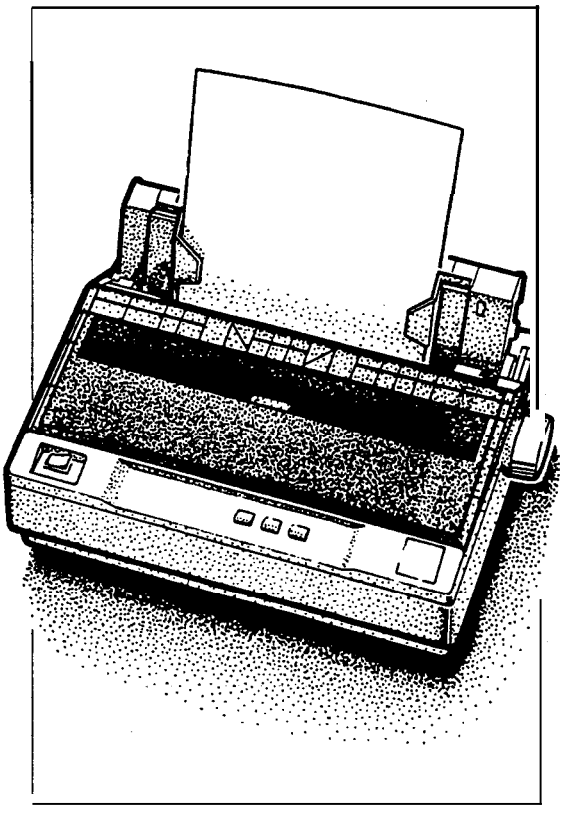
EPSON TERMINAL PRINTER

# LQ-300

# SERVICE MANUAL



**EPSON**

4003792

## NOTICE



**The contents of this manual are subjects to change without notice.**

**Alleffortshavebeen made toensuretheaccuracy of** the contents of this **manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.**

**The above notwithstanding SEIKO EPSON can** assume no **responsibility for any errors in** this **manual or the consequence thereof.**

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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 darnage to equipment.**

**Theprecautionary measures itemized below should alwaysbe observed when performingrepair/ maintenance procedures.**

## *DANGER*

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

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 UNITTOA 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.**

## *WARNING*

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

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

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

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

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

# PREFACE

**This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of** LQ-300.
**The instructions and procedures included herein are intended for the experience repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:**

### CHAPTER 1. PRODUCT DESCRIPTION

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

### CHAPTER 2. OPERATING PRINCIPLES

**Describes the theory of printer operation.**

### CHAPTER 3. DISASSEMBLY AND ASSEMBLY

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

### CHAPTER 4. ADJUSTMENTS

Includes a step-by-step guide for adjustment.

### CHAPTER 5. TROUBLESHOOTING

Provides Epson-approved techniques for adjustment.

### CHAPTER 6. MAINTENANCE

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

### APPENDIX

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

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

# REVISION SHEET

| Revision | Issue Date | Revision Page |
|---|---|---|
| Rev. A | September 28, 1994 | 1st issue |
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# TABLE OF CONTENTS

# CHAPTER 1 Product Description

## Table of Contents

## List of Figures



## List of Tables

## 1.1 FEATURES

The LQ-300 is a small, light-weight, 24-pin serial impact dot-matrix color printer suitable for personal use. The major features of this printer are:

- Fast printing of 10-cpi draft characters at 200 cps
- Compact design saves precious work space
- Easy-to-operate panel
- Quiet printing
- Two built-in 8-bit parallel interfaces and an EIA-232D serial interface
- Printing of up to 66 lines on A4-size or 62 lines on letter-size paper
- Optional color printing using a color ribbon (black, magenta, cyan, yellow)
- Detachable tractor (push, pull, and push-pull tractor feed)

Figure 1-1 shows an exterior view of the LQ-300, and Table 1-1 lists the optional units available for the LQ-300.

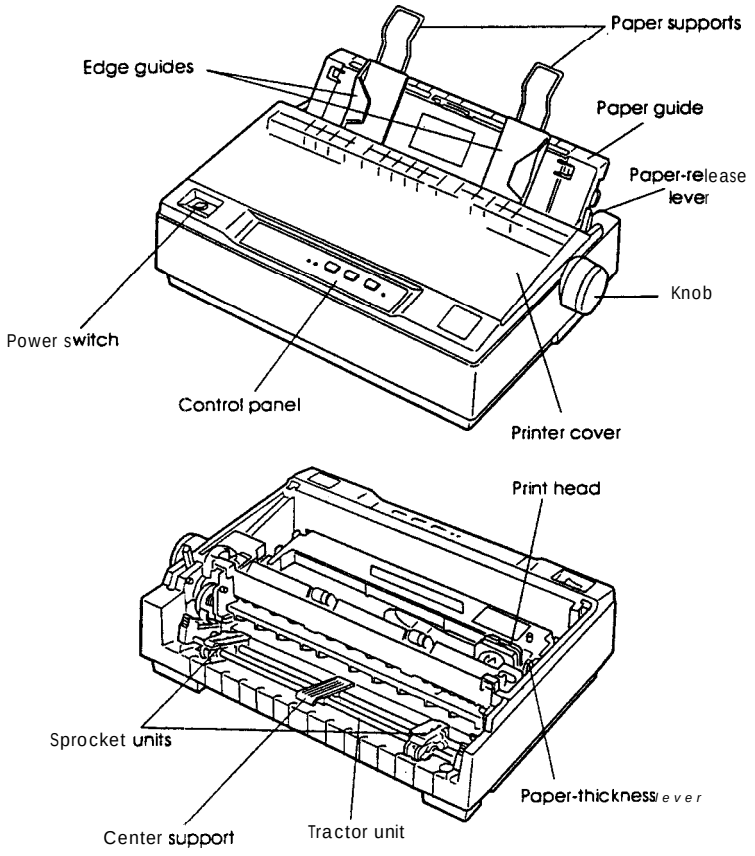



**Figure 1-1. Exterior View of the LQ-300**

**Table 1-1. Optional Units**

| Model | Description |
|---|---|
| #7753 | Ribbon cartridge (monochrome) |
| #7755 | Ribbon cartridge (monochrome, sub-cartridge) |
| #7768 | Ribbon cartridge (film) |
| S015077 | Ribbon cartridge (color) |
| C80637* | Single-bin cut sheet feeder |
| C83211• | Color upgrade kit |
| C80030* | Pull tractor unit |

* The number represented by an asterisk varies depending on the country.

## 1.2 SPECIFICATIONS

This section **provides detailed information about the** LQ-300.

### 1.2.1 Hardware Specifications

**Printing** method: Serial impact dot matrix

Pin arrangement: 12 x 2, staggered

Pin diameter: 0.20 mm (0.0079 inches)

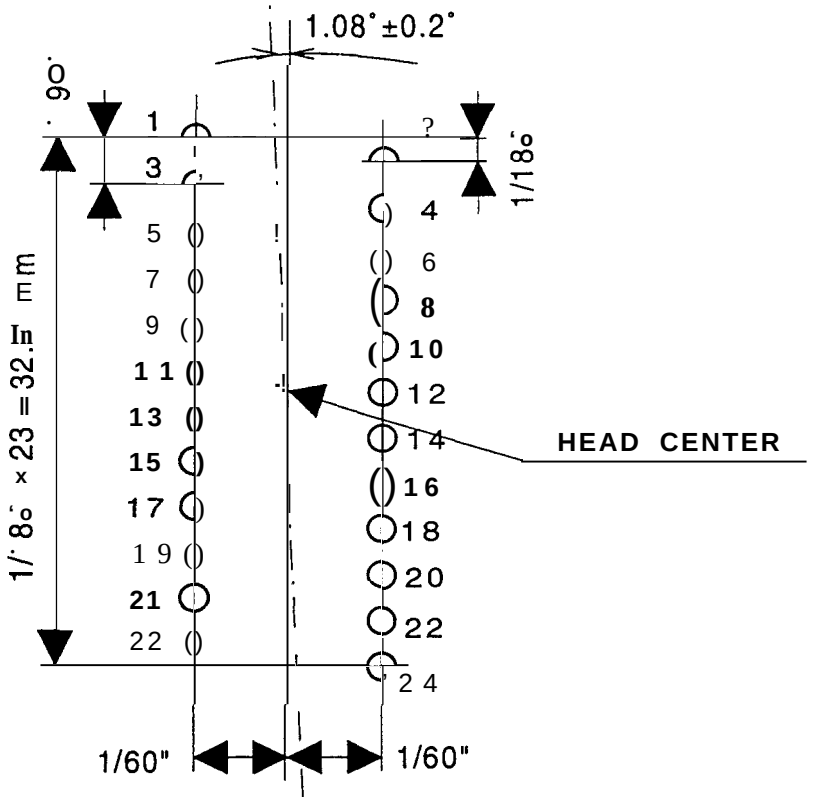



**Figure 1-2. Pin Configuration**

Printing direction: Bidirectional with logic seeking for text and unidirectional for graphics. (Bidirectional printing of graphics can be selected with a printer setting or software command.)

### 1.2.1.1 Paper Handling Specifications

**Paper paths**

| | |
|---|---|
| **Cut sheet path:** | **Rear entry (manual insertion or optional CSF)**<br>**Cannot handle multi-part paper using friction feed** |
| **Continuous paper paths:** | **Rear entry ( push tractor feed using the push tractor unit or pull tractor feed using the pull tractor unit or push-pull tractor feed using both tractor units)** |
| **Continuous paper parking:** | **Possible, using push tractor unit** |
| CSF: | **Cannot handle envelopes or multi-part paper** |
| **Feeding pitch:** | 1/6 inch, 1/8 inch, or **Programmable feeding in increments of 1/360 inch, minimum** |
| **Feeding system:** | **Friction feed or tractor (push, pull, and push-pull) feed** |

**❑ Friction feed**

- Set the release lever to the friction position.
- Insert the left edge of the sheet at the marked position.
- Do not perform reverse feed in the area within 0.63 inch (16 mm) from the bottom edge of the sheet.

**Push tractorfeed**

- Set the release lever to the tractor position.
- **Install the tractor unit in the rear in the push tractor position.**
- **On the first page (that is, the page immediately after sheet loading) the accuracy of paper feeding is not guaranteed within the area 0.87 inch (22 mm) from the top edge of the sheet.**
- **On the last page, the accuracy of paper feeding is not guaranteed after the paper comes off the tractor pins.**
- **During printing of labels, never perform reverse feeding.**
- Do **not eject the labels from the rear.**

**❑ Pull tractor feed**

- Set the release lever to the tractor position.
- Install the tractor unit in the top in the pull tractor position.
- Do not perform reverse feeding.
- Do not eject them from the rear.

Push pull tractor feed

- **Set the release lever to the tractor position.**
- **Install one tractor unit in the rear in the push tractor position and install the other tractor unit in the top in the pull tractor position.**
- **Do not perform reverse feeding.**
- Do **not eject the paper from the rear.**

Paper thickness lever: The adjust lever must be set to proper position for the paper thickness, as shown below.

**Table 1-2. Paper Thickness Lever Settings**

| Lever Position | Paper Thickness | Corresponding Paper |
|---|---|---|
| 0 | **0.065** mm -0.12 **mm (0.0026 in. -0.0047 in.)** | **Ordinary paper** |
| 1 | **0.12 mm -0.19 mm (0.0047** in. -0.0075 **in.)** | **Multi-part forms (2 sheets)** |
| 2 | **0.19 mm -0.26** mm **(0.0075** in. **-0.01 in.)** | **Multi-part forms (3 sheets)** |
| 3 | **0.26 mm -0.32 mm (0.01 in. -0.013 in.)** | **Multi-part forms (4 sheets)** |
| 4 | **0.32 mm -0.44 mm (0.013 in. -0.017 in.)** | **Envelopes (20 lb.)** |
| 5 | **0.44 mm -0.52 mm (0.017 in. -0.02 in.)** | **Envelopes (24** lb.) |

Paper-feeding speed: See Table 1-3.

**Table 1-3. Feeding Speed**

| Lever Position | Feeding | 1/6 inch Line Feed | Continuous Feed |
|---|---|---|---|
| o, 1 | Friction | Max. 94 ins/line<br>Typ. 80 ins/line (*)<br>Min. 75 ins/line | Max 3.6 inches/sec.<br>Typ. 3.3 inches/sec (*)<br>Min. 2.8 inch/sec. |
| | Tractor | | |
| 2-5 | Friction | | |
| | Tractor | Max. 106 redline<br>Typ. 104 ins/line (*)<br>Min. 94 ms/line | Max. 2.8 inches/sec.<br>Typ. 2.5 inches/sec.*<br>Min. 2.2 inches/sec. |

* Feed speed is varies depending on the motor driving voltage.

### 1.2.1.2 Paper Specifications

**Table 1-4. Specifications for Cut Sheet Paper (CSF)**

| | |
|---|---|
| Width | 182 mm -216 mm (7.2 in. -8.5 in.) |
| Length | 210 mm -364 mm (8.3 in. -14.3 in.) |
| Thickness | 10.07 mm -0.12 mm (0.0028 in. -0.0047 in.) |
| Weight | 64-90 g/m$^2$ (18 -24 lb.) |
| Quality | Plain paper, recycled paper |

**Table 1-5. Specifications for Cut Sheet Paper (Manual Insertion)**

| | |
|---|---|
| Width | 148 mm -257 mm (5.8 in. -10.1 in.) |
| Length | 182 mm -364 mm (7.2 in. -14.3 in.) |
| Thickness | 0.065 mm -0.14 mm (0.0025 in. -0.0055 in.) |
| Weight | 52.3-90 g/m$^2$ (14 -24 lb.) |
| Quality | Plain paper, recycled paper |

**Table 1-6. Specifications for Envelopes**

| | |
|---|---|
| Size | No. 6 Width x Length: 166 mm x 92 mm (6.5 in. x 3.6 in.)<br>No. 10 Width x Length: 240 mm x 104 mm (9.5 in. x 4.1 in.) |
| Thickness | 0.16 mm - 0.52 mm (0.0063 in. - 0.0197 in.) |
| Weight | 45- 91 g/m$^2$ (12 -24 lb.) |
| Quality | Bond paper (not curled, folded, or crumpled), plain paper, airmail paper |

***Notes:*** . Printing of envelopes is guaranteed only at room temperature and normal humidity (15 - 25° C (59 - 77° F) ,20- 60% RH).

- Variations in envelope thickness must be less than 0.25 mm (0.0098 in.).
- When inserting envelopes, keep the longer side horizontal.

**Table 1-7. Specifications for Continuous Paper (Single Sheet and Multi-Part)**

| | |
|---|---|
| Width | 101.6 mm - 254 mm (4.0 in. - 10.0 in.) |
| Total thickness | 0.065 mm - 0.32 mm (0.0025 in. - 0.012 in.) |
| Weights | 52.3- 82 g/m$^2$ (14 - 22 lb.) — not multi-part<br>40- 58.2 g/m$^2$ (12 - 15 lb.) — multi-part |
| Copies | 4 sheets (1 original + 3 copies) |
| Quality | Plain paper, recycled paper, carbonless multi-part paper |

**Table 1-8. Specifications for Continuous Paper with a Label**

| | |
|---|---|
| Label size (W x L) | 63.5 **mm (min.) x 23.8** mm (min.) [ 2.5 **in. (min.) x 15/16** in. (min.)] |
| Width of base paper | 101.6 mm -254 mm (4.0 in. x 10.0 in.) |
| Thickness of base paper | 0.07 mm - 0.09 mm (0.0028 in. - 0.0031 **in.)** |
| **Total thickness** | **0.16 mm -0.19 mm (0.0063 in. - 0.0075 in.)** |
| **Weight** | **68 g/m$^2$ (17 lb.)** |
| **Quality** | **Plain paper** |

***Notes:*** • Use only continuous-type labels and use them only with the tractor.
. Examples of labels —Avery Continuous Form Labels
—Avery Mini-Line Labels
• Printing of envelopes is guaranteed only at room temperature and normal humidity (15 - 25° C (59 - '77° F) ,20- 6(Mo RH).

### 1.2.1.3 Printable Area

***Cut sheets***

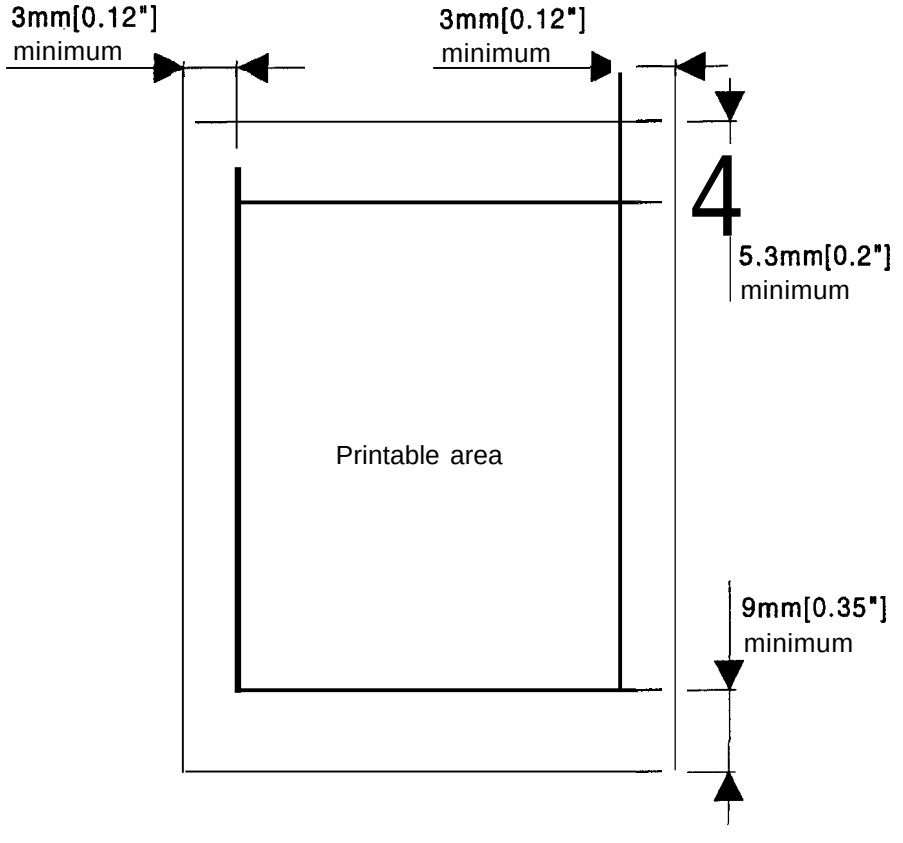



**Figure 1-3. Printable Area for Cut Sheets**

### *Envelopes*

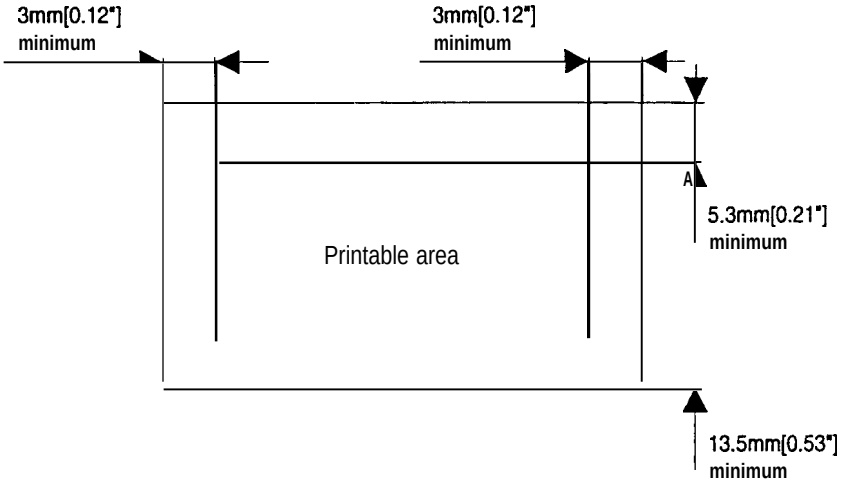



**Figure 1-4. Printable Area for Envelopes**

### *Continuous paper*

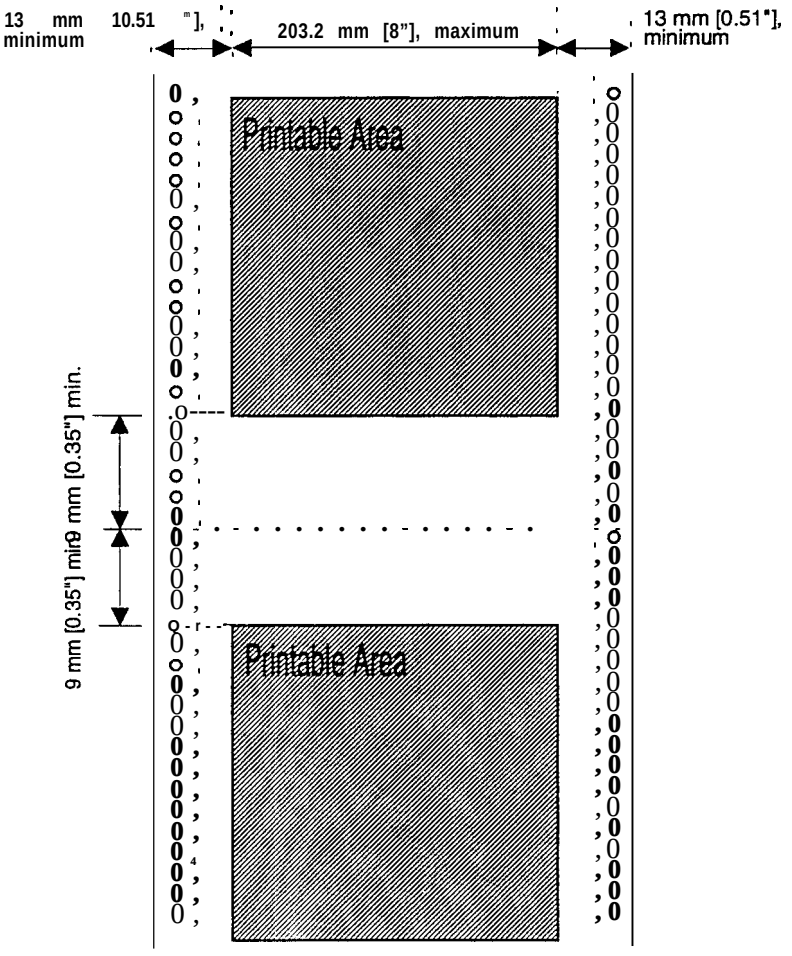



**Figure 1-5. Printable Area for Continuous Paper**

### 1.2.1.4 Ribbon Specifications

Ribbon cartridge (mono): #7753
#7755 (sub-cartridge)
Ribbon cartridge (film): #7768
Ribbon cartridge (color): S015077

Ribbon color: Black, magenta, cyan, yellow

Black ribbon life: 2 million characters (48 dots/character)
Film ribbon life: 0.2 million characters (48 dots/character)
Color ribbon life
Black: 1 million characters (48 dots/character)
Magenta: 0.7 million characters (48 dots/character)
cyan: 0.7 million characters (48 dots/character)
Yellow: 0.5 million characters (48 dots/character)

### 1.2.1.5 Electrical Specifications

**Table 1-9. Electrical Ranges**

| Description | 120 V Version | 230 V Version |
|---|---|---|
| Rated voltage | 120 VAC | 220-240 VAC |
| Input voltage range | 103.5-132 VAC | 198-264 VAC |
| Rated frequency range | 50- 60 Hz | |
| Input frequency range | 49.5- 60.5 Hz | |
| Rated current | 1.1 A | 0.6 A |
| Power consumption | 30 W (self-test in 10 cpi draft) | |
| Insulation resistance | 10 MΩ, minimum (applying 500 VDC between AC line and chassis) | 10 MΩ, minimum (applying 500 VDC between AC line and chassis) |
| Dielectric strength | 1000 VAC ms for 1 minute or 1200 VAC rms for 1 second (between AC line and chassis) | 1500 VAC rms for 1 minute (between AC line and chassis) |

#### 1.2.1.6 Environmental Conditions

Temperature range:

Operation: 5to35“C (41 to 95 “F)
Operation (film ribbon): 15to35‘C (59 to 95 ‘F)
Operation (envelopes, labels, or recycled paper): 15to25‘C (59 to 77 °F)
Storage: –20 to55‘C (-4 to 131 ‘F)

Humidity (without condensation):

Operation: 5 to 80%RH
Operation (film ribbon): 10 to 80% RH
Operation (envelopes, labels, or recycled paper): 20 to 60% RH
Storage: 5 to 85%RH

### 1.2.1.7 Reliability

MTBF: 4000 power on hours (POH)
Printhead life: 200 million strokes/wire (with monochrome ribbon)
100 million strokes/wire (with color and film ribbon)

### 1.2.1.8 Safety Approvals

| | | |
|---|---|---|
| Safety standards: | U.S. version: | UL1950 with D3, CSA22.2 #950 with D3 |
| | European version: | EN 60950 (TÜV)<br>IEC950 (SEMKO, DEMKO, NEMKO, SETI) |
| Radio frequency interference: (RFI) | U.S. version: | FCC part 15 subpart B class B |
| | European version: | Vfg.243 (VDE0878 part 3, part 30)<br>EN55022 (CISPR PUB. 22) class B |

### 1.2.1.9 Physical Specifications

| | |
|---|---|
| Dimensions (W x D x H): | 366 x 275x 141 mm (14.4 x 10.8x 5.6 inches) without tractor |
| Weight without tractor: | 4.3 kg (9.5 lb.) |

## 1.2.2 Firmware Specifications

| | |
|---|---|
| Control codes: | ESC/P2<br>IBM X24E emulation<br>EPSON remote |
| Input data buffer: | 8KB |
| Download memory: | 10KB |
| Character sets: | 14 international character sets and one legal character set |
| Character tables: | |

**Table 1-10. Character Tables**

| Character Table | Standard Model | NLSP* Model |
|---|---|---|
| ITALIC | o | 0 |
| PC437 (US, Standard Europe) | o | 0 |
| PC850 (Multilingual) | o | 0 |
| PC860 (Portuguese) | o | x |
| PC861 (Icelandic) | o | x |
| PC863 (Canadian-French) | o | x |
| PC865 (Norwegian) | o | x |
| BRASCII | O | x |
| Abicomp | o | x |
| PC852 (East Europe) | x | o |
| PC853 (Turkish) | x | o |
| PC855 (Cyrillic) | x | o |
| PC857 (Turkish) | x | O |
| PC864 (Arabic) | x | O |
| PC866 (Russian) | x | o |
| PC869 (Greek) | x | o |
| PC437 Greek | x | o |
| ISO Latin IT (Turkish) | x | o |
| ISO 8859-7 (Greek) | x | o |
| Code MJK (Czecho, Slovakia) | x | o |
| MAZOWIA (Polland) | x | o |
| Bulgaria (Bulgaria) | x | o |

***0** Supported **x** Not supported*
*' NSLP = **National Language** Support*

| | | |
|---|---|---|
| Bitmap fonts: | EPSON Draft | (10 cpi/ 12 cpi/ 15 cpi) |
| | EPSON Roman | (10 cpi/ 12 cpi/ 15 cpi/ Proportional) |
| | EPSON Saris Serif | (10 cpi/ 12 cpi/ 15 cpi/ Proportional) |
| | EPSON Courier | (10 cpi/ 12 cpi/ 15 cpi) |
| | EPSON Prestige | (10 cpi/ 12 cpi) |
| | EPSON Script | (10 cpi/ 12 cpi) |
| Scalable fonts: | EPSON Roman | 8-32 points (units= 2 points) |
| | EPSON Sans Serif | 8-32 points (units= 2 points) |
| | EPSON Roman T | 8-32 points (units= 2 points) |
| | EPSON Saris Serif H | 8- 32points (units = 2 points) |
| Character matrix: | Draft 10 cpi; 12 horizontal dots, 24 vertical dots | |
| | NLQ 10 cpi; 36 horizontal dots, 24 vertical dots | |
| Print mode: | Double-width<br>Double-height<br>Condensed<br>Bold<br>Double-strike<br>Italics<br>Super/subscript<br>Outline<br>Shadow<br>Underline (single, double, single-broken, double-broken)<br>Strike-through (single, double, single-broken, double-broken)<br>OverScore (single, double, single-broken, double-broken) | |
| Resolution: | See Table 1-11. | |
| Printing speed and printable columns: | See Table 1-12. | |

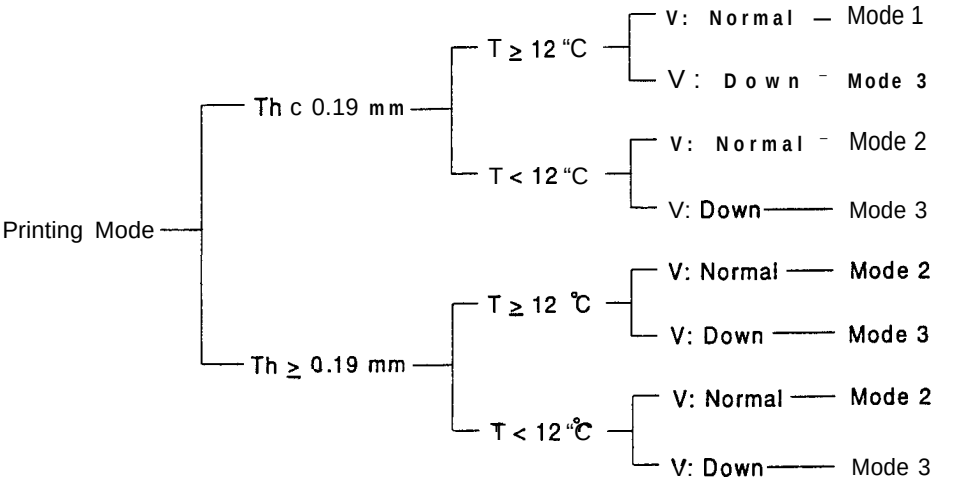
**Table 1-11. Resolution**

| Printing Mode | Horizontal Density | Vertical Density | Adjacent Dot Printed? |
|---|---|---|---|
| Draft | 120 dpi | 180 dpi | No |
| Draft condensed | 240 dpi | 180 dpi | No |
| LQ | 360 dpi | 180 dpi | No |
| 8-pin bit image | 60 dpi | 60 dpi | Yes |
| | 120 dpi | 60 dpi | Yes |
| | 120 dpi | 60 dpi | No |
| | 240 dpi | 60 dpi | No |
| | 80 dpi | 60 dpi | Yes |
| | 90 dpi | 60 dpi | Yes |
| 24-pin bit image | 60 dpi | 180 dpi | Yes |
| | 120 dpi | 180 dpi | Yes |
| | 90 dpi | 180 dpi | Yes |
| | 180 dpi | 180 dpi | Yes |
| | 360 dpi | 180 dpi | No |

## Table 1-12. Printing Speed

| Printing Mode | Character Size | Printable Columns | Maximum Print Speed [cps] | | |
|---|---|---|---|---|---|
| | | | **Mode 1** | Mode 2 | Mode 3 |
| Draft | 10 cpi | 80 | 200 | 133 | 100 |
| | 12 cpi | 96 | 240 | 160 | 120 |
| | 15 cpi | 120 | 300 | 200 | 150 |
| Draft condensed | 17 cpi | 137 | 171 | 114 | 86 |
| | 20 cpi | 160 | 200 | 133 | 100 |
| | 10 cpi | 80 | 67 | 50 | 33 |
| | 12 cpi | 96 | 80 | 60 | 40 |
| | 15 cpi | 120 | 100 | 75 | 50 |
| LQ condensed | 17 cpi | 137 | 114 | 86 | 57 |
| | 20 | 160 | 133 | 100 | 67 |

***Vote:*** Each maximum print speed is changeable depending on attributes of characters within the line.




Th: Paper thickness
T : Printhead temperature
V : Printhead driving voltage

# 1.3 INTERFACE SPECIFICATIONS

LQ-300 has a Centronics-compatible parallel interface and an EIA-232D serial interface, one of which can be selected in default setting mode. Auto selection is also available.

## 1.3.1 Parallel Interface

The parallel interface has two modes:

. Compatible mode
• Reverse mode

### 1.3.1.1 Compatible Mode

| | |
|---|---|
| Data format: | 8-bit parallel |
| Synchronization: | By $\overline{\text{STROBE}}$ pulse synchronization |
| Handshaking: | By BUSY and $\overline{\text{ACKNLG}}$ signals |
| Signal level: | TTL-compatible level (IEEE-P1284 level 1 device) |
| Adaptable comector: | 36-pin 57-30360 (Amphenol) or equivalent |
| Data transmission timing: | See Figure 1-6. |

***Note:*** Transition time (rise time and fall time) of every input signal must be less than 0.2 µs.

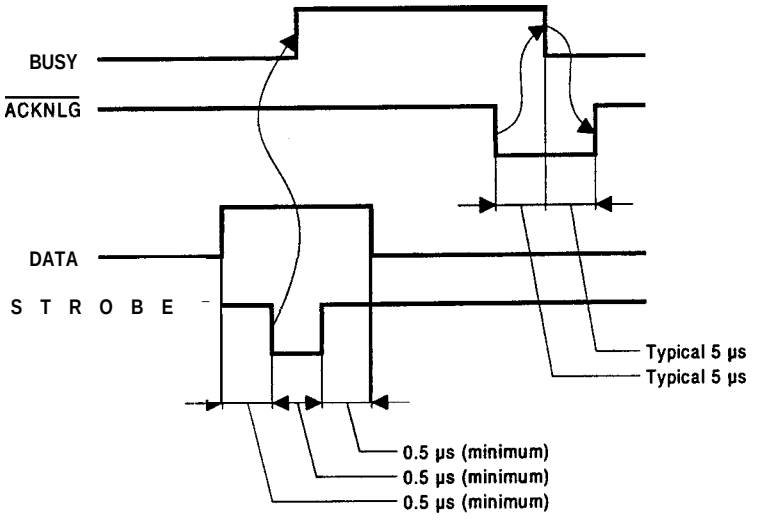



**Figure 1-6. Data Transmission Timing**

The BUSY signal is active (HIGH) under the following conditions:

. During data reception (See Figure 1-6.)
• When the input buffer is full
. When the INIT input signal is active
. During a printer error
. During the self-test mode
. During the default setting mode
. When the parallel interface is not selected

The $\overline{\text{ERROR}}$ signal is active (LOW) under the following conditions:

. When a paper-out error occurs
. When a release lever operation error occurs
• When a fatal error occurs

The PE signal is active (HIGH) under the following conditions:

• When a paper-out error occurs

Table 1-13 shows the connector pin assignments and signal functions for the 8-bit parallel interface.

## Table 1-13. Signal and Connector Pin Assignments for Parallel Interface

| Pin No. | Signal Name | Return GND Pin | I/O* | Description |
|---|---|---|---|---|
| 1 | $\overline{\text{STROBE}}$ | 19 | In | The $\overline{\text{STROBE}}$ pulse is used to read the input data. The pulse width must be more than 0.5 µs. Input data is latched after the falling edge of this signal. |
| 2-9 | DATAO-DATA7 | 20-27 | In | Parallel input data to the printer. A HIGH level means data 1. A LOW level means data O. |
| 10 | $\overline{\text{ACKNLG}}$ | 28 | out | This pulse indicates data has been received and the printer is ready to accept more data. The pulse width is approximately 12 µs. |
| 11 | BUSY | 29 | Out | HIGH indicates the printer cannot accept more data. |
| 12 | ‘ E | 28 | Out | HIGH indicates paper-out. This signal is effective only when the ERROR signal is LOW. |
| 13 | SLCT | 28 | Out | Always HIGH output. (Pulled up to +5 V through 3.3K Ω resistor.) |
| 14 | $\overline{\text{AFXT}}$ | 30 | In | Not used. |
| 15,34 | NC | . | — | Not connected. |
| 16 | GND | — | — | Signal ground. |
| 17 | Chassis GND | — | — | Chassis ground. |
| 18 | LOGIC-H | — | out | Pulled up to +5 V through 3.9K Ω resistor. |
| 19-30 | GND | . | — | Signal ground. |
| 31 | INIT | 30 | In | Input for printer initialization. Pulse width 50 µs minimum, active LOW. |
| 32 | $\overline{\text{ERROR}}$ | 29 | Out | LOW indicates that some error has occurred in the printer. |
| 33 | GND | — | — | Signal ground. |
| 35 | +5V | — | out | Pulled up to +5 V through 3.3K Ω resistor. |
| 36 | SLIN | 30 | In | Not used. |

* *The //0 column indicates the direction of the signal as viewed from the printer.*

### 1.3.1.2 Reverse Mode

LQ-300 reverse mode supports IEEE-P1284 nibble mode, described in this section.

Transmission mode: IEEE-P1284 nibble mode

Signal level: IEEE-P1284 level 1 device

Adaptable connector: 36-pin 57-30360 (Amphenol) or equivalent

**Table 1-14. Signal and Connector Pin Assignments for Parallel Interface**

| Pin No. | Signal Name | Return GND Pin | I/O* | Description |
|---|---|---|---|---|
| 1 | HostClk | 19 | In | Host clock signal. |
| 2-9 | DATA0-7 | 20-27 | In | Signals DATA0 through DATA7 represent data bits O to 7. |
| 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 I DataBit-I,5 | 28 | Out | X-flag signal and reverse channel transfer data bit 1 or5. |
| 14 | HostBusy | 30 | In | Host busy signal. |
| 15 | NC | — | — | Not connected. |
| 16 | GND | · | — | Signal ground. |
| 17 | Chassis GND | — | — | Chassis ground. |
| 18 | Logic-H | — | out | Pulled up to +5 V via 3.9K Ω resistor. |
| 19-30 | GND | — | — | Signal ground. |
| 31 | $\overline{\text{INIT}}$ | 30 | In | Not used. |
| 32 | $\overline{\text{DataAvail}}$ / DataBit-0,4 | 29 | Out | Data available signal and reverse channel transfer bit O or 4. |
| 33 | GND | — | — | Signal ground. |
| 34 | NC | — | — | Not connected. |
| 35 | +5 V | — | out | Pulled up to +5 V via 3.3K S2 resistor. |
| 36 | 1284-Active | 30 | In | 1284 active signal. |

* *The I/O column indicates the direction of the signal as viewed from the printer.*

### 1.3.2 Serial Interface

The LQ-300 is equipped with an 8-bit serial interface, standard.

Data format: EIA-232D serial

Synchronization: Asynchronous

Handshaking: By DTR protocol, X-ON/X-OFF protocol, ETX/ACK protocol

Word length
- Start bits: 1 bit
- Data bits: 7 or 8 bits (selectable)
- Parity bit: Odd, even, or none (selectable)
- Stop bits: 1 bit

Bit rate: 300,600,1200,2400,4800, 9600,19200 bps (selectable)

Logic level
- MARK (logical 1): –3 V to –25 V
- SPACE (logical O): +3 v to +25 v

Parity check: Odd, even, or no parity bit (selectable)

Connector: EIA standard 25-pin D-SUB female comector

**Table 1-15. Signal and Connector Pin Assignments for Serial Interface**

| Pin No. | Signal Name | I/O* | Description |
|---|---|---|---|
| 1 | Chassis GND | — | Chassis ground. |
| 2 | TXD | out | Transmit serial data. |
| 3 | RXD | In | Receive serial data. |
| 4 | RTS | out | Request to send. Always SPACE level when the printer is powered on. Pulled up to +12V via 4.7K Ω resistor. |
| 7 | Signal GND | — | Return path for data and control signals. |
| 11 | REV | out | Connected directly to the DTR signal. |
| 20 | DTR | out | Indicates that the printer is ready to receive data or not. |
| 5,6,8-10, 12-19, 21-25 | NC | — | No connection (not used). |

* *The I/O column indicates the direction of the signal as viewed from the printer.*

### 1.3.3 Interface Selection

The printer has 2 interfaces: parallel and serial. These interfaces can be selected manually in default-setting mode or selected automatically.

- Manual selection

  One of the two interfaces can be selected in default-setting mode.

. Automatic selection

  When automatic interface selection is enabled in default-setting mode, the printer is initialized to idle state scanning, in which an interface receives data when it is powered on, and the interface that receives data first is selected. When the host stops data transfer, and the printer is in the standby state for 10 or 30 seconds (time selectable in the default-setting mode), the printer returns to the idle state. As long as the host sends data to the printer interface in the BUSY state, the currently selected interface remains the same.

. Interface state and interface selection

  When the parallel interface is not selected, the interface is in the BUSY state. When the serial interface is not selected, the interface sends X-OFF and sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface is in a READY state, the serial interface sends X-ON and sets the DTR signal SPACE. Notice that the interrupt signal such as a INIT signal on the parallel interface is not effective while that interface is not selected.

### 1.3.4 Preventing the Host from Data Transfer Timeout

Hosts abandon attempts at data transfers to peripherals when a peripheral is in BUSY state for dozens of seconds continuously. To prevent hosts from this kind of timeout, the printer receives data very slowly, several bytes per minute, even if the printer is in BUSY state. This slowdown is started when the rest of the input buffer becomes several hundreds of bytes. Finally, when the input buffer is full, the printer goes into the BUSY state continuously.

## 1.4 OPERATING INSTRUCTIONS

This section describes control panel operation functions, self-test, hexadecimal dump, paper feed, micro adjustment, and printer initialization methods.

### 1.4.1 Control Panel Operation

The printer control panel contains three non-lock-type push buttons and three LED indicators for easy operation of the various printer functions.

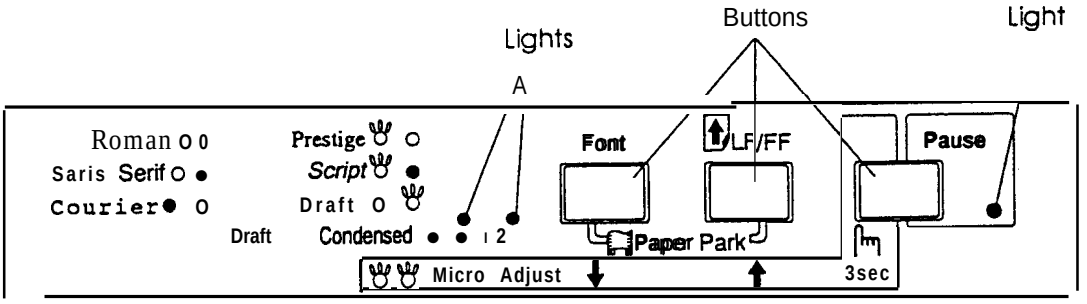



**Figure 1-7. Control Panel**

#### *Buttons*

| | |
|---|---|
| Pause: | Switches printer status between printing and no printing, if there is print data in the input buffer. When the printer is out of paper, the light flashes and the beeper sounds three times. |
| Font: | Selects one of the available fonts. When you hold down this button while you turn on the printer, you enter the printer setting mode. |
| LF/FF: | When you press this button, the printer feeds paper line by line. Hold it down to load a single sheet, or to advance continuous paper to next top-of-form position. |

#### *Indicators*

| | |
|---|---|
| Pause (Orange): | Lights when the printer in pause mode. |
| Font 1 and 2 (Green): | Indicates the currently selected font. |

#### *Special Mode*

| | |
|---|---|
| Self-test mode: | Hold down the LF/FF button and turn on the printer. |
| Hex dump mode: | Hold down the LF/FF and Font buttons and turn on the printer. |
| Default-setting mode: | Hold down the Font buttons and turn on the printer. |
| Micro adjustment mode: | Hold down the Pause button or Font button. |
| Paper park mode: | Hold down the Font and LF/FF buttons together. |

**Table 1-16. Paper Feeding Functions**

| Operations | Tractor Feed | | Friction Feed | |
|---|---|---|---|---|
| | Not Paper Out | Paper Out State | Not Paper Out | Paper Out State |
| Press LF/FF button briefly | Line feed (*1) | Load continuous paper | Line feed | Load a sheet (*2) |
| Press LF/FF button continuouslv | Form feed (*1) | Load continuous paper | Eject | Load a sheet (*2) |
| Press LF/FF and Font buttons at the same time | Paper park (*1) | — | — | — |
| Insert a sheet to the manual insertion slot | — | — | — | After 2 seconds load the sheet manuallv (*2) |

(*1): When the printer is in tear-off state, these functions are performed after returning from the tear-off position.

(*2) Once a manually inserted sheet is loaded, the printer enters manual insertion mode. After that, even if data remains in the buffer, the printer goes into a paper out error state at the end of every a sheet and waits for insertion of the next sheet. The CSF is enabled again by sheet loading operation from the CSF *or* by initialization.

### 1.4.2 Self-test Function

This section explains how to run the self-test.

1. Hold down the LF/FF button and turn on the printer to start the self-test.
2. If paper is not loaded, the printer attempts to load it.
3. The printer prints alphanumeric characters continuously.
5. Quit self-test mode printing bypressingthe Pause button and turning the printer off.

### 1.4.3 Hexadecimal Dump Function

The hexadecimal dump is a useful tool for troubleshooting data control problems. This section describes how to run a hex dump.

1. Turn on the printer while holding down the LF/FF and Font buttons.
2. If paper is not loaded, the printer attempts to load it (either single sheet or continuous paper).
3. If the printer cannot Ioad the paper, it indicates a paper-out error. In this case, insert paper again, and press the Pause button.
4. The printer waits for data after printing the message “Hex dump(*).”
   - “Hex Dump”: English or German is selected
   - “Codes Hexadecirnaux”: French is selected
   - “Dump esadecimale": Italian is selected
   - "Volcado hex”: Spanish is selected
5. Received data is printed as both hexadecimal codes and ASCII characters. If a corresponding printable character does not exist, the printer outputs a period (.).
6. Quit hexadecimal dump printing by pressing the PAUSE button and turning the printer off.

***Note:*** *In* hex dump mode, the character table depends on the default setting, and 10 cpi draft is selected automatically.

### 1.4.4 Micro Adjustment Function

To enter adjustment mode, press the Pause button for three seconds, until the printer beeps once and the Pause lights blink to indicate that the adjustment operation is available. If the printer state is not one of the conditions shown below, this operation is ignored.

- TOF position adjustment:
  The position can be adjusted just after the paper is loaded.
- Tear-off position adjustment:
  The position can be adjusted when paper is actually located at the tear-off position.

In the adjustment mode, press the LF/FF button to feed paper forward and the Font button to feed paper backward. You can cancel adjustment mode by pressing the Pause button or inputting a print coremand. The adjusted position is stored in non-volatile memory.

### *1.4.5* Printer Status Indication

This section describes how the printer indicates status and error conditions using LEDs and the beeper.

The symbols below describe the frequency of beeper sounds.

( • ): The beeper sounds for 100 rns with an interval of 100 ms between beeps.
(—): The beeper sounds for500rns.

| | |
|---|---|
| *While initialize* signal is active: | Pause light is on. |
| During initialization: | Pause light blinks |
| Standby or printing state: | Pause light is off |
| Pause state: | Pause light is on |
| Micro adjustment mode: | Beeper sounds ( •) and Pause light blinks. (light on:off ratio= 1:1) |
| Tear-off: | Pause light blinks (light on:off ratio= 1:6) |
| Paper-out error state(*1) | Beeper sounds (.. . ) and Pause light blinks (light on:off ratio= 6:1) |
| Operating error (*2), fatal error (*3): | Beeper sounds (— ) and Pause light is on. |

***Notes:***

(*1): A paper-out error occurs with any of the following conditions:

- Paper is not loaded after loading is attempted.
- A full sheet finishes printing after single sheet loading by manual insertion.
- The end of continuous paper is reached.

When a paper-out error occurs, the printer stops printing and enters the pause state. After that, when a sheet is loaded, the PAUSE light stops blinking and the light stays on, but the printer remains in the pause state. Press the PAUSE button to start printing.

(*2): An operating error occurs for any of the following conditions:

- The release lever is set to the TRACTOR position without ejecting cut sheets.
- The release lever is set the FRICTION position without ejecting continuous paper.

(*3): A fatal error occurs with any of the following conditions:

- Power supply voltage is abnormal.
- Printhead temperature is abnormal.

### 1.4.6 Selected Font

The combination of two **Font** LEDs (1 and2) is used to indicate the selected font.
To choose one of the seven internal fonts listed on the control panel, press the **Font** button.

**Table 1-17. Font Selection**

| Selected Font | Font 1 Light | Font2 Light |
|---|---|---|
| Roman | On | On |
| Saris Serif | On | off |
| **Courier** | off | **On** |
| Prestiae | Blinking | On |
| script | Blinking | off |
| **Draft** | **On** | **Blinking** |
| **Draft condensed** | **off** | **off** |

### 1.4.7 Printer Initialization

There are three types of initialization: power-on initialization, hardware initialization, and software initialization.

#### 1.4.7.1 Power-on Initialization

The power-on initialization is performed by turning the printer powered on. When the power-on initialization is performed:
. The printer mechanism is initialized.
• *The* hardware initialization is performed.

#### 1.4.7.2 Hardware Initialization

Hardware initialization is performed by:
. Turning on the printer.
. The falling edge of a negative pulse ora low signal on theparallel interface /INIT line.

When hardware initialization is performed:
• Print data in the input buffer is cleared.
. Download character definitions are cleared.
. The printer's settings areretumed to the defaults.
• *The* printer is set to the standby condition, if no fatal error occurs.

#### *1.4.7.3* Software Initialization

Software initialization is performed upon receipt of the control code ESC @. When software initialization is performed:
• Print characters in the buffer are not cleared.
. The printer setting is changed to the default, but download character definition is not cleared.

### 1.4.8 Printer Settings

#### 1.4.8.1 Selectable Printer Settings

The following printer settings can be changed by users in default-setting mode:

| | |
|---|---|
| Character table (Standard): | PC437/850/860/861 /863/865 /BRASCII/Abicomp |
| Character table (NLSP): | PC437/437 Greek/850 /852/853/855/857/864/866/869 /ISO Latin IT /ISO 8859-7/Code MJK/Mazowia/Bulgaria |
| Page length: | 11 /12/ 8.5/ 70/6 inches (A4) |
| l-inch skip-over-perforation: | On / Off |
| Auto tear off: | On / Off |
| Graphic print direction: | Unidirectional / Bidirectional |
| Software | ESC/P2 / IBM X24E |
| AGM: | on/ Off |
| Auto line feed: | On / Off |
| Interface: | Auto selection (10 second wait) / Auto selection (30 second wait)/ Parallel / Serial |
| Bit rate (serial I/F): | 300 / 600/ 1200/ 2400/ 4800/ 9600 / **19200** bps |
| Parity bit (serial I/F): | None / Odd/ Even |
| Data length (serial): | 7 bits / 8 bits |
| ETX/ACK (serial): | On / Off |
| State reply | On / Off |

**Note:** Underlines show factory setting.

#### 1.4.8.2 Changing the Default Settings

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

1. To enter the default setting mode, turn on the printer while holding down the Font button, The printer prints out the firmware version. Ifpaperisnot loaded, insert a sheet of paper.
2. The printer automatically loads paper and prints a table of languages to choose from: English, French, German, Italian, and Spanish. The Font lights indicate the currently selected language, as shown in the table below.

**Table 1-18. Font Lights and Language Selection**

| *Font 1 Light* | *Font 2 Light* | *Language* |
|---|---|---|
| OFF | ON | English |
| OFF | Blinks | French |
| ON | OFF | German |
| ON | ON | Italian |
| ON | Blinks | Spanish |

3. Press the Font button to change the language, and press the LF/FF button to select.
4. Press the Font button again after selecting a language. The printer prints help text to guide you in setting defaults. The printed instructions include submenu tables listing all the settings you can change and showing you how the control panel lights appear for each selection.
5. To change the settings, press the Font button to move down and press the LF/FF button to move up in the menu of options shown below. The printer beeps once each time you press the these buttons while you are in this menu.

## Table 1-19. Default Options

| Font 1 Light | Font 2 Light | Pause Light | Setting | Go to Submenu |
|---|---|---|---|---|
| Blinks | OFF | OFF | Character table | Table 1-20 |
| Blinks | ON | OFF | Page length | Table 1-21 |
| OFF | Blinks | OFF | Skip over perforation | Table 1-22 |
| ON | Blinks | OFF | Auto tear-off | Table 1-22 |
| Blinks | OFF | ON | Graphic print direction | Table 1-23 |
| Blinks | ON | ON | Software | Table 1-24 |
| OFF | Blinks | ON | AGM | Table 1-22 |
| ON | Blinks | ON | Auto line feed | Table 1-22 |
| Blinks | OFF | Blinks | interface | Table 1-25 |
| Blinks | ON | Blinks | Bit rate | Table 1-26 |
| OFF | Blinks | Blinks | Parity bit | Table 1-27 |
| ON | Blinks | Blinks | Data length | Table 1-28 |
| Blinks | Blinks | Blinks | ETX/ACK | Table 1-22 |
| Blinks | Blinks | OFF | State reply | Table 1-22 |

6. When you reach the setting you want to change, press the Pause button once. The printer automatically enters the submenu for that setting.
7. Press the Font button to move the through the settings in the submenu. The printer beeps twice each time you press the Font button while in a submenu.
8. When the lights match your desired setting, press the Pause button to make your selection. The printer saves the new setting and returns to the menu shown above.
9. Repeat steps 5 through 8 for each additional setting you want to change, or skip to step 10 to exit the printer's default setting mode.
10. When you are finished, turn the printer off. Any settings you have made remain in effect until you change them again.

## Table 1-20. Character Tables

| Font 1 Light | Font 2 Light | Pause Light | Standard Model | NLSP Model |
|---|---|---|---|---|
| OFF | OFF | OFF | PC 437 | PC 437 |
| ON | OFF | OFF | PC 850 | Pc 650 |
| OFF | ON | OFF | Pc 860 | PC 864 |
| ON | ON | OFF | PC 863 | PC 437 Greek |
| OFF | OFF | ON | PC 865 | Pc 652 |
| ON | OFF | ON | Pc 861 | PC 853 |
| OFF | ON | ON | BRASCII | PC 855 |
| ON | ON | ON | Abicomp | PC 857 |
| OFF | OFF | Blinks | — | Pc 866 |
| ON | OFF | Blinks | — | PC 869 |
| OFF | ON | Blinks | — | ISO Latin IT |
| ON | ON | Blinks | — | ISO 8859-7 |
| OFF | Blinks | Blinks | — | Code MJK |
| ON | Blinks | Blinks | — | Mazowia |
| Blinks | Blinks | Blinks | — | Bulgaria |

**Table 1-21. Page Length**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| **OFF** | **OFF** | **OFF** | 11 inches |
| ON | OFF | OFF | 12 inches |
| OFF | ON | OFF | 8.5 inches |
| ON | ON | OFF | 70/6 inches |

**Table 1-22. Skip Over Perforation / Auto Tear Off/ AGM / Auto Line Feed/ ETX/ACK / State Reply**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| OFF | OFF | OFF | off |
| ON | ON | ON | On |

**Table 1-23. Graphic Print Direction**

| *Font 1 Light* | *Font 2 Light* | *Pause Light* | Setting |
|---|---|---|---|
| **OFF** | **OFF** | OFF | Uni-D |
| ON | ON | ON | Bi-D |

**Table 1-24. Software**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| OFF | OFF | OFF | ESC/P2 |
| ON | ON | ON | IBM X24E |

**Table 1-25. Interface**

| *Font 1 Light* | *Font 2 Light* | *Pause Light* | *Setting* |
|---|---|---|---|
| OFF | OFF | OFF | Auto selection (10 ms wait) |
| ON | OFF | OFF | Auto selection (30 ms wait) |
| OFF | ON | OFF | Parallel |
| ON | ON | OFF | Serial |

**Table 1-26. Bit Rate**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| OFF | OFF | OFF | 300 bps |
| ON | OFF | OFF | 600 bps |
| OFF | ON | OFF | 1200 bps |
| ON | ON | OFF | 2400 bps |
| OFF | OFF | ON | 4800 bps |
| ON | OFF | ON | 9600 bps |
| OFF | ON | ON | 19200 bps |

**Table 1-27. Parity Bit**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| OFF | OFF | OFF | None |
| ON | OFF | OFF | Odd |
| OFF | ON | OFF | Even |

**Table 1-28. Data Length**

| Font 1 Light | Font 2 Light | Pause Light | Setting |
|---|---|---|---|
| OFF | OFF | OFF | 7 bits |
| ON | ON | ON | 8 bits |

## 1.5 MAIN COMPONENTS

The main components of the LQ-300 is designed for easy removal and repair. The main components are:

- C143 MAIN board: control board
- C130 PSB/PSE (120 V/230 V) board: power supply board
- M-5M1O: Printer mechanism
- Housing

### 1.5.1 C143 MAIN Board

The C143 MAIN board consists of the TMP90C041 (CPU), an E05B02(GA), a program/CG ROM, a PS-RAM, an EEPROM, etc.

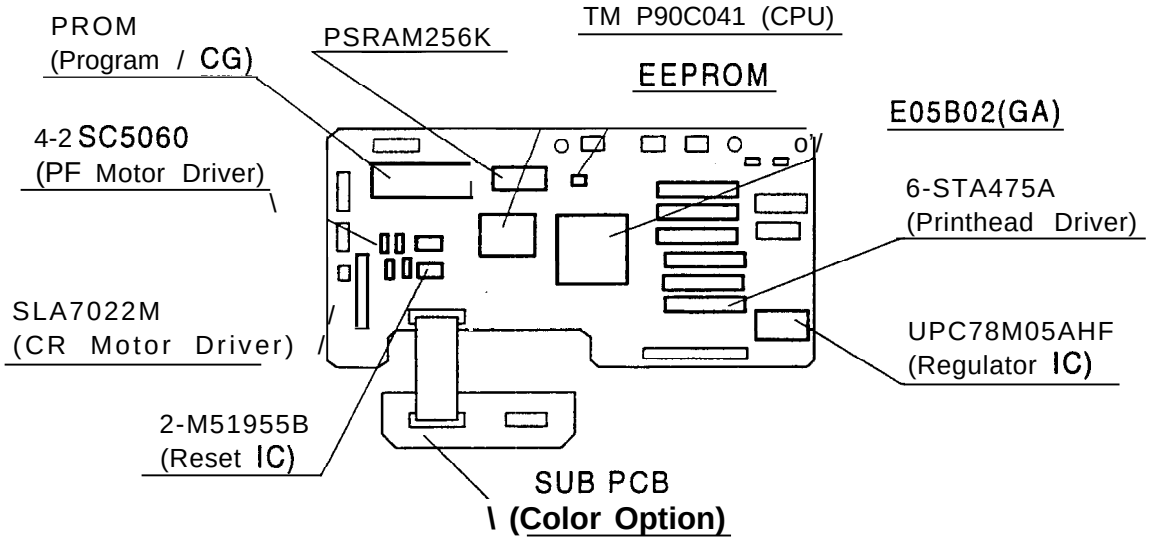



**Figure 1-8. C143 MAIN Board Component Layout**

### 1.5.2 C130 PSB/PSE Board

The power supply boards are the same as those for the LX-300. The boards have two ratings for input AC voltages: 120 VAC (C130 PSB) and 230 VAC (C130 PSE). Both boards consist of a transformer, switching FETs, regulator IC, diode bridge, etc. The power supply board provides +5 VDC and +35 VDC for the main board and printer mechanism.

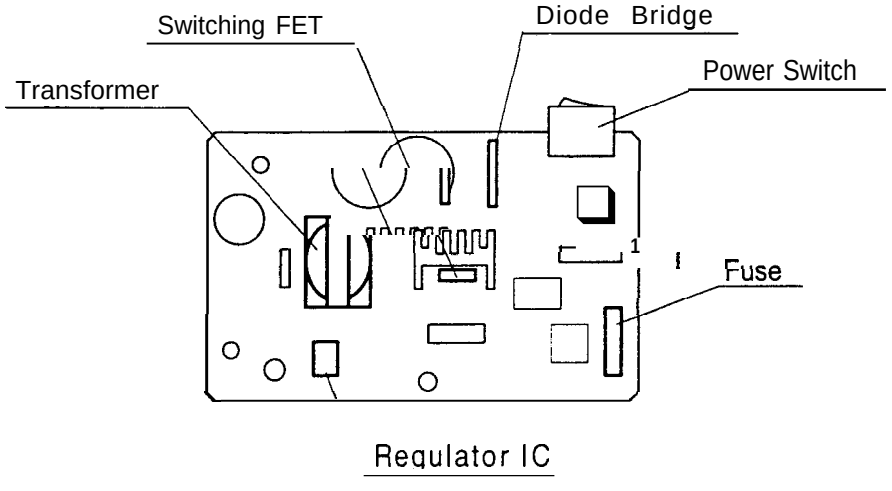



**Figure 1-9. C130 PSB/PSE Board Component Layout**

### 1.5.3 Printer Mechanism (M-5M1O)

The printer mechanism consists of 24-pin impact dot head, PF motor, RF motor, PE sensor, HP sensor, PG sensor, release lever sensor, etc.

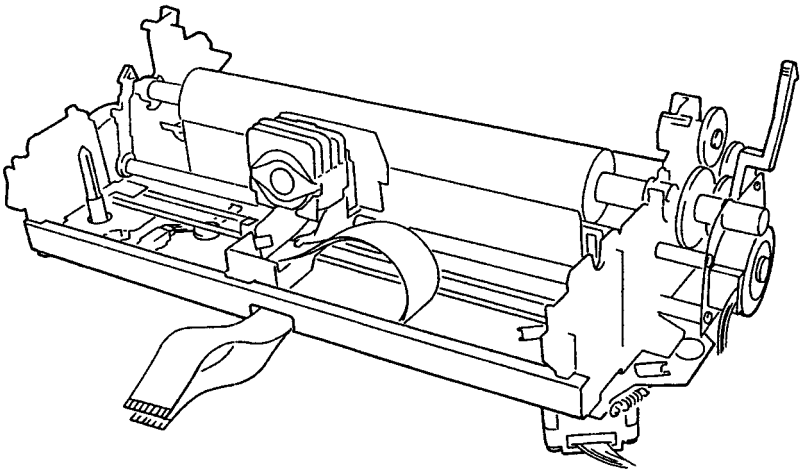


**Figure 1-10. Printer Mechanism**

### 1.5.4. Housing Assembly

This consists of printer cover assembly, edge guide assembly, upper housing, lower housing assembly, etc.

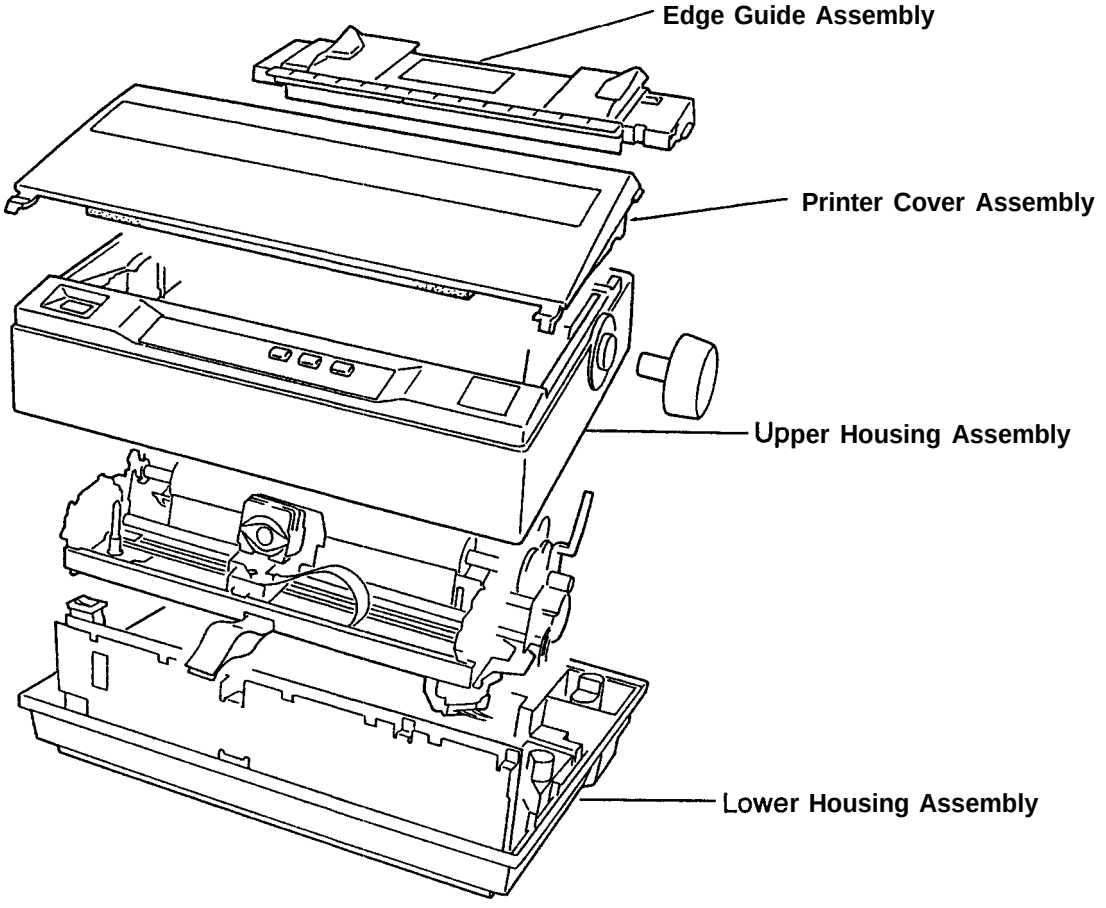



**Figure 1-11. Housing Assembly**

# CHAPTER 2 Operating Principles

## Table of Contents

## List of Figures



## List of Tables

# 2.1 PRINTER MECHANISM OPERATION

This section describes the printer mechanism and explains how it works.

## 2.1.1 Printing Mechanism

The printing mechanism is composed of the printhead, ink ribbon, and ribbon mask. The printhead is a 24pin head for impact dot printing. Each wire has own drive coil, which causes the wire to move in and out of the printhead to print each dot. The four steps below describe how these driving wires work.

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

This is the sequence used to print a single dot.

The mechanism is equipped with a built-in thermistor for head temperature detection. The temperature detected by the thermistor is converted to an electric signal and fed back to the control circuit.

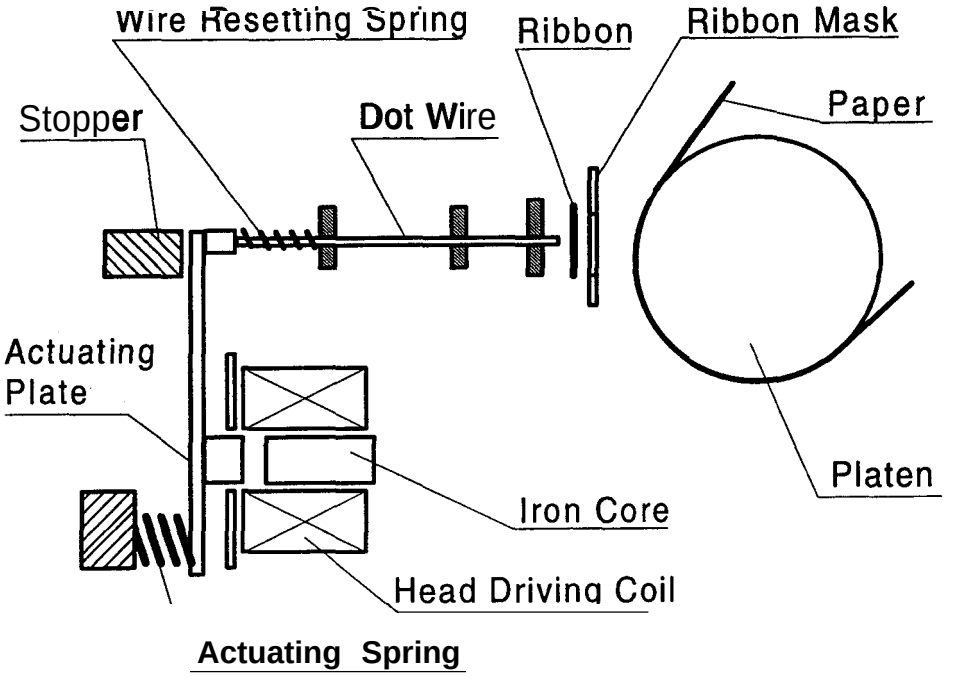



**Figure 2-1. Printhead Operation Principles**

### 2.1.2 Carriage Movement Mechanism

The carriage movement mechanism consists of the carnage assembly, CR motor, timing belt, driven pulley, HP sensor, etc. The CR motor drives the timing belt. The carnage assembly is connected to the timing belt, which is moved by the CR motor. Figure 2-2 shows the carriage movement mechanism.

The printer detects the carriage home position with the HI? sensor. This sensor is the basis for determining the carriage home position. The HP sensor informs the CPU of the carriage home position. The sensor is ON, when the carriage is pushed to the right or left. The striker on the carriage actives the sensor to indicate the carriage home position, which toggles the sensor to OFF.

**Table 2-1. CR Motor Assembly Specifications**

| Category | *Requirement* |
|---|---|
| Type | 4-phase, 96-pole, HB-type stepping motor |
| Drive Voltage | 31.5 -38.5 VDC |
| Coil Resistance | 19.6 Ω ± 8% (per phase, at 25° C, 77° F) |
| Drive Pulse Frequency | Normal Mode Draft 2400 pps<br>Color Mode LQ 1600 pps |
| Excitation Method | Constant-voltage 2-2 phase excitation<br>1-2 phase excitation |

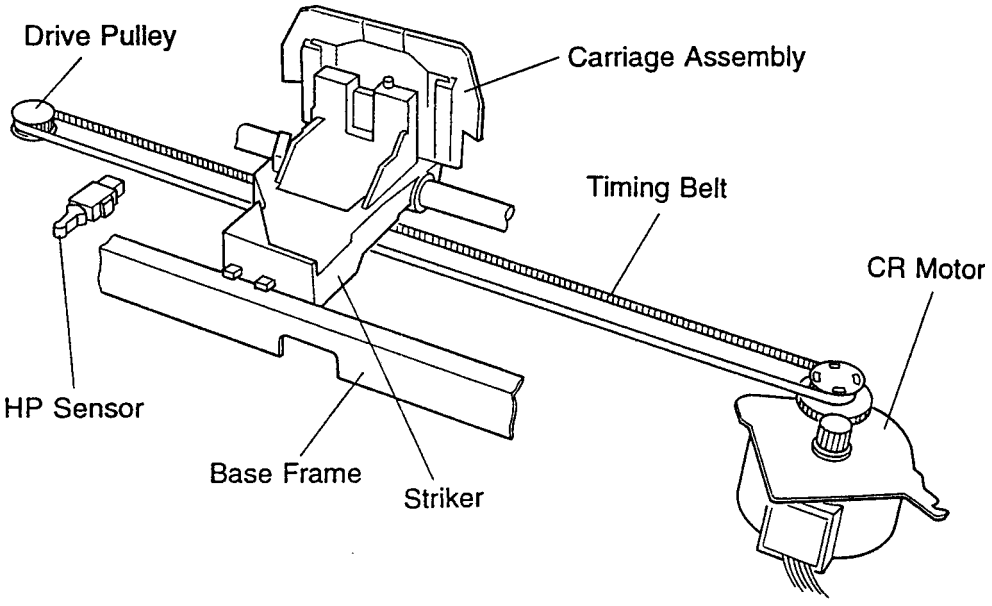



**Figure 2-2. Carriage Movement Mechanism**

## 2.1.3 Paper Handling Mechanism

During *normal* operation, paper is fed to the printer, advanced to the specified position, and ejected from the printer. These functions are performed by various paper handling mechanisms, such as the tractors, rollers, and gears. This section describes the paper handling mechanism for this printer.

### 2.1.3.1 Paper Feed Mechanisms

Cut sheets are fed by friction. Continuous paper is fed by a tractor. There are three ways to feed with tractors: the push tractor method, the pull tractor method, and the push-pull tractor method. During normal operation, the printer is set up with only one tractor, which functions as either a push or a pull tractor, depending on where it is attached on the printer. To use the push-pull tractor feed method, an optional tractor must be attached.

There are two ways to insert paper into the printer. Cut sheets use the top entrance and continuous paper uses rear insertion.

### 2.1.3.2 Paper Advance Mechanism

This section describes how the friction and tractor advance mechanisms feed paper through the printer. The paper advance mechanism consists of the PF motor, platen, driven roller assembly, driven roller cover, tractor assembly, knob, PF gear train, etc. The PF motor can drive the platen both forward and in reverse.

#### *Friction Advance Method*

Paper is held by the platen, the PF driven roller, and the eject roller assembly. Turning in the direction of the black arrows, the PF motor pinion gear drives the paper advance reduction gear. The paper advance reduction gear turns the platen gear, PF driven roller, and the platen. The platen drives the driven roller cover; then the driven roller cover drives to eject the paper. The paper advances in the direction of white arrows. Figure 2-3 shows the friction advance method when the paper is fed through the top paper entrance.

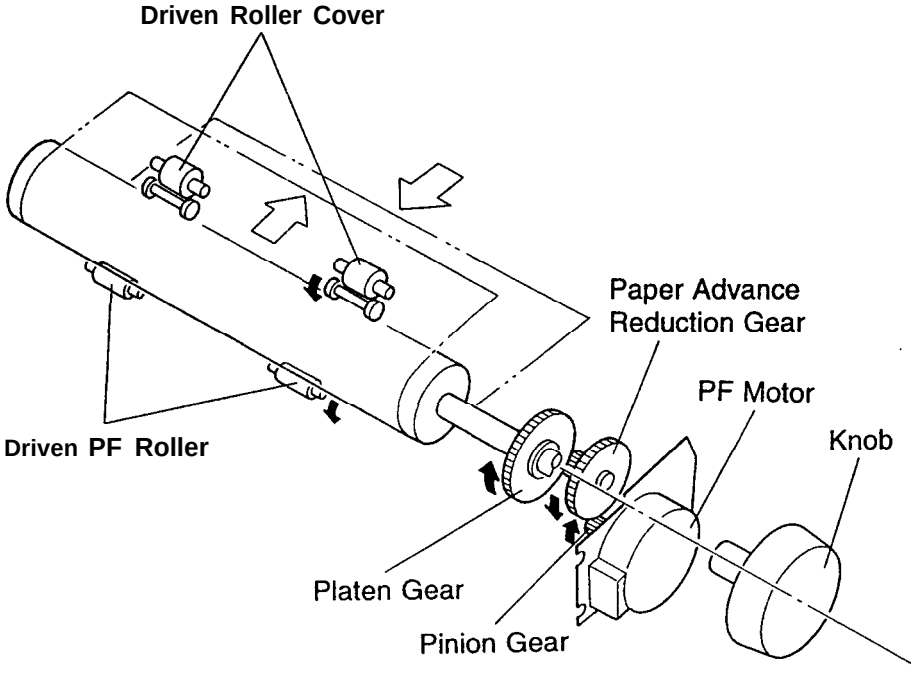



**Figure 2-3. Friction Advance Mechanism**

**Table 2-2. PF Motor Specifications**

| Category | Requirement |
|---|---|
| Type | 4-phase, 48-pole, PM-type stepping motor |
| Drive Voltage | 31.5 -38.5 VDC |
| Coil Resistance | 58.5 Ω ± 5% (per phase, at 25°C, 77°F) |
| Drive Pulse Frequency | 800,900, 1000, 1200, 1300 pps |
| Excitation Method | Constant-voltage 1-2 phase excitation |

### *Push Tractor Method*

When the push tractor method is used with the rear entrance, the torque generated by the PF motor is transmitted to the push tractor gear through the PF motor pinion gear, the paper advance reduction gear, and the tractor transmission gear. When the PF motor pinion gear turns in the direction of the black arrows, the tractor gear rotates in the direction of the black arrow and thus feeds the paper into the printer. The paper is advanced by the platen, which is also driven by the PF motor through the gear train.

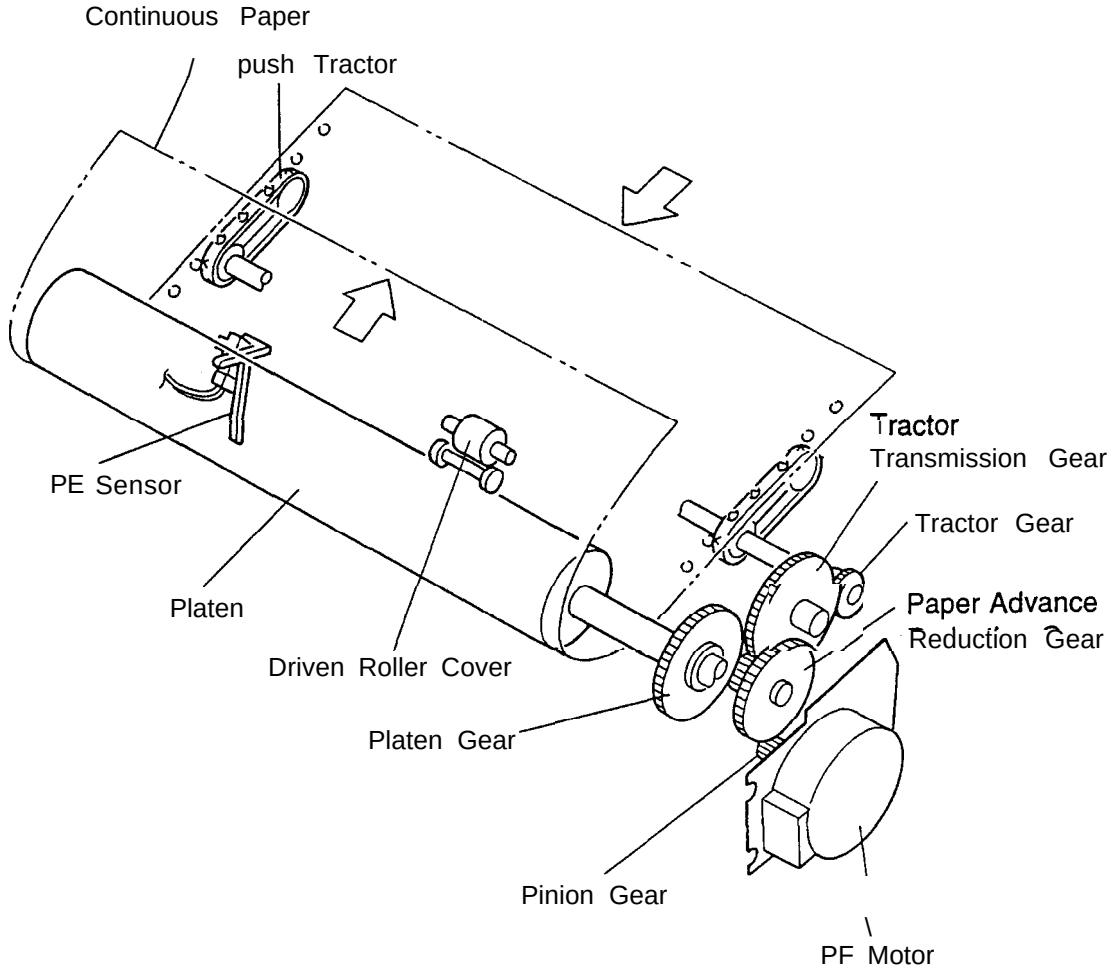



**Figure 2-4. Push Tractor Paper Advance Mechanism**

### Pull Tractor Method

The pull tractor advances paper in basically the same way as the push tractor. When the push tractor is installed at the paper exit instead of paper entrance, the tractor functions as a Pull tractor instead of a push tractor, pulling the paper out of the printer mechanism. Figure 2-5 shows the pull tractor advance mechanism.

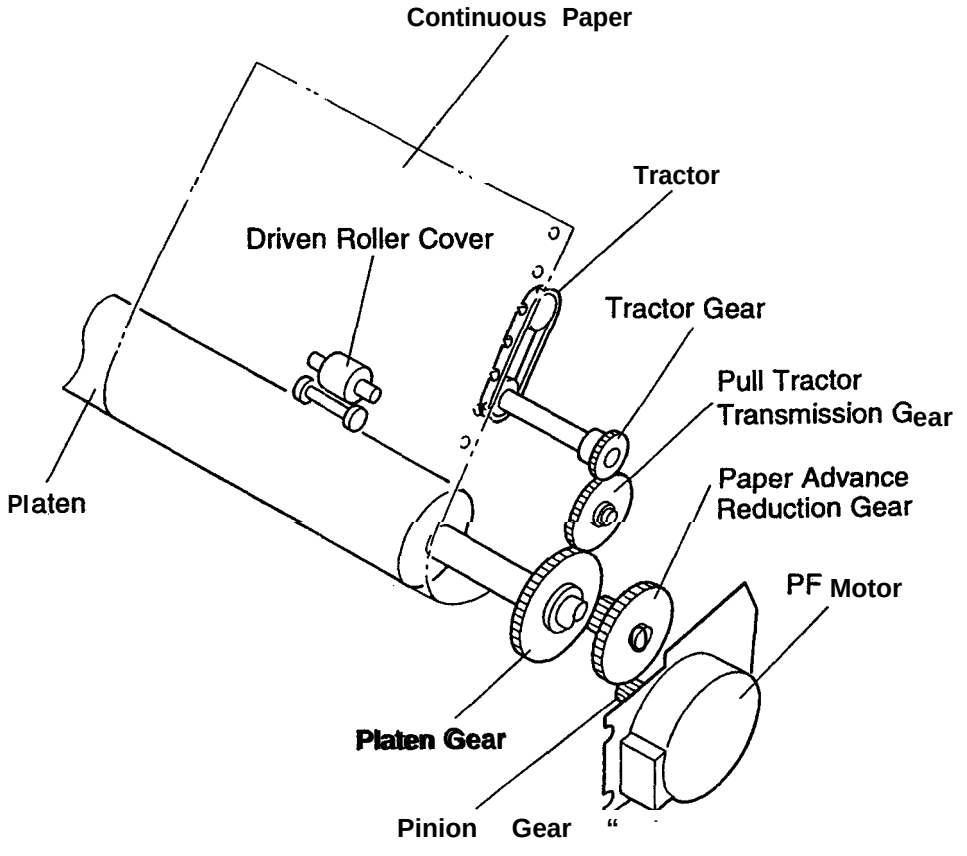



**Figure 2-5. Pull Tractor Paper Advance Mechanism**

### *Push - Pull Tractor Method*

The push-pull tractor method is a combination of the push method, using the standard tractor, and the pull method, using an optional tractor. The two tractors operate simultaneously to push and pull the paper through the printer mechanism. Figure 2-6 shows push-pull &actor operation when the paper is fed through the rear paper entrance.

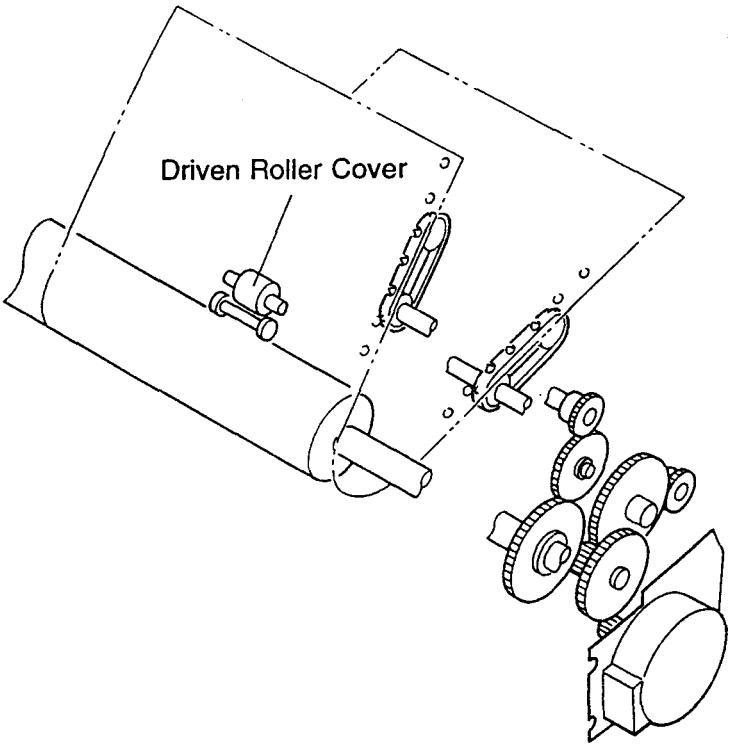



**Figure 2-6. Push-Pull Tractor Paper Advance Mechanism**

### *Disengage Lever*

The disengage lever switches whether or not the printer transmits the torque of the PF motor to the tractor transmission gear. (See Figures 2-5 and 2-6.)

The paper path is different from friction feed and tractor feed. The PF driven roller is not in the tractor feed paper path, so continuous paper is not advanced by this roller. Figure 2-7 shows the paper path.

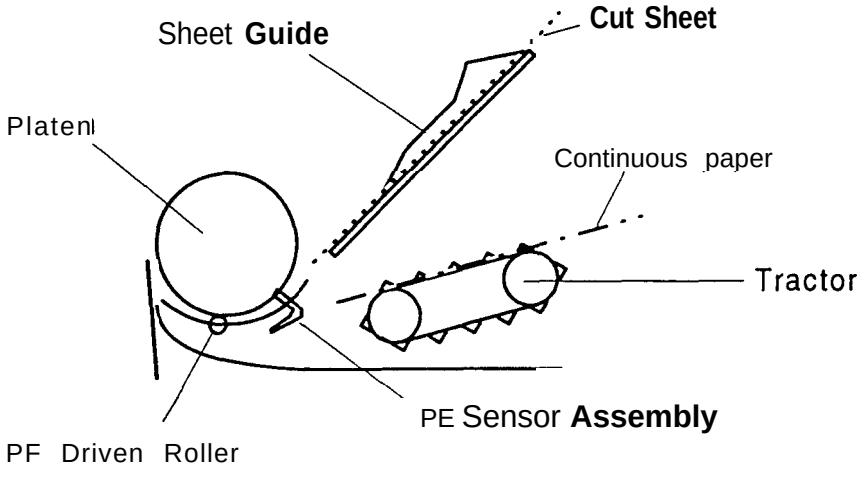



**Figure 2-7. Paper Path**

### 2.1.4 Ribbon Advance Mechanism

The ribbon is held between the ribbon advance roller (ribbon driven gear) and the ribbon pressure roller. When the carriage moves on the CR guide shaft from left to right and vice versa, the timing belt turns the belt driven pulley. Then the torque is transmitted to the ribbon driving gear through the gear trains. The ribbon driving gear rotates counterclockwise no matter what direction the carriage moves, because a planetary gear is used in the gear linkage.

**Table 2-3. Ribbon Advance Gear Linkage**

| Direction of Carriage Movement | Gear Linkage |
|---|---|
| **Left to right** (indicated by the black arrow) | Belt driven pulley → Gear(1)+ Gear (2) → Ribbon driving gear |
| Right to light indicated by the white arrow) | Belt driven pulley → Gear(1)+ Gear (3)+ Gear (4) → Ribbon driving gear |

The ribbon brake spring, attached to the exit of the cartridge case, prevents slack in the ribbon and keeps the ribbon tension at an appropriate level. The ribbon mask prevents the ribbon from brushing against the paper.

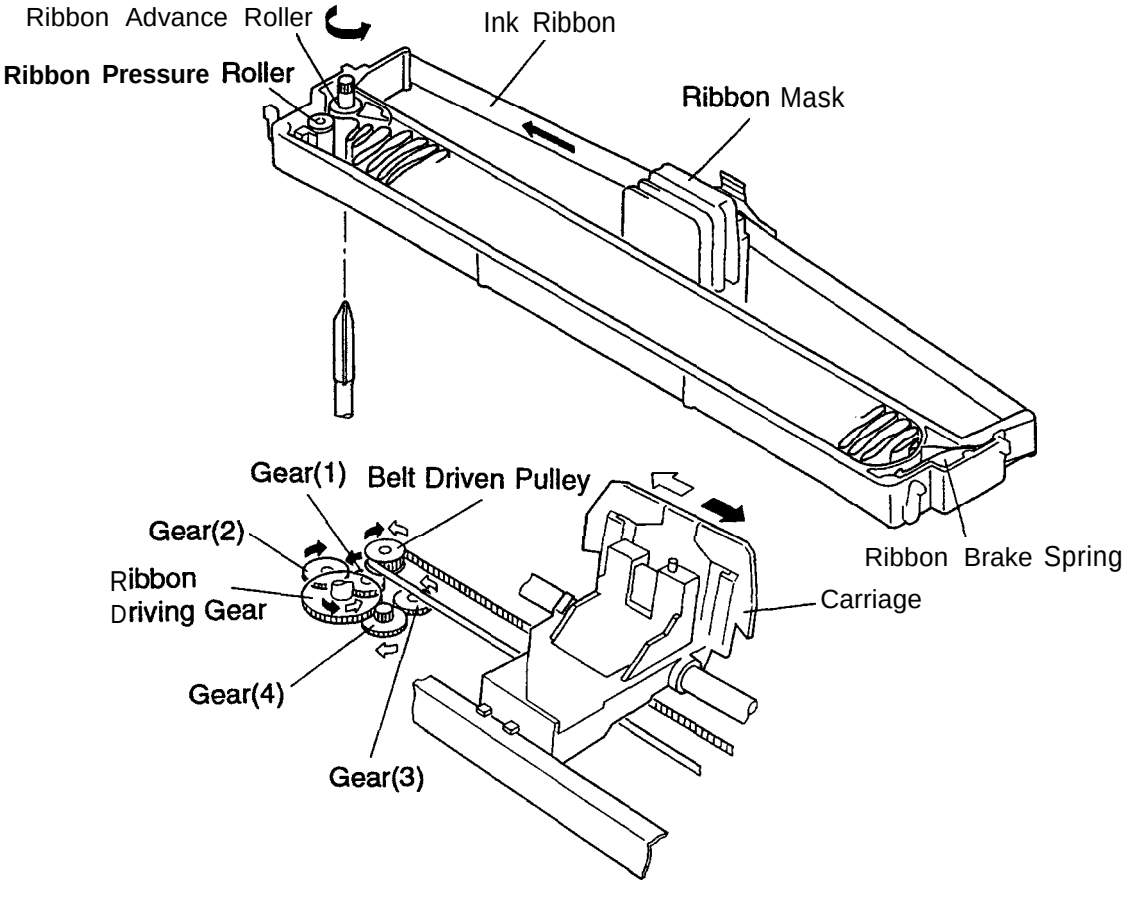



**Figure 2-8. Ribbon Advance Gear Linkage**

### 2.1.5 Ribbon Shift Mechanism

This printer can be equipped with a color upgrade kit to print in color. The printer performs color printing unidirectionally. The option is composed of the color ribbon shift mechanism. The color ribbon feed mechanism is shared in common with black ribbon feed mechanism, and the shift mechanism shifts the ribbon cartridge up and down.

Table 2-2 shows the CS motor specifications. The motor control system is open-loop, so that when the color is being changed, the positioning is controlled by stepping pulse.

**Table 2-4. CS Motor Specifications**

| Category | Requirement |
|---|---|
| **Type** | **4-phase, 48-pole, PM-type stepping motor** |
| Drive Voltage | 35 VDC ± 10% |
| Coil Resistance | 150 Ω ± 5% (per phase, at 25° C or 77° F) |
| Drive Pulse Frequency | Color shift 500 pps |
| Excitation Method | Constant-voltage 2-2 phase excitation |

The ribbon shift mechanism consists of the color ribbon and color upgrade kit. The color upgrade kit is composed of the CS motor, ribbon shift gear/cam, motor driver IC, and color ribbon sensor. The 1-inch-wide color ribbon is separated into four equal-width bands of different colors. The ribbon shift mechanism shifts the ribbon cartridge up and down.

When the color ribbon cartridge is loaded, it is possible to print in up to seven colors. One of the four colors on the ribbon is selected by the color ribbon cartridge motion, which inserts a portion of the plastic posts into the slots in the printer mechanism as a fulcrum. Figure 2-9 illustrates the color shift mechanism. The mechanism shifts the ribbon cartridge by converting the gear rotation to liner motion (up and down) of the color ribbon cartridge, using color shift cam gear.

Any color band can be selected by rotation of the CS motor, using the color home position (the position of the black color band) as a starting point and reference position. Home position is recognized by the CS motor stepping pulse. When printer is powered on, the CS motor is first excited at any phase position. Next, the CS motor is turned 235 steps ( black → yellow). Then, the motor returns one step (yellow→ black), and the motor is stopped. Finally, the motor returns 223 steps (yellow→ black) and stops. This position is home position.

Table 2-5 gives coloring sequences. For halftones, as shown in the table, a color is created by printing one color on top of another.

**Table 2-5. Coloring Sequences**

| Print Color | Print Ribbon | |
|---|---|---|
| | First Printing | Second Printing |
| **Black** | **Black** | — |
| Magenta | Magenta | — |
| Cyan | Cyan | — |
| Yellow | Yellow | — |
| Green | Yellow | Cyan |
| Orange | Yellow | Magenta |
| Violet | Magenta | Cyan |

***Note:*** ***The printer prints the brightercolor first to prevent the ribbon from being stained,***

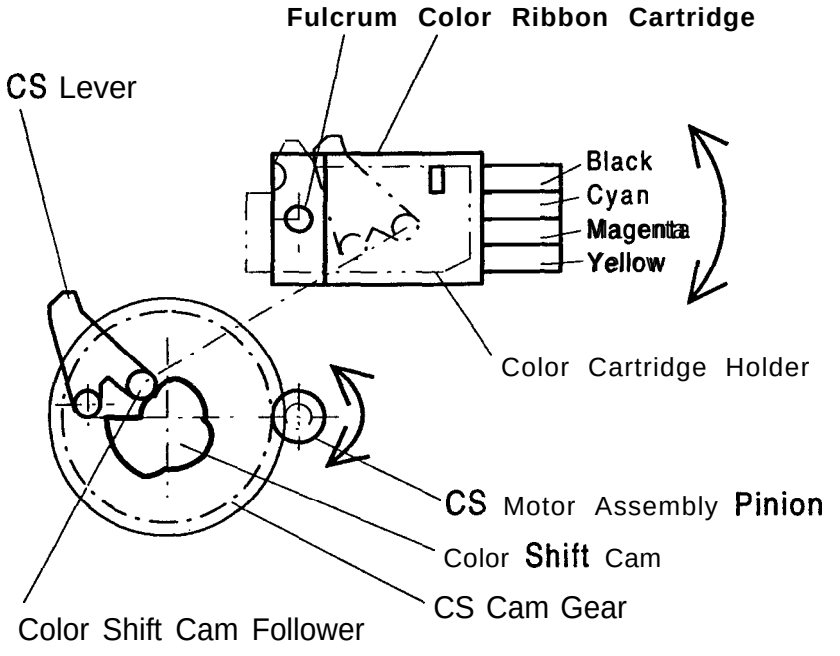



**Figure 2-9. Color Shift Mechanism**

### 2.1.6 Platen Gap Adjustment Mechanism

The platen gap (the gap between the platen and the printhead) can be adjusted to allow the printer to use paper of different weights or thicknesses. When the gap adjust lever is moved forward or backward, the CR guide shaft rotates. This rotation moves the carriage either toward or away from the platen and changes the platen gap. The correct platen gap is 0.45 ± 0.02 mm, with the gap adjust lever set to position O.

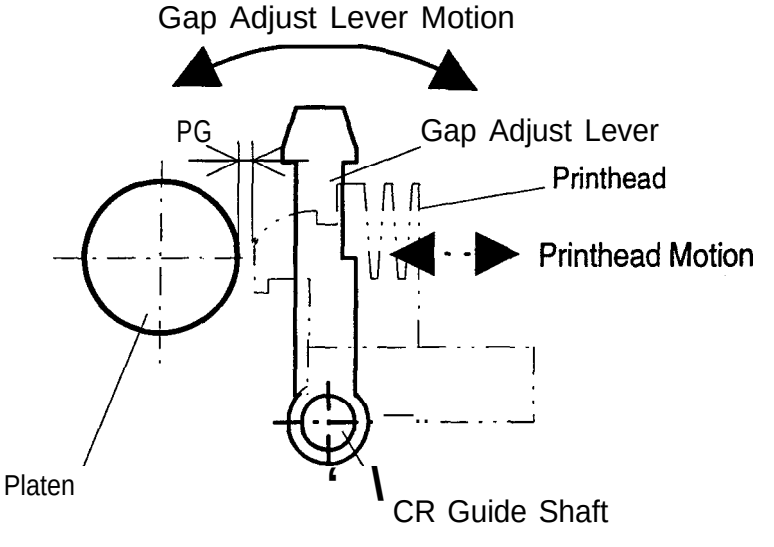



**Figure 2-10. Platen Gap Adjustment Mechanism**

## 2.2 POWER SUPPLY OPERATION

The printer can be powered by either of two power supply boards: the C130 PSB (120 V) or the C130 PSE (230 V) power supply. These boards are the same as the LX-300'S power supplies. The two boards function identically, except for a difference in primary circuitry. The power supply board outputs the DC current necessary to drive the printer control circuits and drive mechanism. Table 2-6 shows the input voltages and fuse ratings for these boards.

**Table 2-6. Power Supply Board**

| Board | Input Voltage | Fuse F1 Rating |
|---|---|---|
| C130 PSB | 100.5-132 VAC | 2.5A 1125 V, 250 V |
| C130 PSE | 198-264 VAC | 1.25 A 1250 V |

### 2.2.1 Power Supply Overview

The power supply board has two power outputs for use in the various control circuits and drive mechanisms. Table 2-7 lists the circuitry and the units that are driven by the two DC output supply voltages.

**Table 2-7. Power Supply Output Voltages and Applications**

| output supply Voltage (DC) | *Applications* |
|---|---|
| +35 v (VP) | CR motor drivers |
| | PF motor drivers |
| | Printhead drivers |
| | CS motor drivers |
| +9 V (VL) | Main board assembly logic circuitry |
| | Various sensors |
| | Control panel LED |
| | PF motor/ CS motor hold |

### 2.2.2 Power Supply Circuit Operation

Figure 2-11 shows a block diagram of the power supply circuitry. When AC power is supplied to the printer from an external power source, a filter circuit removes the noise. The AC voltage then undergoes full-wave rectification and is smoothed to produce the direct current supply voltage. This voltage is fed through a switching circuit and secondary smoothing circuit to produce the stepped down +35 VDC supply. A +35 V line voltage detector (ZD51 and PC1) circuit is connected to the switching circuit. This feedback control arrangement ensures that the +35 VDC supply is kept stabilized.

A +9 VDC supply is created by putting the +35 VDC line through the +9 VDC power supply circuit. This circuit further steps down the +35 VDC voltage and outputs a stabilized supply. The +9 VDC output is stabilized to +5 VDC using the regulator on the C130 MAIN board assembly. There are several circuits to protect the supply circuits and avoid danger.

The +9 VDC line contains a voltage overload protection circuit. The +9 V voltage overload protection circuit (ZD53, Q82, and PC1) cuts the supply if the voltage reaches or exceeds +11 VDC. It stops switching circuit operation, which stops the output from the +35 VDC line.

The +35 VDC line has a voltage overload protection circuit. The +35 VDC voltage overload protection circuit ( ZD52, Q82, and PC1 ) cuts the supply if the voltage reaches or exceeds +36 VDC. It stops switching circuit operation, which stops the output from the +35 VDC line.

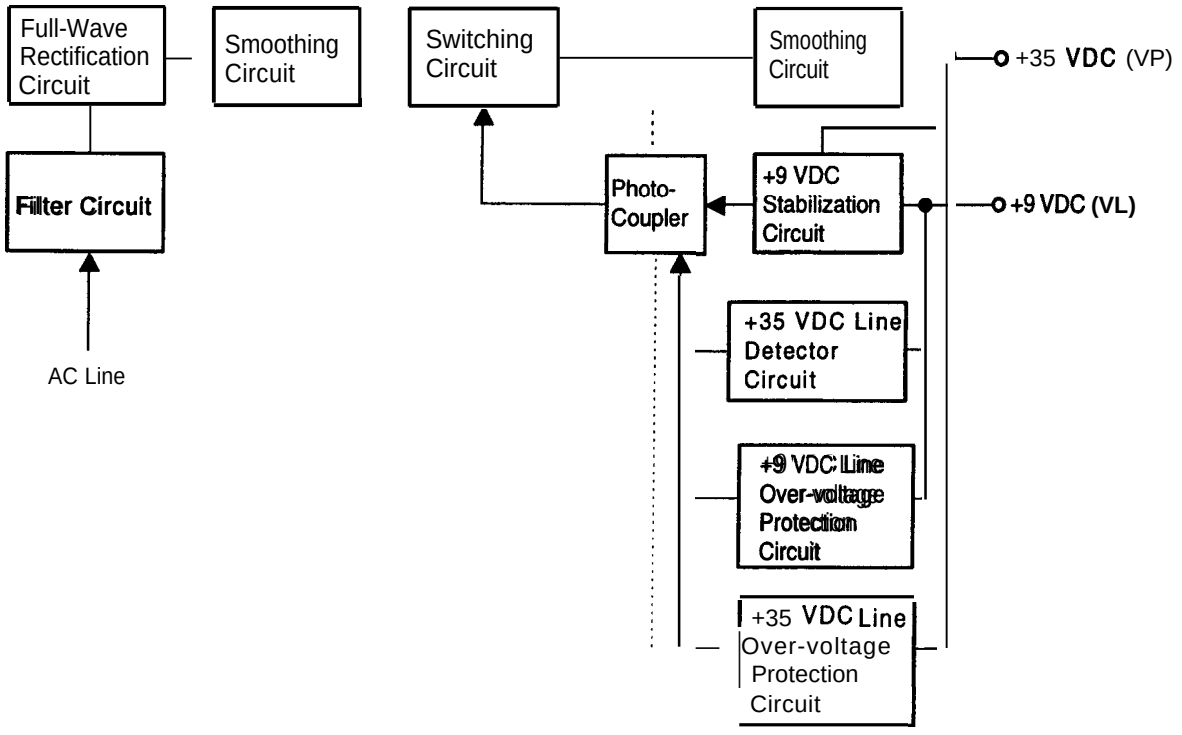



**Figure 2-11. Power Supply Circuit Block Diagram**

# 2.3 CONTROL CIRCUIT

The control circuit consists of the C143 MAIN board assembly. This section describes the major components and explains how the board works.

## *2.3.1* Control Circuit Operation Overview

The printer has a CPU (TMP90C041) that runs at 9.8304 MHz, a gate array (E05B02-type), a PS-RAM (256K-bit), a ROM (4 or 8M-bit), etc. It oversees control of all the components in the printer. The printer uses the E05B02 gate array to control memory management, parallel communications, PF motor drive signals, etc. Table 2-8 shows functions of ICs and circuits. Figure 2-12 shows the control circuits in block diagram form.

**Table 2-8. Functions of the Main IC**

| IC | *Location* | Function |
|---|---|---|
| CPU | IC1 | Receives data from the host computer and sends it to the input buffer in RAM (under interrupt processing control). Extends the input data held in the buffer to create image data. Loads this image data to the image buffer in RAM. Transfers the image data to the Printhead drive circuit. Also controls various parts of the printer mechanism, such as PF motor control and color select motor control. |
| Gate Array | IC2 | Controls the functions below:<br>• Input/Output Control<br>• Memory Management<br>. Bit Manipulation<br>• Interface Control<br>. Expanded Parallel Port<br>. Printhead Control<br>• Motor Control |
| EEPROM | IC3 | An electrically writable and erasable ROM used to hold such information as the TOF position and bidirectional adjustment value. |
| Serial I/F IC | IC4 | Driver / receiver |
| Reset IC | IC6 | Hardware reset function |
| | IC7 | Power off detection |
| ROM | IC10 | Contains the program that runs the CPU and holds the character design (also called the charaoter generator). |
| RAM | IC11 | Input buffer |

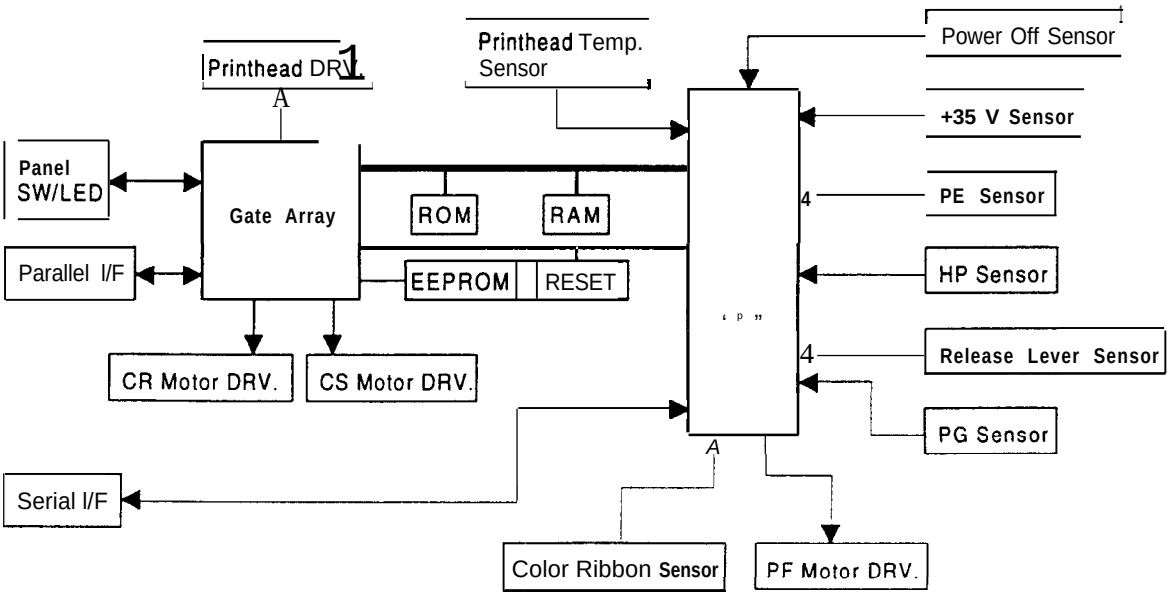
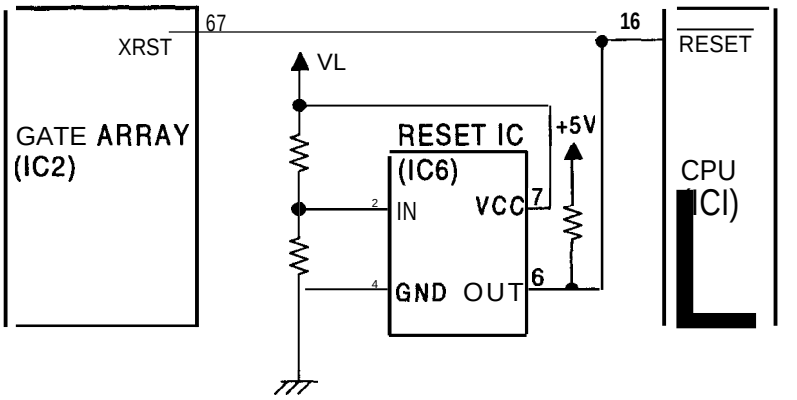



**Figure 2-12. Control Circuit Block Diagram**

### 2.3.2 Power On Reset Circuit

When the power supply is turned on and immediately the VL (+9 V) goes up to +7.5 V (typical), the reset IC (IC6) outputs the system RESET signal (LOW). The CPU and gate array receive this LOW level signal from the reset IC and reset themselves.




**Fgiure 2-13. Power On Reset Circuit Diagram**

### 2.3.3 Power Off Sensor Circuit

When the power supply is turned off and the VP (+35V) immediately goes down to +25 V (typical), the reset IC (IC7) outputs the system RESET signal (LOW). The CPU receives this LOW level signal from the reset IC and resets itself.

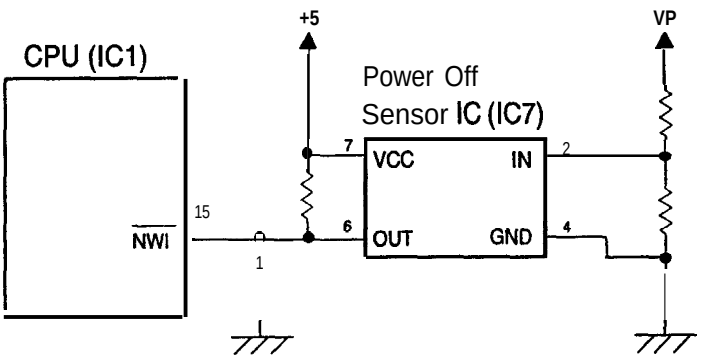



**Figure 2-14. Power Off Sensor Circuit Diagram**

### *2.3.4* Home Position Sensor Circuit

This printer has a connector switch to sense the carriage home position. The CPU receives a signal from the HP sensor and recognizes the carriage home position when the printer is turned on. The connector switch is open (OFF) when the carriage is in the home position and is closed (ON) when the carriage is out of home position.

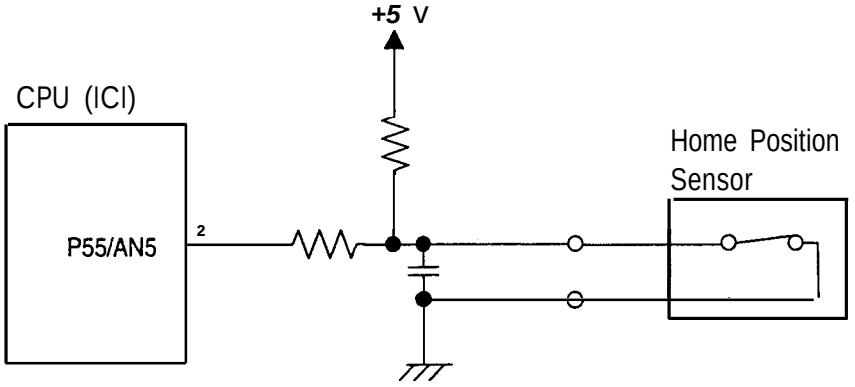



**Figure 2-15. Home Position Sensor Circuit Diagram**

### 2.3.5 Paper End Sensor Circuit

This printer has a connector switch for sensing the paper end. The CPU receives a signal from the connector switch and recognizes a paper end. The connector switch is closed (ON) when there is no paper on the platen and is open (OFF) when paper is present.

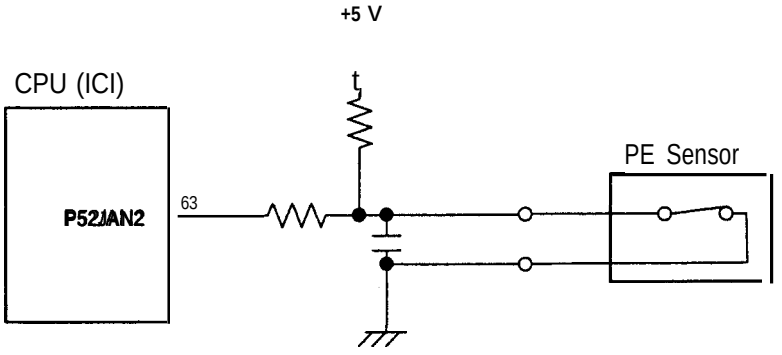



**Figure 2-16. Paper End Sensor Circuit**

### 2.3.6 Release Lever Position Sensor Circuit

This printer has a connector switch to detect the type of paper handling. The CPU receives a signal from the connector switch to indicate whether the paper is fed using friction or tractor feed. The connector switch is closed (OFF) when friction feed is selected and is open (ON) when tractor feed is selected.

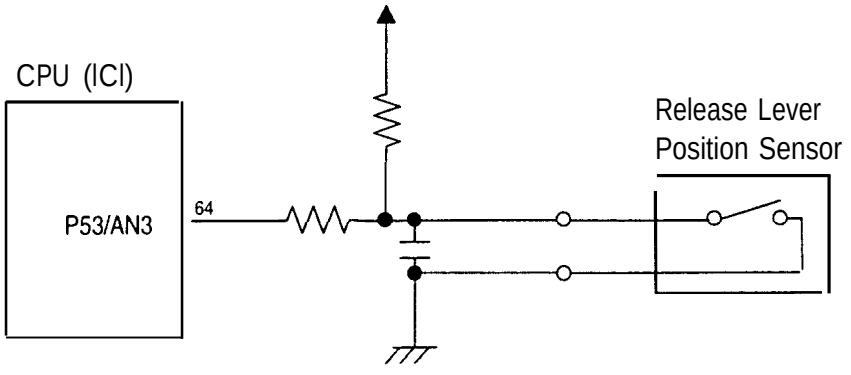



**Figure 2-17. Release Lever Position Sensor Circuit Diagram**

### 2.3.7 Carriage Motor Driver Circuit

Figure 2-18 shows the carriage motor driver circuit. The carriage motor driver uses an open-loop, constant-current chopping drive arrangement. The motor is driven with 2-2 phase excitation and 1-2 phase excitation.

The MOO-3 (pins 3-6) on the CPU are used to control the phases of stepping motor. The carriage motor driver IC (IC8) detects the amount of current in the carnage motor coils and regulates the current. The amount of current flowing in the coils varies, depending on the speed of the carriage motor. The amount of the current is set by the gate array (IC2). Signals are sent to the OD0~OD2 on the CPU. ODEN0~1 and OPH0~1 on the CPU control the stepping motor.

**Table 2-9. Carriage Motor Drive Modes**

| Driver Mode | Excitation Type | Drive Frequency Type | Standard Print Character |
|---|---|---|---|
| **3 x speed** | **2-2 phase** | **2400 pps** | Draft Mode |
| 2 *x* **speed** | 2-2 phase | 1600 **pps** | Draft Copy Mode |
| 3/2 *x* speed | 2-2 phase | **1200** pps | Bit Image Mode |
| 1 *x* speed | **1-2 phase** | **1600** pps | **LQ Mode** |
| **3/4 x** speed | 1-2 phase | **1200** pps | **LQ** Copy Mode |
| 1/2 x speed | 1-2 phase | 800 **pps** | **LQ** Speed Down Mode |

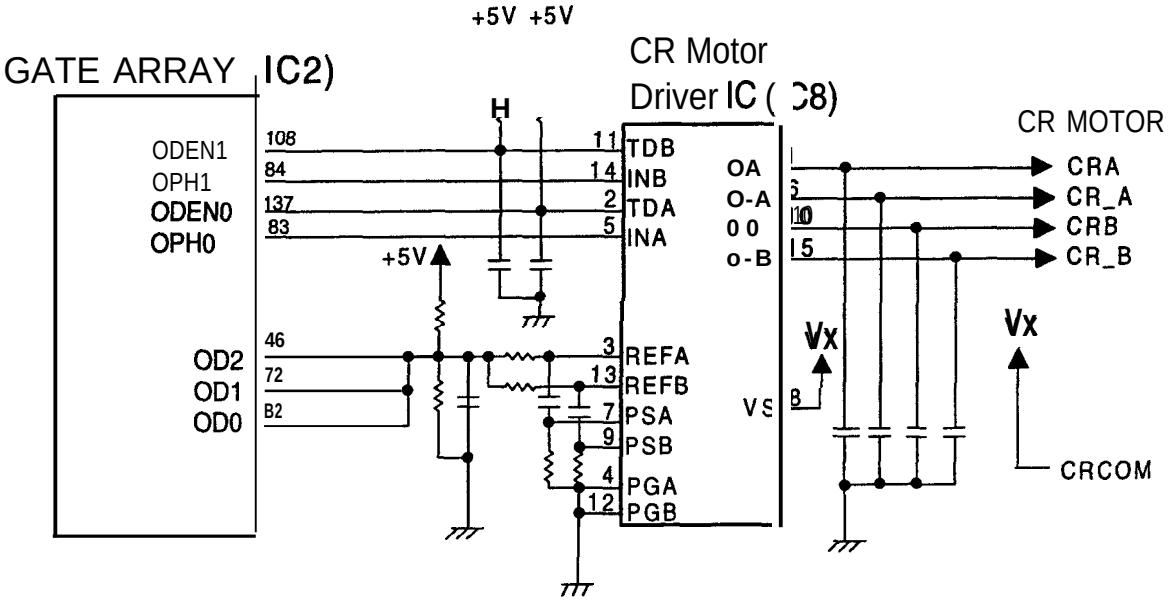



**Figure 2-18. Carriage Motor Driver Circuit Diagram**

### 2.3.8 Paper Feed Motor Driver Circuit

Figure 2-19 shows the paper feed motor driver circuit, an open-loop, constant-voltage drive with 1-2 phase excitation.

The ports (pins 7-lo) on the CPU are used to control the stepping motor. The pulse signal from the IC1 controls four transistors and the stepping motor. The motor is driven at six speeds, 300,500, 600, 1000, 1200, and 1300 pps, to correspond to the idling voltage, the paper handling condition, and the volume of paper feeding. The CPU controls motor driving speed. At the holding time, the PFCOM voltage is changed VX (+35 V) into VL (+5 V) via Q1 and Q6 by the gate array.

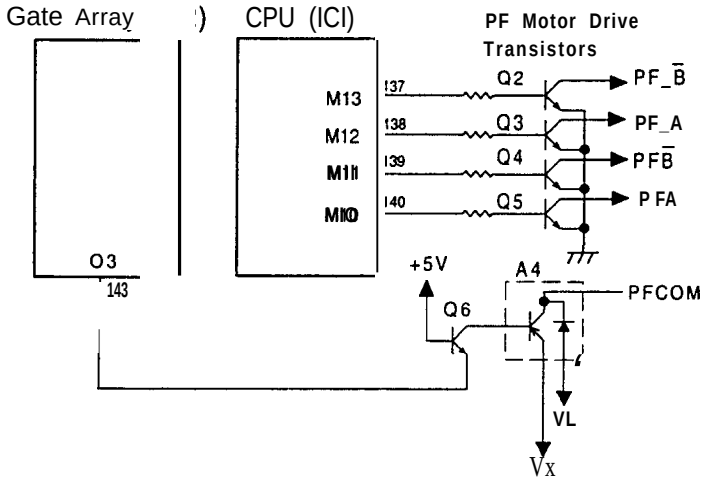



**Figure 2-19. Paper Feed Motor Driver Circuit Diagram**

### 2.3.9 Printhead Driver Circuit

Figure 2-20 shows the printhead driver circuit block diagram. Print data, already expanded into image data, is split by the CPU and transferred to the latch circuit in the gate array in the system. Port AN6 (pin 66) of IC1 samples the voltage of the +35 VDC line via the A/D converter. By sampling the +35 VDC line voltage and deterrninin g the length of the head drive signal, it is possible to maintain the energy supplied to the head at a constant level. If the voltage from the +35 V line is HIGH, IC1 shortens the output pulse. If the voltage from the +35 VDC line is LOW, ICI lengthens the output pulse.

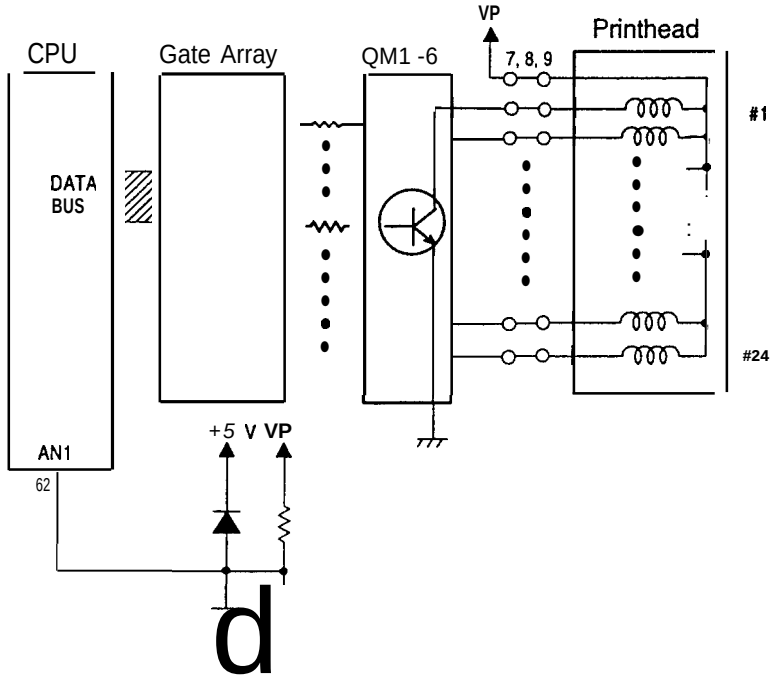



**Figure 2-20. Printhead Driver Circuit Diagram**

### 2.3.10 Interface Circuit

Figure 2-21 shows the parallel interface circuit block diagram. Data from the host computer is latched within the gate array by STROBE signal. The gate array outputs XBUSY signal automatically to stop the host computer from sending further data. The gate array reads the data latched periodically with generating an interrupt.

The parallel I/F conforms to bidirectional parallel I/F IEEE-P1284 level 1 nibble mode.

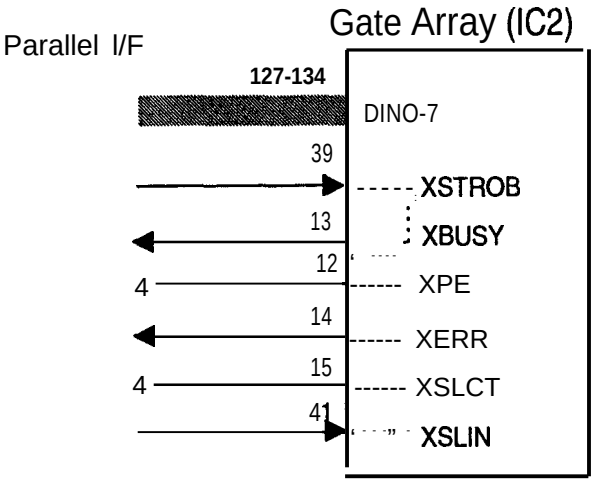



**Figure 2-21. Parallel Interface Block Diagram**

Figure 2-22 shows the serial interface circuit block diagram. The serial interface conforms to EIA-232D. RXD is data received by the serial 1/0 of the CPU block from the host computer via driver/receiver IC4. Data is transmitted to an input buffer in IC11 from the CPU. Printing starts when a CR code is received or when the input buffer is filled.

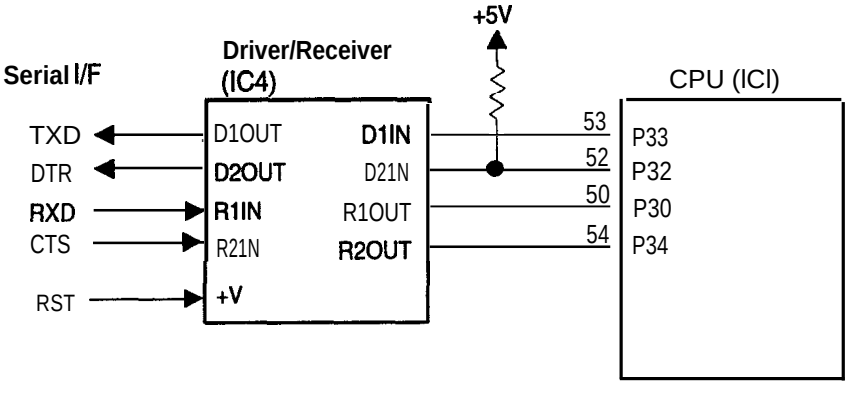



**Figure 2-22. Serial Interface Block Diagram**

## 2.3.11 EEPROM Control Circuit

Figure 2-23 shows the EEPROM control circuit block diagram. The EEPROM (IC6) contains such information as the top-of-form position. The EEPROM is non-volatile memory, so information is not lost if the printer is powered off. Since the EEPROM is a serial I/O-type device, the CPU converts 8-bit data into serial data.

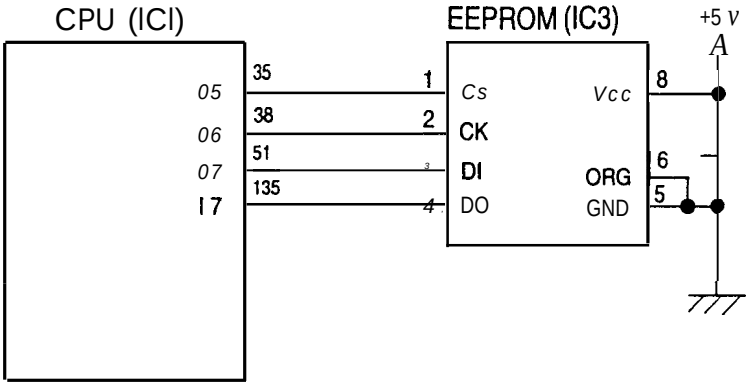



**Figure 2-23. EEPROM Control Circuit Diagram**

## 2.3.12 CS Motor Circuit

Figure 2-24 shows a block diagram of the CS motor circuit in the optional color upgrade kit. The CS motor is a permanent magnet (PM) stepping motor, driven with 2-2 phase excitation in proportion to the desired rotational speed. This motor can be rotated in either direction and stopped at any position. Four phase signals are directly output from the system IC and pass through a transistor array. The drive voltage is constant (i.e., +35 VDC from the VP line).

| | |
|---|---|
| Source Voltage | 35 VDC ± 10 % |
| Current Consumption | 245 mA ( peak) |

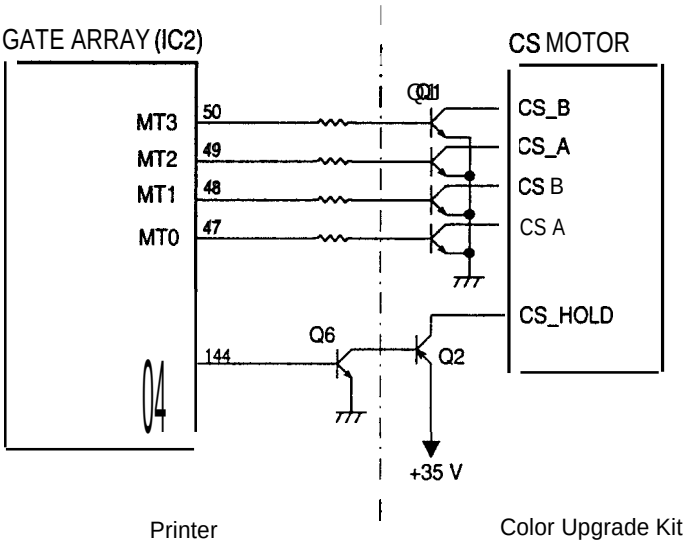



**Figure 2-24. CS Motor Circuit**

### 2.3.13 Color Ribbon Sensor Circuit

The printer's color ribbon circuitry is shown in the figure below. The CPU receives signals (HIGH or LOW) from the mechanical switch. The signal is HIGH (ON) when a color ribbon is installed and is LOW (OFF) otherwise.

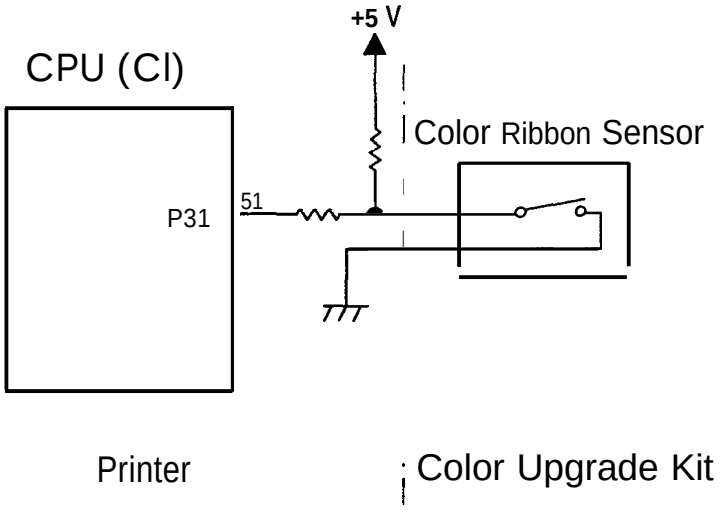



**Figure 2-25. Color Ribbon Sensor Circuit Diagram**

### 2.3.14 Platen Gap Sensor Circuit

This printer has a connector switch to sense the PG(Platen Gap) adjust lever position. The CPU receives a signal from the PG sensor and recognizes the PG adjust lever position. The comector switch is open(OFF) when the printer is in copy mode(PG adjust lever position:2-6) and is close(ON) when the printer is in normal mode(PG adjust lever position:-l-+l). The printing speed decrease in copy mode.

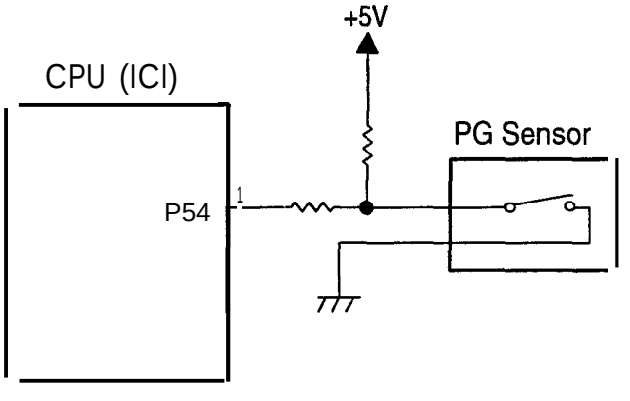



**Figure 2-26. Platen Gap Sensor Circuit Diagram**

# CHAPTER 3 Disassembly and Assembly

## Table of Contents

# CHAPTER 3 Disassembly and Assembly

## Table of Contents

# 3.1 OVERVIEW

This section describes various points to note when disassembling and assembling the printer.

## 3.1.1 Disassembly Precautions

Follow the precautions below when disassembling the printer.

**WARNING**

***Before disassembling, assembling, or adjusting the printer, disconnect the power supply cable from the AC power socket. Failure to do so can cause personal injury.***

**CAUTION**

***To maintain efficient printer operation:***
- ***Use only the recommended tools for maintenance work.***
- ***Use only the recommended lubricants and adhesives (see Chapter 6).***
- ***Adjust the printer only in the manner described in this manual.***

## 3.1.2 Tools

Tables 3-1 and 3-2 list the tools recommended for disassembling, assembling, or adjusting the printer. Use only tools that meet these specifications.

**Table 3-1. Recommended Tools**

| *Tool* | *Part No.* |
|---|---|
| Round-nose pliers | 6740400100 |
| Nippers | B7405OO1OO |
| Tweezers | 6741000100 |
| Soldering iron | B7402OO1OO |
| E-ring holder #2.5 | 6740800400 |
| Phillips screwdriver No.2 | 6743800200 |
| Normal screwdriver | 6743000100 |
| Thickness gauge | 6776702201 |

***Note:*** ***All tools are commercially available.***

**Table 3-2. Equipment Required for Maintenance**

| Description | Specification |
|---|---|
| Multimeter | |
| Oscilloscope | 50 MHz |

***Note:*** ***An oscilloscope is required only for servicers who repair to the component level.***

### 3.1.3 Service Checks After Repair

Before returning the printer after service, use the checklist in Table 3-3, which provides a record to make servicing and shipping more effiaent.

**Table 3-3. Inspection Check list for Repaired Printer**

| Category | Component | Item to Check | Is Check Required? |
|---|---|---|---|
| Printer units | Printhead | Are any wires broken? | ❑ Checked ❑ Not necessary |
| | | Are any wires worn out? | ❑ Checkeda Not necessary |
| | Carriage mechanism | Does the carriage move smoothly? ❑ Movement noisy ❑ Mechanism dirty ❑ Mechanism oily | ❑ Checked D Not necessary |
| | | Is the CR motor at the correct temperature (not overheating) | ❑ Checked UNot necessary |
| | Paper advance mechanism | Is paper advancing smoothly? ❑ Movement noisy ❑ Mechanism dirty ❑ Mechanism oily | ❑ Checkedn Not necessary |
| | | Is the paper advance motor running at the correct temperature (not overheating) | ❑ Checked ❑ Not necessary |
| | Paper path | Is the *type* of paper in the printer feeding smoothly? | ❑ Checked ❑ Not necessary |
| | | Is the tractor feeding the paper correctly? | ❑ Checkedn Not necessary |
| | | Is the paper path clear of all obstructions? | ❑ Checked ❑ Not necessary |
| | | Is the platen free of damage? | ❑ Checked ❑ Not necessary |
| | Ribbon mask | Is the ribbon mask free of distortion? | ❑ Checkedn Not necessary |
| | Self-print test | Was the self-print successful? | ❑ Checked ❑ Not necessary |
| | On-line test | Was the on-line test successful? | ❑ Checked ❑ Not necessary |
| Adjustment | Printhead printing | Is the platen gap adjusted correctly? | ❑ Checked ❑ Not necessary |
| | | Is the bidirectional print position adjusted correctly? | ❑ Checked D Not necessary |
| | Default setting | Have user-ohangeable settings been reset to the default value? | ❑ Checked ❑ Not necessary |
| System upgrade | ROM version | ROM version _____ | ❑ Checked ❑ Not necessary |
| | Shipment | Has the ribbon been removed? | ❑ Checked ❑ Not necessary |
| | | Have all relevant parts been included in the shipment? | ❑ Checked ❑ Not necessary |

### 3.1.4 Specifications for Screws

Table 3-4 lists the abbreviations used in the following sections for small parts, such as ***screws*** and washers.

**Table 3-4. Screw Abbreviations**

| *Abbreviation* | *Part* **Name** |
|---|---|
| CP | Cross-recessed pan head screw |
| CPB | Cross-recessed pan head B-tight screw |
| CBB | Cross-recessed bind head B-tight screw |
| CBS | Cross-recessed bind head S-tight screw |
| CBC | Cross-recessed bind head C-Lamitite screw |
| CB(O) | Cross-recessed bind head with outside toothed lock washer |
| CFP | Cross-recessed flat head P-tight screw |

# 3.2 DISASSEMBLY AND ASSEMBLY

This section describes the procedures for disassembling and assembling the main components of the printer. When the procedure for installing a component is simply the reverse of the procedure for removing the component, no description of the installation is given. Any points of special concern follow the description of the procedure.

**CAUTION**

- ***Before disassembling any part of the printer, note the warnings in Section 3.1.***
- ***Before disassembling any part of the printer, remove the paper and the ink ribbon.***

Disassembly includes the following seven procedures:

1. Removing the printhead.
2. Removing the upper housing assembly.
3. Removing the MAIN and PSB/PSE board assemblies.
4. Removing the printer mechanism.
5. Removing the interface board assembly.
6. Disassembling the driven roller assembly.
7. Disassembling the color upgrade kit

Refer to the diagrams in the appendix to see how components fit together.

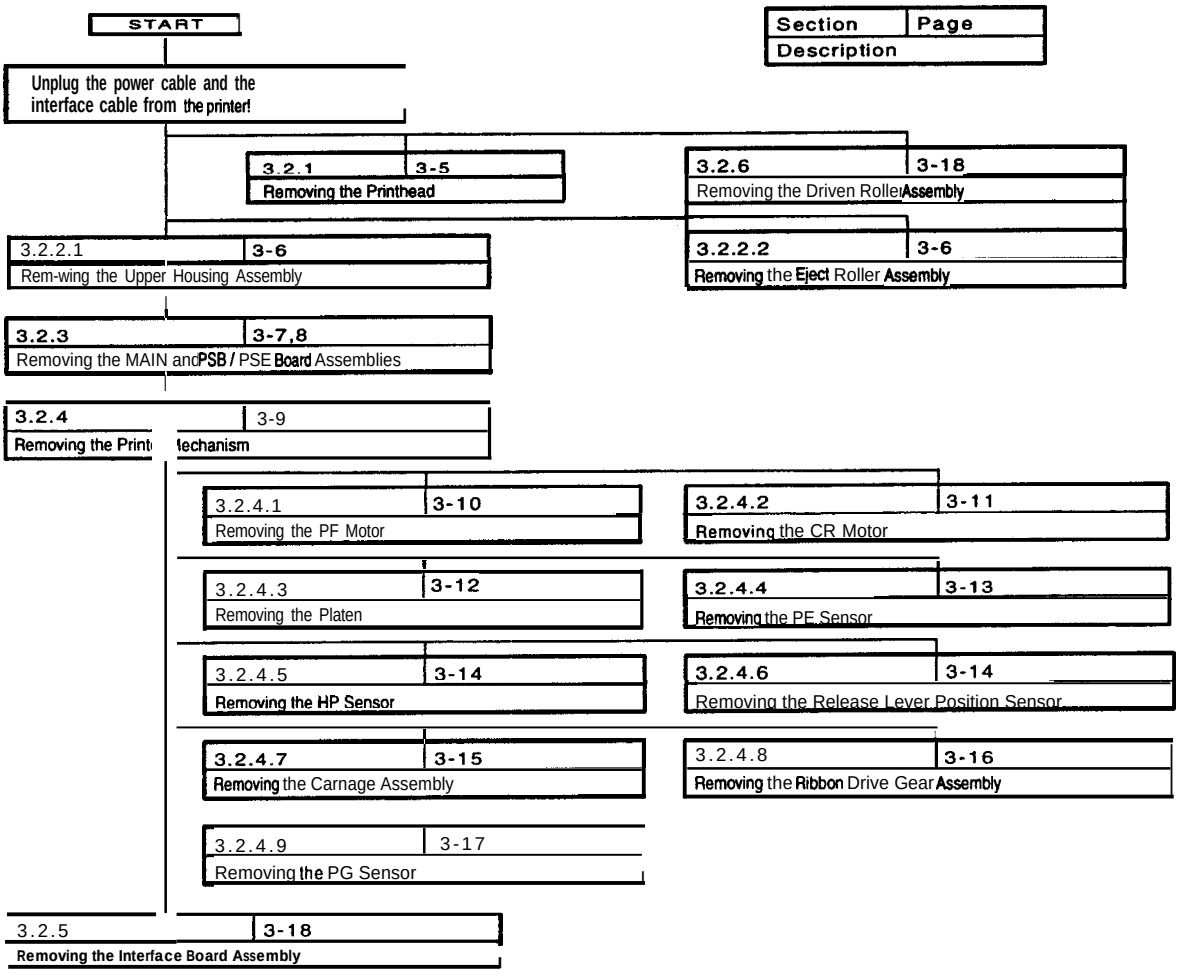
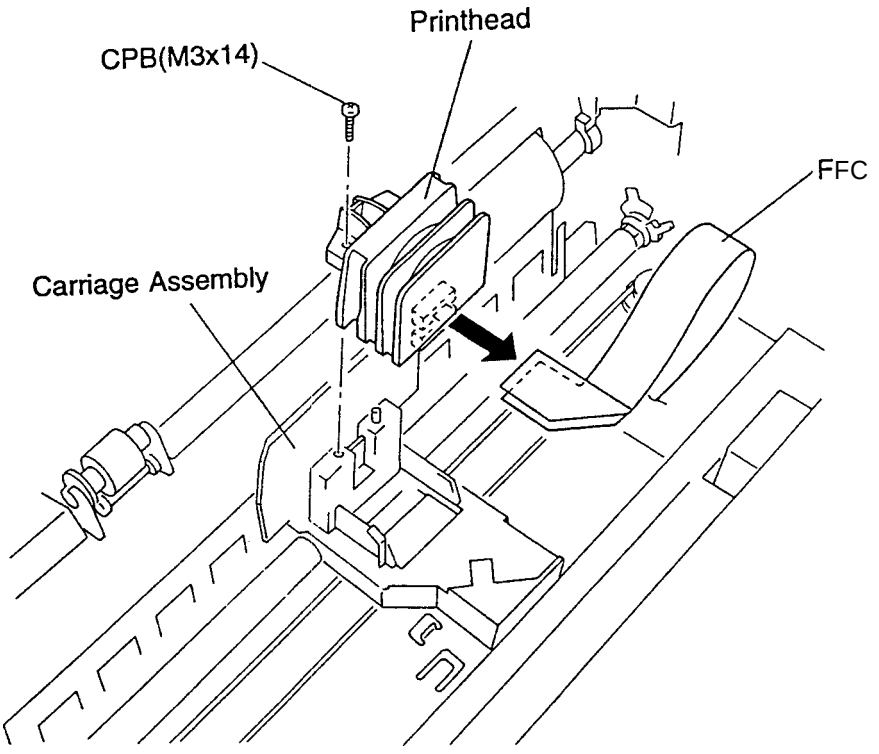



**Figure 3-1. Procedure for Disassembling the Printer**

### 3.2.1 Removing the Printhead

1. Remove the printer cover assembly, edge guide assembly, ribbon cartridge, tractor assembly, platen knob, and color upgrade kit.
2. Remove the CPB (M3 x 14) screw attaching the printhead to the carnage assembly.
3. Remove the printhead.
4. Remove the head cables (FFCs) from the printhead.




**Fgiure 3-2. Removing the Printhead**

### 3.2.2 Removing the Upper Housing Assembly

1. Remove the printer cover assembly, edge guide assembly, ribbon cartridge, tractor assembly, platen knob, and optional color upgrade kit.
2. Remove 4 CPB (M4 x 12) screws attaching the upper housing assembly to the lower housing assembly.
3. Lift off the upper housing assembly.

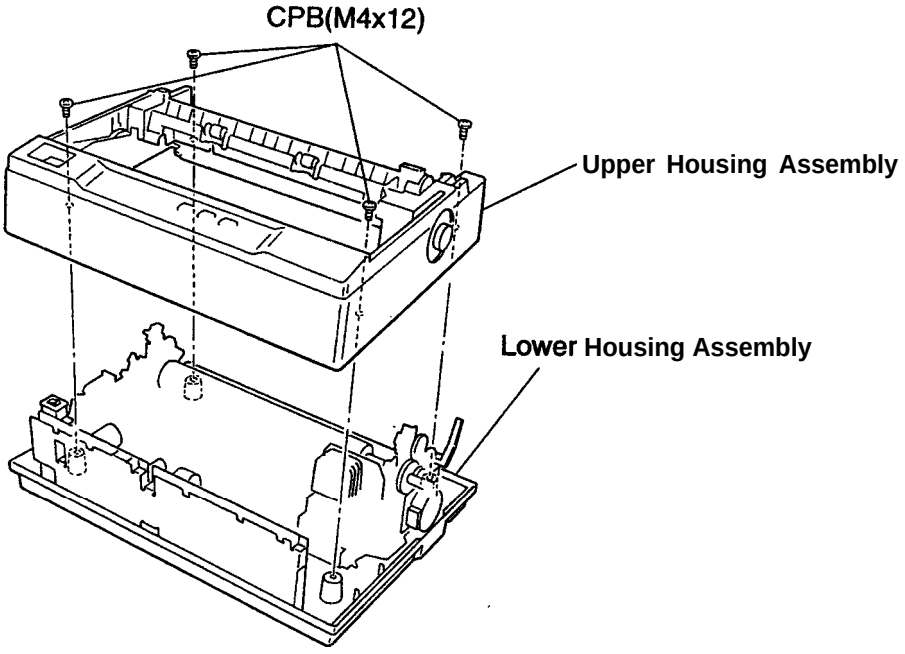



**Figure 3-3. Removing the Upper Housing Assembly**

#### 3.2.2.1 Removing the Eject Roller Assembly

**1.** Remove the upper housing assembly ( see Section 3.221).
2. Lift the eject roller assembly up and atan angle from theupperhousing assembly.

***Note:*** ***User care*** *when removing the eject* ***roller assembly,*** *or the 500 g spring may pop out.*

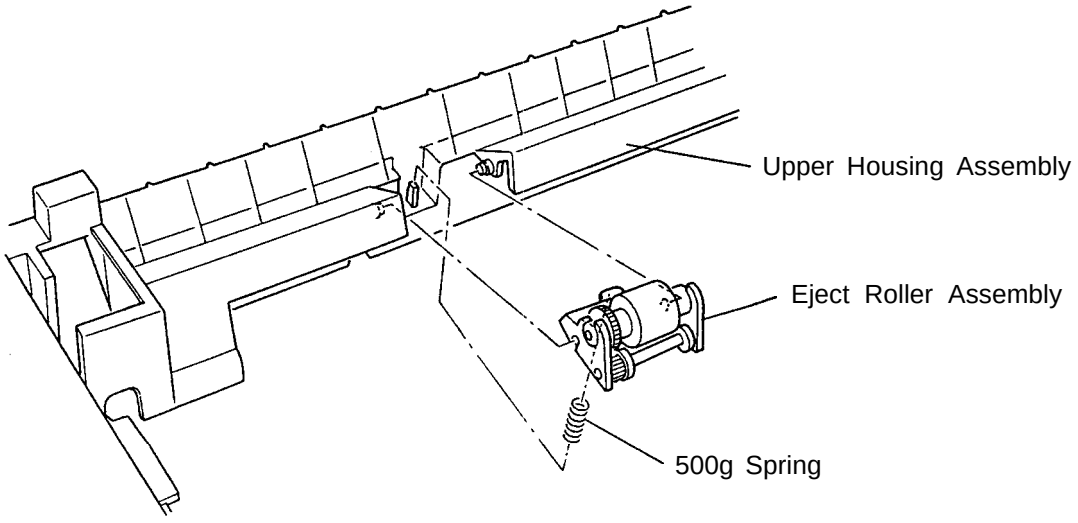



**Figure 3-4. Removing the Eject Roller Assembly**

### 3.2.3 Removing the MAIN and PSB/PSE Board Assemblies

1. Remove the printer cover assembly, edge guide assembly, ribbon cartridge, tractor assembly, platen knob, and optional color upgrade kit.
2. Remove the upper housing assembly (see Section 3.2.2).
3. Disconnect 4 flexible flat cables (FFCs) and 7 connectors from the MAIN and PSB/PSE board assemblies.
4. Remove 4 CBB (M3 x 8) screws attaching the shield plate to the MAIN and PSB/PSE board assemblies, the CBB (M3 x 8) screw attaching the CS board, and the CB(O) (M4 x 8) screw attaching the ground wire of the power cable.
5. Disengage the shield plate and W and PSB/PSE board assemblies from the grounding plate.

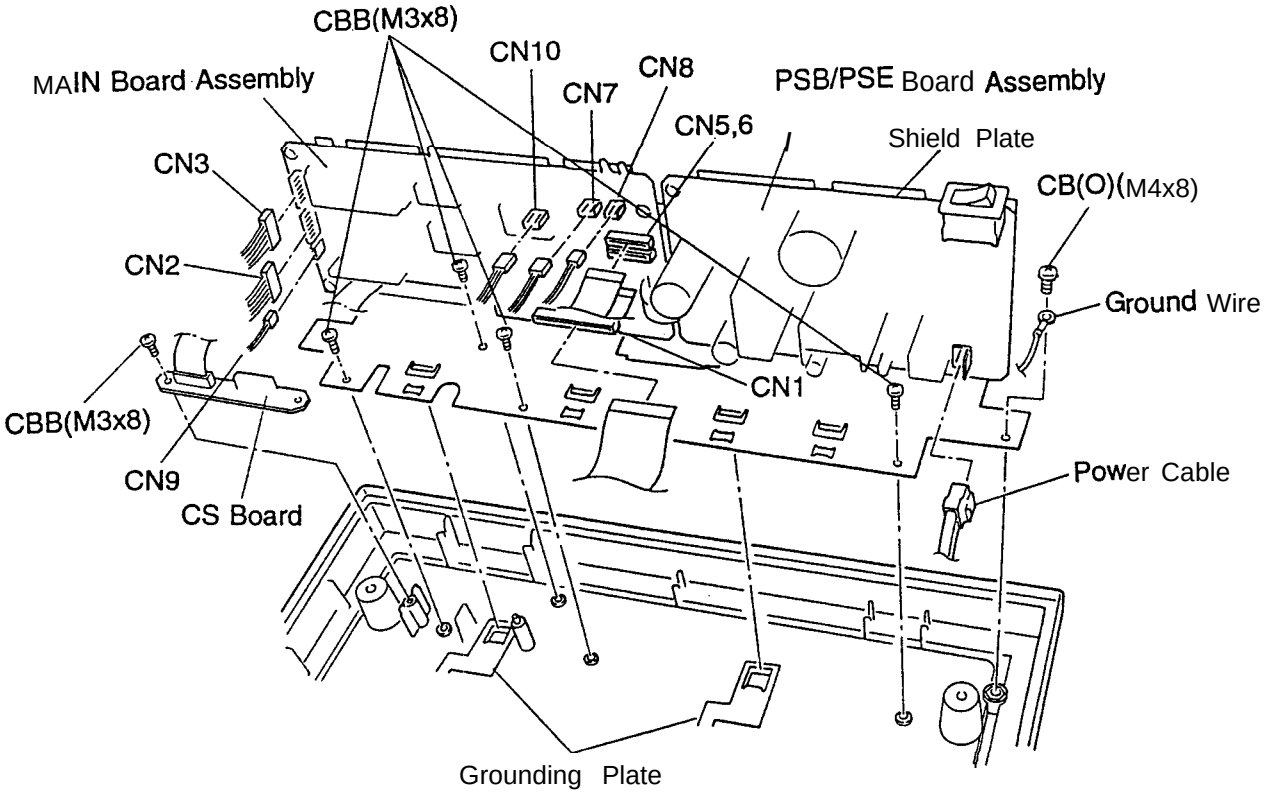



**Figure 3-5. Removing the Shield Plate**

### *3.2.3.1* Removing the MAIN Board Assembly

1. Remove the PSB/PSE board assembly FFC from connector CN2 of the MAIN board assembly.
2. Remove the CBC (M3 x 8) screw and the 3 CB USCA C (M3 x8).
3. Remove the MAIN board assembly.

### 3.2.3.2 Removing the PSB/PSE Board Assembly

1. Remove the FFC for the PSB/PSE board assembly from connector CN2 on the MAIN board assembly.
2. Remove the CB USCA C (M3 x 10) screw and 2 CB USCA C (M3 x 8) screws.
3. Remove the PSB/PSE board assembly.

## Assembly Note

- ***When replacing the MAIN board assembly, bend the LED lead wires parallel to the MAIN board assembly (see Figure 3-7).***
- ***The shield plate is easily bent; be careful when tightening the screws that attach it to the MAIN and PSB/PSE board assemblies.***

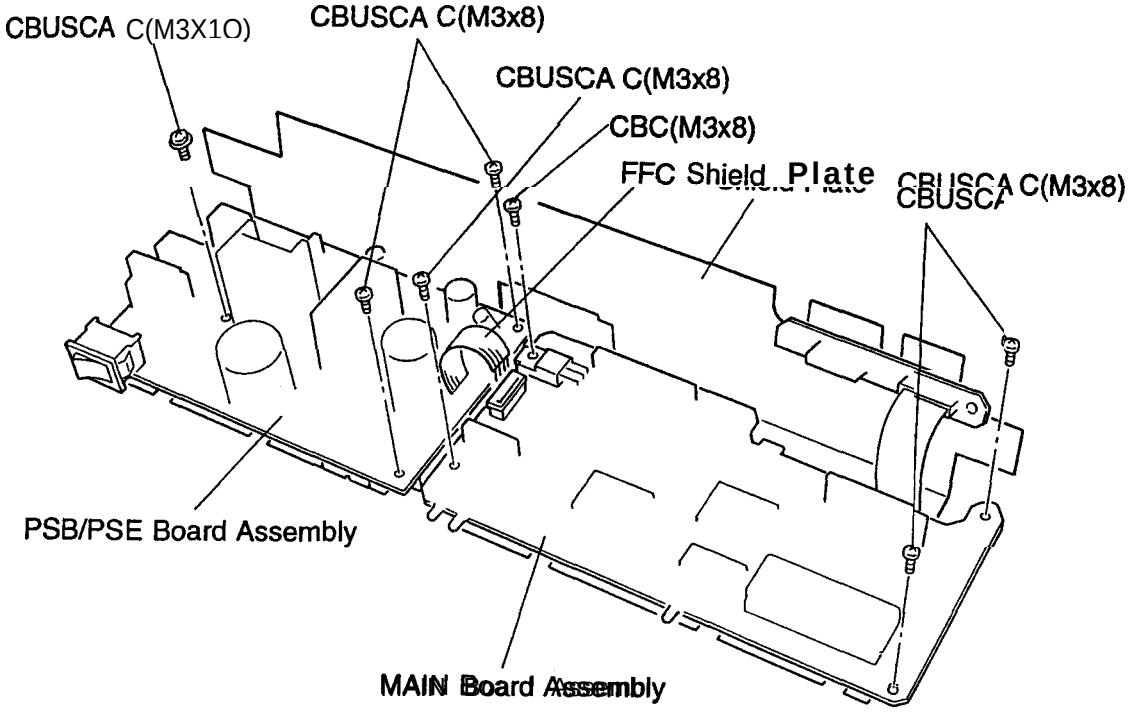



**Figure 3-6. Removing MAIN and PSB/PSE Board Assemblies**

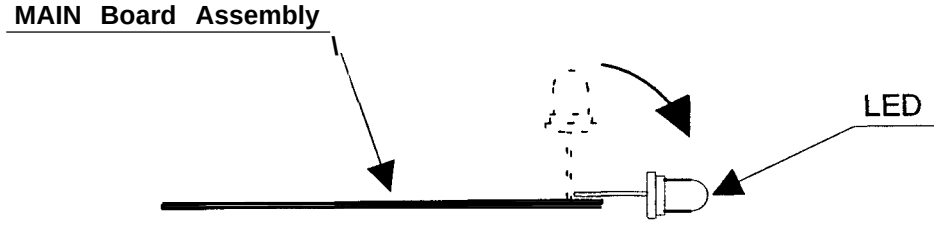



**Figure 3-7. Bending the LED Lead Wires**

### 3.2.4 Removing the Printer Mechanism

1. Remove the printer cover assemblies, edge guide assemblies, ribbon cartridge, tractor assemblies, platen knob, and optional color upgrade kit.
2. Remove the upper housing assembly (see Section 3.2.2).
3. Remove the connectors and FFCs from the MAIN board assembly.
4. Remove the 3 lower housing shafts (1018296).
5. Remove the other lower housing shaft (1015457). (Note that this shaft is different from the three described in the previous step.)
6. Remove the printer mechanism.

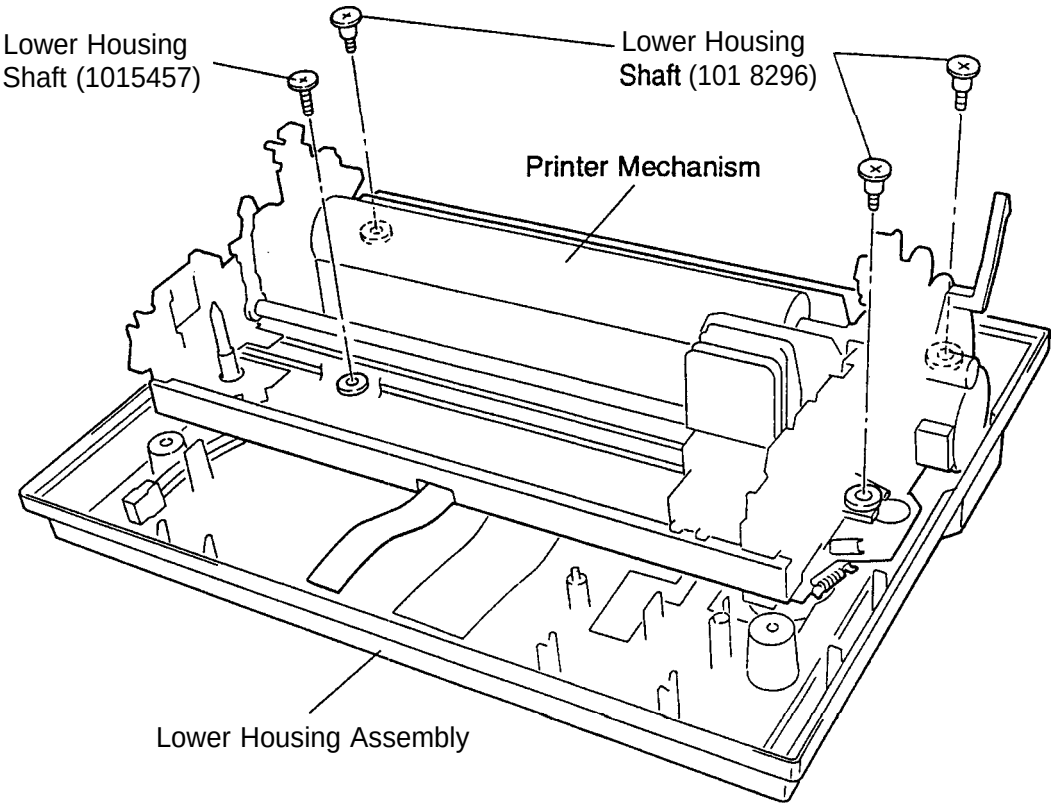



**Figure 3-8. Removing the Printer Mechanism**

### 3.2.4.1 Removing the PF Motor

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the platen grounding spring that secures the platen shaft (see Section 3.2.4.3).
3. Remove the CBB (M3 x8) screw attaching the PF motor to the right frame.
4. Release the clip holding the PF motor assembly from the right frame.
5. Remove the PF motor from the right frame.

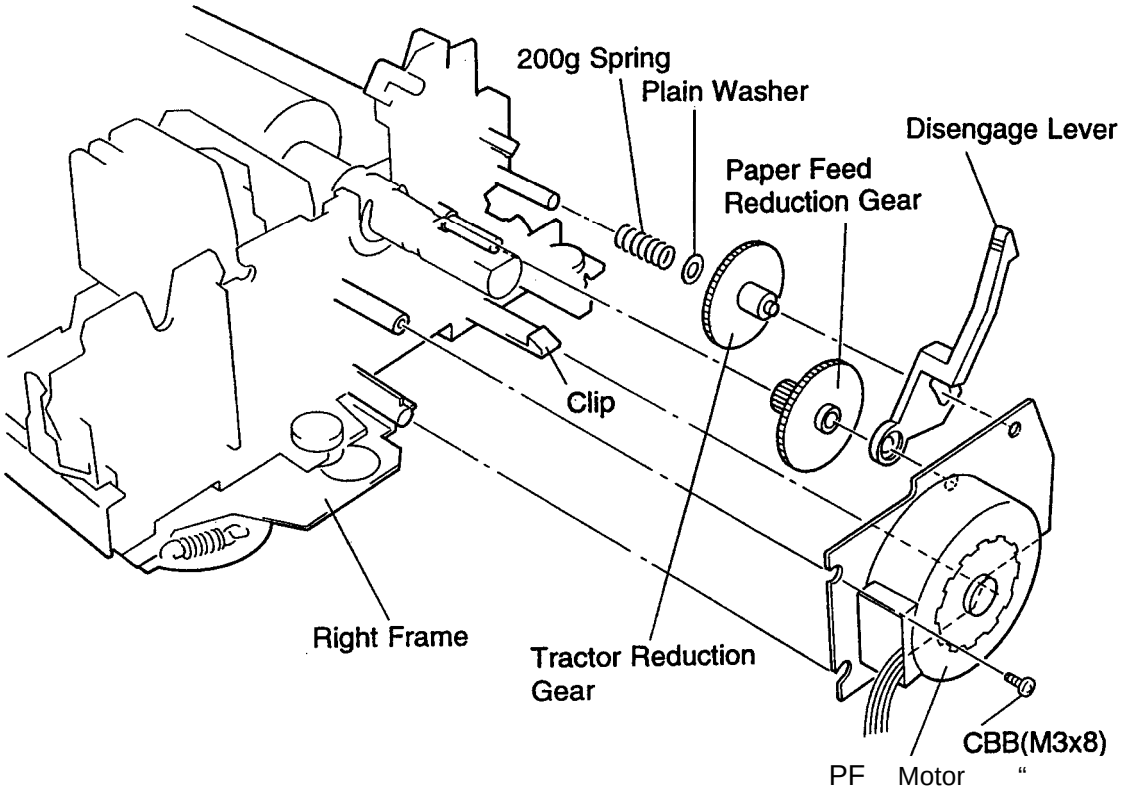



**Figure 3-9. Removing the PF Motor**

### *3.2.4.2* Removing the CR Motor

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the extension spring from the hook on the CR motor and the hook on the base frame.
3. Remove the timing belt from the pulley drive.
4. Remove the E-ring, pulley washer, belt pulley flange, and pulley drive from the CR motor.
5. Rotate the CR motor counterclockwise and remove it.

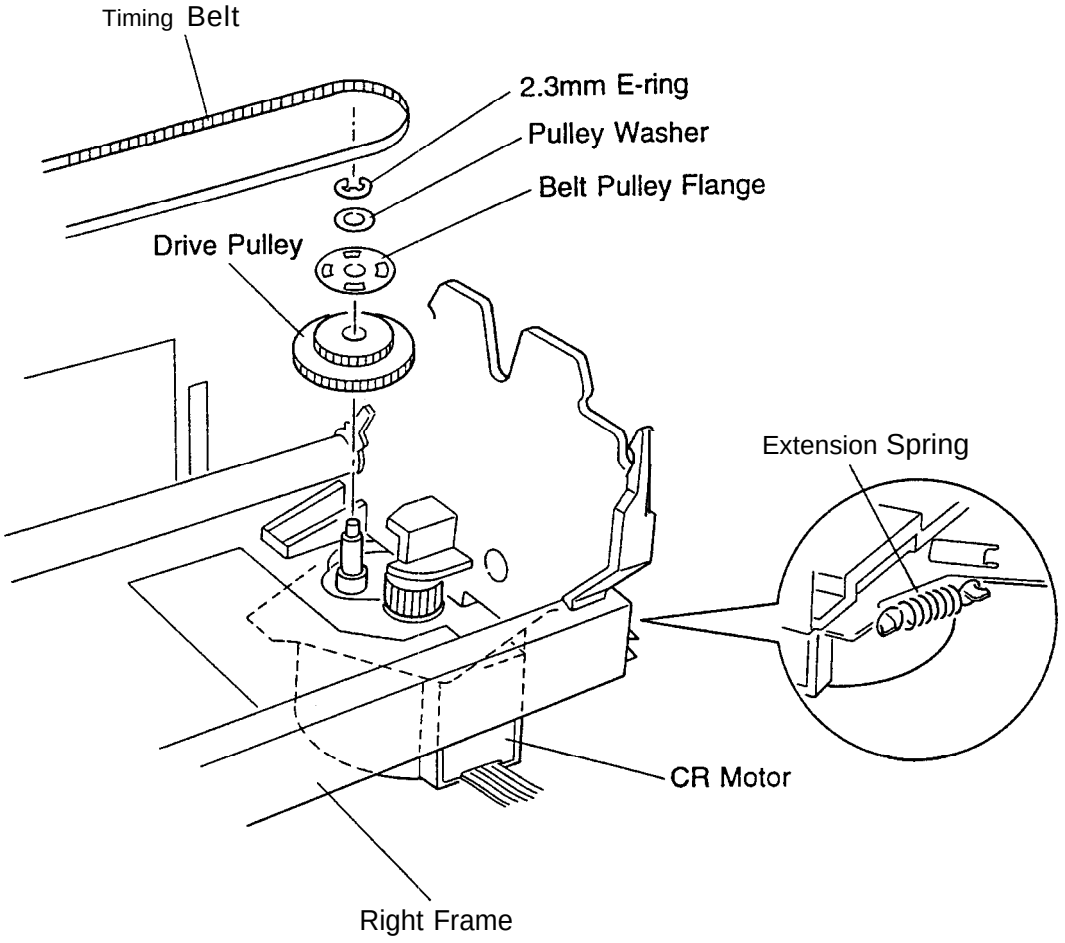



**Figure 3-10. Removing the CR Motor**

### 3.2.4.3 **Removing the Platen**

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the platen grounding spring that secures the platen shaft.
3. Remove the 25 mm gear from the right frame.
4. Disengage the teeth of the 211 mm bushings and rotate them.
5. Rotate the platen and remove it.

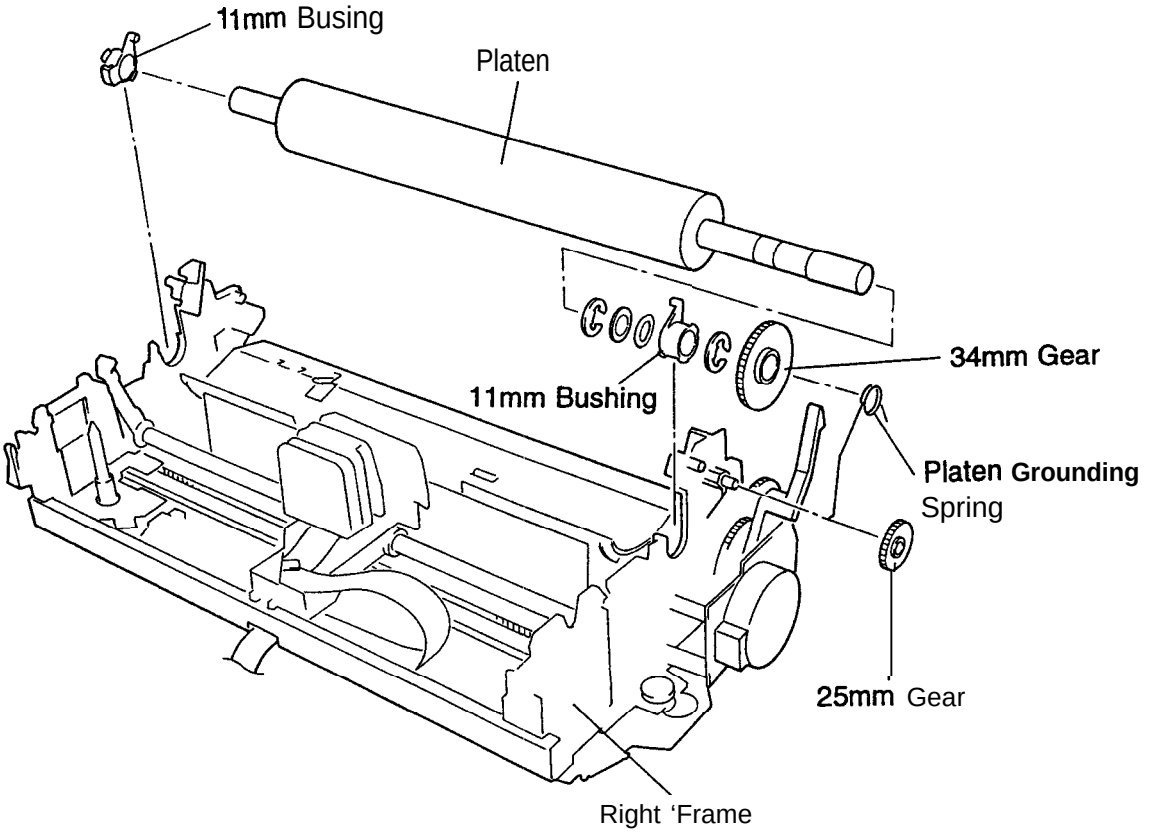



**Figure 3-11. Removing the Platen**

### 3.2.4.4 Removing the PE Sensor

1. Remove the printer mechanism (see Section **3.2.4).**
2. Remove the platen (see Section3.2.4.3)-
3. Release the friction shaft of the upper paper Wide from the clips on the right and left frame.
4. Remove the upper paper guide from the right and left frame.

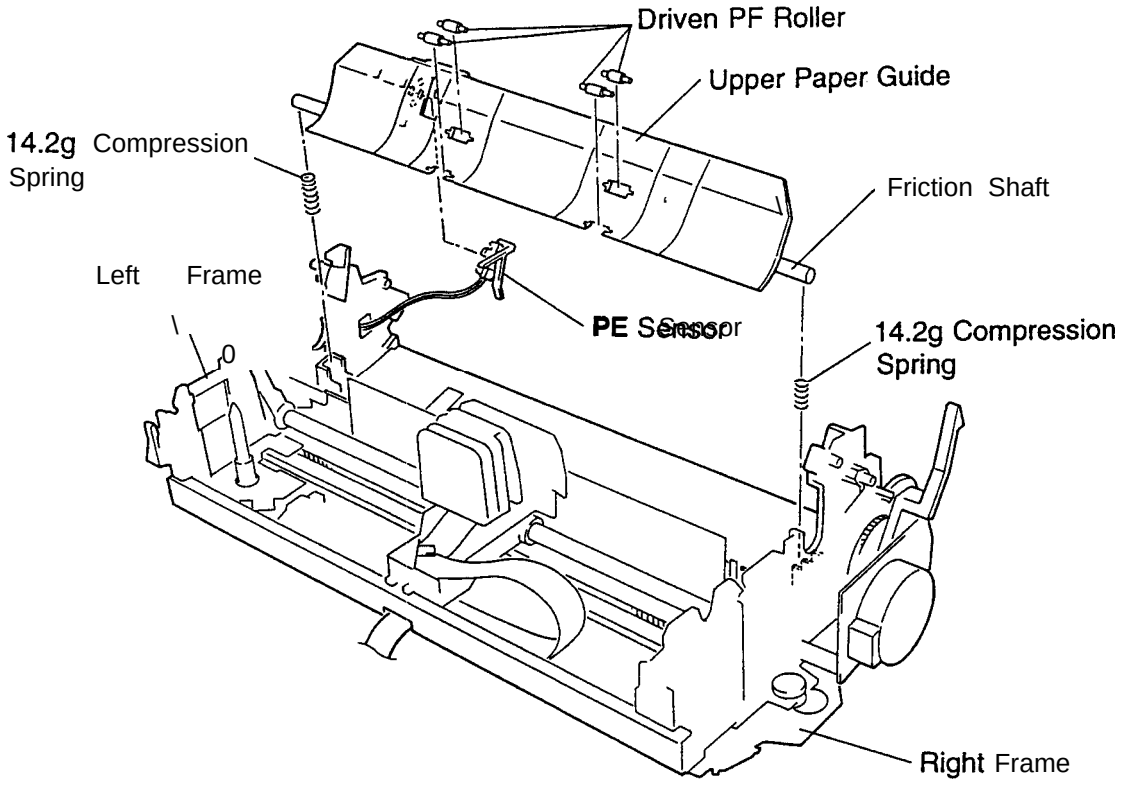



**Figure 3-12. Removing the PE Sensor**

5. Release the 2 clips securing the PE sensor and remove it.

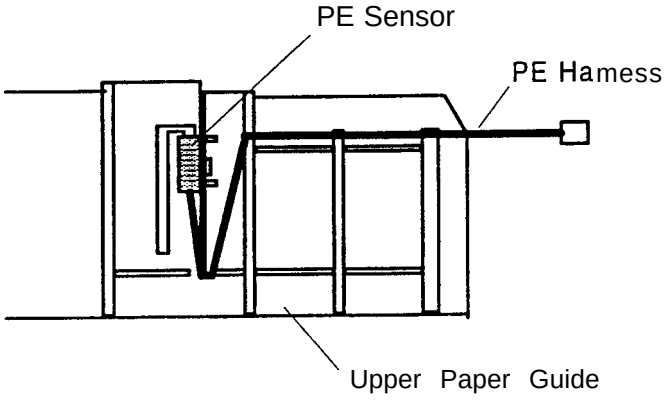



**Figure 3-13. Wiring of the PE Harness**

### *3.2.4.5* Removing the HP Sensor

**1.** Remove theprinter mechanism (see Section 3.2.4).

2. Release the 2 clips attaching the HP sensor and remove it. The clips can be accessed through 2 holes in the base frame. To release the clips, push each with a pair of tweezers.

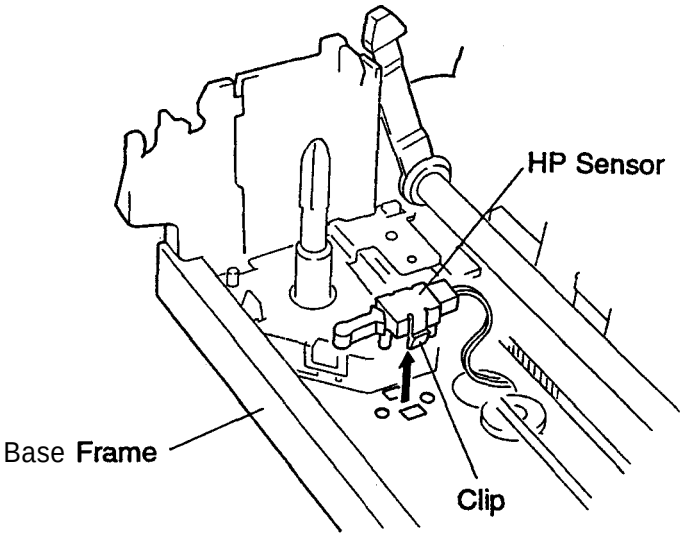



**Figure 3-14. Removing the HP Sensor**

### 3.2.4.6 Removing the Release Lever Position Sensor

1. Remove the PF motor assembly (see Section 3.2.4.1).
2. Release the 2 clips that attach the release lever position sensor to the frame of the PF motor assembly.
3. Remove the release lever position sensor from the frame of the PF motor assembly.

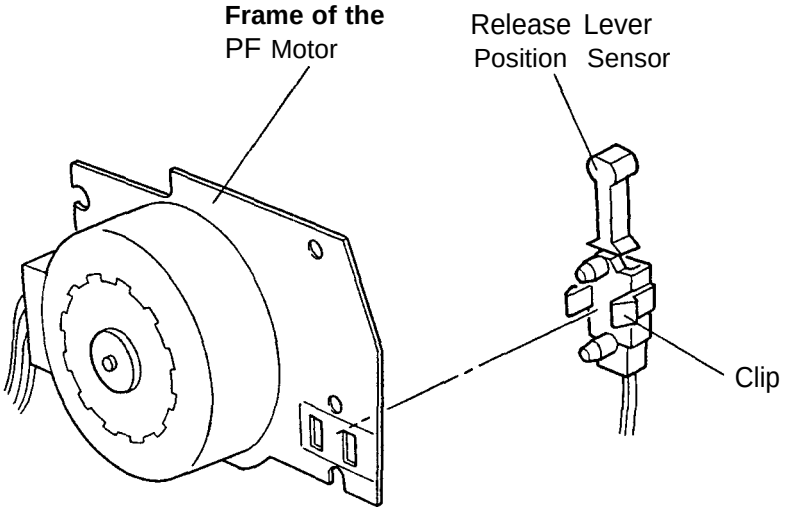



**Figure 3-15. Removing the Release Lever Position Sensor**

### 3.2.4.7 Removing the Carriage Assembly

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the belt tension spring from the hook on the CR motor (see Section 3.2.4.2), and remove the carriage assembly timing belt from the drive pulley.
3. Release the hook that attaches the head cable sheet to the base frame. Slide the cable to the left and remove it.
4. Remove the printhead FFC from the base frame.
5. Remove the CR shaft grounding plate from the left side of the printer mechanism.
6. Rotate both sides of the parallelism adjustment bushing and remove them from the left and right frame.
7. Remove the CR guide shaft assembly and the carriage assembly.

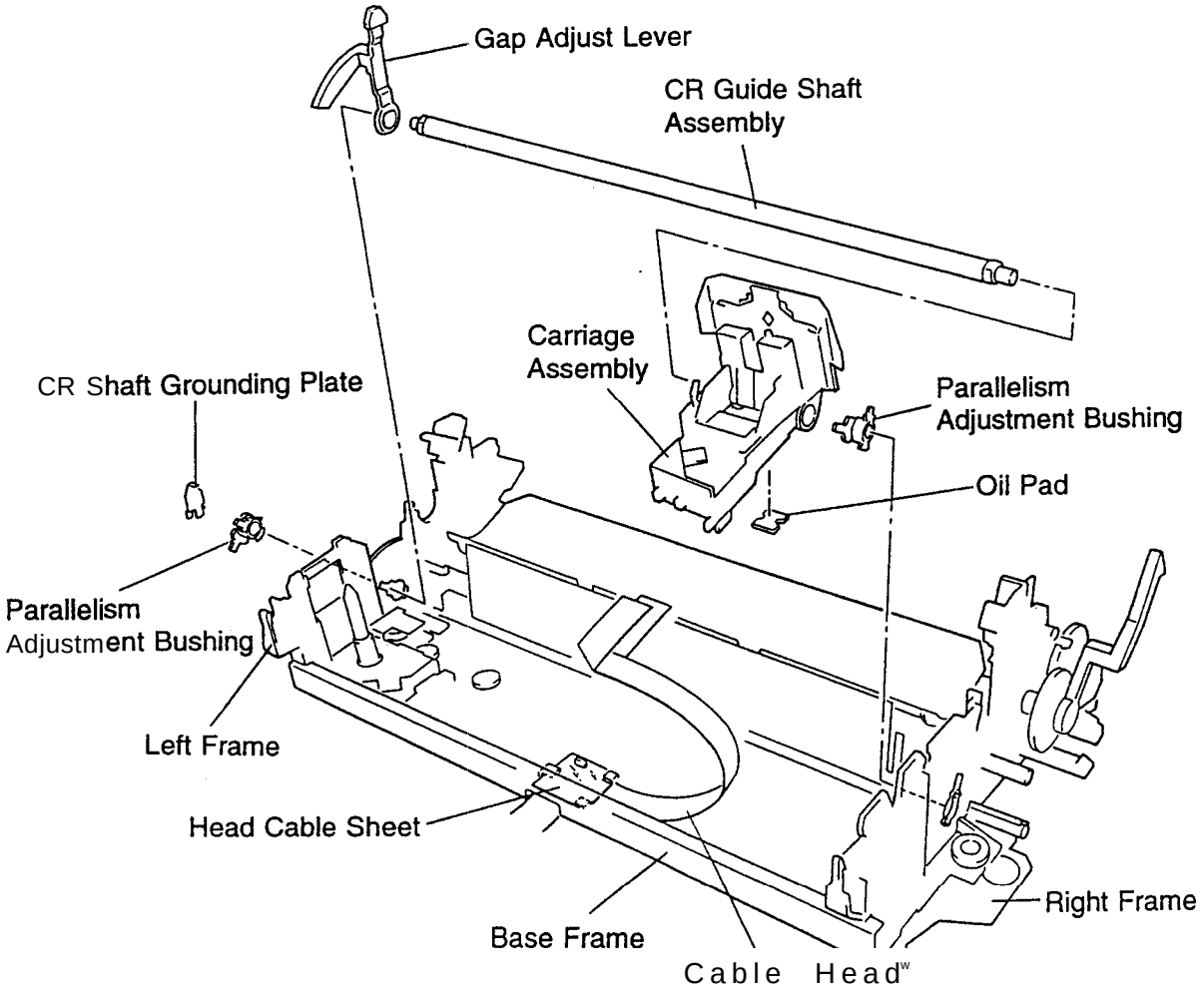



**Figure 3-16. Removing the Carriage Assembly**

### 3.2.4.8 Removing the Ribbon Drive Gear Assembly

1. Remove the printer mechanism (see Section 3.2.4).
2. Release the 3 hooks attaching the ribbon drive (RD) cover to the left frame.
3. Remove the RDcover.
4. Remove the belt tension spring between the hook on the CR motor assembly and the hook on the base frame (see Section 3.2.4.2).
5. Remove the timing belt from the driven pulley.

## Assembly Note

***Make sure not to put the timing belt between the RD cover and the left frame.***

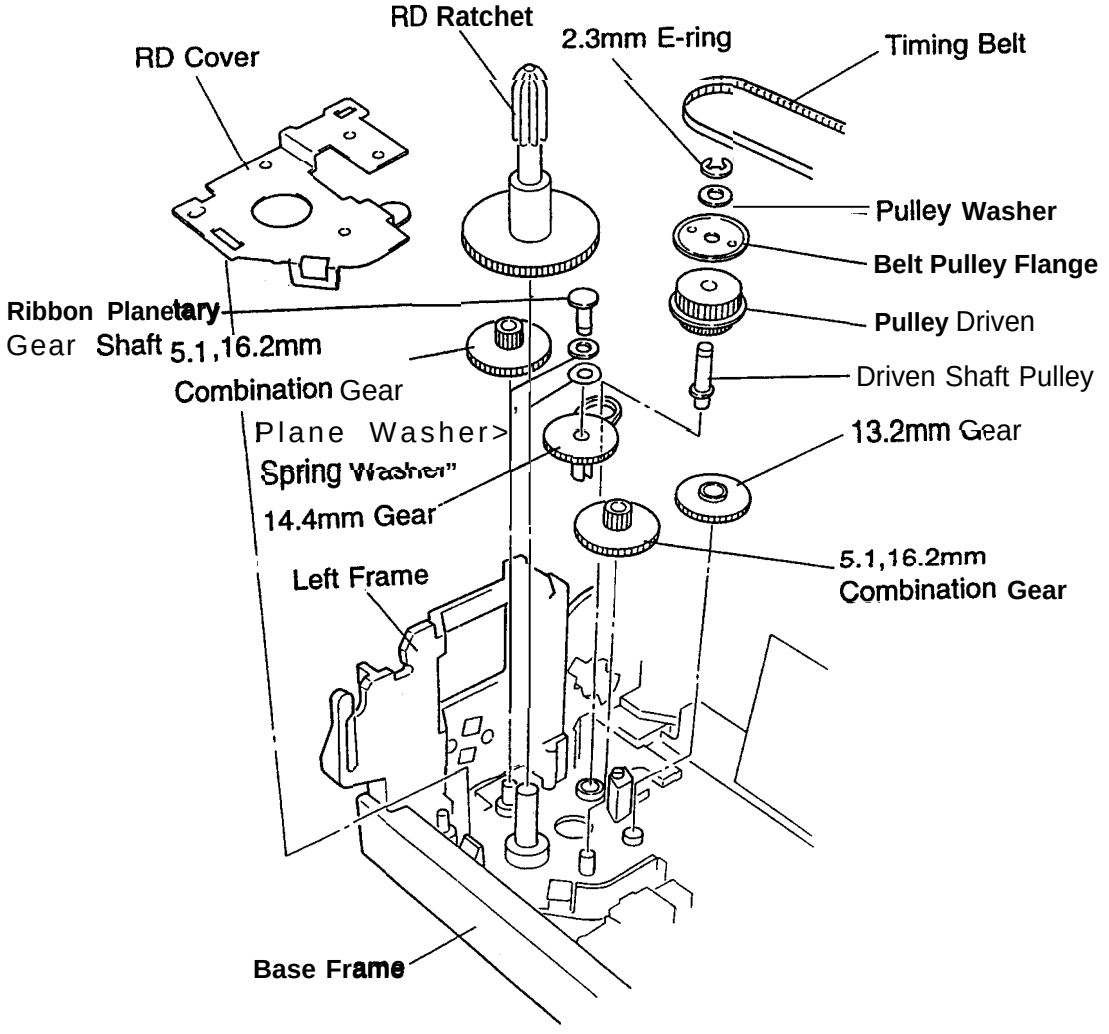



**Figure 3-17. Removing the Ribbon Drive Gear Assembly**

### 3.2.4.9 **Removing the PG Sensor**

1. Remove the printer mechanism (see Section 3.2.4).
2. Release the 2 clips attaching the PG sensor and remove it. The clips can be accessed through 2 holes in the left frame; to release the clips, push each with a pair of tweezers.

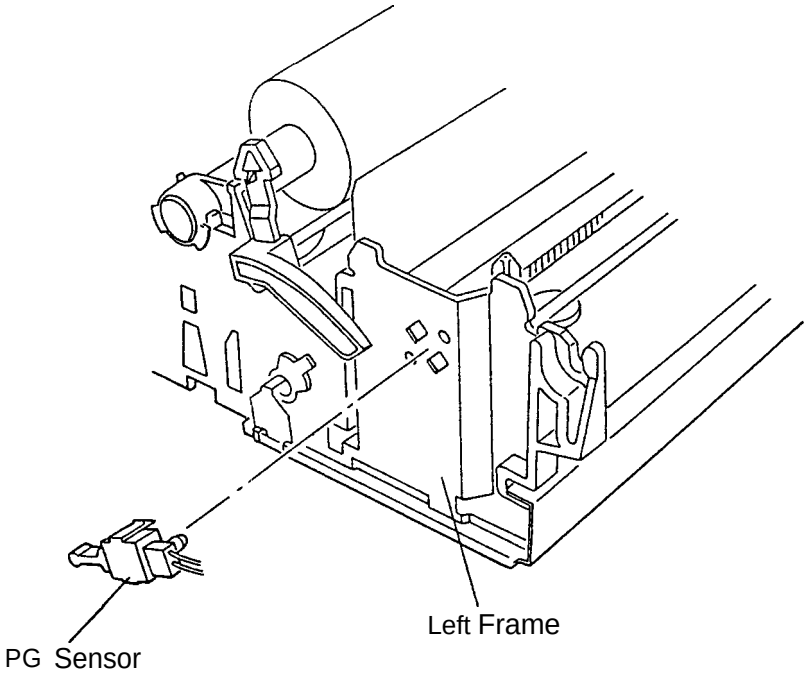



**Figure 3-18. Removing the PG Sensor**

### 3.2.5 Removing the Interface Board Assembly

1. Remove theprinter mechanism (see Section 3.2.4).
2. Remove the grounding plate connecting the interface shield plate and theshieldplate.
3. Remove the CBB (M3 x 8) screw and the CBB (M3 x 10) screw attaching the bottom cover to the lower housing assembly.
4. Remove the 2 CBB (M3 x 8) screws attaching the interface board assembly to the lower housing assembly.
5. Remove the bottom cover and the interface board assembly.

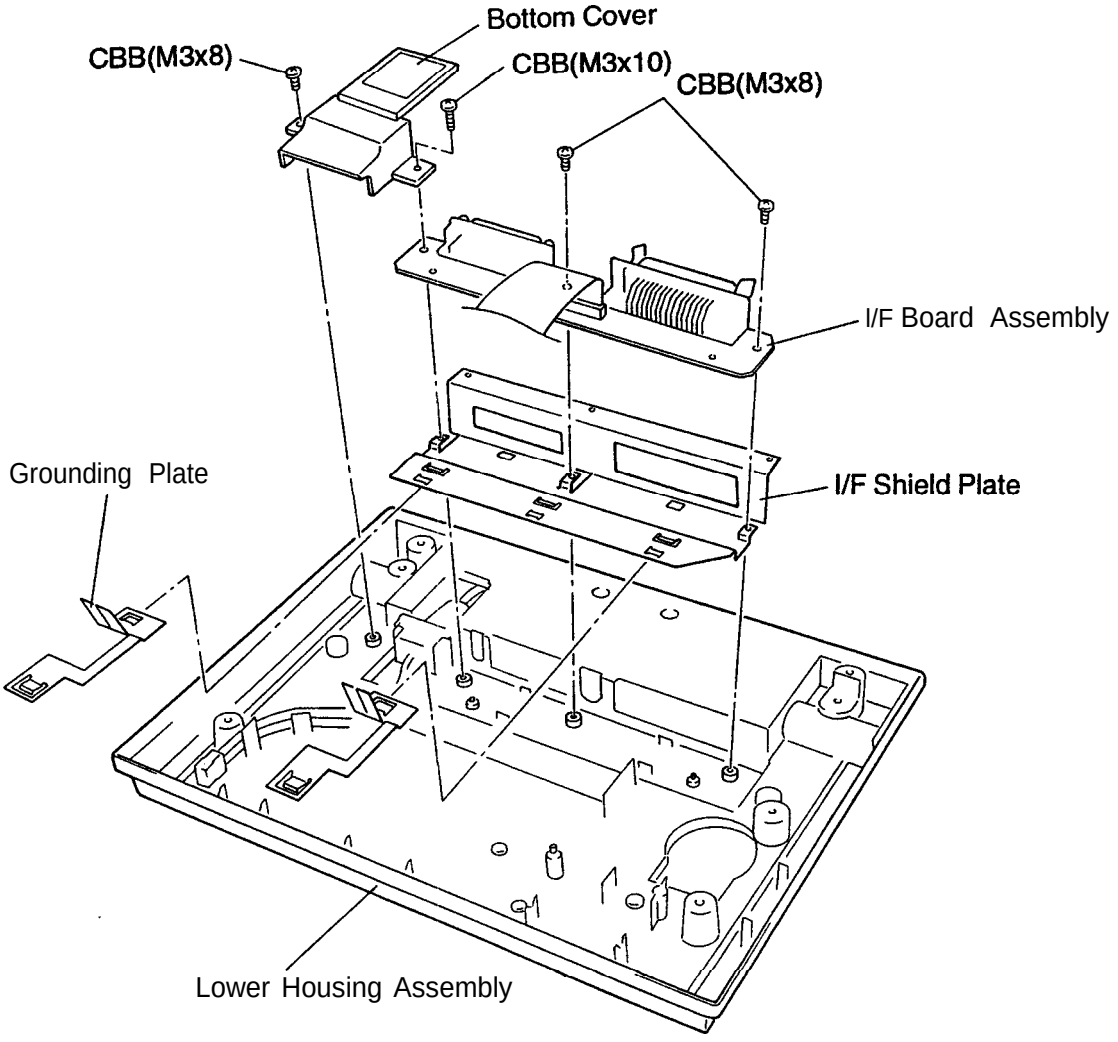



**Figure 3-19. Removing the Interface Board Assembly**

### 3.2.6 Removing the Driven Roller Assembly

1. Remove the printer cover.
2. Remove the CFP (M2.6 x 8) screw attaching the driven roller assembly.
3. Remove the driven roller assembly.

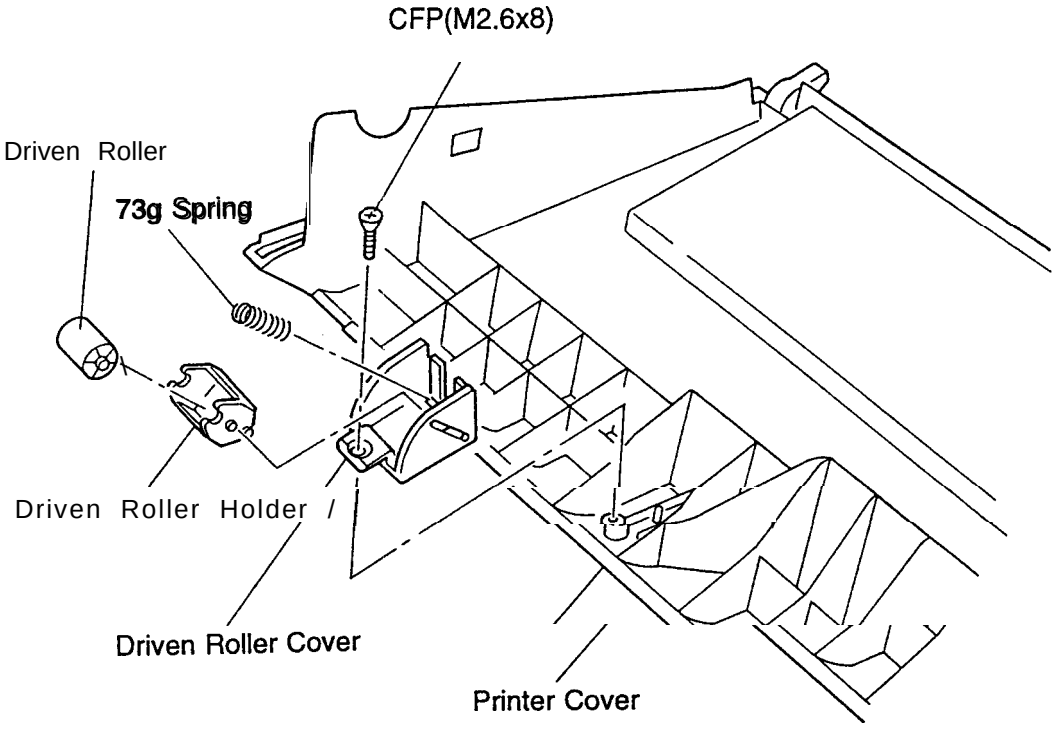



**Figure 3-20. Removing the Driven Roller Assembly**

## 3.2.7 Disassembling and Assembling the Color Upgrade Kit

### 3.2.7.1 Removing the Ribbon Motor Assembly

1. Remove the 2 CBB (M3 x 8) screws attaching the ribbon motor assembly to the CS cover.
2. Release the 2 clips attached to the CS cover.
3. Remove the ribbon motor assembly along with the CS board assembly from the CScover.

### 3.2.7.2 Remove the CS Cam

1. Remove theribbonmotor assembly (see Section 3.2.7.1).
2. Remove the E-ring3 from the CS frame shaft.
3. Remove the CS cam.

### 3.2.7.3 Removing the Color Sensor Assembly

1. Remove the ribbon motor assembly andthe CS board assembly (see Section 3.2.7.1).
2. Remove the 4rnm E-ring from thecartridge holder shaft.
3. Remove the color cartridge holder from the ribbon motor assembly.
4. Release the clip that attaches the color cartridge holder to the color sensor assembly.
5. Remove the connector of the color sensor assembly fromthe CS board assembly.

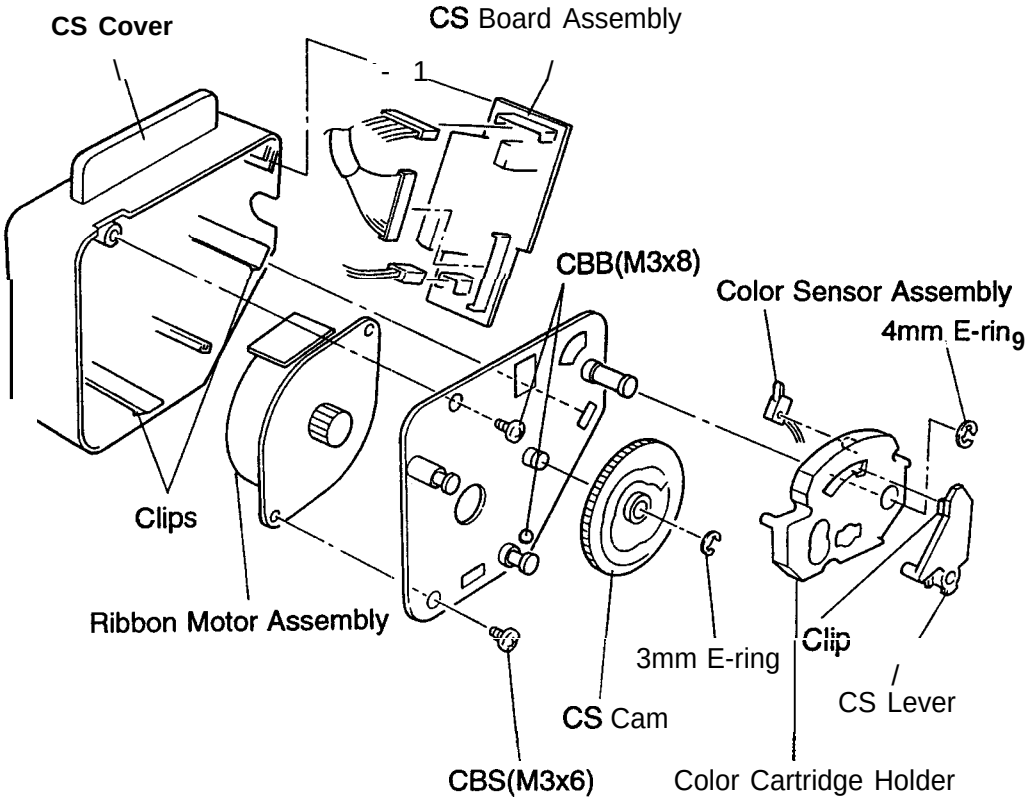



**Figure 3-21. Disassembling the Color Upgrade Kit**

# CHAPTER 4 Adjustments

## Table of Contents



## List of Figures

# 4.1 ADJUSTING THE PRINTER MECHANISM

This section describes the adjustments you may need to make to the printer mechanism.

## 4.1.1 Platen Gap Adjustment

If you have rotated or reassembled the CR guide shaft assembly or the parallelism adjustment bushing, or if printing is abnormal, you must adjust the platen and the printhead.

1. Set the release lever to the friction position.
2. Remove the upper housing assembly (see Section 3.2.1).
3. Set the gap adjustment lever to O.
4. Remove the printhead.
5. Remove the ribbon mask with a pair of tweezers.
6. Install the printhead.
7. Adjust the platen gap using the flowchart below. The correct platen gap is 0.455 mm ± 0.015 mm. When measuring the gap, take care to let the gauge fall between the platen and the printhead by gravity only. To increase the platen gap, turn the parallelism adjustment bushing toward the platen using a screwdriver. To reduce the platen gap, turn the parallelism adjustment bushing away from the platen.

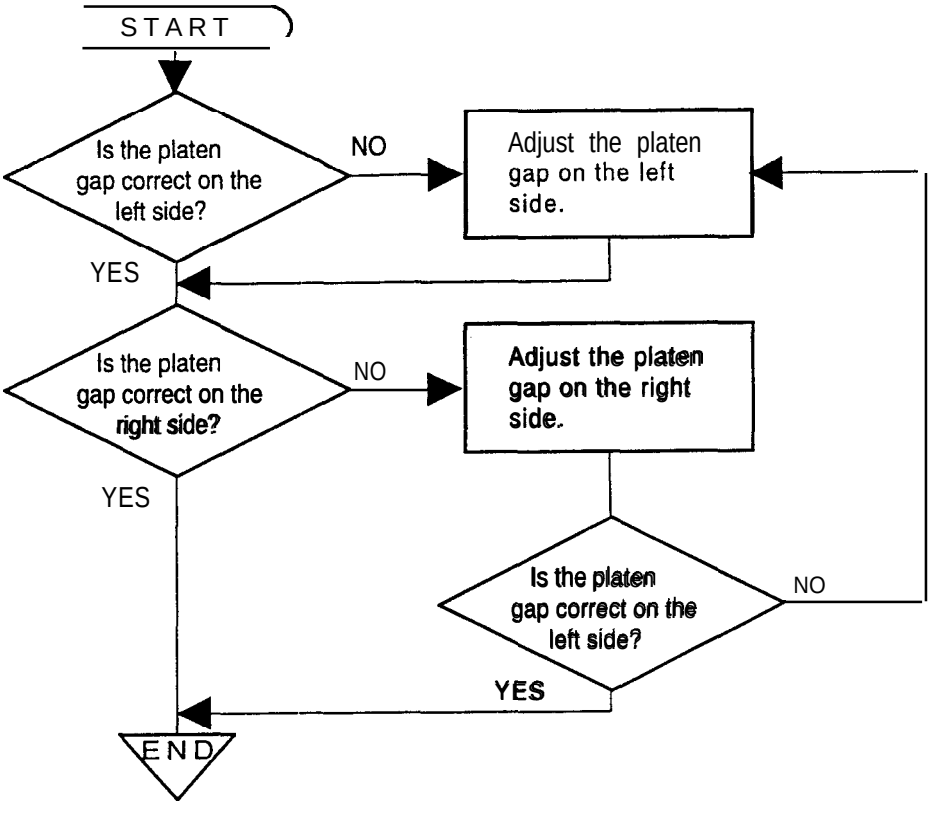



**Figure 4-1. Flowchart for Platen Gap Adjustment**

# 4.2 DEFAULTS, MACHINE INFORMATION SETTINGS, AND BIDIRECTIONAL ADJUSTMENT

## 4.2.1 Defaults and Machine Information Settings

Perform the procedure below when the main board assembly is replaced.

1. Connect the printer to a PC.
2. Turn the printer on.
3. Load paper into the printer by pressing the **LF/FF** button. You can use either cut sheet or continuous paper.
4. Load the GWBASIC program onto the PC.
5. Insert a diskette containing the LQ-300 Adjustment Program into the PC's diskette drive.
6. Load the LQ-300 Adjustment Program"BKMENU.BAS".
7. When you run the program, the following message appears on the display:

```
LQ-300 Adjustment Program
1. EAI, EAI (Latin A), EIS, EIB, EUL, ESP, EHK
2. EDG, EFS
3. EDG (NLSP)
4. ETT
5. END
Do nut input unspecified destination!
Please input each destination No.( 1-4 ) and Enter Key.
```

**WARNING**

***Do not input unspecific destination data!***

*8.* Press 1-4, then go to adjustment program of each destination

9. The following message appears on the display:

```
LQ-300 Adjustment Program
1. Bi-DAdjustment
2. Defaults& Machine Information Settings
3. END
If ready, press 1-3 and the Enter key. -
```

**10. The following message** appears on the display:

```
LQ-300
Default & Machine Information Data
Registration Program
```

If you press the Y key, all data stored in the EEPROM on the main board will be initialized to the factory default settings.

Before proceeding, confirm the following:

1. The printer is comected to the computer correctly.
2. The printer is on.
3. Paper is loaded in the printer.

If ready, press Y and the Enter key. -

11. Press Y, then Enter. The default setting table appears on the display:

| No. | Add Function | SW& Valid |
|---|---|---|
| 1 | language | English |
| 2 | Model ID | STD |
| 3 | Character table | PC-437 |
| 4 | Page length (Tractor) | 11 inch |
| 5 | Skip-over-perforation | OFF |
| 6 | Auto tear-off | OFF |
| 7 | Graphic Print Direction | Uni-D |
| 8 | Software | ESC/P2 |
| 9 | Auto line feed | OFF |
| 10 | Interface selection | Auto Selection(10s) |
| 11 | Bit rate | 19200 bps |
| 12 | Parity bit | None |
| 13 | Date Length | 8 bit |
| 14 | ETX/ACK protocol | OFF |
| 15 | State Reply | OFF |
| 16 | Font | Roman |
| 17 | Model Name | LQ-300 |

These are the factory defaults programmed into this printer.

12. Press Y, then Enter to confirm these settings and return to the initial menu.
13. Exit the program by pressing 3, then Enter.
14. The following message appears on the display:

> Any setting value specified within this program
> is not stored in the EEPROM until you turn the printer OFF.
> Turn the printer OFF now.

15. Turn the printer off to store the defaults shown above into the EEPROM on the main board assembly.

***Notes:*** ***1. If you have replaced the main board assembly, you must also perform the bidirectional adjustment procedure after competing this procedure.***

***2. The SOFTWARE and INTERFACE settings are not been able to change to Factory setting by this program, but wecan only change those settings by operation panel.***

## 4.2.2 Bidirectional Adjustment

**This** section describes the adjustment procedure necessary when the LQ-300 printer is reassembled or when parts are reinstalled or replaced. This procedure is also necessary if the main board assembly has been replaced.

Notes:
- *When the main board is rep/aced, perform the* **Defaults& Machine Information Settings** *procedure first, then perform the* **Bi-D Adjustment** *procedure.*
- *The printer cover must be installed when you perform the Bi-D adjustment.*
- *. Do not perform the* **Bi-D** Adjustment *procedure if the input voltage is fluctuating heavily.*
- *. The optional color upgrade kit must be removed when you perform the Bi-D adjustment.*

1. Connect the printer to a PC.
2. Turn the printer on.
3. Load paper into the pninterbypressing the **LF/FF** button.
4. Load the GWBASIC program onto the PC.
5. Insert a diskette containing the LQ-300Adjustment Program into the PC's diskette drive.
6. Load the LQ-300 Adjustment Program''BKMENU.BAS".
7. When you run the program, the following message appears on the display:

```
LQ-300 Adjustment Program
1. EAI, EAI(Latin A), EIS, EIB, EUL, ESP, EHK
2. EDG, EFS
3. EDG (NLSP)
4. El-r
5. END
Do nut input unspecified destination!
Please input each destination No.( 1-4 ) and Enter Key.
```

8. Press 1-4, then go to adjustment program of each destination
9. When you input 1 -4, the following message appears on the display:

```
LQ-300 Adjustment Program
1. Bi-D Adjustment
2. Defaults& Machine Information Settings
3. END
If ready, press 1-3 and the Enter key. –
```

10. Type 1 to select Bi-D Adjustment then press Enter. After 10 line feeds, the printer prints 5 rows of H characters in both draft and LQ modes. When the printer begins bidirectional printing, the message "Bi-D TEST PRINTING" appears on the display.

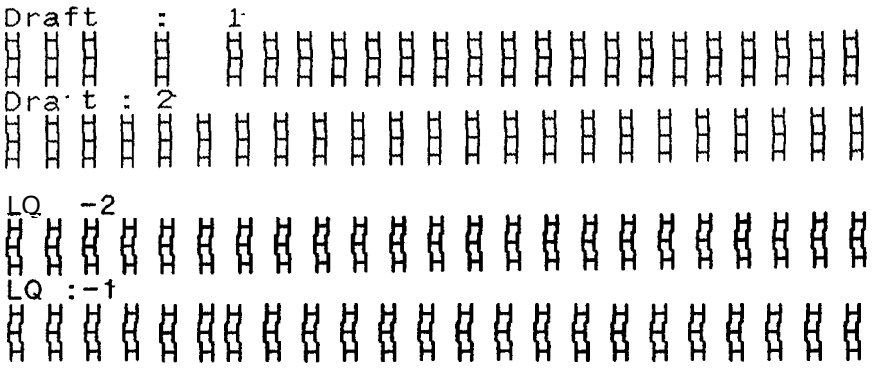



**Figure 4-2. The Bidirectional Pattern Print**

11. After printing is complete, the following message appears on the display:

```
Bi-D INPUT
      Draft : _
```

From the 5 rows of draft patterns, find the row in which the vertical lines in the H are best aligned, then enter the value assigned to that row. The following figure is an example of the Bi-D printout.

12. After you enter the value for draft, the following message appears on the display:

```
LQ : _
```

From the 5 rows of LQ patterns, find the row in which the vertical lines in the H are best aligned, then enter the value assigned to that row.

13. The printer lets you check your print pattern selection for confirmation following steps 9 and 10 by printing one row of the pattern you selected.
14. After the printer prints check patterns for confirmation, the following message appears on the display:

```
If Bi-D is correct, press "Y" and the Enter key, and
if Bi-D is incorrect, press "N" and Enter. _
```

15. If your printed pattern is aligned vertically, press Y and **Enter** to complete the Bi-D adjustment. Otherwise, press N to return to step 11 to specify another adjustment value.8.

# Chapter 5 Troubleshooting

## Table of Contents



## List of Figures



## List of Tables

## 5.1 OVERVIEW

Follow the procedures in the flowchart below to identify printer problems.

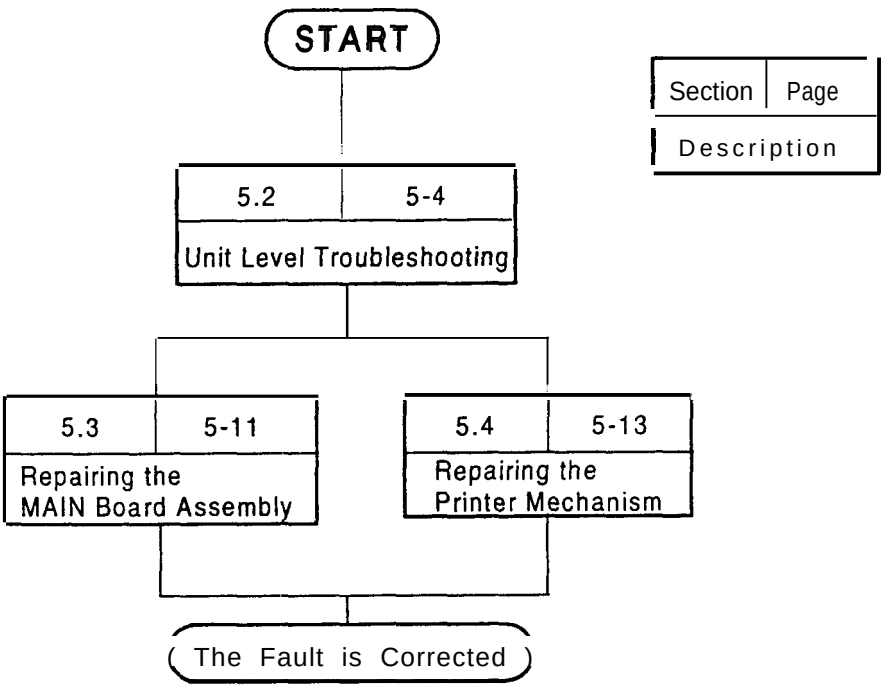



**Figure 5-1. Troubleshooting Procedures**

***Note:*** *If the power supply board assembly is faulty, it must be replaced as a whole unit. No field repair should be performed on it, except for the replacement of fuse F1.*

The following tables provide troubleshooting information.

**Table 5-1. Printhead Coil Resistance**

| *Part* | **Specifications** |
|---|---|
| Printhead | Coil resistance 54.7 Ω ± 3.9 Ω at 25° C (77° F) |

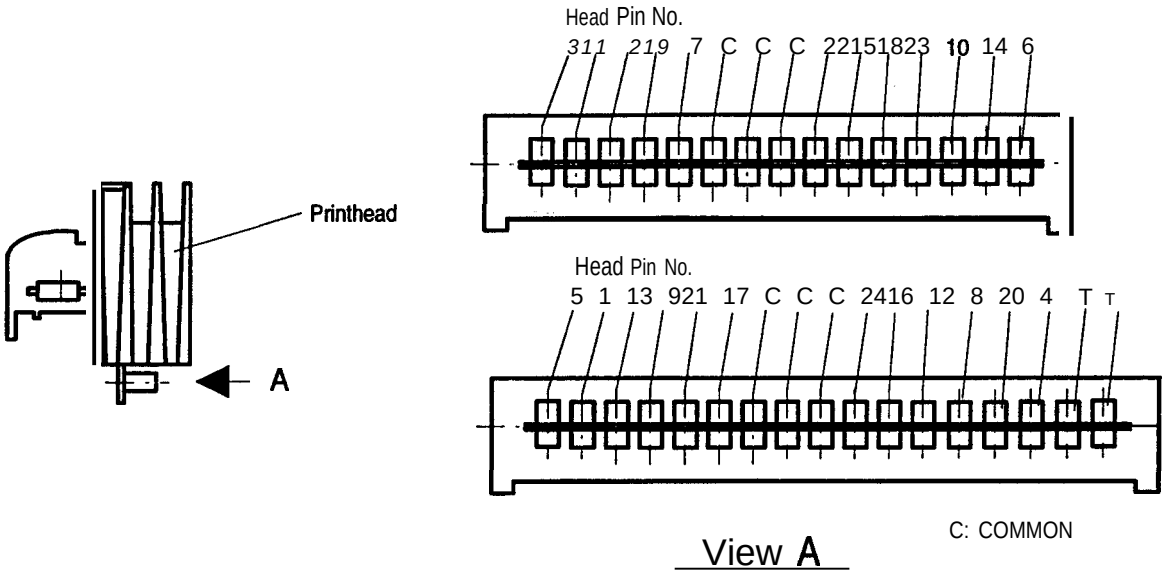



**Figure 5-2. Printhead Connector Pin Alignment**

**Table 5-2. Motor Driver Test Points**

| Transistor Numbers | Test Method (Set Meter to Diodes. Check wfth Power Off.) | Meter Reading |
|---|---|---|
| **PF Motor** Driver (Q2, Q3, Q4, Q5 | Cheek from base to **collector** and from base to **emitter.**<br>**Reverse leads and test again.**<br>(Emitter and base are marked on the main board assembly.) | **The reading should be neither open nor shorted from** base to collector or base to emitter. |

## Table 5-3. Motor Coil Resistance Test Points

| Motor Connector Number | Common Pin Number | Test Pin Number | Test Method (Set Meter to Ohms. Disconnect Motor from Main Board and Check it with Printer Power Off.) | Meter Reading |
|---|---|---|---|---|
| CR Motor (CN2) | 3 | 1,2,4,5 | Place one lead on pin 3 and the other lead on each of the 4 test pins to check the two motor phases. | 19.6Ω ± 8% (at 25° C, 77° F) |
| PF Motor (CN3) | 3 | 1,2, 4,5 | Place one lead on pin 3 and the other lead on each of the 4 test pins to check the two motor phases. | 58.5Ω ± 5% (at 25° C, 77° F) |
| CS Motor (CS Board Assembly) | 5 | 1,2,5,6 | Place one lead on pin 5 (brown) and the other lead on each of the 4 test pins to check the 4 motor phases. (Pin 3 is a common pin.) | 150Ω ± 5% (at 25° C, 77° F) |

## Table 5-4. Sensor Test Points

| Sensor Connector Number | Test Method Set Meter to Ohms. Check Printer witt Power Off.) | Method Reading |
|---|---|---|
| HP sensor (CN8) | Place one lead on pin 1 **and the other lead on pin 2. Toggle the sensor position** | Meter should toggle between open and short. (Open = home.) |
| PE sensor (CN7) | Place one lead on pin 1 and the other lead on pin 2. Toggle the **sensor by *inserting*** and removing a sheet of paper. | Meter should toggle between open and short. (Open = paper installed.) |
| Release Lever Position Sensor (CN9) | Place one lead on pin 1 and the other lead on pin 2. Change the paper-release lever position. | Meter should toggle between open and short. (Open = continuous paper.) |
| Platen Gap Sensor (CN1O) | Place one lead on pin 1 and the other lead on pin 2. Change the paper-release lever position. | Meter should toggle between open and short. (Open = platen gap lever position 2 -6) |
| Color Ribbon Sensor (CS Board Assembly) | Place one lead on pin 1 and the other lead on pin 2. Toggle sensor position. | Meter should toggle between open and short. (Open= active.) |

## Table 5-5. Error State Indication

| Error Indication | Error Status | Cause |
|---|---|---|
| **The printer beeps (•••) and the PAUSE light blinks** | **Paper-out error.** | **Paper is not installed** |
| **The printer** beeps (---) and the PAUSE light stays on | Operating error. | . The release lever is set to the TRACTOR position before the cut sheet is ejected.<br>. The release lever is set to the FRICTION position before the continuous paper is ejected. |
| | Fatal error. | Power supply voltage is abnormal. |

***Notes:*** *(•) The printer beeps for 1/10 ofa second with a 1/10-second pause.*
*(-) The printer beeps for 1/2 of a second with a l/10-second pause.*

## 5.2 UNIT LEVEL TROUBLESHOOTING

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

**Table 5-6. Symptoms and Problems**

| Symptom | Problem | See Page |
|---|---|---|
| **Printer fails** to operate when the power is on. | • **Carriage does not move.**<br>. Control panel indicator **LEDs do not light.** | 5-5 |
| **Abnormal carriage** operation. | • **Carriage moves away from** home position at power on.<br>. The carriage returns to home position correctly, but the printer then fails to enter the READY mode. | 5-6 |
| Printing is faulty during self-test, but carriage operation is normal. | • No printing at all.<br>. Faulty printing — some of the dot are not printing. | 5-7 |
| Abnormal paper feed. | . The printer prints but paper feeds incorrectly. | 5-8 |
| Abnormal control panel operation. | . When the LF/FF button is pressed, no paper is fed. | 5-9 |
| Data sent by the host computer is printed incorrectly. | . Carriage operates normally at power up, and self-test is executed correctly, but data is not printed.<br>. Data from the computer is printed incorrectly. | 5-1o |

The repair procedure flowcharts use the following symbols:

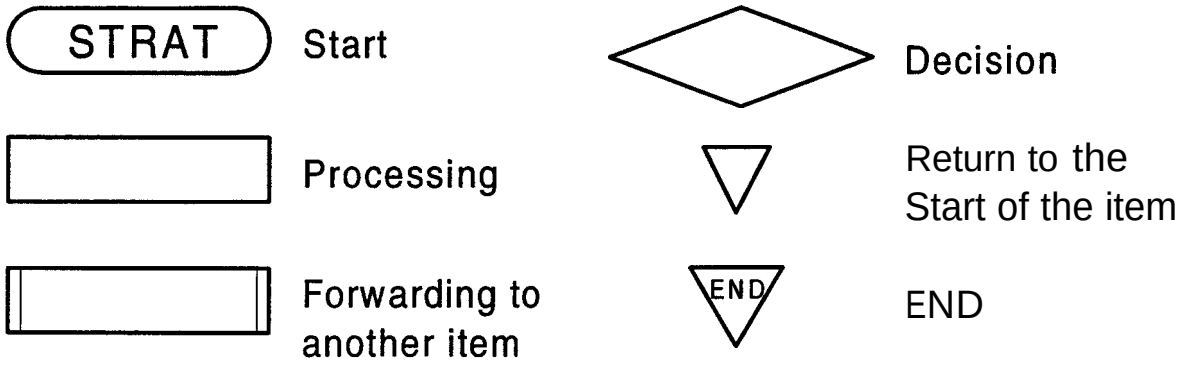



**Figure 5-3. Flowchart Symbols**

## 1. Printer fails to operate when the power is on.

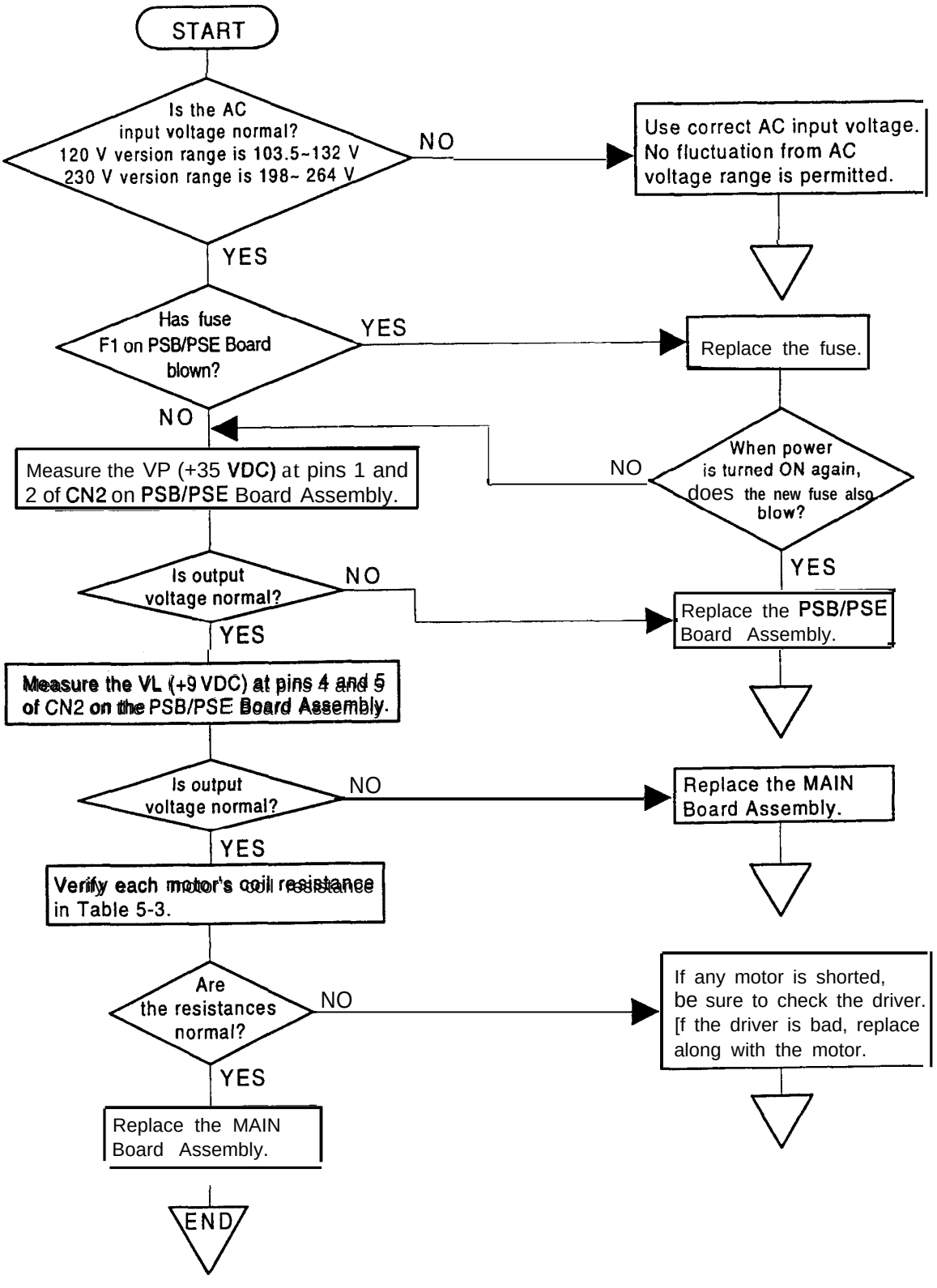



**Figure 5-4. Flowchart -1**

## *2.* Abnormal carriage operation.

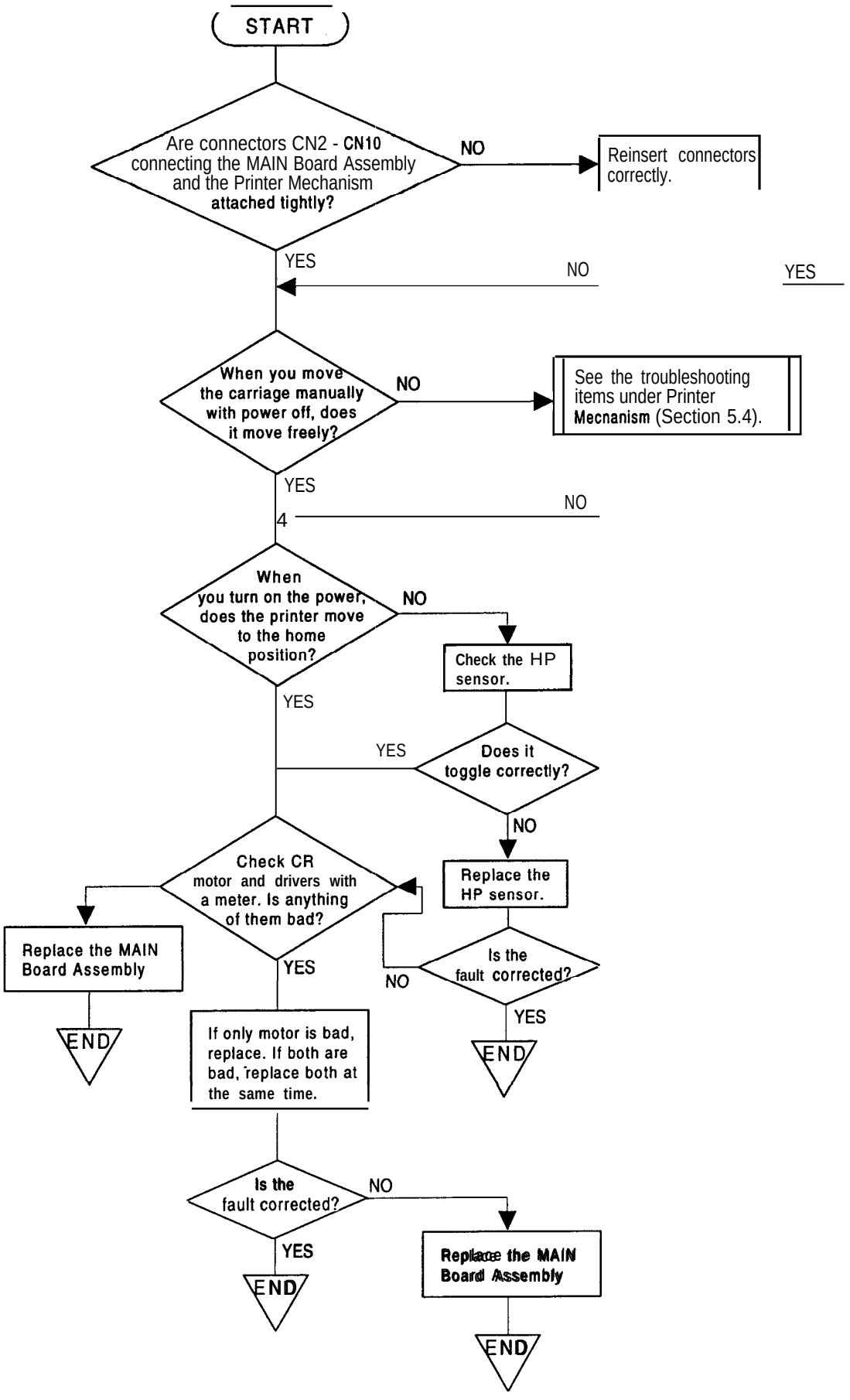



**Figure 5-5. Flowchart -2**

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

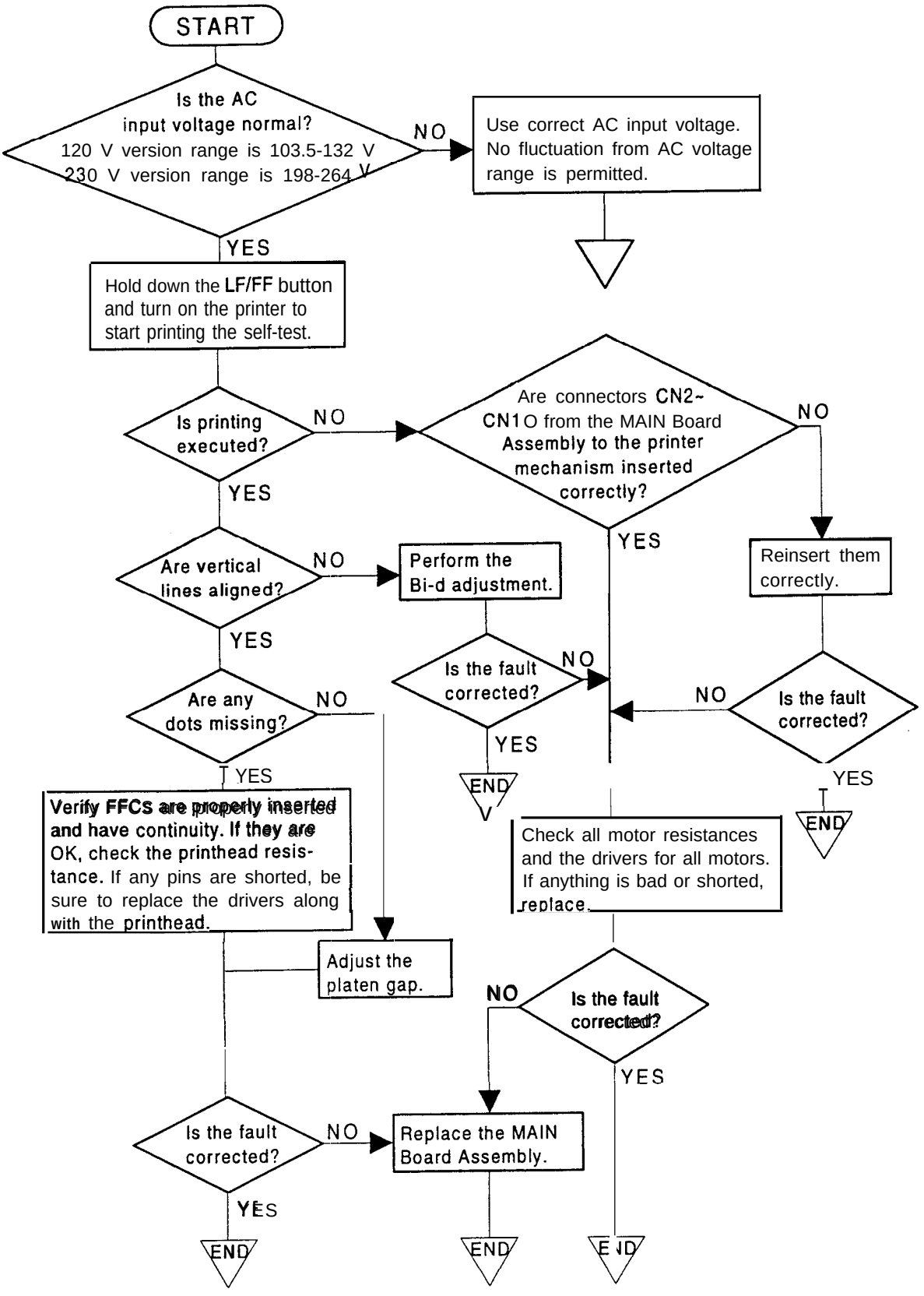



**Figure 5-6. Flowchart -3**

## 4. Abnormal paper feed.

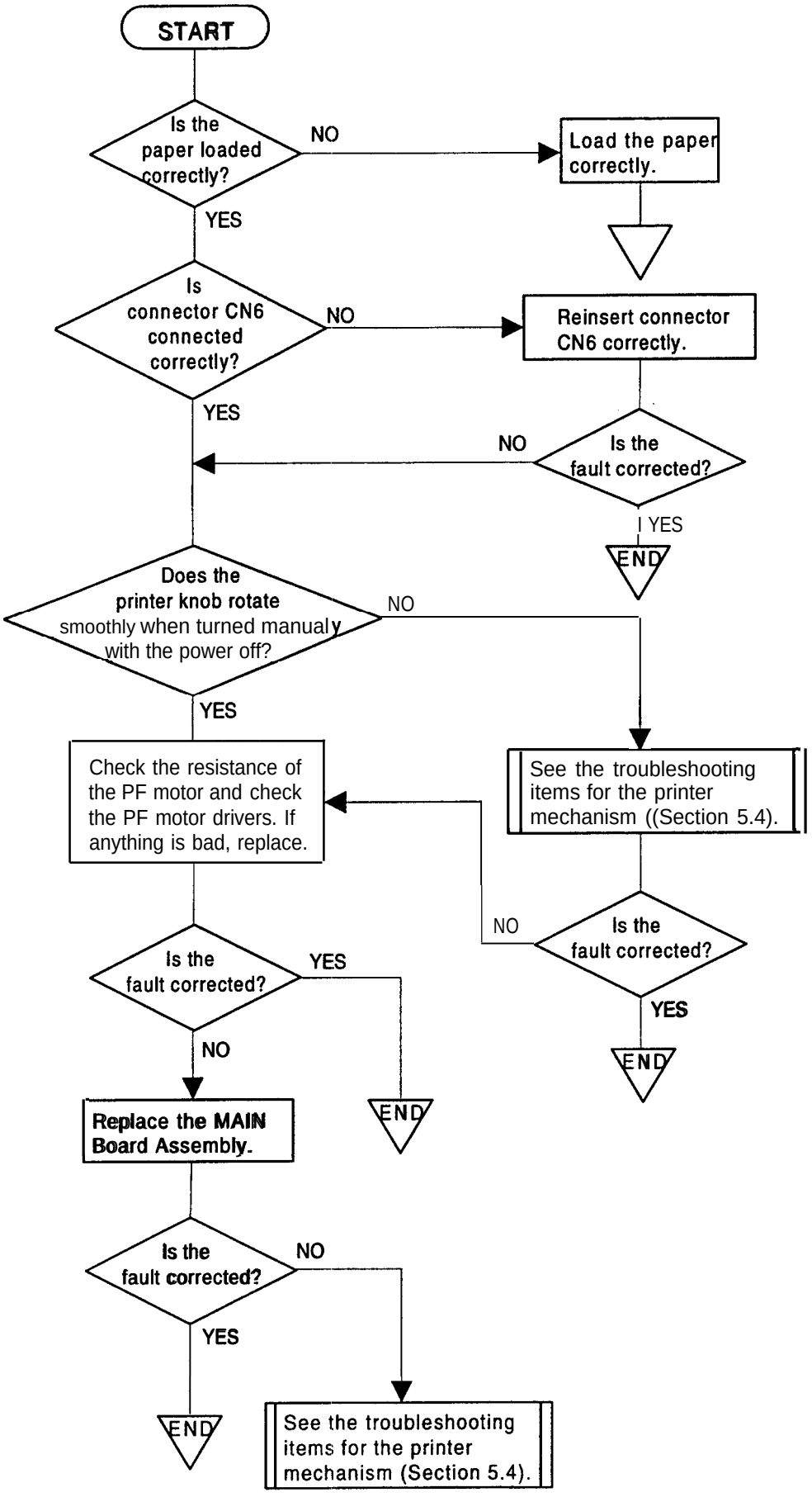



**Figure 5-7. Flowchart -4**

### *5.* Abnormal control panel operation.

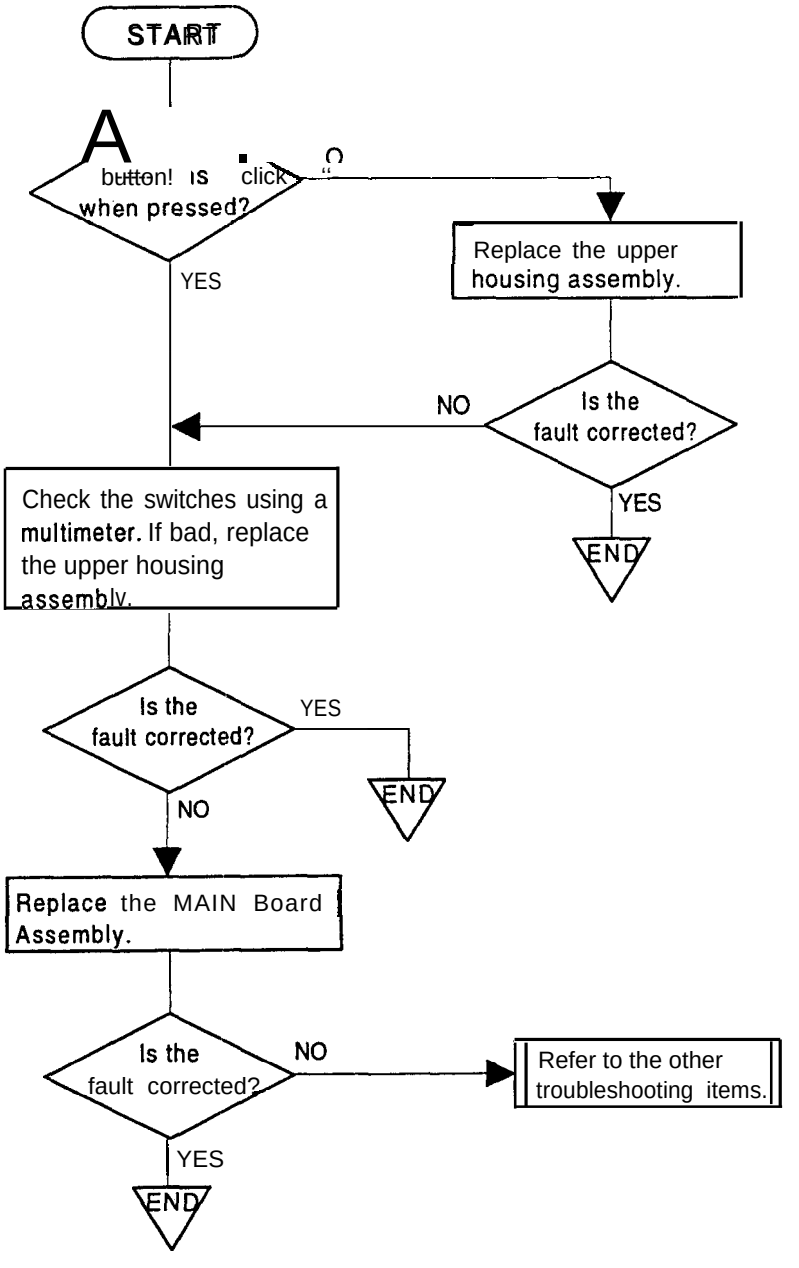



**Figure 5-8. Flowchart -5**

## 6. Data sent by the host computer is printed incorrectly.

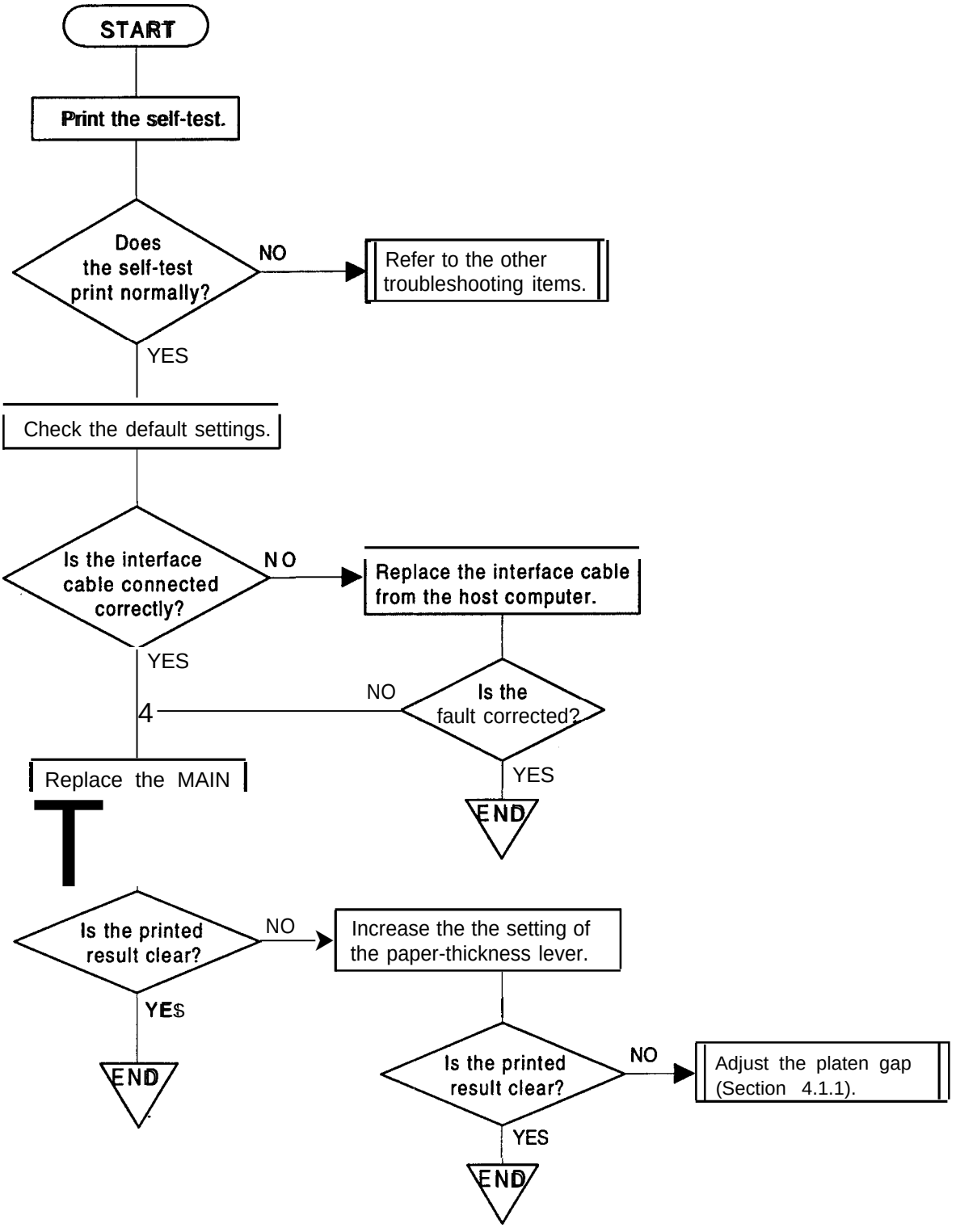


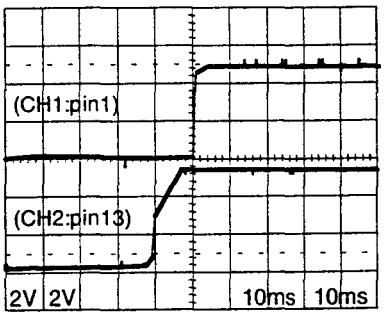
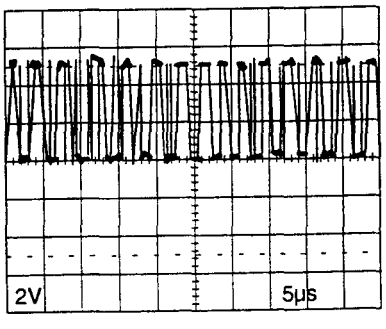
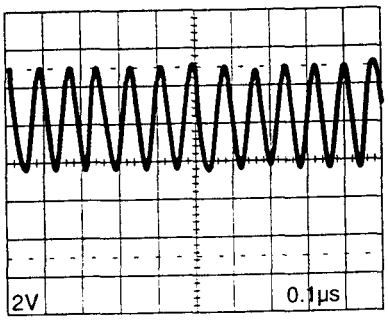

**Figure 5-9. Flowchart -6**

## 5.3 REPAIRING THE MAIN BOARD ASSEMBLY

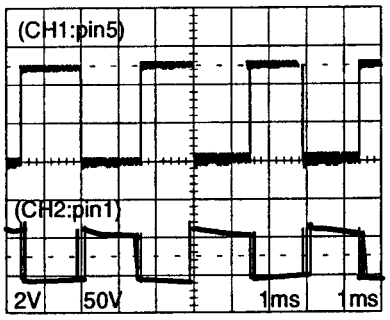
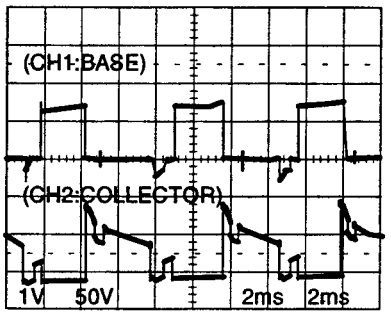
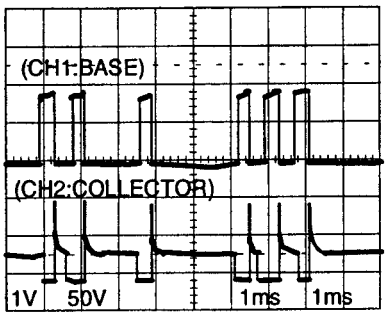
This section provides instructions for repairing a defective main board assembly. It describes various symptoms, likely causes, and checkpoints. Checkpoints refer to proper waveforms, resistance values, and other values to be checked when evaluating the operation of any potentially faulty component. Check these values and take the appropriate action.

Note: *This* section is ***required only for servicers who repair to the component/evel.***

### Table 5-7. Repairing Problems in the Main Board Assembly

| Problem | Symptom | Cause | Checkpoint | Solution |
|---|---|---|---|---|
| The printer does not operate at all.<br><br>(Motors, printhead, drivers, and power supply have already checked out OK.) | The CPU or gate array does not operate. | The reset circuit is not operational. | Check the voltage waveforms for the +5 VDC line (IC1, pin 58) and for the reset signal (IC1, pin 16) when the power is on.<br>  | Replace IC6. Otherwise, replace the main board assembly. |
| | | Selection control ROM is abnormal. | Check that pin 139 of IC2 changes from HIGH to LOW.<br>  | Replace IC10. Otherwise, replace the main board assembly. |
| | | The CPU is defective. | Check the oscillator signal at either pin 27 or 28 of IC1.<br>  | If a signal is detected, replace CR1. Otherwise, replace the main board assembly. |

## Table 5-7. Repairing Problems in the Main Board Assembly (Continued)

| Problem | Symptom | Cause | Checkpoint | Solution |
|---|---|---|---|---|
| The carriage operates abnormally.<br><br>(Carriage moves back and forth freely manually, and CR motor and drivers check out OK.) | The carriage does not operate at all. | IC8 is defective. | Check the CR motor phase signal at pin 5 and output signal at pin 1 of IC8.<br>  <br> | Replace IC8. Otherwise, replace the main board assembly. |
| The paper feeds abnormally.<br><br>(With power off, the platen knob rotates OK, and PF motor checks out OK.) | The paper does not feed at all. | One or more of the following transistors is defective: Q2, Q3, Q4, Q5. | Check the signal at the collector and base of Q2, Q3, Q4 or Q5.<br>  <br> | Replace any of these transistors that are defective: Q2, Q3, Q4 or Q5 Otherwise, replace the main board assembly. |
| Self-test printing is abnormal. | The self-test is not executed, or a particular dot is not being printed (but printhead resistance is OK). | Any printhead driver QM1-6, may be defective. | Check the input signal at the collector and base of QM1-6.<br>  <br> | Replace any of these ICs that are defective: QM1-6. Otherwise, replace the main board assembly. |
| Data from the host computer is printed incorrectly. | Data corruption occurs when the interface is used. | IC1,2 or IC8 is defective. | | Replace IC8 or the main board assembly. |

## 5.4 REPAIRING THE PRINTER MECHANISM

For detailed procedures for replacing or adjusting parts, refer to Chapter 3, *Disassembly and Assembly,* and Chapter 4, *Adjustments.* If a problem or symptom recurs following an attempted repair, refer to Table 5-8 and try to find other potential causes.

**Table 5-8. Repairing the Printer Mechanism**

| Problem | Symptom | Cause | Checkpoint | Solution |
|---|---|---|---|---|
| The CR motor fails to operate. | The CR motor fails to operate the timing belt after power on. | Foreign substances are lodged in the gears or elsewhere in the mechanism. | Manually move the timing belt to see if the motor can rotate freely. | Remove the foreign substances. |
| | | The CR motor is defective. | Measure the motor coil resistance. It should be about 19.6 Ω. If the motor is shorted, also check the CR motor drivers on the main board. | Replace the CR motor (and drivers, if necessary). |
| The carriage does not operate when turned on (after the carriage has been manually centered prior to power on.) | The CR motor rotates, but the carriage does not move. | The belt pulleys are defective. | Check for broken or worn pulleys. | Replace the belt pulleys. |
| | | The timing belt is defective. | Check that the timing belt is inserted correctly into the bottom of the carriage. | Reinsert the timing belt. |
| | | | Check for a broken timing belt. | Replace the timing belt. |
| | The carriage moves to the left slightly, then stops. | The carriage movement is not smooth. | Cheek whether the carriage moves smoothly when moved manually. | Clean and lubricate the CR guide shaft. Replace the CR motor. |
| | The carnage moves to the left or right end, then stops. | The HP sensor is defective. | Use a multimeter to check the HP sensor. | Replace the HP sensor. |
| Self-test printing is not executed. | The carriage moves, but does not print. | The printhead FFC common wires are disconnected. | Check the common wires for the printhead FFC. | Replace the FFC. |
| | | The printhead is bad. | Measure the printhead coil resistance. It should be approximately 54.7 Ω. If the Printhead is shorted, also cheek the drivers. | Replace the printhead (and drivers, if necessary). |

## Table 5-8. Repairing the Printer Mechanism (Continued)

| Problem | Symptom | Cause | Checkpoint | Solution |
|---|---|---|---|---|
| Self-test printing is abnormal. | A particular dot is missing. | The printhead is defective. | Measure the pnnthead coil resistance. it should be approximately 54.7 Ω. if the printhead is shorted, also check the drivers. | Replace the printhead (and drivers, if necessary). |
| | | | Check to see if the dot wires are worn. | Replace the printhead. |
| | The printing is too light, or the print density is not uniform. | The printhead is defective. | Check whether the tips of the wires are worn. | Replace the printhead. |
| | | The platen gap is not properly adjusted. | Set the gap adjustment lever to the first position, and check the platen gap. The appropriate value is 0.45 mm. | Adjust the gap. Refer to Section 4.1.1, *Platen Gap Adjustment.* |
| Paper feed is abnormal. | Printing is performed but the paper is not fed or is not fed uniformly. | Foreign substances are lodged in the paper path. | Perform a visual check of the paper path. | Remove any foreign substances. |
| | | The PF motor is not driving the gear correctly. | Check that no foreign substance is lodged between the gears and that the gears are not broken or worn. | Remove any foreign substances. Replace the PF motor reduction gears. Replace the paper pickup gears. |
| | | The PF motor is defective. | Measure the coil resistance for the PF motor. The approximate value should be 56 Ω. if the motor is shorted, also check the drivers. | Replace the PF motor (and drivers, if necessary). |
| The ribbon ‘eed is abnormal. | The ribbon is not turning. | The ribbon cartridge is defective. | Remove the ribbon cartridge, rotate its ribbon feed knob manually, and see if the ribbon feeds normally. | Replace the ribbon cartridge. |
| | | Foreign substances are caught in the gears. . | Cheek whether the RD ratchet rotates when the carriage is moved manually. | Remove any foreign substances. Replace the ribbon feed mechanism. |
| | The ribbon feeds properly only when the carriage moves in one direction (i.e., it fails to feed when the carriage moves in the other direction). | The planetary gear is defective. | Move the carriage manually; check whether the planetary gear turns in reverse and engages the gear. | Replace the ribbon feed mechanism. |

# CHAPTER 6 Maintenance

## Table of Contents



## List of Figures



## List of Tables

## 6.1 PREVENTIVE MAINTENANCE

Preventive maintenance includes regular cleaning of the case exterior (using denatured alcohol), as well as occasional vacuuming of the mechanism's interior to remove dust and paper debris. After cleaning the unit, check that it is adequately lubricated (as described in Section 6.2, below). Before returnmg the printer to the customer, inspect the springs, paper-feed rollers, and basic operation.

**CAUTION**

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

## 6.2 APPLYING LUBRICATION

EPSON recommends that the printer be lubricated at the points illustrated in Figure 6-1. Table 6-2 lists each point along with its recommended lubricant. The recommended lubricants are EPSON G-20, G26 and O-2, all of which have been tested extensively and found to comply with the needs of this printer. (Table 6-1 provides details about these lubricants.) Before applying a lubricant, be sure that the surface to be lubricated is clean. Do not apply too much lubricant, as this may damage nearby parts.

**Table 6-1. Lubrication**

| Type | Name | Quantity | Availability | Part No. |
|---|---|---|---|---|
| Grease | G-26 | 40 gm | EPSON | B702600001 |
| | G-20 | 40 gm | EPSON | B702000001 |
| Oil | o-2 | 40 co | EPSON | B703700001 |

**Table 6-2. Lubrication Points**

| Ref. No. | Lubrication Points | Lubricant |
|---|---|---|
| (1) | The hooks that attach the CR motor to the base frame. | G-26 |
| (2) | The shafts for the gear train on the left frame (5 places). | G-26 |
| (3) | The shafts for the gear train on the right frame (2 places). | G-26 |
| (4) | The contact surface of the disengage lever and tractor reduction gear. | G-26 |
| (5) | The oil pad in the carriage assembly. | o-2 |
| (6) | The teeth of 34 mm gear. | G-26 |
| (7) | The point at which the platen grounding wire contacts the platen shaft. | G-20 |
| (8) | The portions of the carriage assembly that contact the base frame. | G-26 |
| (9) | The contact point of the right tractor frame and TR shaft. | G-26 |
| (lo) | The contact point of the left tractor frame and TR shaft. | G-26 |
| (11) | The contact point of the drive pulley shaft and drive pulley. | G-26 |

***Note: Lubrication must be applied during the reassembly process.***

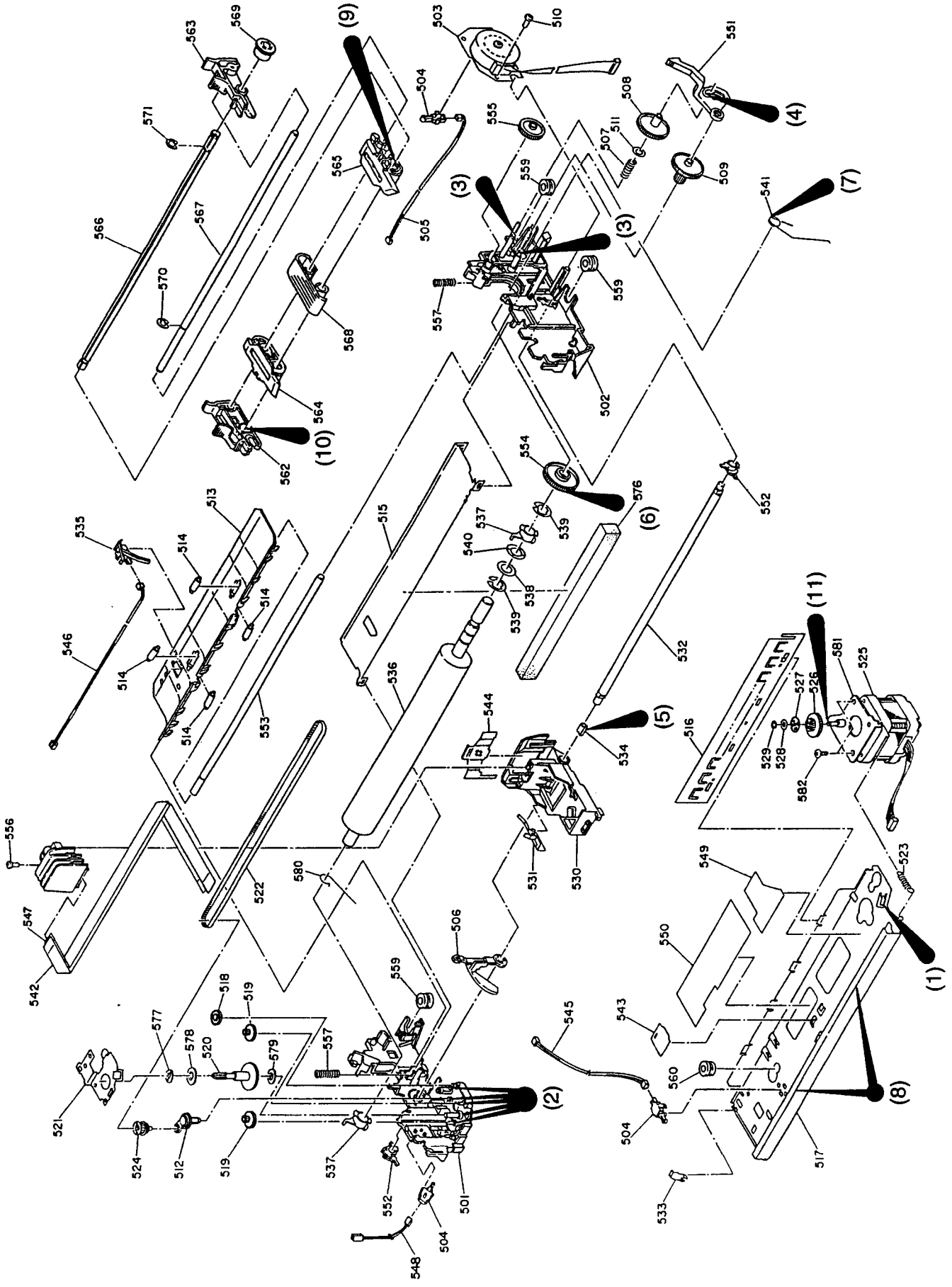



**Figure 6-1. LQ-300 Lubrication Points**

# Appendix

## Table of Contents



## List of Figures



## List of Tables

## A.1 CONNECTOR SUMMARY

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

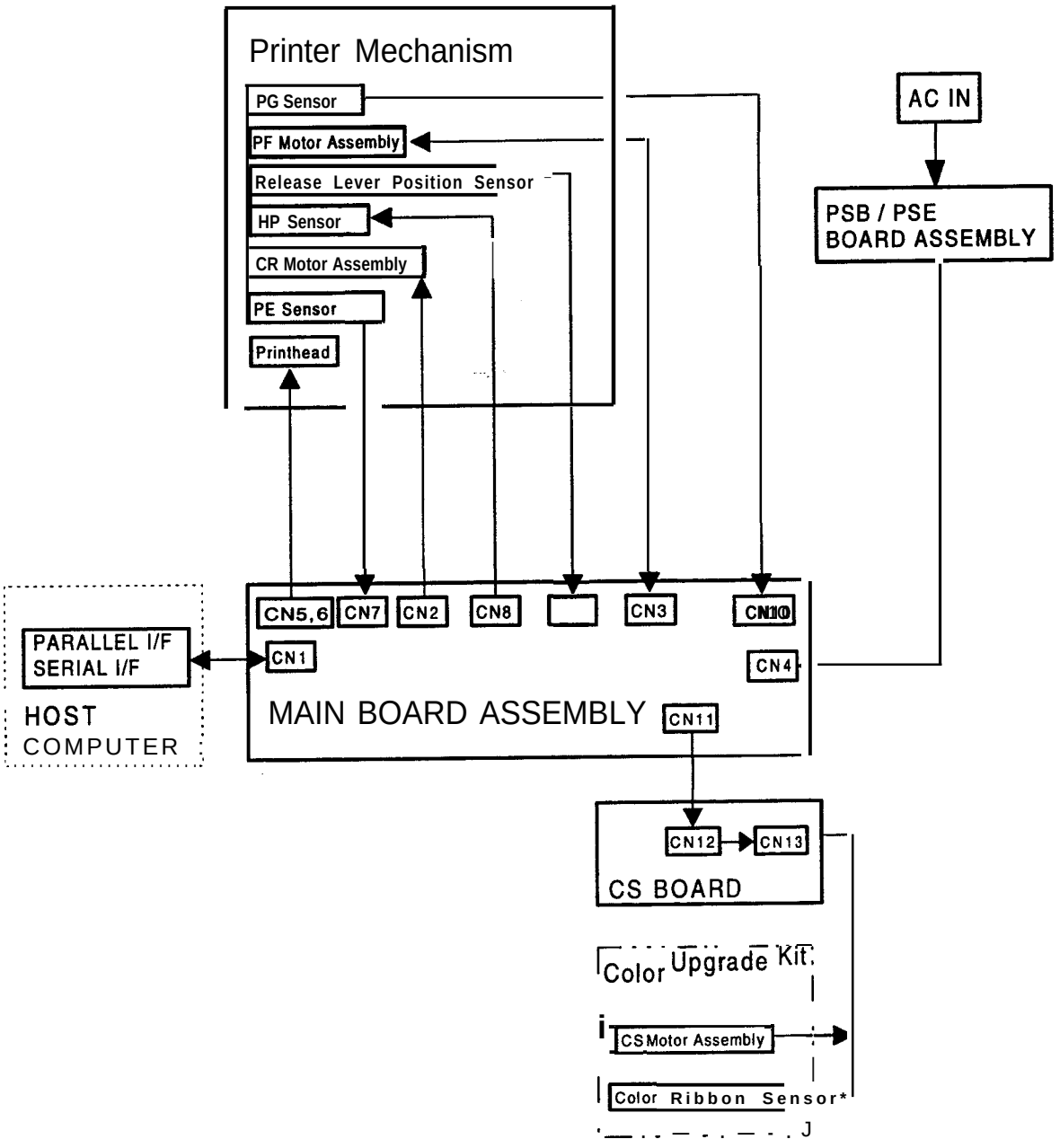



**Figure A-1. Cable Connections**

## Table A-1. Connector Summary

| Board | Connector | Function | Pins |
|---|---|---|---|
| MAIN Board Assembly | CN1 | Parallel, serial interface | 26 |
| | CN2 | CR motor | 5 |
| | CN3 | PF motor | 5 |
| | CN4 | PSB/PSE board assembly | 5 |
| | CN5 | Printhead | 15 |
| | CN6 | Printhead | 17 |
| | CN7 | PE sensor | 2 |
| | CN8 | HP sensor | 2 |
| | CN9 | Release lever position sensor | 2 |
| | CN10 | PG sensor | 2 |
| | CN11 | CS motor (optional)<br>Color ribbon sensor (optional) | 10 |
| | CN12 | CS motor (optional)<br>Color ribbon sensor (optional) | 10 |
| | CN13 | CS motor (optional)<br>Color ribbon sensor (optional) | 10 |

## Table A-2. Connector Pin Assignments - CN2

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | 0 | CR A | CR motor phase A |
| 2 | 0 | CR B | CR motor phase B |
| 3 | — | CRCOM | CR motor common |
| 4 | 0 | CR–A | CR motor phase –A |
| 5 | 0 | CR-B | CR motor phase –B |

## Table A-3. Connector Pin Assignments - CN3

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | 0 | PF A | PF motor phase A |
| 2 | 0 | PF B | PF motor phase B |
| 3 | — | PFCOM | PF motor common |
| 4 | 0 | PF –A | PF motor phase –A |
| 5 | O | PF _B | PF motor phase _B |

## Table A-4. Connector Pin Assignments - CN4

| pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | I | VP | +35 VDC |
| 2 | I | VP | +35 VDC |
| 3 | — | GND | Signal ground |
| 4 | — | GND | Signal ground |
| 5 | I | VL | DC voltage for logic |

## Table A-5. Connector Pin Assignments - CN5

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | o | HD 3 | Head data 3 |
| 2 | 0 | HD 11 | Head data 11 |
| 3 | 0 | HD 2 | Head data 2 |
| 4 | 0 | HD 19 | Head data 19 |
| 5 | 0 | HD 7 | Head data 7 |
| 6 | — | HDCOM | Common (VP) |
| 7 | — | HDCOM | Common (VP) |
| 8 | — | HDCOM | Common (VP) |
| 9 | o | HD 22 | Head data 22 |
| 10 | 0 | HD 15 | Head data 15 |
| 11 | 0 | HD 18 | Head data 18 |
| 12 | 0 | HD 23 | Head data 23 |
| 13 | 0 | HD 10 | Head data 10 |
| 14 | 0 | HD 14 | Head data 14 |
| 15 | 0 | HD 6 | Head data 6 |

## Table A-6. Connector Pin Assignments - CN6

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | o | HD 5 | Head data 5 |
| 2 | 0 | HD 1 | Head data 1 |
| 3 | 0 | HD 5 | Head data 5 |
| 4 | 0 | HD 3 | Head data 3 |
| 5 | 0 | HD 21 | Head data 21 |
| 6 | 0 | HD 17 | Head data 17 |
| 7 | — | HDCOM | Common (VP) |
| 8 | — | HDCOM | Common (VP) |
| 9 | — | HDCOM | Common (VP) |
| 10 | o | HD 24 | Head data 24 |
| 11 | 0 | HD 9 | Head data 9 |
| 12 | 0 | HD 12 | Head data 12 |
| 13 | 0 | HD 8 | Head data 8 |
| 14 | 0 | HD 20 | Head data 20 |
| 15 | 0 | HD 4 | Head data 4 |
| 16 | i | TEMP2 | Head temperature |
| 17 | I | TEMP1 | Head temperature |

## Table A-7. Connector Pin Assignments - CN7

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | I | PE | PE sensor signal |
| 2 | — | GND | Signal ground |

## Table A-8. Connector Pin Assignments - CN8

| Pin | I/O | Signal Name | Function |
|---|---|---|---|
| 1 | I | HP | Carriage home position sensor signal |
| 2 | — | GND | Signal ground |

## Table A-9. Connector Pin Assignments - CN9

| Pin | I/o | Signal Name | Function |
|---|---|---|---|
| 1 | I | RELSW | Release lever position sensor signal |
| 2 | — | GND | Signal ground |

## Table A-10. Connector Pin Assignments - CN1O

| Pin | I/o | Signal Name | Function |
|---|---|---|---|
| 1 | I | Gap-Adj | Platen gap sensor signal |
| 2 | — | GND | Signal ground |

## Table A-1 1. Connector Pin Assignments - CN11,CN12,CN13

| Pin | I/o | Signal Name | Function |
|---|---|---|---|
| 1 | — | +35 | +35 VDC |
| 2 | — | CS-HOLD | +5 VDC |
| 3 | — | +5 VDC | +5 VDC |
| 4 | 0 | CS A | CS motor phase A |
| 5 | 0 | CS-A | CS motor phase –A |
| 6 | 0 | CS B | CS motor phase B |
| 7 | 0 | CS–B | CS motor phase –B |
| 8 | — | GP | Signal ground |
| 9 | I | C c s w | Color ribbon sensor signal |
| 10 | — | GAD | Signal ground |

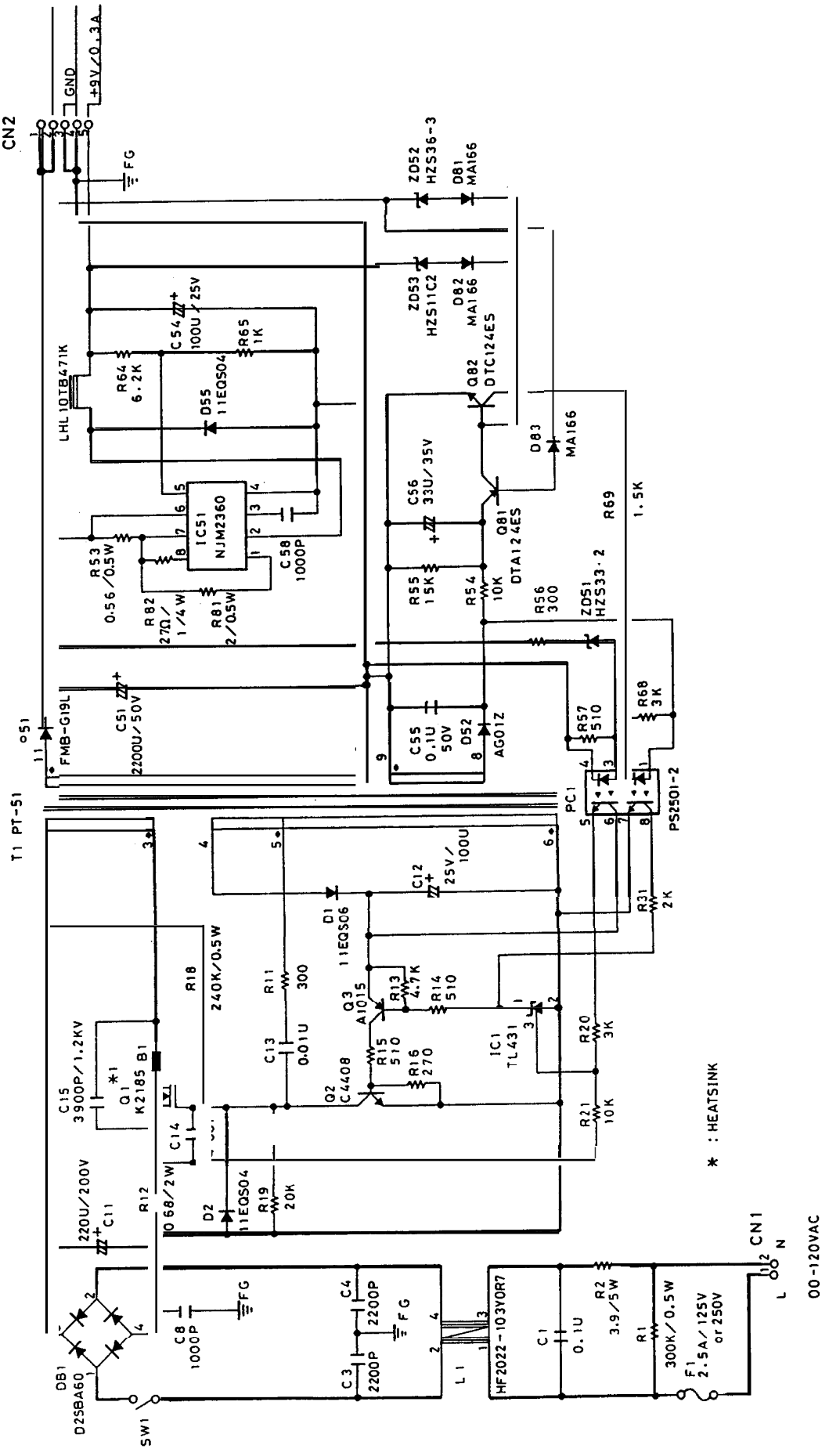



**Figure A-3. C130 PSB Circuit Diagram**

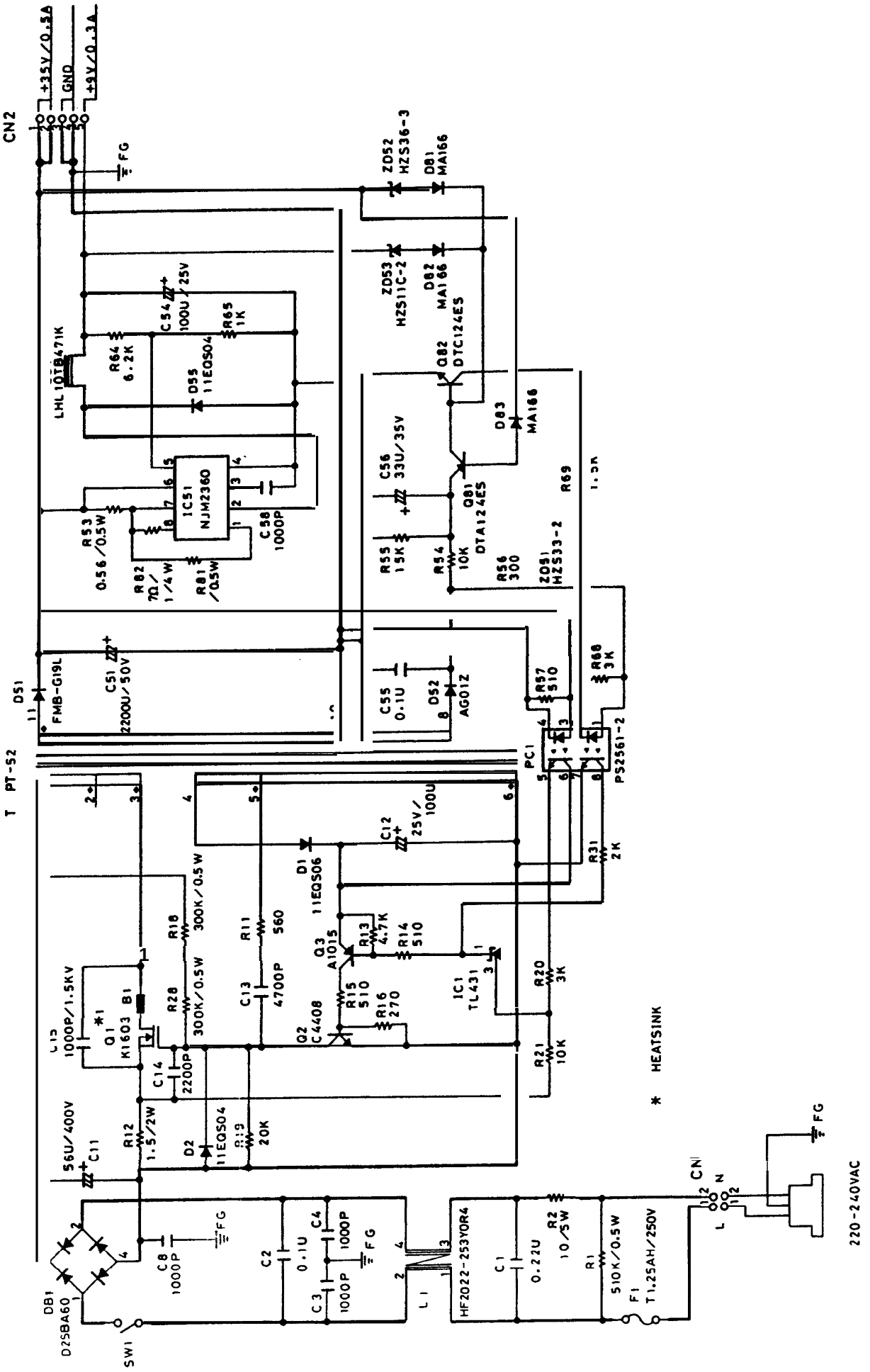



**Figure A-4. C130 PSE Circuit Diagram**

## A.3 COMPONENT LAYOUTS

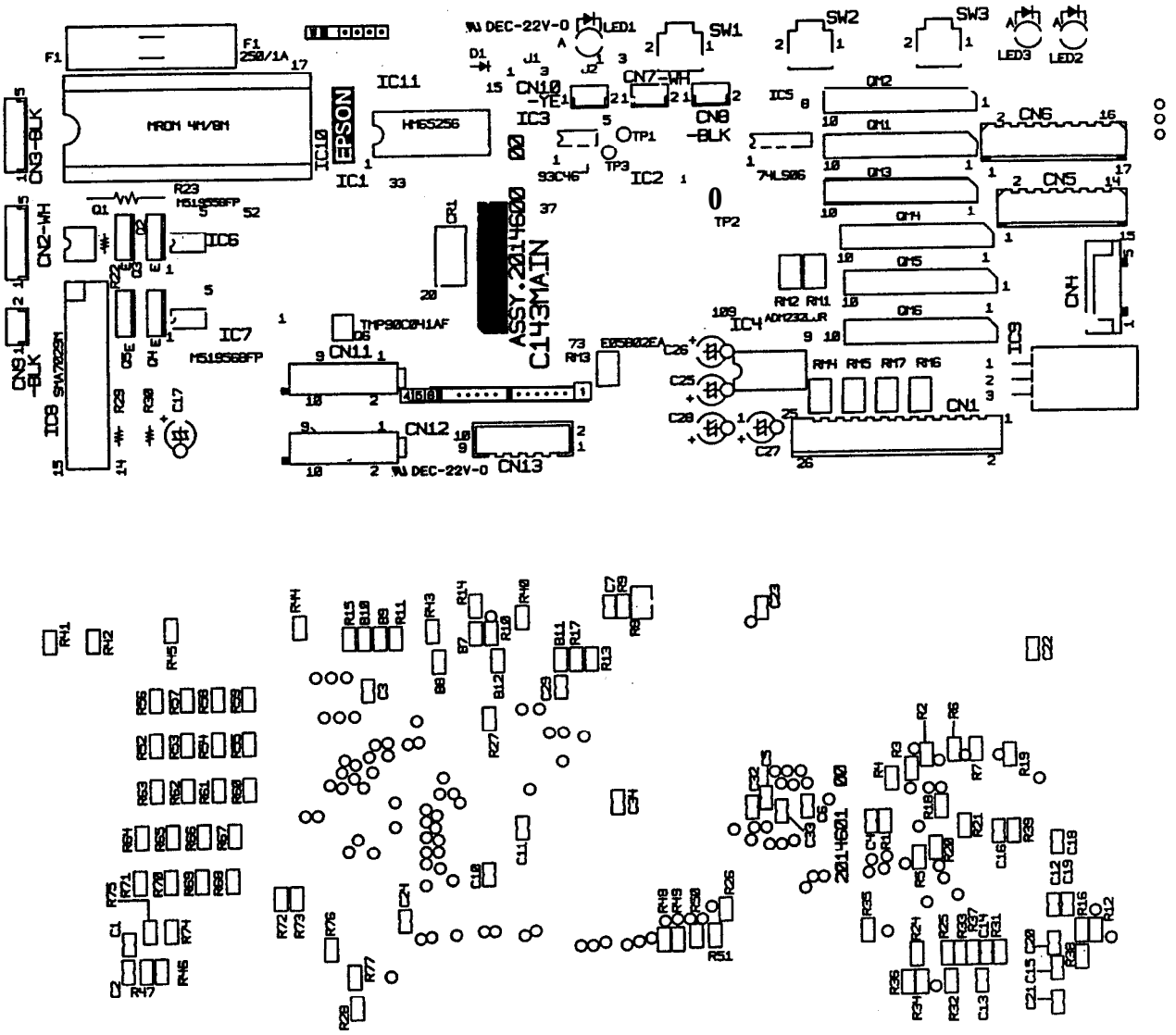



**Figure A-5. C143 MAIN Component Layout**

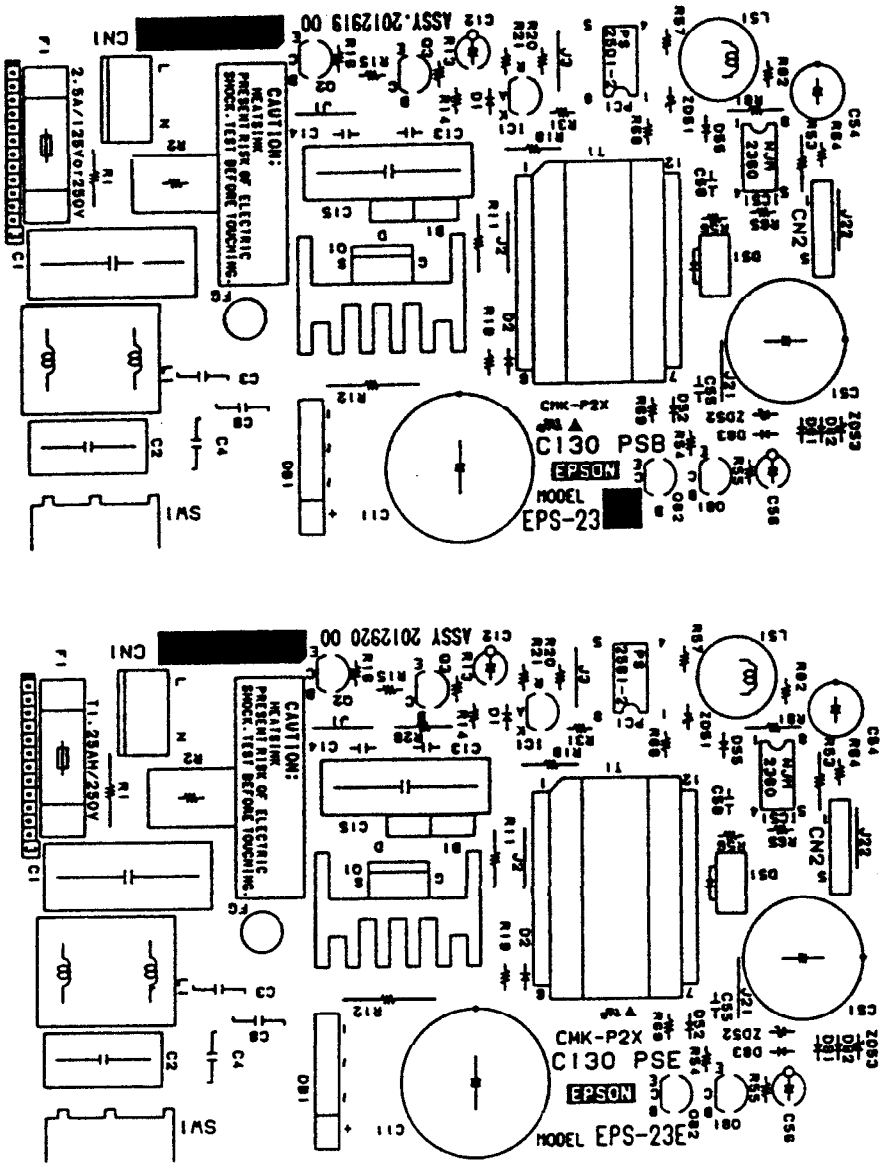



**Figure A-6. C130 PSB/PSE Component Layout**

# A.4. EXPLODED DIAGRAMS

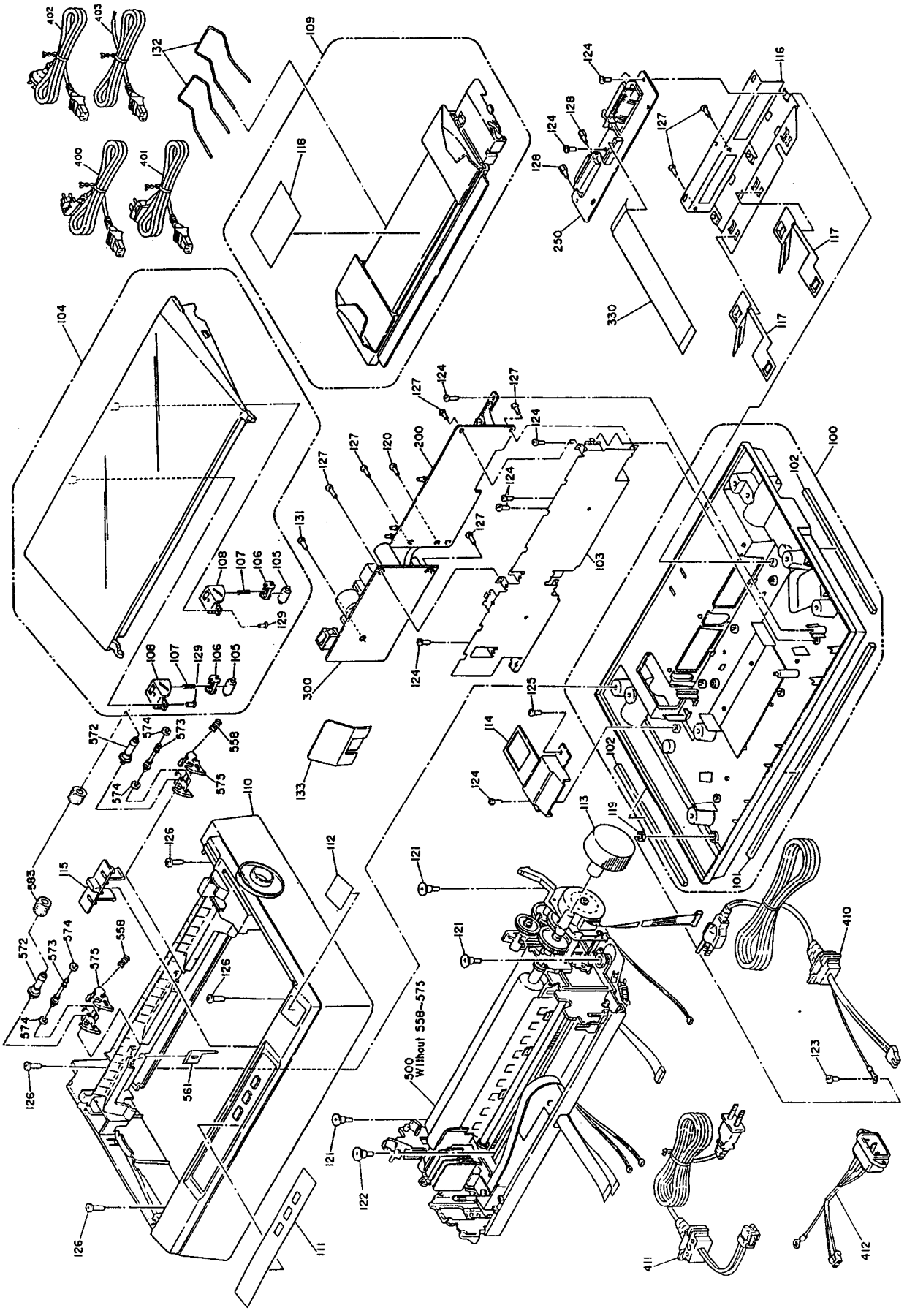



**Figure A-7. LQ-300 Exploded Diagram (1)**

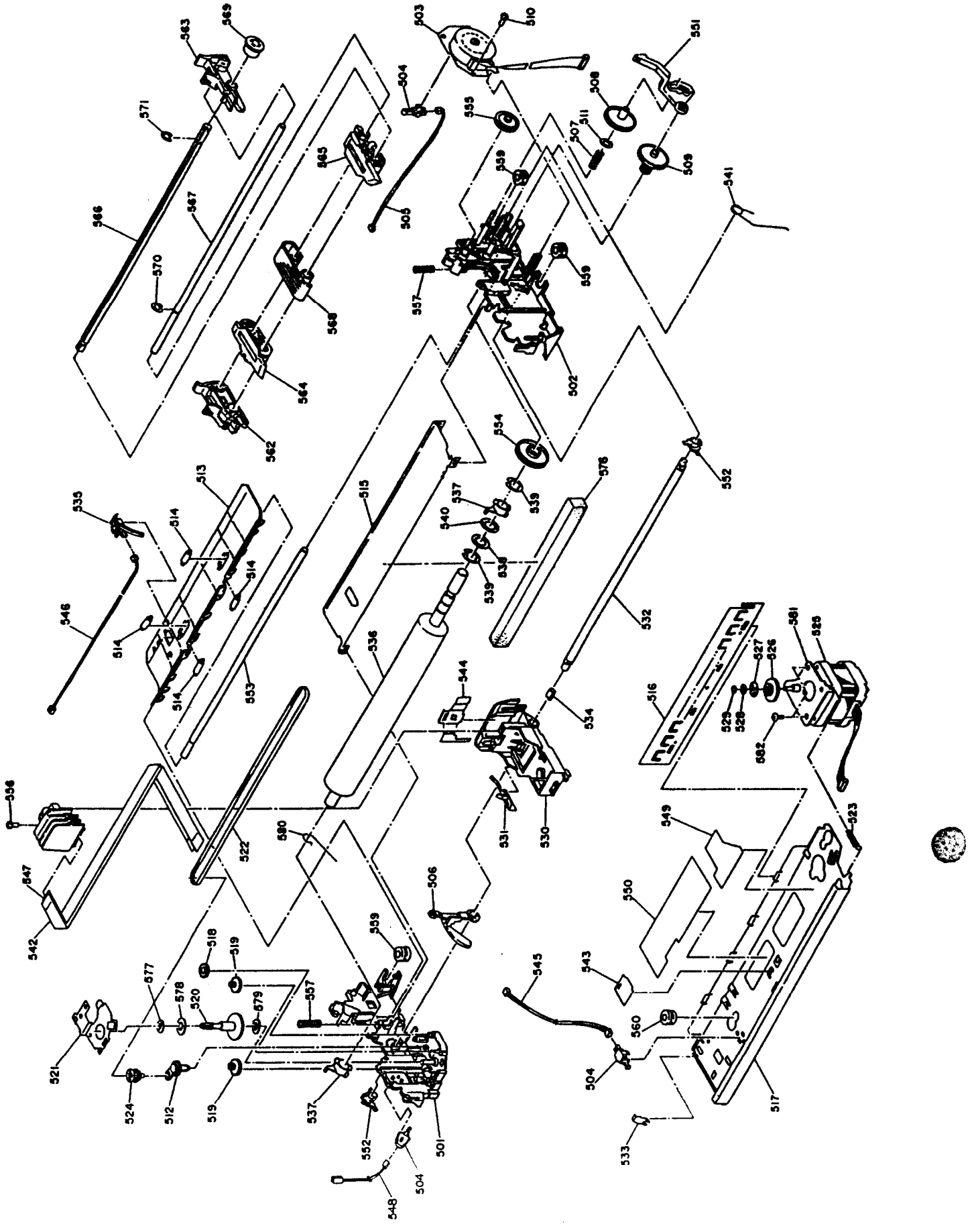


**Figure A-8. LQ-300 Exploded Diagram (2)**

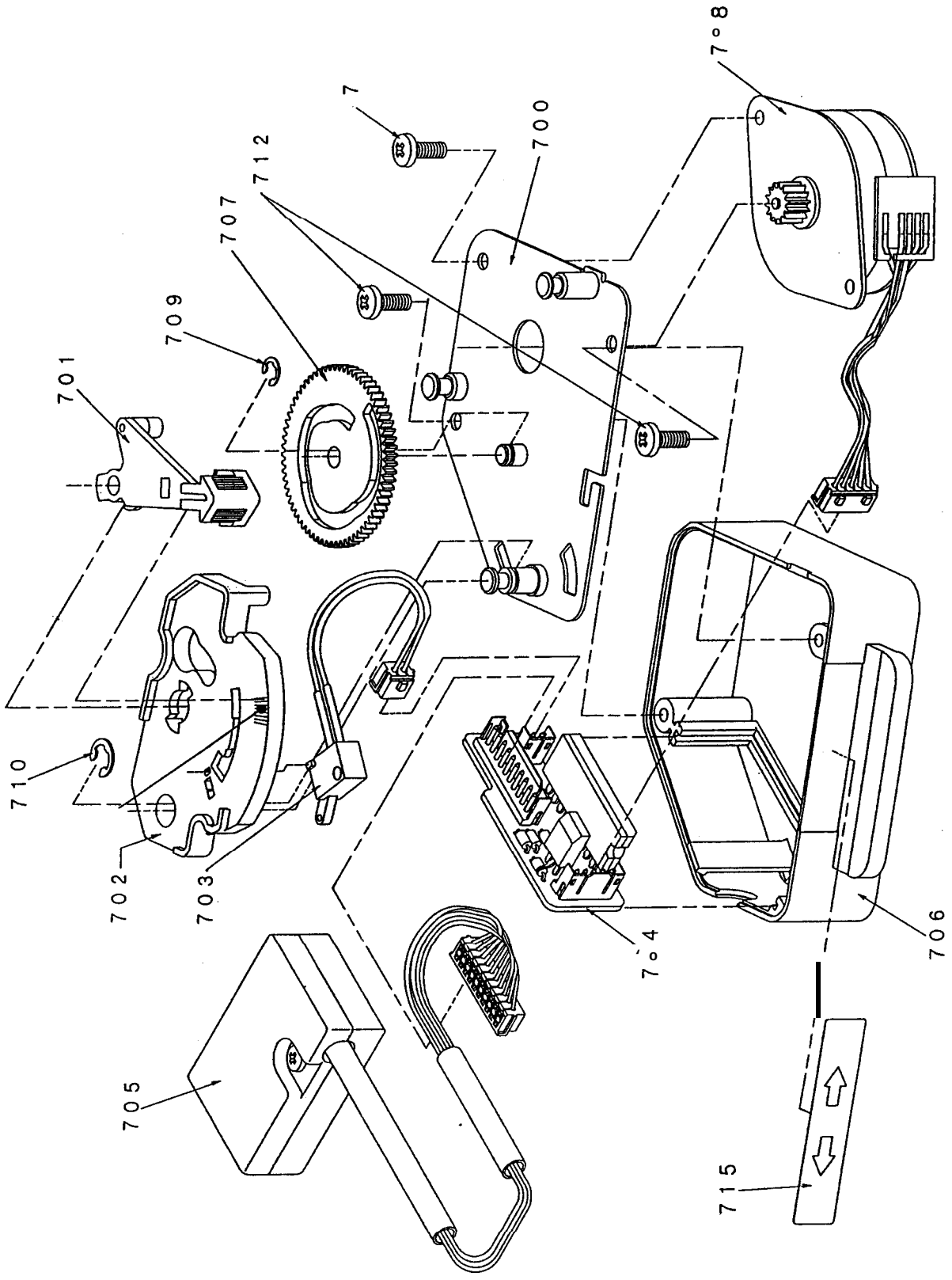



**Figure A-9. Color Upgrade Kit Exploded Diagram**

Table A-12. **Part No.** Reference Table

| Ref. No. | PPL Name | Description | Ref. No. | PPL Name | Description |
|---|---|---|---|---|---|
| 100 | Housing Assv..Lower | *Lower housing* assembly | 101 | Insulator | Insulator |
| 102 | Insulator | Insulator | 103 | Shield Plate | Shield plate |
| 104 | *Cover* Assy.,Printer | Printer cover assembly | 105 | Roller,Driven | Driven roller |
| 106 | Holder,Roller, Driven | Driven roller holder | 107 | Compression Spring,73 | 73 g compression spring |
| 106 | Cover, Roller, Driven | Driven roller cover | 109 | Edge Guide Assy. | Edge guide assembly |
| 110 | Housing, Upper | Upper housing | 111 | Sheet,Panel | Panel sheet |
| 112 | Logo Plate | Logo plate | 113 | Knob | Knob |
| 114 | Cover,Bottom | Bottom cover | 115 | Cover,Connector,CS | CS connector cover |
| 116 | Shield Plate,I/F | I/F shield plate | 117 | Grounding Plate | Grounding plate |
| 118 | Label,Position | Position label | 119 | Hexagon Nut | Hexagon nut |
| 120 | C.B.C-Lamitite (M3 x 8) | CBC-Lamitite (M3x 8) | 121 | Shaft,Housing, Lower | Lower housing shaft |
| 122 | Shaft,Housing, Lower | Lower housing shaft | 123 | C.B.(O) Screw (M4 x8) | CB(O) Saew (M4 x8) |
| 124 | C.B.B. Screw (M3 X 8) | CBB screw (M3 x8) | 125 | C.B.B. Screw (M3 x 10) | CBB screw (M3 x 10) |
| 126 | C.B.B. Screw (M4x 12) | CBB screw (M4x 12) | 127 | C.B.USCA C (M3 X 8) | CBUSCA C (M3 x8) |
| 128 | Jack-Socket | Jack socket | 129 | C. F. P-Tite Screw (M2.6 x8) | CFP-Tite screw (M2.6 x8) |
| 131 | C.B.USCA C (M3 X 10) | CBUSCA C (M3x 10) | 132 | Guide,Stacker | Stacker guide |
| 133 | Stacker | Stacker | 200 | Board Assy., MAIN | MAIN board assembly |
| 250 | Board Assy.,I/F | I/F board assembly | 300 | Board Assy., PSB/PSE | PSB/PSE board assembly |
| 3130 | Wire Harness | Wire harness | 410 | Power Cable Assy. | Power cable assembly |
| 411 | Power Cable Assy. | Power cable assembly | 412 | Wire Harness | Wire harness |
| 500 | Printer Mechanism (M-5M1O) | M-5M10 printer mechanism | 501 | Frame,Left | Left frame |
| 502 | Frame,Right | Right frame | 503 | Motor,PF | PF motor |
| 504 | Detector,Leaf,B1 | Release lever position sensor | 506 | Harness,TR | m harness |
| 506 | Lever,G,Adjust | Gap adjust lever | 507 | Compression Spring,200 | 200 g compression spring |
| 508 | Tractor Reduction Gear | Tractor reduction gear | 509 | Paper Feed Reduction Gear | Paper feed reduction gear |
| 10 | C.B.B. Screw (M3 X 8) | CBB screw (M3 X 8) | 511 | Plain Washer (5.2 X 0.3x 10) | Plain washer (5.2 x 0.3X 10) |
| 12 | Lever Assy., Planetary | Planetary lever assembly | 513 | Paper Guide, Upper | Upper paper guide |
| 14 | Roller, PF,Driven | Driven PF roller | 515 | Paper Guide,Lower | Lower paper guide |

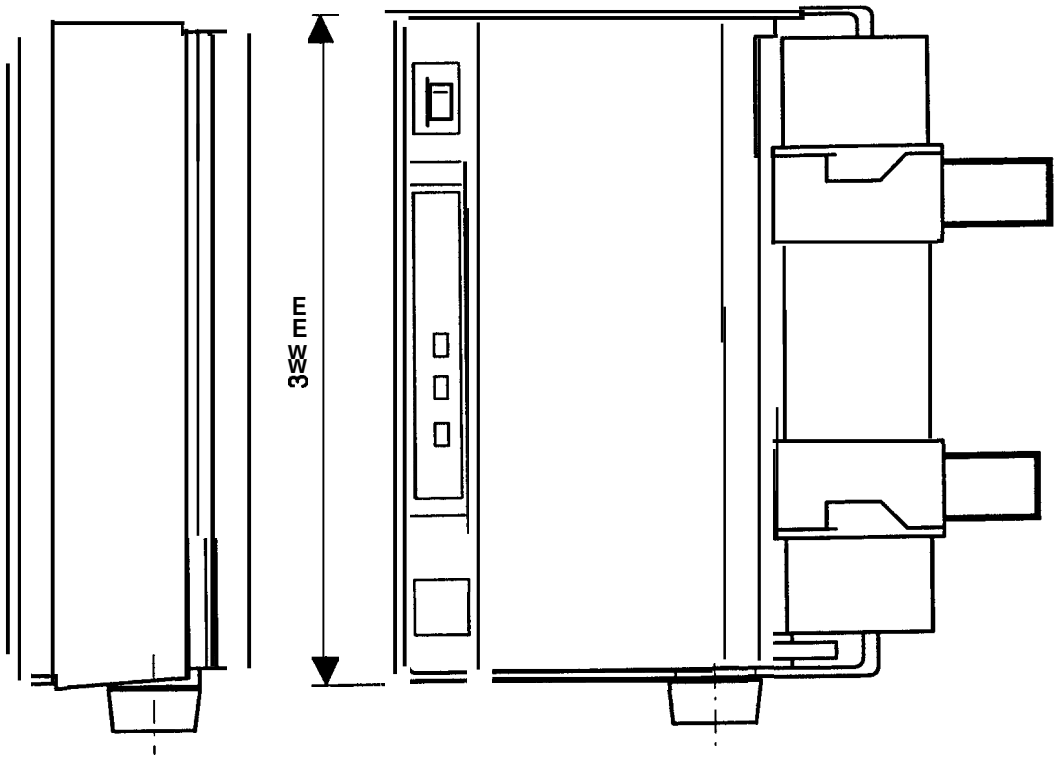
## Table A-12. Part No. Reference Table (Continued)

| Ref. No. | PPL Name | Description | Ref. N. | PPL Name | Description |
|---|---|---|---|---|---|
| 516 | Paper Guide support | Paper guide support | 517 | Frame,Base | Base frame |
| 518 | Spur Gear,13.2 | 13.2 mm spur gear | 519 | Combination Gear,5.1,1 6.2 | 5.1, 16.2 mm combination gear |
| 520 | Rachet,RD | RD rachet | 521 | Cover,RD | RD cover |
| 522 | Timing Belt | Timing belt | 523 | Extension Spring, 8.98 | 8.98 g extention spring |
| 524 | Pulley Assy.,Driven | Driven pulley assembly | 525 | Motor,CR | CR motor |
| 526 | Pulley, Drive | Drive pulley | 527 | Belt Pulley Flange | Belt pulley flange |
| 528 | Plain Washer | Plain washer | 529 | Retaining Ring Type-E(2.3) | 2.3 mm Type-E retaining ring |
| 530 | Carriage Assy. | Carriage assembly | 531 | Grounding Plate, Head | Head grounding plate |
| 532 | Shaft Assy.,CR,Guide | CR guide shaft assembly | 533 | Grounding Plate, Shaft,CR | CR shaft grounding plate |
| 534 | Oil Pad | Oil pad | 535 | Detector,PE | PE sensor |
| 536 | Platen | Platen | 537 | Bushing,11 | 11 mm bushing |
| 538 | Plain Washer | Plain washer | 539 | Retaining Ring Type-E(8) | 8 mm Type-E retaining ring |
| 540 | U-Type,1 1.2x0.13 x 16S/NA | U-Type 11.2 x 0.13 X 16 SINA | 541 | Grounding Wire, Platen | Platen grounding wire |
| 542 | Cable, Head,Rear | Rear head cable | 543 | Sheet,Cable,Head | Head cable sheet |
| 544 | Ribbon Mask | Ribbon mask | 545 | Harness,HP | HP harness, |
| 546 | Harness,PE | PE harness | 547 | Cable, Head, Front | Front head cable |
| 548 | Harness,PG | PG harness | 549 | Heat insulator | Heat insulator |
| 550 | Sheet, Frame,Base | Base frame sheet | 551 | Lever, Disengage | Disengage iever |
| 552 | Bushing, Parallel, Adjust | Parallelism adjustment bushing | 553 | Shaft, Friction | Friction shaft |
| 554 | Gear,34 | 34 mm gear | 555 | Spur Gear,25 | 25 mm spur gear |
| 556 | C.P.B. Screw (M3 X 14) | CPB screw (M3 X 14) | 557 | Compression Spring,14.2 | 14.2 g compression spring |
| 558 | Compression Spring,500 | 500 g compression spring | 559 | Damper | Damper |
| 560 | Damper,Base | Base damper | 561 | Sheet,PE Detector | PE sensor sheet |
| 562 | Frame, TR,Left | Left TR frame | 563 | Frame,TR,Right | Right TR frame |
| 564 | Tractor,Left | Left tractor | 565 | Tractor, Right | Right tractor |
| 566 | Shaft,TR | TR shaft | 567 | Shaft,Guide,TR | TR guide shaft |
| 568 | Paper Support | Paper support | 569 | Spur Gear,17 | 17 mm spur gear |
| 570 | Retaining Ring Type-E(5) | 5 mm Type-E retaining ring | 571 | Retaining Ring Type-E(6) | 6 mm Type-E retaining ring |
| 572 | Roller,EJ | Eject roller | 573 | Roller,EJ, Transmission | Eject roller transmission |
| 574 | Roller, EJ,Support | Eject roller support | 575 | Holder, EJ,Roller | Eject holder roller |
| 576 | Sound Absorber | Sound absorber | 577 | Leaf Spring, 8.6 x 0.13 x 15,S/NA | Leaf spring 8.6 x 0.13 x 15 S/NA |

*Table A-12. Part No. Reference Table (Continued)*

| Ref. No. | PPL Name | Description | Ref. No. | PPL Name | Description |
|---|---|---|---|---|---|
| 578 | P.w.,8.4xo.lx15, S/NA | PW 8.4x0.1x15 S/NA | 579 | Plain Washer | Plain washer |
| 580 | Grounding Wire, Platen,Left | Left platen grounding wire | 581 | Mounting Plate Assy.,CR Motor | CR motor mounting plate assembly |
| 562 | C.P. Screw (M3 x 5) | CP screw (M3 x 5) | 583 | Bushing,EJ,Roller | EJ bushing roller |
| 700 | Frame Assy.,CS | CS frame assembly | 701 | Lever Assy.,CS | c s & v e r - |
| 702 | Holder,Cartridge, Color | Color cartridge holder | 703 | Detector Assy.,Color | Color sensor assembly |
| 704 | Board Assy.,CS | CS board assembly | 705 | Harness Assy.,CS | CS harness assembly |
| 706 | Cover,CS | CS cover | 707 | Cam,CS | CS cam |
| 708 | Motor Assy.,Ribbon | Ribbon motor assembly | 709 | Retaining Ring Type-E(3) | 3 mm Type-E retaining ring |
| 710 | Retaining Ring Type-E(4) | 4 mm Type-E retaining ring | 711 | C.B.S. Screw (M3 x 6) | CBS screw (M3 X 6) |
| 712 | C.B.B. Screw (M3 X 8) | CBB screw (M3 X 8) | 713 | Label,CS | CS label |

## A.5 CASE OUTLINE DRAWING



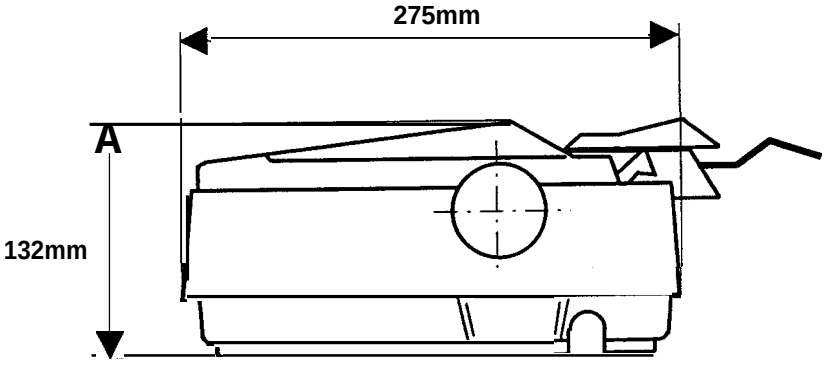




**Figure A-10. LQ-300 Case Outline Drawing**

# EPSON OVERSEAS MARKETING LOCATIONS

**EPSON AMERICA, INC.**
20770 Madrona Avenue,
P.O. Box 2842
Torrance, CA 90509-2842
Phone: (800) 922-8911
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10F, No.287 Nanking E. Road, Sec. 3,
Taipei, Taiwan, R.O.C.
Phone: 2-717-7360
Fax: 2-712-9164

**SEIKO EPSON CORPORATION**
**PRINTER DIVISION**
80 Harashinden, Hirooka Shiojiri-shi,
Nagano-ken, 399-07, JAPAN
Phone: 0263-52-2552
Fax: 0263-54-4007
Telex: 3342-214 (SEPSON J)

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