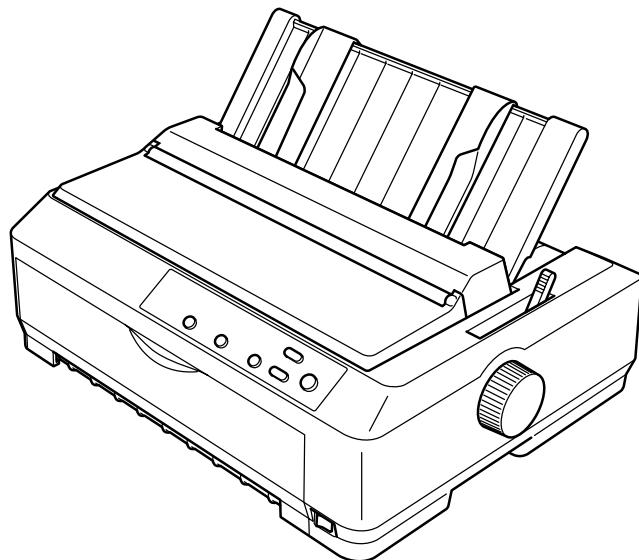


# SERVICE MANUAL



Serial Impact Dot Matrix Printer  
**EPSON FX-890/2190**



**EPSON®**

SEDM02003

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# PRECAUTIONS

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

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

**WARNING** 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.

## **DANGER**

1. ALWAYS DISCONNECT THE PRODUCT FROM 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.
4. When disassembling or assembling a product, be sure to wear gloves to avoid injuries from metal parts with sharp edges.

## **WARNING**

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES 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. DO NOT REPLACE IMPERFECTLY FUNCTIONING COMPONENTS WITH COMPONENTS WHICH ARE NOT MANUFACTURED BY EPSON. IF SECOND SOURCE IF'S OR OTHER COMPONENTS WHICH HAVE NOT BEEN APPROVED ARE USED, THEY COULD CAUSE DAMAGE TO THE EPSON PRODUCT, OR COULD VOID THE WARRANTY OFFERED BY EPSON.

# About This Manual

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of the printer. The instructions and procedures included herein are intended for the experienced repair technicians, and attention should be given to the precautions on the preceding page.

## Manual Configuration

This manual consists of six chapters and Appendix.

### **CHAPTER 1. PRODUCT DESCRIPTIONS**

Provides a general overview and specifications of the product.

### **CHAPTER 2. OPERATING PRINCIPLES**

Describes the theory of electrical and mechanical operations of the product.

### **CHAPTER 3. TROUBLESHOOTING**

Describes the step-by-step procedures for the troubleshooting.

### **CHAPTER 4. DISASSEMBLY / ASSEMBLY**

Describes the step-by-step procedures for disassembling and assembling the product.

### **CHAPTER 5. ADJUSTMENT**

Provides Epson-approved methods for adjustment.

### **CHAPTER 6. MAINTENANCE**

Provides preventive maintenance procedures and the lists of Epson-approved lubricants and adhesives required for servicing the product.

**APPENDIX** Provides the following additional information for reference:

- Connector pin assignments
- Electric circuit boards components layout
- Electrical circuit boards schematics
- Exploded diagram & Parts List

## Symbols Used in this Manual

Various symbols are used throughout this manual either to provide additional information on a specific topic or to warn of possible danger present during a procedure or an action. Be aware of all symbols when they are used, and always read NOTE, CAUTION, or WARNING messages.



Indicates an operating or maintenance procedure, practice or condition that is necessary to keep the product's quality.



Indicates an operating or maintenance procedure, practice, or condition that, if not strictly observed, could result in damage to, or destruction of, equipment.



May indicate an operating or maintenance procedure, practice or condition that is necessary to accomplish a task efficiently. It may also provide additional information that is related to a specific subject, or comment on the results achieved through a previous action.



Indicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.



Indicates that a particular task must be carried out according to a certain standard after disassembly and before re-assembly, otherwise the quality of the components in question may be adversely affected.

# Revision Status

Revision	Date of Issue	Description
A	June 20, 2003	Formal first release
B	August 21, 2003	<p>Revision up:</p> <p>Chapter-3: Error Correction ("3.2.12 Fatal Error" on page 63)</p> <p>Chapter-4: Error Correction ("4.2.3 C524MAIN Board" on page 74)</p> <p>Appendix: The part list and the exploded diagram for the FX-2190 are added. ("7.3 Exploded Diagrams" on page 114, "7.4 Parts List" on page 122)</p>

# Table of Contents

## *Chapter 1 PRODUCT DESCRIPTIONS*

---

<b>1.1 Features .....</b>	<b>9</b>
<b>1.2 Interface .....</b>	<b>23</b>
1.2.1 Parallel interface (Forward channel) .....	23
1.2.2 Parallel interface (Reverse channel) .....	25
1.2.3 USB Interface .....	26
1.2.4 Optional Interface .....	27
1.2.5 Type-B Interface communication specification .....	27
1.2.6 Interface selection .....	28
1.2.7 IEEE1284.4 protocol .....	29
<b>1.3 Operation .....</b>	<b>30</b>
1.3.1 Control panel .....	30
1.3.2 Switches .....	30
1.3.2.1 Operation in Normal Mode .....	30
1.3.2.2 Operations at Power-on .....	31
1.3.2.3 Operation in Default Setting Mode .....	31
1.3.3 Indicators ( LEDs ) .....	31
1.3.3.1 Indications in Normal Mode .....	31
1.3.4 Buzzer .....	33
1.3.5 Default Setting .....	33
1.3.5.1 Setting Method .....	33
1.3.5.2 Setting Items .....	34
1.3.6 EEPROM Clear Function .....	35
1.3.7 Bi-D Adjustment .....	36
<b>1.4 Dimensions and Weight .....</b>	<b>37</b>
1.4.1 FX-880T+ Mode .....	41
1.4.1.1 Setting of FX-880T+ mode .....	41
1.4.1.2 Supported commands .....	41
1.4.1.3 Default setting items .....	42
1.4.1.4 Printer defaults .....	42
1.4.1.5 Action of the printer .....	42

## *Chapter 2 Operating Principles*

---

<b>2.1 Overview .....</b>	<b>44</b>
2.1.1 Printer Mechanism .....	45
2.1.1.1 Printhead .....	45
2.1.1.2 Paper Feed Mechanism .....	45
2.1.1.3 Carriage Movement Mechanism .....	45
2.1.1.4 Tractor Feed Mechanism .....	45
2.1.1.5 Platen Gap Adjustment Mechanism .....	45
2.1.1.6 Ribbon Feed Mechanism .....	46
2.1.1.7 Sensors .....	46
2.1.2 Circuit Operation .....	47
2.1.2.1 C524 MAIN Board .....	47
2.1.2.2 C524 PSB/PSE/PSH Power Supply Circuit .....	50

## *Chapter 3 Troubleshooting*

---

<b>3.1 Overview .....</b>	<b>53</b>
3.1.1 Specified Tools .....	53
3.1.2 Procedure for Troubleshooting .....	53
3.1.3 Preliminary Checks .....	54
3.1.4 Error .....	54
<b>3.2 Troubleshooting Based on Symptoms .....</b>	<b>55</b>
3.2.1 Printer fails to operate when power is turned on .....	55
3.2.2 No LED on Control Panel lights up even with power turned on .....	56
3.2.3 Abnormal operation of Carriage at power on .....	56
3.2.4 Abnormal paper feeding .....	57
3.2.5 Printing is faulty during self-test, but carriage operation is normal .....	58
3.2.6 Abnormal operation of Control Panel .....	59
3.2.7 Abnormal on-line operation (normal self-printing, though) .....	59
3.2.8 Abnormal operation of ribbon .....	60
3.2.9 Abnormal operation of Carriage Unit .....	61
3.2.10 Faulty print .....	62

3.2.11 Electrical Noise .....	62
3.2.12 Fatal Error .....	63
<b>3.3 Troubleshooting for Individual Units .....</b>	<b>64</b>
3.3.1 Main Component Checking Point .....	64

## *Chapter 4 Disassembly and Assembly*

---

<b>4.1 Overview .....</b>	<b>66</b>
4.1.1 Disassembly Precautions .....	66
4.1.2 Tools and Instruments .....	66
4.1.3 Service Check After Repair .....	67
4.1.3.1 Abbreviations for Small Parts .....	68
<b>4.2 Main Components Disassembly .....</b>	<b>69</b>
4.2.1 Pre-disassembly Procedures .....	70
4.2.2 Upper Housing .....	72
4.2.3 C524MAIN Board .....	74
4.2.4 C524PSB/PSE/PSH Board .....	76
<b>4.3 Printer Mechanism Disassembly .....</b>	<b>77</b>
4.3.1 Printhead .....	77
4.3.2 HP (Home Position) Detector .....	78
4.3.3 Platen .....	79
4.3.4 Printer Mechanism .....	80
4.3.5 CR Motor .....	81
4.3.6 PF Motor .....	83
4.3.7 PF Gear Train .....	84
4.3.8 PG (Platen Gap) Detector .....	86
4.3.9 Release Detector .....	86
4.3.10 Front PE (Paper End) Detector .....	87
4.3.11 Rear PE Detector .....	87
4.3.12 Carriage Assembly .....	88
4.3.13 Rear Paper Guide Assembly .....	90
4.3.14 Ribbon Drive (RD) Assembly .....	92

## *Chapter 5 Adjustment*

---

<b>5.1 Adjustment Overview .....</b>	<b>94</b>
5.1.1 Required Adjustment .....	94
5.1.2 Adjustment Tools .....	94
<b>5.2 Adjusting and Resetting the Printer .....</b>	<b>95</b>

5.2.1 Platen Gap Adjustment .....	95
<b>5.3 Adjustment Program .....</b>	<b>97</b>
5.3.1 Preparation .....	97
5.3.1.1 System Requirement .....	97
5.3.1.2 Installation .....	97
5.3.1.3 Running the Program .....	97

## *Chapter 6 Maintenance*

---

<b>6.1 Overview .....</b>	<b>99</b>
6.1.1 Preventive Maintenance .....	99
<b>6.2 Lubrication .....</b>	<b>100</b>

## *Chapter 7 Appendix*

---

<b>7.1 Connector Summary .....</b>	<b>105</b>
<b>7.2 Electric Circuit Diagrams .....</b>	<b>108</b>
<b>7.3 Exploded Diagrams .....</b>	<b>114</b>
<b>7.4 Parts List .....</b>	<b>122</b>

CHAPTER  
**1**

## PRODUCT DESCRIPTIONS

## 1.1 Features

EPSON FX-890/2190 is a small-foot 18-pin serial impact dot matrix printer.

### HARDWARE SPECIFICATIONS

- Print method : Impact Dot Matrix
- Number of pins : 18 pins
- Print pin arrangement : 9 pins x 2 files
- Print pin diameter : 0.29 mm (0.0114 inch)
- Color : Black ink ribbon
- Print Direction : Bi-direction with logic seeking

### RESOLUTION

**Table 1-1. Resolution ( dpi )**

Printing Mode	Horizontal Density	Vertical Density	Adjacent Dot Print
Ultra Speed Draft 10 cpi	80 dpi	72 dpi	No
Ultra Speed Draft 12 cpi	84 dpi	72 dpi	No
High Speed Draft 10 cpi	90 dpi	72 dpi	No
High Speed Draft 12 cpi	96 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 or 120 dpi	72 dpi	Yes
	120 or 240 dpi	72 dpi	No

### PRINTING SPEED

**Table 1-2. Printing Speed (cps) and Printable Columns**

Printing Mode	Character Pitch	Printable Columns		Printing Speed	
		FX-890	FX-2190	Normal	Copy
Ultra Speed Draft	10 cpi	80	136	566	489
	12 cpi	96	163	680	571
	10 cpi	80	136	559	476
High Speed Draft	12 cpi	96	163	627	539
	15 cpi	120	204	629	520
	17 cpi	137	233	595	463
High Speed Draft Condensed	20 cpi	160	272	541	419
	10 cpi	80	136	419	347
	12 cpi	96	163	503	416
Draft	15 cpi	120	204	405	314
	17 cpi	137	233	359	300
	20 cpi	160	272	419	350
Draft Condensed	10 cpi	80	136	209	173
	12 cpi	96	163	104.6	87.5
	15 cpi	120	204	125.9	105.0
NLQ	17 cpi	137	233	100.8	78.5
	20 cpi	160	272	89.7	38.5
	10 cpi	80	136	104.6	44.9

Note 1: When the power supply voltage drops to the lower limit, the printer stops printing and then starts printing remains on that line again more slowly than before.

2: When the head temperature rises to the upper limit, the printer stops printing. When the head temperature falls to the normal level, the printer starts printing again more slowly than before.

**FEEDING METHOD**

- Friction feed : Front, Rear
- Push tractor feed : Front, Rear
- Push & Pull tractor feed : Front, Rear
- Pull tractor feed : Front, Rear, Bottom

**FEED SPEED**

- |                                      |                         |   |
|--------------------------------------|-------------------------|---|
| <input type="checkbox"/> Normal mode | 4.23 mm (1/6 inch feed) | 62 msec                                     |
|                                      | Continuous feed         | 0.127 MPS (m/sec)<br>[5.0 IPS (inches/sec)] |
| <input type="checkbox"/> Copy mode   | 4.23 mm (1/6 inch feed) | 83 msec                                     |
|                                      | Continuous feed         | 0.078 MPS (m/sec)<br>[3.1 IPS (inches/sec)] |

**FEEDER**

- Front push tractor
- Rear push tractor
- CSF Bin 1 / Bin 2 (Option)
- Pull tractor ( Option )
- Roll paper holder (Option)

**PAPER SPECIFICATIONS****Table 1-3. Cut Sheet (Single sheet, Not multi part) FX-890**

FX-890	Front Entry		Rear Entry									
	Manual		Manual		High-Capacity CSF		Single-Bin CSF					
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.				
Width	(inch) (mm)	(3.9) 100	(10.1) 257	(3.9) 100	(10.1) 257	(3.9) 100	(8.5) 216	(7.2) 182	(8.5) 216			
Length	(inch) (mm)	(3.9) 100	(14.3) 364	(3.9) 100	(14.3) 364	(3.9) 100	(14.3) 364	(8.3) 210	(14.3) 364			
Thickness	(inch) (mm)	(0.0025) 0.065	(0.0055) 0.14	(0.0025) 0.065	(0.0055) 0.14	(0.0028) 0.07	(0.0055) 0.14	(0.0028) 0.07	(0.0055) 0.14			
Weight	(g/m <sup>2</sup> ) (lb)	52 (14)	90 (24)	52 (14)	90 (24)	64 (18)	90 (24)	64 (18)	90 (24)			
CSF Capacity		---		---		185 sheets with the form 64 g/m <sup>2</sup> (17lb) *1		60 sheets with the form 64 g/m <sup>2</sup> (17lb) *2				
						150 sheets with the form 82 g/m <sup>2</sup> (22lb) *1		50 sheets with the form 82 g/m <sup>2</sup> (22lb) *2				
Quality	Plain paper, Reclaimed paper											
	Not curled, not folded, not crumpled											

Note : Printing on reclaimed paper is available only under normal temperature and humidity conditions.

Note “\*1” : When using High-Capacity CSF, paper total thickness is below 15 mm.

“\*2” : When using Single-Bin CSF, paper total thickness is below 5 mm.

**Table 1-4. Cut Sheet (Single sheet, Not multi part) FX-2190**

FX-2190	Front Entry		Rear Entry					
	Manual		Manual		High-Capacity CSF		Single-Bin CSF	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Width (inch) (mm)	(3.9) 100	(16.5) 420	(3.9) 100	(16.5) 420	(3.9) 100	(16.5) 420	(7.2) 182	(16.5) 420
Length (inch) (mm)	(3.9) 100	(16.5) 420	(3.9) 100	(16.5) 420	(3.9) 100	(16.5) 420	(8.3) 210	(14.3) 364
Thickness (inch) (mm)	(0.0025) 0.065	(0.0055) 0.14	(0.0025) 0.065	(0.0055) 0.14	(0.0028) 0.07	(0.0055) 0.14	(0.0028) 0.07	(0.0055) 0.14
Weight (g/m <sup>2</sup> ) (lb)	52 (14)	90 (24)	52 (14)	90 (24)	64 (18)	90 (24)	64 (18)	90 (24)
CSF Capacity	---		---		185 sheets with the form 64 g/m <sup>2</sup> (17lb) *1	60 sheets with the form 64 g/m <sup>2</sup> (17lb) *2		
					150 sheets with the form 82 g/m <sup>2</sup> (22lb) *1	50 sheets with the form 82 g/m <sup>2</sup> (22lb) *2		
Quality	Plain paper, Reclaimed paper Not curled, not folded, not crumpled							

Note : Printing on reclaimed paper is available only under normal temperature and humidity conditions

Note “\*1”: When using High-Capacity CSF, paper total thickness is below 15 mm.

“\*2”: When using Single-Bin CSF, paper total thickness is below 5 mm.

**Table 1-5. Cut Sheet (Multi part) FX-890**

FX-890	Front Entry		Rear Entry	
	Manual		Manual / High-Capacity CSF / Single-Bin CSF	
	Minimum	Maximum	Minimum	Maximum
Width (inch) (mm)	(3.9) 100	(10.1) 257	-----	-----
Length (inch) (mm)	(3.9) 100	(14.3) 364	-----	-----
Copies	1 original + 5 copies		-----	
Total thickness (inch) (mm)	(0.0047) 0.12	(0.018) 0.46	-----	-----
Weight (g/m <sup>2</sup> ) (one sheet of multi part) (lb)	40 (12)	58 (15)	-----	-----
Quality	Plain paper, Reclaimed paper Not curled, not folded, not crumpled		-----	
Jointing	Line glue at the top side of form		-----	-----

Note 1: Type of paper of multi-part forms should be Carbonless. Don't use Carbon-backed and Carbon-interleaved.

2: Type of paper of line glue at the top should be set jointing side of paper horizontally.

**Table 1-6. Cut Sheet (Multi part) FX-2190**

FX-2190		Front Entry		Rear Entry	
		Manual		Manual / High-Capacity CSF / Single-Bin CSF	
		Minimum	Maximum	Minimum	Maximum
Width	(inch) (mm)	(3.9) 100	(16.5) 420	----	----
Length	(inch) (mm)	(3.9) 100	(16.5) 420	----	----
Copies		1 original + 5 copies		----	
Total thickness	(inch) (mm)	(0.0047) 0.12	(0.018) 0.46	----	----
Weight (one sheet of multi part)	(g/m <sup>2</sup> ) (lb)	40 (12)	58 (15)	----	----
Quality		Plain paper, Reclaimed paper Not curled, not folded, not crumpled		----	
Jointing		Line glue at the top side of form		----	----

Note 1: Type of paper of multi-part forms should be Carbonless. Don't use Carbon-backed and Carbon-interleaved.

2: Type of paper of line glue at the top should be set jointing side of paper horizontally.

**Table 1-7. Card**

FX-890 & FX-2190		Front Entry		Rear Entry			
		Manual		Manual		High-Capacity CSF	
		Min.	Max.	Min.	Max.	Min.	Max.
Width	(inch) (mm)	(3.9) 100	(5.8) 148	(3.9) 100	(5.8) 148	(3.9) 100	(5.8) 148
Length	(inch) (mm)	(5.8) 148		(3.9) 100	(5.8) 148	(3.9) 100	(5.8) 148
Thickness	(inch) (mm)	(0.0087) 0.22		(0.0087) 0.22		(0.0087) 0.22	
Weight	(g/m <sup>2</sup> ) (lb)	192 (51)		192 (51)		192 (51)	
Quality		Plain paper, Reclaimed paper Not curled, not folded, not crumpled					

Note 1: Printing on card is available only under normal temperature and humidity conditions

- 2: When setting cards, be sure to align their left edge with the matchmark of the sheet guide.
- 3: When Paper size is A6 and the sheet is to be set horizontal, it should be inserted from rear entrance only.
- 4: When using card, set up card mode.

**Table 1-8. Envelope**

FX-890 & FX-2190		Front Entry		Rear Entry					
		Manual		Manual		High-Capacity CSF		Single-Bin CSF	
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Envelope (No.6)	Width (inch) (mm)	-----		(6.5) 165				-----	
	Length (inch) (mm)	-----		(3.6) 92				-----	
Envelope (No.10)	Width (inch) (mm)	-----		(9.5) 241				-----	
	Length (inch) (mm)	-----		(4.1) 105				-----	
Total Thickness	(inch) (mm)	-----		(0.0063) 0.16	(0.0205) 0.52	(0.0063) 0.16	(0.0205) 0.52	-----	
		-----		The difference of thickness at the printable area is within 0.25 mm (0.0098 inch)				-----	
Weight	(g/m <sup>2</sup> )	-----		45	90	45	90	-----	
	(lb)			(12)	(24)	(12)	(24)		
CSF capacity		-----		25 sheets (24lb)				-----	
				30 sheets (12lb)				-----	
Quality		-----		BOND paper, PLAIN paper or AIR MAIL No glue at a flap Not curled, not folded, not crumpled				-----	

Note 1: Printing on envelope is available only under normal temperature and humidity conditions

- 2: Set the longer side of envelope horizontally.
- 3: When setting envelopes of No. 6 paper size, be sure to align their left edge with the matchmark of the sheet guide.
- 4: Envelope should be inserted from rear entrance only.
- 5: Except for AIRMAIL, the sheets stacked must not exceed 4 sheets.
- 6: Printing is allowed only on the front side; printing on the back side is impossible.

**Table 1-9. Handling possible cut sheets of fixed forms  
(single sheet/multi-part) with FX-890**

Direction		Size	A3	B4	A4	B5	A5	A6	Envelope
Rear Entry (manual)	Vertical	---	O/---	O/---	O/---	O/---	O/---	O/---	---
	Horizontal	---	---	---	O/---	O/---	O/---	O/---	O
Front Entry (manual)	Vertical	---	O/O	O/O	O/O	O/O	O/O	O/O	---
	Horizontal	---	---	---	O/O	O/O	O/O	O/O	---
High-Capacity CSF	Vertical	---	---	O/---	O/---	O/---	O/---	O/---	---
	Horizontal	---	---	---	O/---	O/---	O/---	O/---	O
Single-Bin CSF	Vertical	---	---	O/---	O/---	---	---	---	---
	Horizontal	---	---	---	---	---	---	---	---

**Table 1-10. Handling possible cut sheets of fixed forms  
(single sheet/multi-part) with FX-2190**

Direction		Size	A3	B4	A4	B5	A5	A6	Envelope
Rear Entry (manual)	Vertical	O/---	---						
	Horizontal	O/---	O						
Front Entry (manual)	Vertical	O/O	---						
	Horizontal	O/O	---						
High-Capacity CSF	Vertical	TBD							
	Horizontal	TBD							
Single-Bin CSF	Vertical	TBD							
	Horizontal	TBD							

**Table 1-11. Continuous paper (Single sheet and Multi Part) FX-890**

FX-890		Bottom/Front/Rear Entry	
		Minimum	Maximum
Width	(inch) (mm)	(4) 101.6	(10) 254
Length (one page)	(inch) (mm)	(4) 101.6	(22) 558.8
Copies	1 original + 5 copies *		
Total thickness	(inch) (mm)	(0.0025) 0.065	(0.018) 0.46
Weight (not multi part)	(g/m <sup>2</sup> ) (lb)	52 (14)	82 (22)
Weight (one sheet of multi part)	(g/m <sup>2</sup> ) (lb)	40 (12)	58 (15)
Quality	Plain paper, Reclaimed paper Carbonless multi part paper Not break, without wrinkle, without tear, without turn over		
Jointing	Point glue or paper staple(both side)		

Note “\*” : When pull tractor is used, 1 original + 6 copies are available only under normal temperature and humidity conditions.

**Table 1-12. Continuous paper (Single sheet and Multi Part) FX-1190**

FX-2190		Bottom/Front/Rear Entry	
		Minimum	Maximum
Width	(inch) (mm)	(4) 101.6	(16) 406.4
Length (one page)	(inch) (mm)	(4) 101.6	(22) 558.8
Copies	1 original + 5 copies *		
Total thickness	(inch) (mm)	(0.0025) 0.065	(0.018) 0.46
Weight (not multi part)	(g/m <sup>2</sup> ) (lb)	52 (14)	82 (22)
Weight (one sheet of multi part)	(g/m <sup>2</sup> ) (lb)	40 (12)	58 (15)
Quality	Plain paper, Reclaimed paper Carbonless multi part paper Not break, without wrinkle, without tear, without turn over		
Jointing	Point glue or paper staple(both side)		

Note “\*” : When pull tractor is used, 1 original + 6 copies are available only under normal temperature and humidity conditions.

**Table 1-13. Labels (FX-890)**

FX-890	Bottom/Front Entry		Rear Entry	
	Minimum	Maximum	Minimum	Maximum
Label size	See Figure 1-1 below.		----	
Base sheet width	(inch) (mm)	(4) 101.6	(10) 254	----
Base sheet length (one page)	(inch) (mm)	(4) 101.6	(22) 558.8	----
Base sheet Thickness	(inch) (mm)	(0.0028) 0.07	(0.0035) 0.09	----
Total thickness	(inch) (mm)	(0.0063) 0.16	(0.0075) 0.19	----
Label weight	(g/m <sup>2</sup> ) (lb)	64 (17)		----
Quality	Plain paper or the same quality labels		----	

Note 1: Printing on labels is available only under normal temperature and humidity conditions.

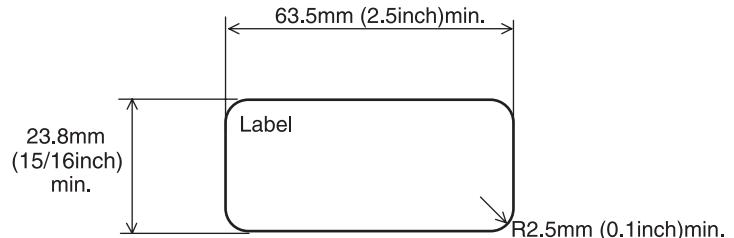
- 2: The base sheet of labels must be continuous paper.
- 3: Labels should be inserted from bottom or front entrance.
- 4: Do not pull out paper from backward.
- 5: No label paper should be left on the printer when the printer is not used.
- 6: Do not print on the base sheet of labels.
- 7: Do not use cut sheet labels.

**Table 1-14. Labels (FX-2190)**

FX-2190	Bottom/Front Entry		Rear Entry	
	Minimum	Maximum	Minimum	Maximum
Label size	See Figure 1-1 below.		----	
Base sheet width	(inch) (mm)	(4) 101.6	(16) 406.4	----
Base sheet length (one page)	(inch) (mm)	(4) 101.6	(22) 558.8	----
Base sheet Thickness	(inch) (mm)	(0.0028) 0.07	(0.0035) 0.09	----
Total thickness	(inch) (mm)	(0.0063) 0.16	(0.0075) 0.19	----
Label weight	(g/m <sup>2</sup> ) (lb)	64 (17)		----
Quality	Plain paper or the same quality labels		----	

Note 1: Printing on labels is available only under normal temperature and humidity conditions.

- 2: The base sheet of labels must be continuous paper.
- 3: Labels should be inserted from bottom or front entrance.
- 4: Don't pull out paper from backward.
- 5: No label paper should be left on the printer when the printer is not used.
- 6: Don't print on the base sheet of labels.
- 7: Don't use cut sheet labels.

**Figure 1-1. Label Size**

**Table 1-15. Roll Paper**

FX-890& FX-2190		Bottom/Front Entry		Rear Entry	
		Minimum	Maximum	Minimum	Maximum
Width	(inch) (mm)	----		(8.5) 216	
Length	(inch) (mm)	----		----	
Diameter	(inch) (mm)	----		(5) φ127 mm	
Thickness	(inch) (mm)	----		(0.0028) 0.07	(0.0035) 0.09
Weight	(g/m <sup>2</sup> ) (lb)	----		52 (14)	82 (22)
Quality		----		Plain paper, not curled, not folded, not crumpled	

Note 1: Roll paper must be set on the roll paper holder (option).

2: Roll paper should be inserted from rear entrance only.

3: Release lever position should be friction.

## 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
- EPSON OCR-B : 10 cpi \*

Bar code fonts:

EAN-13, EAN-8, Interleaved 2 of 5, UPC-A, UPC-E, Code 39, Code 128, POSTNET, Coda bar (NW-7)\*, Industrial 2 of 5\*, Matrix 2 of 5\*

**NOTE:** “\*”: These fonts are not described in user’s manual.

## CHARACTER TABLES

Standard version : 13 tables

NLSP version : 42 tables

International character sets : 13 countries

## INPUT BUFFER

128 Kbyte

**ELECTRICAL SPECIFICATION****Table 1-16. 120V Version**

Rated voltage	AC 120 V
Input voltage range	AC 103.5 to 132 V
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	1.1 A (Max. 2.5 A)
Power consumption	Approx.53 W (ISO/IEC 10561 Letter pattern) Approx. 3.5 W in sleep mode * 0 W in power off mode Energy Star compliant
Insulation resistance	10 MΩ min. (between AC line and chassis, DC 500 V)
Dielectric strength	AC 1000 V rms. 1 min. or AC 1200 V rms. 1 sec. (between AC line and chassis)

**Table 1-17. 230V Version**

Rated voltage range	AC 220 to 240 V
Input voltage range	AC 198 to 264 V
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	0.6 A (Max. 1.3A)
Power consumption	Approx. 53 W (ISO/IEC 10561 Letter pattern) Approx. 3.5 W in sleep mode * 0 W in power off mode Energy Star compliant
Insulation resistance	10 MΩ min. (between AC line and chassis, DC 500 V)
Dielectric strength	AC 1500 V rms. 1 min. (between AC line and chassis)

**Table 1-18. UPS Version**

Rated voltage range	AC 100 to AC240V
Input voltage range	AC 90 to 264V
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	1.1 A (Max. 3.0 A)
Power consumption	Approx.56 W (ISO/IEC 10561 Letter pattern) Approx. 4.0 W in sleep mode * 0 W in power off mode Energy Star compliant
Insulation resistance	10 MΩ min. (between AC line and chassis, DC 500 V)
Dielectric strength	AC 1500 V rms. 1 min. ( between AC line and chassis)

Note “\*” : Upon a lapse of 5 minutes under the following conditions, the printer enters sleep mode:

- Not in Pause, not in error status
- There is no data in input buffer.

**ACOUSTIC NOISE**

Level: 55 dB(A) (ISO 7779 pattern)

**ENVIRONMENTAL CONDITIONS**

Temperature : 5 to 35°C (operating, \*<sup>1</sup>)

15 to 25°C (operating, \*<sup>1,\*2</sup>)

-30 to 60°C (non-operating)

Humidity : 10 to 80 % RH (operating, \*<sup>1</sup>)

30 to 60 % RH (operating, \*<sup>1,\*2</sup>)

0 to 85 % RH (non-operating)

Resistance to shock : 1 G, within 1ms (operating)

2 G, within 2ms (non-operating)

Resistance to vibration : 0.25 G, 10 to 55 Hz (operating)

0.50 G, 10 to 55 Hz (non-operating)

\*1: without condensation

\*2: during printing on reclaimed paper, multi part paper, envelope, label or roll paper

**RELIABILITY**

Total print volume (MVBF) 52 million lines (except print head)

MTBF 20000 POH (25% Duty)

Print head life 400 million strokes/wire  
(Approx. 400 million characters (Draft 10 cpi, 14 dots/character))

**RIBBON CARTRIDGE****<FX-890>**

Type Fabric

Color	Black
Ribbon dimensions	13 mm (W) x 17 M (L) Endless
Ribbon life	Approximately 7.5 million characters (Draft 10 cpi, 14 dots / character)
Cartridge dimensions	287 mm (W) x 30 mm (H) x 77 mm (D)
<FX-2190>	
Type	Fabric
Color	Black
Ribbon dimensions	13 mm (W) x 19 M (L) Endless
Ribbon life	Approximately 12 million characters (Draft 10 cpi, 14 dots / character)
Cartridge dimensions	468.5 mm (W) x 34 mm (H) x 78 mm (D)

**SAFETY APPROVALS**

- 120 V version
  - Safety standards UL 1950, CSA C22.2 No. 950
  - EMI FCC part 15 subpart B class B, CSA C108.8 class B
- 230 V version
  - Safety standards EN60950
  - EMI EN55022 ( CISPR pub.22 ) class B  
AS/NZS.3548 class B
- UPS Version
  - Safety standards UL 1950, CSA C22.2 No. 950  
EN60950
  - EMI FCC part 15 subpart B class B, CSA C108.8 class B  
EN55022 ( CISPR pub. 22) class B  
AS/NZS 3548 class B

**CE MARKING**

- 230 V version & UPS version
- Low Voltage Directive 73/23/EEC: EN60950
  - EMC Directive 89/336/EEC: EN55022 class B  
EN61000-3-2  
EN61000-3-3  
EN55024

**INTERFACE**

- Bi-directional parallel interface (IEEE-1284 nibble mode supported)
- USB (ver1.1) I/F
- Type-B I/F level 2 (Option)

**CONTROL CODE**

- ESC/P
- IBM PPDS emulation

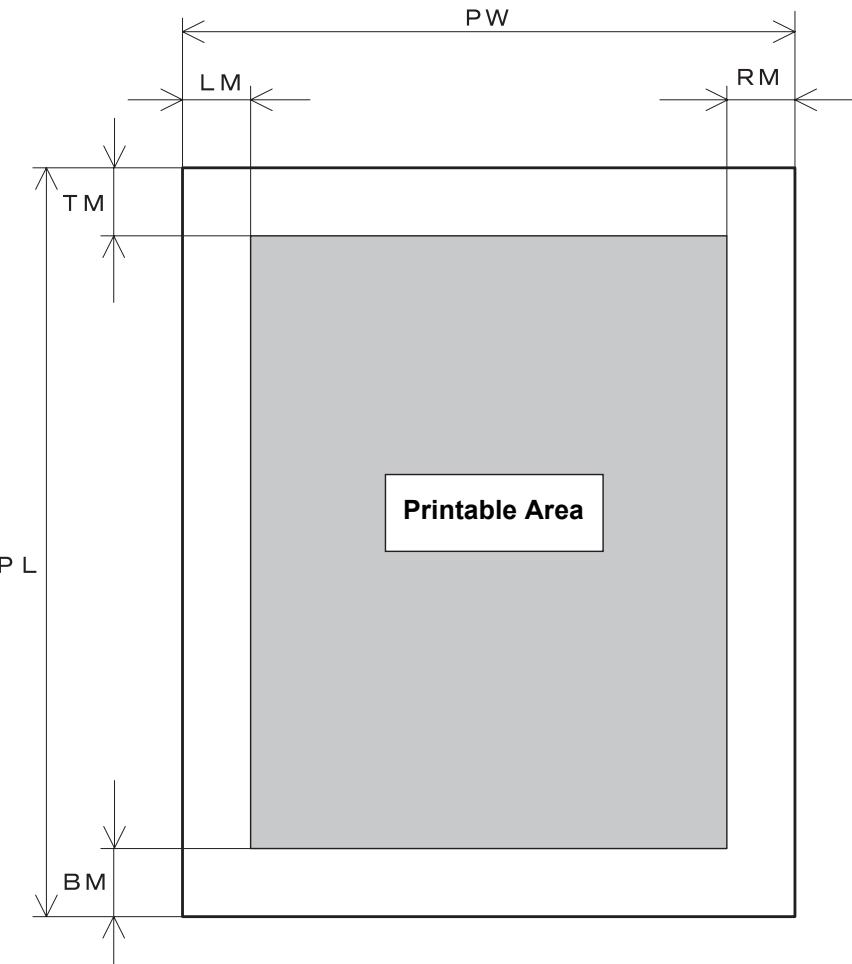
**EXPENDABLES & OPTIONS****Table 1-19. Expendables & Option**

Expendables	Code No.	
	FX-890	FX-2190
Ribbon cartridge (Black)	S015329	S015327
<b>Options</b>		
High capacity cut sheet feeder (Bin 1)	C80638*	C80640*
Single bin cut sheet feeder (Bin 2)	C80637*	C80639*
Pull tractor unit	C80020*	C80021*
Roll paper holder	#8310	#8310
Front sheet guide	C81400*	C81401*
Front paper guide	C81402*	C81403*
Serial Interface card	C82305* / C82306*	C82305* / C82306*
32KB intelligent serial Interface card	C82307* / C82308*	C82307* / C82308*
Local Talk I/F card	C82312*	C82312*
32KB IEEE-488 I/F card	C82313*	C82313*
Coax I/F card	C82314*	C82314*
Twinax I/F card	C82315*	C82315*
IEEE-1284 parallel I/F card	C82345*	C82345*
EpsonNet 10 Base 2/T Int. Print Server	C82362*	C82362*
EpsonNet 10/100 Base Tx Int. Print Server	C82363* *1/C82364*	C82363* *1/C82364*
EpsonNet 10/100 Base Tx Int. Print Server	C82384*	C82384*
EpsonNet 10/100 Base Tx Int. Print Server 2	C82391*	C82391*
EpsonNet 802.11b Wireless Ext. Print Server	C12C82396*	C12C82396*

Note “\*1”: When you use Ethernet interface card C82363\*, you need to attach the optional interface adapter (C82525\*) to the interface card.

**PRINTABLE AREA**

- Cut sheets

**Figure 1-2. Printable Area for Cut Sheet****Table 1-20. Printable Area for Cut Sheet**

	Single Sheet / Multi Part	
	FX-890	FX-2190
<b>PW (Width)</b>	Refer to "PAPER SPECIFICATIONS" Table 1-3 on page 10 for single sheet or Table 1-5 on page 11 for multi part	Refer to "PAPER SPECIFICATIONS" Table 1-4 on page 11 for single sheet or Table 1-6 on page 12 for multi part
<b>PL (Length)</b>		
<b>LM (Left Margin)</b>	3 mm or more ( $PW \leq 209.2$ mm)	3 mm or more ( $PW \leq 351.4$ mm)
<b>RM (Right Margin)</b>	26.9 mm or more ( $PW = 257$ mm)	37.3 mm or more ( $PW = 420$ mm)
<b>TM (Top Margin)</b>		
<b>BM (Bottom Margin)</b>	4.2 mm or more	

Note : The maximum horizontal printable area is 203.2 mm (8 inch) for FX-890 or 345.4 mm (13.6 inch) for FX-2190.

Envelope

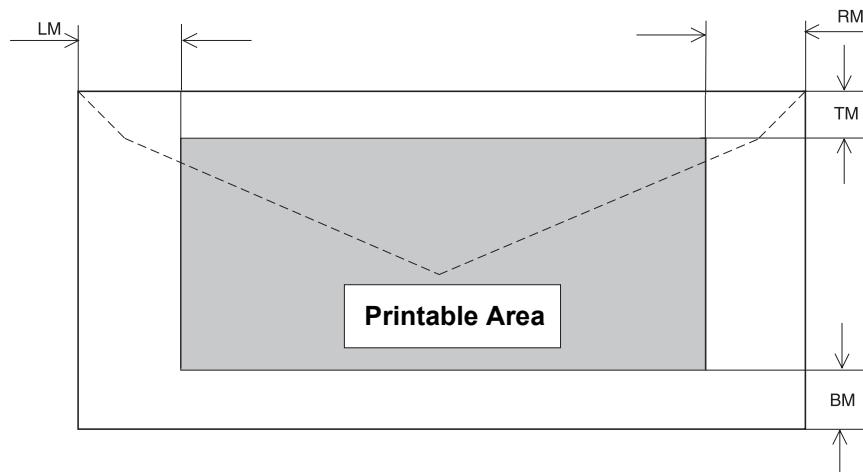


Figure 1-3. Printable Area for Envelope

Table 1-21. Printable Area for Envelope

	Envelope Printable Area
PW (Width)	Refer to "PAPER SPECIFICATIONS" Table 1-8 on page 13
PL (Length)	
LM (Left Margin)	3 mm or more
RM (Right Margin)	
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	

Continuous paper

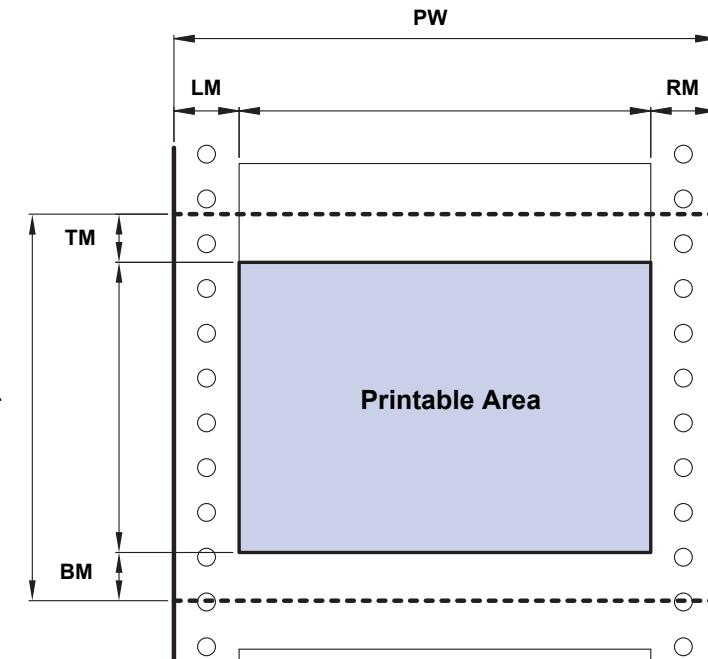
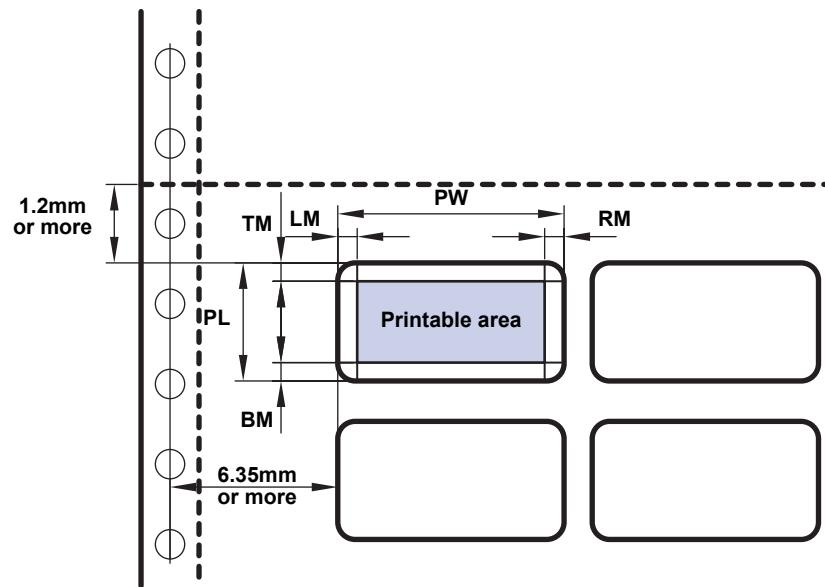


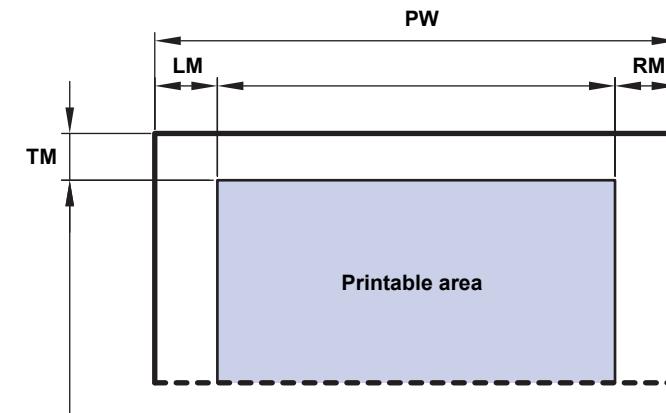
Figure 1-4. Printable Area for Continuous Paper

Table 1-22. Printable Area for Continuous Paper

	Continuous Paper	
	FX-890	FX-2190
PW (Width)	Refer to "PAPER SPECIFICATIONS" Table 1-11 on page 14	Refer to "PAPER SPECIFICATIONS" Table 1-12 on page 14
PL (Length)		
LM (Left Margin)	13 mm or more (PW<=241.3mm, 9.5 inches)	13 mm or more (PW<=377.8mm, 14.875 inches)
RM (Right Margin)	26 mm or more (PW=254 mm, 10 inches)	26 mm or more (PW=406.4 mm, 16 inches)
TM (Top Margin)		4.2 mm or more
BM (Bottom Margin)		

Label Roll paper**Figure 1-5. Printable Area for Label****Table 1-23. Printable Area for Label**

	Continuous Paper	
	FX-890	FX-2190
PW (Width)	Refer to "PAPER SPECIFICATIONS" Table 1-13 on page 15	Refer to "PAPER SPECIFICATIONS" Table 1-14 on page 15
PL (Length)		
LM (Left Margin)		3 mm or more
RM (Right Margin)		3 mm or more
TM (Top Margin)		4.2 mm or more
BM (Bottom Margin)		-----

**Figure 1-6. Printable Area for Roll Paper****Table 1-24. Printable Area for Roll Paper**

	Roll Paper
PW (Width)	Refer to "PAPER SPECIFICATIONS" Table 1-15 on page 16
PL (Length)	-----
LM (Left Margin)	3 mm or more
RM (Right Margin)	3 mm or more
TM (Top Margin)	4.2 mm or more
BM (Bottom Margin)	-----

## 1.2 Interface

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

### 1.2.1 Parallel interface (Forward channel)

#### Specifications

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

**Table 1-25. Connector pin assignment (Forward channel)**

Pin No.	Signal Name	Return GND Pin	IN/Out*	Function description
1	-STROBE	19	In	Strobe pulse. Input data is latched at falling edge of the signal.
2	DATA1	20	In	Parallel input data to the printer. bit 0: LSB
3	DATA2	21	In	bit 1
4	DATA3	22	In	bit 2
5	DATA4	23	In	bit 3
6	DATA5	24	In	bit 4
7	DATA6	25	In	bit 5
8	DATA7	26	In	bit 6
9	DATA8	27	In	bit 7: MSB
10	-ACKNLG	28	Out	This signal (negative pulse) indicates that the printer has received data and is ready to accept next one.
11	BUSY	29	Out	This signal's high level means that the printer is not ready to accept data.

**Table 1-25. Connector pin assignment (Forward channel) (continued)**

Pin No.	Signal Name	Return GND Pin	IN/Out*	Function description
12	PE	28	Out	This signal's high level means that the printer is in a state of paper-out error.
13	SLCT	28	Out	Always at high level when the power to the printer is on.
14	-AFXT	30	In	Not used.
31	-INIT	30	In	This signal's negative pulse initializes printer.
32	-ERROR	29	Out	This signal's low level means the printer is in a state of error.
36	-SLIN	30	In	Not used.
18	Logic H	-	Out	This line is pulled up to +5 V through 3.9 kΩ resistor.
35	+5 V	-	Out	This line is pulled up to +5 V through 1.0 kΩ resistor.
17	Chassis	-	-	Chassis GND.
16, 33 19-30	GND	-	-	Signal GND.
15, 34	NC	-	-	Not connected.

Note : In/Out shows the direction of signal flow from the printer's point of view.

- Data transmission timing

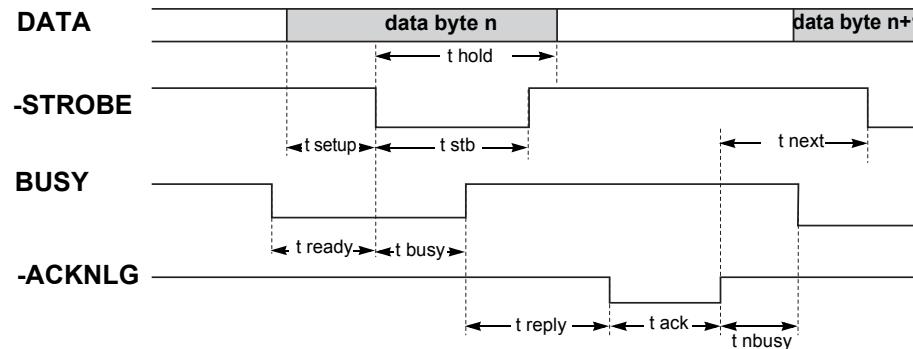


Figure 1-7. Data transmission timing

Table 1-26. Parameters

Parameter	Minimum	Maximum
t setup	500 nsec	—
t hold	500 nsec	—
t stb	500 nsec	—
t ready	0	—
t busy	—	500 nsec
t reply	—	—
t ack	500 nsec	10 us
t nbusy	0	—
t next	0	—
t tout*1	—	120 nsec
t tin*2	—	200 nsec

Note “\*1”: Rise and fall time of output signals

“\*2”: Rise and fall time of input signals

- BUSY signal is active (high level) under any of the following conditions:

- In the process of receiving data
- Input buffer full
- -INT signal active (low level)
- During hardware initialization
- -ERROR or PE signal active (low level or high level, respectively)
- In the self test mode
- In the adjustment mode
- In the default-setting mode

- ERROR signal is active (low level) under any of the following conditions:

- In the condition of the printer hardware error (fatal error)
- In the condition of the paper-out error
- In the condition of the release lever error
- In the condition of the cover open error
- In the condition of the paper eject error

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

- In the condition of paper-out error

## 1.2.2 Parallel interface (Reverse channel)

- Specifications
  - Transmission mode : IEEE-1284 nibble mode
  - Adaptable connector: 57-30360 (Amphenol) or equivalent
  - Synchronization : Refer to the IEEE-1284 specification
  - Handshaking : Refer to the IEEE-1284 specification
  - Signal level: TTL compatible (IEEE-1284 level 1 device)
  - Data transmission timing : Refer to the IEEE-1284 specification
  - Extensibility request : The printer responds to the extensibility request in the affirmative, when the request is 00H or 04H, which mean;
    - 00H : Request nibble mode of reverse channel transfer
    - 04H : Request device ID in nibble mode of reverse channel transfer
- Device ID: The printer sends the following device ID string when it is requested
  - FX-890

When IEEE1284.4 is enabled,

[00H][4CH]  
MFG:EPSON;  
CMD:ESCP9,PRPII9,BDC,D4;  
MDL:FX-890;  
CLS:PRINTER;  
DES:EPSON[SP]FX-890;

When IEEE1284.4 is disabled,

[00H][49H]  
MFG:EPSON;  
CMD:ESCP9,PRPII9,BDC;  
MDL:FX-890;  
CLS:PRINTER;  
DES:EPSON[SP]FX-890;

### ■ FX-2190

When IEEE1284.4 is enabled,

[00H][4EH]  
MFG:EPSON;  
CMD:ESCP9,PRPII9,BDC,D4;  
MDL:FX-2190;  
CLS:PRINTER;  
DES:EPSON[SP]FX-2190;

When IEEE1284.4 is disabled,

[00H][4BH]  
MFG:EPSON;  
CMD:ESCP9,PRPII9,BDC;  
MDL:FX-2190;  
CLS:PRINTER;  
DES:EPSON[SP]FX-2190;

**Table 1-27. Connector pin assignment (Reverse channel)**

Pin No.	Signal Name	Return GND Pin	IN/Out*	Function description
1	HostClk	19	In	Host clock signal.
2	DATA1	20	In	Parallel input data to the printer. bit 0: LSB
3	DATA2	21	In	bit 1
4	DATA3	22	In	bit 2
5	DATA4	23	In	bit 3
6	DATA5	24	In	bit 4
7	DATA6	25	In	bit 5
8	DATA7	26	In	bit 6
9	DATA8	27	In	bit 7: MSB
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy / DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq / DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag / DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host Busy signal.
31	-INIT	30	In	Not used.
32	-DataAvail / DataBit-0,4	29	Out	Data Available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	-	Out	This line is pulled up to +5 V through 3.9 kΩ resistor.
35	+5 V	-	Out	This line is pulled up to +5 V through 1.0 kΩ resistor.
17	Chassis	-	-	Chassis GND.
16, 33 19-30	GND	-	-	Signal GND.
15, 34	NC	-	-	Not connected.

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

### 1.2.3 USB Interface

Specifications

- Standard:

Based on  
 "Universal Serial Bus Specifications Revision 1.1"  
 "Universal Serial Bus Device Class Definition for Printing Devices Version 1.1"

- Bit rate :

12 Mbps (Full Speed Device)

- Data encoding :

NRZI

- Adaptable connector :

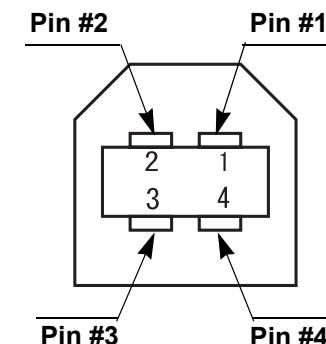
USB Series B

- Recommended cable length : 2 meters

Connector pin assignment and signals :

**Table 1-28. Connector pin assignment**

Pin No.	Signal name	In/Out	Function description
1	VCC	-	Cable power. Maximum power consumption is 100mA
2	-Data	Bi-directional	Data
3	+Data	Bi-directional	Data, pull up to +3.3V via 1.5K Ω resistor
4	Ground	-	Cable ground

**Figure 1-8. USB Interface connector pin assignment**

## 1.2.4 Optional Interface

Type-B optional interface cards are available.

**Table 1-29. FX-890**

Reply message	ESC/P	IBM PPDS
Main-Type	MT9p, PW80c110cpi, PRG(Wxxxx)rev, AP500ma	MT9p, PW80c110cpi, PRG(Wxxxx)rev, AP500ma
Product-Name	FX-890	FX-890
Emulation-Type	ESCP9, PRPII9, BDC	ESCP9, PRPII9, BDC
Entity-Type	EPSONFX	EPSONPRPII9

**Table 1-30. FX-2190**

Reply message	ESC/P	IBM PPDS
Main-Type	MT9p, PW136c110cpi, PRG(Wxxxx)rev, AP500ma	MT9p, PW136c110cpi, PRG(Wxxxx)rev, AP500ma
Product-Name	FX-2190	FX-2190
Emulation-Type	ESCP9, PRPII9, BDC	ESCP9, PRPII9, BDC
Entity-Type	EPSONFX	EPSONPRPII9

## 1.2.5 Type-B Interface communication specification

Reply for Optional command

(\*: Reply for Type-B I/F Level 2 device: *not described in user's manual*)

**Table 1-31. Reply for Optional command**

Option command number	Command name	Reply-A	Reply-B
00h	No-operation	-----	-----
01h	Start Hardware Reset	Accept*	Execute OK*
02h	Start Software Reset	Reject	-----
03h	Send Main System Type	Accept	Execute OK
04h	Send Name Data	Reject	-----
05h	Inquire Name Data	Accept	Execute OK
06h	Send Product Name	Accept	Execute OK
07h	Send Software Emulation Type	Accept	Execute OK
08h	Complete Buffered Data	Accept	Execute OK
09h	Stop Procedure	Reject	-----
0Ah	Return Buffered Data	Reject	-----
0Bh	Send Entity Type	Accept	Execute OK
0Ch	Send Status	Accept	Execute OK
0Dh	Quit Procedure	Reject	-----
0Eh	Inquire ASCII Message	Reject	-----
0Fh	Send ASCII Message	Accept	Execute OK
10h	(Reserved)	Unknown	-----
11h	Send All Entity Type	Reject	-----
12h	Inquire Protocol	Reject	-----
13h	(Reserved)	Unknown	-----
14h	Inquire Emergency Message	Accept	Execute OK
15h	Send Emergency Reply	Accept	Execute OK
16h-17h	(Reserved)	Unknown	-----

- Main command

**Table 1-32. Main command**

Option command number	Command name	Sending Timing
01h	Start Software Reset	<ul style="list-style-type: none"> <li>• Init signal on the std. parallel</li> <li>• Type-B I/F Option command : 01h</li> <li>• Panel Reset</li> <li>• Cold start</li> </ul>
02h	Send Option Type	<ul style="list-style-type: none"> <li>• Deciding the level of Type-B I/F after power on</li> </ul>
04h	Send Name Data	<ul style="list-style-type: none"> <li>• Type-B I/F Option command: 05h</li> </ul>
07h	Inquire Software Emulation Type	<ul style="list-style-type: none"> <li>• Changing control language</li> </ul>
0Eh	Inquire ASCII Message	<ul style="list-style-type: none"> <li>• Writing to DBIN-register</li> </ul>
14h	Inquire Emergency Reply	<ul style="list-style-type: none"> <li>• Reply for Back Ground Job command response</li> </ul>
15h	Send Emergency Message	<ul style="list-style-type: none"> <li>• Receive back Ground Job command</li> </ul>

- Back Ground Job command: Response

“0x00”: get device	ID Normal response
“0x01”: get all status	Normal response
“0x02”~“0x3F”	Processing impossible response

- A bit rate available by Serial I/F card :

19200bps, 9600bps, 4800bps, 2400bps, 1200bps, 600bps, 300bps

## 1.2.6 Interface selection

The printer has 3 interfaces; the parallel interface, USB interface and Type-B optional interface. These interfaces are selected manually by Default Setting or selected automatically.

- Manual selection

One of the three interfaces can be selected by Default Setting.

- Automatic selection

The automatic interface selection is enabled by Default Setting. In this automatic interface selection mode, the printer is initialized to the idle state scanning which interface receives data at power-on. Then the interface that receives data first is selected. When the host stops data transfer and the printer is in the stand-by state for the period of seconds specified by Default Setting, the printer is returned to the idle state. As long as the host sends data or the printer interface is the busy state, the selected interface is let as it is.

- Interface state and interface selection

When the parallel interface is not selected, the interface gets into a busy state. When the Type-B serial interface card is installed and it is not selected, the interface sends XOFF and sets the DTR signal MARK. When the optional interface is not selected, the printer sets “OFFLINE” bit of MNSTS register 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 XON and sets the DTR SPACE and the printer resets “OFFLINE” bit of MNSTS register to the optional interface. Note that the interrupt signal such as a -INIT signal on the parallel interface is not effective while that interface is not selected.

- Preventing Hosts from Data Transfer Timeout

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

IEEE1284.4 on the parallel interface and on the USB interface do not require this function.

## 1.2.7 IEEE1284.4 protocol

The packet protocol described by IEEE1284.4 is supported on the parallel I/F. Two function modes of IEEE1284.4 protocol, “Off” and “Auto”, are available and one of them is selected according to the value of Default setting. (See Section 1.3.5. Default Setting).

**NOTE:** *Packet protocol option “Off” & “Auto” in Default setting mode are effective in not only parallel I/F but also USB I/F.*

Auto: Communication is carried out in the conventional mode until a magic string (1284.4 synchronous commands) is received. By receiving a magic string, communication in IEEE1284.4 packet mode is started.

Off: Communication is carried out in the conventional mode.

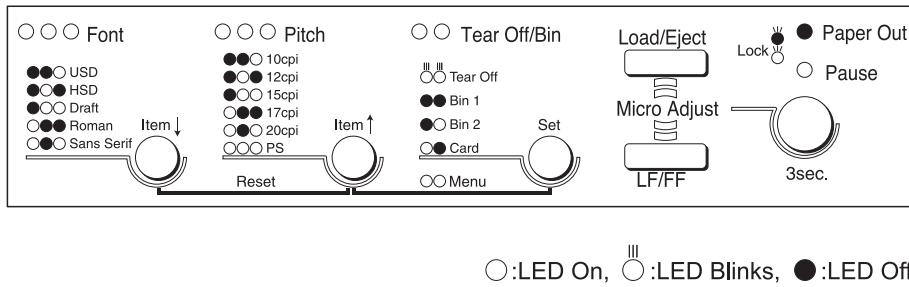
**NOTE:** *The packet protocol of IEEE1284.4 allows a device to carry on multiple exchanges or conversations which contain data and/or control information with another device at the same time across a single point-to-point link. The protocol is not, however, a device control language. It does provide basic transport-level flow control and multiplexing services. The multiplexed logical channels are independent of each other and blocking of one has no effect on the others. The protocol operates over IEEE1284.*

## 1.3 Operation

This section describes the operations on this printer.

### 1.3.1 Control panel

The control panel of this printer is equipped with 6 switches and 10 LEDs, which are located as shown below.



**Figure 1-9. Control Panel**

### 1.3.2 Switches

#### 1.3.2.1 Operation in Normal Mode

In the normal mode, pressing panel switches executes the following functions.

**Table 1-33. Normal Mode**

Switch	Function
Pause	<ul style="list-style-type: none"> <li>Alternates printing and no-printing status.</li> <li>Enables Micro Adjust function, holding it down for 3 seconds.</li> </ul>
Load/Eject	<ul style="list-style-type: none"> <li>Loads or ejects the paper.</li> <li>Executes micro feed forward, when this function is enabled.</li> <li>Executes line feed, pressing it shortly.</li> </ul>
LF/FF	<ul style="list-style-type: none"> <li>Executes form feed, holding it down for a few seconds.</li> <li>Executes micro feed backward, when this function is enabled.</li> </ul>
Tear Off/Bin	<ul style="list-style-type: none"> <li>Advances continuous paper to the Tear-Off position.</li> <li>Selects CSF bin 1/2 or Card mode in friction mode.</li> </ul>
Font	<ul style="list-style-type: none"> <li>Selects font and draft quality.</li> </ul>
Pitch	<ul style="list-style-type: none"> <li>Selects pitch.</li> </ul>
Reset (Font & Pitch)	<ul style="list-style-type: none"> <li>Resets the printer.</li> </ul>
Menu (Pitch & Tear Off/Bin)	<ul style="list-style-type: none"> <li>Enter or exit the default setting mode.</li> </ul>

### 1.3.2.2 Operations at Power-on

Holding down the specified switch (switches) while turning on the power to the printer enables the special functions as listed below.

**Table 1-34. At Power-On**

Switches	Function
Load/Eject	NLQ self test
LF/FF	Draft self test
Load/Eject & LF/FF	Data dump
Load/Eject & LF/FF & Pause	Clear EEPROM
Tear Off/Bin & Load/Eject	Clear EEPROM for Driving Line count for ribbon change timing
Pause	Bi-D adjustment
Load/Eject & Pause	Panel lock out mode
LF/FF & Pause	Default setting for panel lock out

### 1.3.2.3 Operation in Default Setting Mode

**Table 1-35. Default Setting Mode**

Switch	Function
Menu (Pitch & Tear Off/Bin)	Enter or exit the default setting mode.
Item ↑ (Font), Item ↓ (Pitch)	Select the menu.
Set (Tear Off/Bin)	Changes the setting.
The others	Not available

### 1.3.3 Indicators ( LEDs )

This printer has the following indicators to indicate its current condition, as shown in the table below:

#### 1.3.3.1 Indications in Normal Mode

**Table 1-36. Normal Mode**

LED Printer status	Pause *1	Paper Out *2	Tear-Off / Bin	Font	Pitch
Pause	On	—	—	—	—
Paper out error	On	On	—	—	—
Release lever error	On	—	—	—	—
Paper eject error	On	Blink	—	—	—
Head hot warning	Blink	—	—	—	—
Micro Adjust	Blink	—	—	—	—
Tear off	—	—	*3	—	—
Bin selection	—	—	*3	—	—
Font selection	—	—	—	*4	—
Pitch selection	—	—	—	—	*5
Locked switch pressed	*6	*6	—	—	—
Fatal error	Blink	Blink	Blink	Blink	Blink

#### \*1. Pause ( Orange )

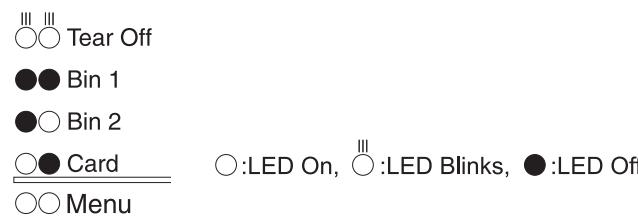
- The “Pause” LED is on when the printer is in the pause status, and off when it is not in the pause status.
- The “Pause” LED blinks when the Micro Adjust function is enabled or when the printer is in the head hot status.
- See \*6 for LED indication when a locked switch is pressed.

**\*2. Paper Out ( Red )**

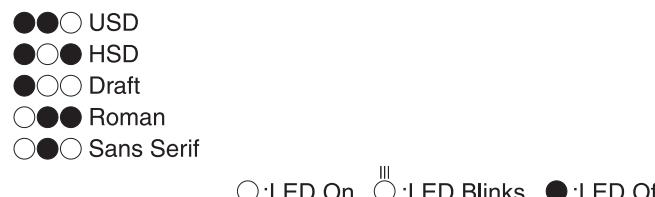
- The “Paper Out” LED is on when the printer is in the “paper out” status, and it blinks when the printer has developed a paper eject error, and it is off when the printer is not in such status.
- See \*6 for LED indication when a locked switch is pressed.

**\*3. Tear Off / Bin (Green)**

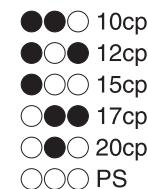
- Two LEDs display the status of CSF bin selection when cut sheet is used. Both LEDs are off when Bin1 is selected, only the right LED is on when Bin2 is selected, and only the left LED is on when Card mode is selected.
- Both LEDs blink when continuous paper is in the Tear-off position and both LEDs are off when continuous paper is out of the Tear-off position.
- Both LEDs are on when the printer is in default setting mode.

**Figure 1-10. Tear Off/ Bin LEDs****\*4. Font ( Green )**

- Three LEDs indicate the status of Font & Draft Quality selection.

**Figure 1-11. Font LEDs****\*5. Pitch ( Green )**

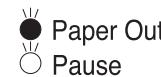
- Three LEDs display the status of Pitch selection.



○:LED On, ⚡:LED Blinks, ●:LED Off

**Figure 1-12. Pitch LEDs****\*6. LED indication when a locked switch is pressed (Green)**

- With panel lock out mode “On”, when a locked switch is pushed, the “Pause” LED and “Paper Out” LED flash simultaneously for three seconds or so.



○:LED On, ⚡:LED Blinks, ●:LED Off

**Figure 1-13. LED indication when a locked switch is pressed**

**NOTE:**At this time, buzzer does not sound.

### 1.3.4 Buzzer

This printer has the buzzer to indicate its current condition with the following indications.

The symbols used in the table above represent the following:

“•” Short Beep (Beeper sounds about 100 ms and interval is about100 ms)

“-” Long Beep (Beeper sounds about 500 ms and interval is about100 ms)

**Table 1-37. Buzzer Status**

Printer status	Beep sounds
Paper out error	•••
Release lever operation error	•••
Cover open error	•••
Paper eject error	•••
Panel operation	•
Fatal error *1	-----

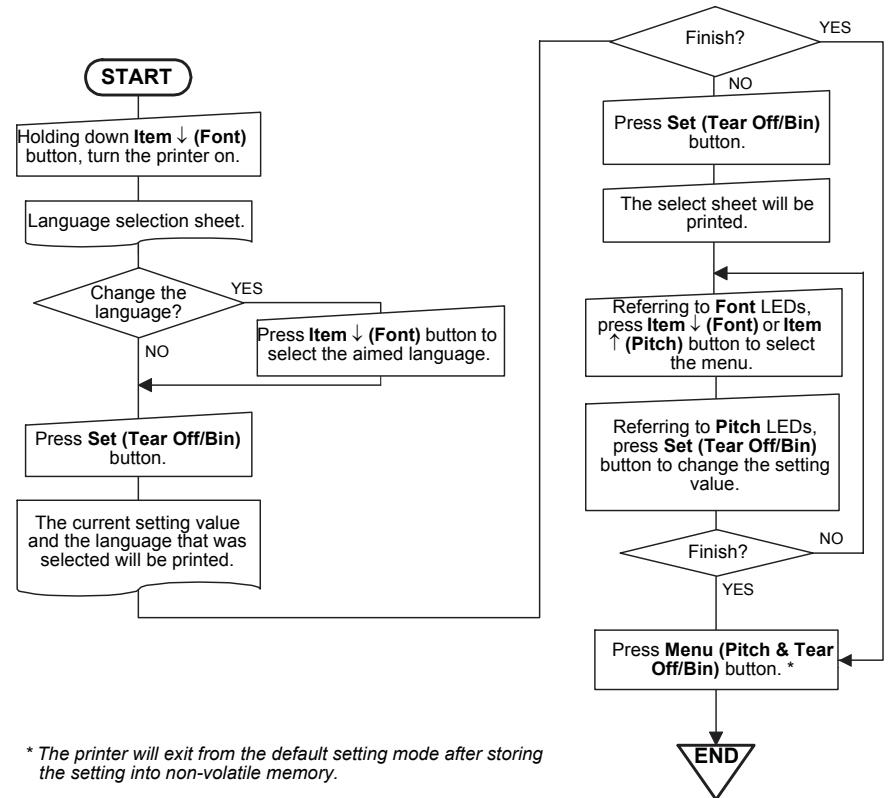
Note “\*1”: The printer detects various type of “Fatal Error” condition and a type of error is memorized in EEPROM of the main controller board. Refer to [Chapter-3: 3.2.12 Fatal Error](#) for details.

### 1.3.5 Default Setting

You can change some parameters that the printer refers to at printer initialization.

#### 1.3.5.1 Setting Method

Refer to the following flowchart for default setting.



**Figure 1-14. Flowchart for Default Setting**

### 1.3.5.2 Setting Items

Setting values available for default setting and factory settings are as shown in the table below:

**Table 1-38. Setting Values Available in Default Setting Mode**

Item	Setting / Value <sup>*2</sup>
Page length for front tractor	3inch, 3.5inch, 4inch, 5.5inch, 6inch, 7inch, 8inch, 8.5inch, <b><u>11inch</u></b> , 70/6inch, 12inch, 14inch, 17inch
Page length for rear tractor	3inch, 3.5inch, 4inch, 5.5inch, 6inch, 7inch, 8inch, 8.5inch, <b><u>11inch</u></b> , 70/6inch, 12inch, 14inch, 17inch
Skip over perforation	<b><u>OFF</u></b> , ON
Auto tear off	<b><u>OFF</u></b> , ON
Auto line feed	<b><u>OFF</u></b> , ON
Print direction	<b><u>Bi-D</u></b> , Uni-D
Software	<b><u>ESC/P</u></b> , IBM PPDS
0 slash	<b><u>0</u></b> , $\emptyset$
I/F mode	<b><u>Auto</u></b> , Parallel, USB, Option
Auto I/F wait time	<b><u>10 seconds</u></b> , 30 seconds.
Parallel I/F bidirectional time	OFF, <b><u>ON</u></b>
Packet mode	<b><u>Auto</u></b> , OFF
Character table	<u>Standard version:</u> Italic, <b><u>PC437</u></b> , PC850, PC860, PC863, PC865, PC861, BRASCI, Abicomp, Roman 8, ISO Latin 1, PC 858, ISO 8859-15
	<u>NLSP version:</u> Italic, <b><u>PC437</u></b> , PC850, PC437 Greek, PC 853, PC855, PC852, PC857, PC866, PC869, MOZOWIA, Code MJK, ISO 8859-7, ISO Latin 1T, Bulgaria, PC774, Estonia, ISO 8859-2, PC866 LAT., PC866UKR, PCAPTEC, PC708, PC720, PC AR864, PC860, PC865, PC861, PC 863, BRASCI, Abicomp, Roman8, ISO Latin 1, PC858, ISO8859-15, PC771, PC437 Slovenia, PC MC, PC 1250, PC 1251
International character set for Italic table	<b><u>Italic U.S.A.</u></b> , Italic France, Italic Germany, Italic U.K., Italic Denmark 1, Italic Sweden, Italic Italy, Italic Spain 1
Manual feed wait time	1 second, 1.5 seconds, 2 seconds, 3 seconds

**Table 1-38. Setting Values Available in Default Setting Mode (continued)**

Item	Setting / Value <sup>*2</sup>
Buzzer	OFF, <b><u>ON</u></b>
Auto CR ( IBM PPDS) <sup>*1</sup>	<b><u>OFF</u></b> , ON
IBM character table <sup>*1</sup>	<b><u>Table 2</u></b> , Table 1

Note “\*1”: This setting is effective when IBM PPDS emulation is selected.

“\*2”: Settings with bold weight mean the standard factory settings.

### 1.3.6 EEPROM Clear Function

You can return some parameters into the factory settings to perform panel operation easily. Pressing **Load/Eject & LF/FF & Pause** switches at the same time while turning on the printer returns the default settings into the factory settings:

**Table 1-39. Cleared Items and Values on EEPROM (Standard Model)**

Item	Value
Character table selection	PC437
Page length for rear tractor	11 inch
Page length for front tractor	11 inch
Page length for CSF bin 1	22 inch
Page length for CSF bin 2	22 inch
TOF adjustment value for rear tractor	8.5 mm
TOF adjustment value for front tractor	8.5 mm
TOF adjustment value for CSF bin 1	8.5 mm
TOF adjustment value for CSF bin 2	8.5 mm
TOF adjustment value for rear manual insertion	8.5 mm
TOF adjustment value for front manual insertion	8.5 mm
Bottom margin for rear tractor	11 inch
Bottom margin for front tractor	11 inch
Font Selection	Draft
Pitch selection	10cpi
Print direction setting	Bi-d
I/F mode selection	Auto
Auto I/F waiting time setting	10 sec.
Auto line feed	Off
Auto tear off	Off
Skip over perforation	Off
Input buffer	On
Software	ESC/P
0 slash	Off

**Table 1-39. Cleared Items and Values on EEPROM (Standard Model) (continued)**

Item	Value
Buzzer	On
Auto CR	Off
Tear-off adjustment value	0
Tear-off wait time	3 sec.
TOF minimum value	4.2 mm
Paper edge length	0
Paper length for rear manual insertion	22 inch
Paper length for front manual insertion	22 inch
Sub number for customization	Standard
Parallel I/F bidirectional mode	On
Packet mode for Parallel I/F (IEEE1284.4)	Auto
Packet mode for USB (IEEE1284.4)	same as 'IEEE 1284.4 for Parallel I/F'
Manual feed wait time	1.5 sec.
IBM character table	Table2

### 1.3.7 Bi-D Adjustment

Refer to the following flowchart for the Bi-D adjustment.

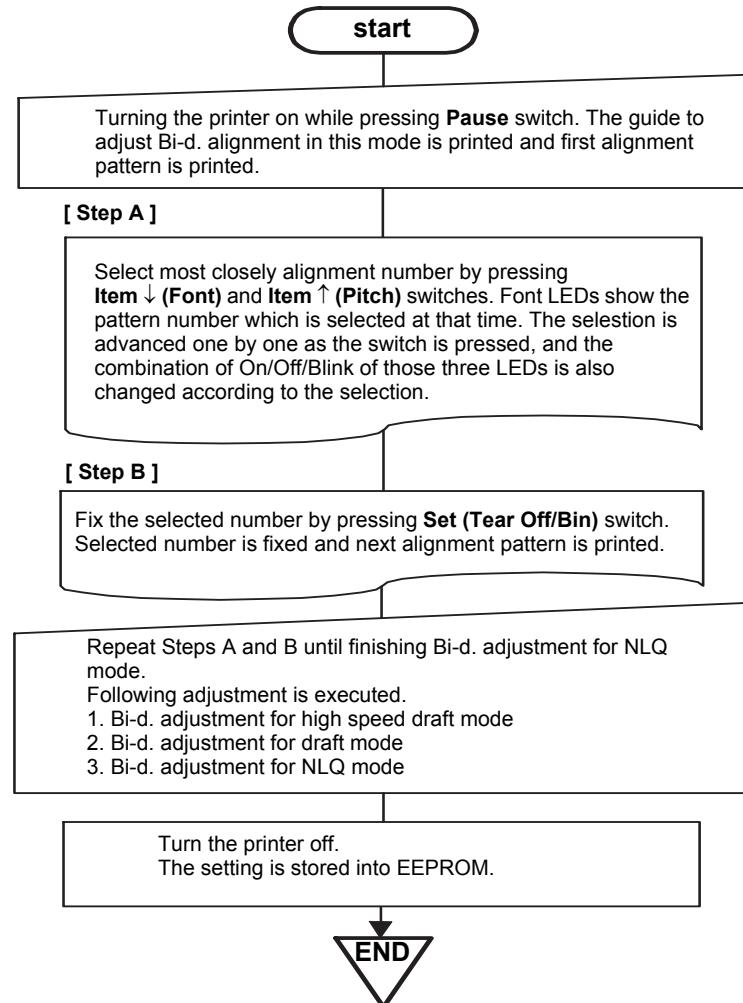


Figure 1-15. Bi-D Adjustment Flowchart

## 1.4 Dimensions and Weight

### Physical specifications

#### ■ FX-890

Dimensions: 414 mm (W) x 350 mm (D) x 167.5 mm (H) \*  
 Weight: Approximately 7.6 kg  
 Appearance: See the figures below.

\* This measure excludes “the protrusions.”

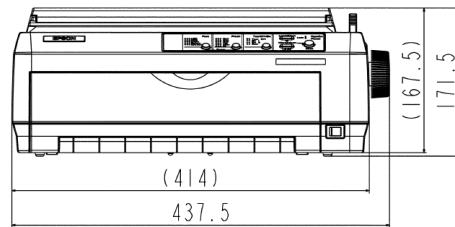
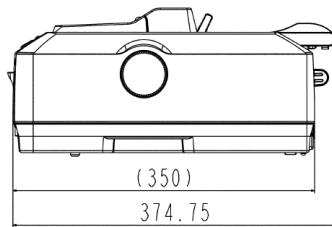
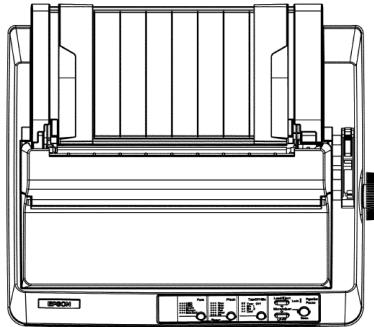


Figure 1-16. Physical Specifications for FX-890

#### ■ FX-2190

Dimensions: 589 mm (W) x 350mm (D) x 167.5mm (H) \*  
 Weight: Approximately TBD kg

\* This measure excludes “the protrusions.”

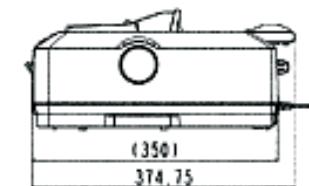
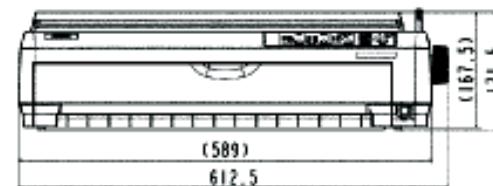
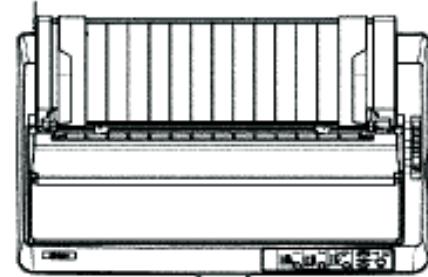


Figure 1-17. Physical Specifications for FX-2190

Physical specifications including High capacity cut sheet feeder (Bin1)

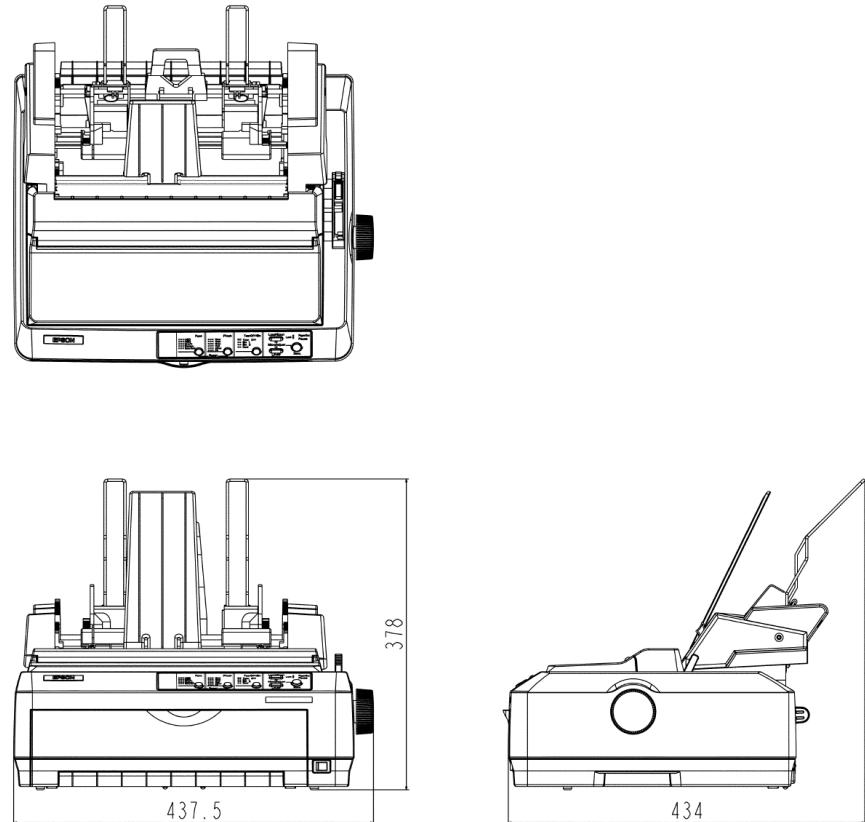
■ FX-890

Dimensions: 414 mm (W) x 434 mm (D) x 378 mm (H) \*

Weight: Approximately 8.9 kg

Appearance: See the figures below.

\* This measure excludes “the protrusions.”



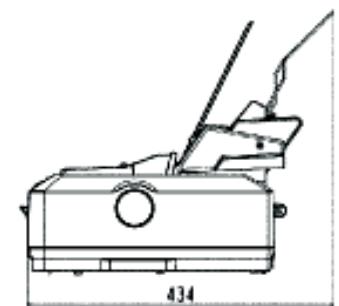
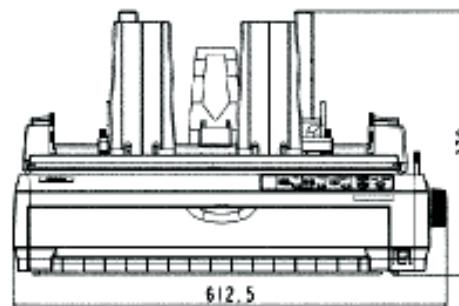
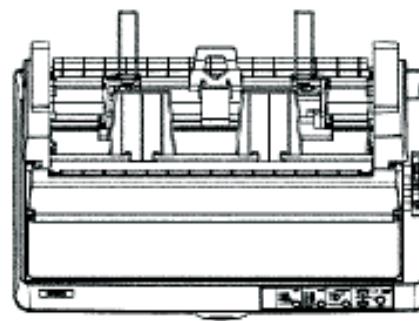
**Figure 1-18. Physical Specifications including High capacity cut sheet feeder (Bin 1) for FX-890**

■ FX-2190

Dimensions: 589mm (W) x 434mm (D) x 378mm (H) \*

Weight: Approximately TBD kg

\* This measure excludes “the protrusions.”



**Figure 1-19. Physical Specifications including High capacity cut sheet feeder (Bin 1) for FX-2190**

Physical specifications including Single bin cut sheet feeder (Bin2)

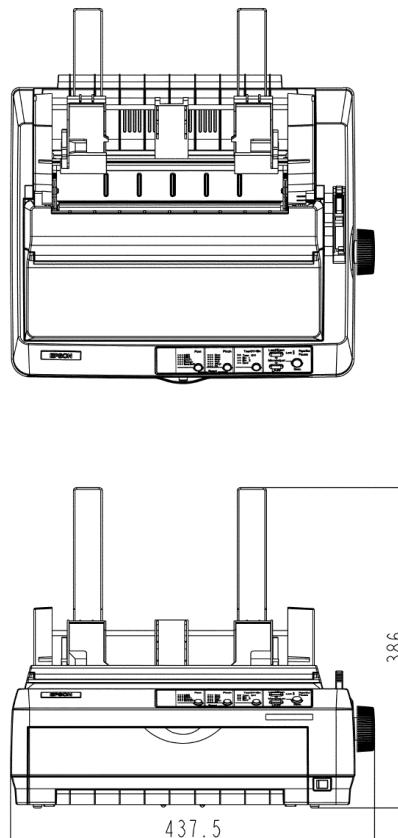
■ FX-890

Dimensions: 414 mm (W) x 445 mm (D) x 386 mm (H) \*

Weight: Approximately 8.2 kg

Appearance: See the figures below.

\* This measure excludes "the protrusions."

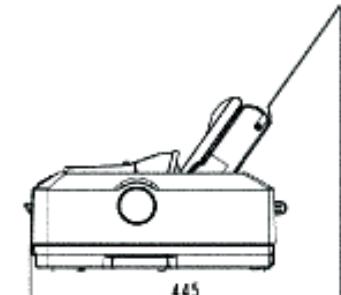
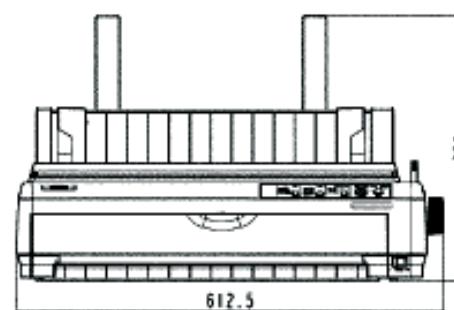
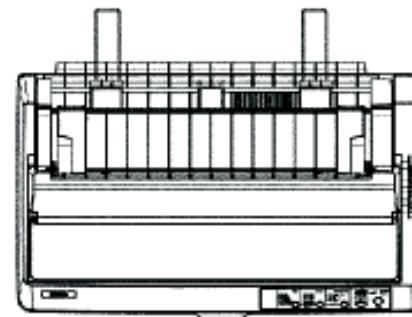


■ FX-2190

Dimensions: 589mm (W) x 445mm (D) x 386mm (H) \*

Weight: Approximately TBD kg

\* This measure excludes "the protrusions."



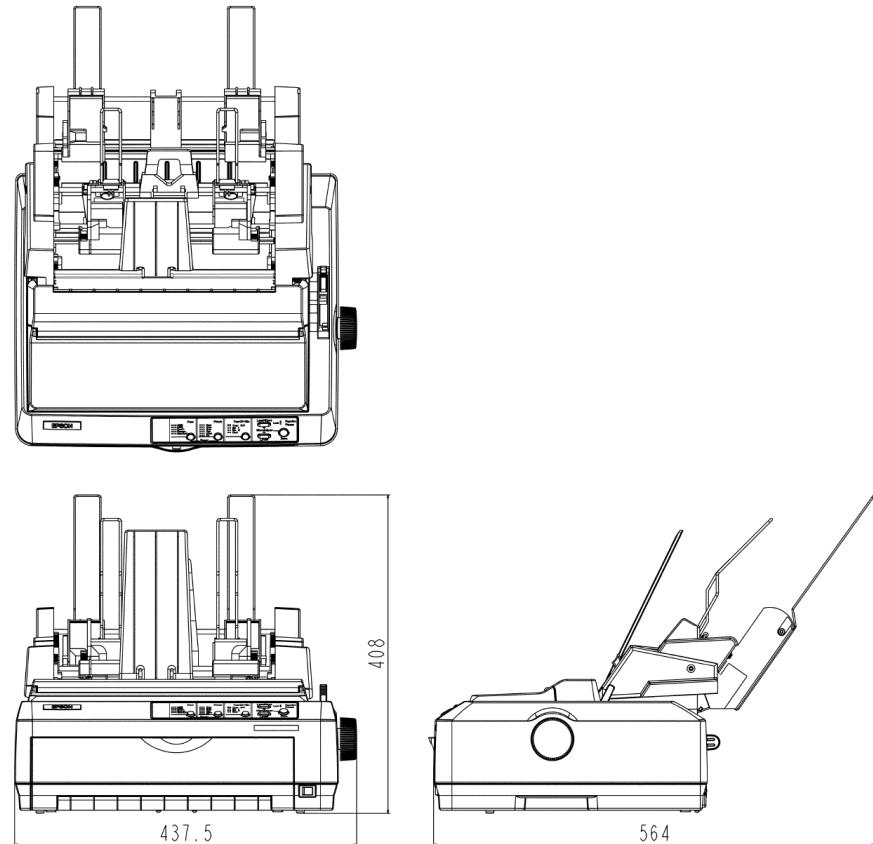
**Figure 1-21. Physical Specifications including Single bin cut sheet feeder (Bin 2) for FX-2190**

**Figure 1-20. Physical Specifications including Single bin cut sheet feeder (Bin 2) for FX-890**

- Physical specifications including High capacity cut sheet feeder (Bin) & Single bin cut sheet feeder (Bin2)

■ FX-890

Dimensions: 414 mm (W) x 564 mm (D) x 408 mm (H) \*  
 Weight: Approximately 9.5 kg  
 Appearance: See the figures below.

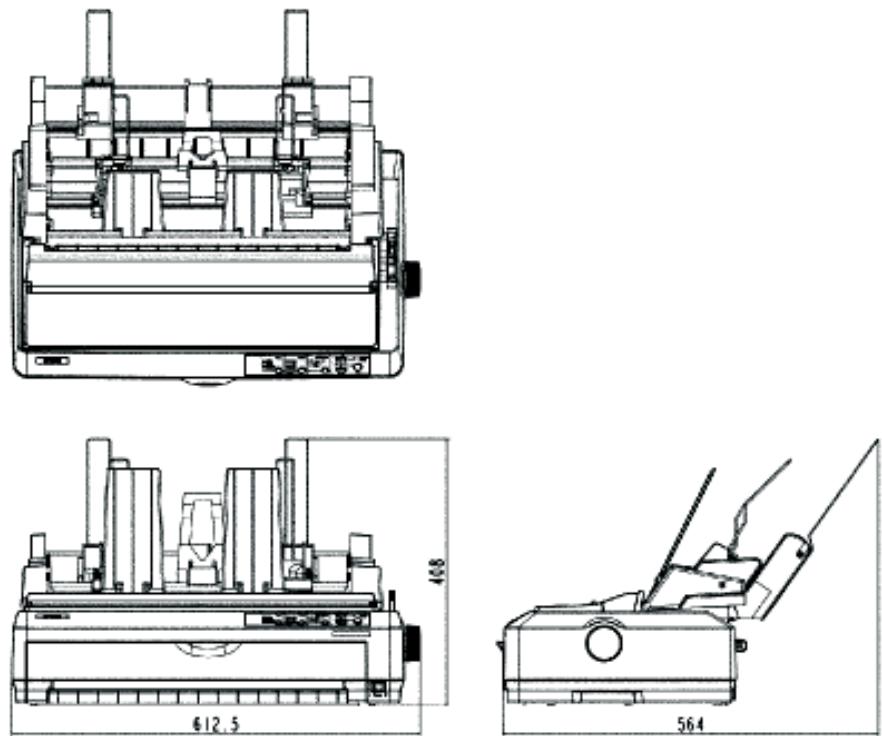


**Figure 1-22. Physical Specifications including High capacity cut sheet feeder (Bin1) & Single bin cut sheet feeder (Bin 2) for FX-890**

■ FX-2190

Dimensions: 589mm (W) x 564mm (D) x 408mm (H) \*  
 Weight: Approximately TBD kg

\* This measure excludes “the protrusions.”



**Figure 1-23. Physical Specifications including High capacity cut sheet feeder (Bin1) & Single bin cut sheet feeder (Bin 2) for FX-2190**

## 1.4.1 FX-880T+ Mode



**This function may be used only on the models intended for EAI market. On any model intended for any other market, do not execute the command to enter this mode.**

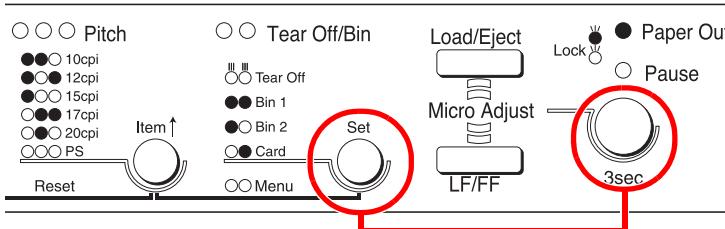
This printer has FX-880T+ mode which supports not only OKI ML command but also ML320T's defaults.

You can switch printer mode from current FX-890 to FX-880T+ (=ML320T) in the following way on FX-890. Also FX-2190 can set FX-880T+ mode.

### 1.4.1.1 Setting of FX-880T+ mode

- To change mode from "current FX-890" to "FX-880T+ (=ML320T)" or vice versa:

Turn the printer on while pressing both of "Tear Off/Bin" and "Pause" buttons.



Turn the printer on while pressing both of "Tear Off/Bin" & "Pause" buttons

#### CHECK POINT



- When the printer starts in the newly set mode, it beeps one time or two times depending on the new mode.  
FX890 → FX-880T+ : 1 time  
FX-880T+ → FX890 : 2 times
- When the printer starts in the newly set mode, the new setting is saved into EEPROM.  
At this point, the other setting contents of EEPROM are initialized.

- FX-880T+ (=ML320T) mode is different from "current FX-890" mode in the following features:

- Supports commands similar to ML320T
- Adds some default setting items similar to ML320T
- Supports printer defaults similar to ML320T
- Action of the printer is similar to ML320T

### 1.4.1.2 Supported commands

FX-880T+ (=ML320T) mode supports ESC/P, IBM and OKI ML320T commands.

**NOTE:** "Remote commands" should not be used in FX-880T+ mode.

- The following commands are available in any command emulation mode (ESC/P, IBM, OKI ML320T)
  - ESC { n            emulation change
  - ESC } Nul        software I-Prime
- In ESC/P command emulation, if the following commands come, printer ignores them.
  - ESC ( Nul
  - ESC X m n1 n2
- In IBM command emulation, if the following commands come, printer ignores them.
  - ESC V Nul
  - ESC % H

### 1.4.1.3 Default setting items

**Table 1-40. Setting Values Available for Default Setting Mode**

Item	Setting / Value
Software	ESC/P, <b>IBM PPDS</b> , OKI ML320T *IBM PPDS is the same as IBM 238x plus.
Auto tear Off Wait Time	<b>0.5 second</b> , 1 second, 2 seconds, others
Bottom margin	4.2 mm, 20 mm, 22 mm, <b>24 mm</b> , others *When “24 mm” is selected, the printer acts with approx.23.5 mm
Line Spacing	<b>6LPI</b> , 8LPI
Paper Out Override	<b>OFF (No)</b> , ON (Yes)

Note : Settings with bold weight mean the default setting.

### 1.4.1.4 Printer defaults

FX-880T+ mode has different defaults from current FX-890 mode as follows.

**Table 1-41.**

Items	Current FX-890	FX-880T+ (=ML320T)
Software	ESC/P	IBM PPDS (*)
Top margin	4.2 mm	22.5 mm
Bottom margin	4.2 mm	24 mm
Auto tear Off Wait Time	3.0 sec.	0.5 sec.

Note “\*” : IBM PPDS is same as IBM 238x plus.

### 1.4.1.5 Action of the printer

- Interface  
FX-880T+ mode does not have Device ID.  
Only Parallel I/F is possible use. (Can not use USB I/F and Optional Type-B I/F)
- Tear Off  
When the Tear Off button is pushed, the printer sends the present printing position in the Tear Off position.  
If the Auto Tear Off setting is On, the printer always do the Tear Off action when it is not printing.
- TOF position (MicroAdjust)  
The setting range of Micro Adjust is 4.2mm to 22mm to 558.8mm(22inch).

*NOTE: \* Don't set up TOF more largely than Page length.*

CHAPTER  
**2**

**OPERATING PRINCIPLES**

## 2.1 Overview

This printer is divided into several main components for easy removal and repair. The main components are:

- C524MAIN: Control board
- C524PSB/PSE/PSH: Power supply board
- C524PNL: Operation panel board
- Printer mechanism: Printhead, Carriage, Ribbon mechanism, Platen gap adjustment mechanism, Paper feed mechanism, Release mechanism
- Housing: Upper case, Lower case, Rear sheet guide, Knob, Printer cover
- C524MAIN Board

The C524MAIN board consists of 2in1ASIC(CPU), EEPROM, PROM, DRAM, PF Motor Driver IC, CR Motor Driver IC driver elements, and so on.

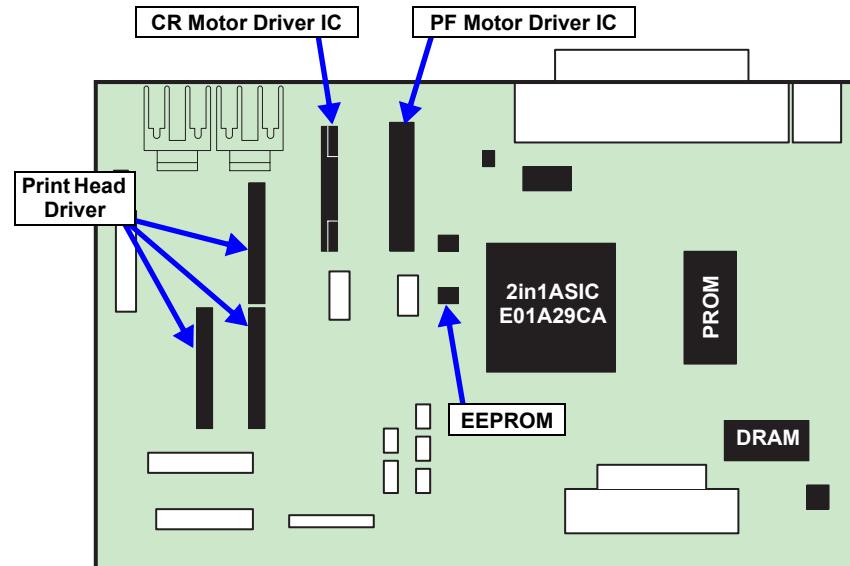
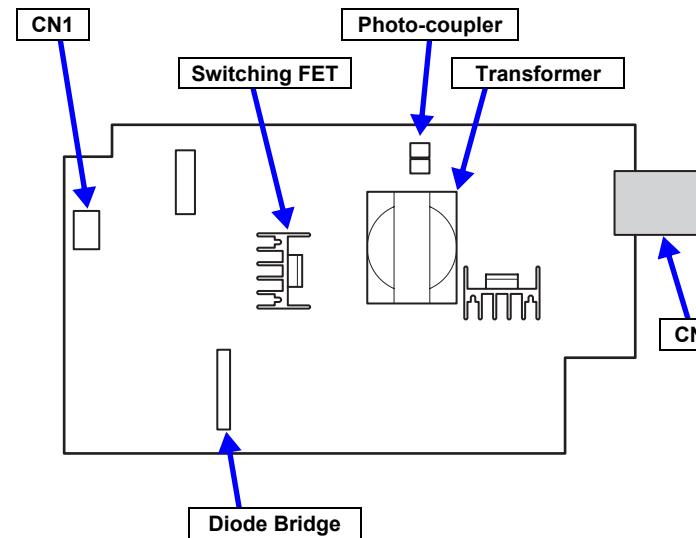


Figure 2-1. C524MAIN Component

### □ C524 PSB/PSE/PSH Board

The C524 PSB/PSE/PSH power supply board consists of Transformer, Switching FET, Regulator IC, Diode bridge, Fuse, Photo-coupler, and so on.



PowerB01.eps

Figure 2-2. C524 PSB/PSE/PSH Component

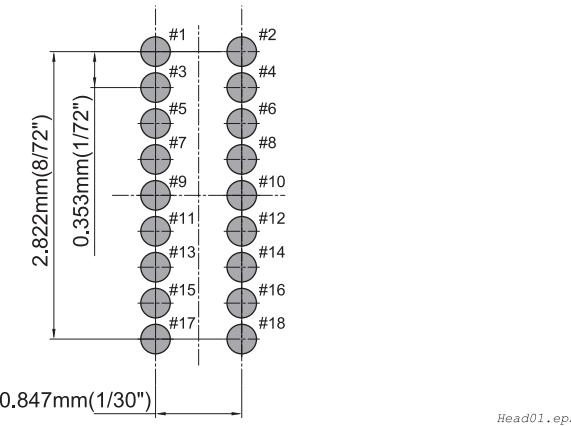
## 2.1.1 Printer Mechanism

This printer mechanism consists of Printhead, Paper feed mechanism, Carriage movement mechanism, Tractor feed mechanism, Platen gap adjustment mechanism, Ribbon feed mechanism, PF motor, CR motor, detectors, and so on.

### 2.1.1.1 Printhead

The printhead prints data from the control board on paper using the ink ribbon. The printhead is mounted on the carriage unit.

- Printing method: Impact dot matrix printing
- Number of dot wires: 18
- Diameter of dot wire:  $\phi$  0.29 mm
- Dot wire arrangement:



**Figure 2-3. Dot Wire Arrangement**

### 2.1.1.2 Paper Feed Mechanism

The paper feed mechanism picks up paper and transports it to the printhead, then ejects the paper step by step or continuously driven by the PF motor. PF motor drives the paper feed mechanism gears and the platen roller. The top of form and paper out condition are detected by the front and rear PE detectors, respectively.

### 2.1.1.3 Carriage Movement Mechanism

The carriage movement mechanism carries the carriage unit left and right along the CR guide shaft and mechanism frame, and stops it at any position for printing. It is driven by torque sent from the CR motor via the timing belt. Home position is detected by the HP (home position) detector at power on and at CR motor phase change.

### 2.1.1.4 Tractor Feed Mechanism

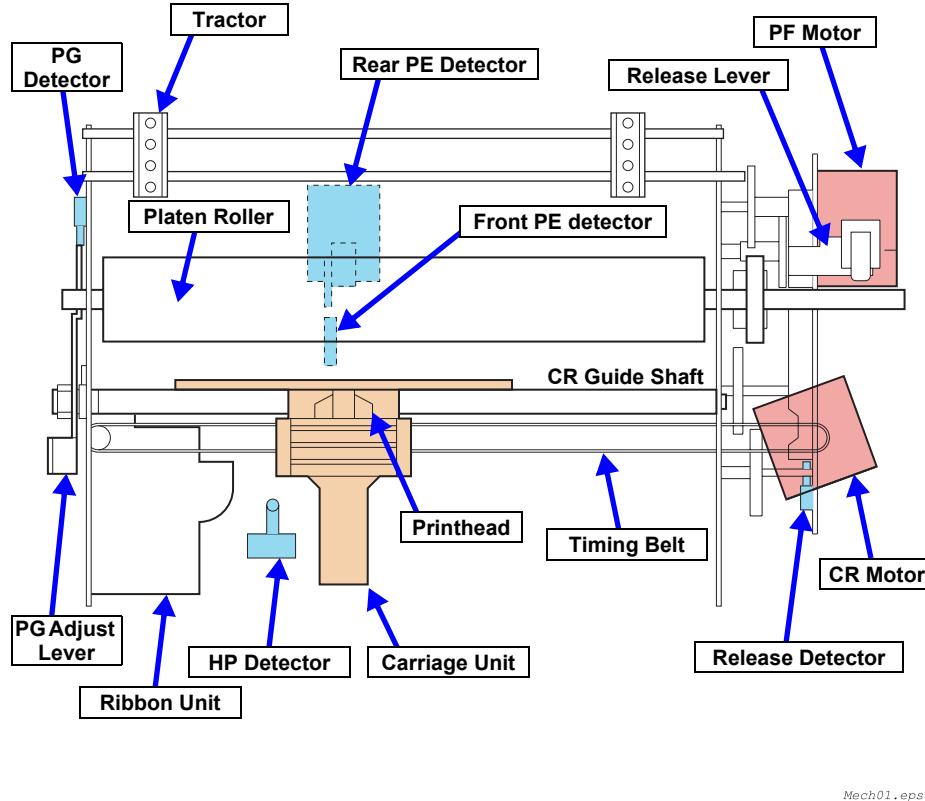
The tractor feed mechanism feeds continuous paper to the printhead and ejects it. Torque from the PF motor is transferred to the tractor unit via the release mechanism in the paper feed mechanism. The release lever in the release mechanism switches torque from the PF motor between cut sheet feeding and continuous paper feeding. This printer is equipped with several tractor feeding methods (front / rear push tractor feeding, front / rear push & pull tractor feeding and front / rear pull tractor feeding), which is selected according to the tractor unit setting positions and the lever positions. The tractor detector detects the release lever setting position, for cut sheet feeding or continuous paper feeding.

### 2.1.1.5 Platen Gap Adjustment Mechanism

The platen gap (the gap between the platen and the printhead) adjustment mechanism consists of the CR guide shaft, parallelism adjustment bushing, PG adjust lever and PG detector. The PG adjust lever is attached to the left side of the CR guide shaft. The bushing is attached to the left frame. Since the CR guide shaft is eccentric, the printhead approaches or recedes from the platen roller as the PG lever turns forward or backward. The PG detector detects the PG lever position. If the lever is set to a position between "2" and "6", the printer is in the copy mode.

### 2.1.1.6 Ribbon Feed Mechanism

The CR motor drives the ribbon feed mechanism via the timing belt. The ribbon feed mechanism has the sun and planetary gear system. No matter the carriage unit is driven left and right, the ink ribbon is driven in one direction.



**Figure 2-4. Printer Mechanism Outline**

### 2.1.1.7 Sensors

Table below lists the sensors of this printer.

**Table 2-1. Sensors**

Sensor	Outline	Refer to for Disassembly/Assembly
CR HP detection	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Mechanical contact 0.6~1.0 mA 5 VDC ± 5% (Resistance load) Within home (IN): CLOSE Out of home (OUT): OPEN</p>	<a href="#">p. 78</a>
PE detection (Front)	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Mechanical contact 0.6~1.0 mA 5 VDC ± 5% (Resistance load) There is paper: OPEN No paper: CLOSE</p>	<a href="#">p. 87</a>
PE detection (Rear)	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Photo interrupter 5 VDC ± 5% (Resistance load) There is paper: OPEN No paper: CLOSE</p>	<a href="#">p. 87</a>
Platen Gap detection	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Mechanical contact 0.6~1.0 mA 5 VDC ± 5% (Resistance load) Normal mode (0~1): CLOSE Copy mode (2~7): OPEN</p>	<a href="#">p. 86</a>
Release Lever detection	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Mechanical contact 0.6~1.0 mA 5 VDC ± 5% (Resistance load) Friction: OPEN Tractor: CLOSE</p>	<a href="#">p. 86</a>
Cover open detection	<input type="checkbox"/> Means <input type="checkbox"/> Switch rating <input type="checkbox"/> Switch mode <p>Mechanical contact 0.6~1.0 mA 5 VDC ± 5% (Resistance load) Case opened: OPEN Case closed: CLOSE</p>	<a href="#">p. 72</a>

## 2.1.2 Circuit Operation

### 2.1.2.1 C524 MAIN Board

The C524 MAIN board is the control circuit board of this printer. This board consists of several IC chips and drivers, as described in the table below:

**Table 2-2. Major Elements on MAIN Board**

Elements	Location	Function
CPU/ASIC (2in1ASIC)	IC1	<ul style="list-style-type: none"> <li><input type="checkbox"/> Package: 240 SQFP (0.5 mm between pins)</li> <li><input type="checkbox"/> Manufacturing process: 0.35μ Cell base IC</li> <li><input type="checkbox"/> CPU (H8S/2670 (Hitachi) equivalent)           <ul style="list-style-type: none"> <li>• Operating frequency: 24 MHz</li> <li><input type="checkbox"/> I/F section (E05B80CC (Hitachi series) equivalent)               <ul style="list-style-type: none"> <li>• Operating frequency: 48 MHz</li> <li>• Function: E05B80C</li> <li>• Memory cycle: 3 states (1 state 41.7 ns, RDNN = 0, no CS assertion)</li> </ul> </li> <li><input type="checkbox"/> Mechanical Controller section (E05B85YA (Fujimi) equivalent)               <ul style="list-style-type: none"> <li>• Operating frequency: 24 MHz</li> <li>• Memory cycle: 3 states (1 state 41.7 ns, RDNN = 0, no CS assertion)</li> </ul> </li> </ul> </li> </ul>
PROM (Flash ROM)	IC4	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use: Program</li> <li><input type="checkbox"/> Type: MBM29LV800BA-90</li> <li><input type="checkbox"/> Capacity: 8Mbit</li> <li><input type="checkbox"/> Package: 44SOP</li> <li><input type="checkbox"/> Bit configuration: 8/16 switching type</li> <li><input type="checkbox"/> Bus width: 16 bits</li> <li><input type="checkbox"/> Access time: tCE 181 ns or less tACC 181 ns or less tOE 156 ns or less tDF 60 ns or less</li> <li><input type="checkbox"/> Memory cycle: 3 states 1 weight (1 state 50.6 ns, RDNN = 0, no CS assertion)</li> </ul>

**Table 2-2. Major Elements on MAIN Board (continued)**

Elements	Location	Function
DRAM	IC5	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use: Various buffers, work areas</li> <li><input type="checkbox"/> Device: MSM51V18165D</li> <li><input type="checkbox"/> Type: 2CAS type 16-Mbit DRAM of access time 60 ns with page access function</li> <li><input type="checkbox"/> Bus width: 16 bits</li> <li><input type="checkbox"/> Package: 50-pin TSOP II</li> <li><input type="checkbox"/> Memory cycle: 4 states at normal times (1 state 50.6 ns) 2 states in burst mode (1 state 50.6 ns) Refresh controller of the CPU is used (CBR method) Period: 1,024 cycles/16 ms (15.625 us or less)</li> <li><input type="checkbox"/> Refresh:</li> </ul>
EEPROM	IC11	<ul style="list-style-type: none"> <li><input type="checkbox"/> Use: Storage of default setting values and various parameters</li> <li><input type="checkbox"/> Device: S-93C46ADPJ (SII) (10 ms/word writing)</li> <li><input type="checkbox"/> Capacity: 1 kbytes</li> <li><input type="checkbox"/> Package: SOP8 pin (150 mil)</li> </ul>
Parallel IF circuit		<ul style="list-style-type: none"> <li><input type="checkbox"/> Specification: IEEE1284 compliant Nibble</li> <li><input type="checkbox"/> Data receiving system: Data transfer by DMA</li> <li><input type="checkbox"/> ACK pulse width: Can be selected</li> <li><input type="checkbox"/> Data transfer timing: Can be selected</li> <li><input type="checkbox"/> Transceiver IC: 74LVX161284 (FAIRCHILD) (IC2)</li> <li><input type="checkbox"/> Control circuit: Inside the ASIC</li> </ul>
USB IF circuit		<ul style="list-style-type: none"> <li><input type="checkbox"/> Specification: Universal Serial Bus Specification Revision 1.1</li> <li><input type="checkbox"/> Reception mode: Full speed mode (D+ signal line is pulled up to +3.3V with 1.5 kΩ) Pull-up of D+ signal line is not activated until the logic system becomes stable after power on.</li> <li><input type="checkbox"/> Receiving system: Bulk transfer / control transfer</li> <li><input type="checkbox"/> Data reception capacity: About 1.15 MB/s at peak (Bulk transfer)</li> <li><input type="checkbox"/> Control circuit: Inside the ASIC</li> </ul>

**Table 2-2. Major Elements on MAIN Board (continued)**

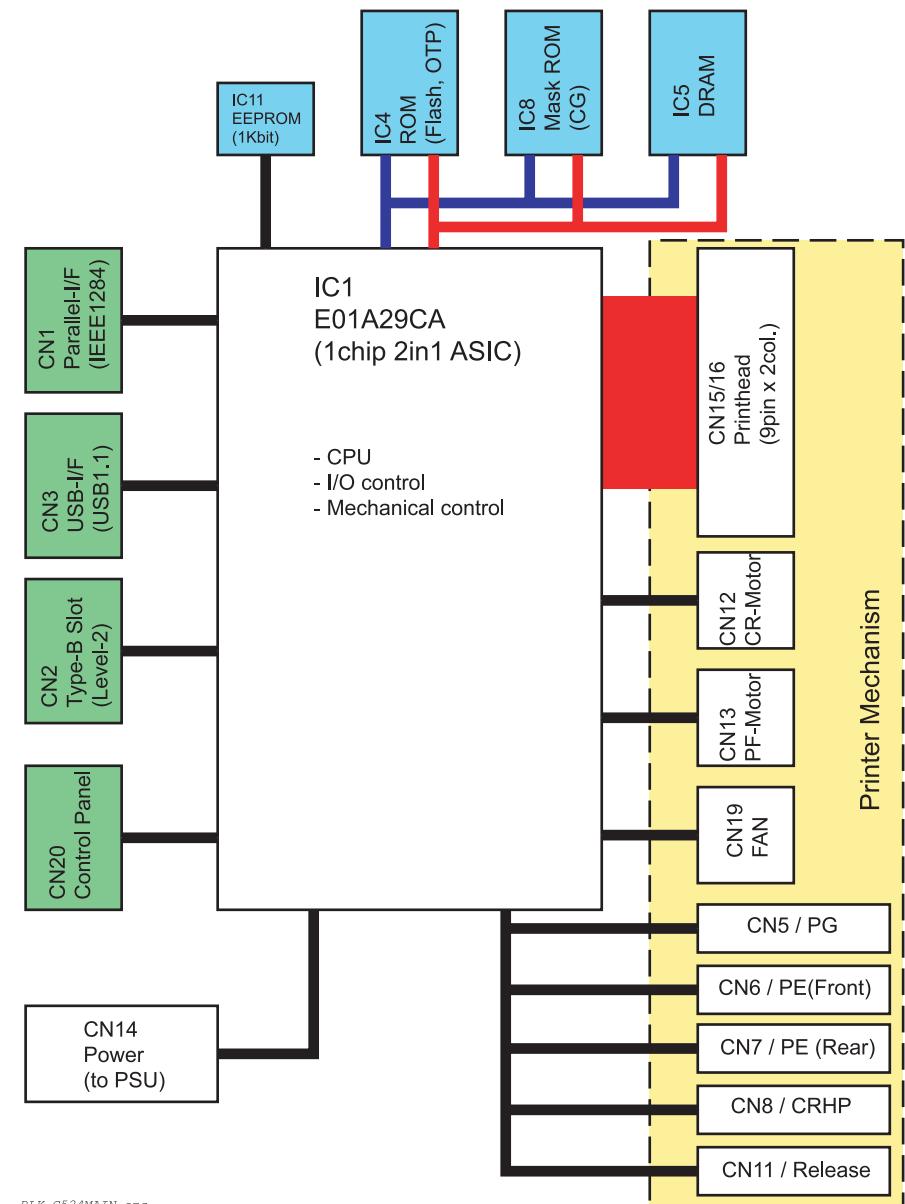
Elements	Location	Function
TYPE-B IF circuit		<ul style="list-style-type: none"> <li><input type="checkbox"/> Specification: Level 2 Current consumption 0.5 A max. SSI is supported. Transmission rates supported are 600/1200/2400/4800/9600/19200 [bps].</li> <li><input type="checkbox"/> Data reception rate (between TYPE B and Main Circuit Board) is 2 MB/s at peak.</li> <li><input type="checkbox"/> Data receiving system: DMA</li> <li><input type="checkbox"/> Data reception timing: Based on TYPE-B specification</li> </ul>
RESET IC	IC13	<ul style="list-style-type: none"> <li><input type="checkbox"/> Power ON reset <ul style="list-style-type: none"> <li>• Device: Reset IC LA5623M (Sanyo) equivalent reset circuit 2</li> <li>• Detecting voltage: <math>4.2 \pm 0.2</math> V (logic system)</li> <li>• Processing: Generates a hardware reset, and there is delay of 60 ms (min.) at turning High from Low.</li> </ul> </li> <li><input type="checkbox"/> Power OFF detection <ul style="list-style-type: none"> <li>• Device: Reset IC LA5623M (Sanyo) equivalent reset circuit 1</li> <li>• Detecting voltage: <math>1.25 \pm 0.05</math> V (keeps watch on power system by resistor division)</li> <li>• Processing: Divides 42 V source voltage by resistance at 1.4/30, and keeps watch on. Generates NMI interrupt request when 42V source voltage is 28.0 V (min. 26.4 V).</li> </ul> </li> </ul>
Oscillating circuit		<ul style="list-style-type: none"> <li><input type="checkbox"/> Element: Ceramic oscillator</li> <li><input type="checkbox"/> Frequency: 48.00 MHz</li> <li><input type="checkbox"/> Oscillation stabilization time: 10 ms or less</li> </ul>

**Table 2-2. Major Elements on MAIN Board (continued)**

Elements	Location	Function
CR Motor Driver	IC15	<ul style="list-style-type: none"> <li><input type="checkbox"/> Drive voltage: <math>42 V \pm 5\%</math></li> <li><input type="checkbox"/> Drive IC: SLA7024M (Sanken)</li> <li><input type="checkbox"/> Drive system: Constant-current unipolar drive</li> <li><input type="checkbox"/> Excitation method: 2-2 phase /1-2 phase (quadrangular) /1-2 phase (circular) /W1-2 phase driving</li> <li><input type="checkbox"/> Current detection resistance: <math>0.68 \Omega</math>, 2 W</li> <li><input type="checkbox"/> Current value setting: Setting with D/A port of the CPU D/A reference voltage (<math>= 3.3 \pm 0.3</math> V) The maximum of 8-bit current setting register for D/A (= d'255) Current setting resolution: <math>3.3/255 = 0.68=0.019</math> A</li> <li><input type="checkbox"/> QPIT compensation: D/A circuit is compensated to ensure current accuracy (<math>\pm 5\%</math> at the maximum current and <math>\pm 10\%</math> at the minimum current).</li> </ul>
PF Motor Driver	IC9	<ul style="list-style-type: none"> <li><input type="checkbox"/> Drive voltage: <math>42 V \pm 5\%</math></li> <li><input type="checkbox"/> Drive system: Constant-current bipolar drive</li> <li><input type="checkbox"/> Drive IC: A3972 (Sanken)</li> <li><input type="checkbox"/> Excitation method: 1-2 phase</li> <li><input type="checkbox"/> Phase change: The ASIC generates the control signal of the drive IC based on the trigger signal (CPU output).</li> <li><input type="checkbox"/> Current value setting: Setting with D/A converter of drive IC. Any setting number is available.</li> <li><input type="checkbox"/> Current detection resistance: <math>0.56 \Omega \pm 1\%</math>, 1 W</li> <li><input type="checkbox"/> Output at reset: SLEEP signal (G/A output) Low. (Output current off)</li> </ul>
Head Driver	QM1, QM2, QM3	<ul style="list-style-type: none"> <li><input type="checkbox"/> Drive voltage: <math>42 V \pm 5\%</math></li> <li><input type="checkbox"/> Drive system: Constant voltage drive</li> <li><input type="checkbox"/> Drive Tr: SMA4037 (Sanken) 3A</li> <li><input type="checkbox"/> Control method: Controlled by ASIC based on print timing signal (CPU output)</li> <li><input type="checkbox"/> At reset: G/A output L (head drive off)</li> <li><input type="checkbox"/> QPIT compensation: The voltage detecting circuit is compensated to ensure the accuracy of head energization time.</li> </ul>

**Table 2-2. Major Elements on MAIN Board (continued)**

Elements	Location	Function
Energy save (ESA VE) circuit		<ul style="list-style-type: none"> <li>□ Driver element: DTC124X</li> <li>□ Control: Controlled by output port (P_CTRL) of ASIC Register setting 0: 42 V power voltage rising (Power ON) {At reset} 1: 42 V power voltage lowering</li> </ul>
Simple ecodrive circuit		<p>90 V constant voltage circuit:(2 circuits each of which is constituted with 9 pins)</p> <ul style="list-style-type: none"> <li>□ Type: Constant-voltage dropper circuit (for head power regression)</li> <li>□ Driver element:FET 2SK3155 (Hitachi)</li> <li>□ Input eco voltage:88.7 V ~ 95.8 V</li> <li>□ Output power voltage:+42 V ± 5% (Controlled to a constant voltage by Power Supply Unit.)</li> <li>□ Overvoltage detecting circuit (OVP): Detects 120 V or above as a overvoltage. Outputs Off signal to the Power Supply Unit.</li> </ul>

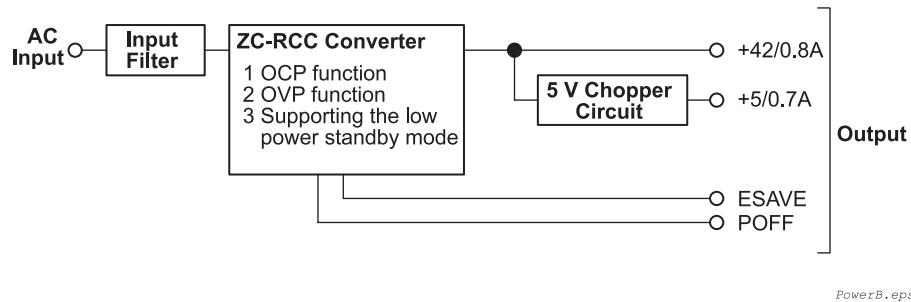
**Figure 2-5. C524 MAIN Block Diagram**

### 2.1.2.2 C524 PSB/PSE/PSH Power Supply Circuit

This printer can be powered by one of the following three power supply boards: the C524PSB (120 V) board, the C524PSE (230 V) board, or the C524PSH (Universal) board. The function of the boards is the same, except for a difference in the primary circuitry. The power supply outputs the DC current necessary to drive the printer control circuit and drive the mechanism.

#### CIRCUIT CONSTITUTION

Figure 2-6 below shows the block diagram of this power supply circuit.



**Figure 2-6. Power Supply Circuit Block Diagram**

**Table 2-3. Circuit Constitution**

Block	Description
Input Filter	<input type="checkbox"/> Inrush current preventive circuit with a power thermistor
ZC-RCC Converter	<input type="checkbox"/> 42 V zero cross RCC of high performance <input type="checkbox"/> Constant-voltage detecting circuit of Tr+ZD type <input type="checkbox"/> Low power standby mode function by the ESAVE signal is supported
+5 V Circuit	<input type="checkbox"/> Chopper circuit with a MOSFET discrete structure

#### INPUT SPECIFICATIONS

**Table 2-4. Input Specifications**

Power Supply Unit Name	C524 PSB (100-120V Spec)	C524 PSE (220-240V Spec)	C524 PSH (100-240V Spec)
Rated input power voltage	100-120 VAC	220-240 VAC	100-240 VAC
Input voltage range	85-138 VAC	187-276 VAC	85-276 VAC
Rated input power frequency		50-60 Hz 47-63 Hz	
Input frequency range			
Input current (Only for reference *)	(100 V / 120 V, 60 Hz) Min. load Rated load Max. load	(220 V / 240 V, 50 Hz) 0.05 A / 0.05 A 0.78 A / 0.69 A 2.30 A / 1.96 A	(100 V, 60 Hz / 240 V, 50 Hz) 0.08 A / 0.08 A 0.78 A / 0.42 A 2.34 A / 1.18 A
Input power (Only for reference *)		(100 V/120 V, 60 Hz) Min. load Rated load Max. load	(100 V, 60 Hz / 240 V, 50 Hz) 2.1 W / 2.3 W 45.5 W / 45.2 W 153.3 W / 148.6 W
Inrush current	40 A (0-p) or less (Input: 138 V/60 Hz)	40 A (0-p) or less (Input: 276 V/50 Hz)	40 A (0-p) or less (Input: 276 V/50 Hz) (Ambient temperature: 25°C, At cold start)
Leak current	0.25 mA or less (Input: 100 V / 50 Hz) 0.75 mA or less (Input: 276 V / 60 Hz)	0.75 mA or less (Input: 138 V / 60 Hz)	0.75 mA or less (Input: 276 V / 60 Hz) (Ambient temperature: 25°C)
Output holding time		43 ms or more (Input: 85 V/47 Hz)	(Input: 187 V/47 Hz) (Input: 85 V/47 Hz) (Output: Rated load/Ambient temperature: 25°C)

**Table 2-4. Input Specifications**

Power Supply Unit Name	C524 PSB (100-120V Spec)	C524 PSE (220-240V Spec)	C524 PSH (100-240V Spec)
Special output holding time (The period from the time when output 1 has dropped below 26 V to the time when output 2 drops below the output voltage lower limit)	120 ms or more (Input: 85 V, 60 Hz) (Input: 187 V, 50 Hz) (Input: 85 V, 60 Hz)  (Output: At output 1 of no-load and output 2 of rated load)		

Note “\*1”: Each value indicated here is only the average of measured values of samples (sample size n = 3), that is, it is not a typical value or guaranteed value.

“\*2”: Each value does not include the current flowing in the capacitor of the EMI filter circuit.

## PROTECTIVE FUNCTIONS

**Table 2-6. Protective Functions**

Item	Output 1	Output 2
Overcurrent protection (OCP)	Dropping + cutoff	Cutoff
OCP reset method	Turning power off once and on again	Turning power off once and on again
Load short-circuit current	0 A	0 A
Overvoltage protection (OVP)	Cutoff type	Cutoff type
OVP preset voltage	45 ~ 58 V	6 ~ 9 V

## OUTPUT SPECIFICATIONS

**Table 2-5. Output Specifications**

Item	Output 1	Output 2
Rated output voltage	+42 V	+5 V
Output voltage fluctuation *1	40.0 ~ 44.0 V	4.75 ~ 5.25 V
Rated output current	0.8 A	0.7 A
Output current at startup *2	0 A	0.7 A
Output current range	0~2.8 A	0~0.7 A
Ripple voltage *3	-----	100 mVpp Typ.
Spike voltage *3	1500 mVpp Typ.	300 mVpp Typ.

Note “\*1”: Neither Output 1 nor Output 2 includes the spike voltage component.

“\*2”: The output current during power supply startup must be not greater than the value specified above.

“\*3”: The values for ripple and spike voltage indicated above, which are the values with a rated resistance load, are only for reference. (Ambient temperature: 25°C)  
For measurement, connect a KMF50V470μF electrolytic capacitor and 0.1 μF film capacitor to the output 1 terminal, and a KME16V47μF electrolytic capacitor and 0.1μF film capacitor to the output 2 terminal.

CHAPTER  
**3**

**TROUBLESHOOTING**

## 3.1 Overview

The printer may exhibit different symptoms for the same problem, which makes troubleshooting more difficult. This section, however, provides simple and effective ways to facilitate troubleshooting.

In addition, the User's Manual for EPSON EPSON FX-890/2190 describes detailed steps to be taken for recovery from typical errors.



- When you disassemble the printer, pull the power cable and the interface cable out of the plug socket beforehand.
- When you touch any surface which can become hot, take care not to suffer a burn.



- Use only specified tools to avoid impairing the quality of the printer.
- Use only specified lubricants and adhesives.
- Carry out the adjustment by following the specified procedure.
- Wear a wrist strap to discharge static electricity from the human body, whenever possible.

### 3.1.1 Specified Tools

This printer does not require any specified tools for troubleshooting.

### 3.1.2 Procedure for Troubleshooting

Perform troubleshooting work according to the flowchart shown at right.



Before starting disassembly and assembly work, read and understand thoroughly the contents of 3.1.3 "Preliminary Checks (p.54)".

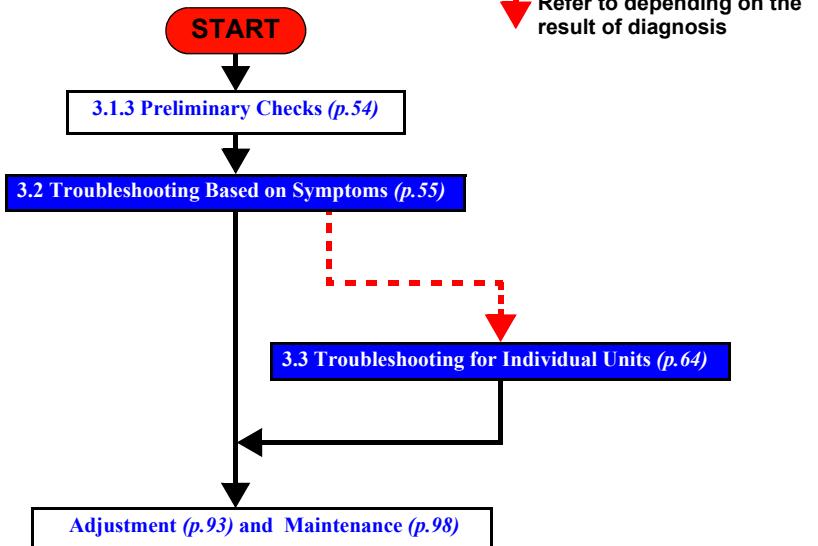


Figure 3-1. Troubleshooting Process Flowchart

### 3.1.3 Preliminary Checks

Before starting troubleshooting, be sure to verify that the following conditions are all met:

- The power supply voltage must be within the specification limits. (Measure the voltage at the wall socket.)
- The POWER CORD must be free from damage, short circuit or breakage, or miswiring in the POWER CORD.
- The printer must be grounded properly.
- The printer should not be located in a place where it can be exposed to too high or low temperature, too high or low humidity, or abrupt temperature change.
- The printer should not be located near waterworks, near humidifiers, near heaters or near flames, in a dusty atmosphere or in a place where the printer can be exposed to blast from an air conditioner.
- The printer should not be located in a place where volatile or inflammable gases are produced.
- The printer should not be located in a place where it can be exposed to direct rays of the sun.
- The printer must be located in a well-ventilated place.
- The printer must be placed on a strong and steady level table (without an inclination larger than 5 degrees).
- The paper used must conform to the specification.
- There must be no error in handling of the printer.
- The Regular Replacement Parts must have been replaced every time their respective specified numbers of sheets had been printed.
- When printing can not be performed, execute self testing and check to see if any trouble occurs. ([Refer to “Operations at Power-on” on page -31.](#))  
In addition, check the values for “Default Setting”. ([Refer to “Default Setting” on page -33.](#))
- Check to see if the surface or the inside of the printer is soiled remarkably or if any component is broken.
- Make certain that the harness is connected properly.

- Make sure that gears of the printer mechanism do not rub each other excessively. Confirm that all gears are engaged properly.
- Make certain that the rollers inside the printer are free from soiling and free from scratches.
- Clear EEPROM to return the internal settings of the printer to the factory default settings, if necessary. ([Refer to “EEPROM Clear Function” on page -35.](#))

### 3.1.4 Error

As this printer checks its condition by itself at power-on, when it finds any trouble, it indicates it with error indication buzzer and LEDs. The error indications and corresponding remedies are shown in the table below:

**Table 3-1. Error Indications**

Error	Beep sounds	Cause	Remedy
Paper out error	•••	When printer fails to load a sheet, it goes into paper out error.	Set paper in the printer correctly.
Release lever operation error	•••	When release lever position is wrong, printer goes into release lever error.	Set the release lever in the correct position.
Cover open error	•••	When printer's cover is open, printer goes into cover open error.	Close the cover.
Paper eject error	•••	When printer fails to eject a sheet, it goes into paper out error.	Remove the jammed paper from inside the printer.
Fatal error	-----	A failure related to certain components is detected.	Turn off the printer once and turn it back on, to see if the same error occurs again..

Note : The symbols used in the table above represent the following:

“•”: Beeper sounds about 100 ms and interval is about 100 ms

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

## 3.2 Troubleshooting Based on Symptoms

You can identify the defective component from the symptom displayed. Table 3-2 below lists the symptoms for various failures so that you can easily identify the problem. Based on the symptom as mentioned below, identify the problem and take a remedy by following the appropriate troubleshooting procedure given in Table 3-3 to Table 3-13.

**Table 3-2. Symptoms and Problems**

Symptom	Problem	Refer to
Printer fails to operate when power is turned on	Printer mechanism does not operate. No LED on control panel lights up.	<a href="#">p.55</a> <a href="#">p.56</a>
Abnormal carriage operation at power on.	Carriage moves away from the home position at power on. Carriage returns to home position correctly, but the printer then fails to enter the READY mode.	<a href="#">p.56</a>
Printing is faulty during self-test, but carriage operation is normal.	No printing at all. Faulty printing. Some dots are missing from print.	<a href="#">p.58</a>
Abnormal paper feeding	The printer prints but does not feed paper properly.	<a href="#">p.57</a>
Abnormal operation of Control Panel	• Faulty LED indication • Input through switches impossible	<a href="#">p.59</a>
Data sent from the host computer is not printed properly.	Carriage operates normally at power on, and self-test is executed correctly, but data is not printed. Data from the computer is not printed properly.	<a href="#">p.59</a>
Abnormal operation of ribbon	• Defective ribbon cartridge • Defective ribbon feed mechanism	<a href="#">p.60</a>
Abnormal operation of Carriage Unit	Printer mechanism does not operate.	<a href="#">p.60</a>
Faulty print	Printer mechanism operates, but print is faulty.	<a href="#">p.62</a>
Printer goes into fatal error status when power is turned on.	• “Fatal error” is displayed on the control panel. • After initialization operation, the printer goes into error status.	<a href="#">p.63</a>

### 3.2.1 Printer fails to operate when power is turned on

**Table 3-3. Printer fails to operate when power is turned on**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b>		
	<ul style="list-style-type: none"> <li>• Fuse</li> <li>• HP (Home Position) Detector (<a href="#">p.78</a>)</li> <li>• CR Motor (<a href="#">p.81</a>)</li> <li>• PF Motor (<a href="#">p.83</a>)</li> <li>• C524MAIN Board (<a href="#">p.74</a>)</li> <li>• C524PSB/PSE/PSH Board (<a href="#">p.76</a>)</li> </ul>		
<b>1</b>	<b>Fuse</b> Check the electric circuit and printer mechanism, and if they are not short-circuited, replace the fuse with a new one. ♦ Is the problem solved?	Problem solved	Go to Step 2
<b>2</b>	<b>Connection with connectors</b> Make sure that the connectors on the Main Board are connected properly. ♦ Is the problem solved?	Problem solved	Go to Step 3
<b>3</b>	<b>Defective CR HP Detector</b> Replace the CR HP Detector with a new one. ♦ Is the problem solved?	Replace the CR HP Detector.	Go to Step 4
<b>4</b>	<b>Defective CR Motor</b> Replace the CR Motor with a new one. ♦ Is the problem solved?	Replace the CR Motor.	Go to Step 5
<b>5</b>	<b>Defective PF Motor</b> Replace the PF Motor with a new one. ♦ Is the problem solved?	Replace the PF Motor.	Go to Step 6
<b>6</b>	<b>Power Supply Board</b> Replace the Power Supply Board with a new one. ♦ Is the problem solved?	Replace the Power Supply Board.	Go to Step 7
<b>7</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.2 No LED on Control Panel lights up even with power turned on

**Table 3-4. No LED on Control Panel lights up**

Step	Action and Question	Yes	No
	Parts below can be the source of this error ( <i>Chapter 4 Disassembly and Assembly</i> ) <ul style="list-style-type: none"> <li>• Fuse</li> <li>• Power Switch</li> <li>• Control Panel (<a href="#">p.72</a>)</li> <li>• Harness of Control Panel</li> <li>• <a href="#">C524MAIN Board (p.74)</a></li> <li>• <a href="#">C524PSB/PSE/PSH Board (p.76)</a></li> </ul>		
1	<b>Fuse</b> Check the electric circuit and printer mechanism, and if they are not short-circuited, replace the fuse with a new one. ♦ Is the problem solved?	Problem solved	Go to Step 2
2	<b>Connection with connectors</b> Make sure that the following connectors are connected properly: <ul style="list-style-type: none"> <li>• Power Supply Board connector (CN1)</li> <li>• Power Supply Board ~ Main Circuit Board (CN2~CN14)</li> </ul> ♦ Is the problem solved?	Problem solved	Go to Step 3
3	<b>Connection of harness of Control Panel</b> Make sure that the connectors of Control Panel ~ Main Circuit Board (CN1 ~ CN20) are connected properly. ♦ Is the problem solved?	Problem solved	Go to Step 4
4	<b>Harness of Control Panel</b> Replace the harness of the Control Panel with a new one. ♦ Is the problem solved?	Replace the harness.	Go to Step 5
5	<b>Control Panel</b> Replace the Control Panel with a new one. ♦ Is the problem solved?	Replace the Control Panel.	Go to Step 6

**Table 3-4. No LED on Control Panel lights up**

Step	Action and Question	Yes	No
6	<b>Power Supply Board</b> Replace the Power Supply Board with a new one. ♦ Is the problem solved?	Replace the Power Supply Board.	Go to Step 7
7	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.3 Abnormal operation of Carriage at power on

**Table 3-5. Abnormal Carriage operation at power on**

Step	Action and Question	Yes	No
	Parts below can be the source of this error ( <i>Chapter 4 Disassembly and Assembly</i> ) <ul style="list-style-type: none"> <li>• <a href="#">HP (Home Position) Detector (p.78)</a></li> <li>• Harness of HP Detector</li> <li>• <a href="#">CR Motor (p.81)</a></li> <li>• <a href="#">C524MAIN Board (p.74)</a></li> </ul>		
1	<b>Connection with connectors</b> Make sure that the connectors on the Main Board are connected properly. ♦ Is the problem solved?	Problem solved	Go to Step 2
2	<b>Defective CR HP Detector</b> Replace the CR HP Detector with a new one. ♦ Is the problem solved?	Replace the CR HP Detector.	Go to Step 3
3	<b>Defective harness of CR HP Detector</b> Replace the harness of CR HP Detector with a new one. ♦ Is the problem solved?	Replace the harness of CR HP Detector.	Go to Step 4
4	<b>Defective CR Motor</b> Replace the CR Motor with a new one. ♦ Is the problem solved?	Replace the CR Motor.	Go to Step 5
5	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.4 Abnormal paper feeding

**Table 3-6. Abnormal paper feeding**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (Chapter 4 Disassembly and Assembly)</b> <ul style="list-style-type: none"> <li>• Front PE (Paper End) Detector (<a href="#">p.87</a>)</li> <li>• Harness of Front PE Detector</li> <li>• Rear PE Detector (<a href="#">p.87</a>)</li> <li>• Harness of Rear PE Detector</li> <li>• Release Detector (<a href="#">p.86</a>)</li> <li>• Harness of Release Detector</li> <li>• Rear Paper Guide Assembly (<a href="#">p.90</a>)</li> <li>• PF Motor (<a href="#">p.83</a>)</li> <li>• PF Gear Train (<a href="#">p.84</a>)</li> <li>• C524MAIN Board (<a href="#">p.74</a>)</li> </ul>		
1	<b>Checking for foreign matters</b> Make sure that there are no foreign matters in the following areas. <ul style="list-style-type: none"> <li>• Paper path</li> <li>• PF Gear Train</li> </ul> <p>◆ Is the problem solved?</p>	Problem solved	Go to Step 2
2	<b>Connection of sensor</b> Make sure that the following sensors are connected properly: <ul style="list-style-type: none"> <li>• Front PE Detector (CN6)</li> <li>• Rear PE Detector (CN7)</li> <li>• Release Detector (CN11)</li> </ul> <p>◆ Is the problem solved?</p>	Problem solved	Go to Step 3
3	<b>Defective sensor</b> Replace the defective one of the following sensors with a new one: <ul style="list-style-type: none"> <li>• Front PE Detector (CN6)</li> <li>• Rear PE Detector (CN7)</li> <li>• Release Detector (CN11)</li> </ul> <p>◆ Is the problem solved?</p>	Replace the defective sensors.	Go to Step 4

**Table 3-6. Abnormal paper feeding**

Step	Action and Question	Yes	No
4	<b>Harness of sensor</b> Replace the defective harness of the following sensors with a new one: <ul style="list-style-type: none"> <li>• Front PE Detector (CN6)</li> <li>• Rear PE Detector (CN7)</li> <li>• Release Detector (CN11)</li> </ul> <p>◆ Is the problem solved?</p>	Replace the defective harness.	Go to Step 5
5	<b>Paper changeover mechanism</b> <p>◆ Is the paper feeding direction switched when you operate the release lever?</p>	Go to Step 6	Check <a href="#">PF Gear Train</a> ( <a href="#">p.84</a> )
6	<b>Paper feed mechanism</b> With power turned off, check to see if you can feed paper by turning the platen knob by hand. <p>◆ Can paper be fed by turning the platen knob by hand?</p>	Go to Step 7	Check the paper feed mechanism
7	<b>PF Motor</b> Replace the PF Motor with a new one. <p>◆ Is the problem solved?</p>	Replace the PF Motor.	Go to Step 8
8	<b>Main Board</b> Replace the Main Board with a new one. <p>◆ Is the problem solved?</p>	Replace the Main Board.	<a href="#">Go to 3.2.11 Electrical Noise (p.62)</a>

### 3.2.5 Printing is faulty during self-test, but carriage operation is normal

**Table 3-7. Printing faulty during self-test, but carriage operation normal**

Step	Action and Question	Yes	No
	<p>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</p> <ul style="list-style-type: none"> <li>• Fuse</li> <li>• Printhead (<a href="#">p.77</a>)</li> <li>• CR Motor (<a href="#">p.81</a>)</li> <li>• PF Motor (<a href="#">p.83</a>)</li> <li>• C524PSB/PSE/PSH Board (<a href="#">p.76</a>)</li> <li>• C524MAIN Board (<a href="#">p.74</a>)</li> </ul>		
1	<p><b>Fuse</b> Check the electric circuit and printer mechanism, and if they are not short-circuited, replace the fuse with a new one. ♦ Is the problem solved?</p>	Problem solved	Go to Step 2
2	<p><b>Connection with connectors</b> Make sure that all the connectors on the Main Circuit Board and Power Supply Board are connected properly. ♦ Is the problem solved?</p>	Problem solved	Go to Step 3
3	<p><b>Platen Gap</b> Adjust the Platen Gap. ♦ Is the problem solved?</p>	Replace the Printhead.	Go to Step 4
4	<p><b>Defective CR Motor</b> Replace the CR Motor with a new one. ♦ Is the problem solved?</p>	Replace the CR Motor.	Go to Step 5

**Table 3-7. Printing faulty during self-test, but carriage operation normal**

Step	Action and Question	Yes	No
5	<p><b>Defective PF Motor</b> Replace the PF Motor with a new one. ♦ Is the problem solved?</p>	Replace the PF Motor.	Go to Step 6
6	<p><b>Power Supply Board</b> Replace the Power Supply Board with a new one. ♦ Is the problem solved?</p>	Replace the Power Supply Board.	Go to Step 7
7	<p><b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?</p>	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.6 Abnormal operation of Control Panel

**Table 3-8. Abnormal operation of Control Panel**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b> <ul style="list-style-type: none"> <li>• Control Panel (<a href="#">p.72</a>)</li> <li>• Harness of Control Panel</li> <li>• <b>C524MAIN Board</b> (<a href="#">p.74</a>)</li> </ul>		
<b>1</b>	<b>Connection of harness of Control Panel</b> Make sure that the connectors of Control Panel ~ Main Circuit Board (CN1 ~ CN20) are connected properly. ♦ Is the problem solved?	Problem solved	Go to Step 2
<b>2</b>	<b>Harness of Control Panel</b> Replace the harness of the Control Panel with a new one. ♦ Is the problem solved?	Replace the harness.	Go to Step 3
<b>3</b>	<b>Control Panel</b> Replace the Control Panel with a new one. ♦ Is the problem solved?	Replace the Control Panel.	Go to Step 4
<b>4</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.7 Abnormal on-line operation (normal self-printing, though)

**Table 3-9. Abnormal on-line operation (normal self-printing, though)**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b> <ul style="list-style-type: none"> <li>• Interface cable (USB or parallel)</li> <li>• <b>C524MAIN Board</b> (<a href="#">p.74</a>)</li> </ul>		
<b>1</b>	<b>Connection of interface cable</b> Make sure that the interface cable meets the specification and is connected properly. ♦ Is the problem solved?	Problem solved	Go to Step 2
<b>2</b>	<b>Interface cable</b> Replace the interface cable because the cable may be defective and thus can cause some trouble. ♦ Is the problem solved?	Replace the interface cable.	Go to Step 3
<b>3</b>	<b>Firmware</b> Upgrade firmware to the latest version. ♦ Is the problem solved?	Problem solved	Go to Step 4
<b>4</b>	<b>EEPROM clearing</b> Clear EEPROM to restore the default settings. ♦ Is the problem solved?	Problem solved	Go to Step 5
<b>5</b>	<b>Main Board</b> Replace the Main Board with a new one.ÅB ♦ Is the problem solved?	Problem solved	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.8 Abnormal operation of ribbon

**Table 3-10. Abnormal operation of ribbon**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b> <ul style="list-style-type: none"> <li>• Ribbon Cartridge</li> <li>• Timing Belt</li> <li>• CR Motor (<i>p.81</i>)</li> <li>• Ribbon Drive (RD) Assembly (<i>p.92</i>)</li> <li>• C524MAIN Board (<i>p.74</i>)</li> </ul>		
<b>1</b>	<b>Ribbon Cartridge</b> Defective Ribbon Cartridge ♦ Can the Ribbon Cartridge be turned by hand?	Go to Step 2	Replace the Ribbon Cartridge.
<b>2</b>	<b>Defective Carriage</b> Check the operation of the Carriage and Timing Belt. ♦ Does the carriage and belt operate smoothly?	Go to Step 3	Go to <a href="#">3.2.9 Abnormal operation of Carriage Unit (<i>p.61</i>)</a>
<b>3</b>	<b>Defective Ribbon Drive Assembly</b> Check the operation of the Ribbon Drive Assembly. ♦ Does the Ribbon Drive Assembly turn smoothly?	Go to Step 3	Replace or lubricate the Ribbon Drive Assembly.
<b>4</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Problem solved	Go to <a href="#">3.2.11 Electrical Noise (<i>p.62</i>)</a>

### 3.2.9 Abnormal operation of Carriage Unit

**Table 3-11. Abnormal operation of Carriage Unit**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (Chapter 4 Disassembly and Assembly)</b> <ul style="list-style-type: none"> <li>• Timing Belt</li> <li>• CR Motor (<i>p.81</i>)</li> <li>• HP (Home Position) Detector (<i>p.78</i>)</li> <li>• Harness of HP Detector</li> <li>• Ribbon Drive (RD) Assembly (<i>p.92</i>)</li> <li>• C524MAIN Board (<i>p.74</i>)</li> </ul>		
<b>1</b>	<b>Checking the connection of connectors</b> Make sure that the following connectors are connected properly. <ul style="list-style-type: none"> <li>• HP Detector (CN8)</li> <li>• CR Motor (CN12)</li> </ul> ♦ Is the problem solved?	Problem solved	Go to Step 2
<b>2</b>	<b>Timing Belt</b> Check to see if the driving path of the Timing Belt is obstructed with foreign matters or the belt is damaged. ♦ Is the Timing Belt free from obstruction or damage?	Go to Step 3	Replace the Timing Belt.
<b>3</b>	<b>Ribbon Drive Assembly</b> Operate the Timing Belt by hand and check the movement. ♦ Does the Timing Belt operate smoothly?	Go to Step 4	Replace or lubricant the Ribbon Drive Assembly.
<b>4</b>	<b>Checking the operation of the Carriage Unit</b> Check to see if you can move the Carriage Unit on the SHAFT,CR,GUIDE from side to side by hand. ♦ Does the Carriage Unit operate smoothly?	Go to Step 5	Refer to Lubrication ( <i>p.100</i> )
<b>5</b>	<b>Defective HP Detector</b> Replace the HP Detector with a new one. ♦ Is the problem solved?	Replace the HP Detector.	Go to Step 6

**Table 3-11. Abnormal operation of Carriage Unit (continued)**

Step	Action and Question	Yes	No
<b>6</b>	<b>Defective harness of HP Detector</b> Replace the harness of the HP Detector with a new one. ♦ Is the problem solved?	Replace the harness of the HP Detector. Go to Step 7	
<b>7</b>	<b>Defective CR Motor</b> Replace the CR Motor with a new one. ♦ Is the problem solved?	Replace the CR Motor. Go to Step 8	
<b>8</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board. Go to 3.2.11 Electrical Noise ( <i>p.62</i> )	

### 3.2.10 Faulty print

**Table 3-12. Faulty print**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b> <ul style="list-style-type: none"> <li>Ribbon Mask</li> <li><a href="#">Printhead (p.77)</a></li> <li>Printhead FFC</li> <li><a href="#">C524MAIN Board (p.74)</a></li> </ul>		
<b>1</b>	<b>Ribbon Mask</b> Remove the Ribbon Mask from the Printhead, and make sure that the Ribbon Mask is free from deformation or damage. ♦ Is the problem solved?	Problem solved	Go to Step 2
<b>2</b>	<b>Defective Printhead</b> Replace the Printhead with a new one. ♦ Is the problem solved?	Replace the Printhead.	Go to Step 3
<b>3</b>	<b>Platen Gap Adjustment (p.95)</b> Adjust the platen gap. ♦ Is the problem solved?	Problem solved	Go to Step 4
<b>4</b>	<b>Printhead FFC</b> Replace the Printhead FFC with a new one. ♦ Is the problem solved?	Replace the Printhead FFC.	Go to Step 5
<b>5</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

### 3.2.11 Electrical Noise

**Table 3-13. Troubleshooting for Electrical Noise**

Step	Action and Question	Yes	No
	<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b> <ul style="list-style-type: none"> <li><a href="#">C524PSB/PSE/PSH Board (p.76)</a></li> <li><a href="#">C524MAIN Board (p.74)</a></li> </ul>		
<b>1</b>	<b>External noise</b> 1. Check to see if within 3 m from the printer there is another electrical apparatus, such as a generator, radio transmitter or an apparatus incorporating a motor. 2. Turn off the power to the electrical apparatus in question or move the printer to a position at least 6 m distant from the apparatus. ♦ Does the problem with electrical noise still occur?	Go to Step 2	Problem solved
<b>2</b>	<b>AC grounding</b> Check the AC power connection. ♦ Is the AC power cable connected and grounded properly?	Go to Step 3	Ask the customer for repair of the AC power connection.
<b>3</b>	<b>Harness of Power Switch</b> 1. <a href="#">Remove the Printer Mechanism. (p.80)</a> 2. Replace the HOUSING ASSY.,LOWER with a new one. ♦ Is the cable grounded properly?	Go to Step 4	Install the grounding screw properly.
<b>4</b>	<b>Grounding of circuit boards</b> 1. Remove the Shield Cover.(p.74) 2. Make sure that the screws for the Power Supply Board is tightened securely. ♦ Is grounding ensured?	Go to Step 5	Ensure grounding.
<b>5</b>	<b>Power Supply Board</b> Replace the Power Supply Board with a new one. ♦ Is the problem solved?	Replace the Power Supply Board.	Go to Step 7
<b>6</b>	<b>Main Board</b> Replace the Main Board with a new one. ♦ Is the problem solved?	Replace the Main Board.	Problem solved

### 3.2.12 Fatal Error

**Table 3-14. Troubleshooting for Fatal Error**

Action and Question	Yes	No
<b>Parts below can be the source of this error (<i>Chapter 4 Disassembly and Assembly</i>)</b>		
<ul style="list-style-type: none"> <li>• C524MAIN Board (<a href="#">p.74</a>)</li> <li>• C524PSB/PSE/PSH Board (<a href="#">p.76</a>)</li> <li>• Printhead (<a href="#">p.77</a>)</li> <li>• CR Motor (<a href="#">p.81</a>)</li> <li>• PF Motor (<a href="#">p.83</a>)</li> <li>• HP (Home Position) Detector (<a href="#">p.78</a>)</li> </ul>		
<b>Abnormal +42V Drive Voltage</b> (PD Error : value = 37H)  The printer detects abnormal voltage level with +42V line.  Check to see if the components to which +42V is supplied; is defective (short-circuit). <ul style="list-style-type: none"> <li>• Printhead</li> <li>• CR Motor</li> <li>• PF Motor</li> </ul>	Replace the defective component.	Replace the power supply circuit board (C524PSB/PSE/PSH).
<b>Abnormal CR operation</b> (CR Error : value = 30H)  CR Home position seek operation is failed, or CR Home position is detected during printing.  Check to see if one of the following component is defective. <ul style="list-style-type: none"> <li>• CR Motor</li> <li>• Timing belt tension</li> <li>• CR HP Sensor</li> </ul>	Replace the defective component.	Replace C524MAIN Board.
<b>CG Access Error</b> (CG Error : value = 33H)  Failed to access CG, or error in EEPROM data verification.  Check to see if an error solved by replacing the C524MAIN board.	Replace C524MAIN Board.	Go to <a href="#">3.2.11 Electrical Noise (p.62)</a>

**Table 3-14. Troubleshooting for Fatal Error (continued)**

Action and Question	Yes	No
<b>Abnormal Printhead Temperature</b> (Head Open Error : value = 3AH)  The printer actually checks the connection between the printhead and C524MAIN Board, and an error is recognized as an abnormal printhead temperature if the connection is wrong.  Check to see if the connection between the printhead and C524MAIN Board is correct. <ul style="list-style-type: none"> <li>• FFC is not properly connected (or disconnected).</li> <li>• FFC is damaged.</li> </ul>	Re-connect FFC or replace the defective component.	Replace the printhead.
<b>Abnormal Printhead TrVce Voltage</b> (VDD Error : value = 36H)  The level of drive voltage supplied to the printhead is abnormal.	Replace the power supply circuit board (C524PSB/PSE/PSH).	Replace the printhead.
<b>Abnormal voltage with the simple ecodrive circuit</b> (ECO Error : value = 3CH)  The printer check the operation of simple ecodrive circuit when it is turned on, and recognizes this error condition if the voltage level is abnormal.	Replace C524MAIN Board.	Replace the power supply circuit board (C524PSB/PSE/PSH).

### 3.3 Troubleshooting for Individual Units

#### 3.3.1 Main Component Checking Point

The following components can be checked with a simple measurement tool, such as a multi-meter, easily.

- Motors

**Table 3-15. Motor Coil Resistance Test Points**

Motor	Test Pin Number	Test Method*	Meter Reading
PF Motor (CN13)	1 and 3, 2 and 4	Place one lead on pin 1 (pin2) and the other lead on pin3 (pin 4) on each of the test pins to check the two motor phases.	$16.0 \Omega \pm 10\%$ (at 25 °C per one phase)
CR Motor (CN12)	Common pin: 5 Test pins: 1, 2, 3 and 4	Place one lead on pin 5 and the other lead on each of the 4 test pins to check the two motor phase.	$2.7 \Omega \pm 10\%$ (at 25°C per one phase)

Note “\*”: Set the meter to ohms. Then disconnect the Motor from the Main Board and check it with printer power off.

- Printhead

- Test Method : For example, place one lead on pin C1 and the other lead on Test pin 1 to check #1 pin of the Printhead solenoid. Test pin numbers match the printhead solenoid (dot wire) numbers.

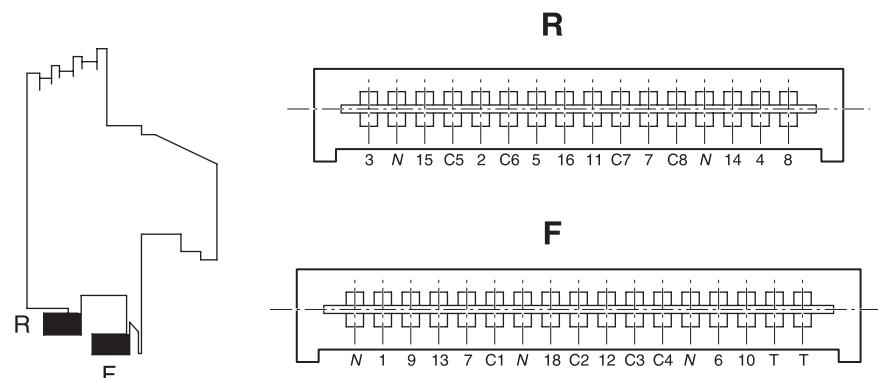
**NOTE:** Set the meter to ohms. Then disconnect the Motor from the Main Board and check it with printer power off.

- Specifications :  $8.19 \pm 0.8 \Omega$  (at 25°C)

**Table 3-16.**

F		R	
Common Line	Corresponding Wires	Common Line	Corresponding Wires
C1	1, 7, 13	C5	2, 5, 11
C2	9	C6	3, 15
C3	10, 18	C7	16, 17
C4	6, 12	C8	4, 8, 14

Note : 1~18: Wire numbers (Refer to “Figure 2-3“ in Chapter 2 for wire numbers.)  
 C1~C8: Common terminals  
 T: Thermistor terminal  
 N: Not used  
 (The contact of the connector and FFC is positioned at the bottom side of the connector.)



Head02.eps

**Figure 3-2. Printhead Connector Pin Assignment**

CHAPTER  
**4**

**DISASSEMBLY AND ASSEMBLY**

## 4.1 Overview

This section describes procedures for disassembling and assembling EPSON FX-890/2190. Unless otherwise specified, disassembled units or components can be reassembled by reversing the disassembly procedure. Therefore, no assembly procedures are included in this section. Precautions for any disassembly or assembly procedure are described under the heading "CHECK POINT". Any adjustments required after disassembling the units are described under the heading "ADJUSTMENTS".

### 4.1.1 Disassembly Precautions

Follow the precautions below when disassembling the printer.



- Before disassembling, assembling or adjusting the printer, disconnect the power supply cable from the AC power socket. Failure to do so might cause personal injury.
- Be careful with the Printhead when you handle it as it may be very hot right after printing.
- Do not touch the heat sink attached to the switching FET (Q1) on the power supply board right after power off, as it may be very hot.



To maintain efficient printer operation, take the precautions below:

- Use only the recommended tools for maintenance work.
- Use only the recommended lubrications and adhesives (See Chapter 6.)
- Adjust the printer only in the manner described in this manual.
- Always wear gloves for disassembly and reassembly to avoid injury from sharp metal edges.
- To protect sensitive microprocessors and circuitry, use static discharge equipment, such as anti-static wrist straps, when accessing internal components.
- Be aware that the existing drawings for FX-890 are substituted for FX-2190. It is because no exclusive drawings for FX-2190 has been made since the major mechanical difference between FX-890 and FX-2190 is width only.

### 4.1.2 Tools and Instruments

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

**Table 4-1. Tool and Instrument List**

Name	Specification	EPSON Part No.
Phillips Screwdriver	No.2	B743800200
Phillips Screwdriver	No.1	B743800100
Box Driver	7.0mm Diagonal	B741700200
Tweezers	-	B741000100
Round-nose pliers	-	B740400100
Thickness gage	-	B776702201
Soldering iron	-	B740200100
E-Ring holder	Size:#6	B740800800
Multi-Meter	OHM/Voltage/Current	-
Oscilloscope	Min. 50MHz	-

**NOTE:**All tools and instruments listed above are commercially available.

### 4.1.3 Service Check After Repair

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

**Table 4-2. Repair Status Check List**

Category	Component	Item to Check	Status
Printer Mechanism	Printhead	Do all wires print properly?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Carriage Mechanism	Dose the carriage move smoothly? • Noisy • Any dirt or excessive oil?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
		Is the CR Motor at the normal temperature? (Not too hot?)	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Paper Feed Mechanism	Does paper advance smoothly? * Noisy? * Paper is jamming?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
		Is the PF Motor at the normal temperature? (Not too hot?)	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Paper Path	Do all types of paper advance smoothly?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
		Is the tractor feeding paper smoothly?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
		Are all paper paths clear of obstructions?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
		Is the plate free of damage?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Ribbon Mask	Is the ribbon mask free of damage?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary

**Table 4-2. Repair Status Check List (continued)**

Category	Component	Item to Check	Status
Operation	Self-Test	Was the self-test printing successful?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	On-line Test	Was the on-line printing successful?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
Adjustment	Platen-Gap	Is the gap adjusted correctly? (PG = 0.38 ( 0.02mm )	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Bi-D Alignment	Is the Bi-Directional alignment made properly?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
ROM	Version	Latest version =	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
Packing	Ribbon Cartridge	Has the ribbon cartridge been removed from the printer?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary
	Attachments	Have all relevant attachments been packed together with the printer?	<input type="checkbox"/> Checked, OK <input type="checkbox"/> Not necessary

#### 4.1.3.1 Abbreviations for Small Parts

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

**Table 4-3. List of Screws Used**

No.	Name and specification	Shape
1	CBS (M3x6)	
2	CBS (M3x12)	
3	PLASTIC HEAD P TITE,4X13	
4	CBP (M4x12)	
5	CBS (M3x8)	
6	CBP (M3x8)	
7	CBP (M3x12)	
8	CBS (M3x4)	
9	CBS (M3x8) C(P2)	
10	CB (0) (M4x8)	

**Table 4-3. List of Screws Used**

No.	Name and specification	Shape
11	PRINTER MECHANISM MOUNTING SCREW	
12	CP (M3x4)	
13	SHAFT,MOUNT,CR (M8x10)	
14	CB (M3x6)	
15	CBS (M3x10)	
16	Hexagon nut normal(M4)	

## 4.2 Main Components Disassembly

This section provides the disassembly procedures. The basic order for disassembly is shown in the flowchart below. The exploded diagrams are also provided in the “Exploded Diagrams” (page 114). Refer to them to see how components are engaged with each other if necessary.

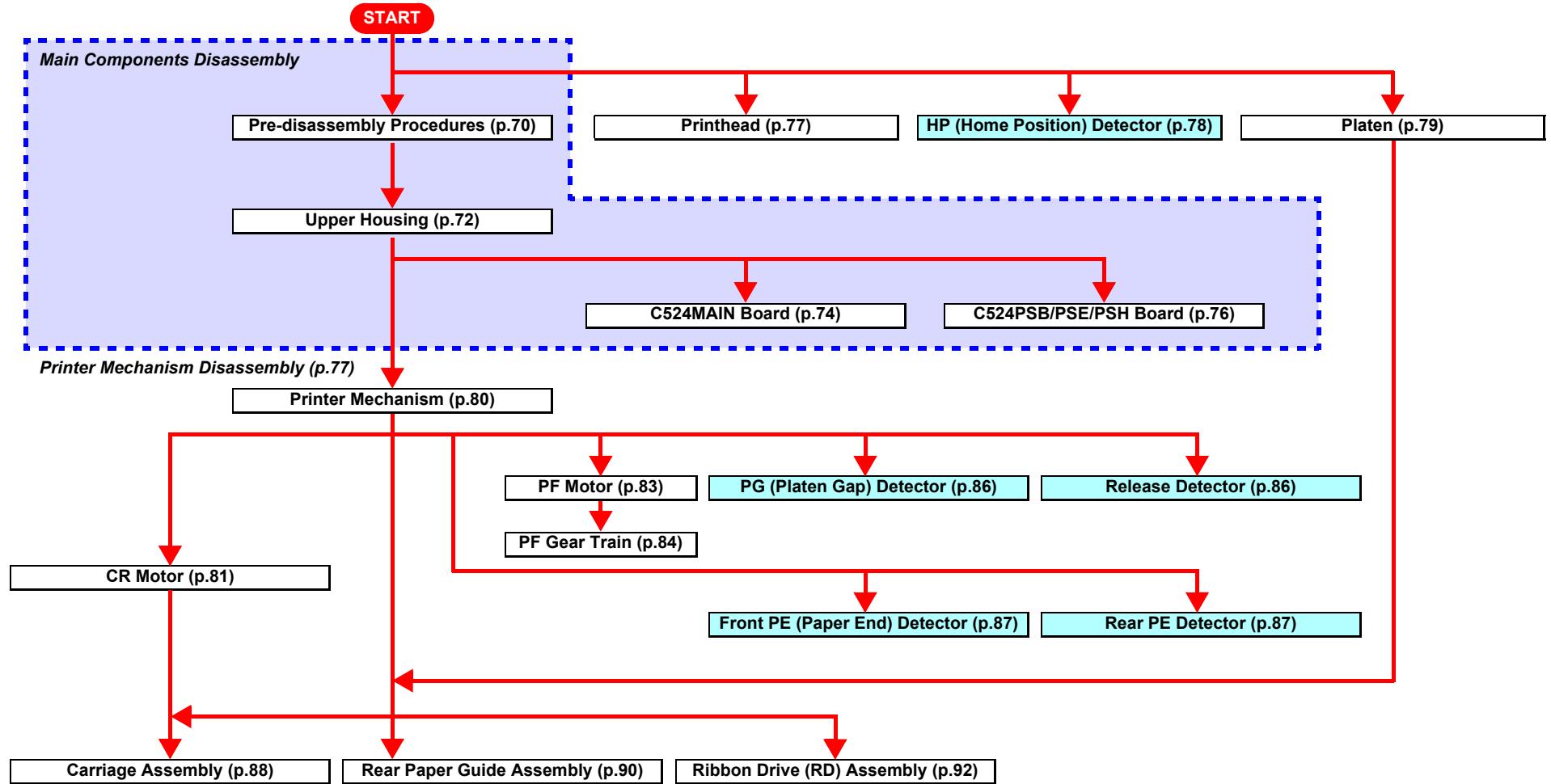
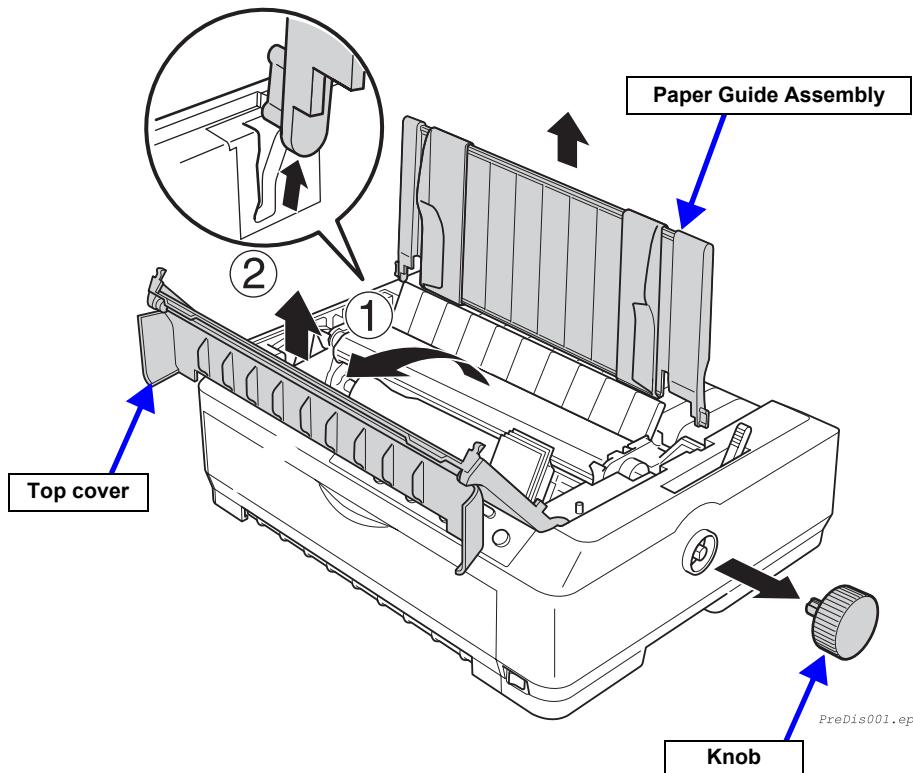


Figure 4-1. Disassembly Flowchart

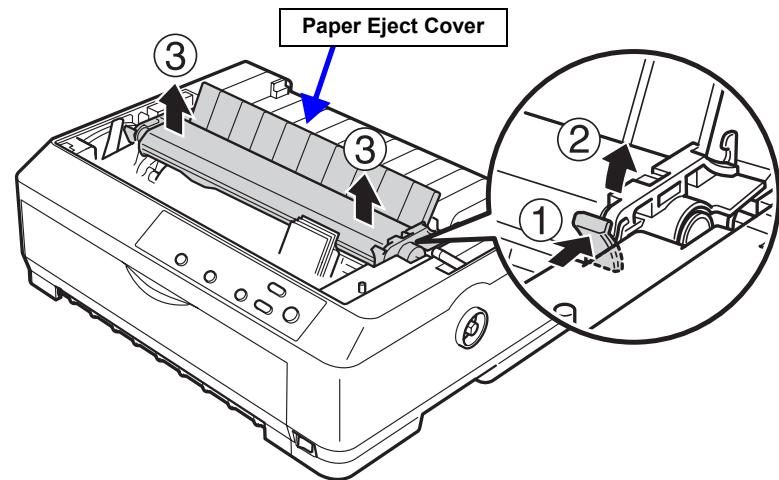
#### 4.2.1 Pre-disassembly Procedures

Remove the Paper Guide Assembly, top cover, front cover, paper eject cover, knob and tractor unit.

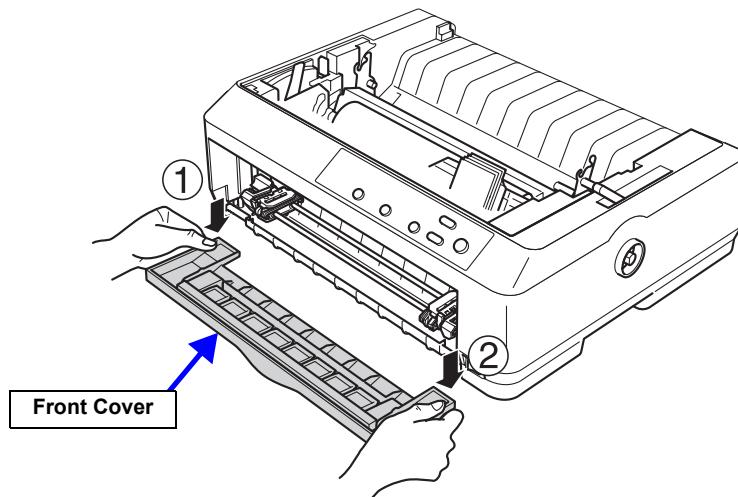
- Paper Guide Assembly. (See Figure 4-2)
- Top cover.(See Figure 4-2)
- Knob. (See Figure 4-2)
- Paper eject cover. (See Figure 4-3)
- Front cover. (See Figure 4-4)
- Tractor unit. (See Figure 4-5)



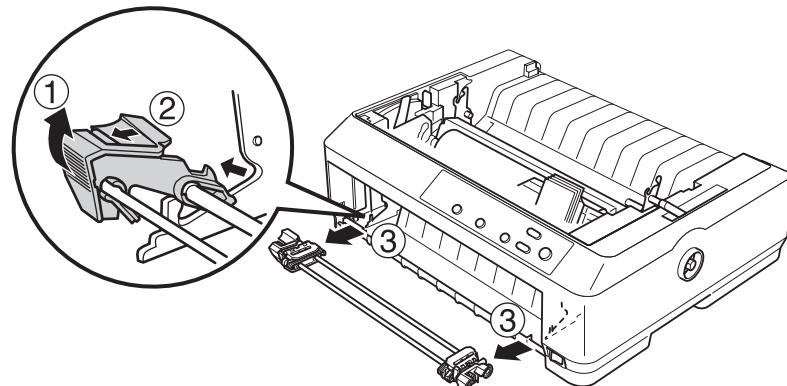
**Figure 4-2. Pre-Disassembly**



**Figure 4-3. Paper Eject Cover Removal**



**Figure 4-4. Front Cover Removal**



Remove the paper eject cover and the tractor unit by pushing and releasing the hooks at both sides. When remounting them, be sure to snap these hooks on the projecting parts.

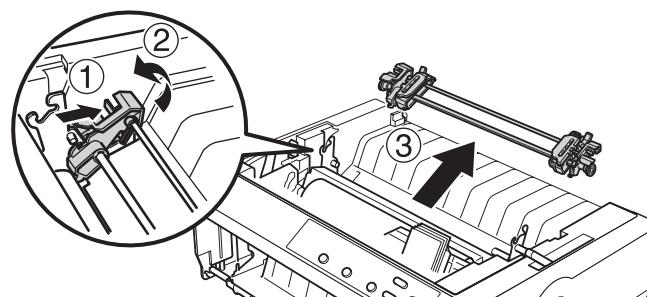
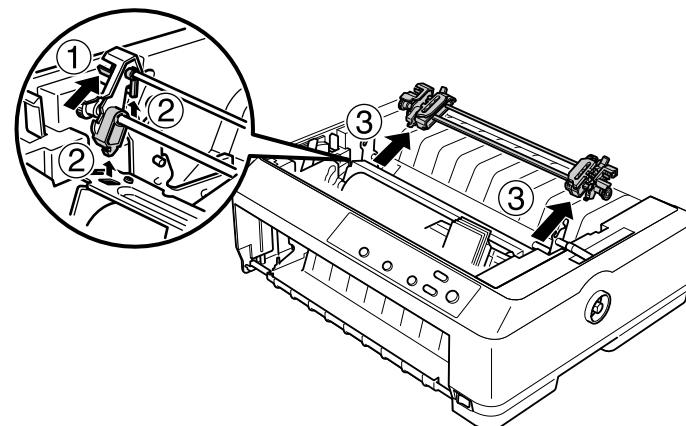


Figure 4-5. Tractor Unit Removal

## 4.2.2 Upper Housing

1. Perform Pre-Disassembly. (p.70)
2. Remove 3 CBS (M3x8) screws securing the upper housing to the lower case. (See Figure 4-6)
3. Set the release lever to the friction feed side.
4. Lifting the front side of the upper housing a little, disengage the hook found at the left of the panel assembly.
5. Push out the left side of the Panel Assembly slightly and take it out by shifting it to the left a little, and disconnect the Panel FFC.



When installing the Panel Assembly, lead the lead wires of the Case Open Sensor as shown below:

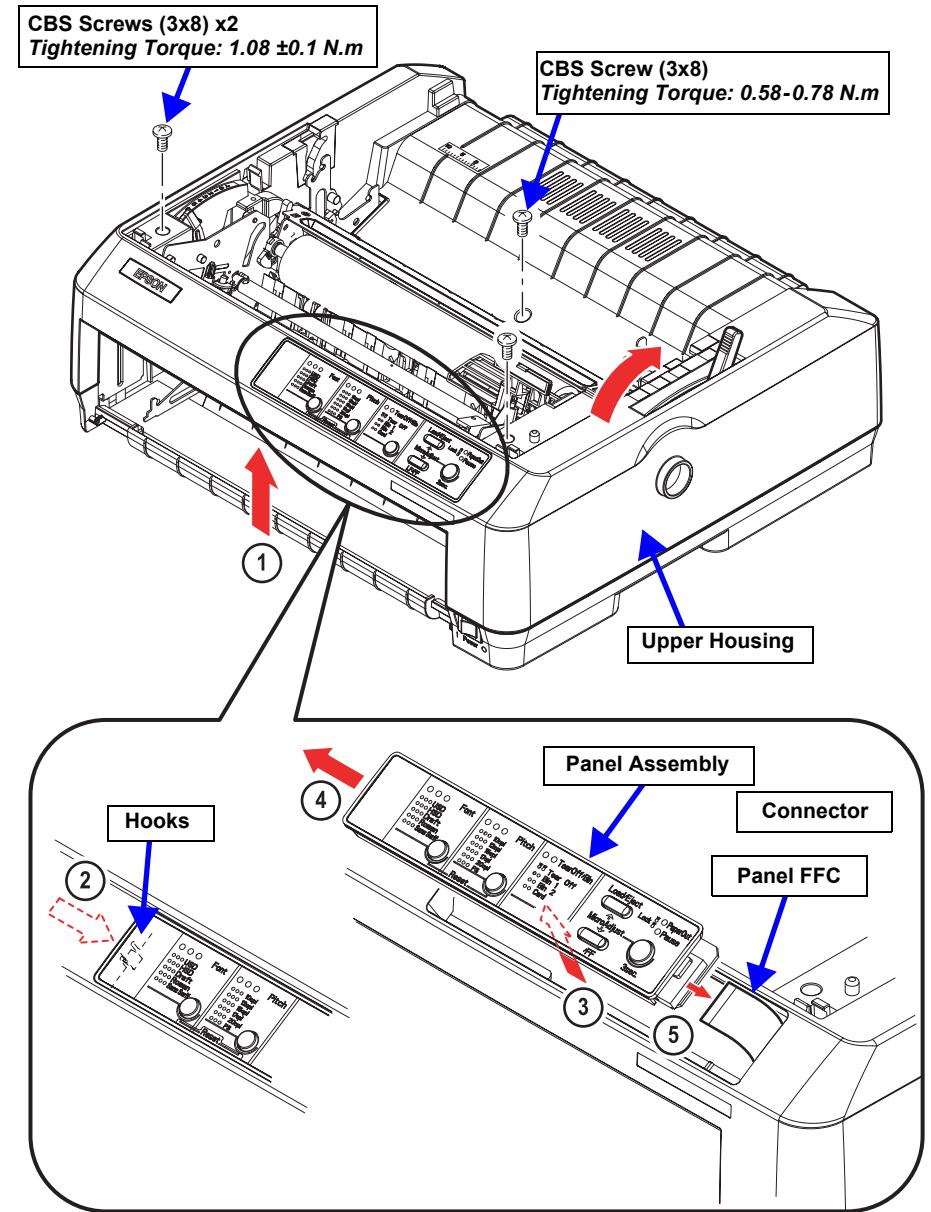
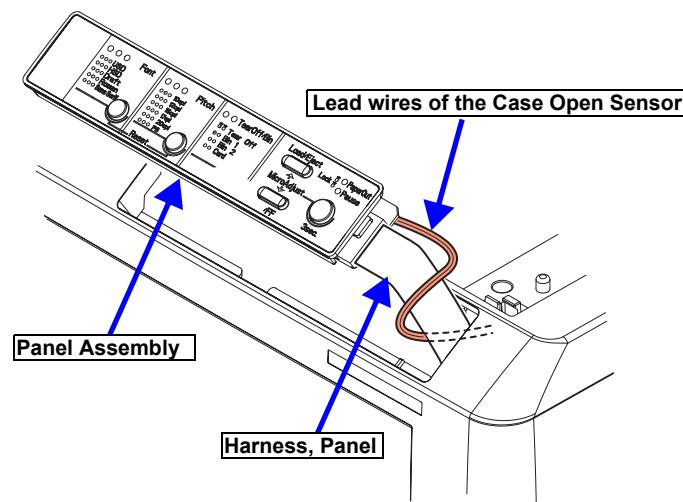
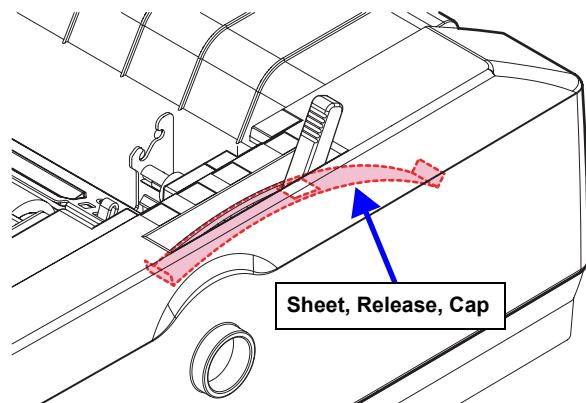


Figure 4-6. Upper Housing Removal 1

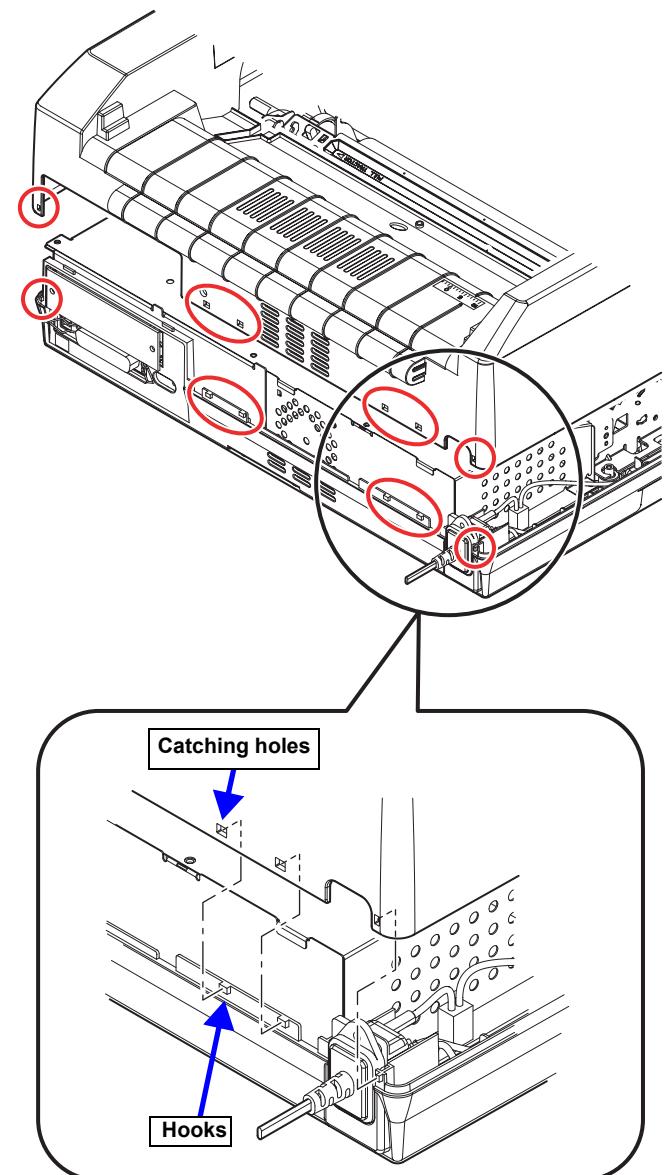
6. Open the upper housing from the front side, and remove it.



- When assembling the upper housing, put the catching holes in the upper housing on the hooks at the rear side of the lower case at first, then close the housing. (See Figure 4-7)
- Mount the Panel assembly onto the upper housing before installing the upper housing assembly.
- Sheet, Release, Cap can be assembled after the upper housing assembly is installed.



UpperH02.eps



UpperH\_R01.eps

**Figure 4-7. Upper Housing Removal 2**

### 4.2.3 C524MAIN Board

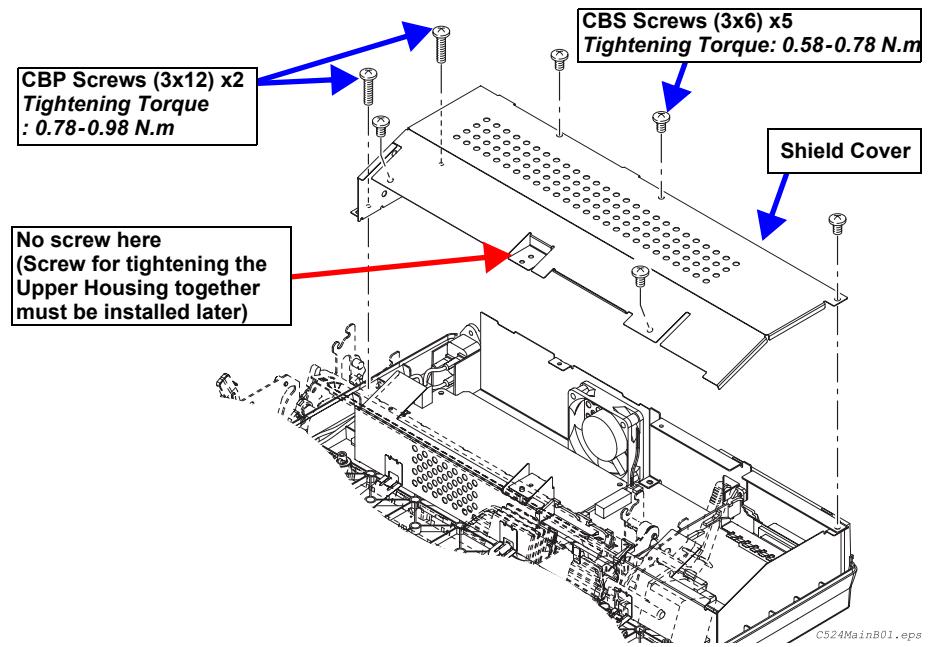
**CAUTION**

- The C524MAIN board has the mechanical drive power supply voltage (+42V, V<sub>p</sub>) management circuit and an electrical characteristic of the components composed of this circuit is measured with the custom instruments and regulated at the assembly process. Never attempt to replace any components of this circuit on the board, and doing so resulted in damaging the unit.
- Be careful with the edges of the shield plate, as they are very sharp.
- Be sure to match the connector colors with each other.

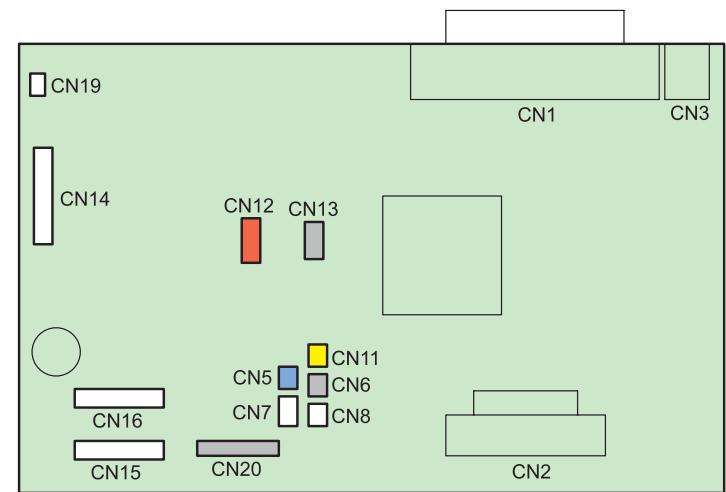
1. Perform Pre-Disassembly. (p.70)
2. Remove the Upper Housing. (p.72)
3. Remove 5 CBS (M3x6) screws and 2 CBP (M3x12) screws securing the shield cover to the Printer Mechanism and lower housing. Then remove the shield cover. (See Figure 4-8)
4. Disconnect all the connectors connected to the C524MAIN board. (See Figure 4-9)

**Table 4-4.**

CN No.	Pins	Color	Connected to
CN5	2	Blue	PG Detector
CN6	2	Black	Front PE Detector
CN7	3	White	Rear PE Detector
CN8	2	White	HP Detector
CN11	2	Yellow	Release Detector
CN12	5	Red	CR Motor
CN13	4	White	PF Motor
CN14	10	-	C524PSB/PSE/PSH Board
CN15	(FPC)		Printhead
CN16	(FPC)		Printhead
CN19	2	White	Fan
CN20	(FPC)		Panel



**Figure 4-8. C524MAIN Board Removal 1**

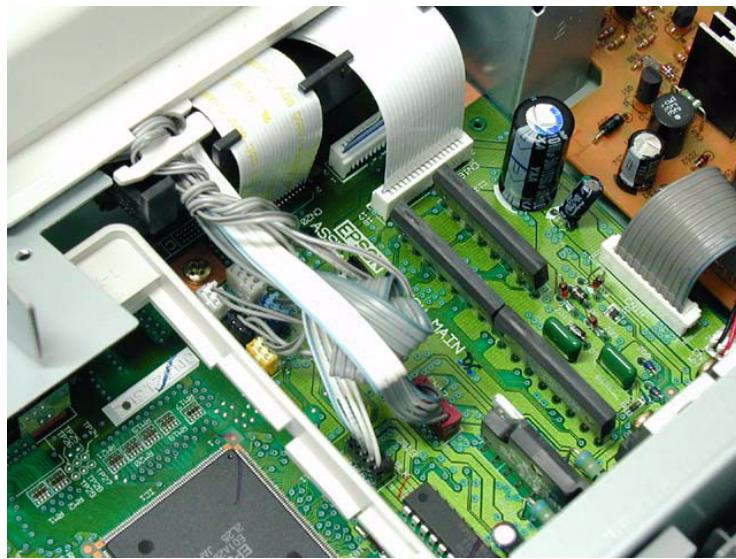


**Figure 4-9. C524MAIN Board Removal 2**

5. Remove the 2 CBS (M3x12) screws securing the COVER,CONNECTOR,UPPER or the optional Type-B I/F Board to the I/F GROUNDING PLATE. (See Figure 4-10)
6. Remove the 6 CBP (M3x12) screws securing the C524MAIN Board to the lower case.
7. Lift the rear side of the I/F GROUNDING PLATE slightly and remove the I/F GROUNDING PLATE together with the C524MAIN board.
8. Remove the 3 CP (M3x4) screws securing the I/F GROUNDING PLATE to the C524MAIN board. Then remove the I/F GROUNDING PLATE.

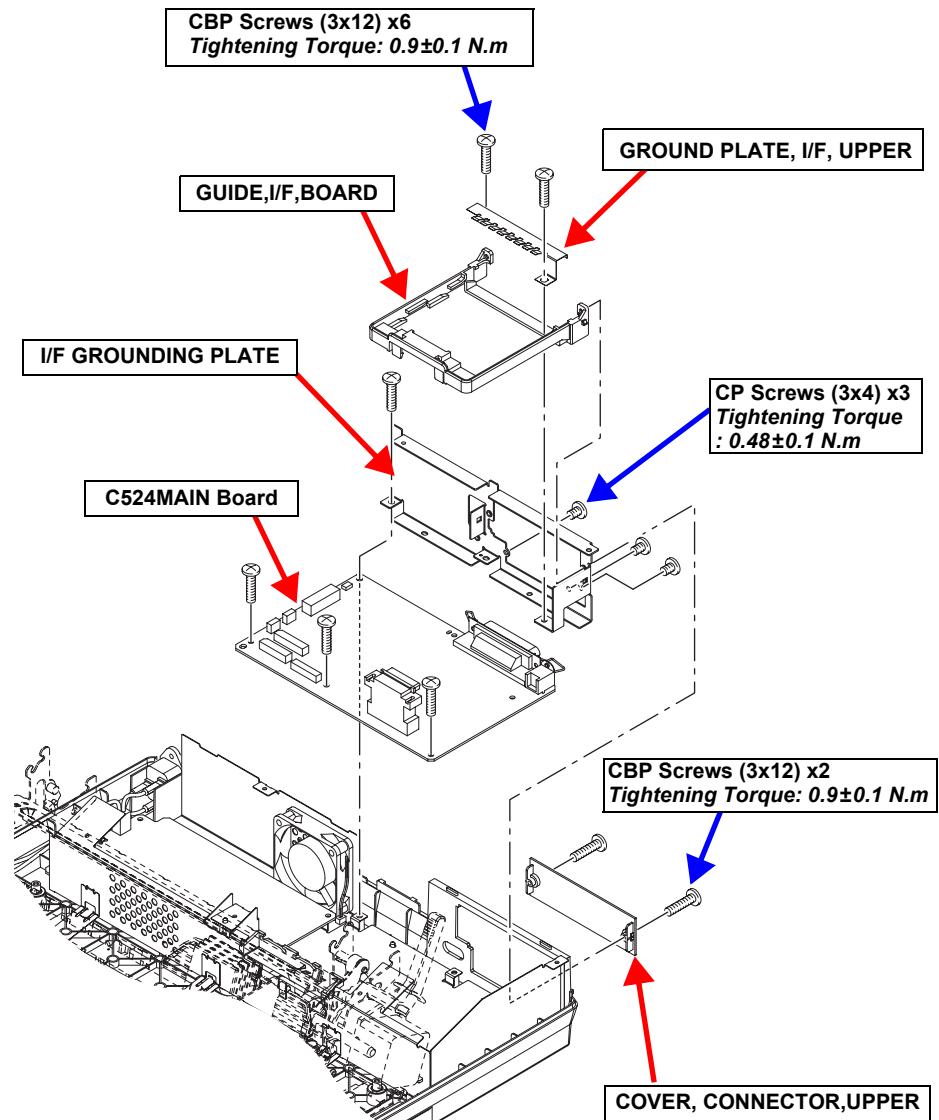


**Lead the lead wires as shown below:**



Once the C524MAIN Board has been replaced, be sure to make the following adjustments with the adjustment program. Refer to “Adjustment Program” on page -97. :

- Bi-D Adjustment
- EEPROM Writing
- USB-ID Input
- Firmware Reloading



C524MainB\_R01.eps

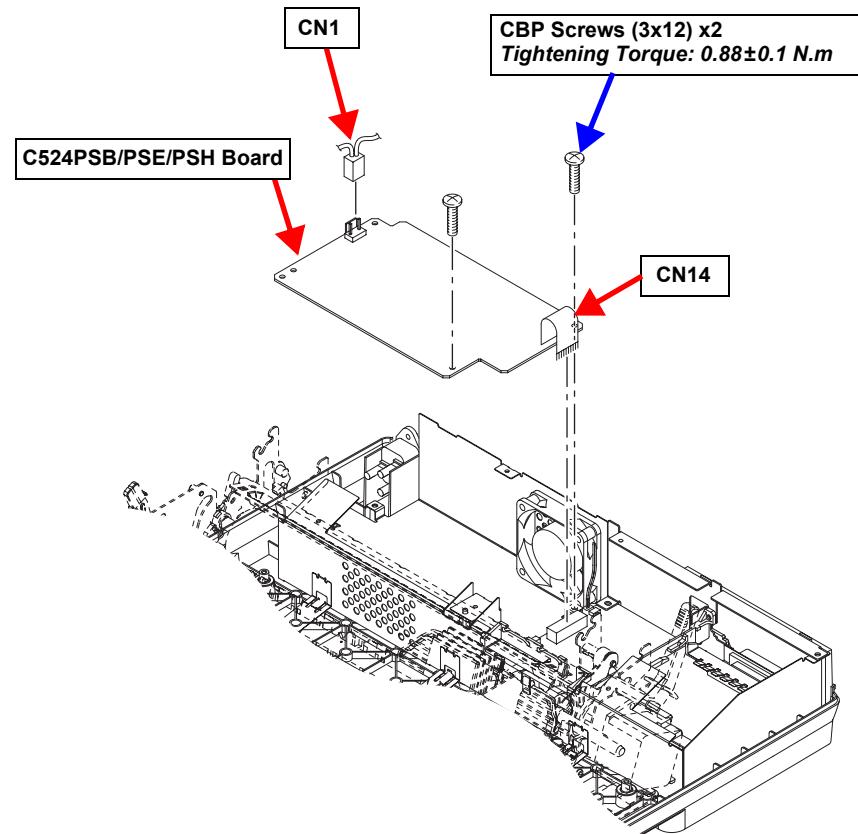
Figure 4-10. C524MAIN Board Removal 3

#### 4.2.4 C524PSB/PSE/PSH Board

1. Perform Pre-Disassembly. (p.70)
2. Remove the Upper Housing. (p.72)
3. Remove the shield cover. (See Figure 4-8)
4. Disconnect the harness from the connector CN14 on the C524MAIN board. (See Figure 4-11)
5. Disconnect the power cable from the connector CN1 on the C524PSB/PSE/PSH Board.
6. Remove the 2 CBP (M3x12) screws securing the C524PSB/PSE/PSH Board to the Lower Case, and remove the C524PSB/PSE/PSH Board.



- Before disassembling, assembling or adjusting the printer, disconnect the power supply cable from the AC power socket. Failure to do so might cause personal injury.
- Do not touch the heat sink attached to the switching FET (Q1) on the power supply board right after power off as it may be very hot.



C524PsbB01.eps

Figure 4-11. C524PSB/PSE/PSH Board Removal

## 4.3 Printer Mechanism Disassembly

### 4.3.1 Printhead

1. Remove the top cover. (See Figure 4-2)
2. Remove the 2 CBS C (P2) (M3x8) screws securing the Printhead to the Carriage Assembly. (See Figure 4-12)
3. Disconnect the head FFC from the Printhead and remove it.



**Be careful with the Printhead when you handle it, as it may be very hot right after printing.**



After installing the Printhead, make the following adjustments:

- [Platen Gap Adjustment \(p.95\)](#)
- [Bi-d Adjustment \(p.101\)](#)



- When installing the Printhead with the Head FFC, put the Head FFC under the hook of the carriage base.
- Make sure that the Head FFC is properly connected to the printhead. Do not connect the Head FFC at angle, to a connector either on the printhead or the C524MAIN Board.
- When replacing the Printhead, be sure to replace the Ribbon Mask Holder (with the Ribbon Mask) at the same time. All related parts are available as a kit as below.

**HEAD KIT, ASP**  
Code: 1267348

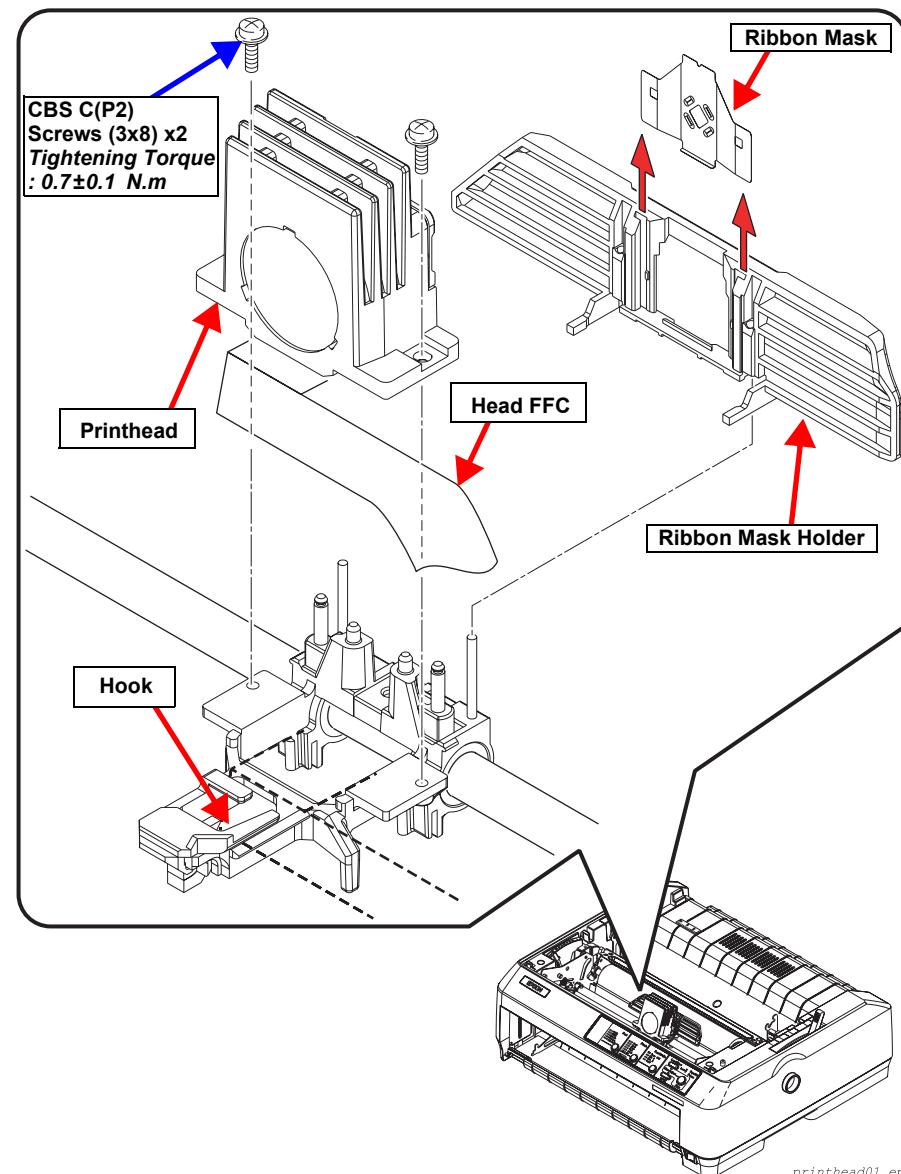


Figure 4-12. Printhead Removal

#### 4.3.2 HP (Home Position) Detector

1. Remove the top cover. (See Figure 4-2)
2. Release the hook attaching the HP detector to the Printer Mechanism, and remove it. (See Figure 4-13)
3. Disconnect the harness of the detector from the detector connector.

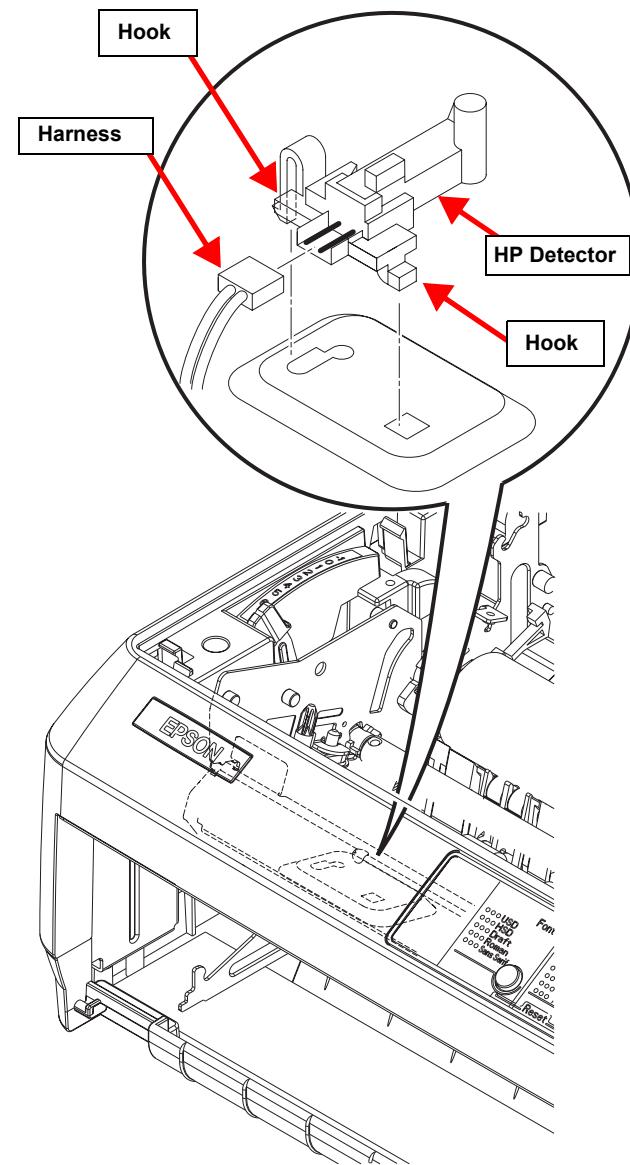


Figure 4-13. HP Detector Removal

### 4.3.3 Platen

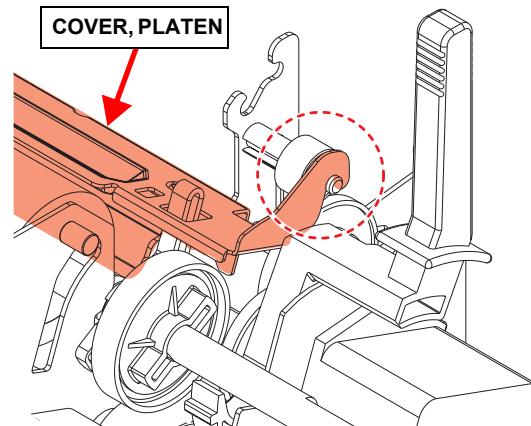
1. Perform Pre-Disassembly. (p.70)
2. Remove the 2 CBS (M3x8) screws securing the COVER,PLATEN. (See Figure 4-14)
3. Rotating the teeth of the Bushing, 8, Right and Bushing 8 Left forward, disengage them from the Left/Right Side Frame.
4. Move the carriage to the right end, lift the left side of the platen slightly, move the carriage to the center and remove the platen to the left. (See Figure 4-15)



**Take care not to cut your finger on the metallic frame or on the PAPER GUIDE ASSY., SUPPORT.**



When installing the COVER, PLATEN, make sure that the hook on the right side of the COVER, PLATEN is engaged with the gear shaft on the right side of the Printer Mechanism Assy properly.



After installing the Platen, make the following adjustment:  
• [Platen Gap Adjustment \(p.95\)](#)

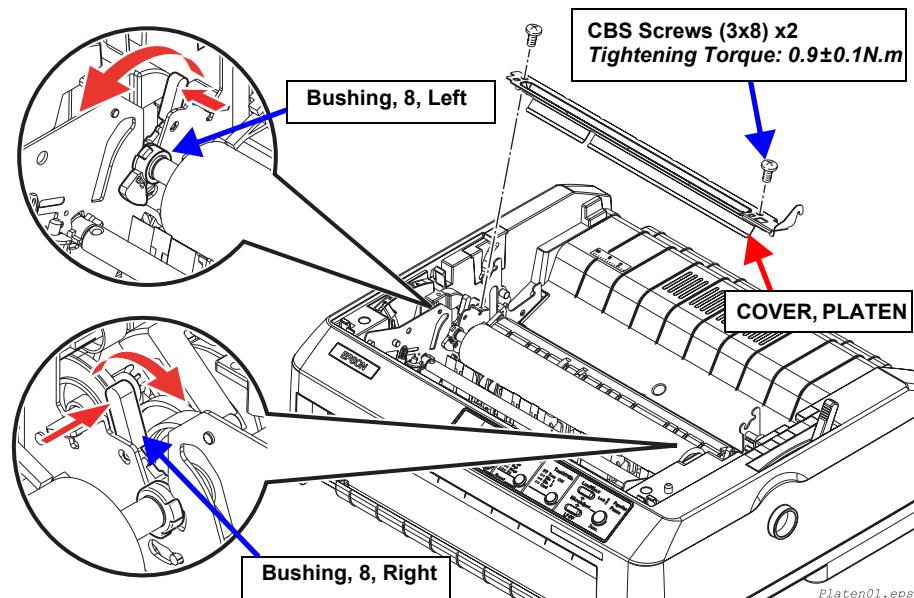


Figure 4-14. Platen Removal 1

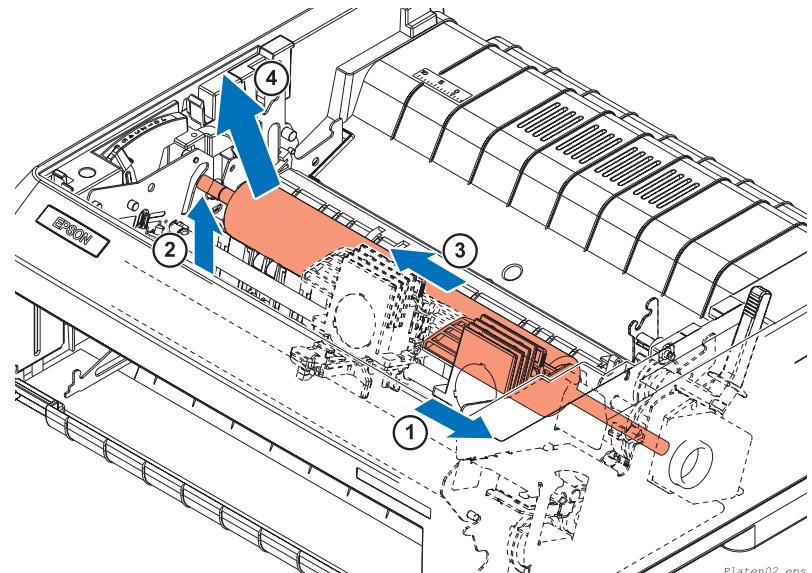


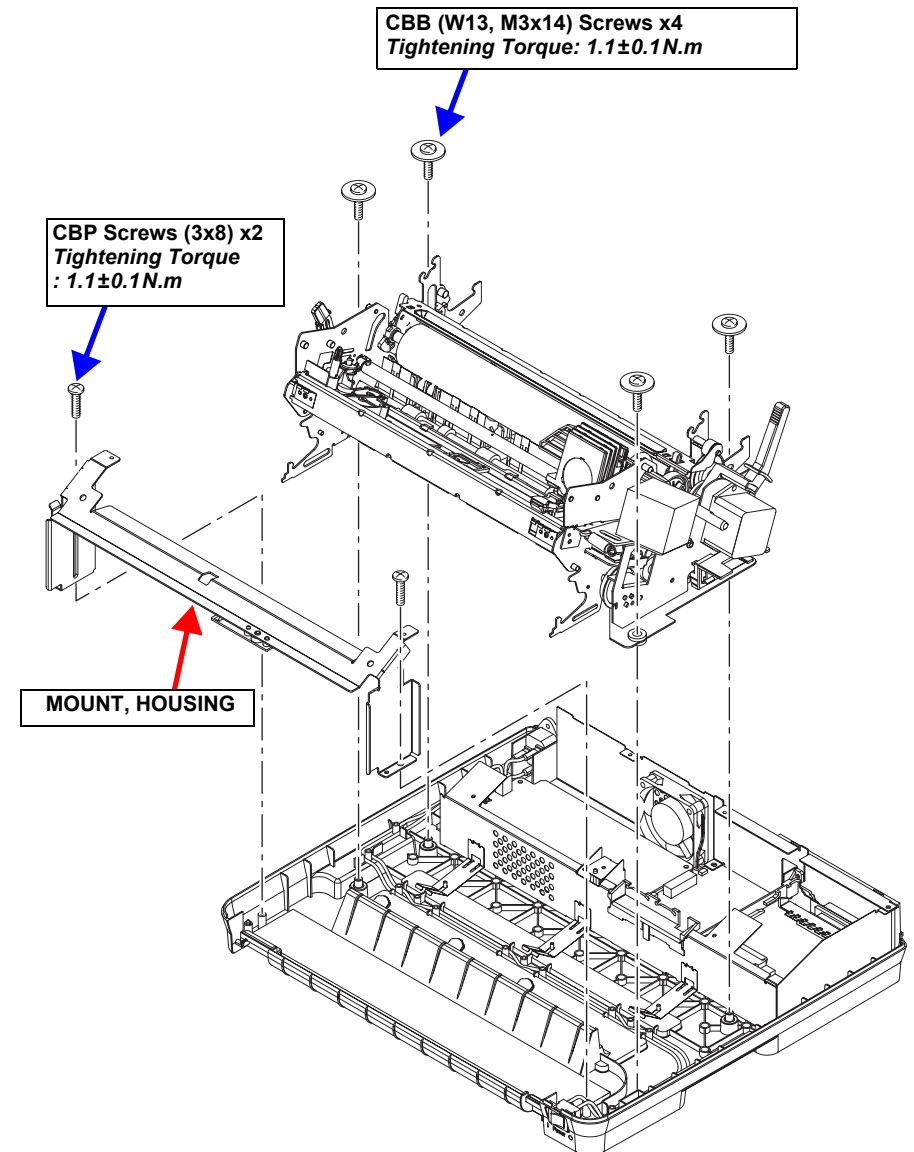
Figure 4-15. Platen Removal 2

#### 4.3.4 Printer Mechanism

1. Perform Pre-Disassembly. (p.70)
2. Remove the Upper Housing. (p.72)
3. Remove the shield cover. (*See Figure 4-8*)
4. Disconnect all the connectors connected to the C524MAIN board. (*See Figure 4-9*)
5. Remove the 2 CBP (M3x8) screws securing the MOUNT HOUSING to the lower housing, and remove the MOUNT HOUSING. (*See Figure 4-16*)
6. Remove the 4 CBB (W13, M3x14) screws, and remove the Printer Mechanism by lifting it up.



After installing the Printer Mechanism, make the following adjustment:  
 • Bi-d Adjustment (p.101)

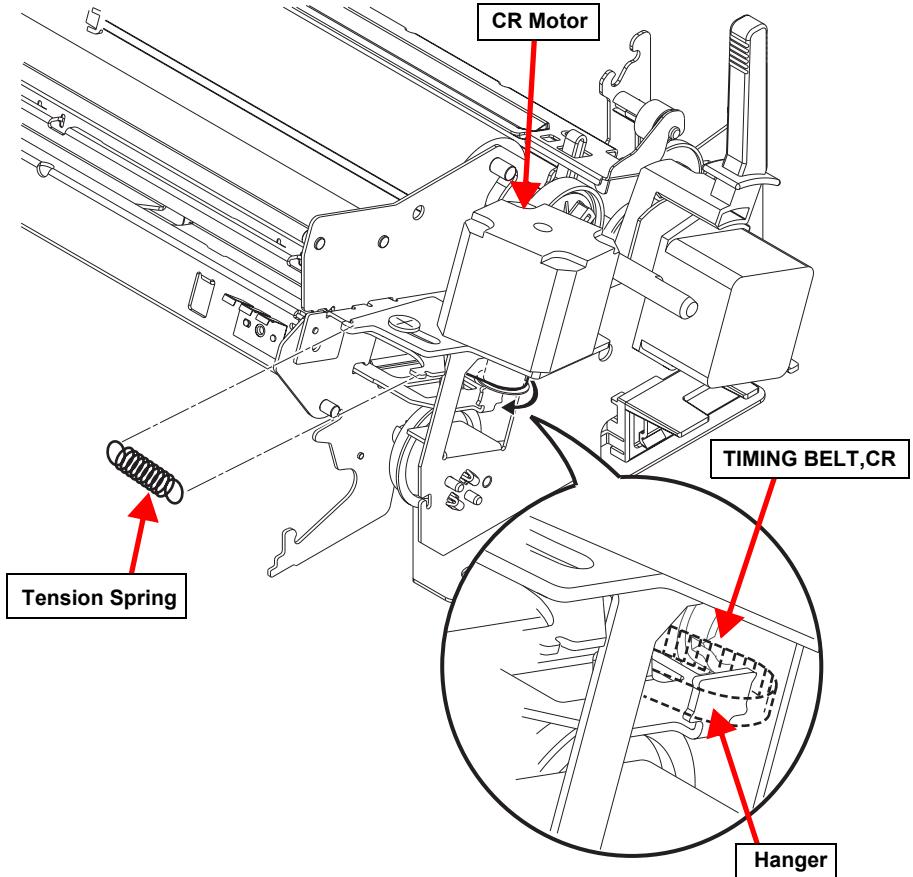


PrinterM01.eps

**Figure 4-16. Printer Mechanism Removal 1**

#### 4.3.5 CR Motor

1. Remove the Printer Mechanism. (p.80)
2. Release the tension spring. (See Figure 4-17)
3. Disengage the TIMING BELT,CR from the CR Motor pinion and hang it on the Hanger.



crmotor01.eps

Figure 4-17. CR Motor Removal 1

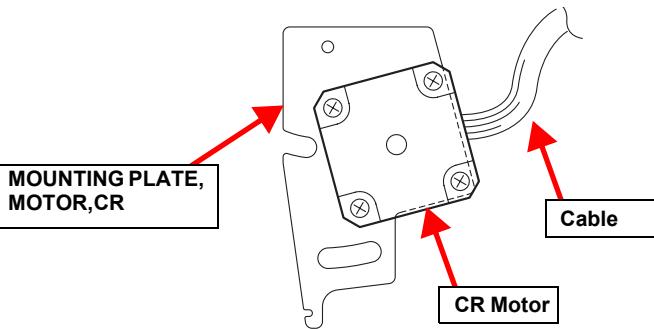
4. Remove the 2 SHAFT,MOUNT,CR (M3x12) screws securing the CR Motor assembly to the FRAME,SUB,RIGHT, and remove the CR Motor.  
(See Figure 4-18)
5. Remove the 2 CB (M3x6) screws securing the CR Motor to the MOUNTING PLATE,MOTOR,CR, and remove the CR Motor.



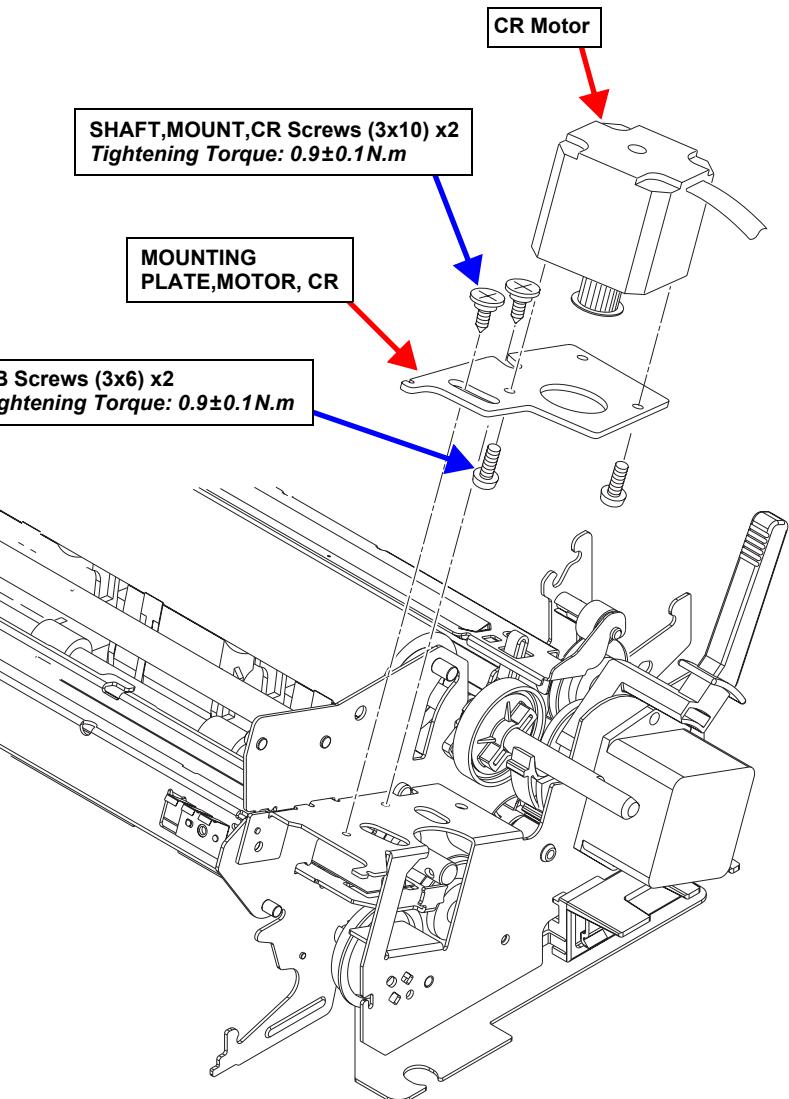
- After installing the CR Motor, make the following adjustment:
  - Bi-d Adjustment (p.101)
- After installing the TIMING BELT,CR, make the following adjustment:
  - Bi-d Adjustment (p.101)



- Position the CR Motor assembly on the MOUNTING PLATE,MOTOR,CR correctly as shown below;



- Lead the FFC and lead wires as shown below:



crmotor02.eps

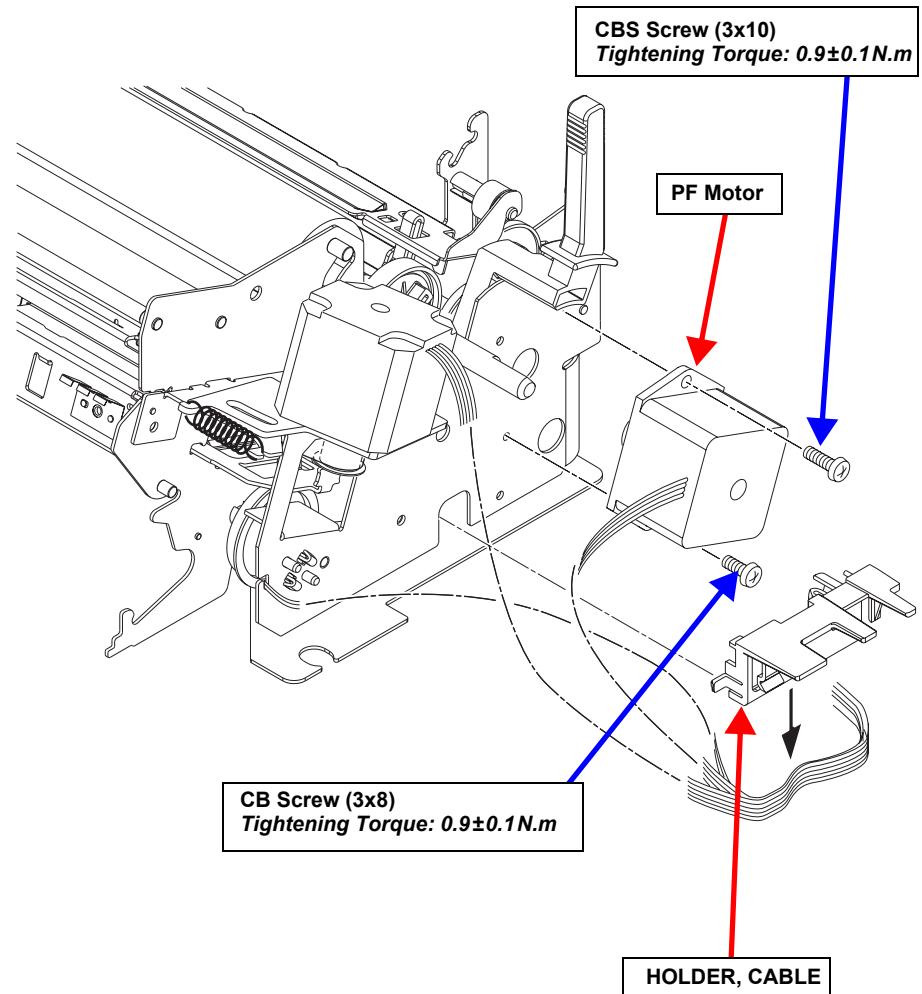
**Figure 4-18. CR Motor Removal 2**

#### 4.3.6 PF Motor

1. Remove the Printer Mechanism. (p.80)
2. Release the motor harness from the Printer Mechanism. (See Figure 4-19)
3. Locate the release lever (Lever, Release) in the forefront position (Tractor Position).
4. Remove the 2 (CBS (M3x10), CB (M3x8)) screws securing the PF Motor to the FRAME,SUB,RIGHT, and remove the PF Motor.



If the release lever is set to the Friction feeding position, PF Motor is not released.

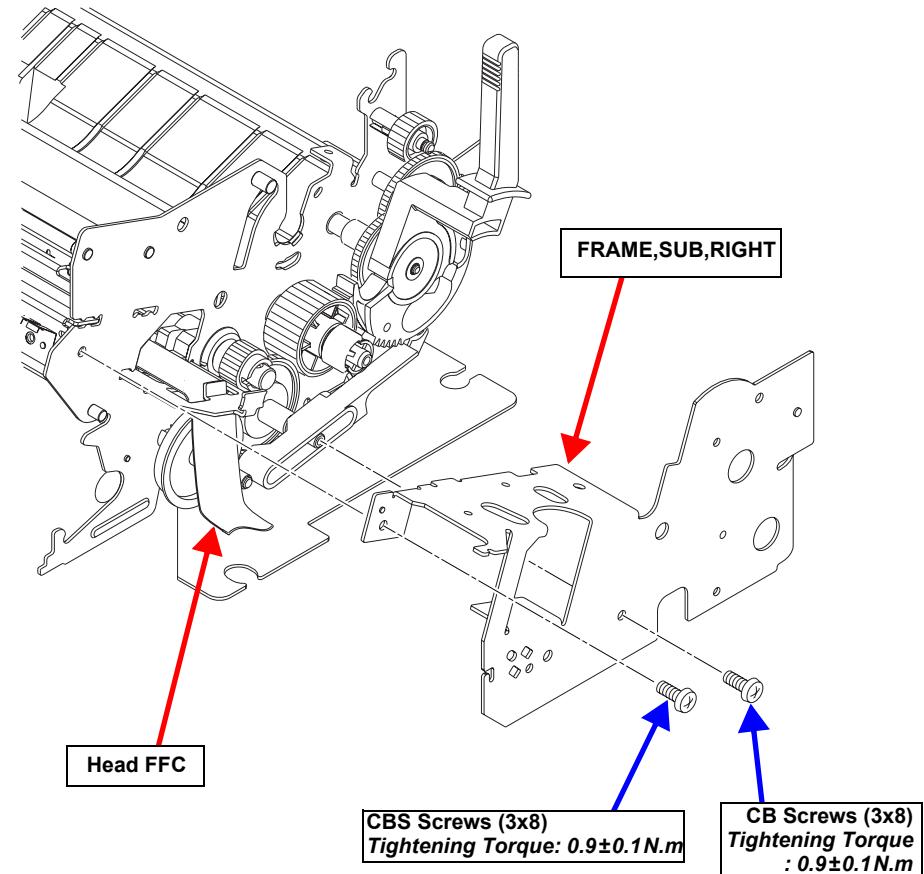


pfmotor01.eps

Figure 4-19. PF Motor removal

#### 4.3.7 PF Gear Train

1. Remove the Printer Mechanism. (p.80)
2. Remove the PF Motor. (p.83)
3. Locate the release lever (Lever, Release) in the forefront position (Tractor Position).
4. Remove the head FFC from the FRAME,SUB,RIGHT of the Printer Mechanism. (See Figure 4-20)
5. Remove the 2 (CBS (M3x8), CB (M3x8)) screws securing the FRAME,SUB,RIGHT, and remove the FRAME,SUB,RIGHT.



pfgeartain01.eps

Figure 4-20. PF Gear Train Disassembly 1



- Lubrication is necessary at two points.  
(For details, refer to “**Lubrication**” (p.100) in Chapter 6.)
  - Pay attention to the gear engagement position of the LEVER,RELEASE.
- For assembly, follow the following procedure:
1. Make certain that the SHAFT,RELEASE is in the Tractor position.
  2. Install the INTERMITTENT GEAR in a position as shown below.
  3. Install the LEVER,RELEASE and LEVER, RELEASE, TRANSMISSION in the Tractor position.  
After installing the FRAME,SUB,RIGHT, move the LEVER,RELEASE from the Tractor position (forefront) to the Friction position and vice versa to confirm proper gear engagement.

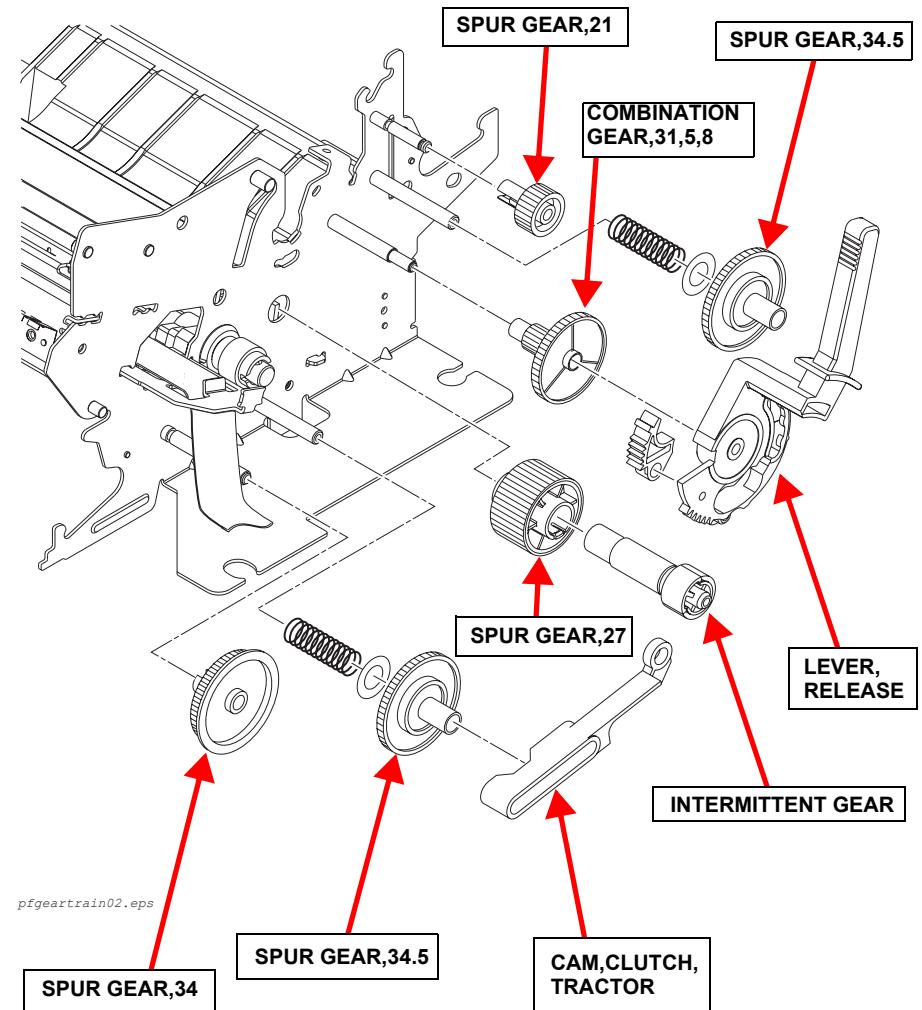
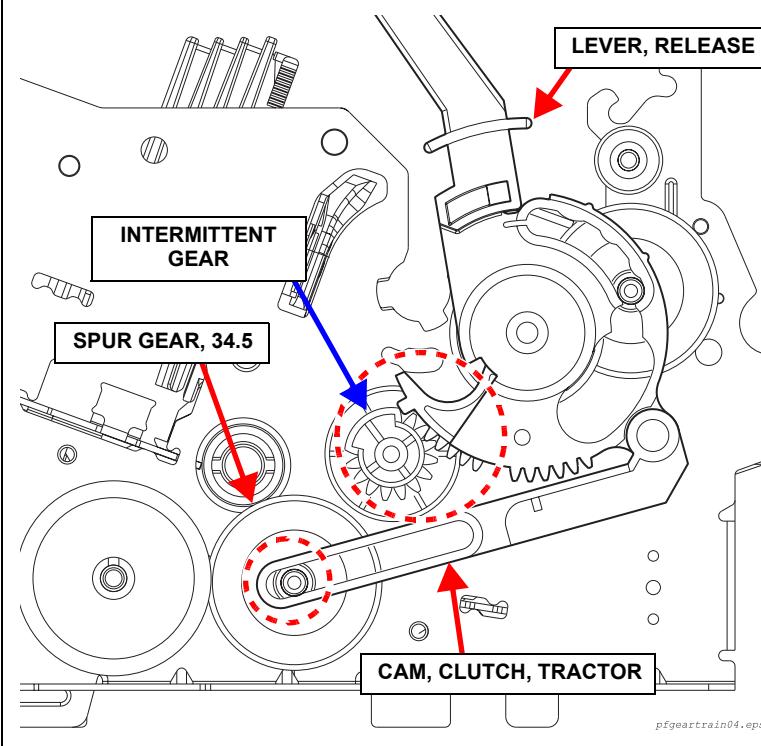


Figure 4-21. PF Gear Train Disassembly 2

#### 4.3.8 PG (Platen Gap) Detector

1. Remove the Printer Mechanism. (p.80)
2. Release the 2 clips attaching the PG detector to the LEFT FRAME in the Printer Mechanism, and remove the detector. (See Figure 4-22)
3. Disconnect the harness from the detector.

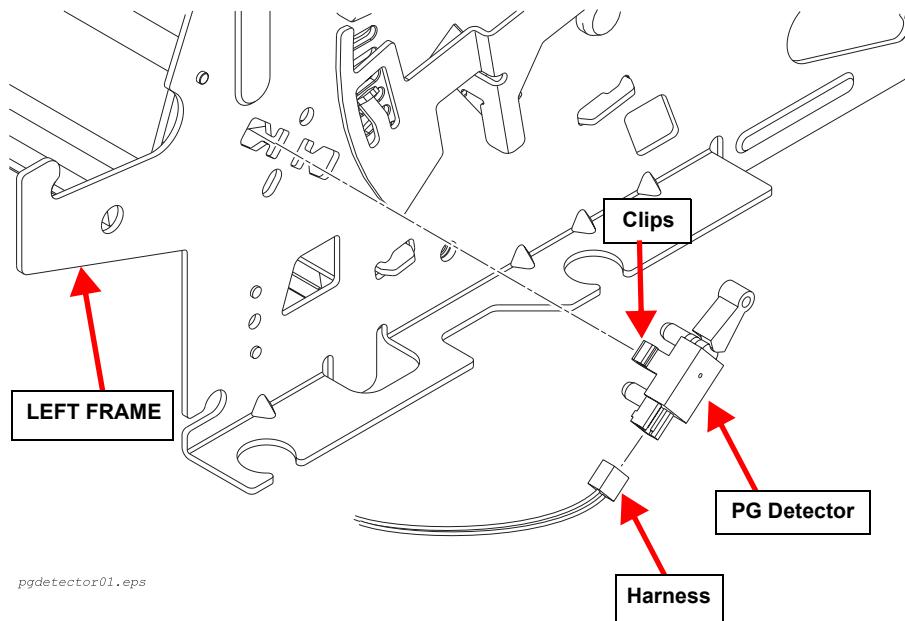


Figure 4-22. PG Detector Removal

#### 4.3.9 Release Detector

1. Remove the Printer Mechanism. (p.80)
2. Release the 2 clips attaching the Release detector to the FRAME,SUB,RIGHT in the Printer Mechanism, and remove the detector. (See Figure 4-23)
3. Disconnect the harness from the detector.

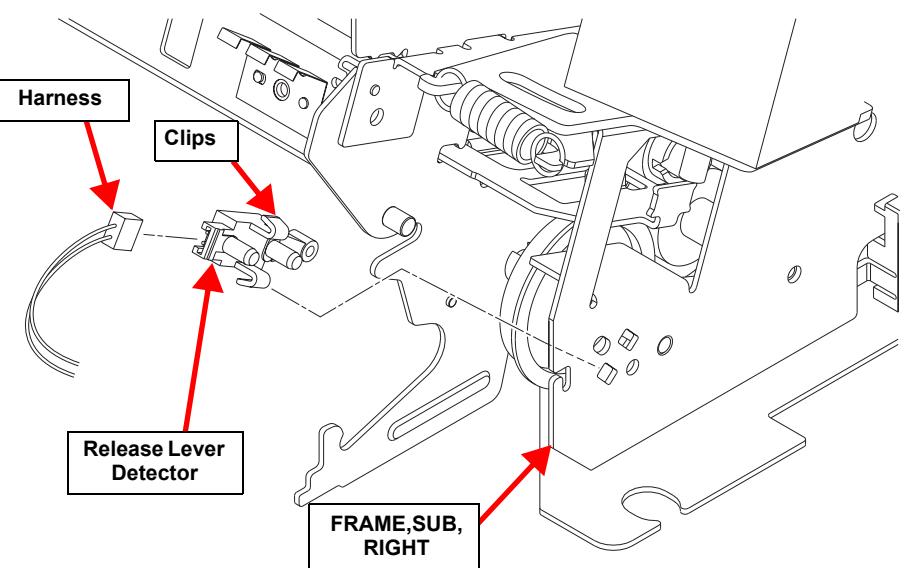


Figure 4-23. Release Detector Removal

#### 4.3.10 Front PE (Paper End) Detector

1. Remove the Printer Mechanism. (p.80)
2. Release the 2 clips attaching the front PE detector to the Rear Paper Guide Assembly, and remove the detector. (See Figure 4-24)
3. Disconnect the harness from the detector.

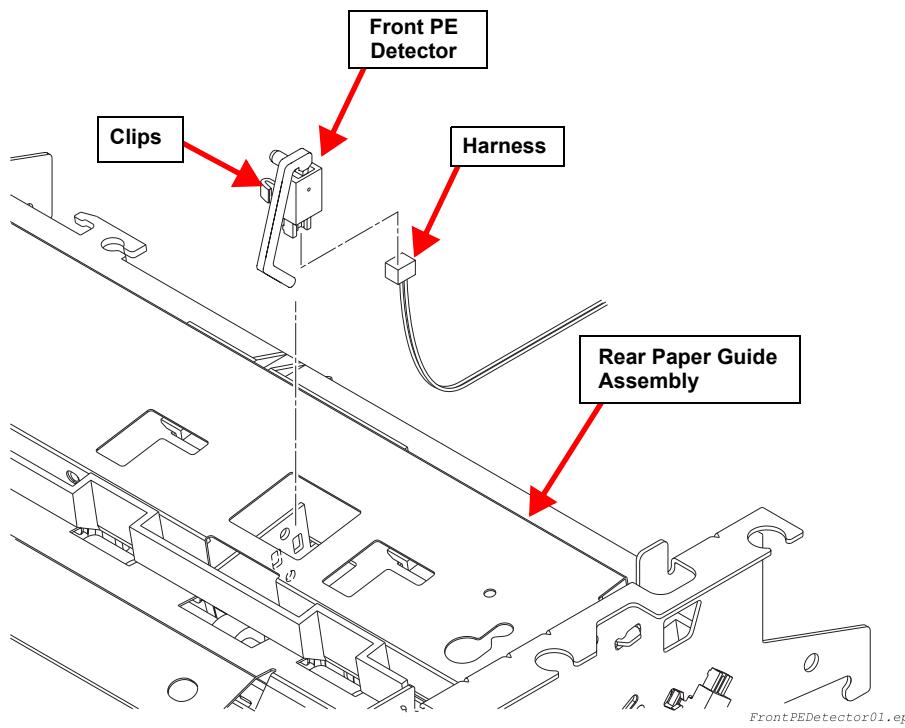


Figure 4-24. Front PE Detector Removal

#### 4.3.11 Rear PE Detector

1. Remove the Printer Mechanism. (p.80)
2. Hold the Printer Mechanism horizontally.
3. Release the 2 clips securing Rear PE detector to Rear Paper Guide Assembly.
4. Release the 2 notches on the Rear Paper Guide Assembly securing the detector, and slide the detector toward rear a little. Then remove the detector by pulling it downward. (See Figure 4-25)
5. Disconnect the harness from the detector.

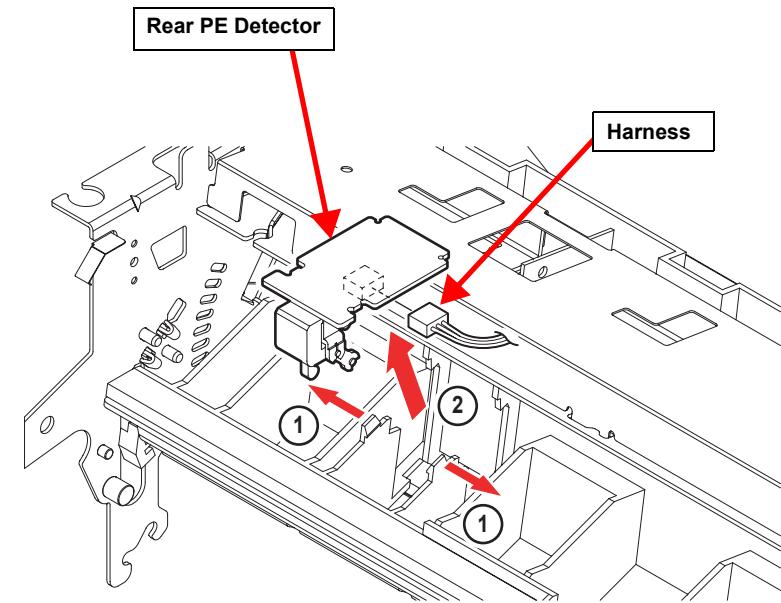


Figure 4-25. Rear PE Detector Removal

#### 4.3.12 Carriage Assembly

1. Remove the Printer Mechanism. (p.80)
2. Remove the Head FFC. (*See page 77*)
3. Remove the Platen. (p.79)
4. Remove the CR Motor. (p.81)
5. Remove the hexagon nut (M4) and the washer securing the LEVER,G,ADJUST to the SHAFT,CR,GUIDE, and remove the lever. (*See Figure 4-26*)
6. Remove the BUSHING,PARALLEL,ADJUST to turn the SHAFT,CR,GUIDE.

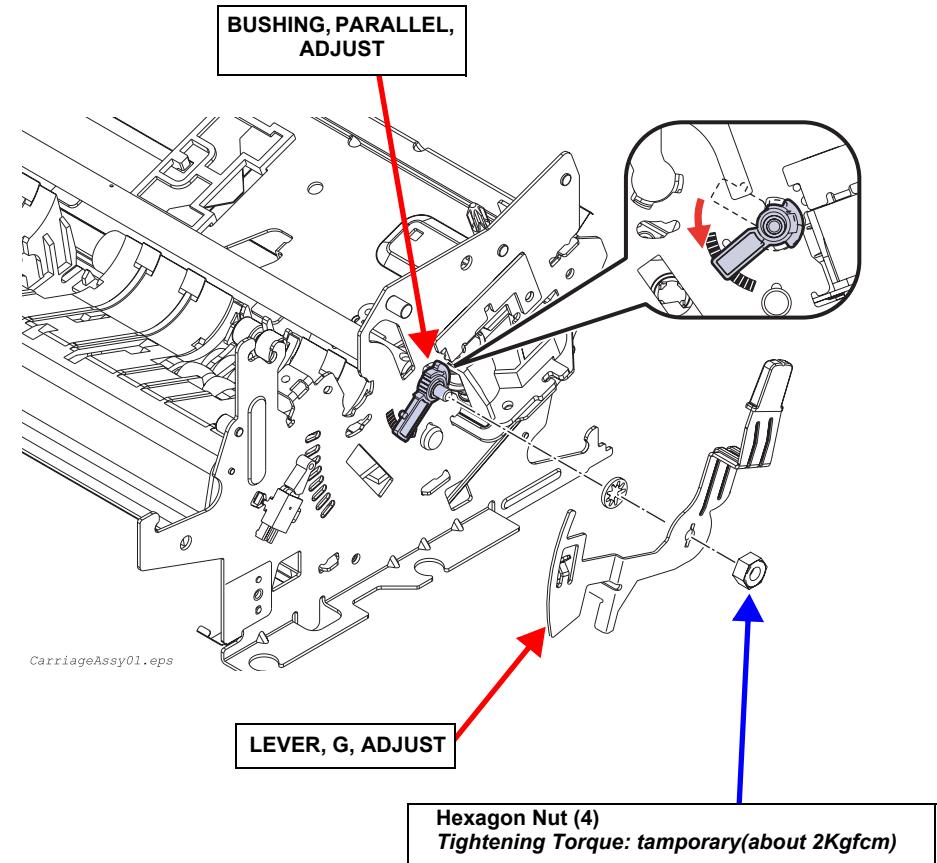


Figure 4-26. Carriage Assembly Removal 1

7. Move the Carriage Assembly to the right end, and remove it from the rack of the FRAME, FRONT with the SHAFT, CR, GUIDE. (See Figure 4-27)
8. Release the TIMING BELT from the 2 clips at the bottom of the Carriage Assembly.

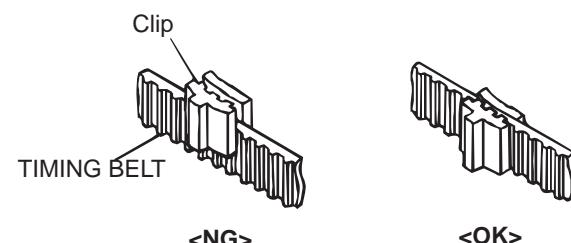


**After installing the Carriage Assembly, make the following adjustments:**

- Bi-d Adjustment (p.101)
- Platen Gap Adjustment (p.95)



- Lubrication is necessary at three points.  
(For details, refer to “Lubrication” (p.100) in Chapter 6.)
- When attaching the TIMING BELT to the Carriage Assembly, secure the TIMING BELT with the left and right clips in the Carriage Assembly, as shown below, and ensure there is no slack in the TIMING BELT.



- Make sure that the groove for the rail in the front of the Carriage Assembly is fitted on the rail of the FRAME, FRONT.

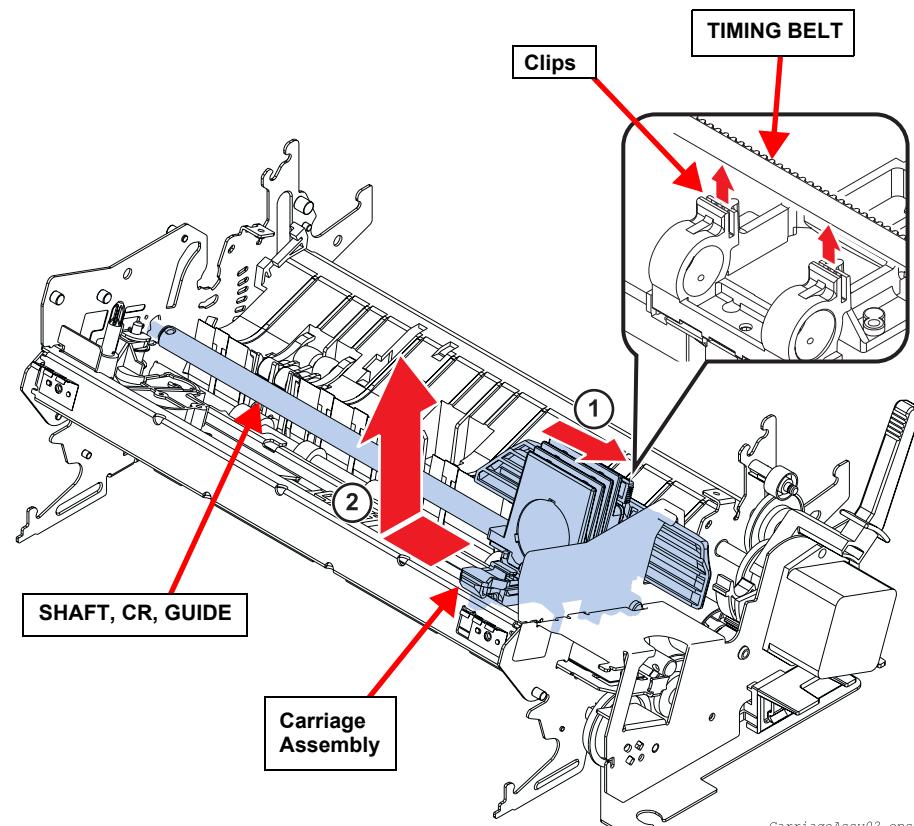
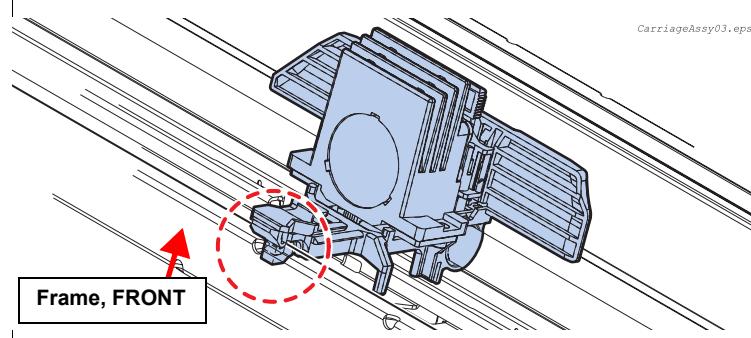
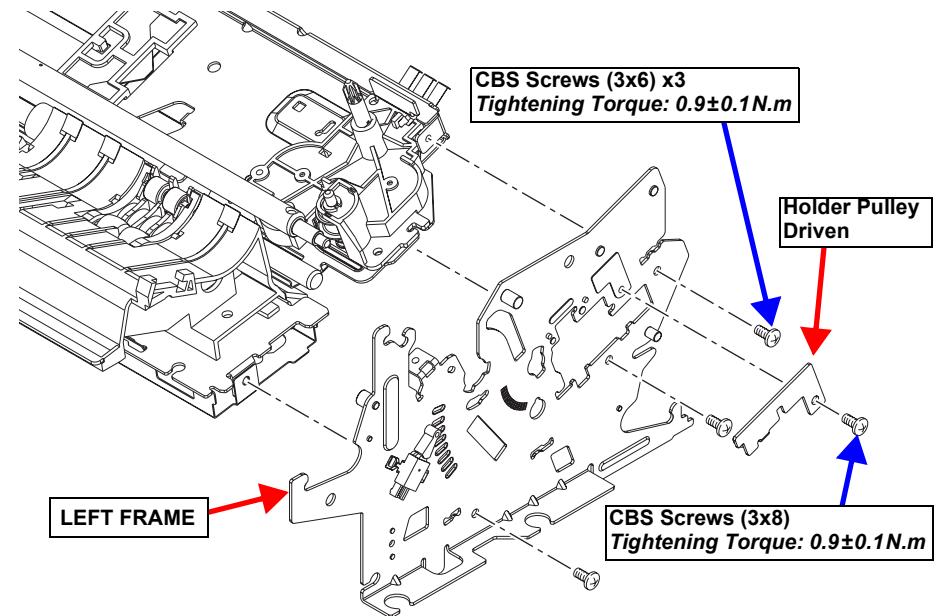


Figure 4-27. Carriage Assembly Removal 2

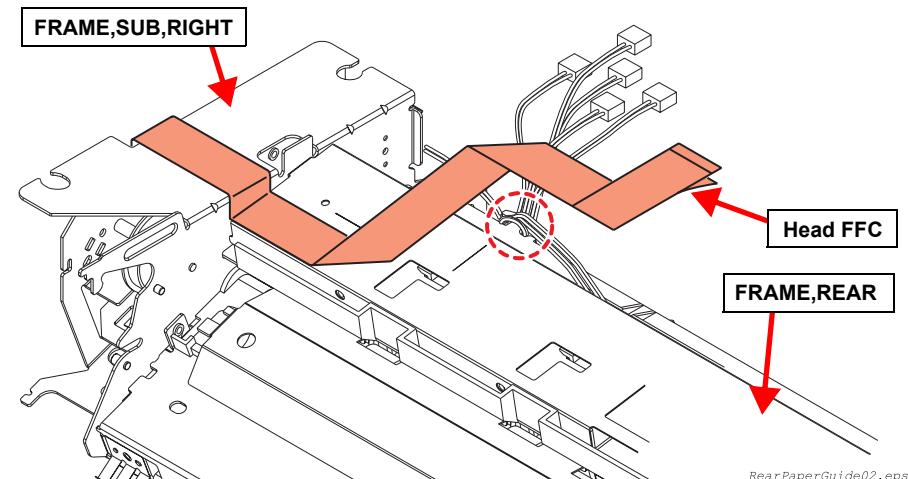
### 4.3.13 Rear Paper Guide Assembly

1. Remove the Printer Mechanism. (p.80)
2. Remove the Platen. (p.79)
3. Remove the hexagon nut and the washer securing the LEVER,G,ADJUST to the SHAFT,CR,GUIDE, and remove the lever. (See Figure 4-26)
4. Remove the BUSHING,PARALLEL,ADJUST to turn the SHAFT,CR,GUIDE. (See Figure 4-26)
5. Remove the harness for PG Detector. (See page 86)
6. Remove the harness for HP Detector. (See page 78)
7. Remove the CBS (M3x8) screw securing the Holder Pulley Driven to the LEFT FRAME, and remove the Holder Pulley Driven. (See Figure 4-28)
8. Remove 3 CBS (M3x8) screws securing the LEFT FRAME in the Printer Mechanism.
9. Remove the Head FFC from the FRAME,REAR in the Printer Mechanism. And release all the cables from the hooks on the FRAME,REAR. (See Figure 4-29)



RearPaperGuide01.eps

Figure 4-28. Rear Paper Guide Assembly Removal 1



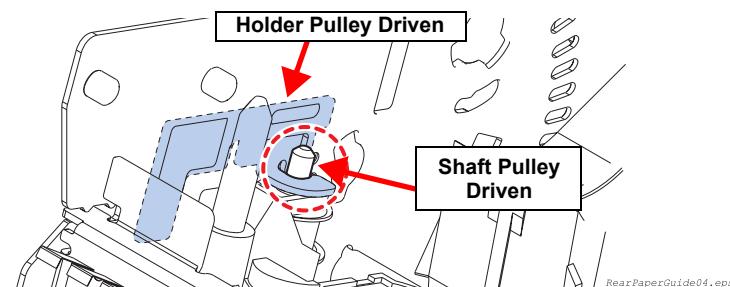
RearPaperGuide02.eps

Figure 4-29. Rear Paper Guide Assembley Removal 2

10. Release the cables from the HOLDER,CABLE on the RIGHT FRAME, and remove the HOLDER,CABLE from the RIGHT FRAME.
11. Remove the CBS (M3x8) screw securing the FRAME,REAR to the RIGHT FRAME, and remove the Rear Paper Guide Assembly. (See Figure 4-30)
12. Push and slide the clip on the left side of the Rear Paper Guide Assembly laterally, and separate the Rear Paper Guide Assembly and the FRAME, REAR from each other.



- Lubrication is necessary.  
(For details, refer to “Lubrication” (p.100) in Chapter 6.)
- When attaching the Holder Pulley Driven to the LEFT FRAME, put the hook of the Holder Pulley Driven on the shaft of driven pulley at the Ribbon Drive Assembly.



- Install the RIGHT FRAME and Rear Paper Guide Assembly so that the Release Shaft is positioned as shown below and the LEVER,RELEASE is in the Pull Tractor position (forefront position). After installation, make certain that the LEVER, RELEASE moves smoothly.

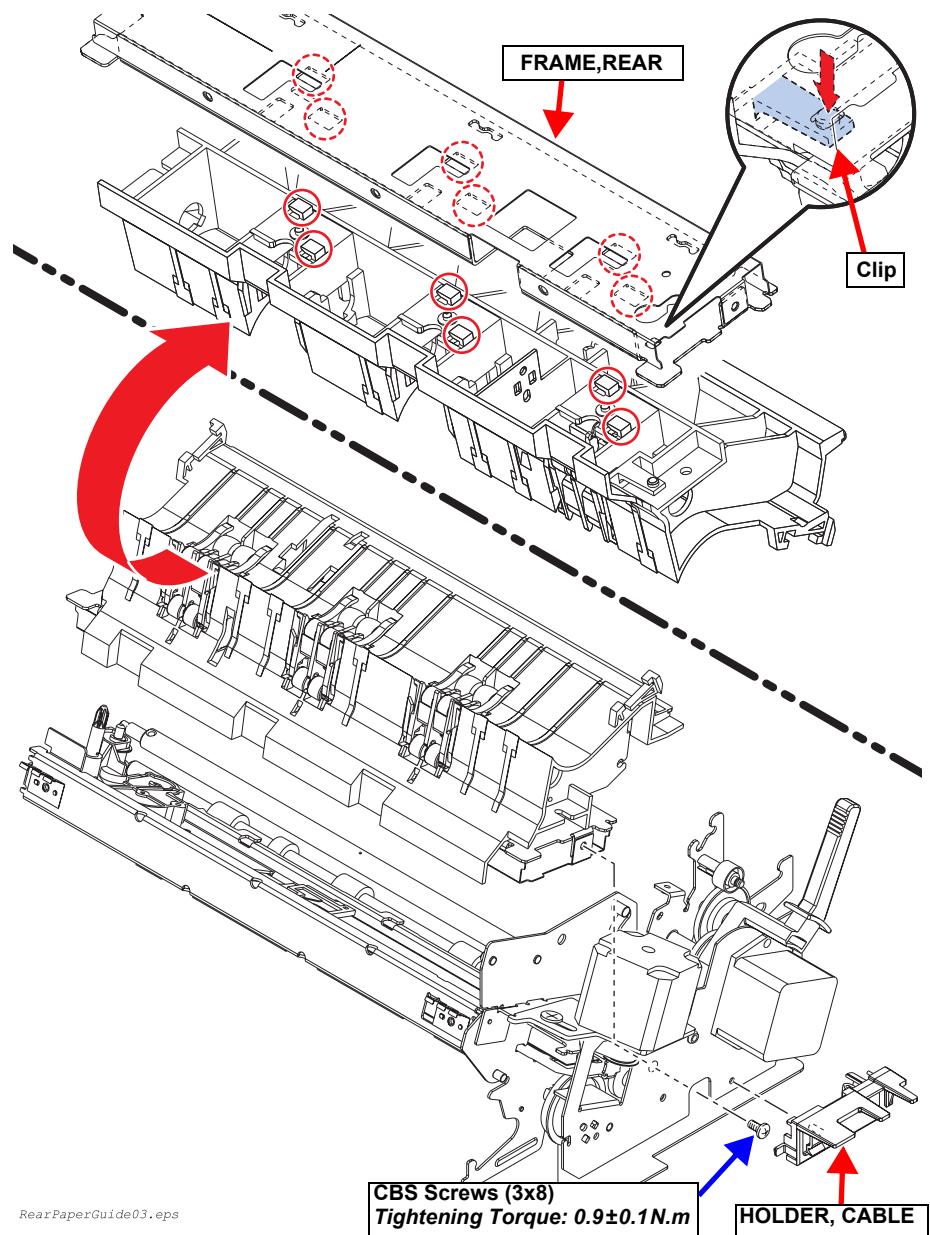
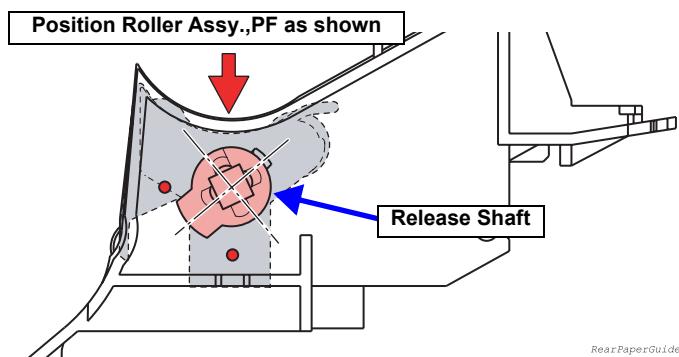


Figure 4-30. Rear Paper Guide Assembly Removal 3

#### 4.3.14 Ribbon Drive (RD) Assembly

1. Remove the Printer Mechanism. (p.80)
2. Remove the Platen. (p.79)
3. Remove the hexagon nut and the washer securing the LEVER,G,ADJUST to the SHAFT,CR,GUIDE, and remove the lever. (*See Figure 4-26*)
4. Remove the BUSHING,PARALLEL,ADJUST to turn the SHAFT,CR,GUIDE. (*See Figure 4-26*)
5. Remove the harness for PG Detector. (*See page 86*)
6. Remove the harness for HP Detector from the LEFT FRAME. (*See page 78*)
7. Remove the CBS (M3x8) screw securing the Holder Pulley Driven to the LEFT FRAME, and remove the Holder Pulley Driven. (*See Figure 4-28*)
8. Remove the 3 CBS (M3x8) screws securing the LEFT FRAME in the Printer Mechanism, and remove the LEFT FRAME. (*See Figure 4-28*)
9. Release the tension spring. (*See Figure 4-17*)
10. Remove the CBS C (P2) (M3x8) screw and the CBP (M3x8) screw securing the Ribbon Drive Assembly. (*See Figure 4-31*)
11. Release the Ribbon Drive Assembly engaging with the ROLLER ASSEMBLY,DRIVE, and remove the Ribbon Drive Assembly.



**After installing the Ribbon Drive Assembly, make the following adjustments:**

- Bi-d Adjustment (p.101)
- Platen Gap Adjustment (p.95)



**When installing the Ribbon Drive Assembly, perform lubrication according to “Lubrication” (p.100) in Chapter 6.**

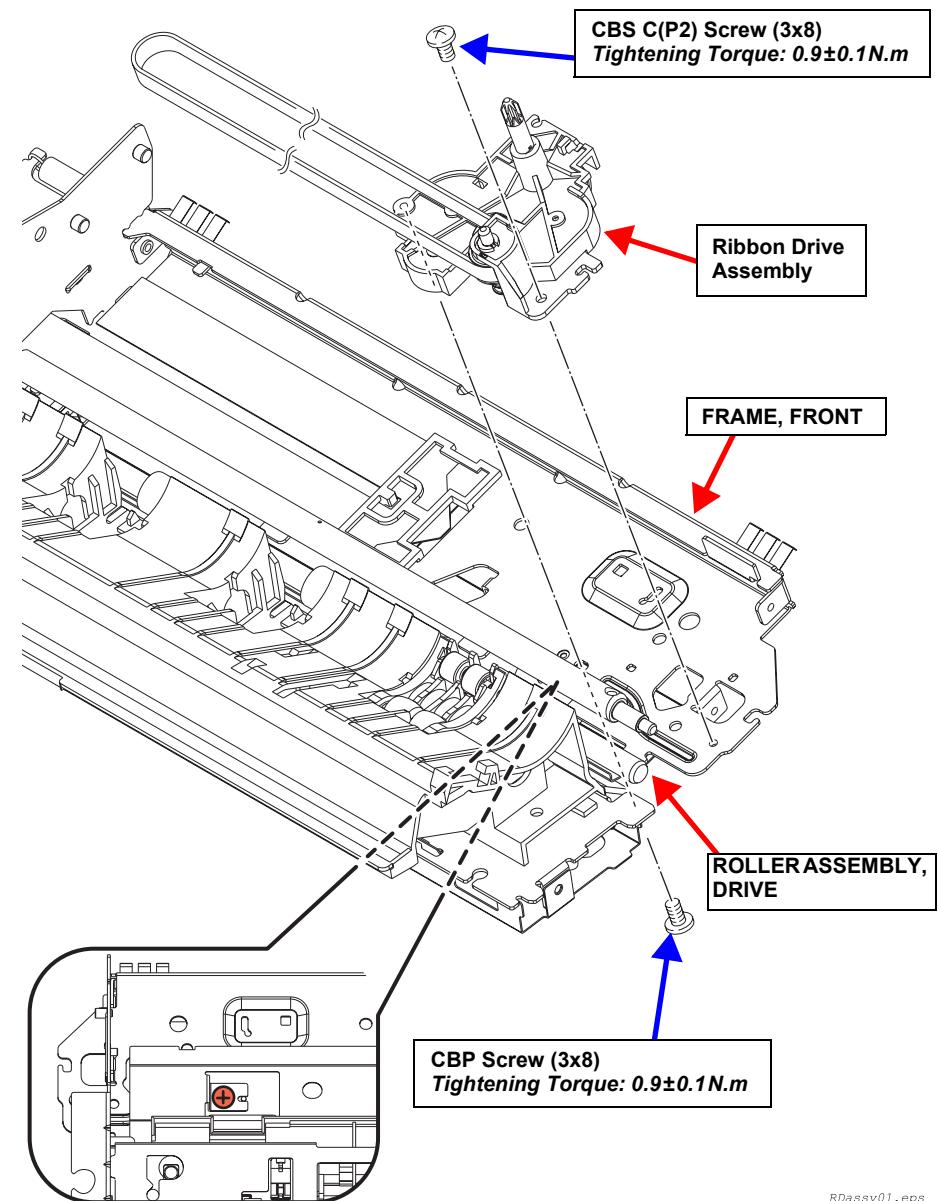


Figure 4-31. Ribbon Drive Assembly Removal 1

CHAPTER

# 5

ADJUSTMENT

## 5.1 Adjustment Overview

### 5.1.1 Required Adjustment

This section describes the adjustments required after specified parts are removed or replaced. Table 5-1 below shows the parts removed/replaced and corresponding adjustments required.

**Table 5-1. Required Adjustment**

Removal or Replacement Requiring Adjustment	Required Adjustment / Setting		
	Platen Gap	Bi-d Adjustment	F/W Reload
Printhead Removal or Replacement	O	O	---
Printer Mechanism Replacement	---	O	---
Printer Mechanism Removal	O	O	---
Main Board Replacement	---	O	O
Timing Belt Replacement	O	O	---
Platen Replacement	O	---	---
Carriage Assembly Replacement	O	O	---
CR Motor Replacement	---	O	---
EEPROM Clear	---	O	---

**NOTE 1:**“O” :Adjustment required.

**NOTE 2:**“---” :Adjustment not required.

### 5.1.2 Adjustment Tools

Table 5-2 below shows the tools required for each adjustment.

**Table 5-2. Adjustment Tools**

Adjustment	Required Tool
Platen Gap	Thickness gauge (0.37 mm, 0.40 mm)
Bi-d Adjustment	<ul style="list-style-type: none"> <li>■ <b>Adjustment program (for FX-890/2190)</b></li> <li>■ <b>Control panel operation (built-in function)</b></li> </ul>

## 5.2 Adjusting and Resetting the Printer

### 5.2.1 Platen Gap Adjustment

When the SHAFT,CR,GUIDE or BUSHING,PARALLEL,ADJUST is rotated or reinstalled, or printing is too faint or stained, the Platen Gap adjustment must be performed by the following procedure:

1. Remove the Upper Housing. (p.72)
2. Remove the Printhead. (p.77)
3. Using tweezers, remove the Ribbon Mask from the ribbon mask holder of the Carriage Assembly.



**Take care not to deform or damage the Ribbon Mask during its removal or installation.**

4. Attach the Printhead onto the Carriage Assembly.
5. Set the PG Adjustment Lever (Lever,Gap,Adjust) in the position "0". (Position the lever in the bottom one of the lever positioning holes in the Frame Assy.,Left.)
6. Rotate the SHAFT,CR,GUIDE so that the large countersink at the left end of the shaft comes upward.
7. Loosen slightly the hexagon nut securing the PG Adjust Lever to the SHAFT,CR,GUIDE.
8. Tilt the printer forward until the Printhead becomes vertical to the reference surface (e.g. the top surface of a table or desk). Put a support (e.g. a stand) underneath the printer to hold the printer at the position.
9. Insert a screwdriver into the countersink located at the left end of the SHAFT,CR,GUIDE.
10. Move the Carriage Assembly to the right end.

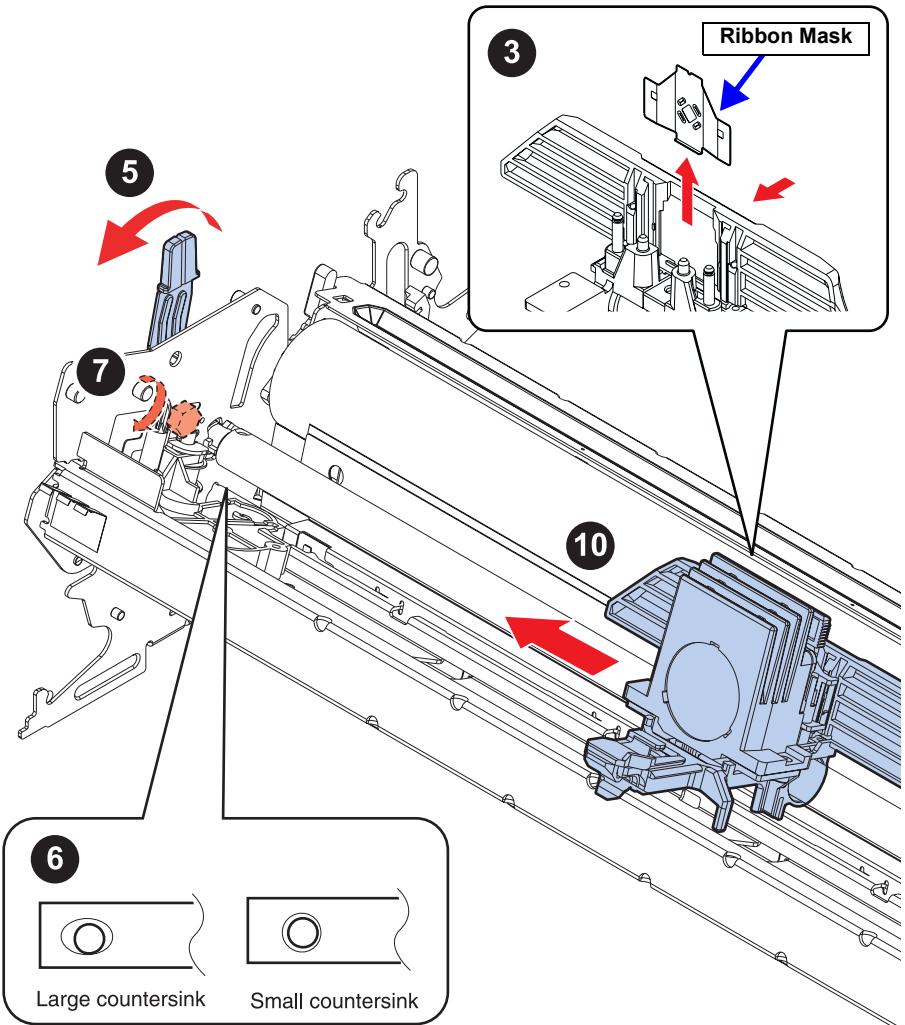


Figure 5-1. Platen Gap Adjustment 1

11. Put an adjustment gauge between the Printhead and the PLATEN vertically, and judge and adjust the platen gap by referring to Table 5-3 below.  
For adjustment, turn the SHAFT,CR,GUIDE toward the PLATEN (widen) or toward the front (lessen). (See Figure 5-2, Figure 5-3)

**Table 5-3. Criteria for Platen Gap**

Adjustment Gauge	Criterion
0.37 mm	Falls by its own weight
0.40 mm	Does not fall by its own weight

12. After completion of the adjustment with the carriage located at the right end, make the judgment with the carriage at the left end and then at the center.  
13. When the adjustment is completed, put the printer down and tighten the hexagon nut and the washer securing the adjust lever.  
14. Attach the ribbon mask onto the ribbon mask holder.

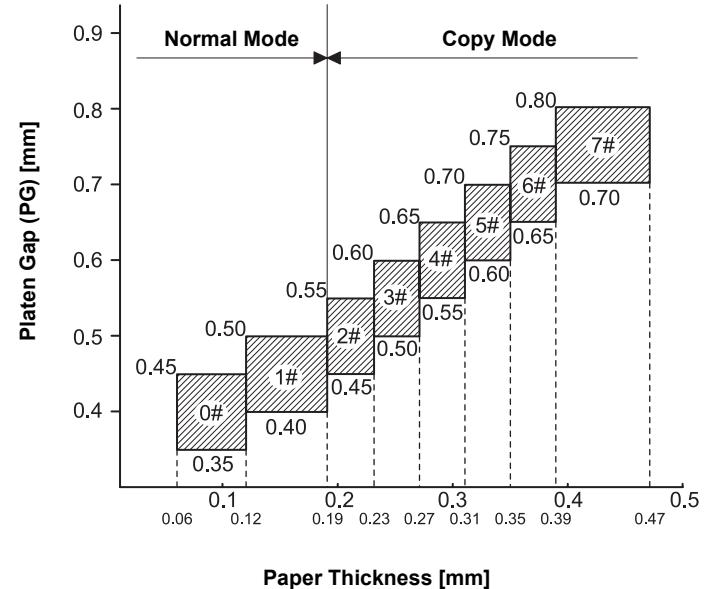


**After the adjustment, perform printing and make certain that there is no problem with print quality.**

- **Single sheet:**  
The printed side of paper must be free from soiling caused by rubbing with the ribbon.
- **Multi-part form:**  
The copy paper must be free from blurs or traces of rubbing.
- **Continuous paper (perforated uncut paper):**  
There must be no catch at perforations in uncut paper.



- Do not rotate the PLATEN during the adjustment.
- Be sure to set the Adjust Lever to the position “0” when adjusting the platen gap.

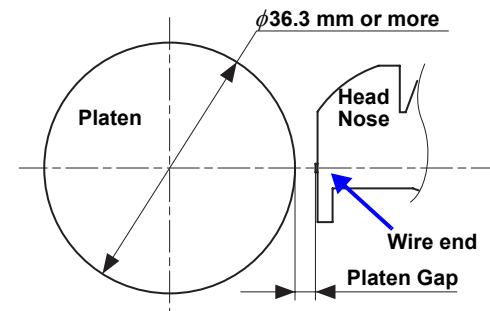


**Figure 5-2. Platen Gap Adjustment 2**

PG01.eps

Note 1: The numbers followed with # represent the Adjust Step Numbers.

- 2: The paper thickness at the boundary of two adjacent Platen Gaps is included in the paper thickness range for the lower Platen Gap.
- 3: “Platen Gap” means the clearance, as shown in Figure.7, between the platen and the wire end without the ribbon or paper in between. The Platen Gap must always meet the appropriate range as shown in Figure 6 under any conditions.



**Figure 5-3. Platen Gap Adjustment 3**

PG02.eps

## 5.3 Adjustment Program

There are various adjustment/settings that required after performing repair on the unit, and in order to facilitate performing all necessary adjustments and settings for each individual repair content, an exclusive adjustment program is available. This section describes the basics on how to use the adjustment program.

### 5.3.1 Preparation

#### 5.3.1.1 System Requirement

- PC  
Windows-base PC equipped with a parallel and a USB interface.
- OS  
Windows 98/SE, Me, 2000, XP

#### 5.3.1.2 Installation

1. Decompress the supplied archive file.
2. Place all extracted files in the same folder.

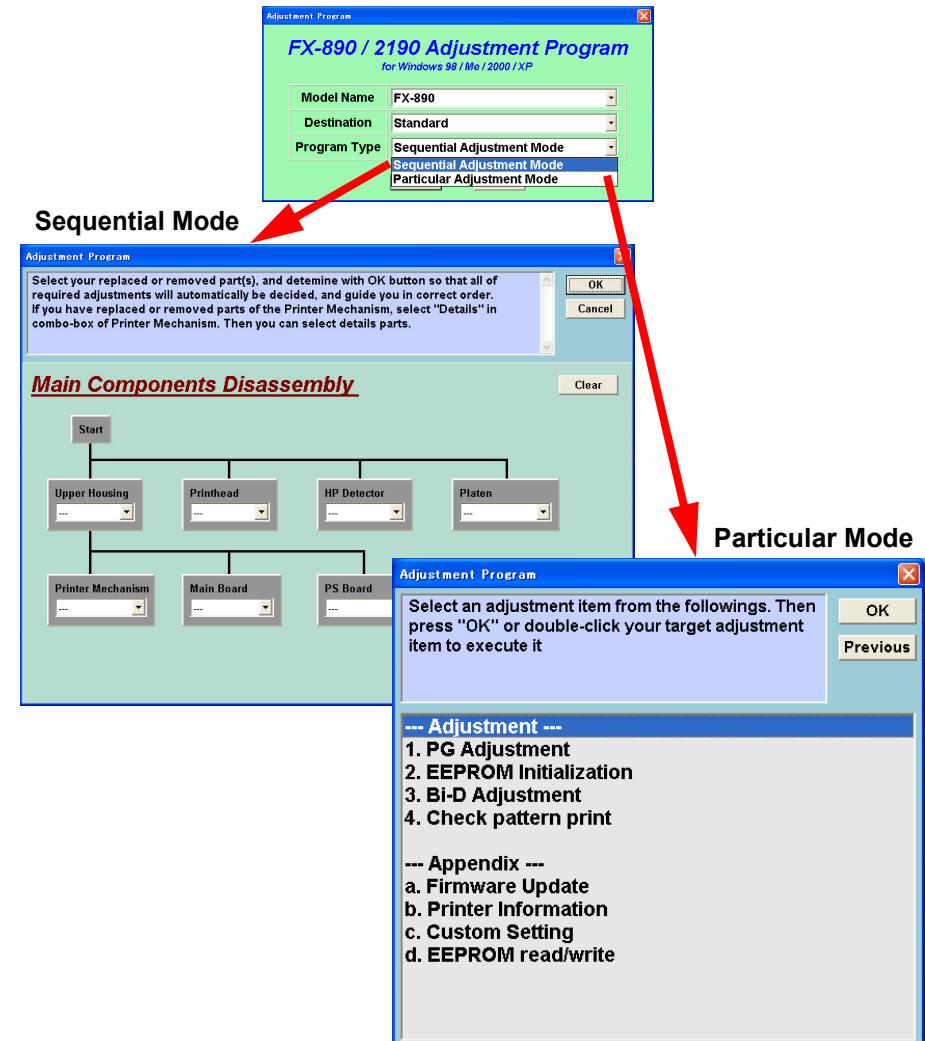
#### 5.3.1.3 Running the Program

To run the program, double-click on the program icon [APFX8902190\_Ver10E]. When the program is properly executed, a main window shown in XXX appears. Select appropriate item wthi each menu.

- Model Name (FX-890 / FX-2190)
  - Destination (Select the product configuration that matches to your market)
  - Program Type  
This adjustment program has two adjustment modes and each mode is designed to be selectively performed depending on your needs. Follow the instructions shown on the screen to perform the adjustment.
- Particular Adjustment Mode  
This mode is useful if a specific adjustment or setting is need to be made.

#### ■ Sequential Adjustment Mode

This mode is specifically designed to assist repair engineer to preform all necessary adjustment/setting item in proper order. A wizard like menu help you to select necessary adjustment in accordance with the type of repair you have made.



CHAPTER  
**6**

**MAINTENANCE**

## 6.1 Overview

### 6.1.1 Preventive Maintenance

Preventive maintenance is important to keep the printer in the best condition and to prevent potential troubles from occurring. If necessary, use denatured alcohol to clean the exterior cases. Use a vacuum cleaner to remove dust and paper debris accumulated in the printer.



WARNING

- Before disassembling, assembling or adjusting the printer, disconnect the power supply cable from the AC power socket. Failure to do so might cause personal injury.
- Be careful with the Printhead when you handle it as it may be very hot right after printing.
- Do not touch the heat sink attached to the switching FET (Q1) on the power supply board right after power off, as it may be very hot.



CAUTION

- Do not use thinner, trichloroethylene, or ketone-based solvents on the plastic components of the printer.
- Never use the oil and grease other than those specified in this manual; use of different type of lubricant can damage the printer or its components.

## 6.2 Lubrication

Influence that oil and grease give is considerably large especially in low temperature. Therefore, EPSON has tested and analyzed various types of oil and grease extensively, and found the oil and grease listed below most applicable to the printer.

**Table 6-1. Lubrication**

Type	Name	Quantity	Available	Part No.
Oil	O-14	40 g	EPSON	1049820
Grease	G-26	40 g	EPSON	1080614



**Lubricant must be applied during the reassembling process.**

**Table 6-2. Lubrication Points**

Assy to be Lubricated <i>(Reference Page)</i>	Lubrication Point	Lubricant (Amount of Application)	Fig. No.
<a href="#">PF Gear Train (p.84)</a>	SPUR GEAR, 34.5 (shaft hole)	G-26 (one grain of rice)	<a href="#">Figure 6-1</a>
	SPUR GEAR, 34.5 (shaft hole)		
	Shaft A Shaft B Shaft C	G-26 (a half grain of rice)	<a href="#">Figure 6-2</a>
	Ratchet, RD	G-26 (a half grain of rice)	
	SPUR GEAR, 21	G-26 (one grain of rice)	<a href="#">Figure 6-3</a>
	Plain Washer, 3.1x0.2x6, S/NA		
	E-Ring, 3x0.45x7, S/NA	G-26 (a half grain of rice)	
	Plain Washer, 4.1x0.2x7.8, S/NA		
	Combination Gear, 8.19 (upper gear teeth)		
	Combination Gear, 8.19 (lower gear teeth)	G-26 (a half grain of rice)	<a href="#">Figure 6-4</a>
<a href="#">Ribbon Drive (RD) Assembly (p.92)</a>	Spur Gear, 25.5 (gear teeth)		
	Combination Gear, 7.5,15 (lower gear teeth)		
<a href="#">Roller Assy, PF, Drive</a>	Holder, PF, Shaft (Holder, PF, Shaft~Plain Washer)	G-26 (a half grain of rice)	<a href="#">Figure 6-5</a>
	Holder, PF, Shaft (Holder, PF, Shaft ~ Direction of Leaf Spring)		
<a href="#">Rear Paper Guide Assembly (p.90)</a>	Shaft Release (Sliding points) ■ FX-890: 6 points ■ FX-2190: 8 points	G-26 (a half grain of rice)	<a href="#">Figure 6-6</a>
<a href="#">Carriage Assembly (p.88)</a>	Oil pad	O-14 (0.2 ± 0.03 cc)	<a href="#">Figure 6-7</a>
<a href="#">LEFT FRAME (p.88)</a>	PG Adjusting holes (7 holes)	G-26	
	Roller, PF, Drive (Upper side of the hole)	(a half grain of rice)	<a href="#">Figure 6-8</a>

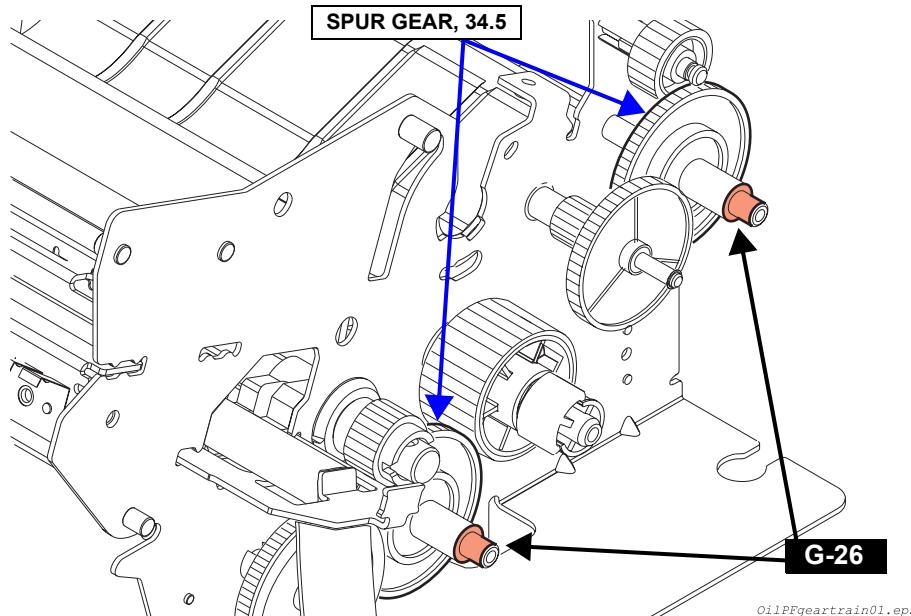


Figure 6-1. Lubrication Point (PF Gear Train)

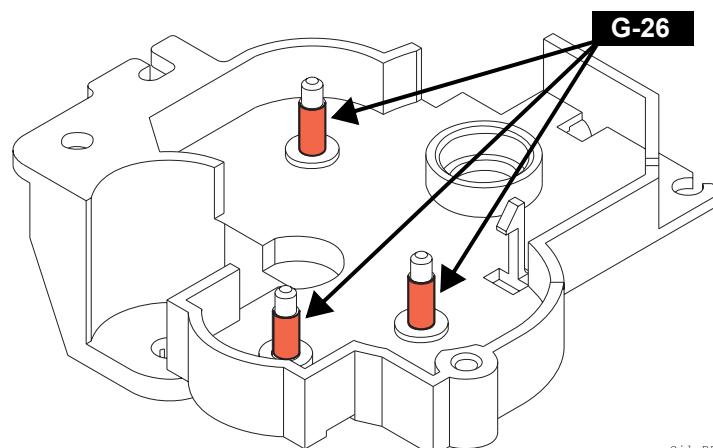


Figure 6-2. Lubricating Point (RD Assy 1)

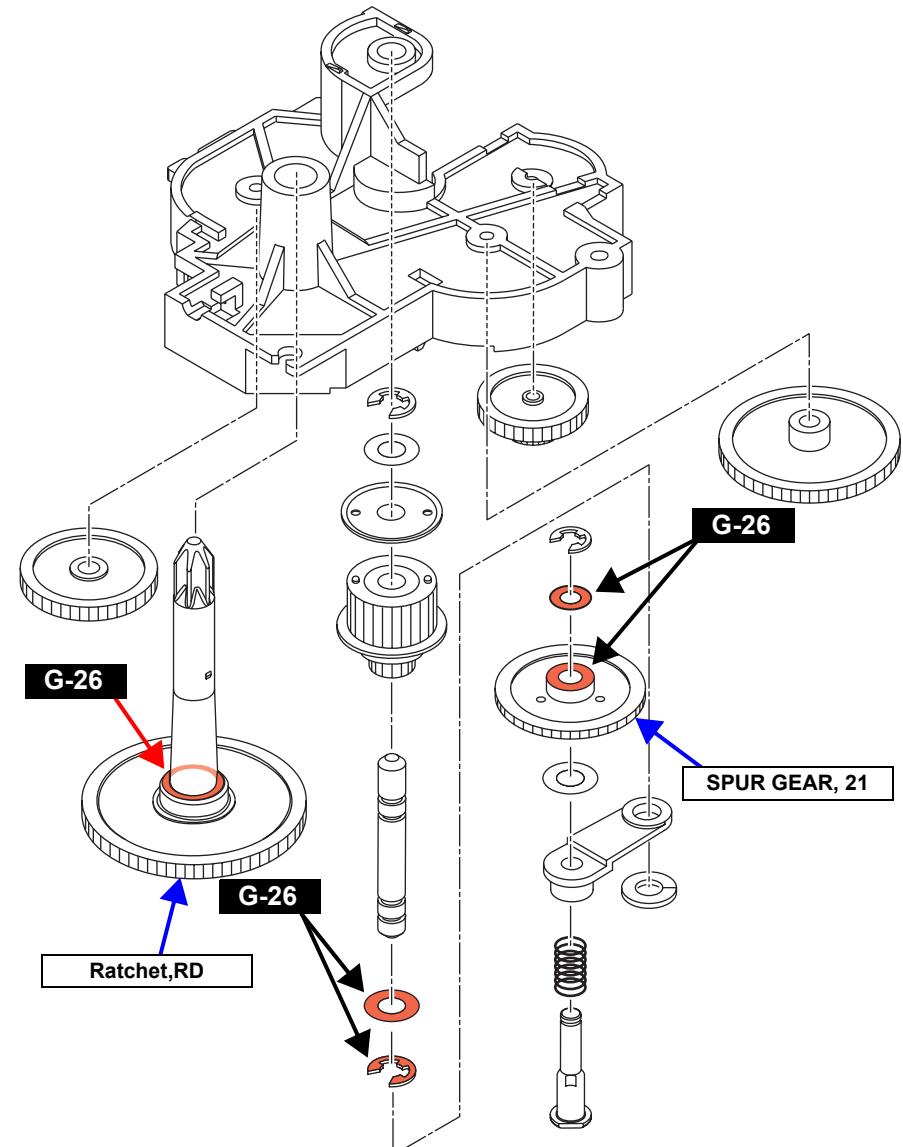


Figure 6-3. Lubricating Point (RD Assy 2)

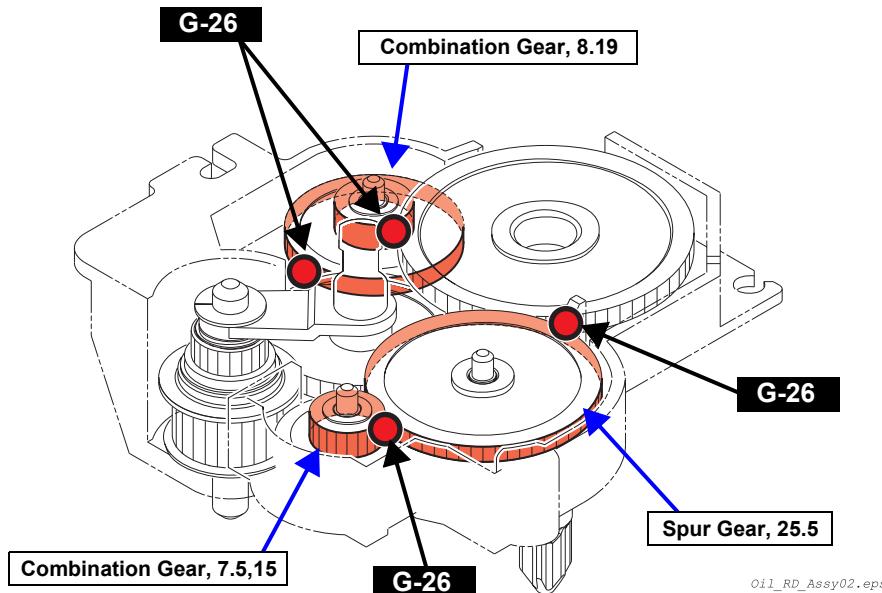


Figure 6-4. Lubricating Points (RD Assy 3)

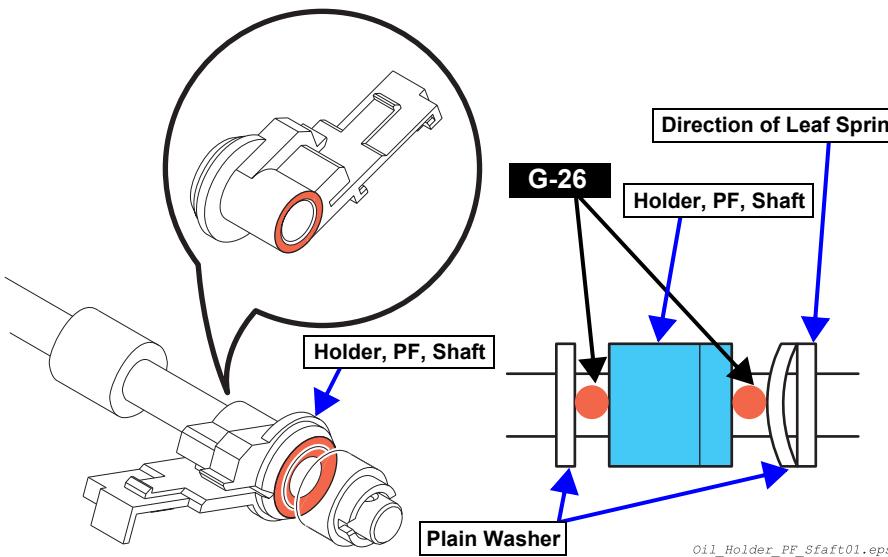


Figure 6-5. Lubricating Points (Roller Assy, PF, Drive)

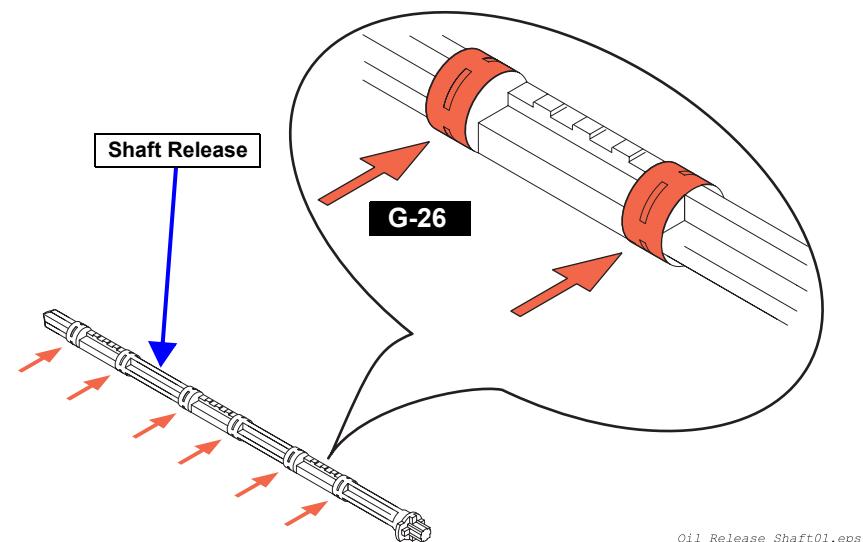


Figure 6-6. Lubricating Points (Shaft Release)

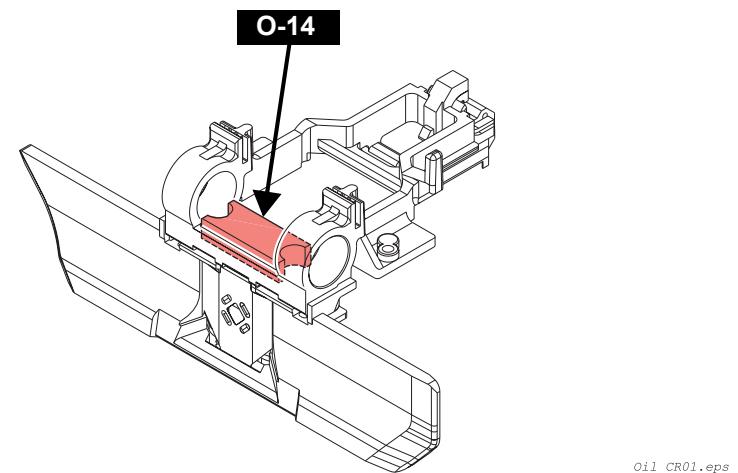
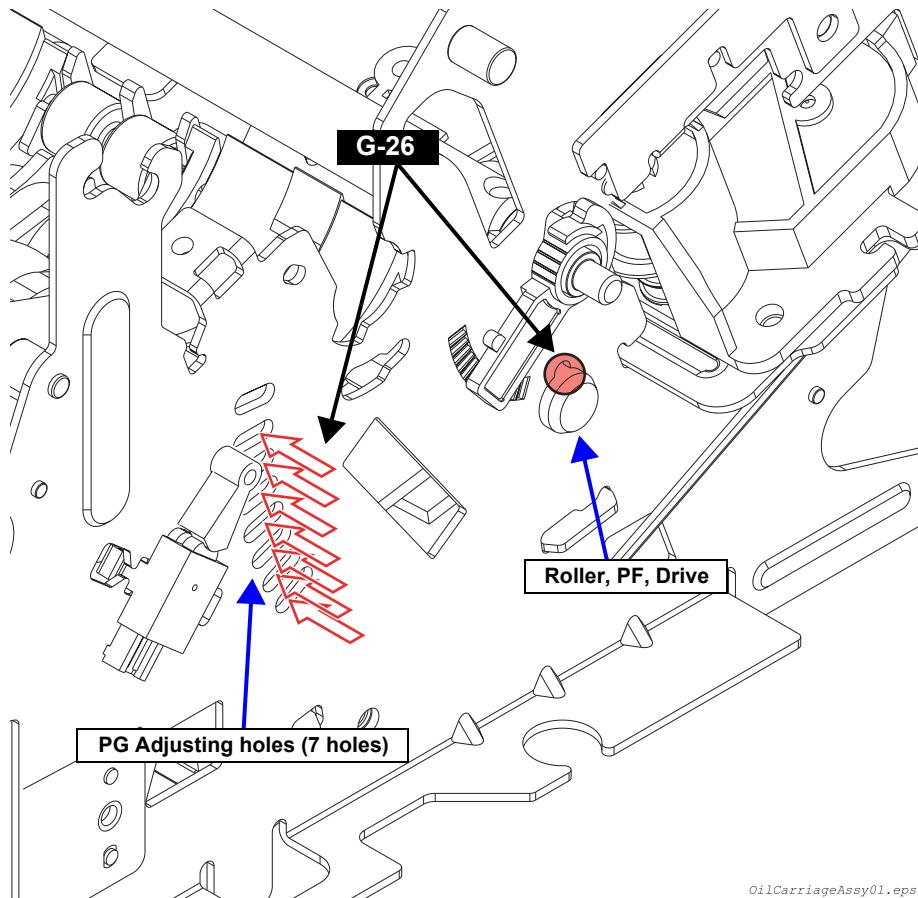


Figure 6-7. Lubricating Points (Carriage Assembly)



OilCarriageAssy01.eps

Figure 6-8. Lubricating Points (LEFT FRAME)

CHAPTER  
**7**

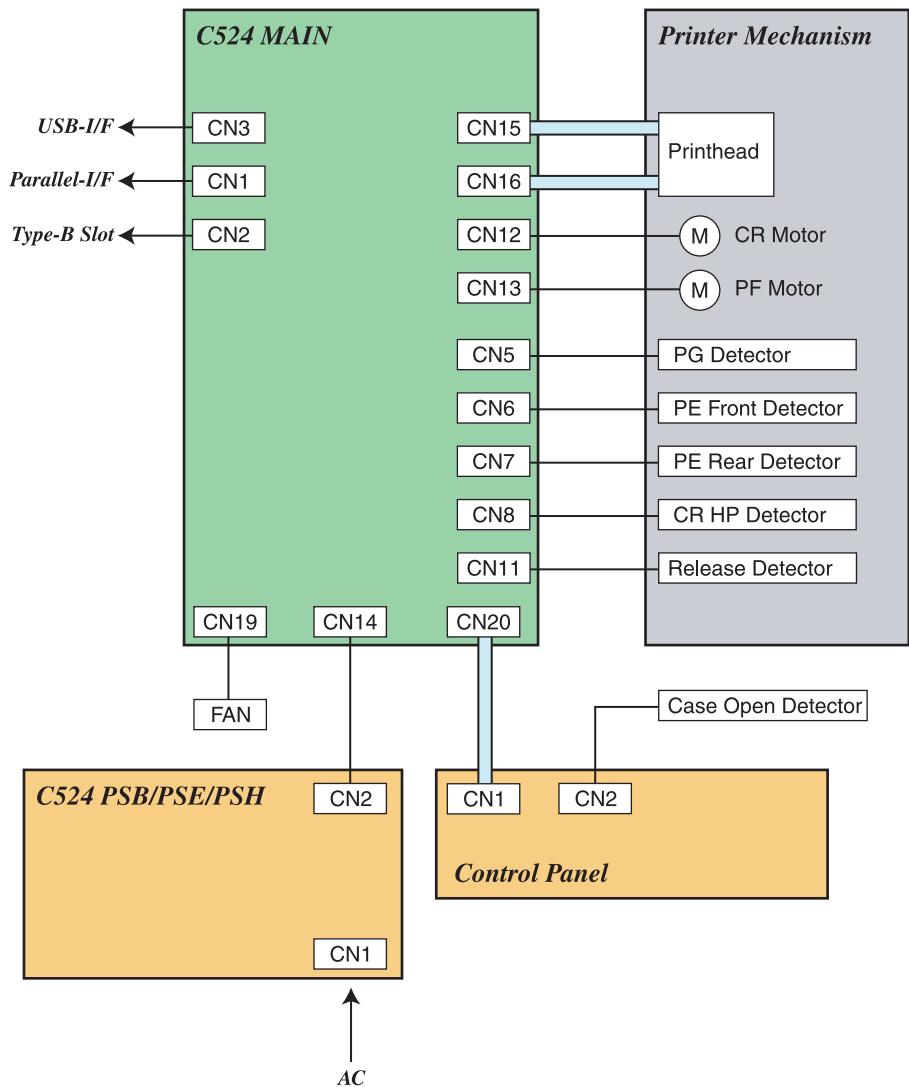
**APPENDIX**

## 7.1 Connector Summary

The primary components of the printer are connected as shown below;

**Table 7-1. Connector Summary**

Board	Connector No.	Pin	Description
C524MAIN Board	CN1	36	Parallel I/F
	CN2	36	Type-B I/F (Option)
	CN3	4	USB I/F
	CN5	2	PG Detector
	CN6	2	Front PE Detector
	CN7	3	Rear PE Detector
	CN8	2	HP Detector
	CN11	2	Release Detector
	CN12	5	CR Motor
	CN13	4	PF Motor
	CN14	10	DC input, Power On/Off
	CN15	16	Printhead (upper connector)
	CN16	17	Printhead, Thermistor (lower connector)
	CN19	2	FAN
	CN20	20	Control Panel
C524 PSB/PSE/PSH Board	CN1	2	AC line input
	CN2	10	DC output
Control Panel	CN1	20	C524 MAIN
	CN2	2	Case Open Detector



CN-C524MAIN.eps

**Figure 7-1. Cable Connections**

- Parallel I/F (CN1)  
Refer to “Parallel interface (Forward channel)” (page 23).
- Type-B I/F (CN2)  
Refer to “Type-B Interface communication specification” (page 27).
- USB I/F (CN3)  
Refer to “USB Interface” (page 26).
- PG Detector (CN5)

**Table 7-2. Connector Pin Assignment - CN5**

Pin No.	I/O	Signal Name	Function
1	I	PG1	PG Detector signal
2	-	GND	Ground

- Front PE Detector (CN6)

**Table 7-3. Connector Pin Assignment - CN6**

Pin No.	I/O	Signal Name	Function
1	I	PE	Front PE Detector signal
2	-	GND	Ground

- Rear PE Detector(CN7)

**Table 7-4. Connector Pin Assignment - CN7**

Pin No.	I/O	Signal Name	Function
1	-	+5V	+5V
2	I	PE	Rear PE Detector signal
3	-	GND	Ground

- HP Detector(CN8)

**Table 7-5. Connector Pin Assignment - CN8**

Pin No.	I/O	Signal Name	Function
1	I	HP	HP Detector signal
2	-	GND	Ground

- Release Detector(CN11)

**Table 7-6. Connector Pin Assignment - CN11**

Pin No.	I/O	Signal Name	Function
1	I	RELEASE	Release Detector signal
2	-	GND	Ground

- CR Motor (12)

**Table 7-7. Connector Pin Assignment - CN12**

Pin No.	I/O	Signal Name	Function
1	O	CRA	CR Motor phase A
2	O	CR-A	CR Motor phase /A
3	O	CRB	CR Motor phase B
4	O	CR-B	CR Motor phase /B
5	-	CRCOM	Common

- PF Motor (CN13)

**Table 7-8. Connector Pin Assignment - CN13**

Pin No.	I/O	Signal Name	Function
1	O	PFA	PF Motor phase A
2	O	PFB	PF Motor phase B
3	O	PF-A	PF Motor phase /A
4	O	PF-B	PF Motor phase /B

- Printhead (CN15, CN16)
  - R side (CN15: upper connector)

- F side (CN16: lower connector)

**Table 7-9. Connector Pin Assignment - CN15**

Pin No.	I/O	Signal Name	Function
1	O	HEAD3	#3 Head Data
2	-	-	Not used
3	O	HEAD15	#15 Head Data
4	-	C5	#2, 5, 11 Common
5	O	HEAD2	#2 Head Data
6	-	C6	#3, 15 Common
7	O	HEAD5	#5 Head Data
8	O	HEAD16	#16 Head Data
9	O	HEAD11	#11 Head Data
10	-	C7	#16, 17 Common
11	O	HEAD17	#17 Head Data
12	-	C8	#4, 8, 14 Common
13	-	-	Not used
14	O	HEAD14	#14 Head Data
15	O	HEAD4	#4 Head Data
16	O	HEAD8	#8 Head Data

**Table 7-10. Connector Pin Assignment - CN16**

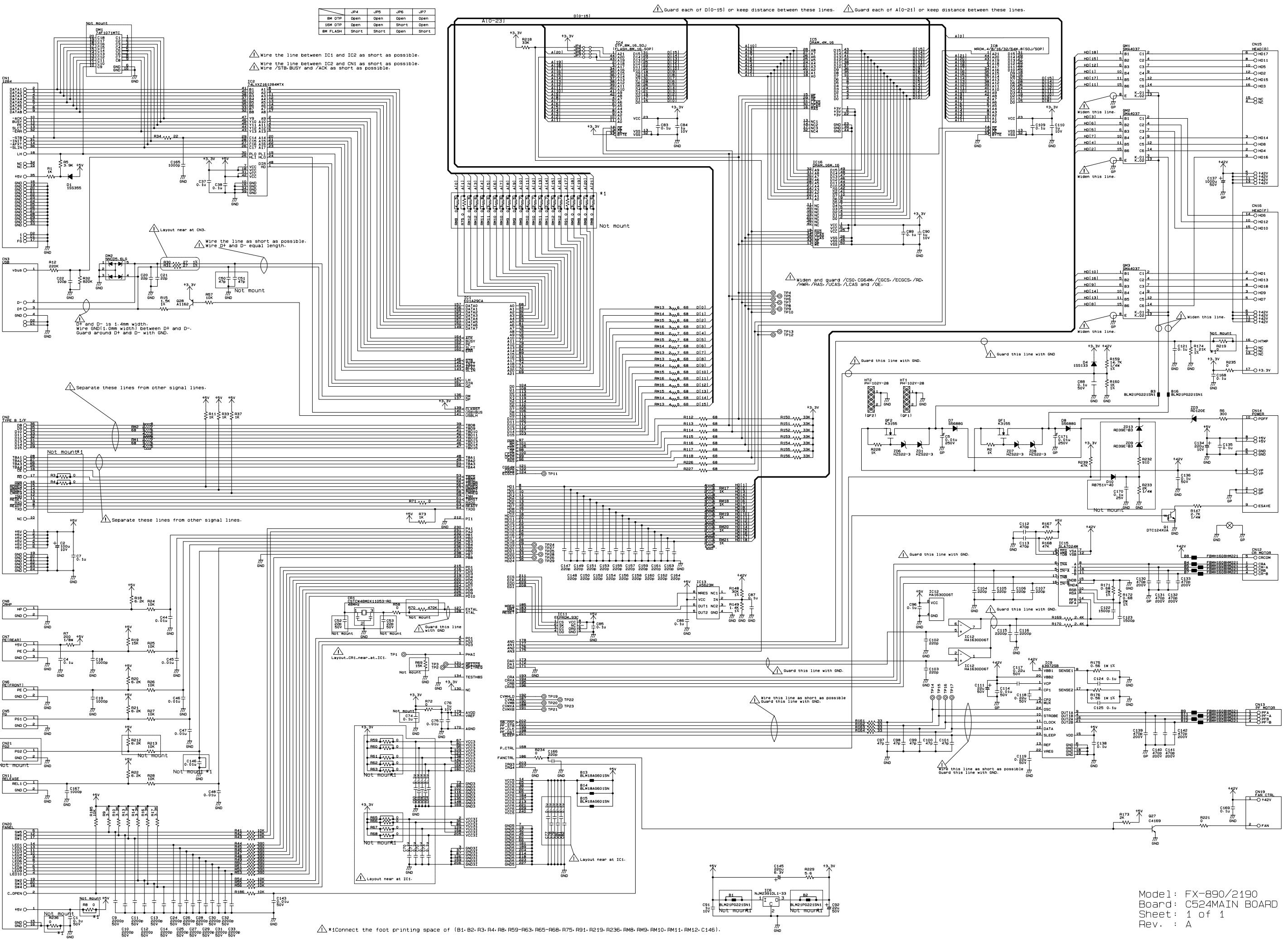
Pin No.	I/O	Signal Name	Function
1	-	-	Not used
2	O	HEAD1	#1 Head Data
3	O	HEAD9	#9 Head Data
4	O	HEAD13	#13 Head Data
5	O	HEAD7	#7 Head Data
6	-	C1	#1, 7, 13 Common
7	-	-	Not used
8	O	HEAD18	#18 Head Data
9	-	C2	#9 Common
10	O	HEAD12	#12 Head Data
11	-	C3	#10, 18 Common
12	-	C4	#6, 12 Common
13	-	-	Not used
14	O	HEAD6	#6 Head Data
15	O	HEAD10	#10 Head Data
16	I	TH	Thermistor
17	I	TH	Thermistor

## 7.2 Electric Circuit Diagrams

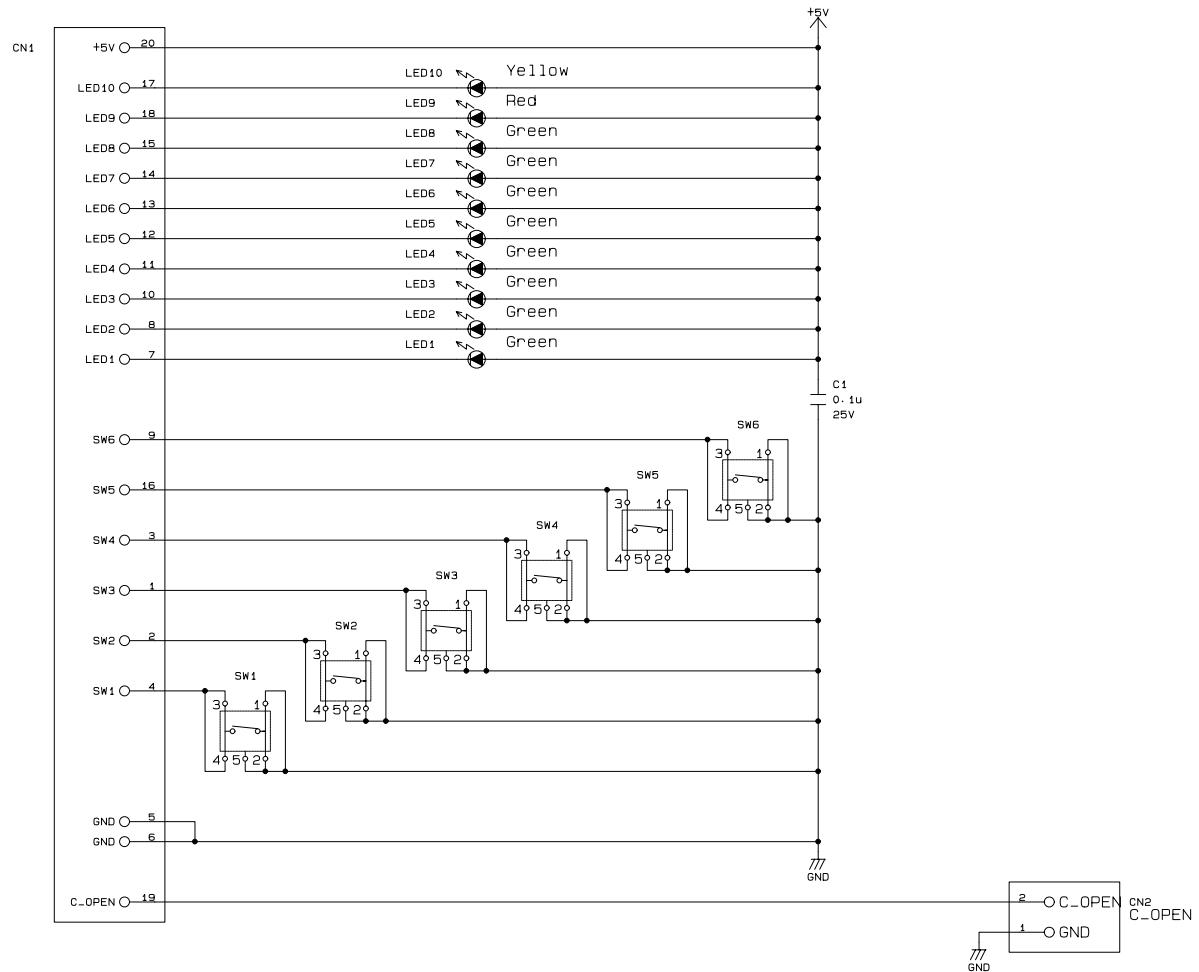
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The following pages show circuit diagrams below.

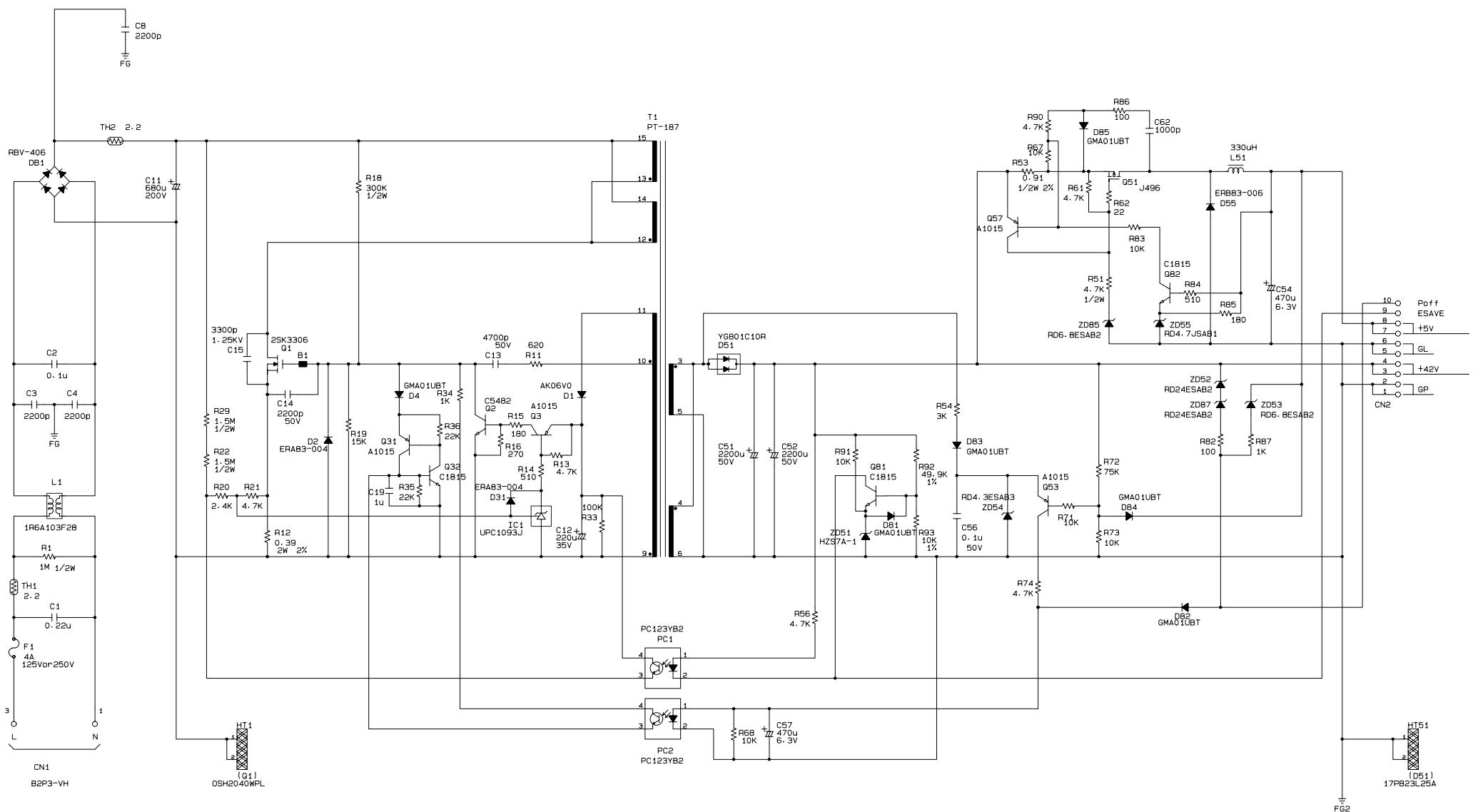
- C524MAIN Circuit Diagram
- C524PANEL Circuit Diagram
- C524PSB Circuit Diagram
- C524PSE Circuit Diagram
- C524PSH Circuit Diagram



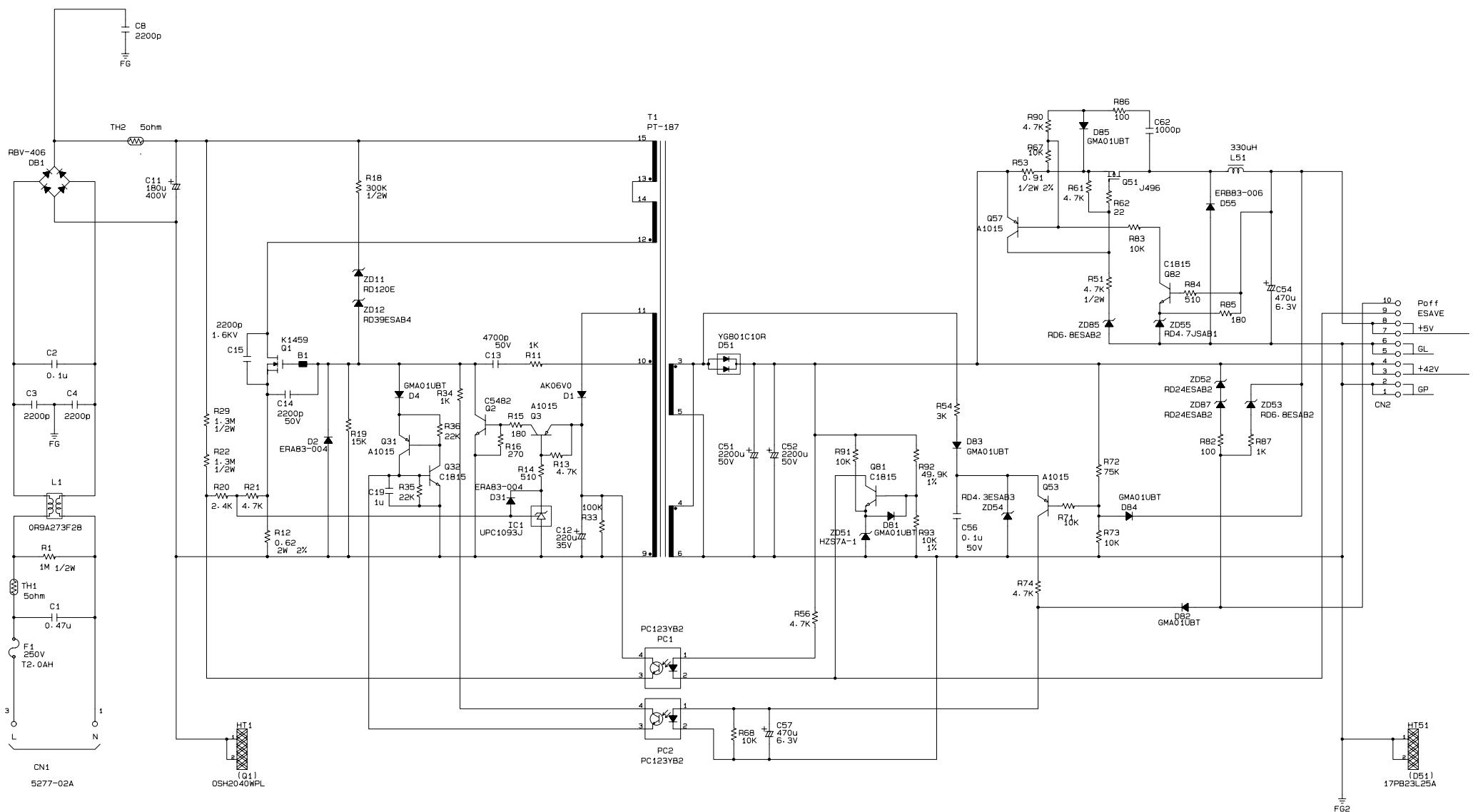
Model : FX-890/2190  
Board : C524MAIN BOARD  
Sheet : 1 of 1  
Rev. : A

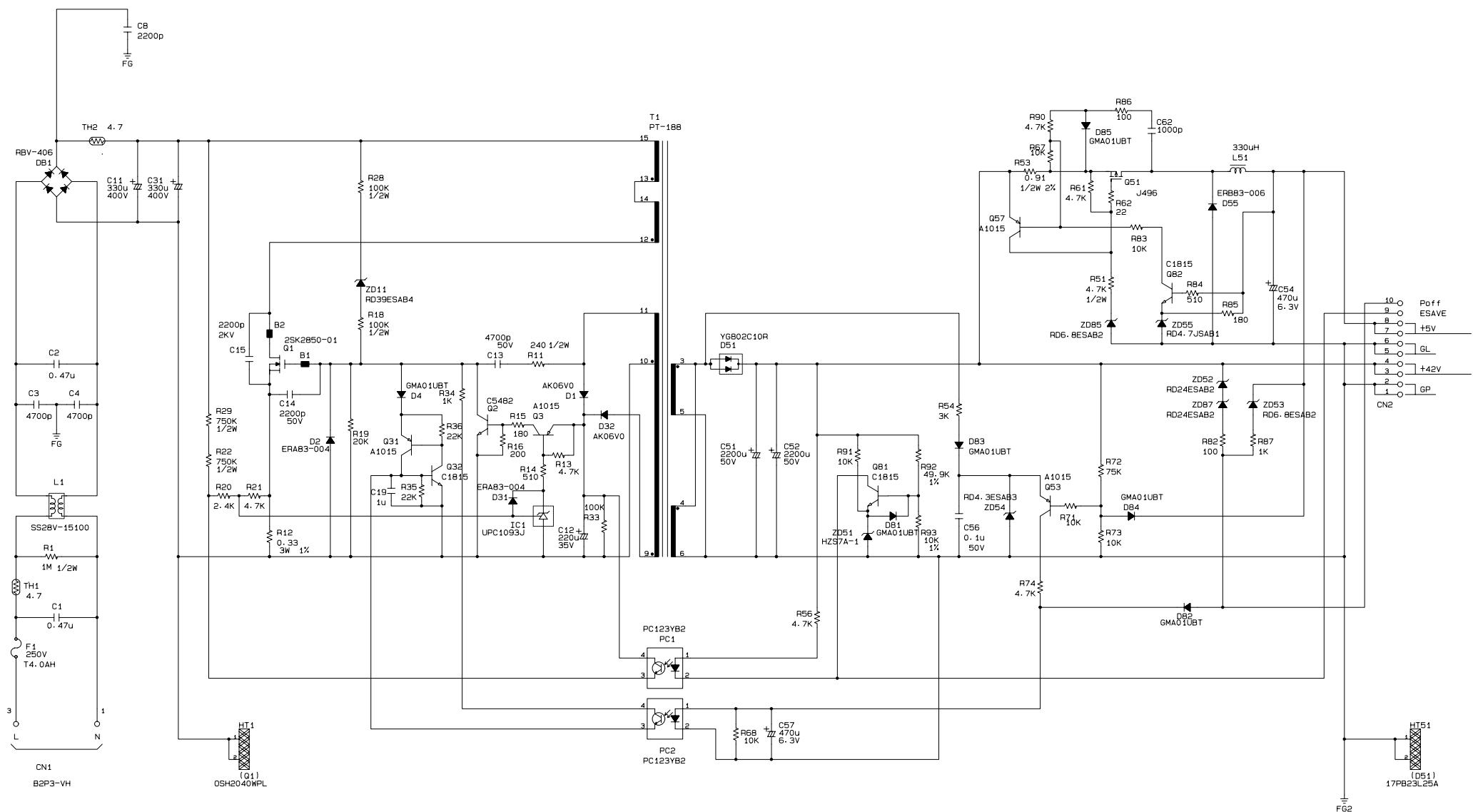


Model : FX-890/2190  
 Board : C524PNL BOARD  
 Sheet : 1 of 1  
 Rev. : A



Model : FX-890/2190  
 Board : C524PSB BOARD (120V)  
 Sheet : 1 of 1  
 Rev. : A





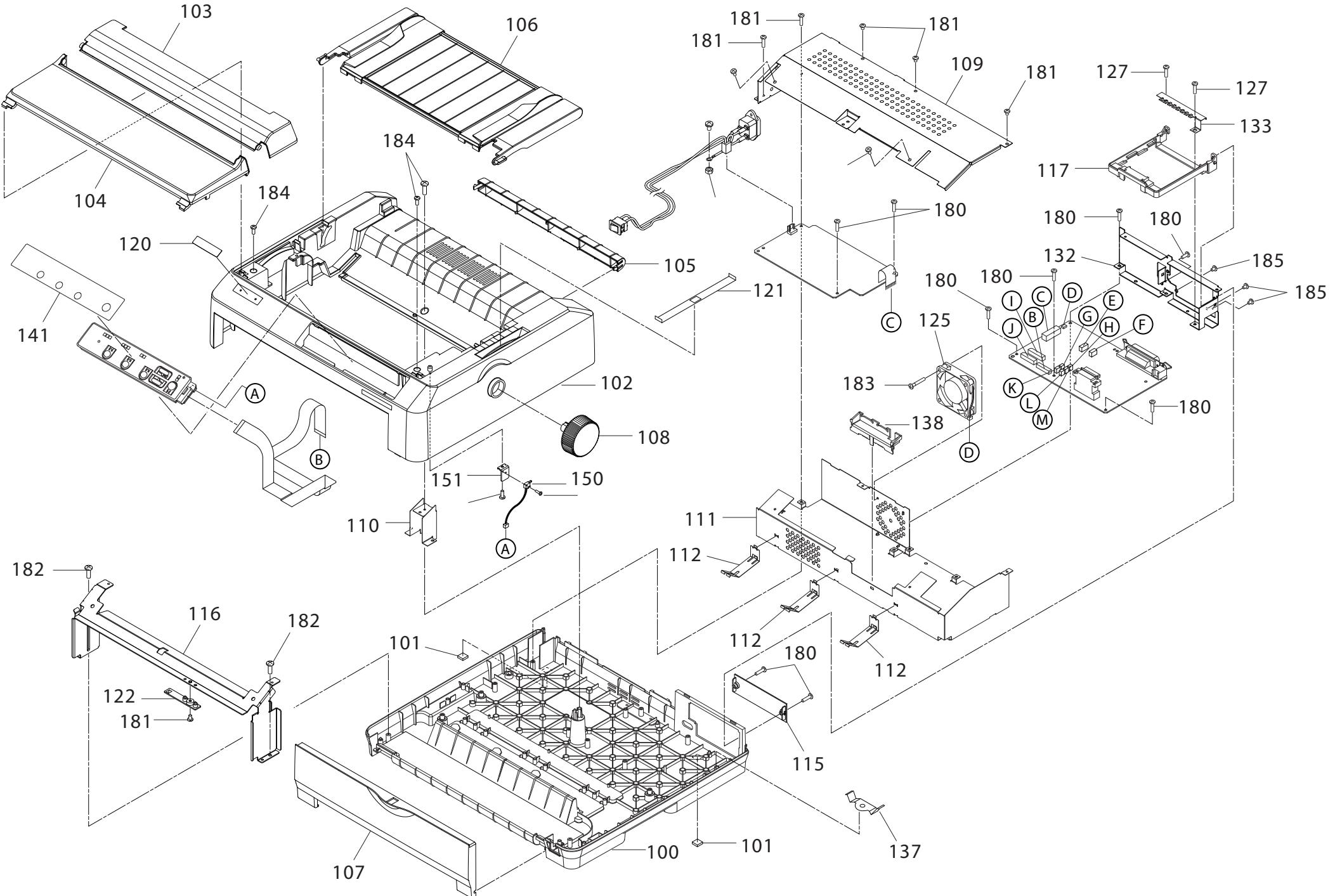
Model: FX-890/2190  
 Board: C524PSH BOARD (100 - 240V)  
 sheet: 1 of 1  
 Rev. : A

## 7.3 Exploded Diagrams

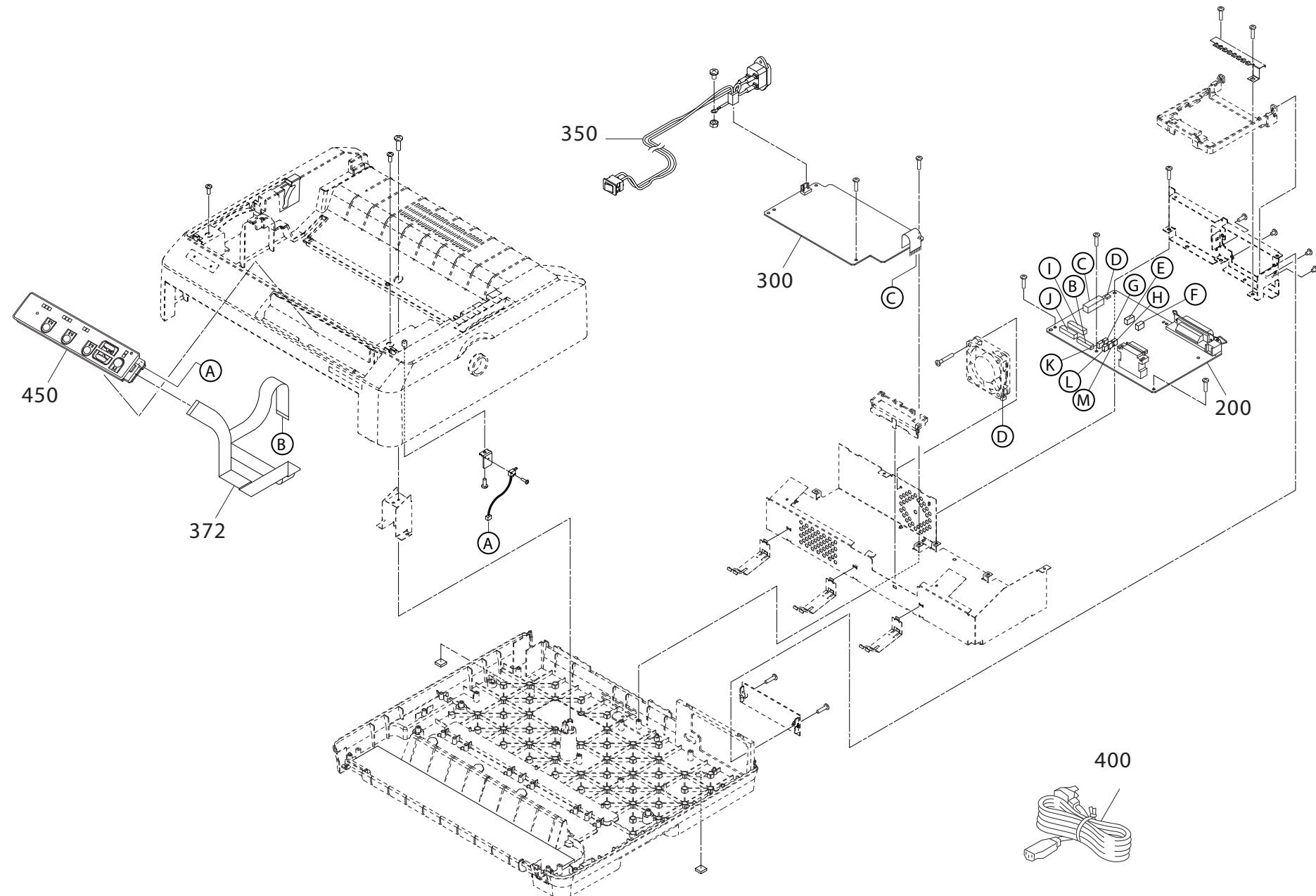
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See the following pages for the exploded diagrams below:

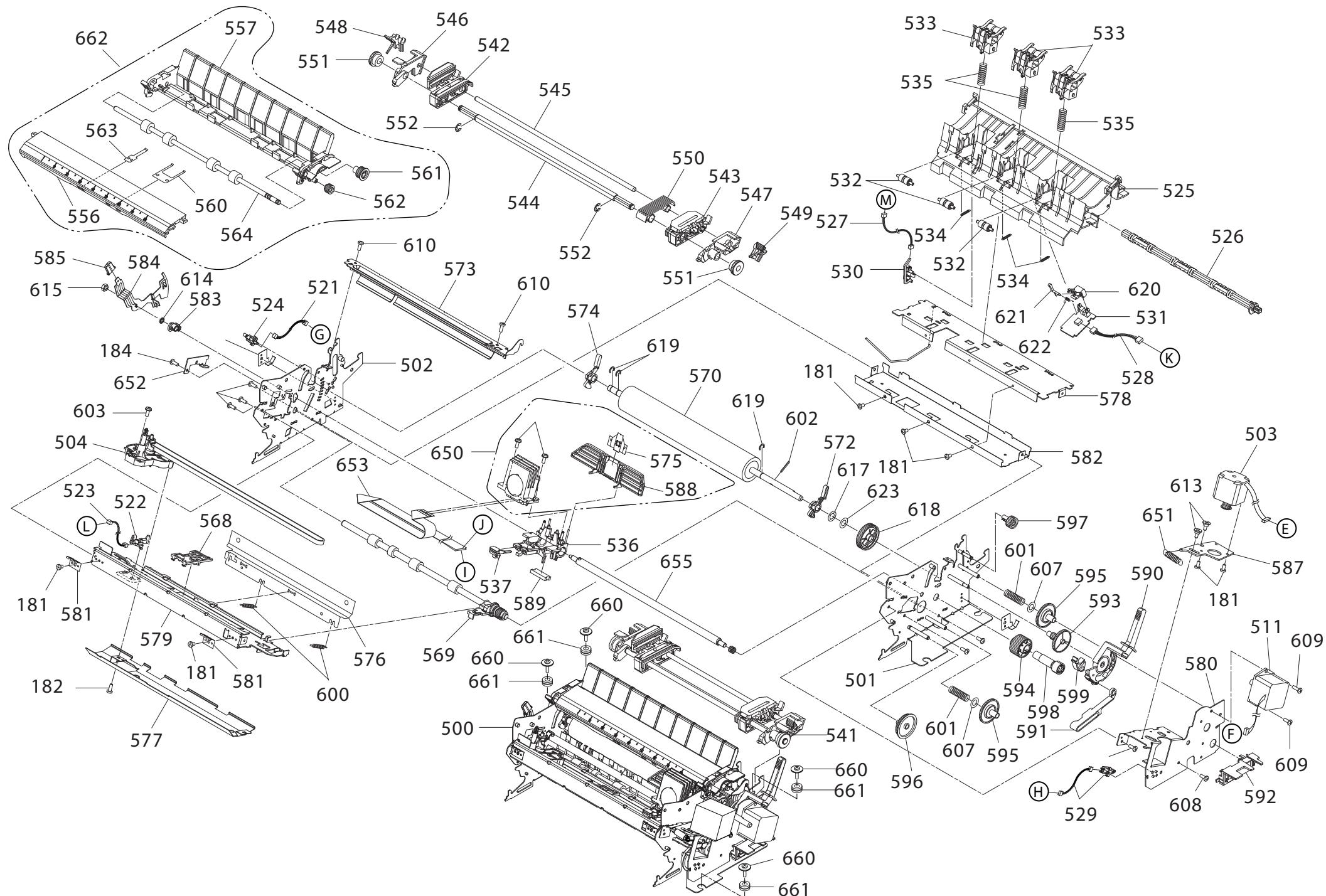
- Exploded Diagram for FX-890 (1)
- Exploded Diagram for FX-890 (2)
- Exploded Diagram for FX-890 (3)
- Exploded Diagram for FX-890 (4)
- Exploded Diagram for FX-2190 (1)
- Exploded Diagram for FX-2190 (2)
- Exploded Diagram for FX-2190 (3)



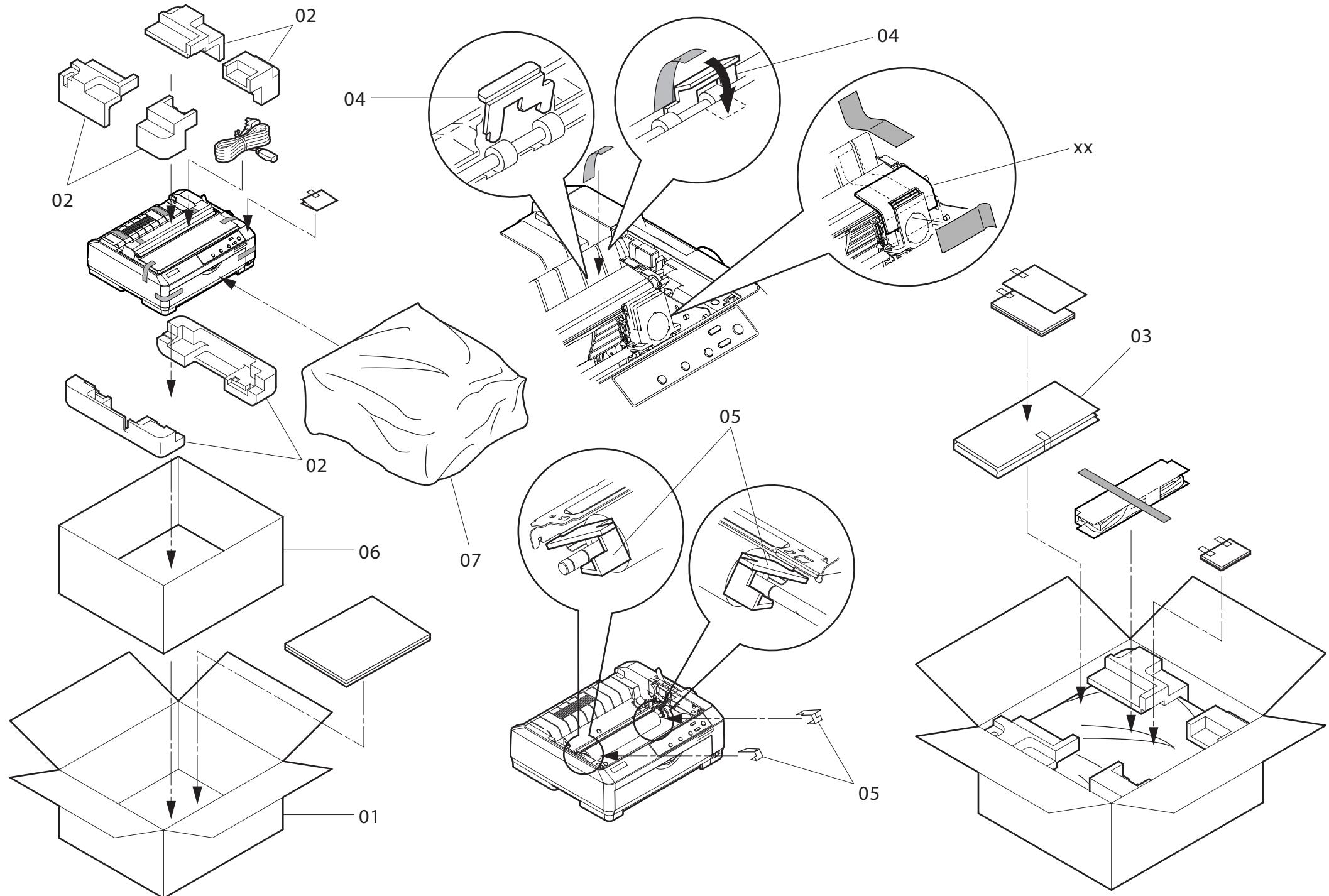
FOR FX-890 NO.1 Rev.01 C524-CASE-01



FOR FX-890 NO.2 Rev.01 C524-ELEC-01



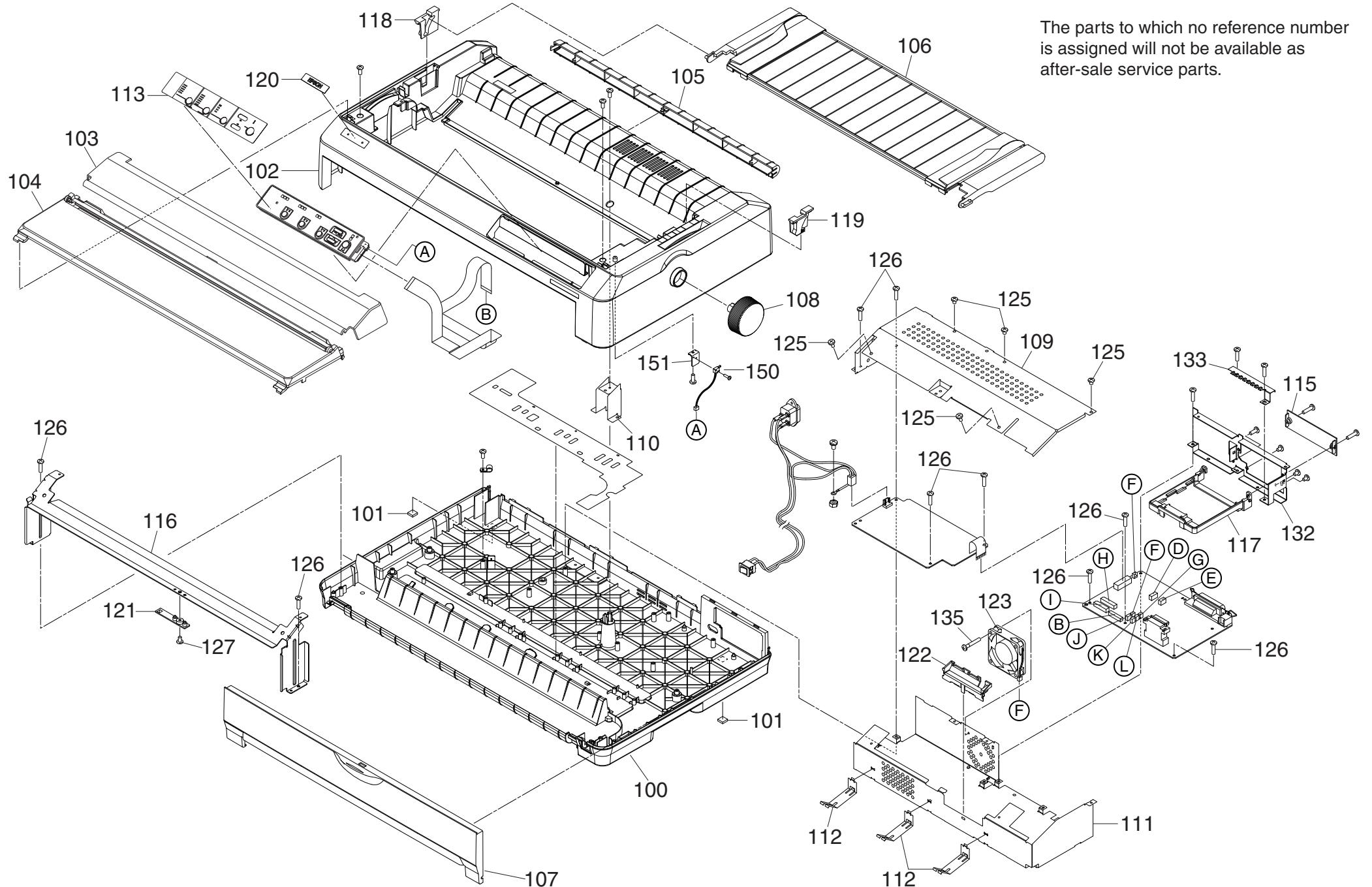
FOR FX-890 NO.3 Rev.01 C524-MECH-01



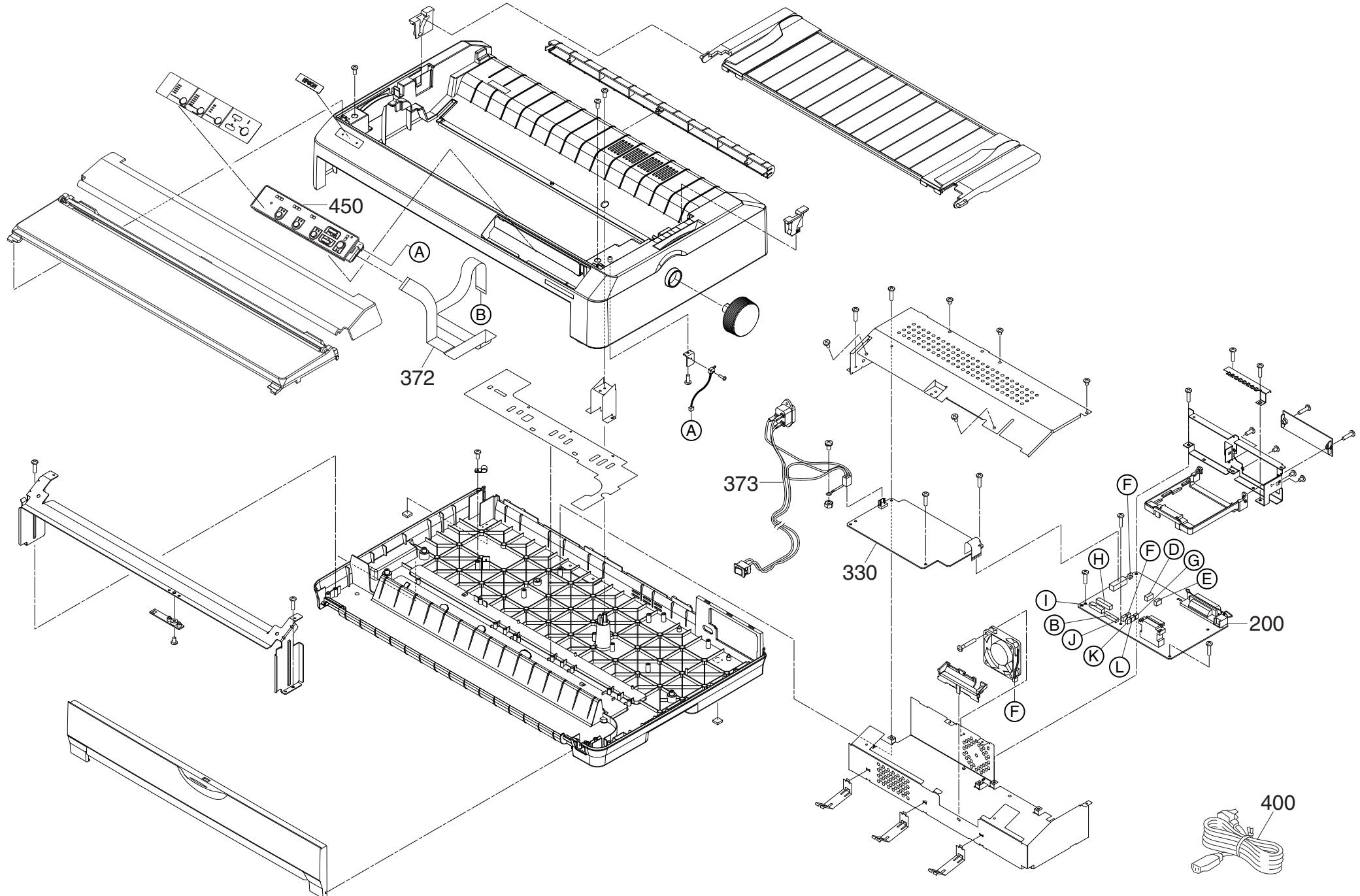
FOR FX-890

NO.4 Rev.01

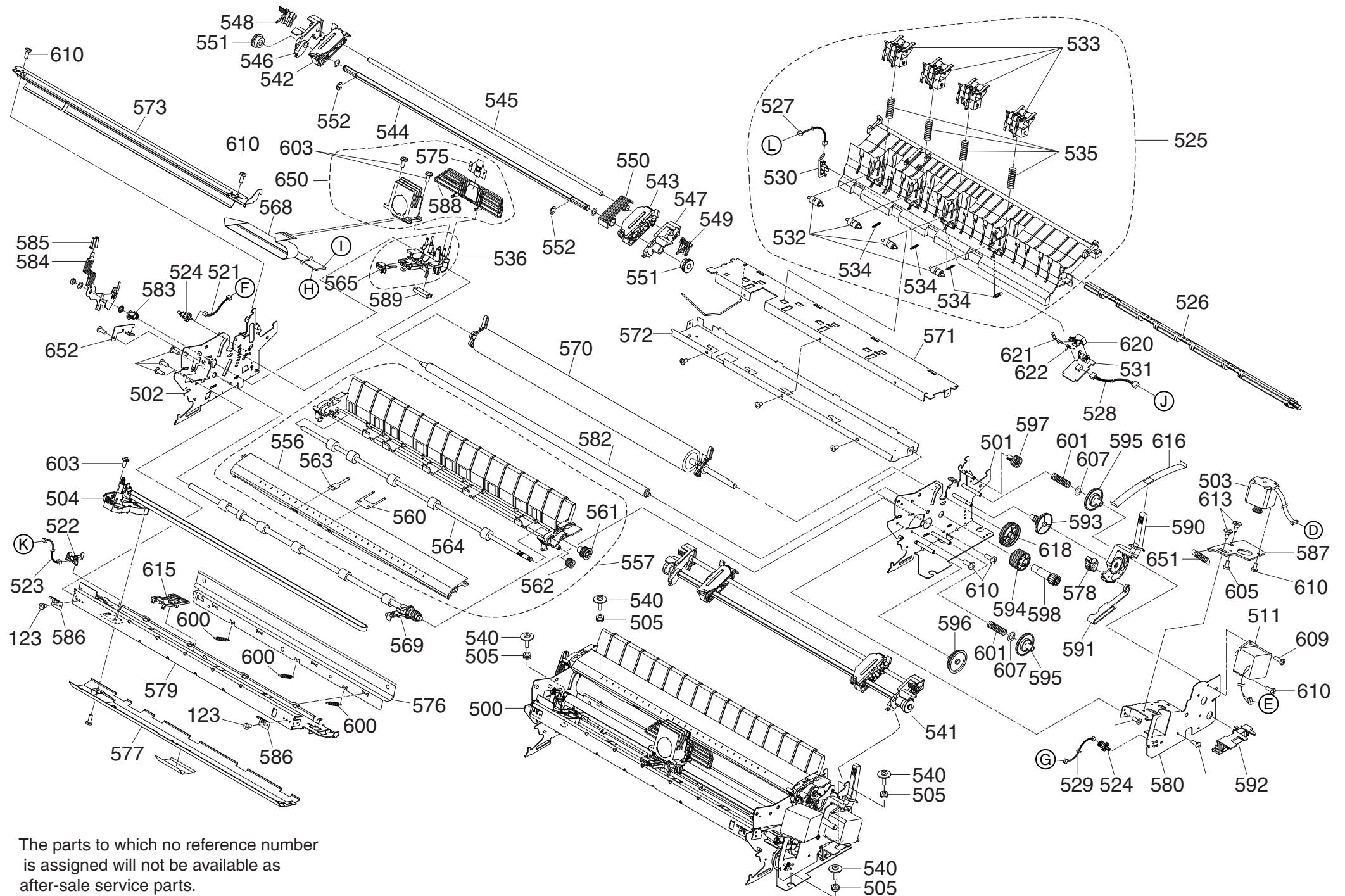
C524\_PACK\_01



The parts to which no reference number is assigned will not be available as after-sale service parts.



FOR FX-2190 NO.2 Rev.01 C526\_ELEC\_01



The parts to which no reference number is assigned will not be available as after-sale service parts.

## 7.4 Parts List

### FX-890

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
NON FIG	"SOFTWARE CD-ROM,EAI"
NON FIG	USER'S GUIDE
100	"HOUSING ASSY.,LOWER"
101	FOOT
102	"HOUSING ASSY.,UPPER"
103	"COVER ASSY .,PRINTER,REAR"
104	"COVER ASSY .,PRINTER"
105	WING;EPAG
106	SHEET GUIDE ASSY
107	"COVER ASSY .,FRONT"
108	KNOB
109	"SHIELD,PLATE,UPPER"
110	SHIELD PLATE;B
111	SHIELD PLATE
112	GROUNDING PLATE
115	"COVER,CONNECTOR,UPPER;EPAG"
116	"MOUNTING,HOUSING"
117	"GUIDE,I/F BOARD"
120	"LOGO PLATE,12X48;C"
121	"SHEET,RELEASE,CAP"
122	"STOPPER,COVER,FRONT"
125	FAN ASSY.

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
127	C.B.S. SCREW(B300204311)
132	"GROUNDING PLATE,I/F"
133	"GROUNDING PLATE,I/F,UPPER"
137	"GROUNDING PLATE,BOTTOM"
138	"HOLDER,CABLE"
141	"SHEET,PANEL"
150	"DETECTOR ASSY.,CASE OPEN"
151	"HOLDER,DETECTOR"
180	"C.B.P-TITE SCREW,3X12,F/ZN"
181	C.B.S. SCREW(B300204211)
182	"C.B.P-TITE SCREW,3X8,F/ZN"
183	"C.B.S-TITE,3X20,F/ZN"
184	C.B.S. SCREW(B300204311)
185	C.P.SCREW(B010109511)
200	"BOARD ASSY., MAIN"
350	HARNESS AC INLET
372	HARNESS
CN1	CONNECTOR 57RE-40360-830B(D7B)
CN11	CONNECTOR
CN12	CONNECTOR
CN13	CONNECTOR
CN14	CONNECTOR
CN15	CONNECTOR
CN16	CONNECTOR
CN2	CONNECTOR

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
CN20	CONNECTOR
CN3	CONNECTOR
CN5	CONNECTOR
CN6	CONNECTOR
CN7	CONNECTOR(X600440310)
CN8	CONNECTOR(X600440120)
CN9	CONNECTOR(X600440120)
D1	DIODE
D4	DIODE(X320010829)
D7	DIODE(X320011839)
D8	DIODE(X320011839)
IC1	ASIC
IC11	EEPROM
IC13	RESET IC
IC15	HYBRID IC SLA7024M
IC4	FLASH ROM
IC9	IC
500	PRINTER MECHANISM(ASP)M-3Q10-100
501	"FRAME ASSY.,RIGHT"
502	"FRAME ASSY.,LEFT"
503	"MOTOR ASSY.,CR"
504	RD ASSY.
511	"MOTOR,PF"
522	"DETECTOR,HP"
523	"HARNESS,HP"

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
524	CONNECTOR SWITCH;B
525	"PAPER GUIDE ASSY.,REAR"
526	"SHAFT,RELEASE"
527	"HARNESS,PE,FRONT"
528	"HARNESS,PE,REAR"
529	"HARNESS,RE"
530	"DETECTOR,PE,FRONT,S"
531	"DETECTOR ASSY., REAR"
532	"ROLLER,PF,DRIVEN,LOWER"
533	"ROLLER ASSY.,PF"
534	"EXTENSION SPRING,70"
535	"COMPRESSION SPRING,1000"
536	CARRIAGE SUB ASSY.
537	"SLIDER,CR"
541	TRACTOR ASSY.
542	"TRACTOR,LEFT;EDGB"
543	"TRACTOR,RIGHT;EDGB"
544	"SHAFT,TR,DRIVE"
545	"SHAFT,TR,GUIDE"
546	"FRAME,TR,LEFT;EPAG"
547	"FRAME,TR,RIGHT;EPAG"
548	"LEVER,TR,LEFT;EDGB"
549	"LEVER,TR,RIGHT;EDGB"
550	PAPER SUPPORT
551	"SPUR GEAR,20"

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
552	RETAINING RING(B150300911)
556	"COVER, PAPER EJECT"
557	"FRAME,PAPER EJECT;EPAG"
560	"LEAF SPRING,PAPER EJECT,DOUBLE"
561	"SPUR GEAR,15"
562	"SPUR GEAR,11.5"
563	"LEAF SPRING,PAPER EJECT,SINGLE"
564	"ROLLER,PAPER EJECT,DRIVE"
568	"HOLDER,CABLE,HEAD"
569	"ROLLER ASSY,DRIVE"
570	PLATEN ASSY.
572	"BUSHING,8,RIGHT"
573	"COVER,PLATEN"
574	"BUSHING,8,LEFT"
575	RIBBON MASK
576	"PAPER GUIDE ASSY.,SUPPORT"
577	"GUIDE,PAPER LOAD"
578	"FRAME,REAR"
579	"FRAME,FRONT"
580	"FRAME,SUB,RIGHT"
581	"GROUNDING PLATE,MECHA"
582	"FRAME,BASE"
583	"BUSHING,PARALLEL,ADJUST"
584	"LEVER,GAP,ADJUST"
585	"CAP,LEVER;EDGB"

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
587	"MOUNTING PLATE,MOTOR,CR"
588	"HOLDER,RIBBON MASK"
589	OIL PAD(F334005140)
590	"LEVER,RELEASE;EDGB"
591	"CAM,CLUTCH,TRACTOR"
592	"HOLDER,CABLE"
593	"COMBINATION GEAR,31,5,8"
594	"SPUR GEAR,27"
595	"SPUR GEAR,34.5"
596	"SPUR GEAR,34"
597	"SPUR GEAR,15"
598	INTERMITTENT GEAR
599	"LEVER,RELEASE,TRANSMISSION;W"
600	"EXTENSION SPRING,71"
601	"COMPRESSION SPRING,200"
602	"SPRING PIN,2X18,F/B"
603	C.B.S(P).(0) SCREW
607	PLAIN WASHER(B100166012)
608	C.B.SCREW(B010303411)
609	C.B.SCREW(B010303511)
610	C.B.S. SCREW(B300204311)
613	"SHAFT,MOUNT,CR"
614	TOOTHED LOCK WASHER A
615	HEXAGON NUT(B070200411)
617	LEAF SPRING(B101253990)

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
618	"SPUR GEAR,36"
619	RETAINING RING(B160101412)
620	"LEVER,DETECTOR,PE,REAR"
621	"LEVER,PE,SUPPORT"
622	"TORSION SPRING,0.26"
623	"PLAIN WASHER,3X0.5X8,F/ZB"
650	HEAD KIT ASP
651	"EXTENSION SPRING,16.45"
652	"HOLDER,PULLEY DRIVEN"
653	"CABLE,HEAD"
655	"SHAFT,CR,GUIDE"
660	"C.B.B-TITE(P(13)),3X14,F/ZN"
661	BASE RUBBER
662	PAPER EJECT ASSY.
1	IND CARTON BOX FOR AMERICA
2	PAD SET PRINTER
3	"PAD,SHEET GUIDE ASSY."
4	"PAD,CR"
5	"PAD,PLATEN"
6	"PAD,SLEEVE"
7	"PLASTIC PROTECTIVE BAG,650X570X0.06T"
300	"BOARD ASSY., POWER SUPPLY"
400	POWER CABLE

**Table 7-11. Parts List - FX-890**

REF#	DESCRIPTION
450	"HOUSING ASSY.,PANEL"
NON FIG	OIL O-14
NON FIG	GREASE G-26 (40GR)

**FX-2190****Table 7-12. Parts List - FX-2190**

<b>Ref. No.</b>	<b>Description</b>
NON FIG	"SOFTWARE CD-ROM,EAI"
NON FIG	USER'S GUIDE
100	"HOUSING ASSY.,LOWER"
101	FOOT
102	"HOUSING ASSY.,UPPER"
103	"COVER ASSY.,PRINTER,REAR"
104	"COVER ASSY.,PRINTER"
105	WIHG;EPAG
106	SHEET GUIDE ASSY
107	"COVER ASSY.,FRONT"
108	KNOB
109	"SHIELD,PLATE,UPPER"
110	SHIELD PLATE;B
111	SHIELD PLATE
112	GROUNDING PLATE
113	"SHEET,PANEL"
115	"COVER,CONNECTOR,UPPER;EPAG"
116	"MOUNT,HOUSING"
117	"GUIDE,I/F BOARD"
118	"HOLDER,SHEET GUIDE,L"
119	"HOLDER,SHEET GUIDE,R"
120	"LOGO PLATE,12X48;C"
121	"STOPPER,COVER,FRONT"
122	"HOLDER,CABLE"

**Table 7-12. Parts List - FX-2190**

<b>Ref. No.</b>	<b>Description</b>
123	FAN ASSY.
125	C.B.S. SCREW(B300204211)
126	"C.B.P-TITE SCREW,3X12,F/ZN"
127	C.B.S. SCREW(B300204211)
132	"GROUNDING PLATE,I/F"
133	"GROUNDING PLATE,I/F,UPPER"
135	"C.B.S-TITE,3X20,F/ZN"
150	"DETECTOR ASSY.,CASE OPEN"
151	"HOLDER,DETECTOR"
(CN2)	"GROUNDING PLATE,I/F"
200	"BOARD ASSY., MAIN"
330	"BOARD ASSY., POWER SUPPLY"
372	HARNESS
373	HARNESS
400	UL/CSA APPROVED P.S. CORD SET 10A 125V
450	"HOUSING ASSY.,PANEL"
B1	BEADS CORE
B2	BEADS CORE
B29	BEADS CORE
CN1	CONNECTOR 57RE-40360-830B(D7B)
CN11	CONNECTOR
CN12	CONNECTOR
CN13	CONNECTOR
CN14	CONNECTOR
CN15	CONNECTOR

**Table 7-12. Parts List - FX-2190**

Ref. No.	Description
CN16	CONNECTOR
CN2	CONNECTOR
CN20	CONNECTOR
CN3	CONNECTOR
CN5	CONNECTOR
CN6	CONNECTOR
CN7	CONNECTOR(X600440310)
CN8	CONNECTOR(X600440120)
D1	DIODE
D4	DIODE(X320010829)
D7	DIODE(X320011839)
D8	DIODE(X320011839)
DM2	DIODE ARRAY
IC13	RESET IC
IC15	HYBRID IC SLA7024M
IC16	DRAM
IC2	INTERFACE IC
IC4	FLASH ROM
IC6	VOLTAGE REGULATOR
IC9	IC
Q1	TRANSISTOR
Q27	TRANSISTOR(X302416909)
Q28	CHIP TRANSISTOR[X304116289]
ZD3	ZENER DIODE
500	PRINTER MECHANISM(ASP)M-3R60-100

**Table 7-12. Parts List - FX-2190**

Ref. No.	Description
501	"FRAME ASSY.,RIGHT"
502	"FRAME ASSY.,LEFT"
503	"MOTOR ASSY.,CR"
504	RD ASSY.
505	BASE RUBBER
511	"MOTOR,PF"
521	"HARNESS,PG"
522	"DETECTOR,HP"
523	"HARNESS,HP"
524	CONNECTOR SWITCH;B
525	"PAPER GUIDE ASSY.,REAR"
526	"SHAFT,RELEASE"
527	"HARNESS,PE,FRONT"
528	"HARNESS,PE,REAR"
529	"HARNESS,RE"
530	"DETECTOR,PE,FRONT,S"
531	"DETECTOR ASSY., REAR"
532	"ROLLER,PF,DRIVEN,LOWER"
533	"ROLLER ASSY.,PF"
534	"EXTENSION SPRING,46"
535	"COMPRESSION SPRING,1000"
536	CARRIAGE SUB ASSY.
540	"C.B.B-TITE(P(13)),3X14,F/ZN"
541	TRACTOR ASSY.
542	"TRACTOR,LEFT;EDGB"

**Table 7-12. Parts List - FX-2190**

Ref. No.	Description
543	"TRACTOR,RIGHT;EDGB"
544	"SHAFT,TR,DRIVE"
545	"SHAFT,TR,GUIDE"
546	"FRAME,TR,LEFT;EPAG"
547	"FRAME,TR,RIGHT;EPAG"
548	"LEVER,TR,LEFT;EDGB"
549	"LEVER,TR,RIGHT;EDGB"
550	PAPER SUPPORT
551	"SPUR GEAR,20"
552	RETAINING RING(B150300911)
556	"COVER,PAPER EJECT"
557	PAPER EJECT ASSY.
560	"LEAF SPRING,PAPER EJECT,DOUBLE"
561	"SPUR GEAR,15"
562	"SPUR GEAR,11.5"
563	"LEAF SPRING,PAPER EJECT,SINGLE"
564	"ROLLER,EJ,DRIVE"
565	"SLIDER,CR"
568	"CABLE,HEAD"
569	"ROLLER ASSY.,DRIVE"
570	PLATEN ASSY.
571	"FRAME,REAR"
572	"FRAME,BASE"
573	"COVER,PLATEN"
575	RIBBON MASK

**Table 7-12. Parts List - FX-2190**

Ref. No.	Description
576	"PAPER GUIDE ASSY.,SUPPORT"
577	"GUIDE,PAPER LOAD"
578	"LEVER,RELEASE,TRANSMISSION;W"
579	"FRAME,FRONT"
580	"FRAME,SUB,RIGHT"
582	"SHAFT,CR,GUIDE"
583	"BUSHING,PARALLEL,ADJUST"
584	"LEVER,GAP,ADJUST"
585	"CAP,LEVER;EDGB"
586	"GROUNDING PLATE,MECHA"
587	"MOUNTING PLATE,MOTOR,CR"
588	"HOLDER,RIBBON MASK"
589	OIL PAD
590	"LEVER,RELEASE;EDGB"
591	"CAM,CLUTCH,TRACTOR"
592	"HOLDER,CABLE"
593	"COMBINATION GEAR,31,5,8"
594	"SPUR GEAR,27"
595	"SPUR GEAR,34.5"
596	"SPUR GEAR,34"
597	"SPUR GEAR,15"
598	INTERMITTENT GEAR
600	"EXTENSION SPRING,71"
601	"COMPRESSION SPRING,200"
603	C.B.S(P).(0) SCREW

**Table 7-12. Parts List - FX-2190**

Ref. No.	Description
605	C.B.SCREW(B010303311)
607	"PLANE WASHER,8.2X0.5X12,L/NA"
609	C.B.SCREW(B010303511)
610	C.B.SCREW(B010303411)
613	"SHAFT,MOUNT,CR"
615	"HOLDER,CABLE,HEAD"
616	"SHEET,RELEASE,CAP"
618	"SPUR GEAR,36"
620	"LEVER,DETECTOR,PE,REAR"
621	"LEVER,PE,SUPPORT"
622	"TORSION SPRING,0.26"
650	HEAD KIT ASP
651	"EXTENSION SPRING,16.45"
652	"HOLDER,PULLEY DRIVEN"
NON FIG	OIL O-14
NON FIG	GREASE G-26 (40GR)(B702600001)