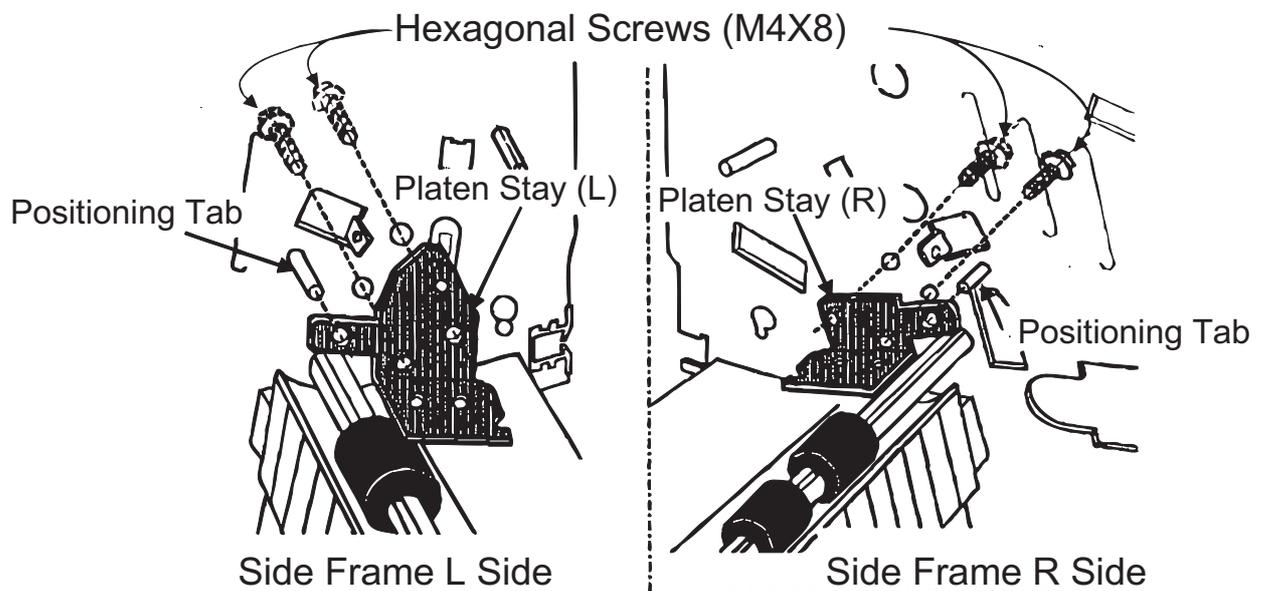
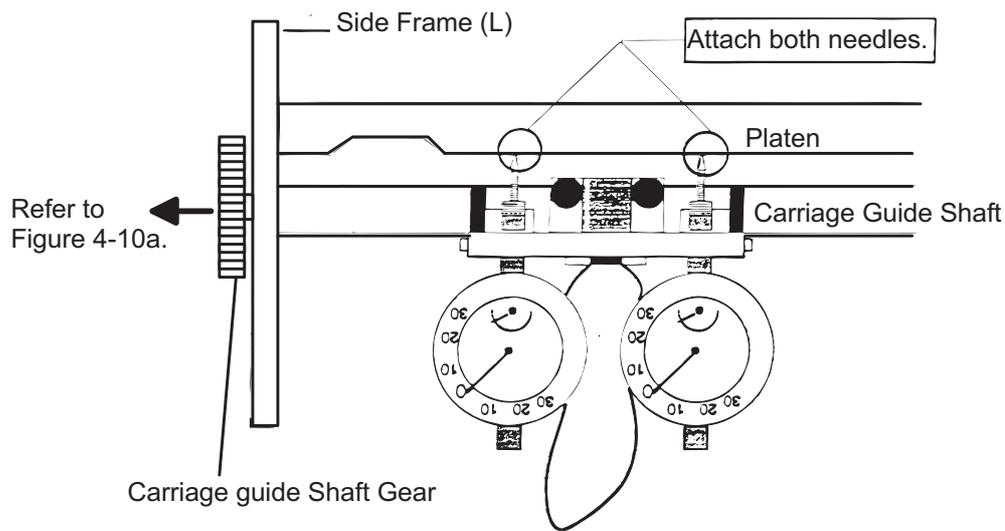


Figure 4-13. Loosening Hexagonal Screws

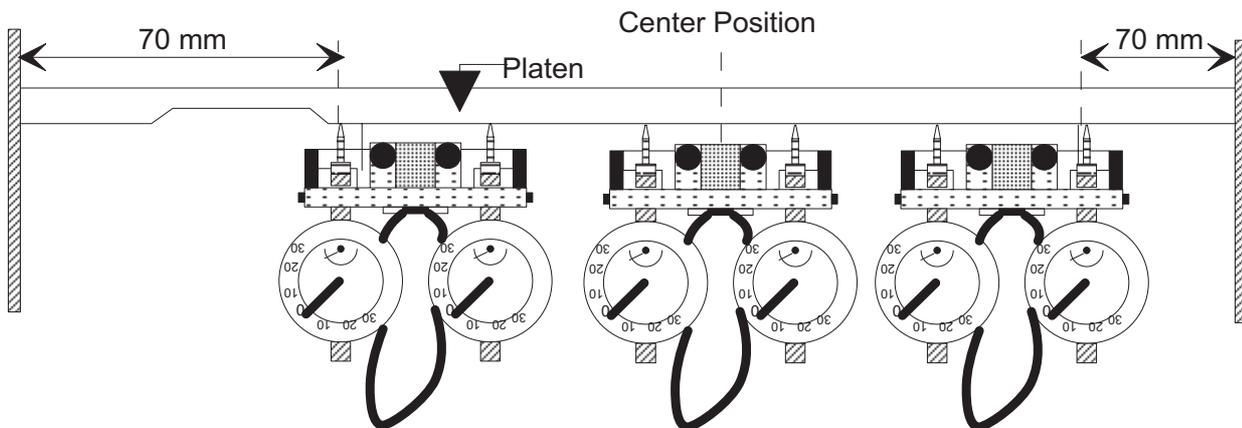
**DFX-8500**

Step 4: Using the carriage guide shaft gear, attach the both dial gauge needles to the platen surface. (The needle doesn't reach the end of the stroke).

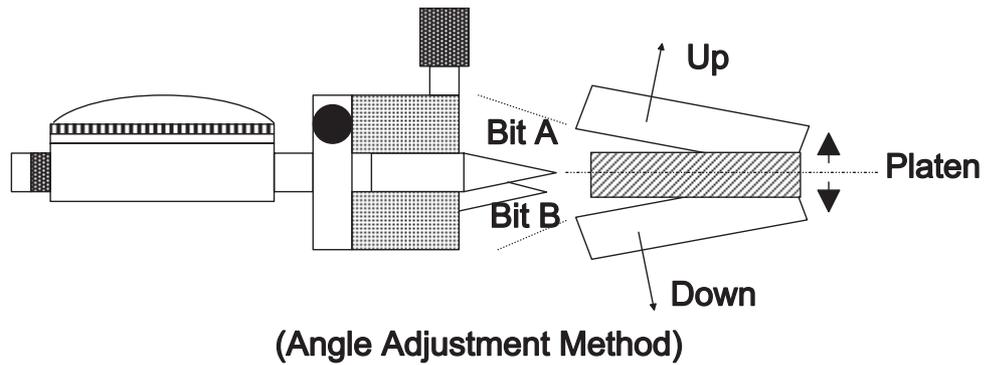


**Figure 4-14. Attaching Two Needles to Platen Surface**

Step 5: Measure the angle difference about three position such as figure below. (Using the CR motor pulley to move the carriage with the dial gauge toward the right side. See Figure 4-11.)



**Figure 4-15. Measuring Angle Difference 1**



**Figure 4-16. Measuring Angle Difference 2**

Step 6: If the angle difference of two values are more than  $\pm 0.015$  mm, loosen (but do not remove) the two hexagonal screws securing the platen stay to both side frames, then change the platen angle slowly and manually.)

Step 7: Tighten two hexagonal screws securing the platen stay to both side frames.



*After perform the adjustment, confirm the value of platen parallelism again. When this value is out of order, readjust the platen parallelism and the platen angle adjustment until the value to be correct.*

### 4.1.7 Platen Gap Motor Value Adjustment

This section describes how to measure the parameter (ALPHA and BETA values) for the PG mechanism unit. Since the ALPHA and BETA values are unique to each mechanism unit, it is written on the label as shown in Figures 4-17 and 4-18, so that it can be confirmed at glance. Be sure to perform this measurement and correct the value written on the label because the value is necessary when the other units (board, printhead) are changed.



- ☑ This measurement is important because it determines the platen gap, so be sure to use the exclusive thickness gauge set and tension gauge.
- Thickness gauge (0.43 mm)
- Thickness gauge (0.80 mm)
- Tension gauge (200 g) : #F545 (EPSON Part No. B765114601)
- ☑ Do not turn the printer off during adjustment.
- When adjusting the platen gap to narrower or wider using the Micro Feed (^) and Micro Feed (v) switches, be sure to adjust the gap by 1 step at a time.
- ☑ After perform this adjustment, perform the Bi-Directional adjustment as explained in section 4.1.8.

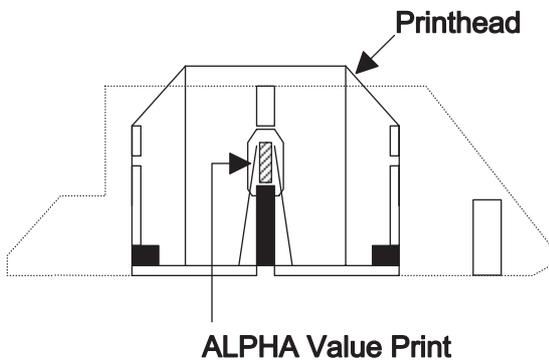


Figure 4-17. ALPHA Value Print

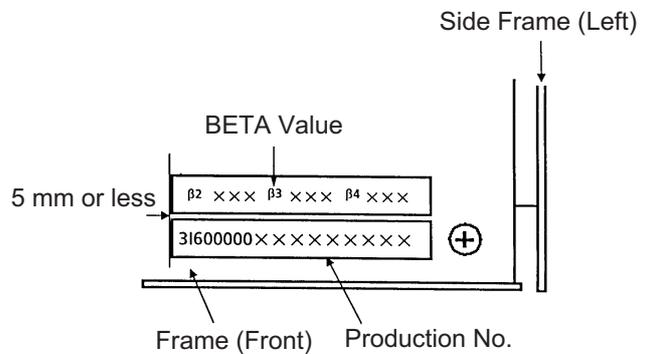


Figure 4-18. BETA Values Print

- Step 1: Remove the paper, ribbon cartridge, and ribbon mask holder from the printer. Then confirm the ALPHA value written on the print head nose.
- Step 2: Close the top cover.

**ALPHA Value Write Mode :**

- Step 3: Turn the printer on while pressing the Tear Off, Micro Feed (v), and Front/Rear switches. At this time the printer performs PG home position seek. and the carriage moves to the 15 column.
- Step 4: The panel indicates the current ALPHA adjustment value (Refer to Table 4-1.).
- Step 5: Write the ALPHA value written on the print head into the memory.
- Press the Micro Feed (v) switch to increment value by +1.
  - Press the Micro Feed (^) switch to decrement the value by -1.
- Step 6: 1) When you finish the adjustment (such as you have replaced the print head.), press the LF/FF Load SW, then the ALPHA value is written to the EEPROM and finish the adjustment mode. Then turn the power off and install the ribbon mask holder and the ribbon cartridge.
- 2) When you continue the BETA values write operation, press the Pause SW, then the ALPHA value is written to the EEPROM and enter to the BETA values write mode.

**BETA Values Write Mode :**

- Step 7: Open the top cover and inset the 0.43 mm thickness gauge into the space between the platen and the print head nose. (At this time, never shift the print head. If done it, return to Step 3.)
- Step 8: Contact the tension gauge to the hole of the thickness gauge and pull it straight to the right.
- Step 9: Hold the thickness gauge gradually with the print head nose by pressing the below switch.
- Press the Micro Feed (v) switch to increment value by +1.
  - Press the Micro Feed (^) switch to decrement the value by -1.
- The panel indicates the current BETA3' adjustment value (Refer to Table 4-1.).
- Step 10: Set the BETA3' value when the tension gauge indicates the 150 (135 - 165) gf, the tension gauge can move to right in a degree.
- Step 11: After complete BETA3' adjustment, press Pause SW to enter next step.
- Step 12: Close the print head nose to the platen by pressing the below switch.
- Press the Micro Feed (v) switch to increment value by +1.
  - Press the Micro Feed (^) switch to decrement the value by -1
- The panel indicates the current BETA2 adjustment value (Refer to Table 4-1.).
- Step 13: After complete BETA2 adjustment, press Pause SW to enter next step.
- Step 14: Inset the 0.43 mm thickness gauge into the space between the platen and the print head nose.
- Step 15: Hold the thickness gauge gradually with the print head nose by pressing the below switch.
- Press the Micro Feed (v) switch to increment value by +1.
  - Press the Micro Feed (^) switch to decrement the value by -1.
- The panel indicates the current BETA3 adjustment value (Refer to Table 4-1.).
- Step 16: After complete BETA3 adjustment, press Pause SW to enter next step.
- Step 17: Inset the 0.80 mm thickness gauge into the space between the platen and the print head nose.
- Step 18: Hold the thickness gauge gradually with the print head nose by pressing the below switch.
- Press the Micro Feed (v) switch to increment value by +1.
  - Press the Micro Feed (^) switch to decrement the value by -1.
- The panel indicates the current BETA4 adjustment value (Refer to Table 4-1.).
- Step 19: After complete BETA4 adjustment, press Pause SW then all of measured BETA values written to the EEPROM, and turn the printer power off.

**Note:** *When either the measured BETA values (BETA2, BETA3, and BETA4) are out of range (Refer to Table 4-1.) or the below formula is not satisfied, the printer sounds five beeps and not written the values to the EEPROM.*

$$\text{Formula: } A1 = 0.43 / (\text{BETA3} - \text{BETA2}) \quad \text{and} \quad 0.0134 < A1 < 0.0187$$

$$A2 = (0.80 - 0.43) / (\text{BETA4} - \text{BETA3}) \quad \text{and} \quad 0.0115 < A2 < 0.0195$$

- Step 20: Install the ribbon mask holder and the ribbon cartridge.

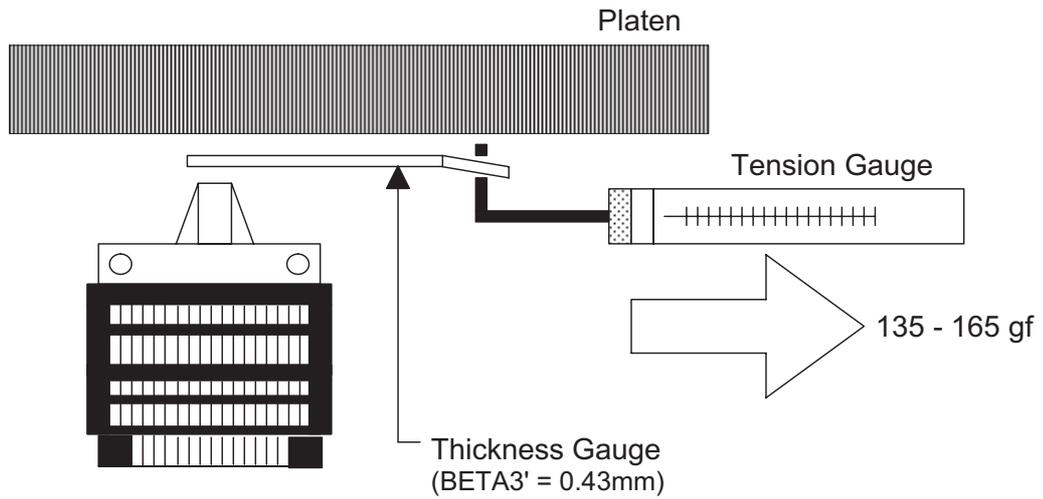


Figure 4-19. Thickness Gauge Setting Method

Table 4-1. BETA Values Adjustment

Beta No.	Reference Thickness Gauge	Allowed Value	Default Value*1)
BETA 3'	0.43 mm with 150gf pull	-	-
BETA 2	0.00 mm	367 - 419	408
BETA 3	0.43 mm	405 - 437	435
BETA 4	0.80 mm	418 - 475	461

\*1: When EEPROM is reset.

### 4.1.8 Measurement Seeking and Bi-directional Printing Adjustment

The purpose of this adjustment is to correct the printer mechanism parameters which control bi-directional printing. Be sure to perform this adjustment when required. If this adjustment is not performed correctly, bi-directional printing may be miss-aligned, or, in the worst case, the carriage might operate incorrectly. Before performing this adjustment, be sure to that the following adjustment are completed correctly.

- 4.1.2 Carriage Timing Belt Tension Adjustment
- 4.1.5 Carriage Guide Shaft parallelism Adjustment
- 4.1.6 Platen Angle Adjustment
- 4.1.7 Platen Gap Motor Value Adjustment

The parameters to be written to the EEPROM on the C204 Main board in this adjustment are as follows:

- 1) Measurement seeking
- 2) Print head flight time adjustment value
- 3) Bi-directional printing alignment value for each speed mode, Super Draft, Draft, and NLQ

- ☑ *If the DIP-SW "3-5" is set to the IBM mode (On), it can not perform the Bi-D adjustment. Therefore, when you perform the Bi-D adjustment, set the DIP-SW"3-5" to Off.*
- ☑ *When replace the C204 Main board, the ALPHA and BETA values are not written into the memory (In reality, "0" value is installed.) on the Main board. Since this reason, (Since PG is too large) it can not print the each current value to the paper. Due to this, Perform the platen gap value adjustment before perform this adjustment.*

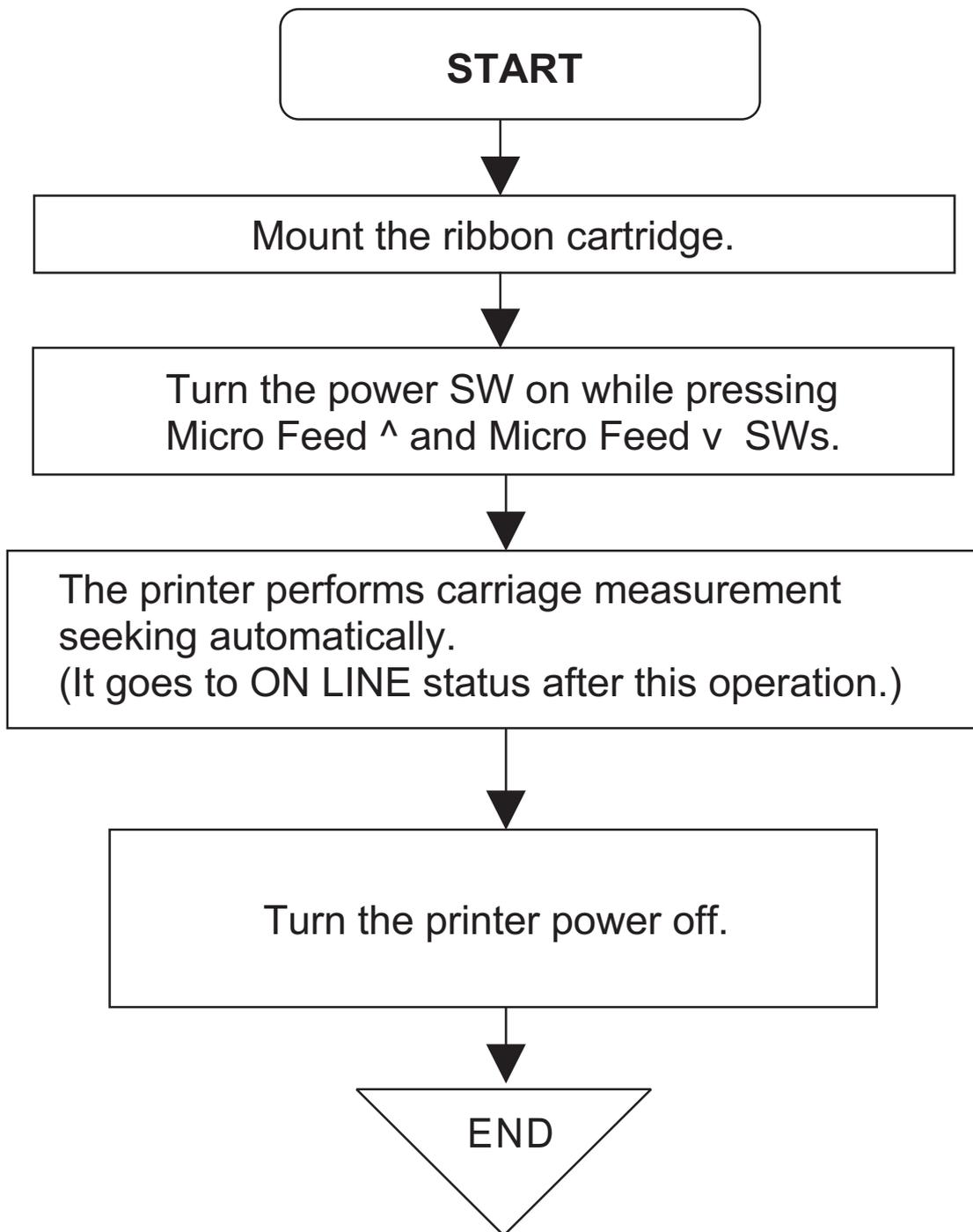


Figure 4-20. Carriage Measurement Seeking

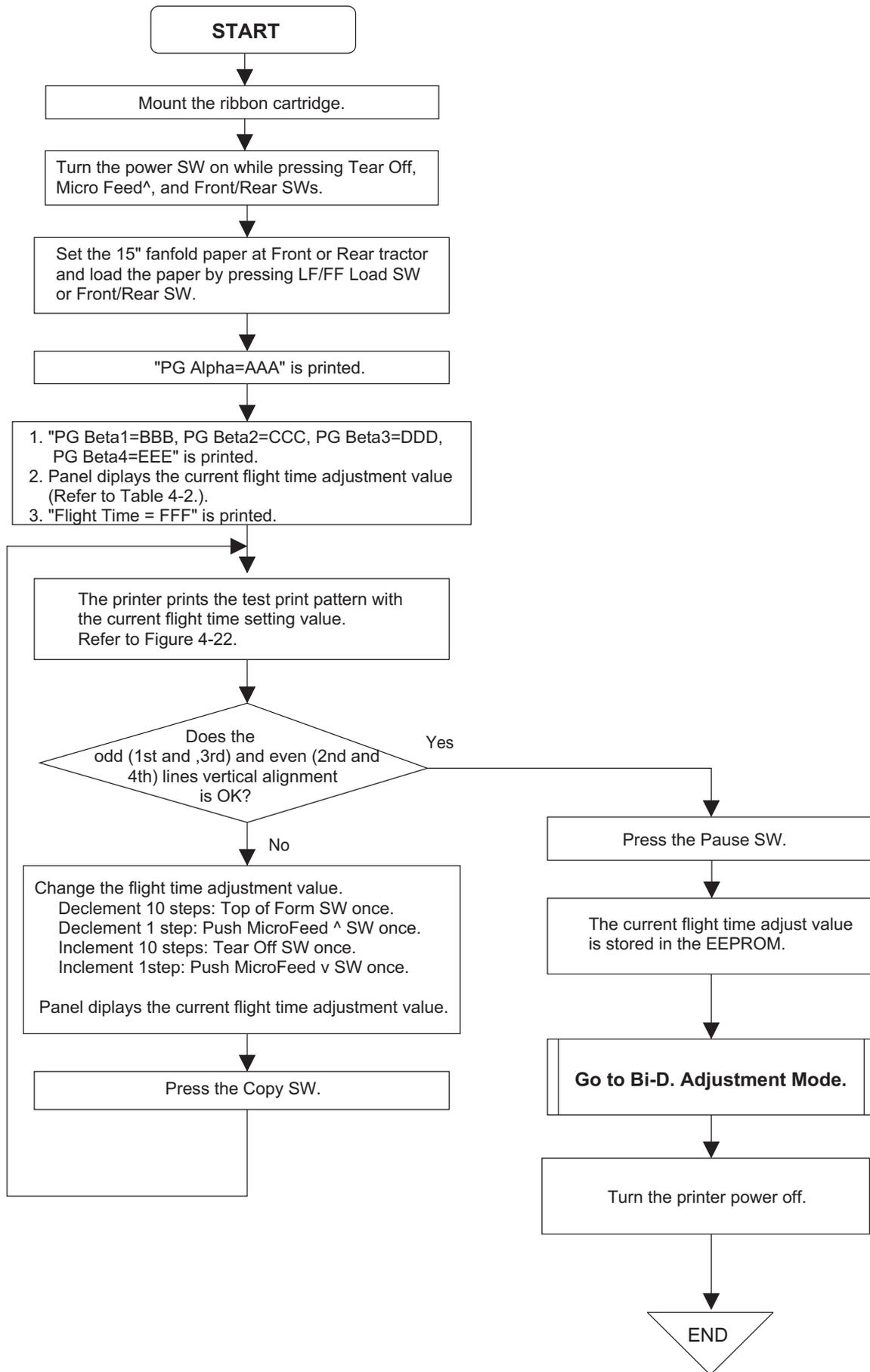


Figure 4-21. Flight Time Adjustment

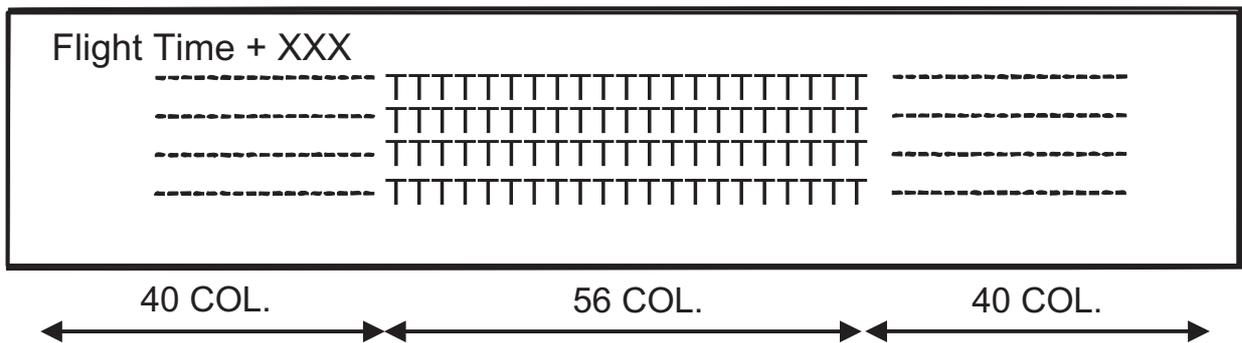


Figure 4-22. Test Print Pattern

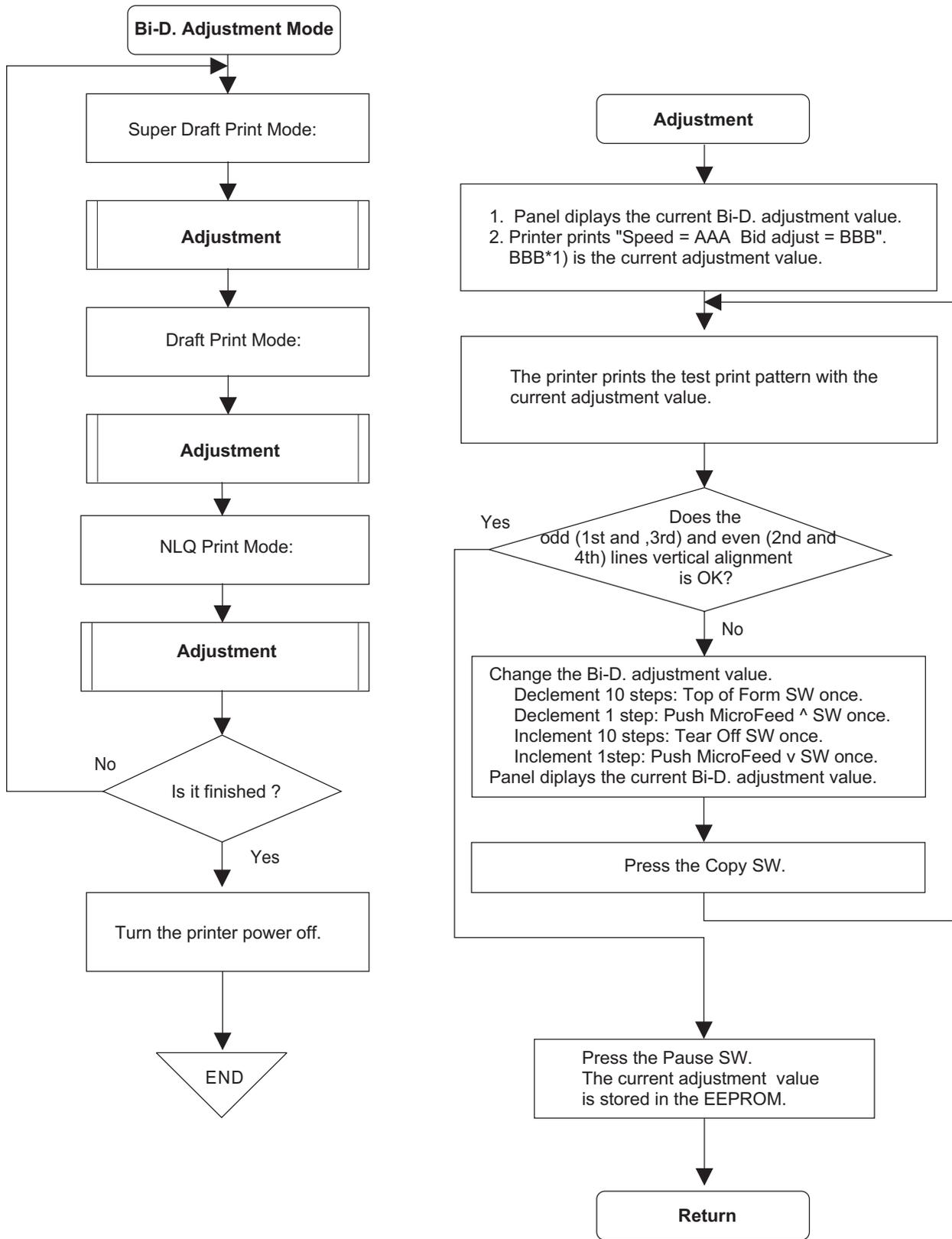
Table 4-2. LED indication and Adjustment Value Comparison

LED*1)	Off	On*2)
Ribbon (Bi-d. adjustment) (PG adjustment)	+ (positive) 300	(negative) 400
Pause		10
Top of Form		20
Tear Off		30
Copy		40
Pitch ■■■□		50
■□□		60
□□□		70
Font ■□		80
□□		90
7 Segment*3)		0 to 9

\*1) ■: off, □: On

\*2) Indicates 2<sup>nd</sup> column.

\*3) Indicates 1<sup>st</sup> column.



\*1)

Speed	BBB
Super Draft	SdrSpd
Draft	DrfSpd
NLQ	NLQSpd

Figure 4-23. Bi-d. Adjustment



# CHAPTER 5 TROUBLESHOOTING

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5.1 PROBLEM ISOLATION.....	5-1
5.2 SELF DIAGNOSTIC FUNCTION.....	5-2
5.3 TROUBLESHOOTING .....	5-3



## 5.1 TROUBLESHOOTING INFORMATION

The information in this chapter makes troubleshooting easier to perform by listing various problems that can occur and providing possible solutions.

**Note:** *For this printer, no special tools are necessary for troubleshooting to the unit level, with the exception of a digital multi-meter. Some component-level troubleshooting may require an oscilloscope.*

### 5.1.1 Error Messages

The DFX-8500 indicates errors using beeps. Table 5-1 lists fatal errors.

Table 5-1. Fatal Error Information

Fatal Error	7-segment LED *1)	Beeper *2)	Description	Note*3)
CR motor circuit shortage error	1	-	<ul style="list-style-type: none"> <li>The isolation resistance in the CR motor is too low.</li> </ul>	Auto power off after 12 seconds
Cutter error	2	--	<ul style="list-style-type: none"> <li>Optional cutter cable is not connected firmly.</li> <li>Optional cutter is defective.</li> </ul>	Auto power off after 12 seconds
Platen gap error	3	---	<ul style="list-style-type: none"> <li>The PG home sensor is broken.</li> <li>The PG motor is broken.</li> <li>The parallelism adjustment is incorrect.</li> <li>PG adjustment values are incorrect.</li> <li>PG backlash is too tight.</li> </ul>	Auto power off after 12 seconds
Carriage lock error	4	----	<ul style="list-style-type: none"> <li>The carriage is locked.</li> <li>The interlock switch doesn't close exactly.</li> <li>The parallelism adjustment is incorrect.</li> <li>PG adjustment values are incorrect.</li> </ul>	Auto power off after 12 seconds
Carriage load measurement error	6	-----	<ul style="list-style-type: none"> <li>PW sensor is defective.</li> <li>The CR motor is defective.</li> <li>The CR encoder sensor is defective.</li> </ul>	Auto power off after 12 seconds
Head fan error	7	-----	<ul style="list-style-type: none"> <li>The head fan driver IC is shorted.</li> <li>The head fan of the print head is defective.</li> </ul>	Head power off immediately
Head circuit shortage error	8	-----	<ul style="list-style-type: none"> <li>The print head driver IC is shorted.</li> <li>The coil of the print head is defective.</li> </ul>	Head power off immediately
RAM check error	9	-----	<ul style="list-style-type: none"> <li>DRAM of C204 MAIN board is defective.</li> </ul>	Auto power off after 12 seconds
Paper memory setting error	a	-----	-	-
EEPROM data compare error	b	-----	<ul style="list-style-type: none"> <li>EEPROM on the C204 MAIN board is defective.</li> </ul>	
Tractor change error	c	----- -	<ul style="list-style-type: none"> <li>Tractor select mechanism is defective.</li> </ul>	Auto power off after 12 seconds
Watch dog error	d		<ul style="list-style-type: none"> <li>C205 MAIN board has trouble.</li> </ul>	Auto power off after 12 seconds

**Note 1:** *The 7 segment LED indicates error No. and "E" alternately.*

**Note 2:** *The descriptions "." and "-" show how the beeper sounds.*

*“.”: Beeper sounds 100 ms and interval is 100 ms.*

*“-”: Beeper sounds 500 ms and interval is 100 ms.*

**Note 3:** *Turn the printer power off while the 7 segment LED are on, or the printer shuts power down automatically. You can't turn the printer back on for 5 minutes after the printer shuts power down automatically*

### 5.1.2 Bypassing Interlock Switch and Cover Open Sensor

To print with the top cover open or removed, you need to bypass the interlock switch and cover open sensor because these sensors automatically disable printing when the top cover is open.

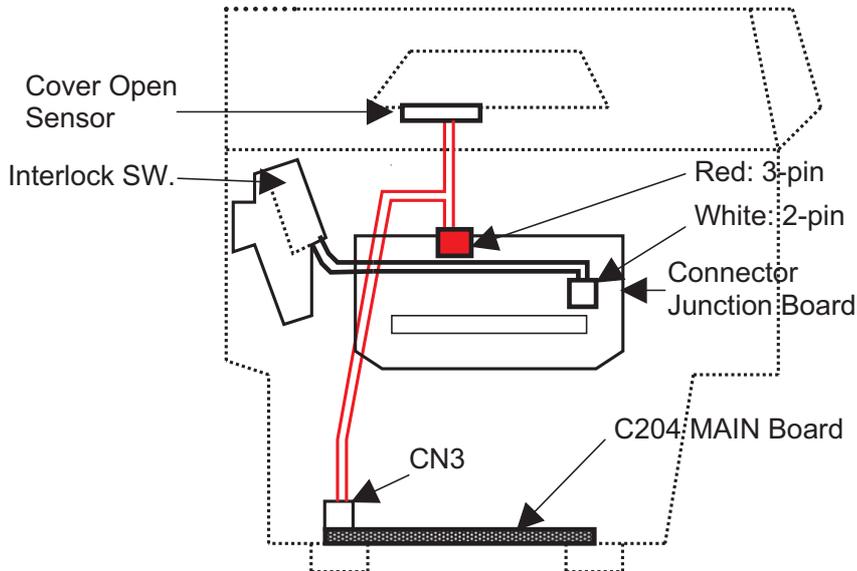


Figure 5-1. Interlock Switch Assembly Location

The interlock switch and cover open sensor consists of an assembly. To bypass the interlock switch and the cover open sensor,

1. remove the left side cover,
2. make the short circuit connectors for the interlock switch and cover open sensor connectors,
3. insert the short circuit connectors for the interlock switch and cover open sensor connectors.

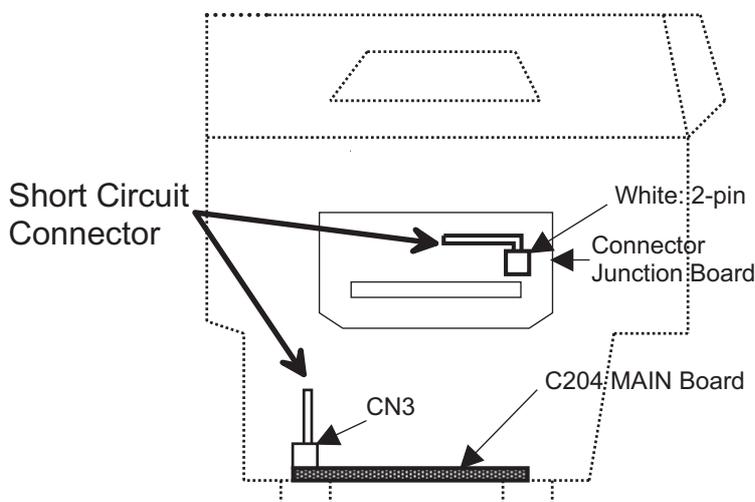
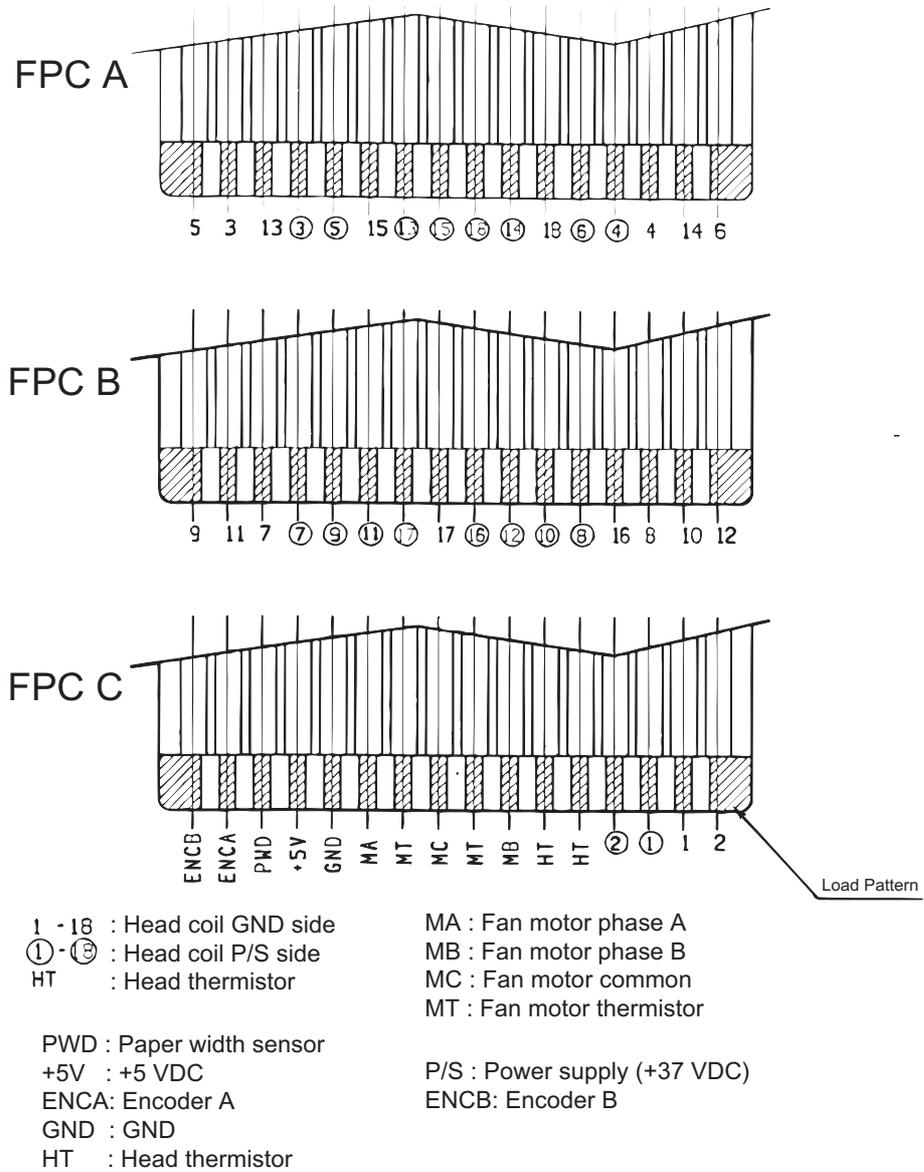


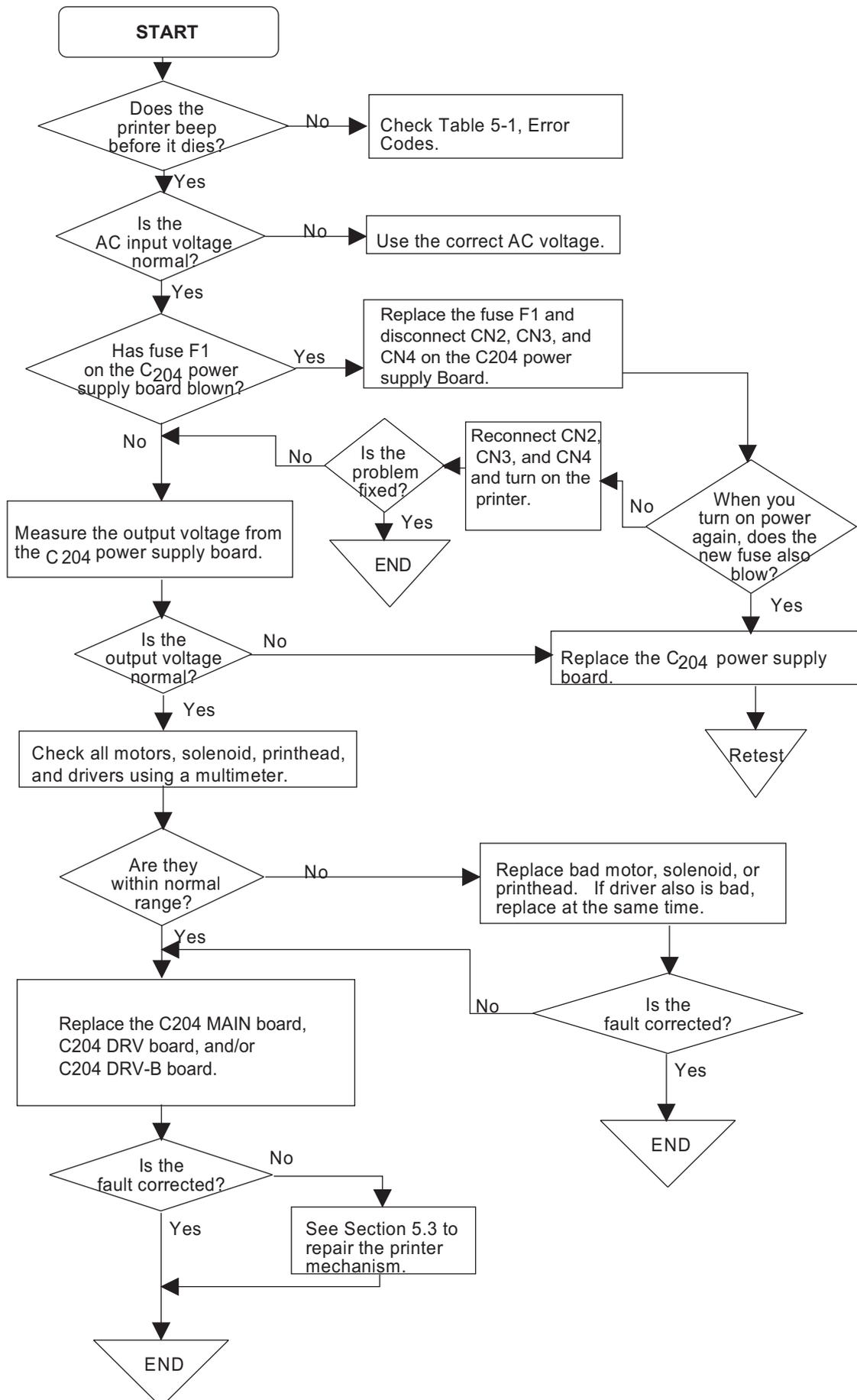
Figure 5-2. Bypassing Interlock Switch and Cover Open Sensor



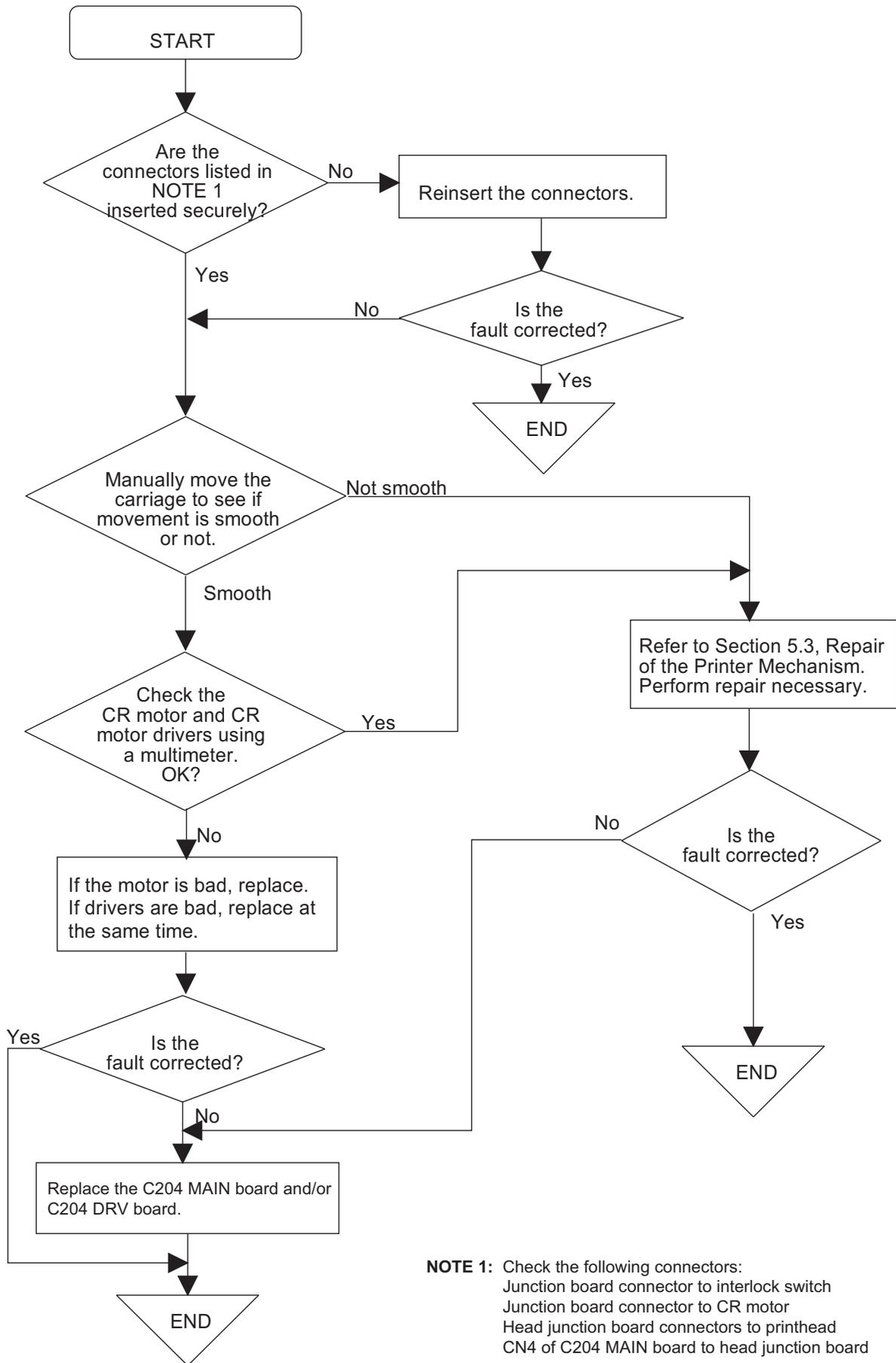


**Figure 5-4. Printhead Coil Resistance**

## 1. The printer does not operate when power is turned on.

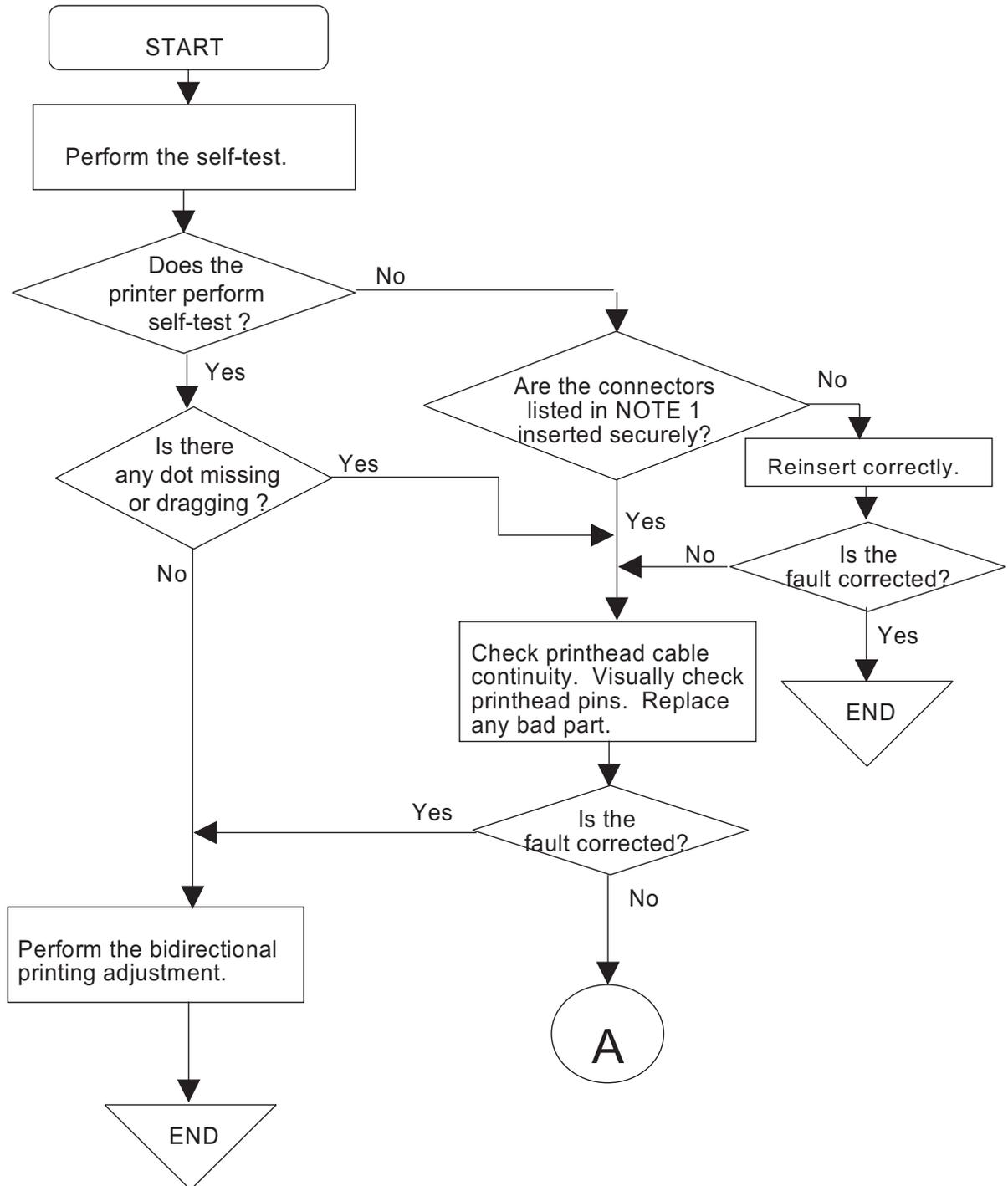


2. Carriage operation is abnormal.



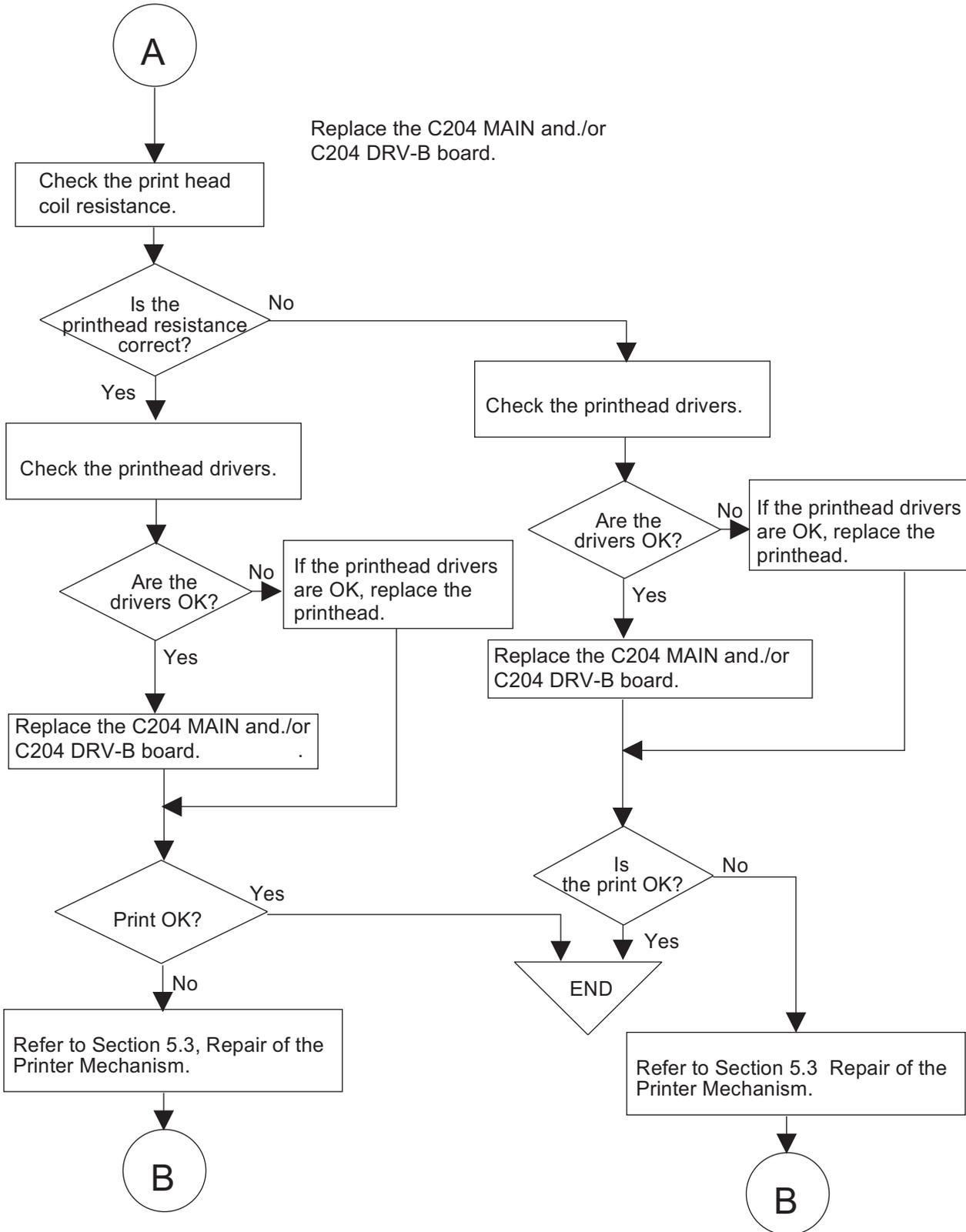
**NOTE 1:** Check the following connectors:  
 Junction board connector to interlock switch  
 Junction board connector to CR motor  
 Head junction board connectors to printhead  
 CN4 of C204 MAIN board to head junction board

## 3. Carriage operation is normal, but the self-test is printed incorrectly (1/3).

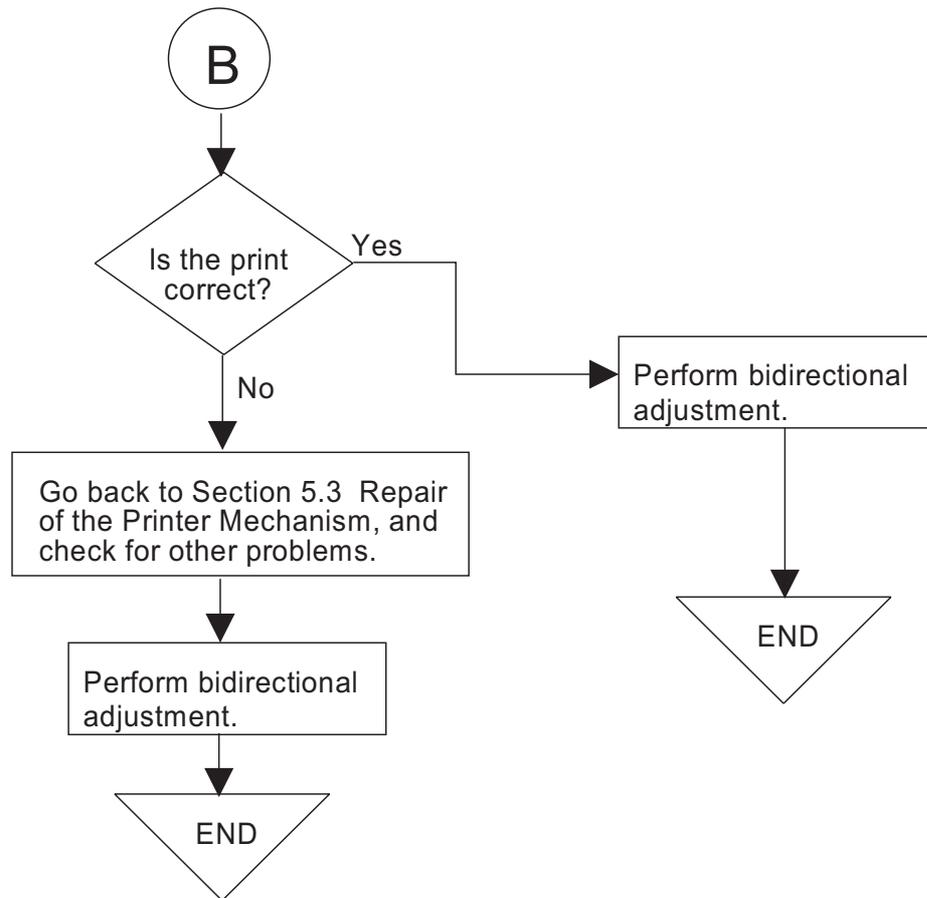


**NOTE 1:** Check the following connectors:  
 Three head junction board connectors to printhead  
 CN1 of C204 MAIN board to head junction board  
 CN2 of C204 MAIN board to C204 DRV-B board  
 CN1 of C204 DRV-B board to printer mechanism

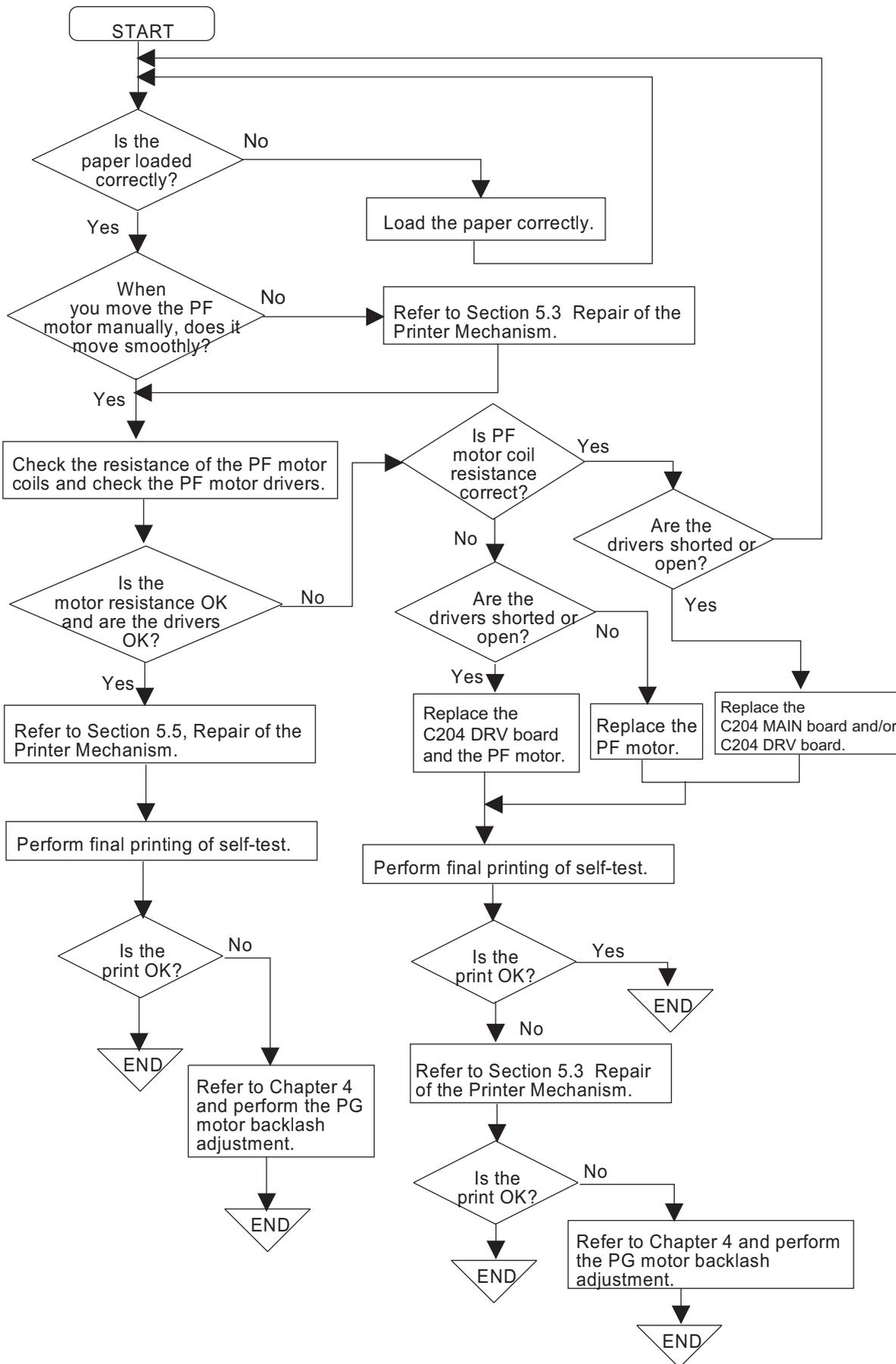
3. Carriage operation is normal, but the self-test is printed incorrectly (2/3).



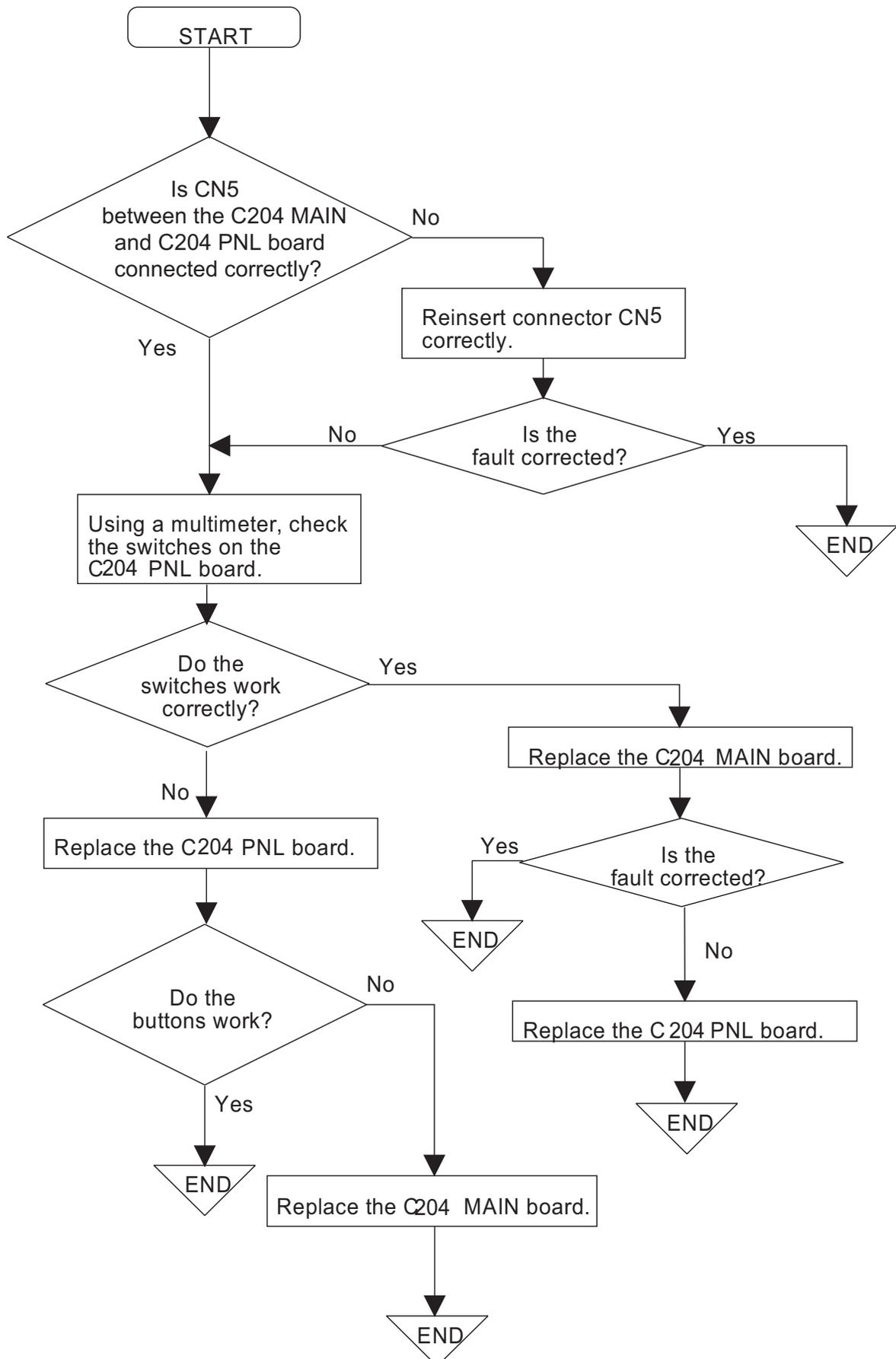
## 3. Carriage operation is normal, but the self-test is printed incorrectly (3/3).



4. Printing is normal, but paper feeding is abnormal.



## 5. Panel unit operation is abnormal.





## 5.2 CIRCUIT BOARD REPAIR

This section provides detailed troubleshooting methods to isolate components in the power supply or on the main board. This information is for use by service personnel who repair to the component level.

The table below provides causes, checkpoints, and solutions for different power supply circuit problems. The checkpoints include waveforms for normal operation. By referring to the checkpoints, determine the defective component. Then perform the proper repair. The table provides the following four columns:

- Symptom: Check this column for a list of common printer problems.
- Cause: Use this column to identify possible causes that could produce this symptom.
- Checkpoint: Follow the troubleshooting checks in this column to isolate your problem.<
- Solution: Repair the printer using the instructions in this column.

### 5.2.1 C204 PSB/PSE Board Repair

Table 5-4 indicates major components which is used for the C204 PSB/PSE board and Table 5-4 shows the C204 PSB/PSE board component level troubleshooting.

**Table 5-4. C204 PSB/PSE Board Main Parts List**

Location	Description
DB1	Diode bridge
TY1	TRIAC
QF101	Switching FET for VP1 and VP2
QF201	Switching FET for VP3 and +5 VDC
IC101	PWM switching controller
IC204	+5 V regulator IC

**Table 5-5. C204 PSB/PSE Board Component Repair 1/3**

Symptom	Cause	Checkpoint	Solution
No DC voltage is present at the output . (Fan on the power supply board doesn't rotate at all.)	PD signal is HIGH (sent from the main board).	Measure the signal level of the PD signal at CN4.	Wait until the printer prints again. Replace the E05B36 on the C204 MAIN board.
	The DRERR signal is HIGH.	Measure the signal level of the DRERR signal at CN4.	Replace the printhead driver on the C204 MAIN board and/or C204 DRV-B board.
	CL signal is HIGH.	Measure the signal level of the CL signal at CN4.	Wait until the printer prints again. Replace the E05B36 on the C204 MAIN board.
Fuse F1 blows immediately after replacement.	The line filter circuit is defective.	Check if any of pins C1-C5 or R1 is shorting the AC line.	Replace the abnormal element.

**Table 5-5. C204 PSB/PSE Board Component Repair 2/3**

<b>Symptom</b>	<b>Cause</b>	<b>Checkpoint</b>	<b>Solution</b>
The +37 VDC (VP1 / VP2) line is dead.	The main switching FETs QF101 is defective.	Observe the voltage waveform between the drain side and GND.	Replace QF101.
	IC101 is defective.	Pin 5 (FB) must be HIGH then observe the voltage waveform between pin 2 (VOUT) and pin 12 (GND) of IC101.	Replace IC101.
The +37 VDC (VP3) line is dead.	The main switching FETs QF201 is defective.	Observe the voltage waveform between the drain side and GND.	Replace QF201.
	Q201 is defective.	Observe the voltage waveform between the collector side and GND.	Replace Q201.
	Q202 is defective.	Observe the voltage waveform between the collector side and GND.	Replace Q202.

Table 5-5. C204 PSB/PSE Board Component Repair 3/3

Symptom	Cause	Checkpoint	Solution
The 5 VDC line is defective.	IC204 is defective.	Check the voltage level at pin 10 (V1) and pin5 (GP).	Replace IC204.
		Observe the drive waveform at pin 8 (VO) and pin 5 (GP).	Replace IC204 or ZD211.
37 VDC line (VP1/VP2) is abnormal.	IC102 is defective. (If this IC is defective, it cannot monitor the 37 VDC lines, and printing operation becomes abnormal.),	When the input voltage of the minus port (pin 6 for VP1 and pin2 for VP2) is less than <u>1.3</u> VDC, the comparator outputs a HIGH signal.	Replace IC203.
37 VDC line (VP3) is abnormal.	IC203 is defective. (If this IC is defective, it cannot monitor the 37 VDC lines, and motor operations become abnormal.),	When the input voltage of the plus port is bigger than <u>1.3</u> VDC, the comparator outputs a HIGH signal.	Replace IC203.

### 5.2.2 C204 MAIN/DRV/DRV-B Boards Repair

Table 5-6 indicates major components which is used for the C204 MAIN/DRV/DRV-B boards and Table 5-7 shows the C204 MAIN/DRV/DRV-B boards component level troubleshooting.

**Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 1/7**

Symptom	Cause	Checkpoint	Solution
The printer does not operate at all.	The DRERR signal was sent to the C204 power supply board (HIGH level turns off the power supply).	Check the logic level of the DRERR signal at CN10 or check the VP1 and VP2 voltage.	Replace the head driver on the C204 MAIN board (VP1) or C204 DRV-B board (VP2).
	The PD signal was sent to the C204 power supply board. (HIGH level turns off the power supply)	Check the logic level of the PD signal during power on and verify the voltage waveform for the head driver. (Refer to the head driver waveform figure, above.)	Replace the head driver or gate array.
	The reset circuit is not operational (for logic).	Check the logic level at pin1 (VOOUT) of IC13.	Replace IC13.
The driver circuits don't operate at all.	The pull up voltage VX is not generated.	When the collector of Q15 is high Check the logic level at collector of Q14 (VX) (When the collector of Q15 is high, VX is HIGH..	Replace Q15.
Serial interface is dead.	The level converter IC is defective.	Check the signal level change between in and out port of the IC9.	Replace IC9.

Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 2/7

Symptom	Cause	Checkpoint	Solution
The printer does not operate at all.	The control ROM is defective.	Confirm that the PROM is inserted the socket correctly.	Replace IC5.
	The gate array (IC1) is defective.	Check pin 86 (D0) of IC1 for a change in the signal (HIGH or LOW).	Replace IC1.
	The CPU (IC2) is defective	Look at the oscillator at either pin 27 (x1) or pin 28 of the CPU.	Replace CRU1 or IC1
	The DRAM (IC14) is defective	Observe pin 2 (D0) of IC14 for a change in the signal (HIGH or LOW).	Replace IC14.

**Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 3/7**

Symptom	Cause	Checkpoint	Solution
The carriage operates abnormally.	IC1 on the C204 MAIN board is defective.	Check the signals for the carriage motor phases at pins 204 (CRA), 205 (CRB), 206 (CRC), and 5 (CRD) of IC1	Replace IC1.
	Q16, Q17, Q18, or Q19 on the C204 MAIN board is defective.	Check the signals for the carriage motor phases at collectors Q16 (CRA), Q17 (CRB), Q18 (CRC), and Q19 (CRD).	Replace Q16, Q17, Q18, or Q19.
	IC1 is doesn't work.	Check the voltage level between Anode and Kathode of ZD2 is APPROX. 6.2 V.	Replace ZD2, Q34, or Q35.
	IC1 on the C204 DRV board is defective.	Check the signals for the carriage motor phases at pins 14 (IN_A) and 10 (OUT1) of IC1..	Replace IC1.
		Measure the voltage level at pins 10 (OUT1) and 5 (GP) of IC1 when the carriage is operating. (The normal voltage level is approximately 37 VDC.),	Replace IC1.
	IC3 on the C204 DRV board is defective.	Observe the waveform at pin 1 of IC3.	Replace IC3.

Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 4/7

Symptom	Cause	Checkpoint	Solution
The carriage operates abnormally.	The carriage encoder sensor is defective.	Observe the carriage encoder sensor output signal at pins 4 (ENCA) and 3 (ENCB) of CN4 on the C204 MAIN board.	Replace the carriage encoder sensor.
	Carriage operation is unstable (due to a lack of motor torque).	Check the switching waveform for Q5, Q6, and Q7.	Replace the abnormal transistor.

**Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 5/7**

Symptom	Cause	Checkpoint	Solution
Paper feeding is abnormal.	The CPU IC2) on the C204 MAIN board is defective.	Check the PF motor phase drive signals at pins 2 - 5 of IC2.	Replace IC2.
	IC2 on the C204 DRV board is defective.	At IC2, check the output signals for pins 2 (OUT_A), 3 (OUTXA), 6 (OUT_B), and 7 (OUTXB).	Replace IC2.
Ribbon feeding is abnormal.	The CPU IC2) on the C204 MAIN board is defective.	Check the RF motor phase drive signals at pins 6 - 9 of IC2.	Replace IC2.
	The common switching transistor on the C204 DRV board is defective.	Check the collector voltage of Q21.	Replace Q20 or Q21.
	The phase switching transistor on the C204 DRV board is defective.	For transistors Q22 - Q25, observe the input signal from the CPU (base) and the output signal (collector).	if there is no output signal, replace the abnormal transistor.
	Fuse F1 on the C204 DRV board is defective.	Check if fuse F1 is defective.	Replace F1.

Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 6/7

Symptom	Cause	Checkpoint	Solution
The head fan operation is abnormal.	IC1 on the C204 MAIN board is defective.	Observe the PG motor phase signal at pins 163 (FANA) and 164 (FANAX) of IC1.	Replace IC1.
	Q10 or Q11 on the C204 MAIN board is defective.	Observe the head fan phase drive voltage level for pins 25 (HFANA) and 17 (HFANB) of CN1. (The normal voltage is approximately 37 VDC.)	Replace Q10 or Q11.
The PG motor operates abnormally.	IC1 on the C204 MAIN board is defective.	Observe the PG motor phase signal at pins 10 (PGA), 12 (PGB), 14 (PGAX), and 13 (PGBX) of IC1.	Replace IC1.
	The common switching transistor on the C204 DRV board is defective.	Check the collector voltage of Q11.	Replace Q10 or Q11.
	The phase switching transistor on the C204 DRV board is defective.	For transistors Q12 - Q15, observe the output signal (collector).	if there is no output signal, replace the abnormal transistor.
	Fuse F2 on the C204 DRV board is defective.	Check if fuse F2 is defective.	Replace F2.
	The PG sensor is defective.	Observe the PG sensor output signal at pins 35 (PGENCA) and 34 (PGENCB) of CN14.	Replace the PG sensor.
	The PG home position sensor is defective.	Observe the PG HP sensor signal level for pin 36 (PGHOME) of CN14. (PG home = LOW level; other = HIGH level.)	Replace the PG home position sensor.
The plunger is defective.	Fuse F3 is defective	Check if fuse F3 is defective.	Replace F3.
	IC1 on the C204 MAIN board is defective.	When paper is loaded into the printer, look at the switching signal at pins 16 (PLP) and 17 (PLN) of IC1.	Replace IC1.
	Plunger drive transistor on the C204 DRV board is defective.	Observe the Q31 collector voltage at paper loading.	Replace Q31, Q30, or Q32.

Table 5-6. C204 MAIN/DRV/DRV-B boards Component Repair 7/7

Symptom	Cause	Checkpoint	Solution
The self-test is printed incorrectly	IC1 on the C204 MAIN board is defective.	Observe the output signal at pins 136-181 of IC1.	Replace IC1.
	The head driver FETs on the C204 MAIN and/or C204 DRV-B boards are defective.	Observe the voltage waveform at the each FET drain side.	Replace the abnormal FET.
	The CPU (IC2) on the C204 MAIN board is defective.	Observe the signals at pins 38 (PTS1) and 42 (PTS2) of the IC2	Replace the IC2.

### 5.2.3 Printer Mechanism Repair

The table below describes how to isolate problems with the printer mechanism. To replace or adjust printer mechanism parts, refer to Chapter 3, *Disassembly and Assembly*, and Chapter 4, *Adjustments*. If a symptom recurs following a repair attempt, look for other possible causes and solutions in the table below.

**Table 5-7. Printer Mechanism Repair 1/4**

Symptom	Cause	Checkpoint	Solution
The CR motor does not operate.	The transport locking bracket (used to hold the carriage in place when the printer is moved) has not been removed.	Verify that the transport locking bracket has been removed.	Remove bracket. (Refer to Section 3.1.)
	Foreign objects are lodged in the gears or elsewhere (e.g. paper dust on the carriage encoder belt) in the mechanism.	Manually move the carriage to see if the motor rotates.	Remove any foreign objects.
	The CR motor is defective.	Measure the coil resistance of the CR motor. It should be approximately 1.66 ohms + 10 %.	Replace the CR motor.
	The carriage timing belt is defective.	Manually check the carriage timing belt tension.	Perform the carriage timing belt tension adjustment, as described in Section 4.1.2.
	The carriage guide shaft parallelism value is incorrect.	Check whether the carriage moves smoothly when moved manually. (Check that foreign objects are not lodged in the printer mechanism.),	Perform the carriage guide shaft parallelism adjustment, as described in Section 4.1.5.
	The CR encoder sensor is defective.	Check the waveform for the carriage encoder signal. (Refer to Table 5-6.),	Replace the CR encoder sensor.
	The carriage encoder belt is damaged or covered with dust.	Check the encoder belt (below the carriage timing belt).	Replace or clean the carriage encoder belt.
The carriage moves, but no printing is performed.	The printhead FPC common wires are broken.	Check the continuity of the common wires for the printhead FPC.	Replace the FPC.

Table 5-7. Printer Mechanism Repair 2/4

Symptom	Cause	Checkpoint	Solution
A particular dot does not print.	The printhead is defective.	Measure the printhead coil resistance. (Refer to Figure 5-4 for details.)	Replace the printhead.
		Check whether a dot wire is worn.	Replace the printhead.
The print is too light or print density is not uniform.	The printhead is defective.	Check if the tip of a dot wire is worn.	Replace the printhead.
	The parallelism value is incorrect.	Print density differs at the right and left sides of the page (darker on one side than the other).	Perform the parallelism adjustment, as described in Section 4.1.5.
	The platen gap value is incorrect.	Print density is too light even the new ribbon cartridge is mounted.	Perform the parallelism adjustment, as described in Section 4.1.5.
Printing is performed, but the printer does not feed paper or does not feed it correctly.	Foreign objects are lodged in the paper path.	Visually check the paper path.	Remove any foreign substances.
	The PF motor is not driving the gear properly.	Check whether the PF motor pinion gear rotates smoothly when rotated manually	Check backlash between PF motor pinion gear and paper feed reduction gear.
	The PF motor is defective.	Measure coil resistance for the PF motor. (The correct resistance is approximately 2.8 ohms $\pm$ 10%.) Also check the PF motor drivers.	Replace the PF motor, and if drivers are bad, replace main board at the same time
The ribbon feed (RF) motor does not operate.	The ribbon cartridge is defective.	Remove the ribbon cartridge, rotate it, and check whether it feeds the ribbon normally.	Replace the ribbon cartridge.
	Foreign objects are caught in the gears.	Check whether the ribbon driving gear rotates when the cartridge is moved manually.	Remove any foreign objects or replace damaged ribbon feed mechanism part (the ribbon feed select gear, ribbon feed transmission gear, or ribbon feed gear).

..

Table 5-7. Printer Mechanism Repair 3/4

Symptom	Cause	Checkpoint	Solution
The RF motor does not operate.	The parallelism value is incorrect.	Check whether the carriage moves smoothly when moved manually. (Check that foreign objects are not lodged in the printer mechanism.)	Perform the parallelism adjustment, as described in Section 4.1.5.
The RF motor does not operate.	The RF motor is defective.	Check the coil resistance of the RF motor. (It should be about 150 ohms $\pm$ 10 %.)	Replace the RF motor.
The PG motor does not operate.	The backlash value is incorrect.	Check whether the carriage guide shaft rotates smoothly when rotated manually.	Loosen the 2 screws securing the PG motor to the left side frame. Then adjust the backlash between the PG motor pinion gear and the carriage guide shaft gear, as described in Chapter 4, <i>Adjustments</i> .
	The PG encoder sensor is defective	Check the output signal of the PG encoder sensor. (Refer to Table 5-6.)	Replace the PG encoder sensor.
	The encoder plate is defective.	Check whether the encoder plate is broken or stained.	Replace the PG motor or clean the encoder plate.
	The PG home sensor is defective	Check the continuity of the sensor. (Check the status of the two micro switches.),	Replace the PG home sensor (micro switch type).
	The PG motor is defective.	Check the coil resistance of the PG motor. (It should be about 250 ohms $\pm$ 18 ohms.)	Replace the PG motor.
Printing continues past the end of the paper.	The front, rear, or top PE sensor is defective.	Check the PE sensor.	Replace the PE sensor.
When paper jams, the printer does not beep.	The paper jam sensor is defective.	Check the paper jam sensor.	Replace the paper jam sensor.
Ribbon Jam error occurs even the ribbon is fed correctly.	Ribbon jam sensor is defective.	Check the ribbon jam sensor.	Replace the ribbon jam sensor.

**Table 5-7. Printer Mechanism Repair 4/4**

Symptom	Cause	Checkpoint	Solution
Printing occurs outside the paper width.	The PW sensor is defective.	Check the PW sensor.	Replace the PW sensor.
The paper bail assembly does not work.	The plunger is defective.	Check the coil resistance of the plunger. (It should be about 9 ohms.)	Replace the plunger.
Continuous paper becomes crumpled at the front or rear tractor assembly.	The tension value of the tractor wire spring is incorrect.	The distance between the frame and the seal securing the white line should be about 3 mm (0.12 inches).	Perform the tractor wire spring tension adjustment, as described in Section 4.1.3.
The tractor select (front or rear) function is not working.	The tractor select sensor is defective.	Check the continuity of the tractor select sensor.	Replace the tractor select sensor.
	The tractor select gear is disconnected from the tractor select cam.	Visually check the tractor select gear holder.	Join the tip of the tractor select lever to the tractor select gear holder.

# CHAPTER 6 MAINTENANCE

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6.2 LUBRICATION AND ADHESIVE APPLICATION.....	6-1





## 6.1 PREVENTIVE MAINTENANCE

To keep the printer in good condition, regularly clean the case exterior (using denatured alcohol) and vacuum the mechanism's interior to remove dust and paper debris. After cleaning the printer, check that it is adequately lubricated, as described in Section 6.2, below. Before returning the printer to the customer, inspect the springs and paper feed rollers and check that the printer operates properly.



*Disconnect the printer from the external AC power source before performing maintenance. Do not use thinner, trichloroethylene, or ketone-based solvents on the plastic components of the printer.*

**Note:** *It is necessary to clean the carriage encoder belt periodically. When this printer is returned for service, clean the surface of carriage encoder belt.*

## 6.2 LUBRICATION AND ADHESIVE APPLICATION

EPSON recommends that the printer be lubricated at the points illustrated in Figures 6-2, 6-3, and 6-4 using EPSON lubricants O2 and G26. These lubricants have been extensively tested and found to comply with needs of the printer. Refer to Table 6-1 for information on lubricants O2 and G26. Table 6-2 lists the appropriate lubricant for each point. Make sure the parts to be lubricated are clean before applying lubricant. Also avoid applying too much lubricant because it may damage related parts.

Adhesive application is necessary at the points indicated in Table 6-3 when parts are disassembled or replaced. EPSON recommends Neji Lock #2 (G) adhesive be applied to the points indicated in Figures 6-2, 6-3, and 6-4. Avoid allowing excess adhesive to overflow onto related parts.

**Table 6-1. Recommended Lubricants**

Type	Name	Quantity	Part No.	Availability
Grease	G26	40 g	B702600001	E
Oil	O2	40 cc	B710200001	E
Adhesive	Neji Lock #2 (G)	1000 g	B730200200	E

**Note:** *E = EPSON exclusive product (not commercially available)*



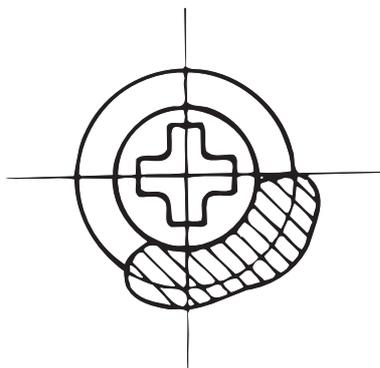
*Do not apply too much lubricant because it may create stains or cause the mechanism to malfunction.*

**Table 6-2. Lubrication Points**

Ref. No.	Ref. Figure	Lubrication Point	Lubricant
(1)	6-3	Carriage oil pad ring (on both left and right sides of carriage)	O2
(2)	6-3	Carriage oil pad (under the carriage head cable holder),	O2
(3)	6-3	Hole holding the tip of the rear carriage guide shaft (in both left and right side frames)	G26
(4)	6-3	Both edges of the rear carriage guide shaft	G26
(5)	6-3	Parallelism adjustment lever (contact point with the rear carriage guide shaft)	G26
(6)	6-4	Rear carriage shaft holding lever (contact point with the rear carriage guide shaft)	G26
(7)	6-3	Carriage guide shaft (on the both front and rear shafts)	G26
(8)	6-4	Platen roller shaft holder (contact point with the platen roller)	G26
(9)	6-4	Paper bail gear	G26
(10)	6-2	Shafts of paper feed gears (shafts on the left frame)	G26,O2
(11)	6-2	Paper feed gears (gears on the left frame)	G26
(12)	6-2	Tension pulley (pulley shaft and hook for the tension pulley spring)	G26
(13)	6-3	Fulcrum point for the paper bail shaft and plunger	G26
(14)	6-4	Platen gap motor pinion	G26
(15)	6-3	Carriage guide shaft gear	G26
(16)	6-3	Ribbon feed gears	G26
(17)	6-3	Tractor select cam	G26

**Table 6-3. Adhesive Application Points**

Ref. No.	Ref. Figure	Adhesive Application Point	Adhesive
(25)	6-3	Tractor tension wire	Neji Lock #2 (G)



**Figure 6-1. Correct Adhesive Application**

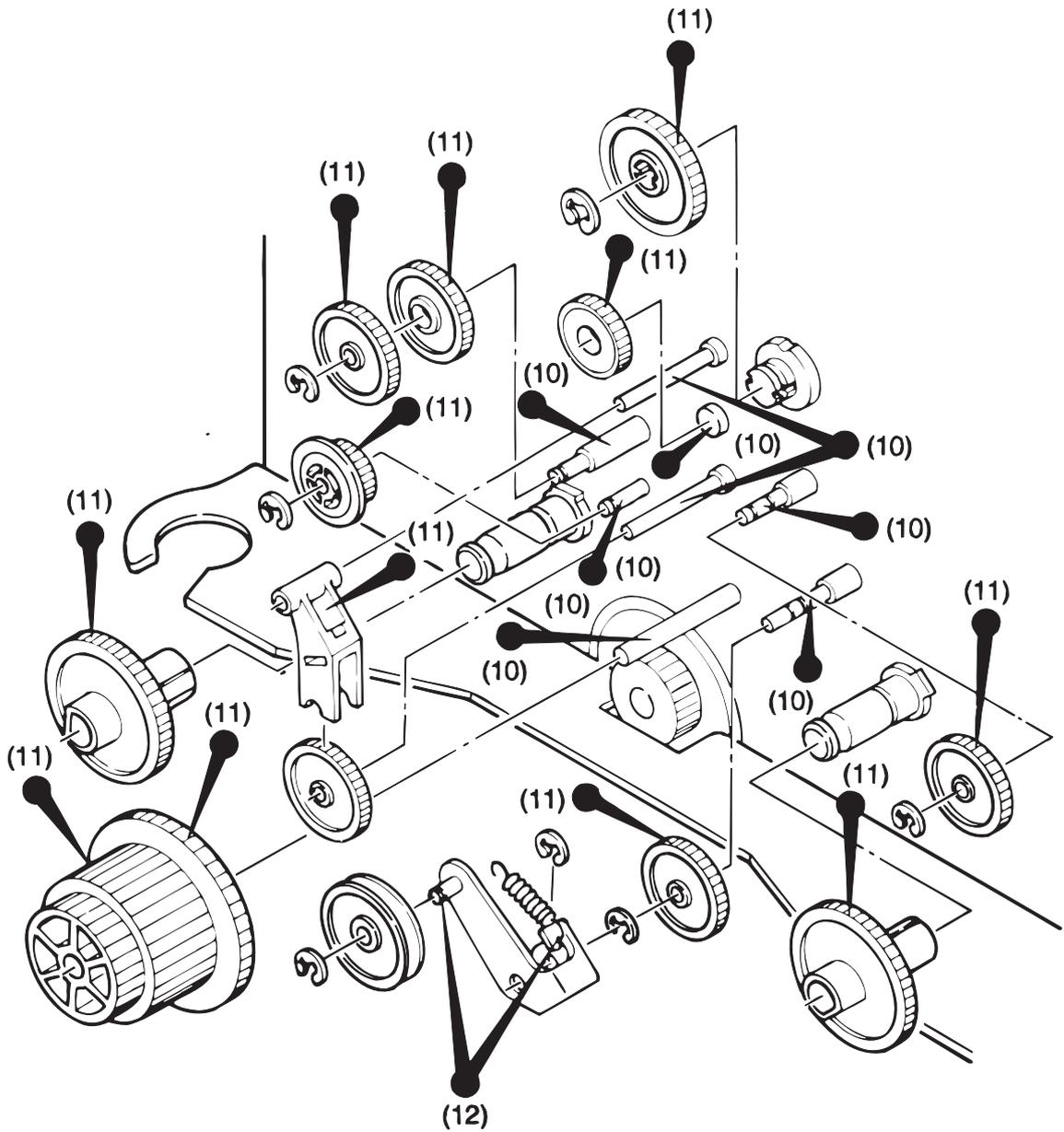


Figure 6-2. Lubrication and Adhesive Diagram 1

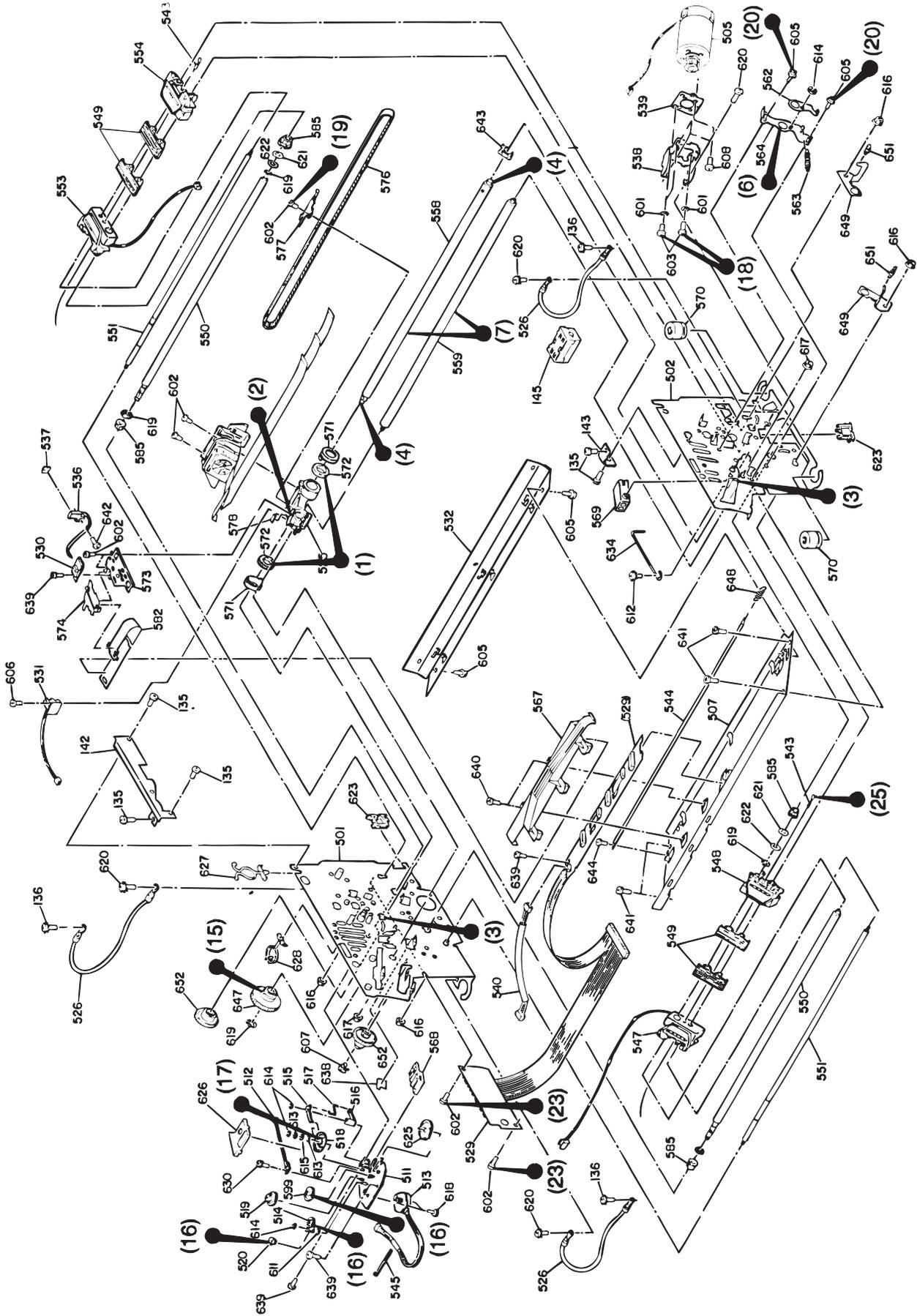


Figure 6-3. Lubrication and Adhesive Diagram 2

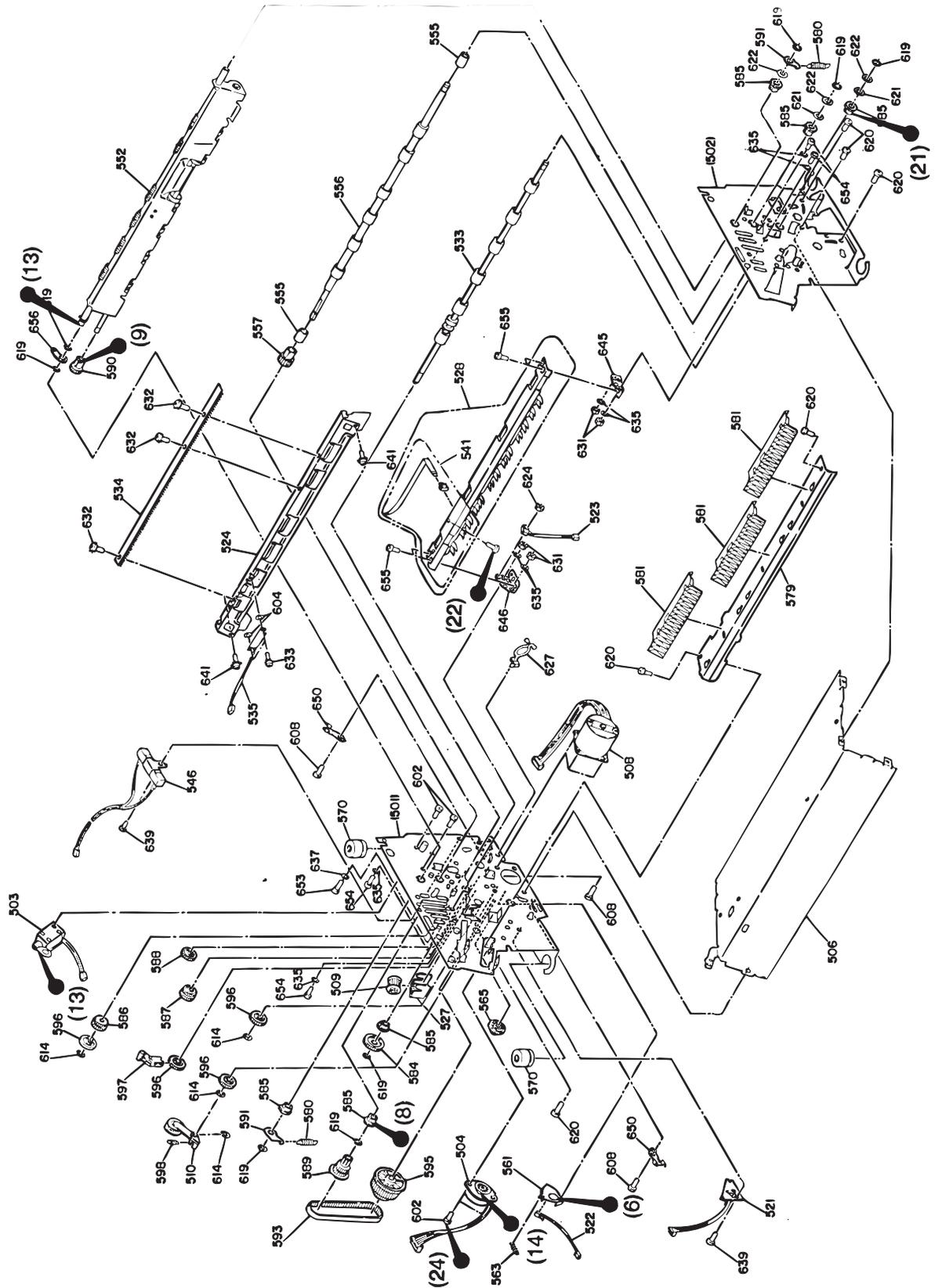


Figure 6-4. Lubrication and Adhesive Diagram 3



## APPENDIX

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A.1 CONNECTOR PIN ASSIGNMENTS .....	A-1
A.2 CIRCUIT DIAGRAMS .....	A-9
A.3 COMPONENT LAYOUT.....	A-21
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Table A-1. Board Connector Summary

Connector	Connection	Pin Number	Table to Refer
<b>C204 MAIN Board</b>			
CN1	=> Mechanism (Print head)	30 pins	Table A-2
CN2	=> C204 DRV-B board	20 pins	Table A-3
CN3	=> Cover Open	2 pins	Table A-4
CN4	=> Mechanism (Carriage encoder)	4 pins	Table A-5
CN5	=> Panel unit	14 pins	Table A-6
CN6	=> C204 PSB/PSE board	6 pins	Table A-7
CN7	=> C204 PSB/PSE board	12 pins	Table A-8
CN8	=> C204 DRV-B board	8 pins	Table A-9
CN9	=> Optional paper cutter	7 pins	Table A-10
CN10	=> C204 PSB/PSE board	8 pins	Table A-11
CN11	=> Optional Type-B I/F card	36 pins	Table A-12
CN12	=> IEEE-1284 I/F	36 pins	Tables 1-10 and 1-11
CN13	=> EIA 232D I/F	7 pins	Table 1-12
CN14	=> C204 DRV board	50 pins X 2	Table A-13
CN15	=> C204 SUB board	6 pins	Table A-14
CN16	=> C204 SUB board	7 pins	Table A-15
<b>C204 DRV Board</b>			
CN1	=> C204 MAIN board	50 pins X 2	Table A-13
CN2	=> Printer mechanism	50 pins	Table A-16
CN3	=> C204 PSB/PSE board	6 pins	Table A-17
<b>C204 DRV-B Board</b>			
CN1	=> Mechanism (Printhead)	30 pins	Table A-18
CN2	=> C204 MAIN board	6 pins	Table A-9
CN3	=> C204 MAIN board	20 pins	Table A-3
<b>C204 PSB/PSE board</b>			
CN1	=> AC inlet	3 pins	Table A-19
CN2	=> C204 MAIN board	6 pins	Table A-7
CN3	=> C204 MAIN (CN7) and C204 DRV (CN3) boards	12 pins	Tables A-8 and A-17
CN4	=> C204 MAIN board	8 pins	Table A-11
CN5	=> Cooling fan motor	2 pins	Table A-20

Table A-2. C204 MAIN Board Connector CN1

Pin	Signal Name	I/O	Function
1	P+10	O	Printhead pin #10
2	P-10	O	GND
3	P+12	O	Printhead pin #12
4	P-12	O	GND
5	P+16	O	Printhead pin #16
6	P-16	O	GND
7	P-17	O	GND
8	P-9	O	GND
9	P+17	O	Printhead pin #17
10	P-11	O	GND
11	P+11	O	Printhead pin #11
12	P-7	O	GND
13	P+9	O	Printhead pin #9
14	P-7	O	GND
15	P+2	O	Printhead pin #2
16	P+1	O	Printhead pin #1
17	HFANB	O	HF motor phase B
18	P-1	O	GND
19	FTMP	I	HF motor temperature
20	P-2	O	GND
21	FANCOM	O	HF motor common
22	HTMP	I	Print head temperature
25	HFANA	O	HF motor phase A
29	PWIDTH	I	Paper width signal
30	+5	-	
23, 24,, 26, 27, 28	GND	-	

Table A-3. C204 MAIN Board Connector CN2

Pin	Signal Name	I/O	Function
1	HR3P	O	Print head coil #6 drive signal
2	HR2P	O	Print head coil #4 drive signal
3	HR9N	O	Print head coil #18 drive signal
4	HR2N	O	Print head coil #4 drive signal
5	HR7P	O	Print head coil #14 drive signal
6	HR7N	O	Print head coil #14 drive signal
7	HR9P	O	Print head coil #18 drive signal
8	HR3N	O	Print head coil #6 drive signal
9	HL8P	O	Print head coil #15 drive signal
10	HL3N	O	Print head coil #5 drive signal
11	HL8P	O	Print head coil #13 drive signal
12	HL2N	O	Print head coil #3 drive signal
13	HL8N	O	Print head coil #15 drive signal
14	HL7N	O	Print head coil #13 drive signal
15	HL3P	O	Print head coil #5 drive signal
16	HL2P	O	Print head coil #3 drive signal
167	HR4P	O	Print head coil #8 drive signal
18	HR4N	O	Print head coil #8 drive signal
19	HRSENS	I	Print head coil shortage monitoring
20	HNSENS	I	Print head coil shortage monitoring

Table A-4. C204 MAIN Board Connector CN3

Pin	Signal Name	I/O	Function
1	COPEN	I	Cover open status
2	GND	-	-

**Table A-5. C204 MAIN Board Connector CN4**

Pin	Signal Name	I/O	Function
1	GND	-	
2	+5V	-	
3	ENCB	I	CR encoder B phase pulse
4	ENCA	I	CR encoder A phase pulse

**Table A-6. C204 MAIN Board Connector CN5**

Pin	Signal Name	I/O	Function
1	LED_DATA	O	LED data
2	LED_XLE	O	LED data latch
3	LED_CLK	O	LED data clock
5	LED_XOE	O	LED light enable
6	BUZZER	O	Buzzer
7	VCC	-	+5 VDC
9	SW_INH	O	Switch data transfer inhibit
9	SW_S/XL	O	Switch data shift/load select
11	SW_DATA	I	Switch data
13	SW_CLK	O	Switch data clock
4, 10, 912, 14	GND	-	

**Table A-7. C204 MAIN Board Connector CN6**

Pin	Signal Name	I/O	Function
1, 2, 3	VP1	-	+37 VDC
4, 5, 6	GP1	-	GND for VP1

**Table A-8. C204 MAIN Board Connector CN7**

Pin	Signal Name	I/O	Function
1, 2, 3	VP2	-	+37 VDC
4, 5, 6	GP2	-	GND for VP2

**Table A-9. C204 MAIN Board Connector CN8**

Pin	Signal Name	I/O	Function
8, 7, 6	VP1	-	+37 VDC
5, 4, 3	GP1	-	GND for VP1
1	VX	-	+5 VDC switched by reset status
2	GND	-	

**Table A-10. C204 MAIN Board Connector CN9**

Pin	Signal Name	I/O	Function
1	CUTON	O	Cut signal
2	CUTDIR	I	Cut direction
3	CUTTER	I	Paper cutter mount/dismount
4	CUTHPI	I	Cutter home position
5	+5V	-	
6	GND	-	
7	RF	I	Reverse point signal

**Table A-11. Digital Board Connector CN10**

Pin	Signal Name	I/O	Function
1, 2	+5V	I	
3, 4	GND	O	
5	DRERR	O	Head driver error signal
6	/PD	O	Power down signal
7	CL	I	Current limit signal
8	SD	I	Power shutdown signal

Table A-12. C204 MAIN Board Connector CN11

Pin	Signal Name	I/O	Function
1, 2, 3, 4, 5, 6	+5	-	
7	BTXD	O	Transmit data
8	XREADY	O	Ready
9	BRXD	I	Receive data
10	NC	-	
11	BXRST	O	Reset signal
12	INH	O	Inhibit signal output
13	XCMDREQ	I	Command request signal
14	XWRRDY	I	Write ready signal
15	XRDREQ	I	Read request signal
16	XWR	O	Write signal
17	XRD	O	Read signal
18	XCS	O	Chip select signal
19, 20, 21, 22, 23, 24	GND	-	
25	A3	O	Address bus 3
26	A2	O	Address bus 2
27	A1	O	Address bus 1
28	A0	O	Address bus 0
29	D7	I/O	Data bus 7
30	D6	I/O	Data bus 6
31	D5	I/O	Data bus 5
32	D4	I/O	Data bus 4
33	D3	I/O	Data bus 3
34	D2	I/O	Data bus 2
35	D1	I/O	Data bus 1
36	D0	I/O	Data bus 0

Table A-13. C204 MAIN Board Connector CN14

Pin	Signal Name	I/O	Function
1	VP3	-	+37 VDC
2, 3, 4	GND	-	
5, 6, 7, 8	+5	-	
9, 10	VX	-	+5 VDC switched by reset status
11	FAN	O	HF control signal
12	PLN	O	Plunger N channel
13	RFH/R	O	RF motor common
14	RFC	O	RF motor C phase pulse
15	RFA	O	RF motor A phase pulse
16	PGD	O	PG motor D phase pulse
17	PGB	O	PG motor B phase pulse
18	CRINS	I	CR motor insulation resistance monitoring
19	CRI1	O	CR motor current limit signal 1
20	CRCLM	I	CR motor current limit signal
21	CRD	O	CR motor bridge D signal
22	CRB	O	CR motor bridge B signal
23	PFH/R	O	PF motor common
24	PFC	O	PF motor C phase pulse
25	PFA	O	PF motor A phase pulse
26, 27	GND	-	
28	TR_SEL	I	Tractor select signal
29	P_TRCT	I	Pull tractor mount/dismount
30	P_JAM	I	Paper jam detection
31	F_PE	I	Front paper end
32	R_PE	I	Rear paper end
33	T_PE	I	Top paper end
34	PGENCB	I	PG encoder B signal
35	PGENCA	I	PG encoder A signal
36	PGHOME	I	PG home position
37	RBJAM	I	Ribbon jam
38	PLP	O	Plunger P channel
39	RFD	O	RF motor bridge D signal
40	RFB	O	RF motor bridge B signal
41	PGH/R	O	PG motor common
42	PGC	O	PG motor C phase pulse
43	PGA	O	PG motor A phase pulse
44	CRI2	O	CR motor current limit signal 2
45	CRI0	O	CR motor current limit signal 0
46	CRCLK	O	Clock pulse for CR motor driver
47	CRC	O	CR motor bridge C signal
48	CRA	O	CR motor bridge A signal
49	PFD	O	PF motor bridge D signal
50	PFB	O	PF motor bridge B signal

Table A-14. C204 MAIN Board Connector CN15

Pin	Signal Name	I/O	Function
1	DIP1	I	DIP SW1 status
2	DIP2	I	DIP SW2 status
3	DIP3	I	DIP SW3 status
4	DIP4	I	DIP SW4 status
5	DIP5	I	DIP SW5 status
6	DIPCNT1	O	DIP SW select port 1

Table A-15. C204 MAIN Board Connector CN16

Pin	Signal Name	I/O	Function
1	DIPCNT2	O	DIP SW select port 2
2	DIPCNT3	O	DIP SW select port 3
3	DIPCNT4	O	DIP SW select port 4
4	DIPCNT5	O	DIP SW select port 5
5	DIPCNT6	O	DIP SW select port 6
6	DIPCNT7	O	DIP SW select port 7
7	DIPCNT8	O	DIP SW select port 8

Table A-16. C204 DRV Board Connector CN2

Pin	Signal Name	I/O	Function
1, 3, 5, 8	VP3	-	+37 VDC
2	+5V	-	
4	K	-	GND
6	RBJAM		Ribbon jam
7	NC		
9	INTLOC	-	GND
10	FANDRV		CR fan drive
11	INTLOC	-	GND
12	INTLOC	-	GND
13	GND	-	
14	GP3	-	GND for VP3
15	TR_SEL		Tractor select signal
16	PGHOME		PG home position
17	RFD		RF motor phase D
18	RFCOM		RF motor common
19	RFB		
20	RFA		RF motor phase A
21	PGCOM		PG motor common
22	RFC		RF motor phase C
23	PGA		PG motor phase A
24	PGD		PG motor phase D
25	PGC		PG motor phase C
26	PGB		PG motor phase B
27	PENCB		PG encoder phase B
28	PENCA		PG encoder phase A
29	R_PE		Rear PE sensor
30	T_PE		Top PE sensor
31	+5V	-	
32	F_PE		PE sensor front
33	P_TRCT		Pull tractor
34	P_JAM		Paper jam sensor
35	PLGP		Plunger
36	GND	-	
37	CRB		CR motor phase B
38	PLGN		Plunger
39	CRB	O	CR motor phase B
40	PFA	O	PF motor phase A
41	CRB	O	CR motor phase B
42	PFB	O	PF motor phase B
43	CRA	O	CR motor phase A
44	PFC	O	PF motor phase C
45	CRA	O	CR motor phase A
46	PFD	O	PF motor phase D
47	CRA	O	CR motor phase A
48, 49, 50	PFCOM	O	PF motor common

Table A-17. C204 DRV Board Connector CN3

Pin	Signal Name4	I/O	Function
1, 2, 3	VP3	-	+37 VDC
4, 5, 6	GP3	I	GND for VP3

Table A-18. C204 DRV-B Board Connector CN1

Pin	Signal Name4	I/O	Function
1	P+6	O	Printhead pin #6
2	P+4	O	Printhead pin #4
3	P-18	O	GND
4	P-4	O	GND
5	P+14	O	Printhead pin #14
6	P-14	O	GND
7	P+18	O	Printhead pin #18
8	P-6	O	GMD
9	P+15	O	Printhead pin #15
10	P-5	O	GND
11	P+13	O	Printhead pin #13
12	P-3	O	GND
13	P-15	O	GND
14	P-13	O	GND
15	P+5	O	Printhead pin #5
16	P+3	O	Printhead pin #3
17	P+8	O	Printhead pin #8
18	P-8	O	GND
19, 20	NC	-	

Table A-19. C204 PSB/PSE Board Connector CN1

Pin	Signal Name4	I/O	Function
1	L	I	AC input
2	NC	-	
3	N	I	AC input

Table A-20. C204 PSB/PSE Board Connector CN5

Pin	Signal Name4	I/O	Function
1	VP3	O	
2	/FANDR	O	Fan motor drive

## A.2 CIRCUIT DIAGRAMS

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See the following pages for the figures below:

Figure A-2. C204 MAIN Board Exploded Diagram



Figure A-3. C204 DRV Board Exploded Diagram



Figure A-4. C204 DRV-B Board Exploded Diagram



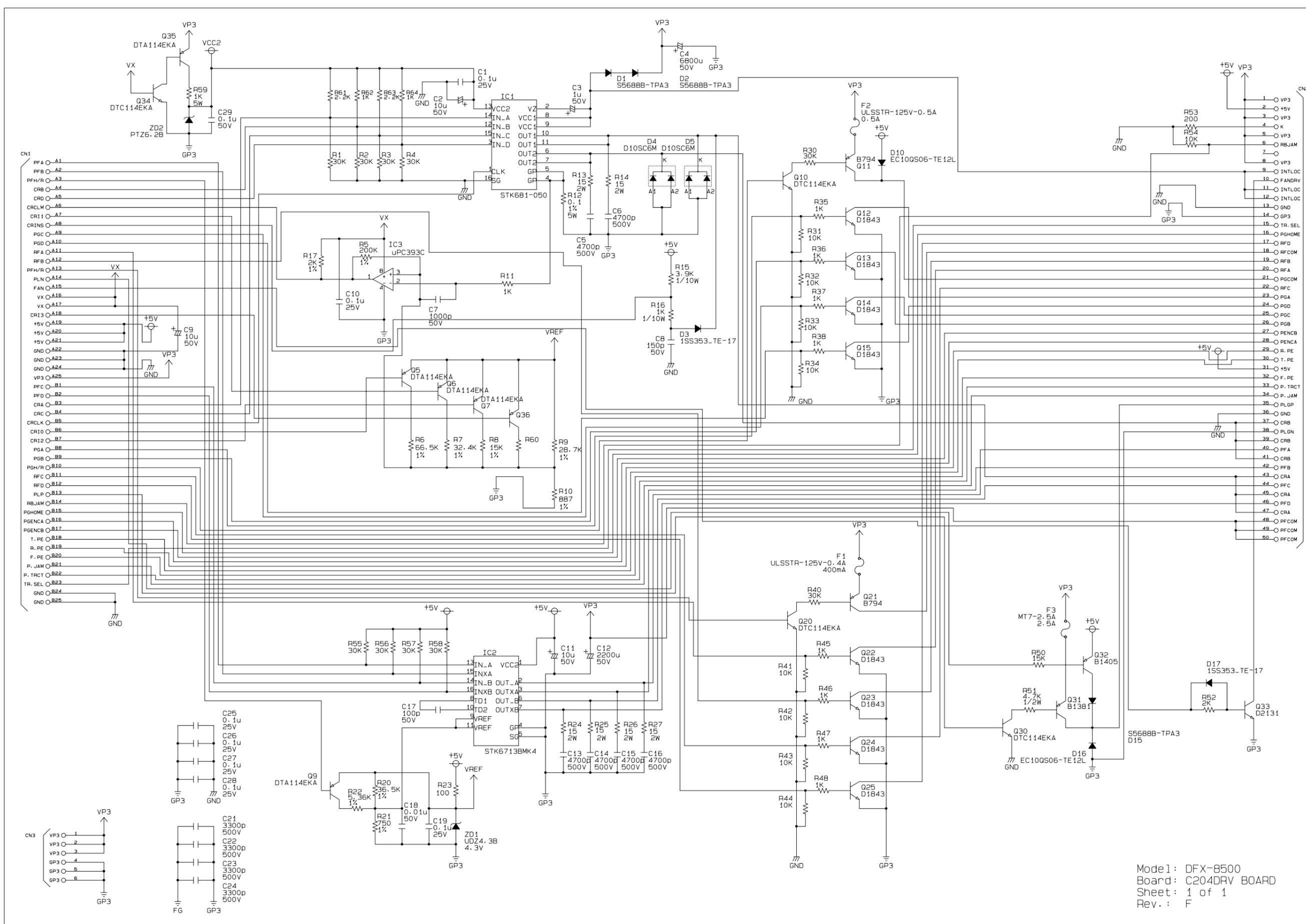
Figure A-5. C204 PSB Board Exploded Diagram



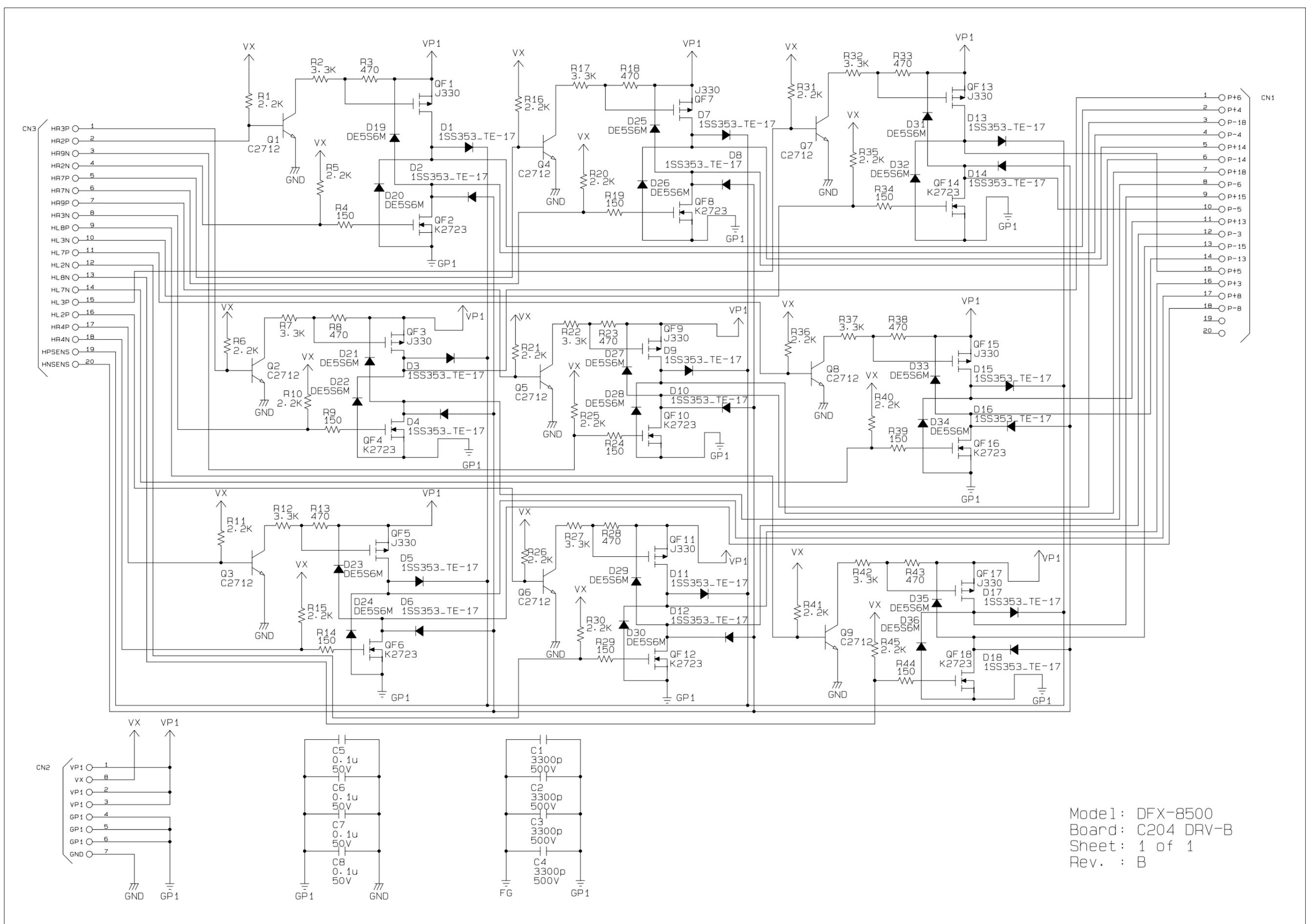
Figure A-6. C204 PSE Board Exploded Diagram



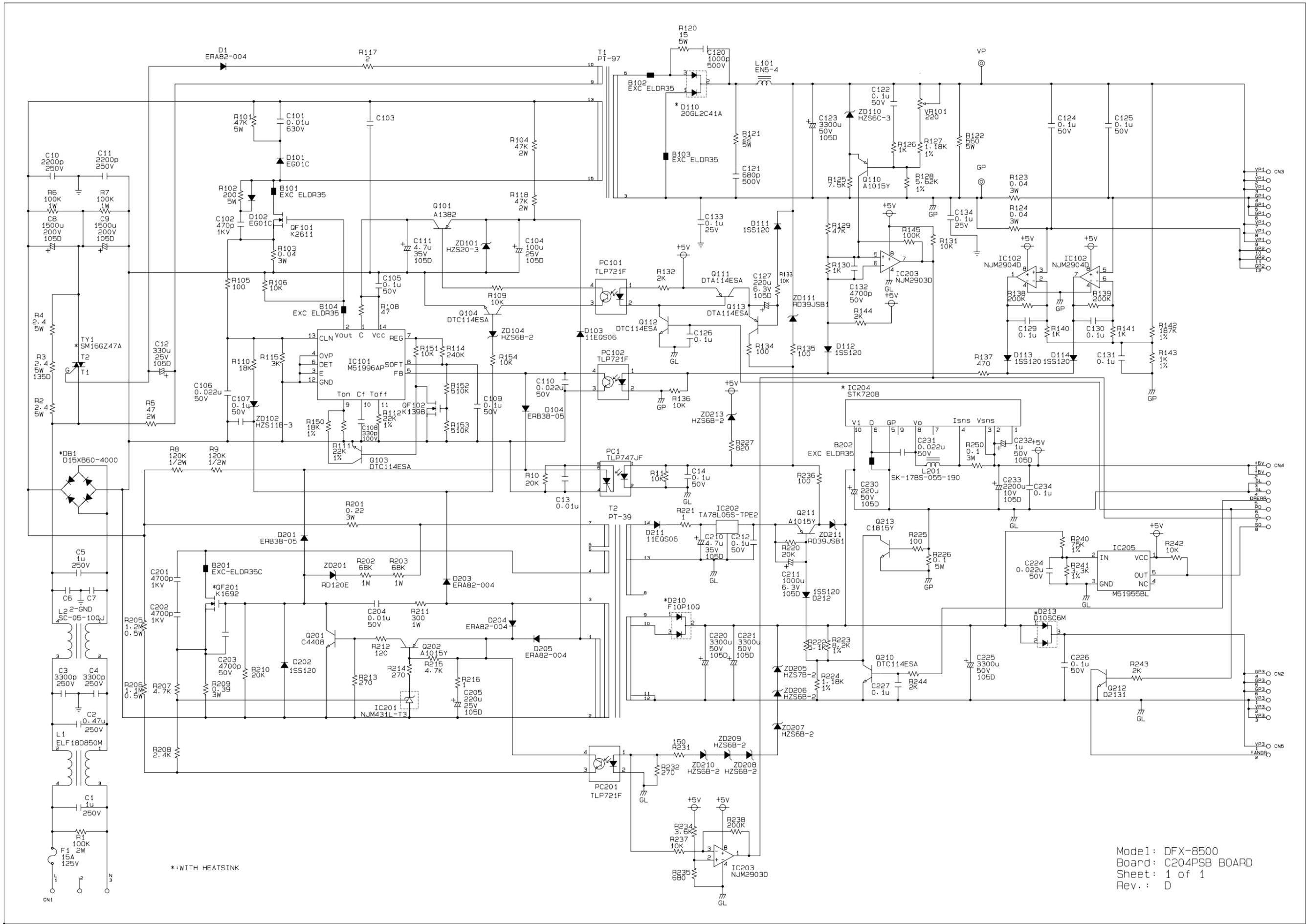




Model: DFX-8500  
 Board: C204DRV BOARD  
 Sheet: 1 of 1  
 Rev.: F



Model: DFX-8500  
 Board: C204 DRV-B  
 Sheet: 1 of 1  
 Rev. : B



\*: WITH HEATSINK

Model: DFX-8500  
 Board: C204PSB BOARD  
 Sheet: 1 of 1  
 Rev.: D





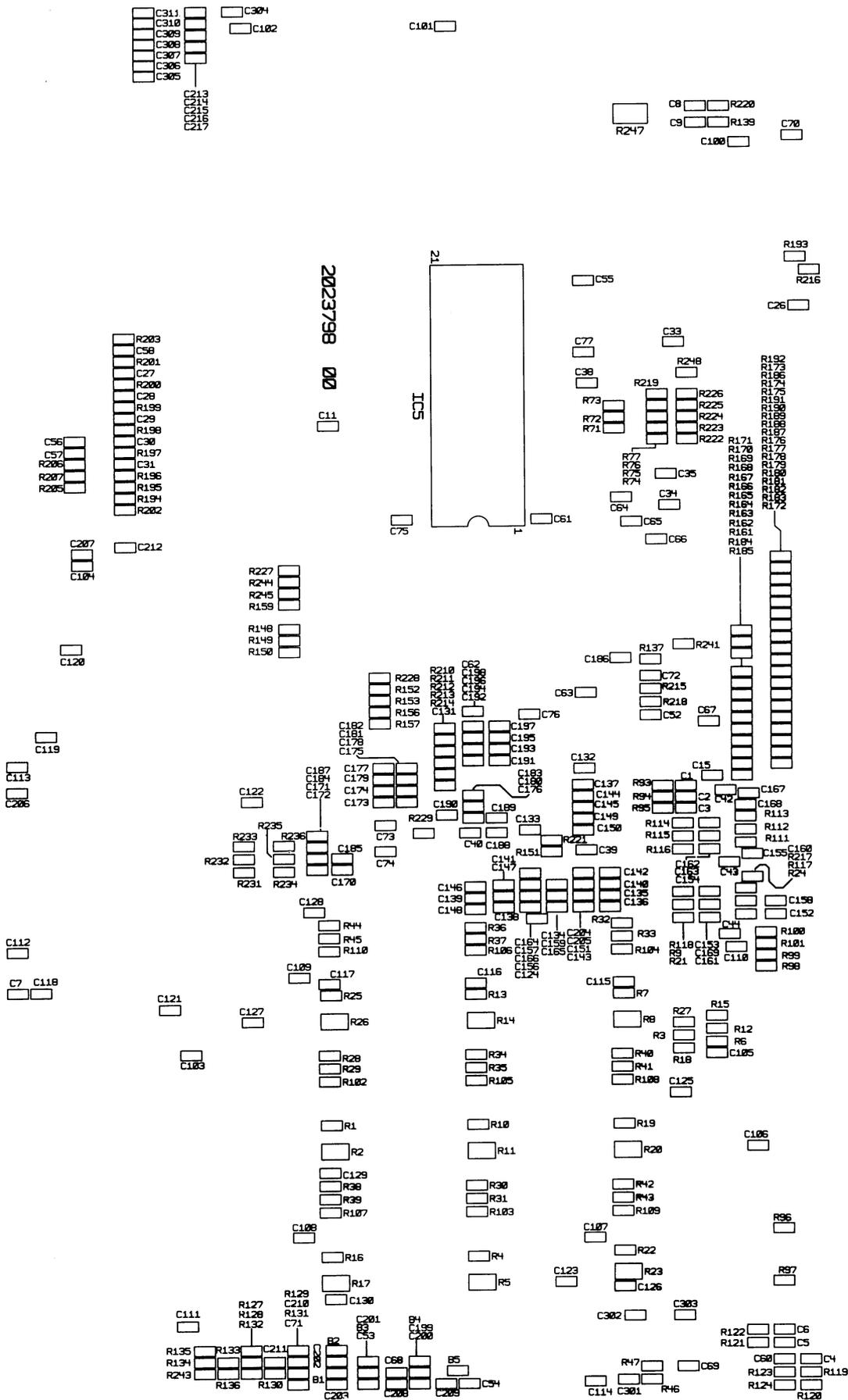


Figure A- 8. C204 MAIN Board Component Layout (2)

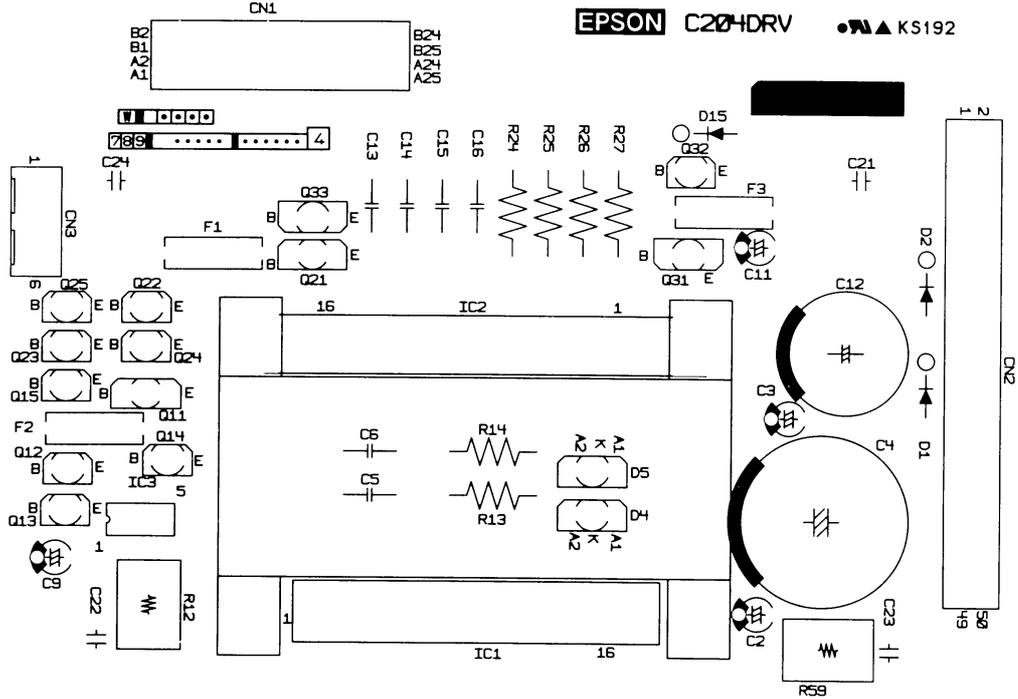


Figure A- 9. C204 DRV Board Component Layout (1)

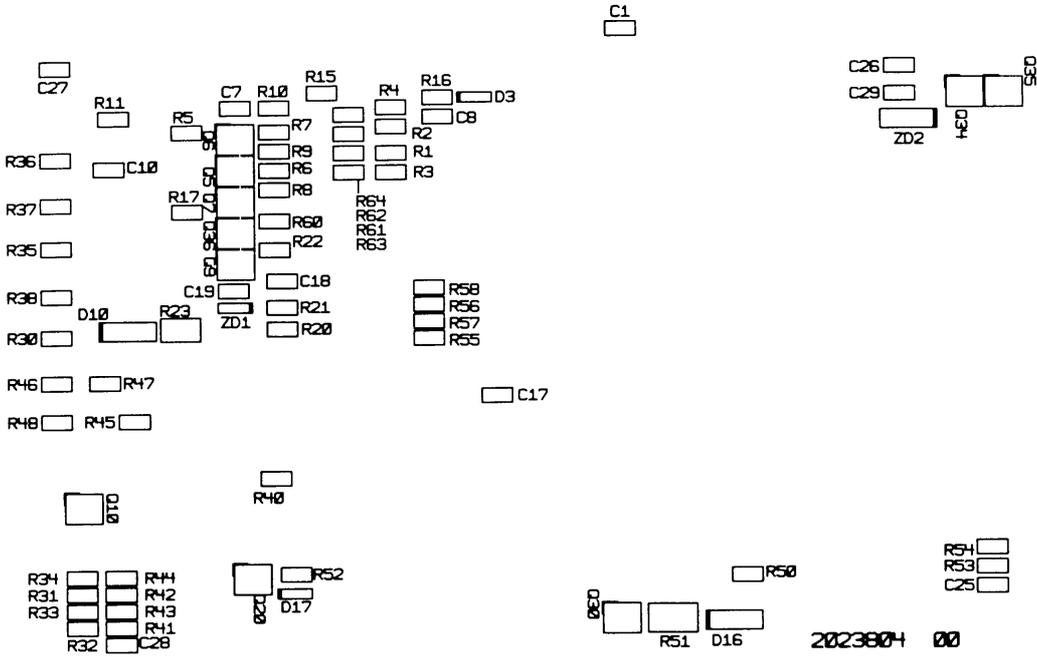


Figure A- 10. C204 DRV Board Component Layout (2)

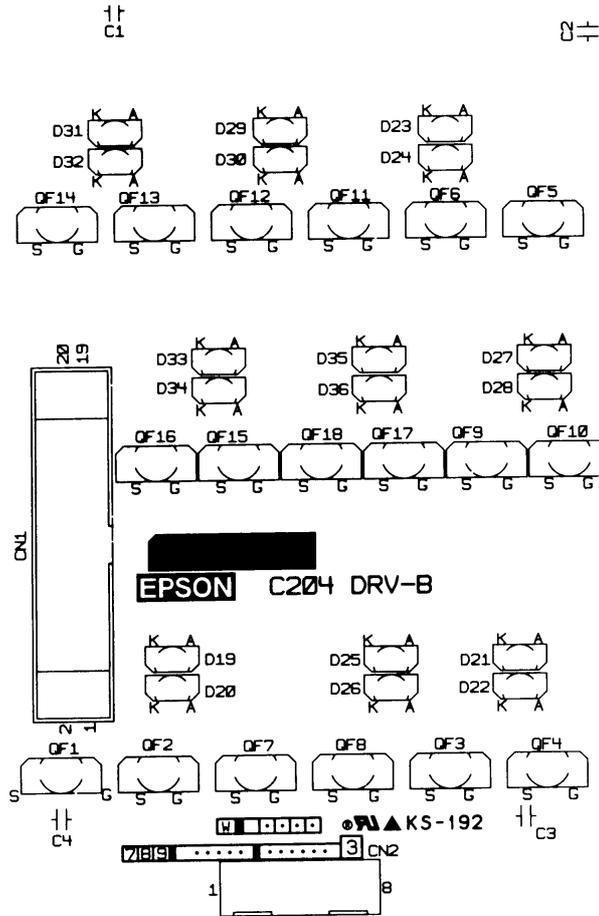


Figure A- 11. C204 DRV-B Board Component Layout (1)

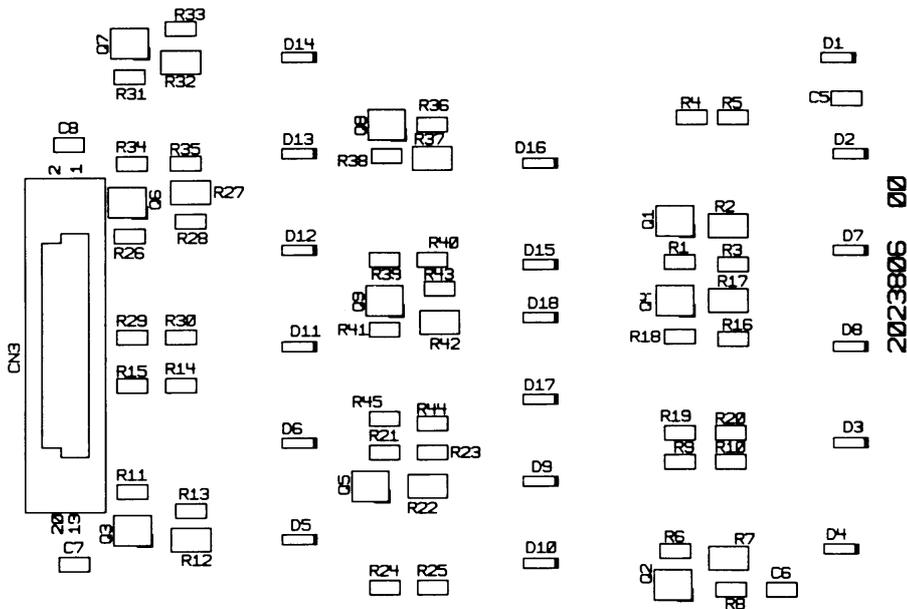


Figure A- 12. C204 DRV-B Board Component Layout (2)

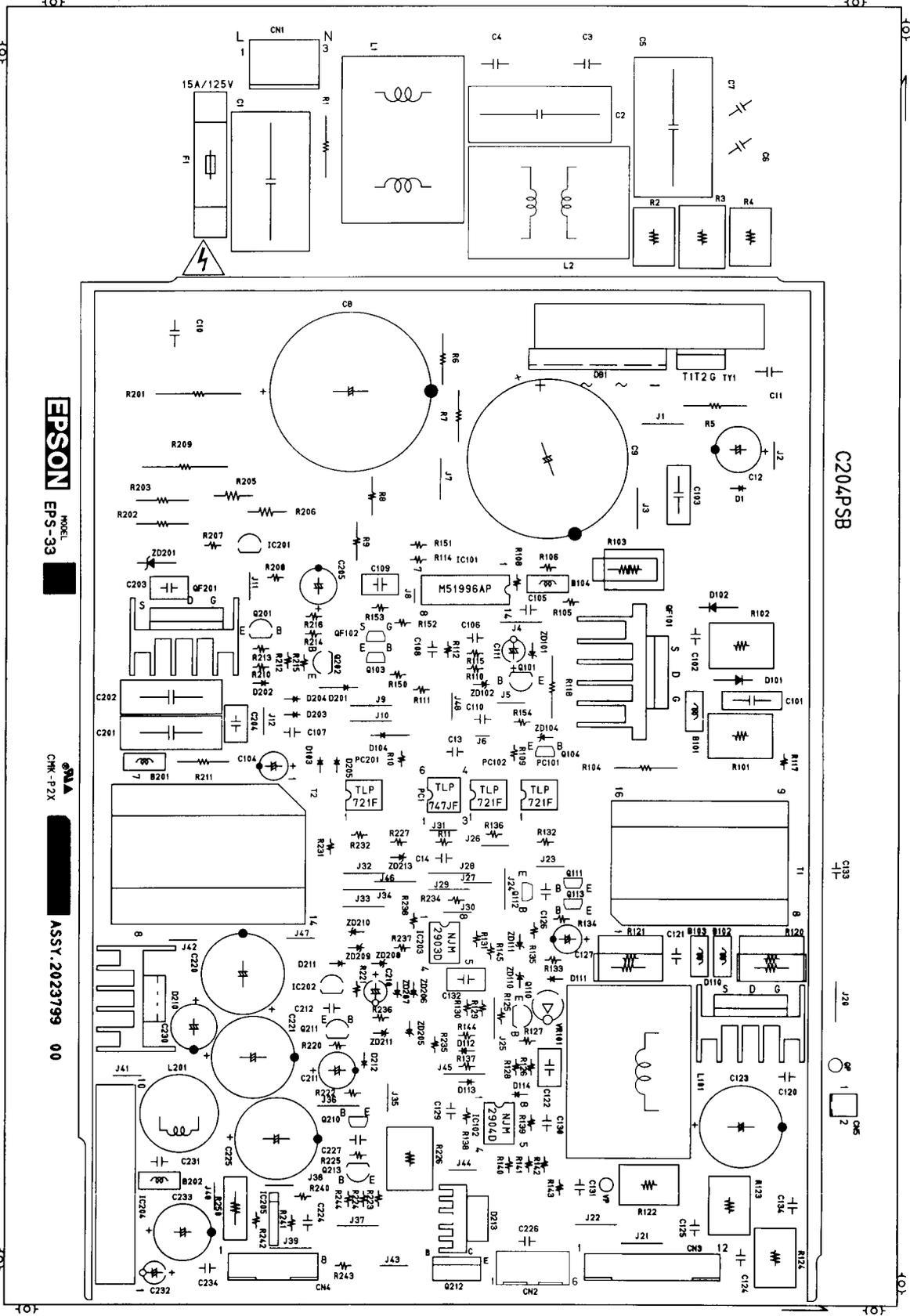


Figure A-13. C204 PSB Board Component Layout

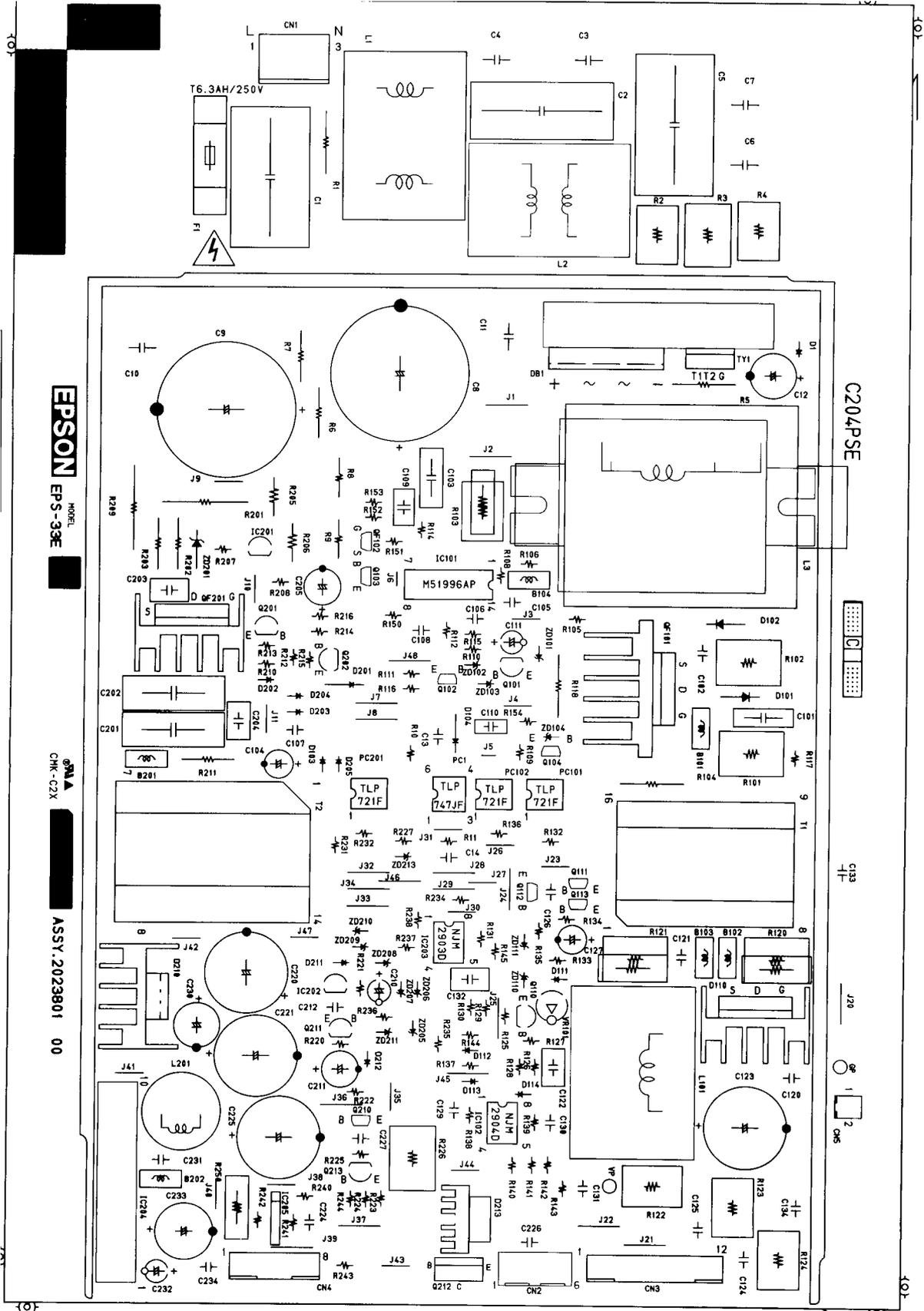


Figure A- 14. C204 PSE Board Component Layout

# A.4 Connectors on the Connector Junction Board

See the figure bellow for the connector arrangement on the connector junction board.

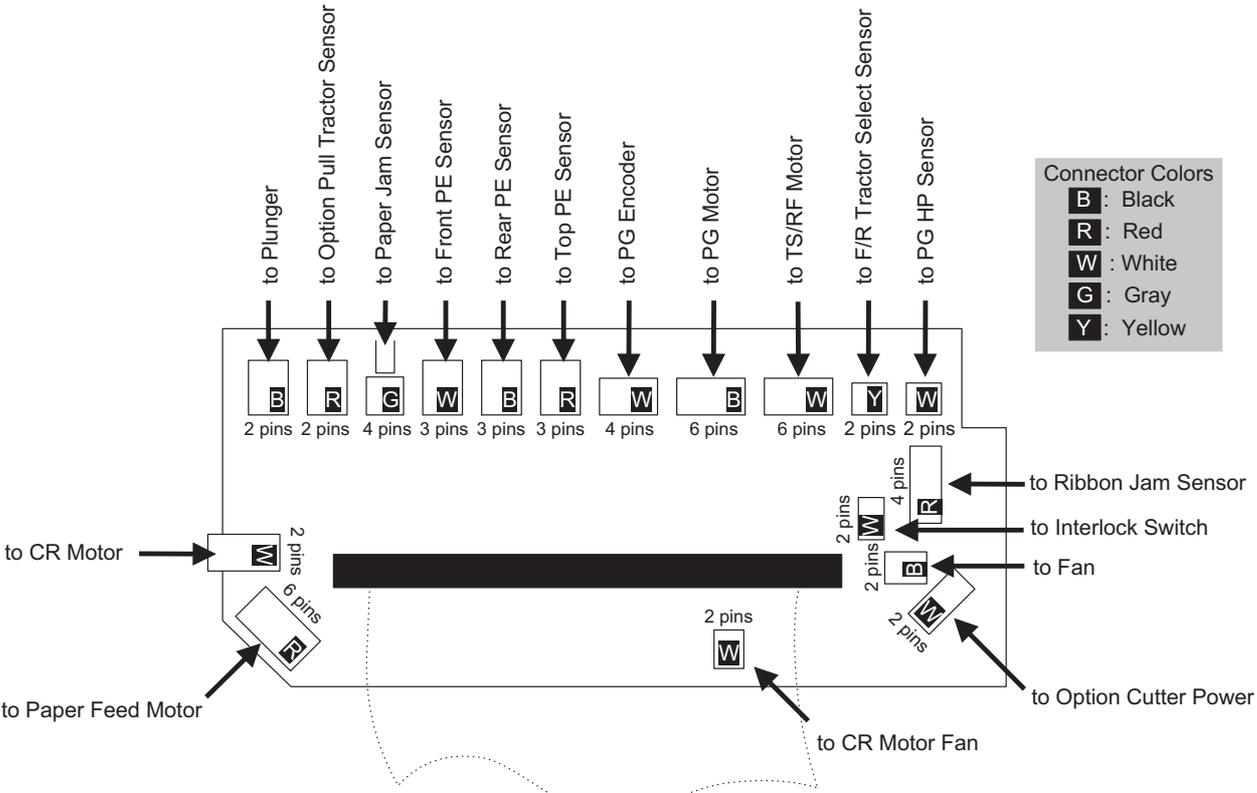


Figure A- 15. Connectors on the Connector Junction Board

## A.5 Part List

Table A-20. Part List (1/3)

No.	Part Names	No.	Part Names
100	HOUSING ASSY.,LOWER	163	SPACER,PS UNIT
101	FRAME ASSY.,BOTTOM	164	LEAF SPRING,BASE FRAME
102	COVER ASSY.,FRONT	165	COVER, DIP SWITCH
103	HOUSING ASSY.,UPPER	166	COVER,CONNECTOR,UPPER ECW
104	HOUSING ASSY.,TOP	167	C.B.(O)SCREW M3X8 F/ZN
105	LOGO PLATE	168	CONNECTOR LOCK NUT for USA
106	COVER,PAPER SUPPORT		CONNECTOR LOCK NUT for others
107	CAP,LOWER	170	DETECTOR,INTER LOCK 2.5,30
108	COVER,REAR	171	BOARD ASSY.,SUB
109	CAP,MAGNET	172	GROUNDING PLATE,MECHANISM PLATE
110	HOUSING SUB ASSY.,TOP		
111	COVER,I/F	173	SHIELD PALTE,DRV-B
112	MAGNET SUB ASSY.,TOP	174	SHIELD PLATE,DRV
113	MECHANISM MOUNTING SCREW	175	GRONDING PLATE,BLACKET
114	TOP COVER HINGE SCREW	176	MOUNT,DIP SWITCH
115	HOLDER,CONTROL PANEL	200	BOARD ASSY.,MAIN
116	HOUSING,LEFT	201	SCREW for USA
117	HOUSING,RIGHT	201	SCREW for EUR, S.E.ASIA, ACEANIA
118	COVER,TOP,SUB ASSY.	202	GUIDE,I/F BOARD
119	COVER,PUSH TRACTOR SUB ASSY.	203	BRACKET,I/F
120	PAPER SUPPORT SUB ASSY.	204	SHIELD PLATE,MAIN
121	MOUNT,INTERLOCK	205	EARTH SPRING;B
122	SHIELD PLATE	206	HARNESS
123	C.B.S.(O) SCREW M3X8	212	C.B.S. SCREW M3X6
124	C.B.(O) SCREW M4X6	500	PRINTER MECHANISM,M-3I60
125	C.P. SCREW WITH S/WM3X16	501	FRAME ASSY.,LEFT
126	C.F.S.SCREW M3X10	502	FRAME ASSY.,RIGHT
127	C.B.B. SCREW M3X8	503	SOLENOID ASSY.,LD
128	C.B.S. SCREW M3X8	504	MOTOR ASSY.,PG
129	C.B.SCREW M3X12	505	MOTOR ASSY.,CR
131	C.B.B. SCREW M3X10	506	FRAME,LOWER
132	C.B.B. SCREW M3X12	507	FRAME,FRONT
133	C.B.B.SCREW M4X10	508	MOTOR ASSY.,PF DC4.34
134	C.B.B. SCREW M4X16	509	PULLY ASSY.,BELT
135	C.P.(PS) SCREW M4X8	510	TENSION PULLEY ASSEMBLY
136	C.B.S.(O) SCREW M4X8	511	FRAME ASSY.,MOTOR RF
137	C.B.S.SCREW, 4X14 F/ZN	512	TRACTOR SELECT DETECTOR
138	C.B.S. SCREW M3X6	513	MOTOR ASSY.,RF
139	C.B.B. SCREW M3X10	514	RIBBON FEED SELECT GEAR
140	C.F.B. SCREW M3X10	515	TRACTOR SELECT LEVER UPPER
141	C.B.S. SCREW M3X4	516	TRACTOR SELECT LEVER LOWER
142	METAL,TRANSPORT,FIX,LEFT	517	TRACTOR SELECT LEVER SPRING
143	TRANSPORT LOCKING BRACKET	518	TRACTOR SELECT CAM
144	FERRITE CORE RISC-4	519	TRACTOR SELECT TRANSMISSION GEAR
145	FERRITE CORE		
146	FERRITE CORE RISC-8	520	RIBBON FEED TRANSMISSION GEAR
147	C.B.S.(O) SCREW M3X6	521	PAPER THICKNESS DETECTOR
148	+.ONEWAY PLA- LOCK,3X12,F/ZN	522	DETECTOR ASSY.,PGHP
152	DAMPER SHEET	523	DETECTOR ASSY.,PULL TRACTOR
153	DAMPER SHEET;B	524	PAPER GUIDE,UPPER
159	SHAFT,FRONT,LOWER,RIGHT ECW	525	CARRIAGE ASSY.
160	SHAFT,FRONT,LOWER,LEFT	526	LEAD WIRE
161	LEVER ASSY.,LOCK,LEFT	527	BELT PULLEY HOLDER
162	LEVER ASSY.,LOCK RIGHT	528	PLATEN ASSY.

Table A-20. Part List (2/3)

NO.	Part Names	NO.	Part Names
529	BOARD ASSY.,INTERMIT,HEAD	587	PLATEN ROLLER TRANSMISSION GEAR
530	BOARD ASSY.,INTERMIT,CARRIAGE	588	PLATEN ROLLER MIDDLE GEAR
531	BOARD ASSY.,DETECTOR,PTS	589	TENSION ROLLER GEAR
532	PAPER ASSY.,SUPPORT	590	PAPER BAIL GEAR
533	ROLLER ASSY.,LOAD	591	PAPER BAIL LEVER
534	BLUSH,ELIMINATION ELECTLIC	592	CUP SCREW M3X30
535	DETECTOR ASSY.,PE,UPPER	593	TIMING BELT,PF
536	DETECTOR ASSY.,PW	595	PAPER FEED REDUCTION GEAR
537	HARNES,CUTTER	596	PAPER FEED MIDDLE GEAR
538	HODLER,CR MOTOR	597	TRACTOR SELECT GEAR HOLDER
539	MOUNT PLATE,CR MOTOR	598	TENSION PULLEY SPRING
540	CABLE,BOARD,INTERMIT,HEAD	599	RIBBON FEED TRANSMISSION GEAR
541	FAN	600	PLAIN WASHER 3X0.2X9
543	WIRE,TRACTOR	601	PLAIN WASHER 4X0.8X10
544	DETECTOR PLATE,PTS	602	C.P.S.P.SCREW M3X6 F/ZN
545	WIRE BAND	603	C.P.(C).(S) SCREW M4X10
546	RESISTOR	604	C.P.S.(P) SCREW M3X6
547	TRACTOR SUB ASSY.,LEFT,FRONT	605	C.P.(PS) SCREW M4X6
548	TRACTOR,RIGHT,FRONT	606	C.P.(S) SCREW M2.6X5 F/ZN
549	PAPER SUPPORT	607	MINI CLAMPYMC-05-H-0
550	SHAFT,TRACTOR	608	C.P.(PS) SCREW M4X8
551	TRACTOR GUIDE SHAFT	610	C.P.S.P.SCREW M2.5X6
552	FRAME ASSY.,PF	611	PLAIN WASHER 4X0.2X6
553	TRACTOR SUB ASSY.,LEFT,REAR	612	C.B.S.(O) SCREW M4X8
554	TRACTOR,RIGHT,REAR	613	PLANE WASHER 4.1X0.2X7.8
555	SPACER,PF ROLLER	614	RETAINING RING TYPE-E
556	ROLLER,PF,DRIVE	615	LEAF SPRING4.1X0.13X8.3
557	SPUR GEAR 18.4	616	H.N.F. M4
558	SHAFT,CR,GUIDE,REAR	617	FLANGE NUT
559	SHAFT,CR,GUIDE,FRONT	618	C.P.S.(P.S) SCREW M3X8
561	LEVER,SHAFT,LEFT	619	RETAINING RING TYPE-E
562	LEVER,SHAFT,RIGHT	620	C.B.S SCREW 4X8
563	GUIDE SHAFT HOLDING SPRING	621	LEAF SPRING 8.2X0.15X15
564	LEVER,GAP,ADJUST	622	PLAIN WASHER 8X0.5X15
565	PAPER GAP ADJUSTMENT MIDDLE GEAR	623	WIRE HOLDER
566	DUCT,FAN	624	HEXAGON NUT M2
567	COVER,CONNECTOR	625	RIBBON FEED DRIVE GEAR
568	DAMPER,LEFT	626	RIBBON FEED GEAR COVER
569	DAMPER,RIGHT	627	CABLE CLIP
570	DAMPER,LOWER	628	ROCKING WIRE SADDLE
571	OIL PAD COVER	629	C.P.(PS).SCREW M4X8
572	OIL PAD RING	630	C.P.S.SCREW M2X10
573	FLAME,CABLE,HEAD	632	C.P.S.(O) SCREW M3X6
574	COVER,HEAD CABLE	633	C.P.S(P.S) SCREW,3X10,F/ZN
575	SHAFT,FASTEN,HOLDER	634	METAL FITTINGS,FASTEN,SHAFT
576	TIMING BELT,CR	635	C.P.O SCREW M4X5
577	HOLDER,BELT FASTEN	637	PLAIN WASHER 2.5X0.5X7.5
579	FRAME,PAPER GUIDE MOUNT	638	SHEET,DUST PROOF
580	EXTENSION SPRING,1000	639	C.B.S. SCREW M3X6
581	PAPER GUIDE,LOWER	640	C.B.S. SCREW M3X8
582	SHEET,HEAD CABLE,PROTECT	641	C.B.S.SCREW M4X6
584	PLATEN ROLLER GEAR	644	PLASTI RIVET
585	PLATEN ROLLER SHAFT HOLDER	645	HOLDER,PLATEN,RIGHT
586	PLATEN ROLLER REDUCTION GEAR	646	HOLDER,PLATEN,LEFT

Table A-20. Part List (3/3)

NO.	Part Names	NO.	Part Names
647	SPUR,GEAR,40	669	FAN,CR
648	EXTENSION SPRING,320	671	RIBON MASK SUB ASSY.
649	MOUNT PLATE WIRE,RIGHT	672	SPUR,GEAR,24
650	MOUNT PLATE,WIRE,LEFT	673	MOUNT PLATE,DETECTOR,RJ
651	EXTENSION SPRING,40	674	DETECTOR ASSY.,RJ0V,0A,
652	SPUR GEAR,32	675	HARNESS,FAN
653	C.P.S SCREW,2X14,F/ZN	676	PAPER GUIDE ASSY.,PJ DETECTOR
654	HEXAGON NUT A	801	INDIVIDUAL CARTON FOR AMERICA
655	HEXAGON NUT,B	901	INDIVIDUAL CARTON BOX FOR EUROPE
656	LEVER,TENSION,CANCEL	1001	INDIVIDUAL CARTON BOX FOR PACIFIC
657	BUSH,8	1102	OUTER CARTON BOX
658	BUSH,12	1203	PAD,PRINTER,UPPER
660	RESISTOR 0OHM,	1304	SHEET,PRINTER
661	C.B.S.(O) SCREW M4X8	1405	PAD,PRINTER,UNDER
662	MOUNTING PLATE,FAN,CR	1506	SHEET A
663	DOUBLE SIDE TAPE,20X10	1607	SHEET B
664	SHAFT,FASTEN,DAMPER,LEFT	1708	JOINT
665	CABLE,SHIELD	1809	JOINTHP-601
666	BOARD ASSY.,INTERMIT,MECHANISM	1910	CARRIAGE FIXING PLATE
667	SHEET,PROTECT,CABLE	2011	PAD,PAPER GUIDE
668	COMPOSITION SCREW,FAN	2118	PLASTIC BAG50X70X

## A.6 EXPLODED DIAGRAMS

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See the following pages for the exploded diagrams below. Note that the last page shows the packing material for DFX-8500.

Figure A-16. EXPLODED DIAGRAMS FOR DFX-8500 (1)

**EXPLODED DIAGRAM (1)**

Figure A-17. EXPLODED DIAGRAMS FOR DFX-8500 (2)

**EXPLODED DIAGRAM (2)**

Figure A-18. EXPLODED DIAGRAMS FOR DFX-8500 (3)

**EXPLODED DIAGRAM (3)**

Figure A-19. EXPLODED DIAGRAMS FOR DFX-8500 (4)

**EXPLODED DIAGRAM (4)**

Figure A-20. EXPLODED DIAGRAMS FOR DFX-8500 (5)

**EXPLODED DIAGRAM (5)**

Figure A-21. EXPLODED DIAGRAMS FOR DFX-8500 (6)

**EXPLODED DIAGRAM (6)**

Figure A-22. EXPLODED DIAGRAMS FOR DFX-8500 (7)

**EXPLODED DIAGRAM (7)**

Figure A-23. PACKING MATERIAL FOR DFX-8500

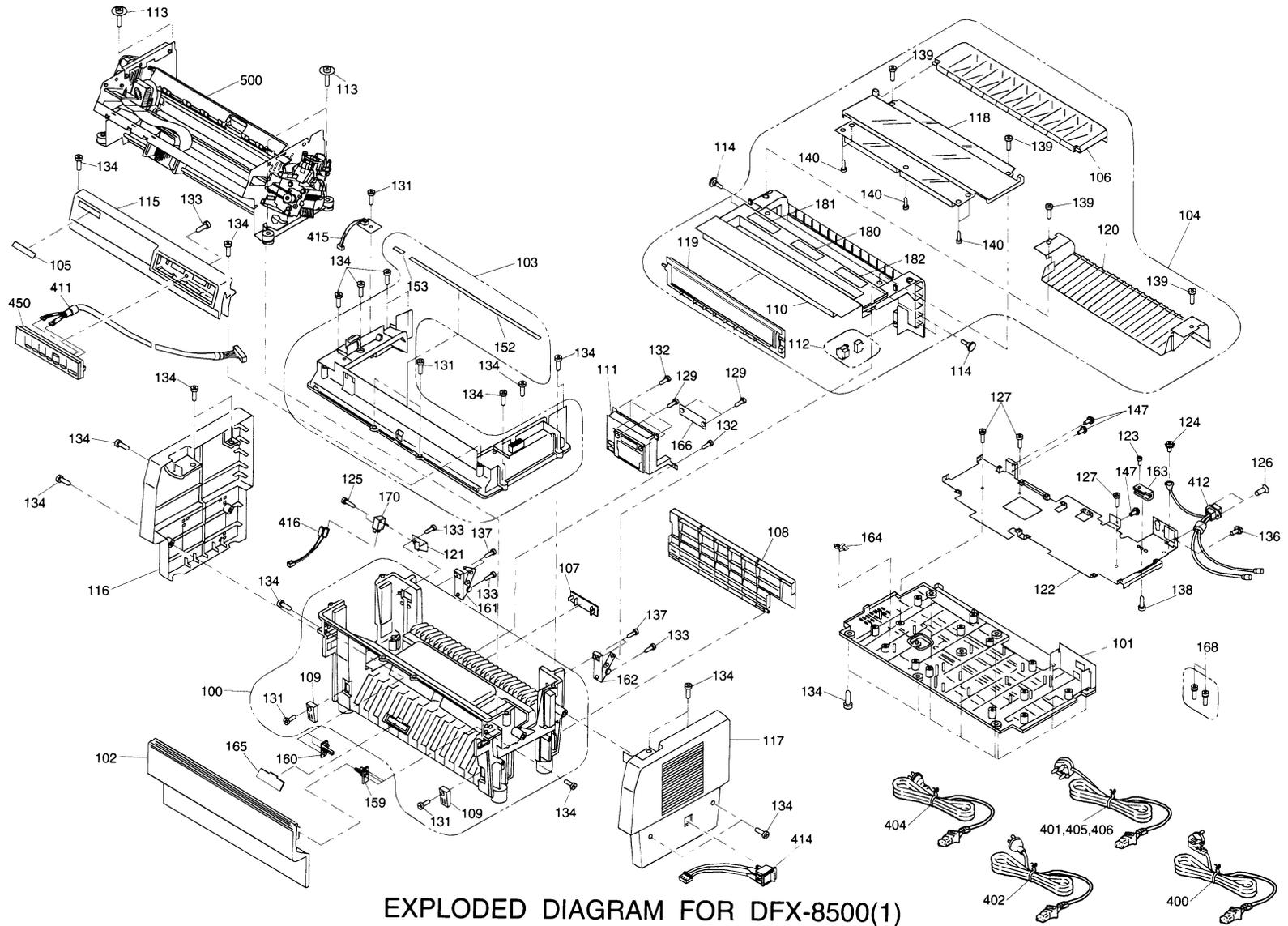
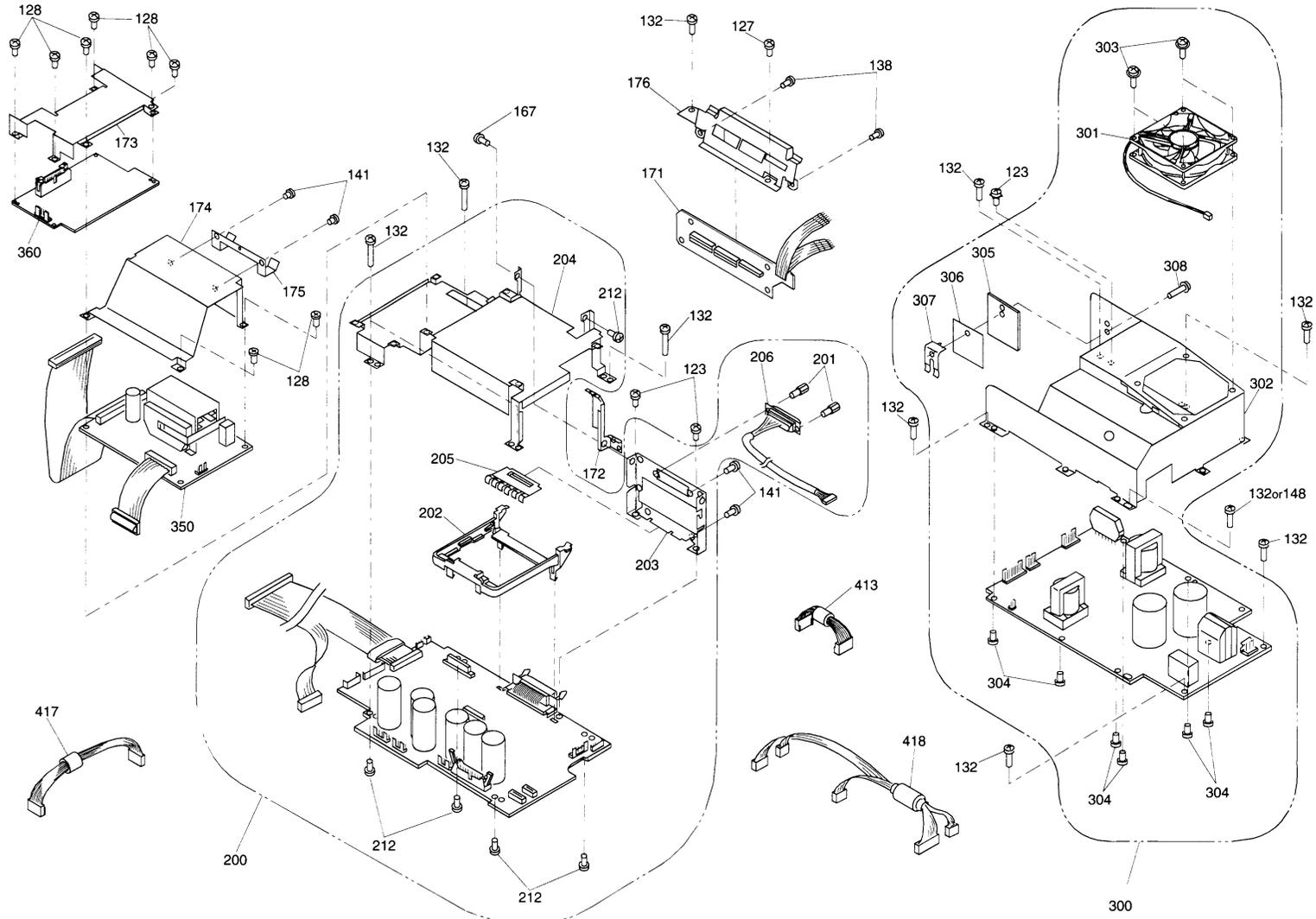


Figure A-16. Exploded Diagrams (1)

EXPLODED DIAGRAM FOR DFX-8500(1)

Figure A-17. Exploded Diagrams (2)



EXPLODED DIAGRAM FOR DFX-8500(2)

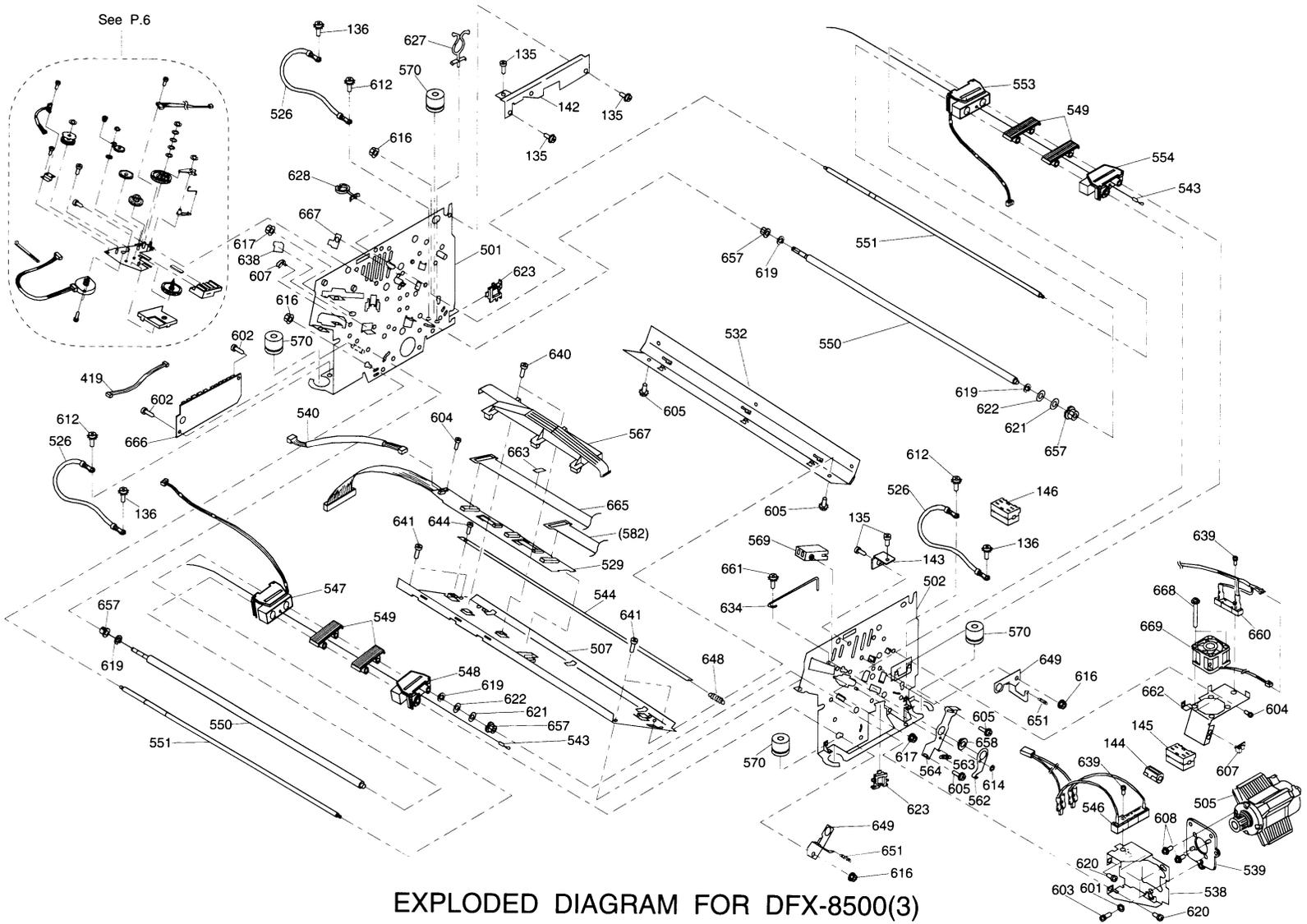
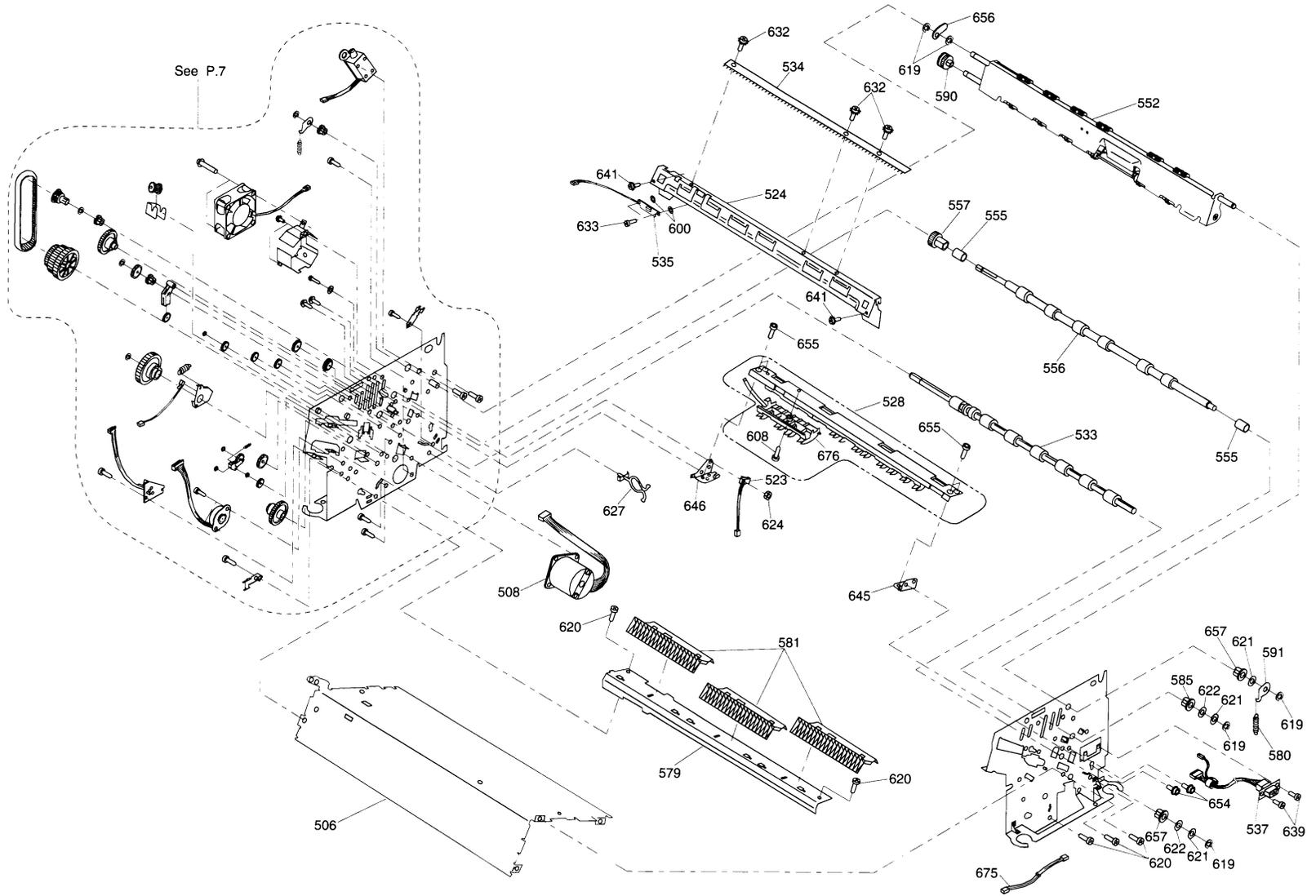
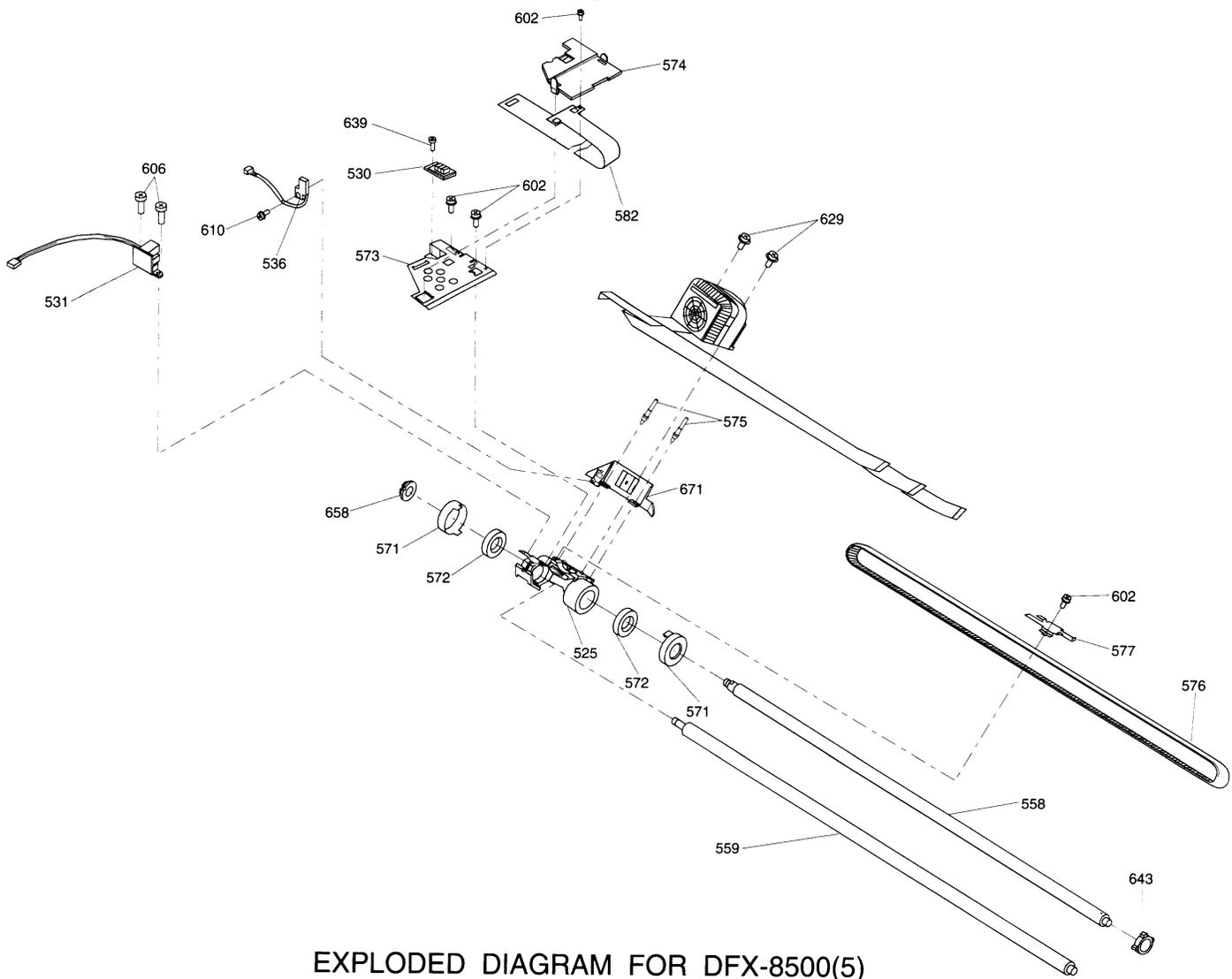


Figure A-18. Exploded Diagrams (3)

Figure A-19. Exploded Diagrams (4)



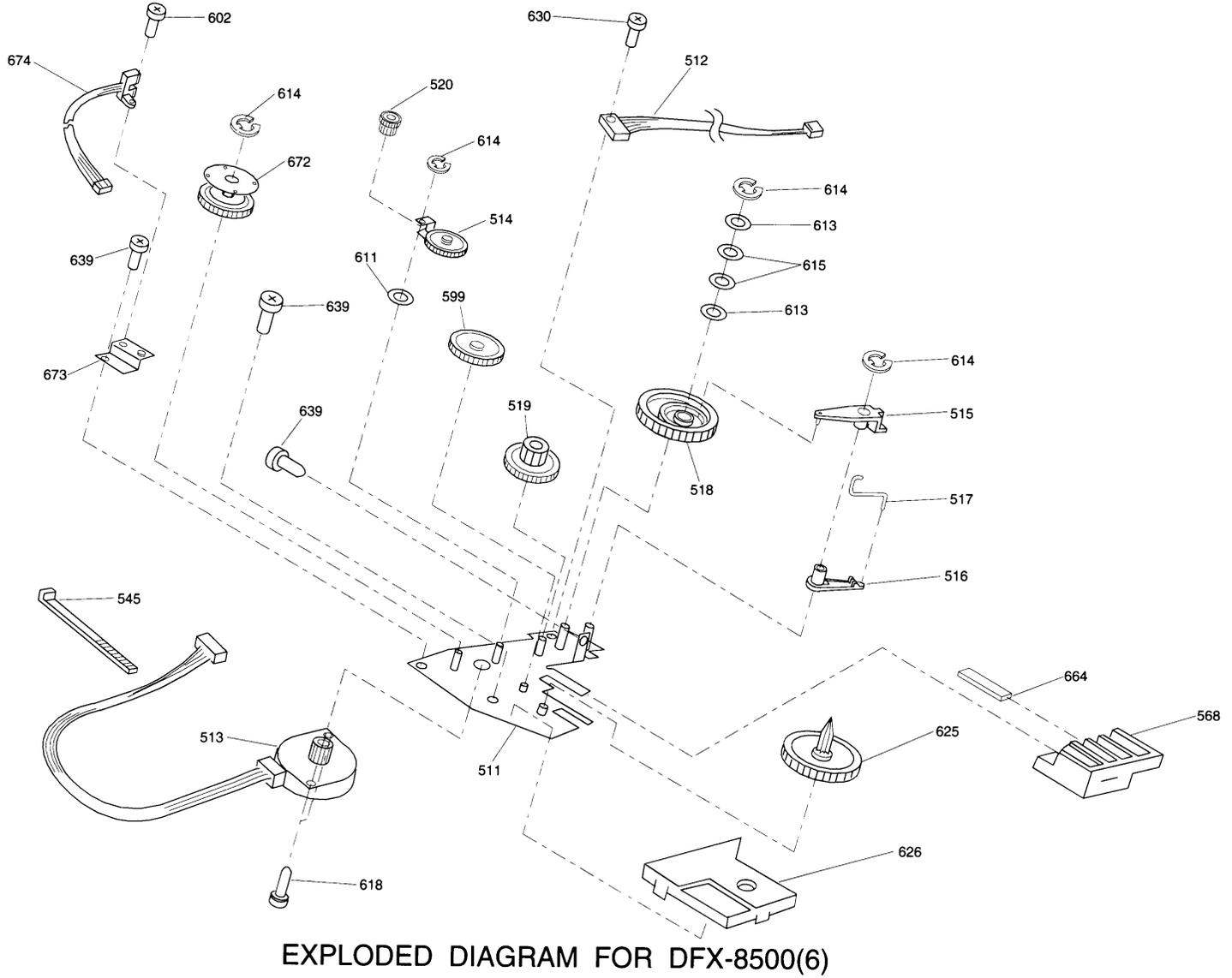
EXPLODED DIAGRAM FOR DFX-8500(4)

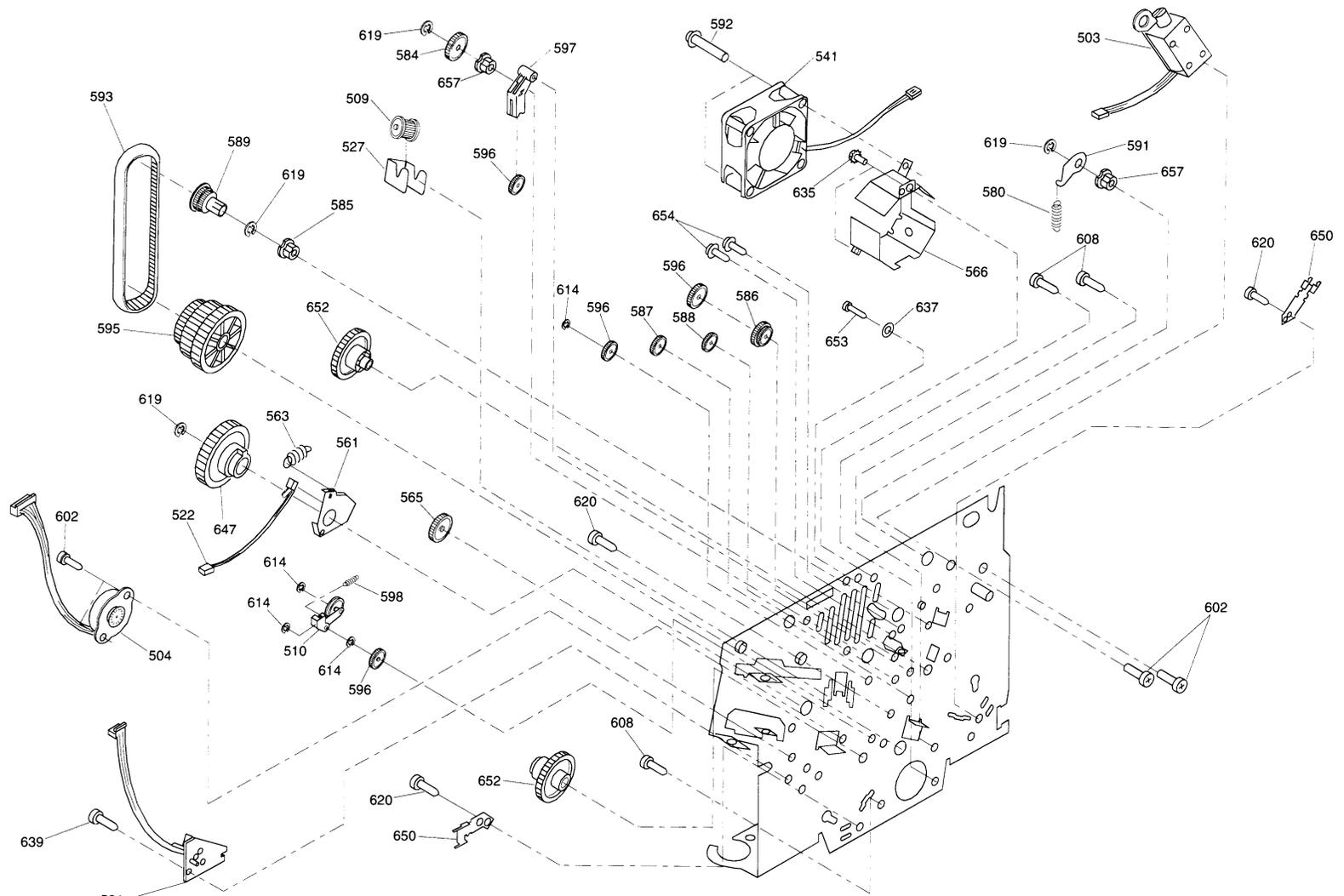


EXPLODED DIAGRAM FOR DFX-8500(5)

Figure A-20. Exploded Diagrams (5)

Figure A-21. Exploded Diagrams (6)

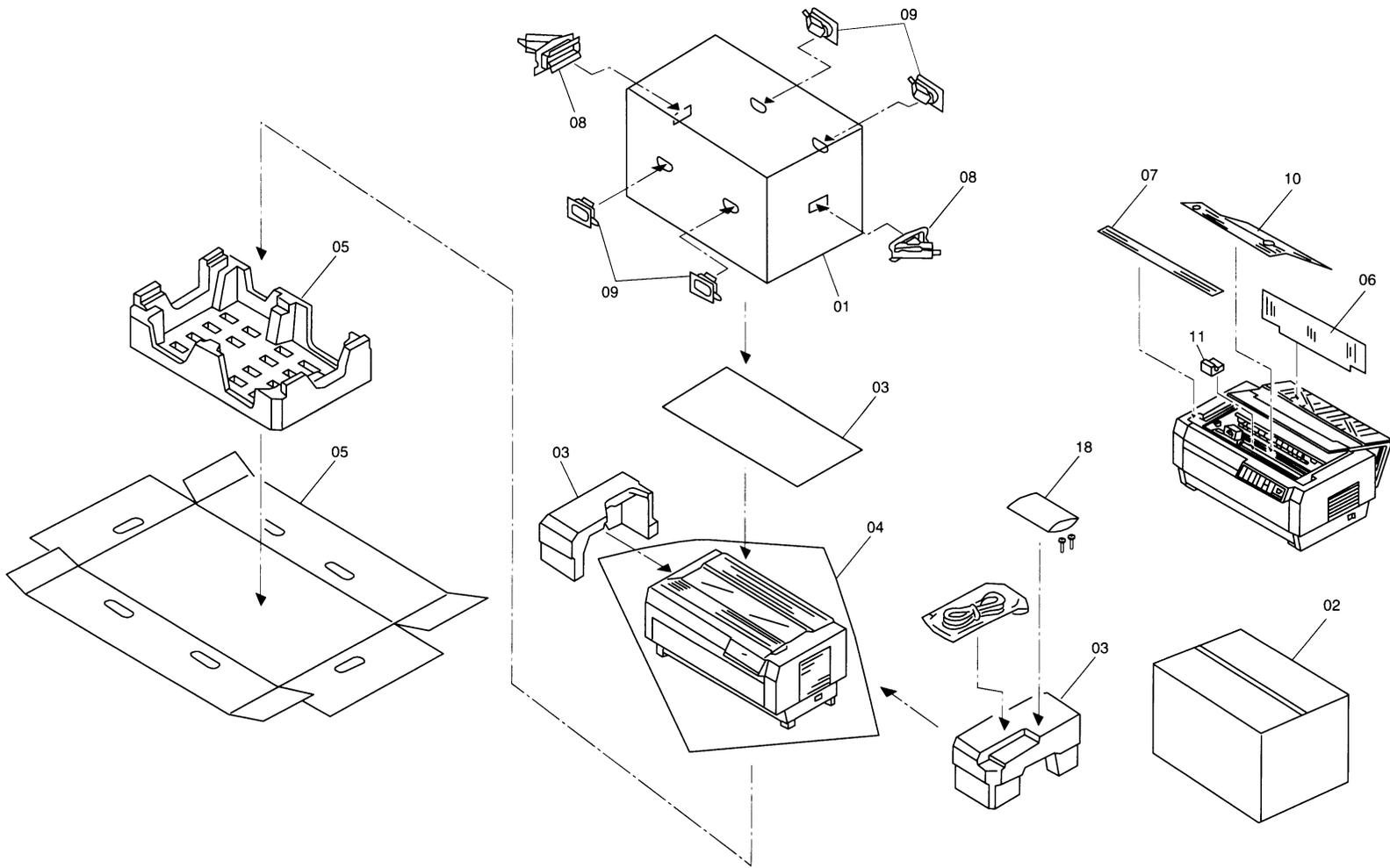




EXPLODED DIAGRAM FOR DFX-8500(7)

Figure A-22. Exploded Diagrams (7)

Figure A-23. Packing Material



PACKING MATERIAL FOR DFX-8500

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<p><b>EPSON AMERICA, Inc.</b></p> <p>20770 Madrona Avenue, P.O. Box 2842 Torrance, CA 90509-2842 Phone: (800)922-8911 Fax: (310)782-5220</p>	<p><b>EPSON DEUTCHLAND GmbH</b></p> <p>Zülpicher Straße 6, 4549 Düsseldorf Germany Phone: (0211)56030 Telex: 8584786</p>
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<p><b>SEIKO EPSON CORPORATION</b> <b>Imaging &amp; Information Products Division</b></p> <p>80 Harashinden, Hirooka, Shiojiri-Shi, Nagano-Ken 399-07 JAPAN Phone: 0263-52-2552 Fax: 0263-54-4007</p>	

*As of September, 1996*

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