

**EPSON**

**EPSON TERMINAL PRINTER**

**LQ-570/1070**

**SERVICE  
MANUAL**

#### **NOTICE**

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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 a DANGER heading.

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

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

### DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND THE HOST COMPUTER BEFORE 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 UNIT TO A POWER SOURCE UNTIL INSTRUCTED TO DO SO. WHEN THE POWER SUPPLY CABLE MUST BE CONNECTED, USE EXTREME CAUTION IN WORKING ON POWER SUPPLY AND OTHER ELECTRONIC COMPONENTS.

### 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 THE 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  $\mu$ P CHIPS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS RECOMMENDED BY THE MANUFACTURER; 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 the LQ-570/1 070.

The instructions and procedures included herein are intended for the experienced repair technician, and attention should be given to the precautions on the preceding page. The chapters are organized as follows:

**Chapter 1 - Provides a general product overview, lists specifications, and illustrates the main components of the printer.**

**Chapter 2 - Describes the theory of printer operation.**

**Chapter 3 - Includes a step-by-step guide for product disassembly and assembly.**

**Chapter 4 - Includes a step-by-step guide for adjustment.**

**Chapter 5 - Provides Epson-approved techniques for troubleshooting.**

**Chapter 6 - Describes preventive maintenance techniques and lists lubricants and adhesives required to service the equipment.**

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

## REVISION SHEET

REVISION	DATE ISSUED	CHANGE DOCUMENT
A	June 20, 1991	1st issue
B	Sept. 6, 1991	Added information for the LQ-1 070: I-i, I-ii, 1-1 - 1-8, 1-10, 1-11, 1-24, 1-26 - 1-28 2-i, 2-ii, 2-1 - 2-11, 2-13- 2-15, 2-17, 2-18 3-i, 3-ii, 3-5 - 3-20 4-i, 4-1 - 4-4, 4-6 5-i, 5-1 - 5-5, 5-9, 5-11 - 5-19 6-i, 6-1, 6-4 A-1, A-ii, A-1 - A-1 5, A-17 - A-1 9, A-22, A-23

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# CHAPTER 1

## GENERAL DESCRIPTION

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## 1.1 FEATURES

The LQ-570/1 070 are small, light-weight, low-cost, printers with advanced paper handling that is compatible with the LQ-5 10/550/1010. The printer's main features are as follows:

- Use of ESC/P 2 control codes
  - Ability to print multi-point fonts
  - Ability to receive and print raster graphic images
  - Compatibility with the LQ/SQ series available on the market
- Printing speeds: 225 characters per second (cps) (high-speed draft, 10 characters per inch (dpi))
  - 252 cps (draft, 12 dpi)
  - 210 cps (draft, 10 dpi)
  - 84 cps (LQ, 12 dpi)
  - 64 cps (LQ, 10 dpi)
- Optional interface card
- Clear, easy-to-read printing with standard EPSON fonts
- Multiple fonts resident in the printer
  - 9 LQ fonts (Roman, Saris Serif, Courier, Prestige, Script, OCR-B, Script C, Orator, Orator-S)
  - 1 draft font
- Control panel switch selection of fonts, condensed, and cut-sheet feeder (CSF) bin
- Optional tractor unit for push-pull tractor feed
- Flexible handling of continuous paper
  - Three ways to insert continuous paper (front/bottom/rear path)
  - Auto backout and auto loading (rear insertion)
  - Use of continuous paper without removing CSF
  - Attachment of standard tractor unit in either of two positions (push/pull)
- Easy handling of cut sheets with the optional cut-sheet feeder
  - Two ways to insert cut sheets (front/top)
  - Auto loading

The LQ-570/1 070 are equipped with the standard EPSON 8-bit parallel interface. Various interface options ensure compatibility with a wide variety of computers. Table 1-1 lists the interface options, Table 1-2 lists the optional units available for the LQ-570/1 070, and Figure 1-1 shows an exterior view of the LQ-570/1 070.

Table 1-1. Interface Options

Model	Description
C82305	Serial interface card (inch screw)
C82306	Serial interface card (mini screw)
C82307	32KB serial interface card (inch screw)
C82308	32KB serial interface card (mini screw)
C82310	32KB parallel interface card
C82313	32KB IEEE-488 interface card

Printing is not possible for the following baud rates : 1800, 200, 134.5, 110, 75 bps.

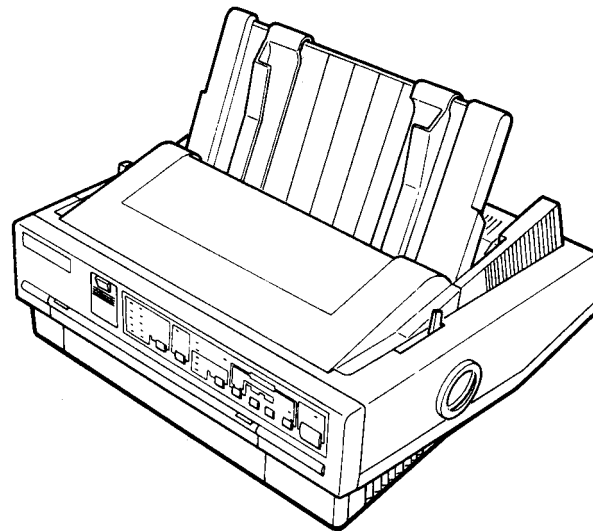
NOTES: Refer to the "Optional Interface Technical Manual" for details.

The asterisks (\*) in the table above represent the last digit of the part numbers. This digit varies, depending on the country. For instance, in the U.S. the last digit is 1.

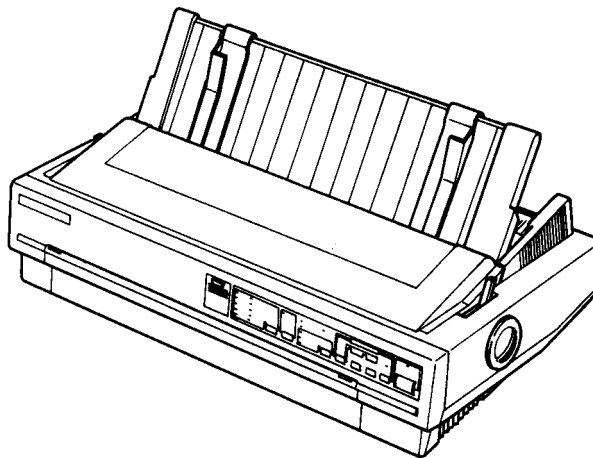
Table 1-2. Optional Units

Model	Description
C80637*	Single-bin cut-sheet feeder (80-column)
C80638*	High-capacity cut-sheet feeder (80-column)
C80639*	Single-bin cut sheet feeder (1 36-column)
C80640*	High capacity cut sheet feeder (1 36-column)
C80019*	Tractor unit (80-column)
C80022*	Tractor unit (1 36-column)
7753	Fabric ribbon cartridge (80-column)
7754	Fabric ribbon cartridge (1 36-column)
7768	Film ribbon cartridge (80-column)
7770	Film ribbon cartridge (1 36-column)

Note: When a part number in the table above is followed by an asterisk (\*), the last digit of the number varies, depending on the country. For example, in the U. S., the model number for a single-bin cut-sheet feeder (80-column) is C80637.



(LQ-570)



(LQ-1070)

Figure 1-1. Exterior View of the LQ-570/1070

## 1.2 SPECIFICATIONS

This section provides specifications for the LQ-570/1 070 printer.

### 1.2.1 Hardware Specifications

Printing method	Serial, impact, dot matrix
Pin configuration	24 wires (12 X 2 staggered, diameter 0.2 mm)

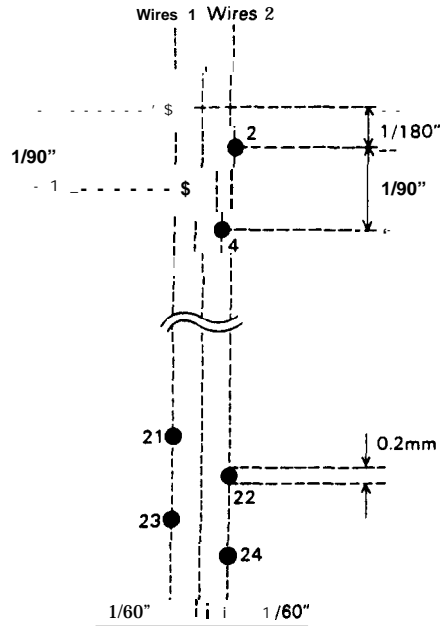


Figure 1-2. Pin Configuration

Feeding methods	Friction feed (front/top)
	Push tractor feed (rear)
	Pull tractor feed (front/bottom)
	Push-pull tractor feed (with optional tractor) (rear)
Line spacing	1/6 inch, 1/8, or programmable in units of 1/360 inch
Paper insertion	Friction feed Front or rear side
	Tractor feed Front, bottom, or rear side
Paper-feed speed	Friction without CSF 77.6 msec (1/6-inch feed)
	2.2 inches per second (ips) (continuous)
	Friction with CSF 77.6 msec (1/6-inch feed)
	2.2 ips (continuous)
	Tractor 77.6 msec (1/6-inch feed)
	2.2 ips (continuous)

NOTE: The points below provide precautions for handling paper.

#### 1. Friction feed (release lever in FRICTION POSITION).

- Paper must be loaded from the front or top entrance.
- Do not use continuous paper.
- Do not perform any reverse paper feeds within the top 8.5 mm (.34 in.), bottom 22 mm (.87 in.) (top entrance), or bottom 40.2mm (1.6 in.) (front entrance) area.
- Do not perform reverse feeds greater than 1/6 inch after a paper end has been detected.

REV.-B

- Use the paper tension unit.
- Do not use multi-part cut-sheet forms, except with front insertion.
- Do not perform reverse feeds greater than 1/6 inch when using envelopes.

2. Push tractor feed (release lever in REAR PUSH POSITION).

- Paper must be loaded from the rear entrance.
- Release the friction-feed mechanism.
- Multi-part forms must be spot pasted beyond the perforation between the tractor holes.
- Paper for multiple copies must be carbonless multi-part paper.
- Use the paper tension unit.
- Do not perform reverse feeds greater than 4/15 inch.
- Since accuracy of paper feed cannot be assured after the paper end has been detected, please do not perform reverse feeds after detection of a paper end.

3. Push-pull tractor feed (release lever in REAR PUSH POSITION).

- Paper must be loaded from the front, rear, or bottom entrance.
- Release the friction-feed mechanism.
- Remove the paper tension unit and attach the pull tractor unit.
- Ensure that there is no slack in the paper between the platen and the pull tractor.
- Precisely adjust the horizontal position of the pull tractor and push tractor sprockets.
- Paper for multiple copies must be spot pasted beyond the perforation between the tractor holes.
- Paper for copies must be a carbonless multi-part paper.
- Do not perform reverse feeds greater than 4/15 inch.
- Do not perform reverse feeds after the paper end has been detected.

4. Pull tractor feed (release lever in PULL POSITION).

- Paper must be loaded from the front or rear entrance.
- Release the friction-feed mechanism.
- Remove the paper tension unit and attach the pull tractor unit.
- Insert the paper from either front or bottom.
- Paper for multiple copies must be spot pasted beyond the perforation between the tractor holes.
- Paper for copies must be a carbonless multi-part paper.
- Do not perform reverse feeds.

Paper specifications See tables 1-3, 1-4, 1-5, 1-6, and 1-7

Table 1-3. **Specifications** for Cut Sheets (One-Part Paper)

Width	148 mm to 257 (*420) mm (5.8 in. to 10.1 (* 16.5) in.) (top insertion) 182 mm to 257 (*364) mm (7.2 in. to 10.1 (* 16.5) in.) (front insertion)
Length	364 mm (1 4.3 in.), maximum
Thickness	0.065 mm to 0.14 mm (0.0025 in. to 0.0055 in.)
Weight	14 lb. to 24 lb. (52.3 g/m <sup>2</sup> to 90 g/m <sup>2</sup> )
Quality	Standard paper (photocopier paper, etc.) Recycled paper (at normal temperatures)

(\*136-column)

Table 1-4. Specifications for Cut Sheets (Carbonless Duplicating Paper)

Width	182 mm to 216 ('364) mm (7.2 in. to 8.5 (* 14.3) in.)
Length	257 mm to 297 mm (10.1 in. to 11.7 in.)
Thickness	0.065 mm to 0.14 mm (0.0025 in. to 0.0055 in.) - single sheet 0.12 mm to 0.32 mm (0.0047 in. to 0.012 in.) - total
Weight	17 lb. to 24 lb. (52.3 g/m <sup>2</sup> to 90 g/m <sup>2</sup> ) - single sheet 12 lb. to 15 lb. (40 g/m <sup>2</sup> to 58 g/m <sup>2</sup> ) - each
Quality	Carbonless duplicating paper
Copies	4 sheets (1 original and 3 copies)

(\*136-column)

Table 1-5. Specifications for Continuous Paper

Width	101 mm to 254 ("406) mm (4.0 in. to 10.0 (* 16) in.)
Thickness	0.065 mm to 0.10 mm (0.0025 in. to 0.0039 in.) - single sheet 0.065 mm to 0.32 mm (0.0025 in. to 0.012 in.) -total
Weight	14 lb. to 22 lb. (52.3 g/m <sup>2</sup> to 82 g/m <sup>2</sup> ) - single sheet 12 lb. to 15 lb. (40 g/m <sup>2</sup> to 58 g/m <sup>2</sup> ) - each
Quality	Standard paper or carbonless duplicating paper Recycled paper (at normal temperatures)
Copies	4 sheets (1 original and 3 copies)

(\*:1 36-column)

Table 1-6. Envelopes

Size	No. 6= 166 mm X 92 mm No. 10= 240 mm X 104 mm
Thickness	0.16 mm to 0.52 mm (0.0063 in. to 0.0197 in.) Differences in thickness within the printing area must be less than 0.25 mm (0.0098 in.)
Weight	12 lb. to 24 lb. (40 g/m <sup>2</sup> to 91 g/m <sup>2</sup> )
Quality	Bond paper, standard paper, airmail
Copies	Not available

- NOTES:
- Printing on envelopes is available only at normal temperatures and only using top insertion.
  - Keep the longer side of the envelope horizontal during insertion.
  - Place the left edge of a No. 6 envelope at the sheet guide setting mark.

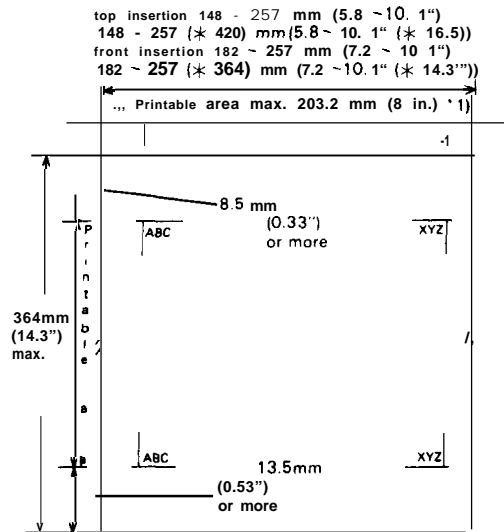
Table 1-7. Label Specifications

Label size	2 1/2 in. X 15/16 in. 4 in. X 15/16 in. " 4 in. X 1 7/16 in.
Copies	Not available
Thickness	0.07 mm to 0.09 mm (0.0028 in. to 0.0031 in.) - base paper 0.16 mm to 0.19 mm (0.0063 in. to 0.0075 in.) -total

- NOTES:
- Printing on labels is available only at normal temperatures.
  - Labels must be of the fanfold type.
  - Labels with pressure sensitive paper must be spot pasted beyond the perforation between the tractor holes. The total thickness must be less than or equal to 0.3 mm (0.01 18 in.). Labels can be printed out only if the temperature is between 5 and 35 degrees C (41 and 95 degrees F) and humidity is between 10 % and 80 % RH.
  - Examples of labels AVERY CONTINUOUS FORM LABELS  
AVERY MINI-LINE LABELS
  - Labels must be used with the pull tractor (front or bottom).
  - Do not perform reverse feeds.

Printable area

See figures 1-3, 1-4, and 1-5



(\* 136-column)

(80-column):

\* 1) 3.0 mm (0.12 in.) or more when paper width is less than 229 mm (9 in.).

24 mm (0.9 in.)(topinsertion)/26 mm (1.0 in.)(front insertion) or more when paper width is 229 mm (9.0 in.) to 257 mm (10.1 in.).

(136-column):

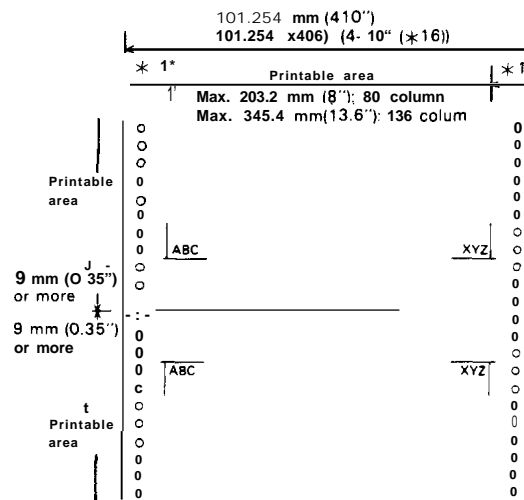
3.0 mm (0.12 in.) or more when paper width is less than 392 mm (15.4 in.). 29 mm (1.14 in.) (top insertion) /31 mm (1.22 in.) (front insertion) or more when paper width is 392 mm (15.4 in.) to 420 mm (16.4 in.).

● Paper-feed accuracy cannot be assured within 22 mm (0.87 in.) from the bottom edge of paper (top insertion).

Paper-feed accuracy cannot be assured within 40.2 mm (1.58 in.) from the bottom edge of paper (front insertion).

Paper-feed accuracy cannot be assured within 22 mm (0.87 in.) from the top edge of paper.

Figure 1-3. Printable Area for Cut Sheets



(\* 136-column)

Figure 1-4. Printable Area for Continuous Sheets

**(80-column):**

- 1) 13 mm (0.51 in.) or more when a paper width of 101 mm (4 in.) to 241 mm (9.5 in.) is used.  
24 mm (0.9 in.)(rear insertion)\ 26 mm (1.0 in.)(front/bottom insertion) or more when a paper width of 254 mm (10 in.) is used.

**(1 36-column):**

13 mm (0.51 in.) or more when a paper width of 101 mm to 401.3 mm (4 in. to 15.8 in.) is used.  
15 mm or more when a paper width of 381 mm to 406 mm (15 in. to 16 in.) is used. 13 mm (rear insertion) (0.5 1 in.) /1 7 mm (front/bottom insertion) (0.67 in.) is used. ( 136-column).

<b>Ink ribbon</b>	<p>Type #7753 black ribbon cartridge (80-column) #7768 film ribbon cartridge (80-column) #7754 black ribbon cartridge (1 36-column) #7770 film ribbon cartridge (1 36-column)</p> <p>Color Black</p> <p>Life 2 million characters at 48 dots/character (black ribbon) (80-column) 0.2 million characters at 48 dots/character (film ribbon) (136-column) 0.3 million characters at 48 dots/character (film ribbon)</p> <p>Dimensions of ribbon cartridge</p> <p>Fabric Type: (80-column): 293 mm (W) X 34 mm (H) X 72 mm (D) (136-column): 468.3 mm (W) X 34 mm (H) X 72 mm (D)</p> <p>Film Type: (80-column): 293 mm (W) X 34 mm (H) X 72 mm (D) (136-column): 468.5 mm (W) X 34 mm (H) X 72 mm (D)</p>																								
<b>Reliability</b>	<p>Mean cycles between failures (MCBF) 3 million lines (excluding printhead) Mean time between failures (MTBF) 4000 power on hours (POH) (25% duty)</p>																								
<b>Life of printhead</b>	<p>200 million strokes (black ribbon) 100 million strokes (film ribbon)</p>																								
<b>Safety approvals</b>	<p>Safety standards UL1 950 with D3 (U.S. version) CSA22.2#220 EN 60950 (TUV) (European version)</p>																								
<b>Electrical specifications</b>	<p>Radio frequency interference (RFI) FCC class B (U.S. version) VDE0871 (self-certification) (European version)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 15%;">120 V version</td> <td style="width: 45%;">Rated voltage</td> <td style="width: 40%;">120 VAC</td> </tr> <tr> <td></td> <td>Input voltage range</td> <td>103.5 to 132 VAC</td> </tr> <tr> <td></td> <td>Rated frequency</td> <td>50 to 60 Hz</td> </tr> <tr> <td></td> <td>Input frequency</td> <td>49.5 to 60.5 Hz</td> </tr> <tr> <td></td> <td>Rated current</td> <td>2.0 A</td> </tr> <tr> <td></td> <td>Power consumption</td> <td>Approx. 33 W (during a self-test in draft mode, 10 cpi)</td> </tr> <tr> <td></td> <td>insulation resistance</td> <td>10 megohms, minimum (at 500 VDC between AC line and chassis).</td> </tr> <tr> <td></td> <td>Dielectric strength</td> <td>1000 VACrms for 1 minute or 1200 VACrms for 1 second (between AC line and chassis)</td> </tr> </table>	120 V version	Rated voltage	120 VAC		Input voltage range	103.5 to 132 VAC		Rated frequency	50 to 60 Hz		Input frequency	49.5 to 60.5 Hz		Rated current	2.0 A		Power consumption	Approx. 33 W (during a self-test in draft mode, 10 cpi)		insulation resistance	10 megohms, minimum (at 500 VDC between AC line and chassis).		Dielectric strength	1000 VACrms for 1 minute or 1200 VACrms for 1 second (between AC line and chassis)
120 V version	Rated voltage	120 VAC																							
	Input voltage range	103.5 to 132 VAC																							
	Rated frequency	50 to 60 Hz																							
	Input frequency	49.5 to 60.5 Hz																							
	Rated current	2.0 A																							
	Power consumption	Approx. 33 W (during a self-test in draft mode, 10 cpi)																							
	insulation resistance	10 megohms, minimum (at 500 VDC between AC line and chassis).																							
	Dielectric strength	1000 VACrms for 1 minute or 1200 VACrms for 1 second (between AC line and chassis)																							

220 to 240 V version	Rated voltage	220 to 240 VAC
	Input voltage range	198 to 264 VAC
	Rated frequency	50 to 60 Hz
	Input frequency	49.5 to 60.5 Hz
	Rated current	1.0 A
	Power consumption	Approx. 33 W (during a self-test in draft mode, 10 cpi)
	Insulation resistance	10 megohms, minimum (at 500 VDC between AC line and chassis).
	Dielectric strength	1250 VACrms 1 minute <i>or</i> 1500 VACrms 1 second (between AC line and chassis)

Environmental conditions	Temperature range	5 to 35 degrees C (41 to 95 degrees F) - operating -30 to 60 degrees C (-22 to 140 degrees F) - in shipment container
	Humidity	10 to 80 % RH - operating 5 to 85 % RH - storage
	Resistance to shock	1 G, within 1 ms - operating 2 G, within 1 ms - storage
	Resistance to vibration	0.25 G, 55 Hz, max. - operating 0.50 G, 55 Hz, max. - storage

Physical specifications (80-column):

Weight 6.1 kg, approx. (13.5 lbs., approx.)  
Dimensions 434 mm (width) X 368 mm (depth) X 151 mm (height)  
17.4 in. (width) X 14.7 in. (depth) X 6 in. (height)

(136-column):

Weight 8.4 kg, approx. (18.6 lbs., approx.)  
Dimension 609 mm (width) X 368 mm (depth) X 151 mm (height)  
24.4 in. (width) X 14.7 in. (depth) X 6 in. (height)



## 1.2.2 Firmware Specifications

<b>Control code</b>	ESC/PTM level ESC/P 2 (EPSON standard code for printers)																				
<b>Printing direction</b>	Bidirectional with logic seeking																				
<b>Input data buffer</b>	8KB (when SW 1-7 is OFF) OKB (when SW 1-7 is ON)																				
<b>Character code</b>	8 bits																				
<b>Character tables</b>	Italic character table, PC 437, PC 850, PC 860, PC 863, PC 865 (PC indicates character table for personal computer)																				
<b>Fonts and pitches</b>																					
<b>Bit-map fonts</b>	<table> <tr> <td>EPSON Roman</td> <td>10, 12, 15, proportional</td> </tr> <tr> <td>EPSON Saris Serif</td> <td>10, 12, 15, proportional</td> </tr> <tr> <td>EPSON Courier</td> <td>10, 12, 15</td> </tr> <tr> <td>EPSON Prestige</td> <td>10, 12</td> </tr> <tr> <td>EPSON Script</td> <td>10, 12</td> </tr> <tr> <td>EPSON Script C</td> <td>proportional</td> </tr> <tr> <td>OCR-B</td> <td>10</td> </tr> <tr> <td>EPSON Orator</td> <td>10</td> </tr> <tr> <td>EPSON Orator-S</td> <td>10</td> </tr> <tr> <td>EPSON Draft</td> <td>10, 12, 15</td> </tr> </table>	EPSON Roman	10, 12, 15, proportional	EPSON Saris Serif	10, 12, 15, proportional	EPSON Courier	10, 12, 15	EPSON Prestige	10, 12	EPSON Script	10, 12	EPSON Script C	proportional	OCR-B	10	EPSON Orator	10	EPSON Orator-S	10	EPSON Draft	10, 12, 15
EPSON Roman	10, 12, 15, proportional																				
EPSON Saris Serif	10, 12, 15, proportional																				
EPSON Courier	10, 12, 15																				
EPSON Prestige	10, 12																				
EPSON Script	10, 12																				
EPSON Script C	proportional																				
OCR-B	10																				
EPSON Orator	10																				
EPSON Orator-S	10																				
EPSON Draft	10, 12, 15																				
<b>Scalable fonts</b>	<table> <tr> <td>EPSON Roman</td> <td>8 pt to 32 pt</td> </tr> <tr> <td>EPSON Saris Serif</td> <td>8 pt to 32 pt</td> </tr> </table>	EPSON Roman	8 pt to 32 pt	EPSON Saris Serif	8 pt to 32 pt																
EPSON Roman	8 pt to 32 pt																				
EPSON Saris Serif	8 pt to 32 pt																				
<b>Printing modes</b>	<p>Selection and mixture of the following modes are allowed, excluding 15 cpi condensed mode:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Print quality (draft/letter quality)</li> <li><input type="checkbox"/> Character pitch (10, 12, 15, or proportional)</li> <li><input type="checkbox"/> Condensed</li> <li><input type="checkbox"/> Double-width</li> <li><input type="checkbox"/> Double-height</li> <li><input type="checkbox"/> Emphasized</li> <li><input type="checkbox"/> Double-strike</li> <li><input type="checkbox"/> Italic</li> <li><input type="checkbox"/> Underlined</li> <li><input type="checkbox"/> Double-underlined</li> <li><input type="checkbox"/> Overscore</li> <li><input type="checkbox"/> Strike-through</li> <li><input type="checkbox"/> Outline</li> <li><input type="checkbox"/> Shadow</li> </ul>																				

NOTES: High-speed draft is valid if the printer status is as follows:

- High-speed draft is selected by DIP switch.
- Emphasized character mode is not selected.
- Condensed character mode is not selected.
- Draft is selected.
- No D/L (download) characters are sent to the printer,
- The horizontal dot space of characters is not set.
- No bit image is sent to the printer.
- Super/subscript is not selected.

(The printer switches back into normal mode to print emphasized, condensed, or download characters and bit images.)

Printing speed                    See tables 1-8 and 1-9.  
 Printing columns                See Table 1-8.  
 Character matrix                See Table 1-10.  
 Character size                   See Table 1-10.

Table 1-8. Printing (Text Mode)

Print Pitch	Condensed	Printable Columns	Character Pitch (dpi)	Printing Speed (cps)		
				Draft	LQ	HSD
10	0	80 (* 136)	10	210	70	225
	1	137 ("233)	17.1	180	120	—
12	0	96 (* 164)	12	252	84	—
	1	160 (*272)	20	210	140	—
15	0	120("204)	15	315	105	—
	1	Invalid				

(\* 136-column)

dpi:        characters per inch  
 Cps:       characters per second  
 LQ:        letter quality  
 HSD:      high-speed draft

Table 1-9. Printing (Bit Image Mode)

Pins	Bit Image Printing Mode	Density (dpi)	Printable Dots	Printing Speed (ips)
8	Single-density	60	480 (*8 16)	21.0
8	Dual-density	120	960 (* 1632)	10.5
8	Double-speed, dual-density	120	960 ("1632)	21.0
8	Quadruple-density	240	1920 (*3264)	10.5
8	CRT graphics	80	640 (" 1088)	10.5
8	CRT graphics II	90	720 ("1224)	14.0
24	Single-density	60	480 (*8 16)	21.0
24	Dual-density	120	960 (* 1632)	10.5
24	CRT graphics II	90	720 ("224)	14.0
24	Triple-density	180	1440 ("2448)	7.0
24	Hex-density	360	2880 (*4896)	7.0

(\* 136-column)

dpi: dots per inch

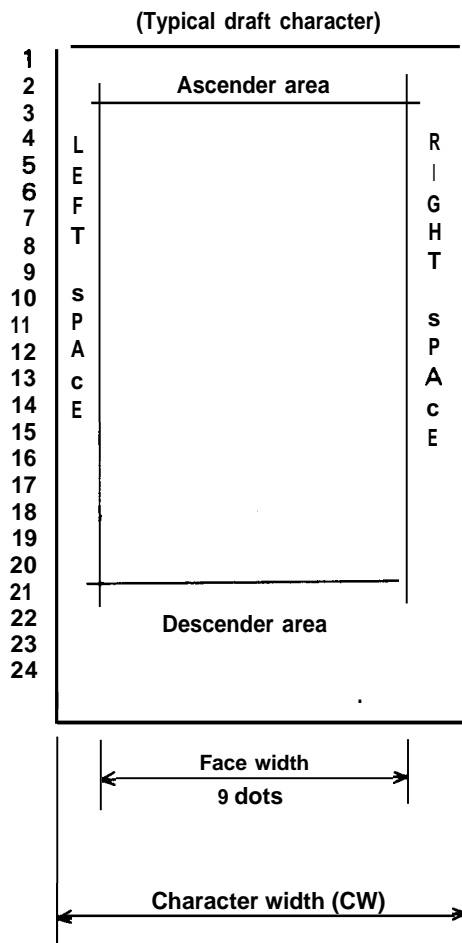
ips: inches per second

Table 1-10. Character Matrix and Character Size

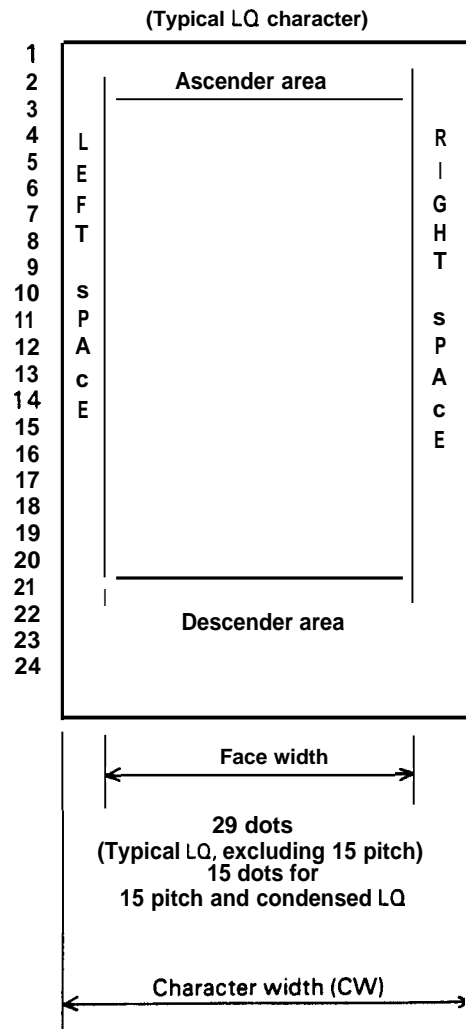
Printing Mode	Face Matrix	HDD	Character Size	Unit ESC sp
High-speed draft, 10 pitch	7 × 22	90	2.0 x 3.1	—
Draft, 10 pitch	9 x 22	120	1.9 x 3.1	120
Draft, 12 pitch	9 x 22	120	1.9 x 3.1	120
Draft, 15 pitch	7 X 16	120	1.0 X 2.3	120
Draft, 10 pitch, condensed	—	240	—	120
Draft, 12 pitch, condensed	—	240	—	120
LQ, 10 pitch	31 x 22	360	2.2 x 3.1	180
LQ, 12 pitch	27 X 22	360	1.9 x 3.1	180
LQ, 15 pitch	22 X 16	360	1.6 X 2.3	180
LQ, 10 pitch, condensed	—	360	—	180
LQ, 12 pitch, condensed	—	360	—	180
LQ, proportional	Max. 37 X 22	360	2.6 X 3.1	180
	Min. 18 X 22	360	1.0 x 3.1	
LQ, proportional, condensed	—	360	—	180
	—	360	—	
LQ, proportional, super/subscript	Max. 28 X 16	360	1.8 X 2.3	180
	Min. 12 X 16	360	0.7 X 2.3	
LQ, proportional, super/subscript, condensed	—	360	—	180
	—	360	—	

NOTES: . HDD is horizontal dot density in dots per inch.

- Face matrix and character size indicate the size of the maximum character. This value is dependent on paper, ribbon, etc.
- Unit ESC sp (which also can be sent as unit, followed by the character string CHR(&h20)), indicates the minimum length to be added to the right of the character specified with the ESC sp control code.
- “-” indicates that the character matrix is reshaped by printer firmware. Character width becomes half of the noncondensed character width.



- 12 dots (10 CPI) 120 DPI
- 15 dots (12 CPI) 180 DPI
- 16 dots (15 CPI) 240 DPI
- 14 dots (condensed 10 CPI) 240 DPI
- 12 dots (condensed 12 CPI) 240 DPI



- 36 dots (10 CPI) 360 DPI
- 30 dots (12 CPI) 360 DPI
- 24 dots (15 CPI) 360 DPI
- 21 dots (condensed 10 CPI) 360 DPI
- 18 dots (condensed 12 CPI) 360 DPI

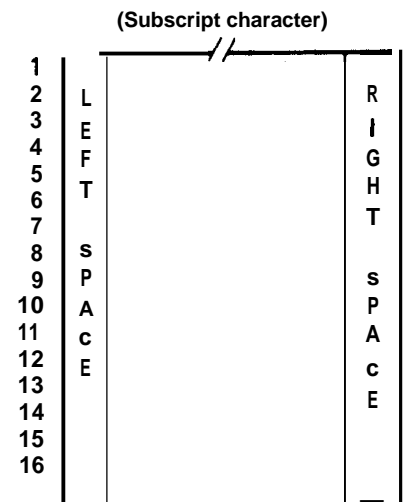
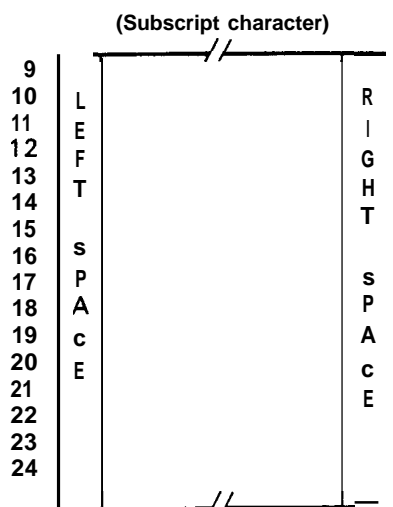


Figure 1-5. Character Matrix

### 1.3 INTERFACE OVERVIEW

The printer has a parallel interface with the specifications described below.

#### 1.3.1 Parallel Interface

Specifications for the 8-bit parallel interface are as follows:

Data format	8-bit parallel
Synchronization	$\overline{\text{STROBE}}$ signal
Handshaking	BUSY and $\overline{\text{ACKNLG}}$ signal
Signal level	TTL-compatible
Adaptable connector	57-30360 (Amphenol) or equivalent
Data transmission timing	See Figure 1-6.

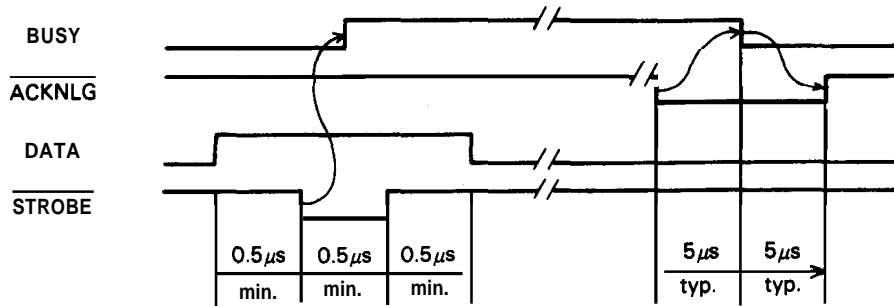


Figure 1-6. Data Transmission Timing

Table 1-11 shows the connector pin assignments and signal functions of the 8-bit parallel interface.

Table 1-11. Connector Pin Assignments and Signal Functions

Pin No.	Signal Name	Return Pin No.	Dir.	Functional Description
1	$\overline{\text{STROBE}}$	19	IN	$\overline{\text{STROBE}}$ pulse to read the input data. Pulse width must be more than 0.5 μs. Input data is latched at falling edge of this signal.
2	DATA 1	20	IN	Parallel input data to the printer. HIGH level means data 1. LOW level means data 0.
3	DATA 2	21	IN	
4	DATA 3	22	IN	
5	DATA 4	23	IN	
6	DATA 5	24	IN	
7	DATA 6	25	IN	
8	DATA 7	26	IN	
9	DATA 8	27	IN	
10	$\overline{\text{ACKNLG}}$	28	OUT	This pulse indicates data has been received and the printer is ready to accept more data. Pulse width is approximately 11 μs.
11	BUSY	29	OUT	HIGH indicates the printer cannot accept more data.
12	PE	30	OUT	HIGH indicates paper out. This signal is effective only when the ERROR signal is LOW.
13	SLCT	—	OUT	Always HIGH output. (Pulled up to +5 V through a 3.3K ohm resistor.)

Table 1-11. Connector Pin Assignments and Signal Functions (Cont.)

Pin No.	Signal Name	Return Pin No.	Dir.	Functional Description
14	$\overline{\text{AUTO FEED-XT}}$	—	IN	If LOW when the printer is initialized, the printer automatically performs a line feed upon input of the CR code (Auto LF).
15				Not used.
16	GND		—	Ground for twisted-pair grounding.
17	Chassis GND	—	—	Chassis ground level of printer.
18				Not used.
19 to 30	GND			Ground for twisted-pair grounding.
31	INIT	16	IN	Pulse (width: $50\mu\text{s}$ , min., active LOW) input for printer initialization.
32	$\overline{\text{ERROR}}$		OUT	LOW indicates an error has occurred in the printer.
33	GND	—	—	Ground for twisted-pair grounding.
34				Not used.
35			OUT	Always HIGH. (Pulled up to +5V through 3.3K ohm resistor.)
36	$\overline{\text{SLCT-IN}}$	—	IN	DC 1/DC3 control is disabled.

- NOTES: 1. "Dir." indicates the direction of the signal flow as viewed from the printer.
2. "Return Pin No." denotes a twisted-pair return line.
3. The cable used must be shielded to prevent noise.
4. All interface conditions are based on TTL levels. Both the rise and fall times of all signals must be less than  $0.2\mu\text{s}$ .
5. The  $\overline{\text{AUTOFEED-XT}}$  signal can be set to LOW by DIP switch 2-4.
6. The  $\overline{\text{SELECT-IN}}$  signal can be set to LOW by jumper 3.
7. Printing tests, including those of the interface circuits, can be performed without using external equipment by setting DATA 1- DATA 8 pins to the  $\overline{\text{STROBE}}$  signal.

## 1.4 CONTROL PANEL

On the control panel are: a power button (labeled OPERATE), 7 non-lock type buttons, and 19 indicators.

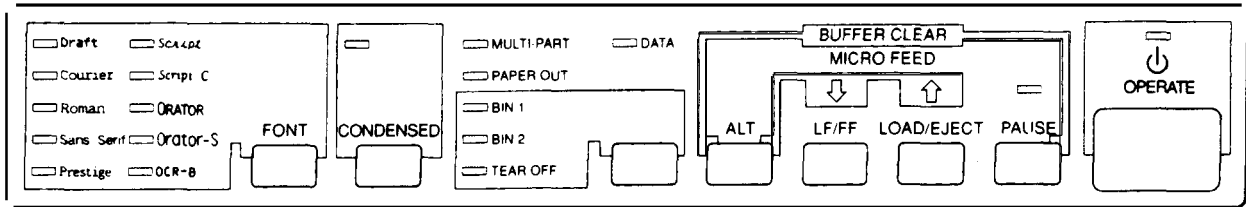


Figure 1-7. Control Panel

### BUTTONS

**(1) OPERATE Button**

This button turns on the power supply to the printer.

**(2) PAUSE Button**

This button controls printer action. Pressing the button toggles the printer between PAUSE condition (no printing, no paper feeding, and not accepting data) and RUNNING. This button is also used in conjunction with the ALT button as a buffer clear to clear the input buffer and perform software initialization, as if ESC @ had been received.

**(3) LINE FEED/FORM FEED Button**

Pressing this button performs a line feed, and holding down the button performs a form feed, irrespective of the PAUSE/RUNNING condition. This button is also used in conjunction with the ALT button as the micro reverse feed.

**(4) LOAD/EJECT Button**

Pressing this button loads or ejects the paper. Refer to Section 1.6.8, Sheet Loading and Sheet Ejection. This button is also used in conjunction with the ALT button as the micro forward feed.

**(5) TEAR-OFF/BIN 1/BIN 2 Button**

In tractor-feed mode, pressing this button advances continuous paper to the tear-off position, and the TEAR-OFF indicator is lit. In friction-feed mode, pressing this button toggles between bin 1 and bin 2, and the selected BIN indicator is lit.

**(6) ALT Button**

This button is used only in combination with another button,



**(7) FONT Button**

Pressing this button selects a font, and pressing it continuously selects the next one, sequentially. The FONT LED indicates the currently selected font.

**(8) CONDENSED Button**

Pressing this button toggles the printing mode between normal and condensed, alternatively.

**NOTE:** Selections of the FONT and CONDENSED buttons are stored as defaults, so that the last FONT and the CONDENSED selection become effective when the printer is initialized.

**INDICATORS****(1) OPERATE (green)**

Lit when the printer's OPERATE button is on, and AC power is supplied.

**(2) PAUSE (orange)**

Lit when the printer is in PAUSE-mode (no printing, no paper feeding, and not accepting data).

**(3) TEAR-OFF (orange)**

Lit when the sheet is advanced to the tear-off position.

**(4) DATA (orange)**

Lit when the printer has received data from the host. .

**(5) PAPER-OUT (red)**

Lit when the paper-out detector senses no paper. Refer to Section 1.6.3, Paper-out Detection and Forms Override Function.

**(6) MULTI-PART (green)**

Lit when the adjust lever is positioned at the 4th step or higher,

**(7) BIN 1 (green)**

Lit when bin 1 is selected.

**(8) BIN 2 (green)**

Lit when bin 2 is selected.

**(9) FONT (green) - Draft, Courier, Roman, Saris Serif, Prestige, Script, Script C, Orator, Orator-S, OCR-B**

These indicators show the currently selected font.

**(10) CONDENSED (green)**

Lit when condensed mode is selected.

## 1.5 DIP SWITCHES AND JUMPER SETTING

This section describes the DIP switch selections and jumper setting for the LQ-570 printer.

### 1.5.1 DIP Switch Settings

The two DIP switch banks for the printer, located on control panel, function as shown in tables 1-12 through 1-15. (Note that the status of the DIP switches is read only at power on or upon receipt of the INIT signal.)

Table 1-12. Settings for DIP Switch 1 (SW1)

No.	Description	ON	OFF	Factory Setting
1 2 3	International character set and PC selection	See Table 1-14.		ON ON ON
4	Character table selection	Graphic	Italic	OFF
5	Graphic print direction	Unidir.	Bidir.	OFF
6	High-speed draft	Invalid	Valid	OFF
7	Input buffer	Invalid	Valid	OFF
8	1-inch skip continuous paper	ON	OFF	OFF

Table 1-13. Settings for DIP Switch 2 (SW2)

No.	Description	ON	OFF	Factory Setting
1 2	Page length of continuous paper	See Table 1-15.		OFF OFF
3	Auto tear-off	ON	OFF	OFF
4	Auto LF	ON	OFF	OFF

Table 1-14. International Character Set Selection

1-1	1-2	1-3	Country	PC
ON	ON	ON	Us.	437
ON	ON	OFF	France	850
ON	OFF	ON	Germany	860
ON	OFF	OFF	U.K.	863
OFF	ON	ON	Denmark 1	865
OFF	ON	OFF	Sweden	(437)
OFF	OFF	ON	Italy	(437)
OFF	OFF	OFF	Spain 1	(437)

When SW 1-4 is OFF,  
If graphic table was selected by  
ESC t 1, PC becomes 437.

When SW 1-4 is ON,  
if italic table was selected by  
ESC t O, country setting becomes U.S.

Table 1-15. Page Length

2-1	2-2	Page Length
OFF	OFF	11 inches
ON	OFF	12 inches
OFF	ON	8.5 inches
ON	ON	70/6 inches

### 1.5.2 Jumper Setting

If Jumper 3 is connected to GND, the SLCT-IN signal is fixed to LOW.

## 1.6 OPERATING INSTRUCTIONS

This section describes the self-test and hexadecimal dump functions and also includes the error states, printer initialization, and buzzer operation.

### 1.6.1 Self-Test

To run the self-test using draft mode, turn the printer on while pressing the LOAD/EJECT button. To run the self-test using the letter quality (LQ) mode, turn the printer on while pressing the LINE FEED/FORM FEED button. You can stop or start self-test printing by pressing the PAUSE button. When you are satisfied with the self-test, stop the printing by pressing the PAUSE button and turn the printer off.

The firmware revision number is printed on the first line of the self-test, followed by the current DIP switch settings.

```

Xxxxxx
Country/PC      SW1-1 1-2 1-3 1-4      High speed draft SW1-6
U.S.A.          on  on  on  off      Valid             off
France          o n o n  off off      Invalid           on
Germany         on  off Onl off      Receive buffer   SW1-7
U.K.            on  off off off      Valid             off
Denmark         off on  on  off      Invalid           on
Sweden          off on  off off      1 inch skip      SW1-8
Italy           off off on  off      Invalid           off
Spain           off off off off      Valid             on
TC 437          on  on  on             SW2-1 2-2
                off off
                off
    
```

Figure 1-8. Self-Test Printout

### 1.6.2 Hexadecimal Dump Function

To put the printer in hex. dump mode, power it on while pressing both the LOAD\ EJECT and LINE FEED/FORM FEED buttons. In hex. dump mode, the printer prints out the hexadecimal representation of the input data, along with the corresponding ASCII characters. This function is valuable for checking the data the printer has received from the host. If input data is a nonprintable character code, a period (.) is printed in the ASCII column.

```

1B 40 LB 52 00 1B 74 01 1B 36 12 1B 50 1B 70 00      .@.R..t..6..P.D.
20 20 54 68 69 73 20 69 73 20 61 6E 20 65 78 61      This is an exa
6D 70 6C 65 20 6F 66 20 61 20 64 61 74 61 20 64      mple of a data d
75 6D 70 20 70 72 69 6E 74 6F 75 74 2E 20 54 68      ump printout. Th
69 73 20 66 65 61 74 75 72 65 20 6D 61 68 65 73    is f ea tU re makes
04 20 20 20 20 20 69 74 20 65 61 73 79 20 66 6F    . i t e a s y f o
    
```

Figure 1-9. Hexadecimal Dump Function

### 1.6.3 Paper-out Detection and Forms Override Function

When the paper-out detector, attached to the printer mechanism, detects a paper-end, the printer first performs a forms override. If paper loading fails, the BUSY signal goes HIGH, the PAPER OUT indicator is lit, the interface PE signal becomes HIGH, the ERROR signal becomes LOW, and the printer enters the PAUSE condition automatically.

By ignoring the paper out, the printer can print additional lines after the paper out is detected. This function is called the forms override function. After you load new paper and press the PAUSE button, the printer recovers to the RUNNING condition, and printing restarts.

The printer enters the paper-out condition only when a paper-out is detected after the printer performs paper loading.

### 1.6.4 Error Conditions

If any of the following error conditions are detected, the printer automatically enters PAUSE condition.

- Home position is not detected at printer mechanism initialization.
- Home position is detected during printing.
- The PAUSE button is pressed, and the printer enters PAUSE condition.
- A paper-out is detected after performing paper loading operation.

If parallel interface is selected, the following interface signals are output to indicate the error and to stop data transmission:

The BUSY signal becomes HIGH.

The ERROR signal becomes LOW.

No ACKNLG pulse is sent.

### 1.6.5 Buzzer Operation

The buzzer sounds under the following conditions:

- . A paper-out error is detected (beeps 3 times for 0.1 second, with 0.1 second intervals).
- Abnormal carriage movement is detected (beeps 5 times for 0.5 second, with 0.5 second intervals).
- A panel setting is accepted (O. 1 second beep).

### 1.6.6 Printer Initialization

There are three initialization methods: hardware initialization, software initialization, and panel initialization.

#### (1) Hardware initialization

This type of initialization takes place when the printer power button is turned on (and the AC power cord is plugged in) or when the INIT signal is received.

When the printer is initialized, it performs the following actions:

## REV.-A

- (a) Initializes printer mechanism.
- (b) Clears input data buffer.
- (c) Clears downloaded character set.
- (d) Clears print buffer.
- (e) Returns printer settings to their default values.

### (2) Software initialization

Input of the ESC@ command also initializes the printer. Printer initialization by ESC@ code does not perform functions (a), (b), and (c) above. The settings changed by the last SelectType operation are maintained.

### (3) Panel initialization

This printer can be initialized by pressing the PAUSE button in combination with the ALT button. When the printer is initialized from the front panel, functions (a) and (c) above are not performed. The settings changed by the last SelectType operation are maintained.

## 1.6.7 Default Values

When the printer is initialized, the following default values are set:

Page position	The current paper position becomes the top-of-form position
Left and right margins	Released
Line spacing	1/6 inch
Vertical tabs	Cleared
Horizontal tabs	Every 8 characters (relative)
Family number of type style	Last font selected from the panel
Download characters	Kept - software initialization Cleared - hardware initialization
Character spacing	10 cpi
Printing effects	Cleared, except condensed printing
Condensed printing	Last setting selected from the panel
Printer condition	RUN

## 1.6.8 Sheet Loading and Sheet Ejection

The release lever can disengage the pull-tractor unit drive mechanism, giving this printer improved paper-handling for functions that utilize the release lever. These functions are described below:

### Automatic cut-sheet loading without the cut-sheet feeder

Move the release lever to the friction-feed position, and place the sheet along the paper guide (top or front). A few seconds later, the sheet is automatically loaded to the top-of-form position and the printer enters the RUNNING condition.

### Automatic cut-sheet loading and ejection with cut-sheet feeder

Move the release lever to the friction-feed position, and place the sheets into the hopper of the cut-sheet feeder. Pressing the LOAD/EJECT button loads one sheet to the top-of-form position. If a paper-out is detected before printing starts, a sheet will again be loaded automatically to the top-of-form position.

### Continuous paper loading and ejection (backout)

Move the release lever to the REAR PUSH position, and insert the paper into the tractor unit. Pressing the LOAD/EJECT button loads the paper automatically to the top-of-form position. If a paper-out is detected before printing starts, the paper will be loaded automatically to the top-of-form position.

If the LOAD/EJECT button is pressed after continuous paper has been loaded, the paper is ejected backward to the push tractor unit. To back out several pages, press the LOAD/EJECT button several times. Each time LOAD/EJECT is pressed, reverse feed is performed for a single page.

When the paper is at the current setting for the top-of-form position, the top-of-form adjustment function is valid for the next loaded position. At this time, the LOAD/EJECT button advances the paper forward, and the LINE FEED/FORM FEED button moves the paper backward.

The adjusted top-of-form position for continuous paper is saved in EEPROM, but the setting for cut sheet paper is not saved.

### 1.6.9 Tear-off Function

The below tear-off function is limited under the push tractor mode.

#### Auto-tear-off

The auto-tear-off function is enabled by DIP switch setting. When this function is enabled and the release lever is in the tractor position, the paper advances to the tear-off position automatically if the input data buffer is empty and the printer is in the RUNNING condition. The TEAR-OFF LED lights to indicate that you can use the LOAD/EJECT and LINE FEED/FORM FEED buttons, in combination with the ALT button, for backward and forward micro feed adjustment.

Using micro feed, adjust the paper to meet the tear-off edge. Once the tear-off position is set, this setting remains valid even after the printer is turned off or initialized. If subsequent data is sent to the printer, the paper returns to the original position automatically and printing starts. If the PAUSE button is pressed while the paper is advanced to the tear-off position, the paper returns to the original position (and the printer enters the PAUSE condition).

Short-tear-off

To access the short-tear-off function, press the TEAR-OFF button. The release lever must be in the tractor position. The paper advances to the tear-off position whether the printer is in PAUSE or RUNNING condition. At this time, the TEAR-OFF LED lights to indicate that you can use the LOAD/EJECT and LINE FEED/FORM FEED buttons, in conjunction with the ALT button, for backward and forward micro feed adjustment. Using micro feed, adjust the paper to meet the tear-off edge. Once the tear-off position is set, this setting remains valid even after the printer is turned off or initialized. If subsequent data is sent to the printer and the printer is in the RUNNING condition, the paper returns to its original position automatically and printing starts. If the TEAR-OFF button is pressed again while the paper is advanced to the tear-off position, paper returns to its original position whether the printer is in PAUSE or RUNNING condition.

I 1.6.10 LEVER, G, ADJUST Operation

The LEVER, G, ADJUST must be set to the proper position for the paper thickness. If this lever has been set to the 4th step or higher, printing speed is reduced and the head energy is increased.

Table 1-16. Lever Positions

Lever Position	Paper Thickness
0 (2nd step)	0.06 – 0.12 mm
1 (3rd step)	0.13 – 0.18 mm
2 (4th step)	0.19 – 0.25 mm
3 (5th step)	0.26 – 0.32 mm

J NOTE: If printing density becomes lighter, adjust the LEVER, G, ADJUST position one step higher.

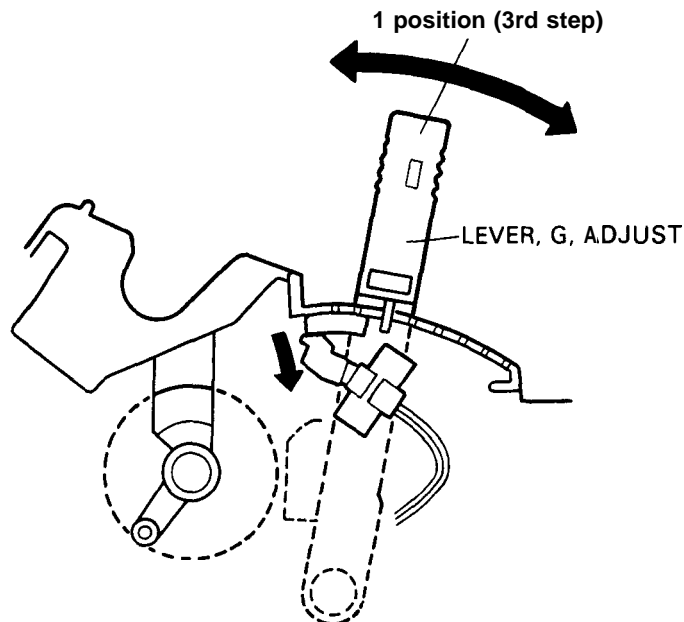


Figure 1-10. Lever Positions



### 1.6.11 Printer Protection for Heavy-Duty Printing

This printer has a printhead protection function to prevent it from overheating and to protect the printer when the head driver voltage drops. If head temperature exceeds its maximum value, printing stops automatically until the head temperature drops to a certain value before printing resumes. Printing resumes at a lower print speed at first.

However, as the head temperature decreases, print speed increases to normal speed automatically. If the head temperature continues to increase at the lower speed, printing is stopped or resumed as temperature increases or decreases.

If the voltage supplied to the head drive circuit drops below its minimum limit as a result of heavy-duty printing, printing is interrupted immediately. When the power supply voltage recovers to a certain value, the remaining print line is printed at half speed. This protective action occurs when half or more of the wires are activated continuously.

## 1.7 MAIN COMPONENTS

The main components of the LQ-570/1070 printers are designed for easy removal and replacement to maintain and repair the printer. The main components are:

- 1) C062 MAIN board: the main control board; the CPU on this board controls all main functions.
- 2) C062 PNL board: the control panel board.
- 3) C062PSB/PSE board: the power supply board.
- 4) M-5 E10/5E60: the printer mechanism.

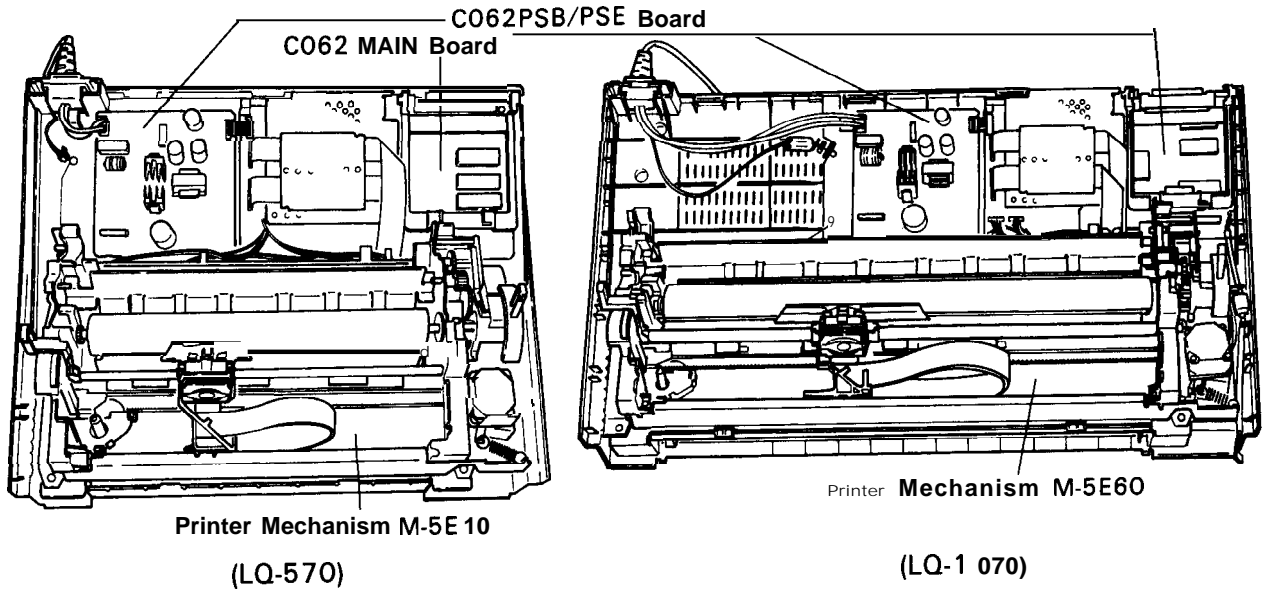


Figure 1-11. LQ-570/1070 Component Layout

### 1.7.1 C062 MAIN Board (Main Control Circuit Board)

The C062 MAIN Board for the LQ-570 consists of a TMP90C041 N 8-bit CPU, an E05A50 gate array, a PROM (5 12K), a PSRAM (256 K), a mask ROM (character generator, 2M), an EEPROM, and a hybrid IC (STK-6022B). In addition to this, the board for the LQ-1070 also includes a SRAM (64 K).

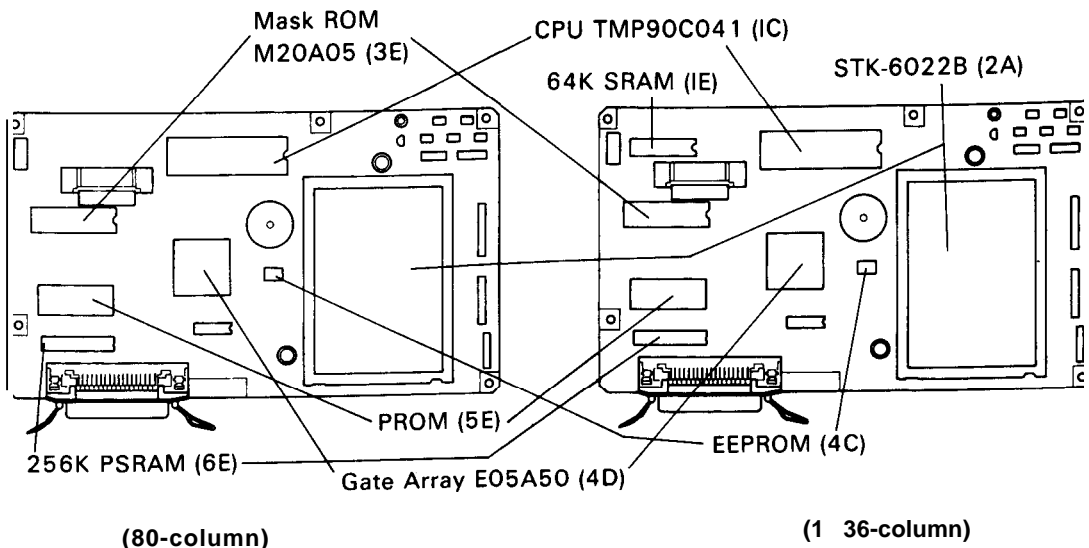


Figure 1-12. C062 MAIN Board (80-column and 136-column)

### 1.7.2 C062 PNL Board (Control Panel Circuit Board)

The C062PNL board is the LQ-570/1070 control panel, which includes the indicator LEDs, switches, I and DIP switches.

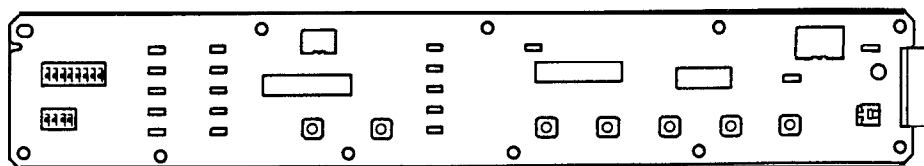


Figure 1-13. C062PNL Board

### 1.7.3 C062 PSB/PSE Board (Power Supply Circuit Board)

The power supply unit consists of a switching regulator circuit, which converts the AC line voltage to the DC voltages (for example, +35V and +5V) used by the printer. The C062PSB board is 120V input type, and the C062PSE board is 220\240V input type.

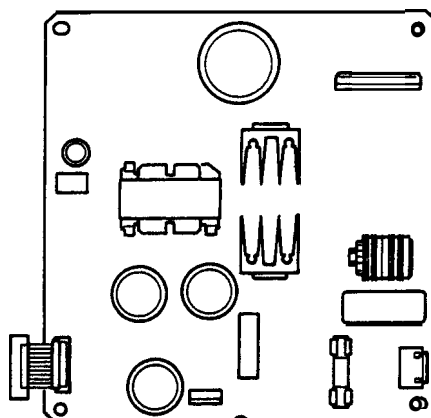
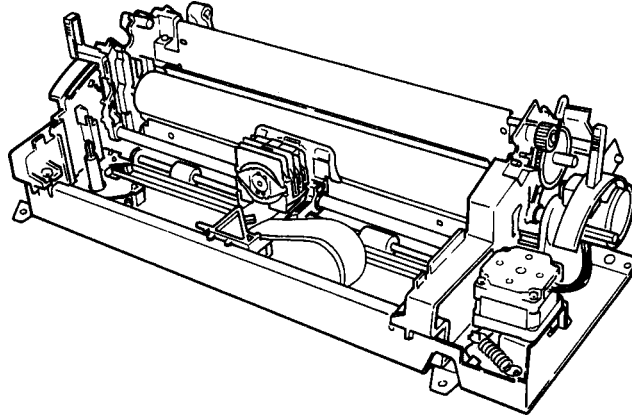


Figure 1-14. C062PSB/PSE Board

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#### 1.7.4 Printer Mechanism (M-5 E10/M-5E60)

The M-5E10/M-5E60 printer mechanism was developed specifically for use with LQ-570/1070 printer. The components include a carriage motor, carriage mechanism, paper-feed motor, paper-feed mechanism, ribbon-feed mechanism, printhead, and sensors. This printer mechanism allows three ways of paper insertion.



This picture shows an 80-column Printer. The M-5E10 and M-5E60 differ in width only.

Figure 1-15. Model-5E10/5E60 Printer Mechanism

#### 1.7.5 Housing

The LQ-570/1070 housing consists of the upper, lower, and front cases. The front case houses the control panel board. The lower case contains the printer mechanism, the main control circuit board, and power supply circuit board.

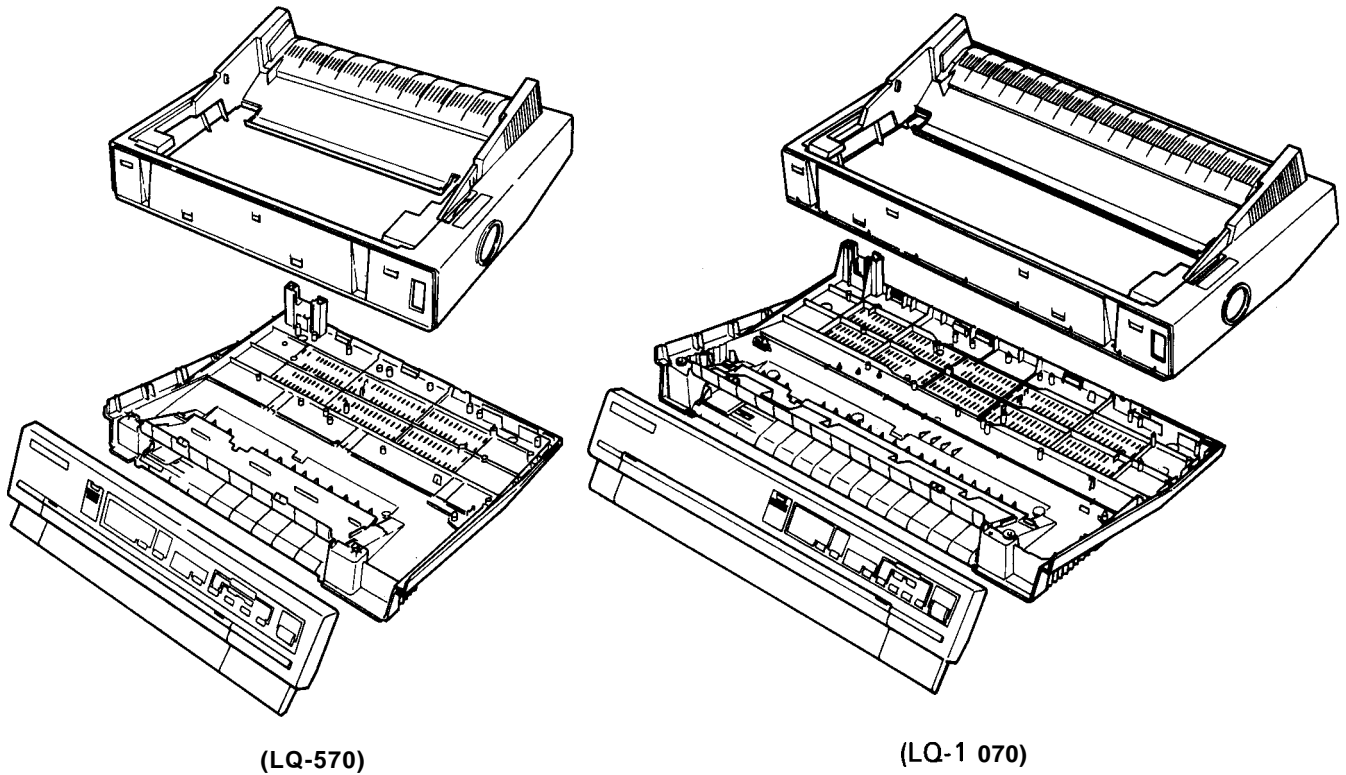


Figure 1-16. Housing (LQ-570/LQ-1070)

# CHAPTER 2

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## 2.1 OVERVIEW OF PRINTER MECHANISM OPERATION

This section describes the **PRINTER MECHANISM** of the Model-5E10/5E60 printer unit and explains how the printer works. The Model-5E10/5E60 has a **PRINTER MECHANISM** that features a 24-pin impact dot printhead for serial printing. There are four main parts to the printer mechanism: 1) the printhead mechanism, 2) the carriage movement mechanism, 3) the paper advance mechanism, and 4) the ribbon advance mechanism. Each of these is described below.

### 2.1.1 Printhead Mechanism

The printhead mechanism consists of the printhead itself, the ink ribbon, and the **PLATEN**. The printhead contains 24 wires in a zigzag arrangement in two rows of 12. A drive coil is provided for each of these wires to make the wires move in and out of the printhead and print dots independently of each other. The basic way that the wires are driven is described in the four steps below.

1. The control circuit outputs the drive signal to the printhead drive circuit. This changes the printhead drive voltage, and current flows through the corresponding printhead coil. The coil acts as a solenoid and generates a magnetic force.
2. This induced force causes the plate to approach the coil rod and the associated dot wire is rapidly ejected to impact on the platen.
3. The dot wire presses the ink ribbon up against the paper as it hits the platen, and in this way prints a dot on the paper.
4. As soon as the current through the coil is switched off, the force induced in the coil rod stops. The plate then returns to its original position (its position before the coil was energized) through the action of the plate spring. After the dot wire hits the platen, the rebounding force of hitting the platen works together with the wire return spring to pull the wire back to its original position in relation to the plate.

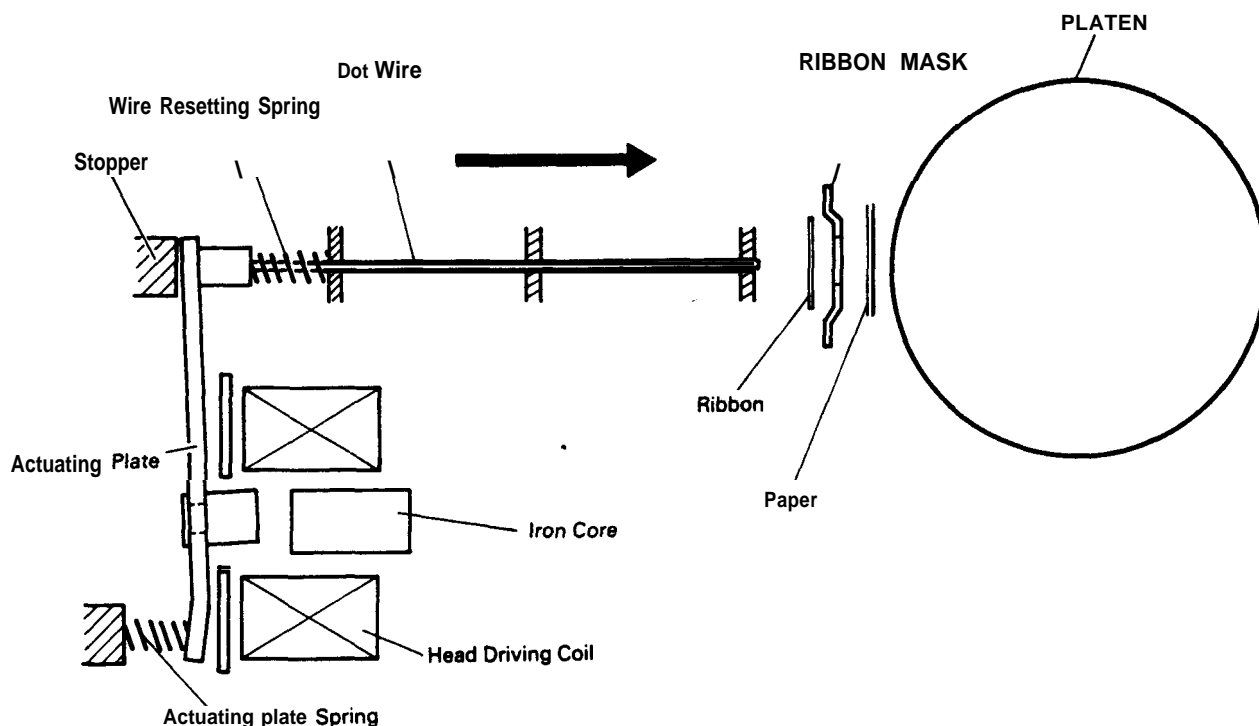


Figure 2-1. How the **Printhead** Works

Figure 2-1 shows the action of the **PRINTER MECHANISM** when a single dot is printed. The printhead tends to heat up after a period of continuous printing. To minimize the possibility of the dot wire drive coils overheating within the printhead and any loss of performance, the head is equipped with a thermistor that detects the head temperature. When this thermistor detects changes in the printhead temperature, the voltage signal changes. This signal change is read by the control circuit for feedback control.

### 2.1.2 Carriage Movement Mechanism

A timing belt is connected to the carriage on the lower side. With the printhead installed, this carriage moves in either direction along the SHAFT, CR, GUIDE. The carriage is driven by the MOTOR, CR a stepping motor that drives the TIMING BELT via the BELT PULLEY. The DETECTOR ASSY., HP DETECTS when the carriage is in the home position.

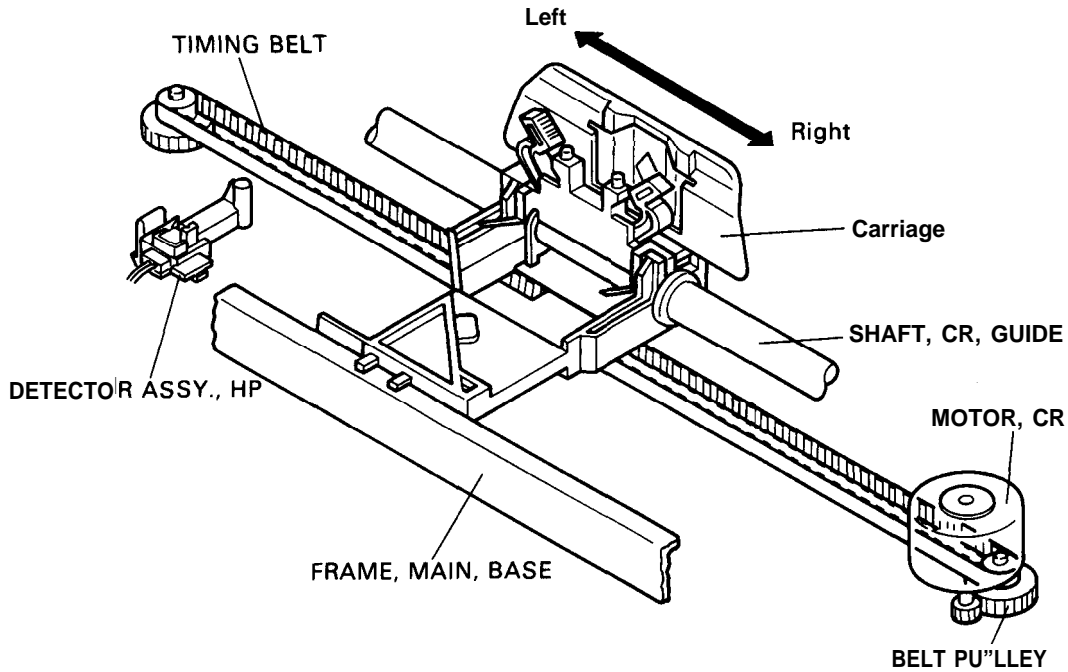


Figure 2-2. Carriage Movement

The paper-thickness LEVER, G, ADJUST allows the printer to use different weights of paper (different thicknesses). The user controls this lever and alters the platen gap on the SHAFT, CR, GUIDE by changing its position. Changing the position of the lever rotates the CHAFT, CR, GUIDE and moves the carriage either toward or away from the PLATEN. Moving the paper-thickness LEVER, G, ADJUST to the fourth position or higher slows down the printing speed to protect the printhead. The PG sensor reads the current position of the paper-thickness LEVER, G, ADJUST.

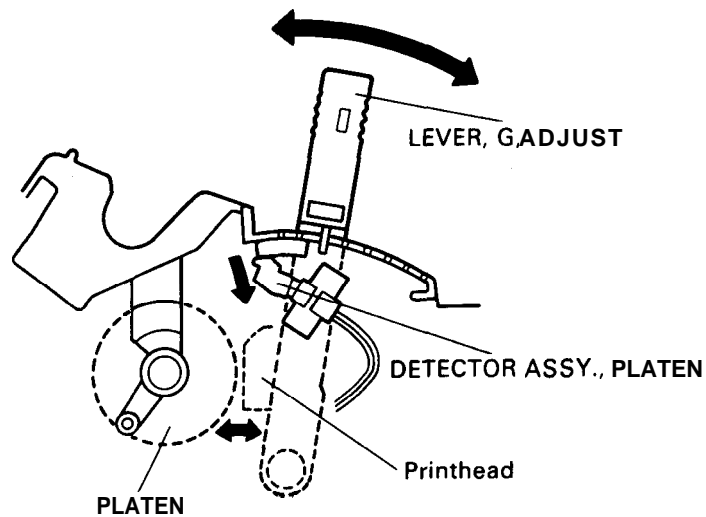


Figure 2-3. Paper-Thickness LEVER, G, ADJUST Movement



### 2.1.3 Paper Feed Mechanism

Cut sheet paper is advanced by friction feed. Continuous form paper is advanced using a tractor feed mechanism.

There are three ways to advance the paper with tractor feed: using the push tractor, using the pull tractor, and using the push and pull tractors together. Any one of these three tractor configurations can feed paper through the printer. In normal operation, the printer is set up with one tractor, which functions as either a push tractor or pull tractor, depending on where it is attached to the printer body. To use the push-pull tractor feed method, an optional tractor must be attached in addition.

There are also four ways to insert paper into the printer. Different paper paths are used for different types of paper. Table 2-1 lists which paper paths can be used for each of the various paper advance methods.

Table 2-1, Paper Advance Methods and Paper Paths

Paper Advance Method	Paper Insertion (Paper Paths)			
	Rear Entrance	Front Entrance	Bottom Entrance	Top Entrance
Friction Feed	No	OK	No	OK
Push Tractor	OK	No	No	No
Pull Tractor	No	OK	OK	No
Push-pull Tractor Feed	OK	No	No	No

#### 2.1.3.1 Paper Advance Mechanisms

This section describes how the friction feed and tractor feed mechanisms work to advance the paper in the printer.

##### Friction Feed Method

The paper is held between the platen and paper advance roller, and between the paper eject roller and paper eject unit cover. The paper-feed pinion gear, turning in the direction of the black arrow, drives the COMBINATION GEAR, 8.5, 30. The COMBINATION GEAR, 8.5, 30 turns the SPUR GEAR, 34, paper-feed rollers, and top ROLLER ASSY., PAPER EJECT. The paper then advances in the direction of the white arrow.

The paper advance roller spring holds the paper against the platen. Setting the LEVER, G, ADJUST to the tractor feed position releases this pressure and frees the paper. Figure 2-4 illustrates friction feed when paper is inserted through the top entrance.

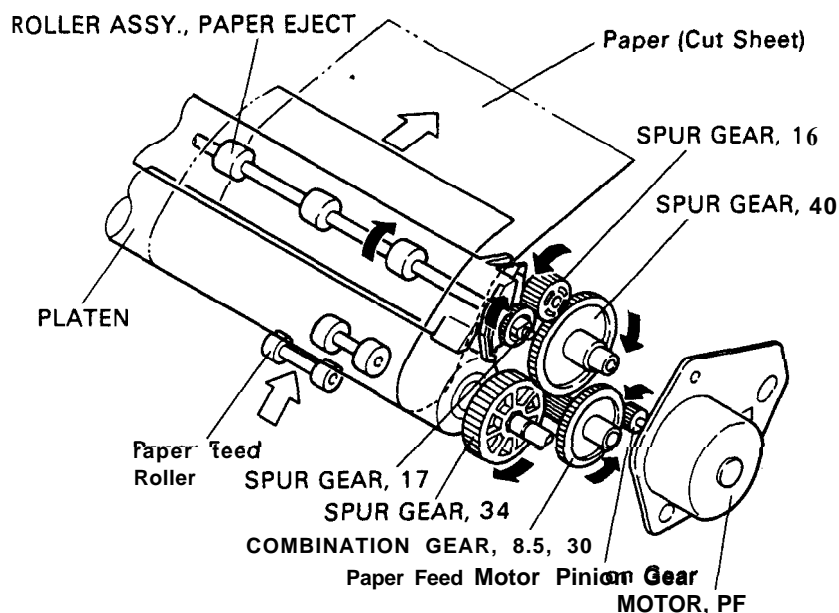


Figure 2-4. Top Path Friction Feed  
2-3

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Push Tractor Method

When the push tractor is selected, the SPUR GEAR, 16 engages the SPUR GEAR, 17 (Tractor gear) on the TRACTOR ASSY. COMBINATION GEAR, 8.5, 30 is driven by the paper-feed gear, which in turn is driven by the paper-feed motor pinion gear. The paper-feed pinion gear, when turning in the direction of the black arrow, results in pushing the paper through the mechanism.

During tractor feeding, the LEVER, G, ADJUST is set to the tractor position to disengage the friction drive. This releases the pressure between the paper advance roller and the platen. Figure 2-5 illustrates push tractor operation.

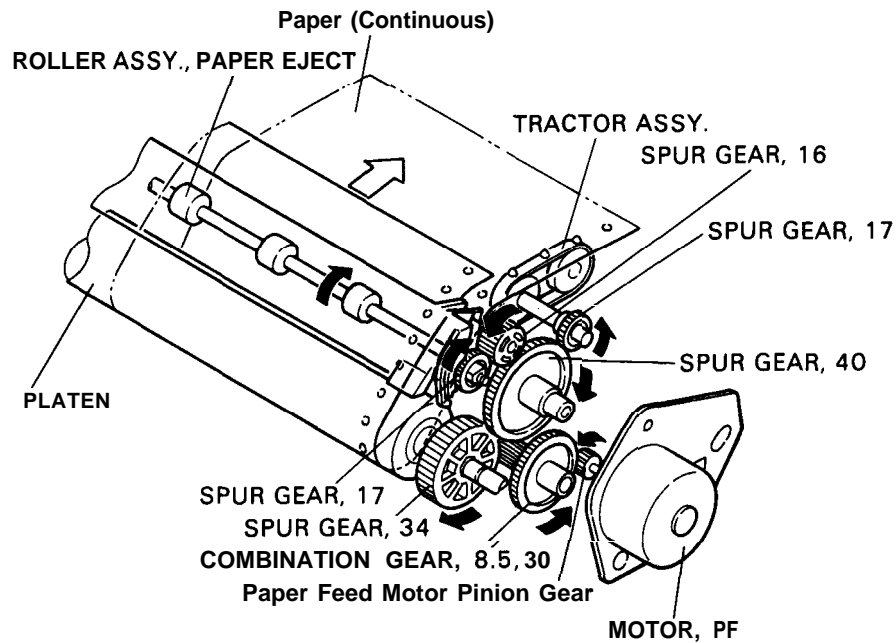


Figure 2-5. Push Tractor Operation

Pull Tractor Method

Using pull tractor feed to advance the paper is basically the same as using push tractor feed. In push tractor feed, the TRACTOR ASSY. (paper advance mechanism) is before the paper entrance. It pushes the paper through the PRINTER MECHANISM. Pull tractor feed, however, has the opposite arrangement, with the tractor situated after the paper entrance. Since it pulls the paper through the PRINTER MECHANISM, it requires no paper tension unit. Figure 2-6 illustrates pull tractor operation tractor when paper is inserted through the bottom path.

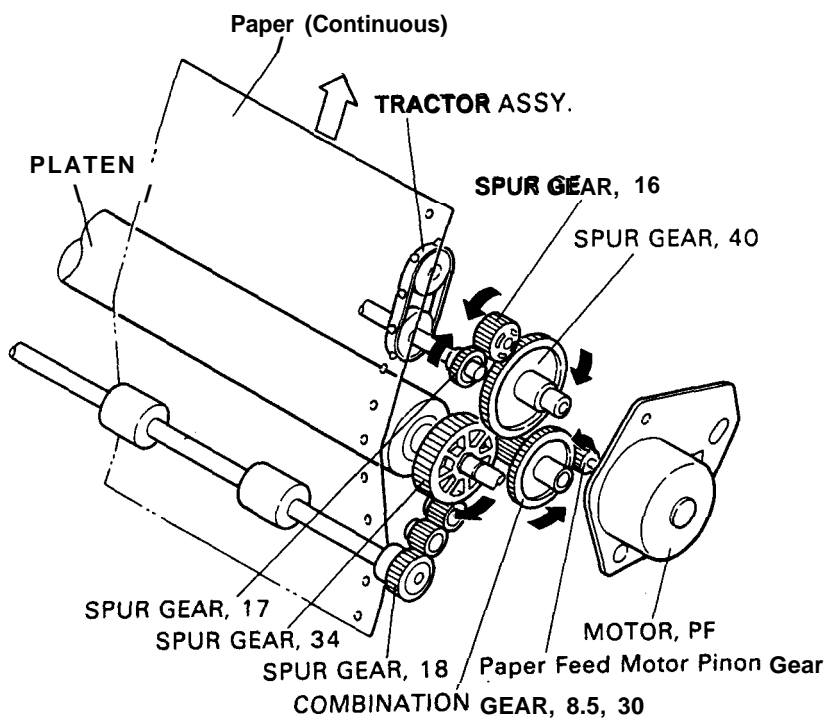


Figure 2-6. Pull Tractor Operation

Push-Pull Tractor Method

This is a combination of the push tractor and pull tractor methods. Two tractors are used, one in front of and one behind the paper entrance, to advance the paper. They act simultaneously to push and pull the paper through the PRINTER MECHANISM. Figure 2-7 illustrates push-pull tractor operation.

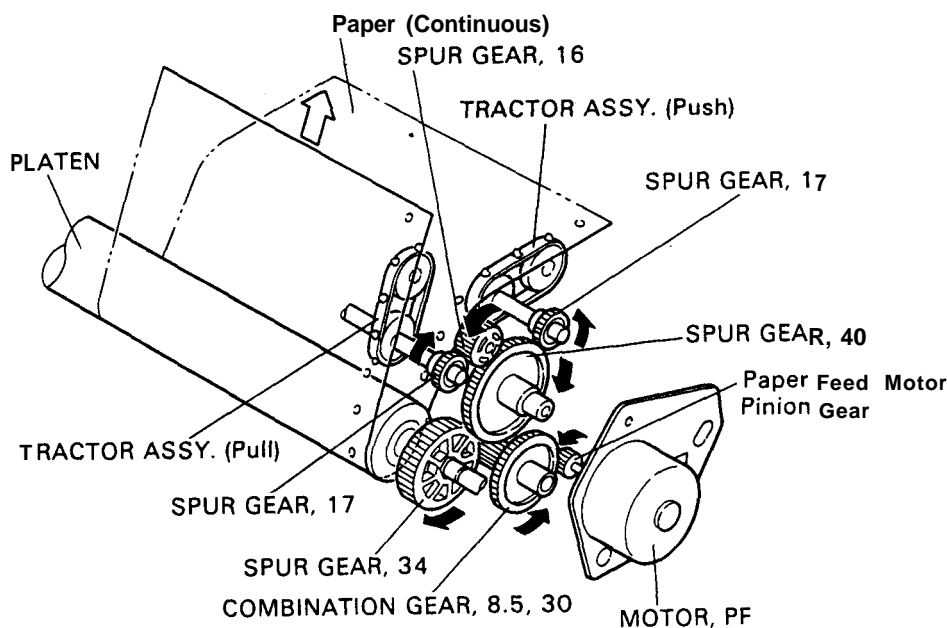


Figure 2-7. Push-Pull Tractor Operation

The LEVER, RELEASE switches between friction feed and tractor feed. Setting the LEVER, RELEASE to the friction feed position presses the paper advance roller against the PLATEN. Setting the release lever to the tractor feed position releases this pressure, so that the paper advance roller separates from the PLATEN. The DETECTOR ASSY., RELEASE senses the current position of the LEVER, RELEASE.

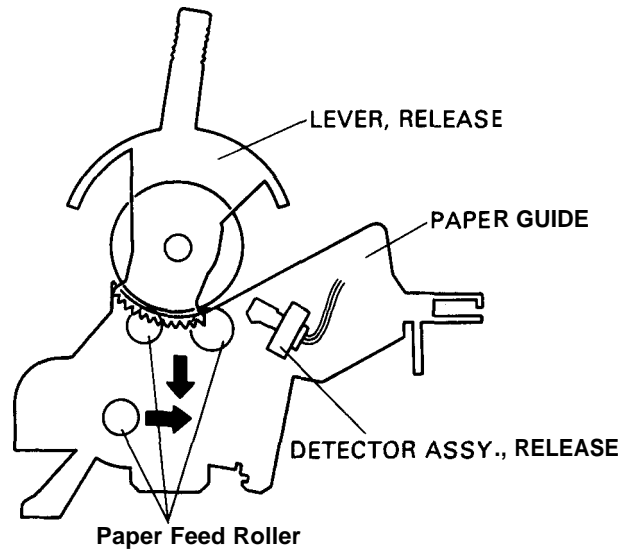


Figure 2-8. LEVER, RELEASE Movement

### 2.1.3.2 Paper Insertion Entrances

This section describes the different ways to feed paper into the printer.

#### Top entrance paper insertion

When you feed paper into the printer through the top entrance, the method to advance the paper is friction feed.

There are two paper-out detectors: the front paper-out detector is in front of the PRINTER MECHANISM and the rear paper-out detector is behind the PRINTER MECHANISM. When paper is inserted through the top entrance, the rear detector senses when the paper runs out.

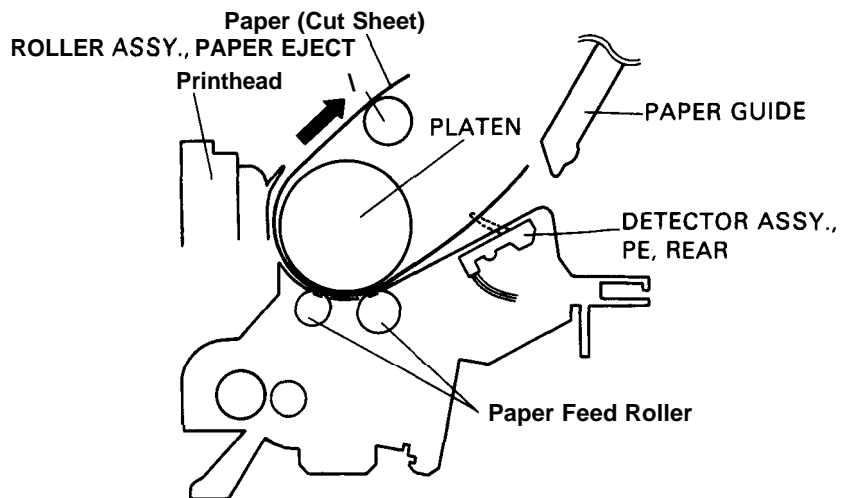


Figure 2-9. Paper Path for Top Entrance Friction Feed

Rear entrance paper insertion

When you feed paper into the printer through the rear entrance, the method to advance the paper can be: the push tractor, or the push-pull tractor. The rear paper-out detector senses when the paper has run out.

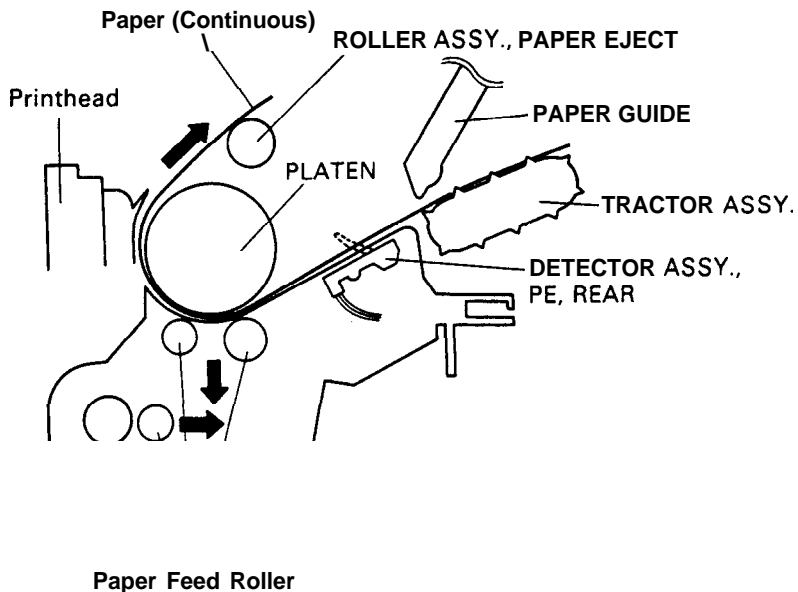


Figure 2-10. Paper Path for Rear Entrance Push Tractor Feed

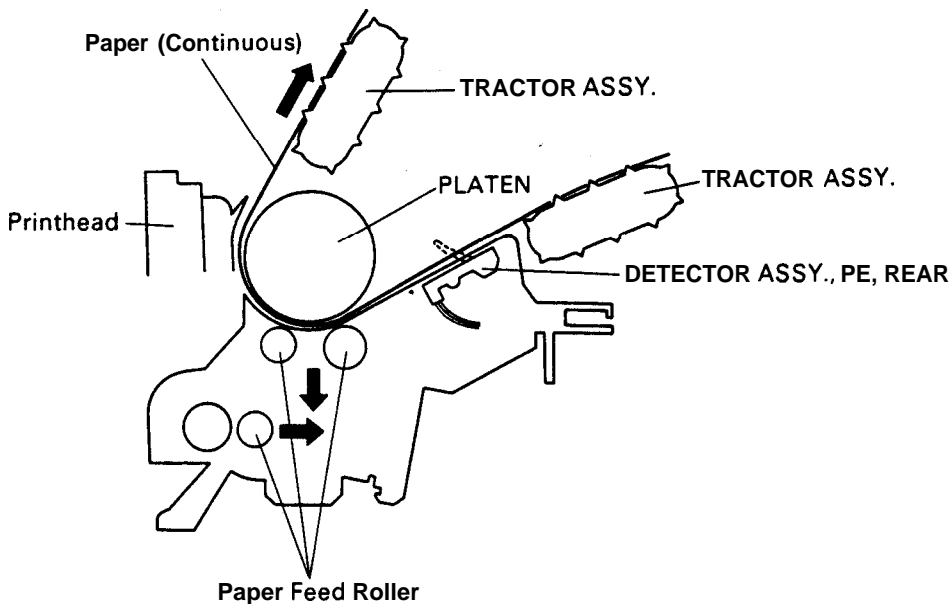


Figure 2-11. Paper Path for Rear Entrance Push-Pull Tractor Feed

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**Bottom entrance paper insertion**

When you feed paper into the printer through the bottom entrance, the pull tractor advances the paper. The front paper-out detector senses when the paper runs out.

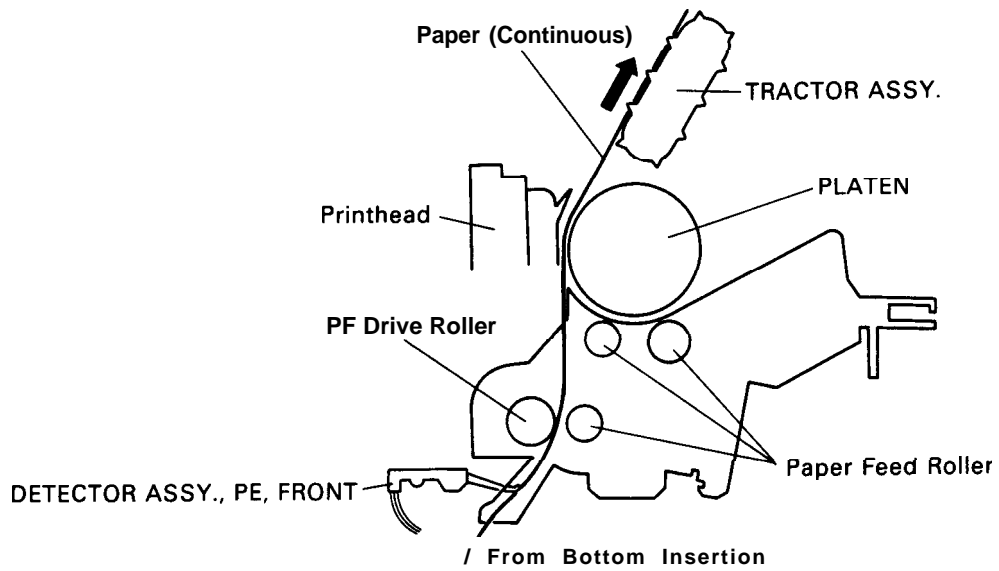
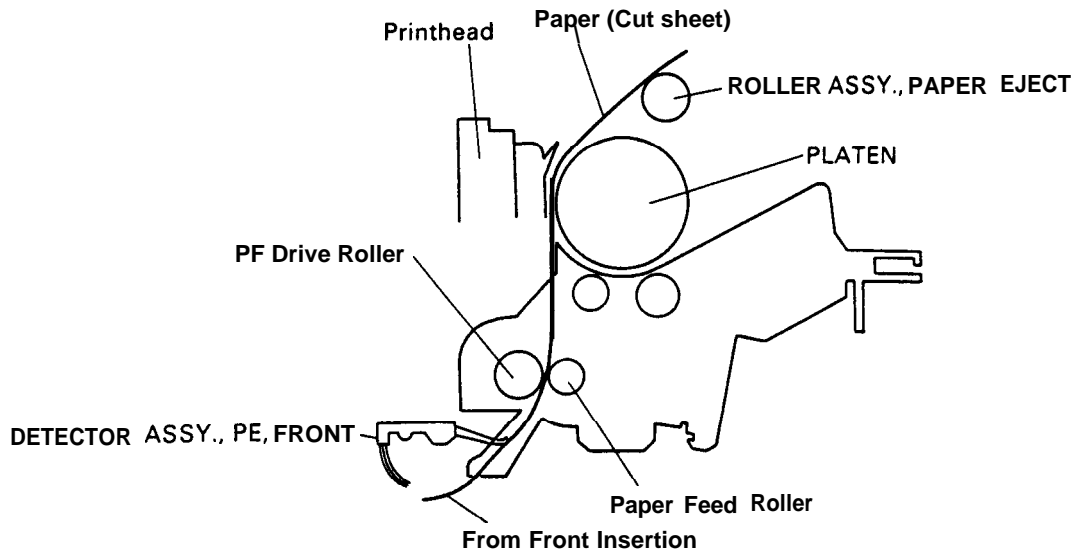


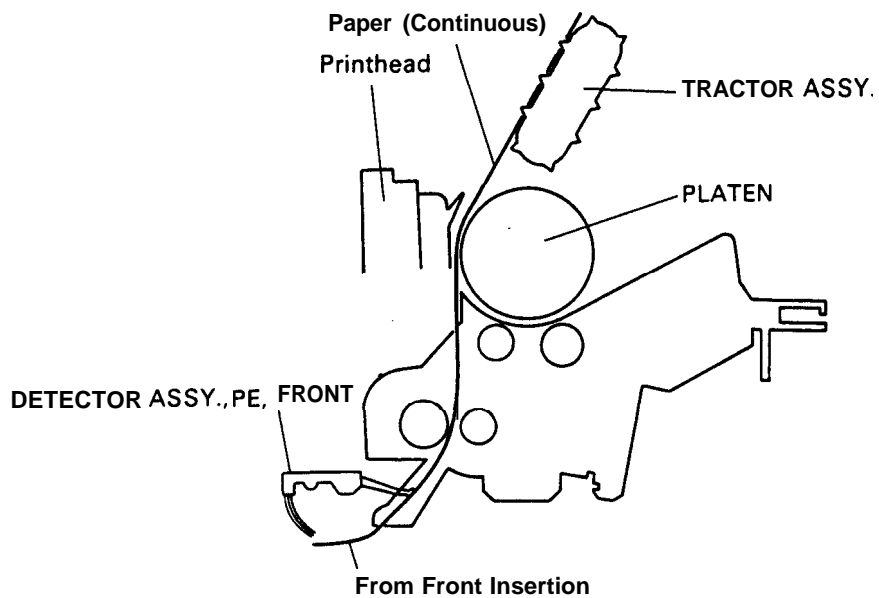
Figure 2-12. Paper Path for Bottom Entrance Pull Tractor Feed

**Front entrance paper insertion**

When you feed paper into the printer through the front entrance, the paper can be advanced either with friction feed or the pull tractor. The front paper-out detector senses when the paper runs out.



**Figure 2-13. Paper Path for Front Entrance Friction Feed**



**Figure 2-14. Paper Path for Front Entrance Pull Tractor Feed**

2.1.4 Ribbon Advance Mechanism

The ribbon drive gear advances the ribbon through a gear linkage. This arrangement of gears makes the ribbon drive gear always rotate in a counterclockwise direction, regardless of the direction the carriage is moving.

Table 2-2. Ribbon Advance Gear Linkage

Direction of Carriage Movement	Gear Linkage
Left to right (arrow ➡)	PULLEY, DRIVEN ➡ Ribbon transmission gear ● COMBINATION GEAR (1) ● COMBINATION GEAR (3) ➡ COMBINATION GEAR (4) ● RATCHET, RD
Right to left (arrow ⇐)	PULLEY, DRIVEN ⇐ Ribbon transmission gear ⇐ COMBINATION GEAR (1)⇐ COMBINATION GEAR (2) ⇐ RATCHET, RD

The ink ribbon within the cartridge case is an endless ribbon that is held against the ribbon advance roller by the pressure of the ribbon grip roller. The ribbon advance roller, linked to the ribbon drive gear, winds the ink ribbon.

The ribbon brake spring, attached to the exit slot of the cartridge case, prevents slack in the ribbon and keeps the ribbon tension correct, The ribbon mask keeps the paper clean by preventing the ribbon from brushing against the paper.

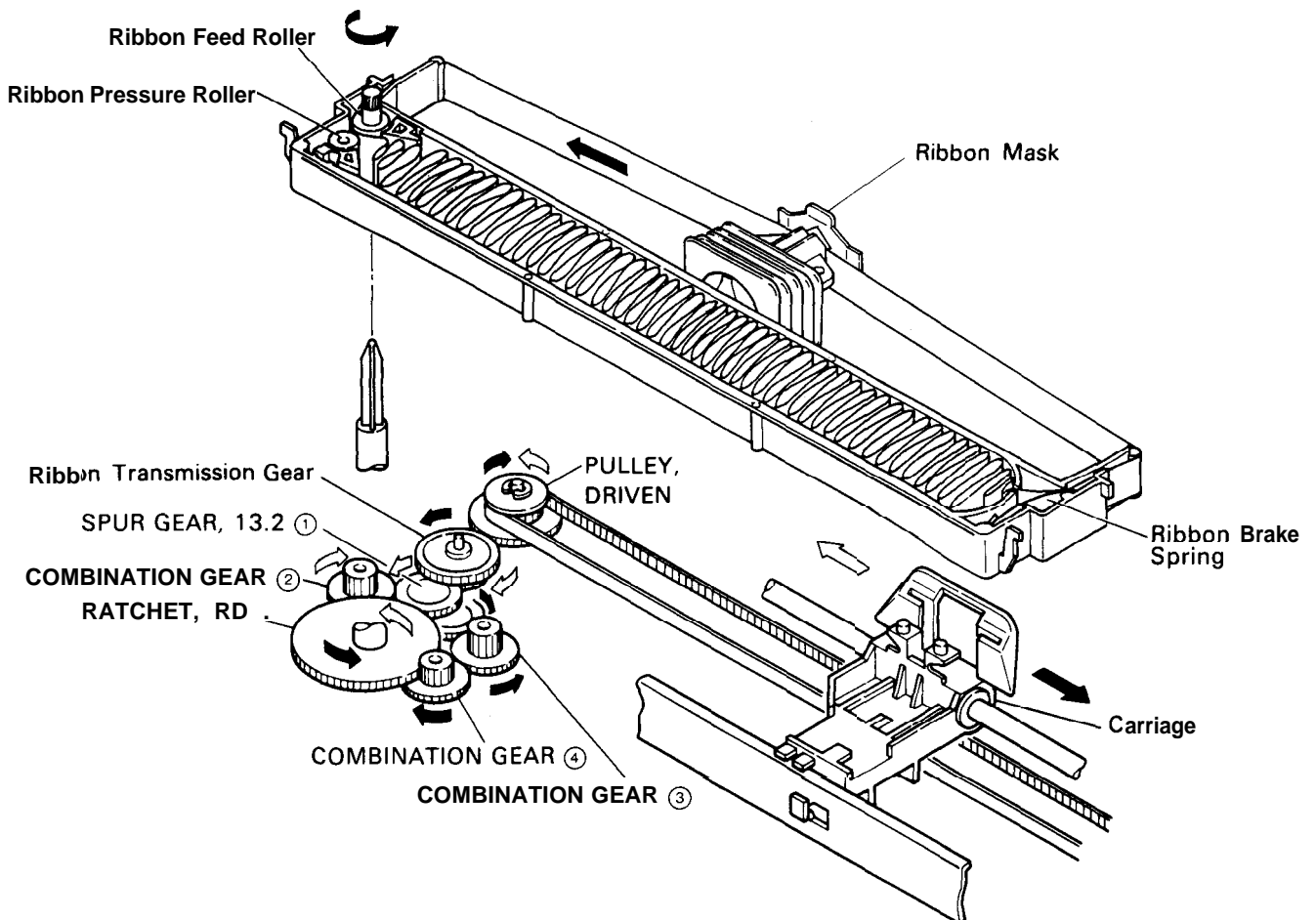


Figure 2-15. Ribbon Advance Mechanism



## 2.2 POWER SUPPLY OPERATION

The printer can be powered by either of two power supply boards: the 120 V C062PSB board or the 220/240 V C062PSE board. The only difference in the way these two boards operate is in the primary circuitry. How they work to supply power to the printer is identical. These power boards output the DC current necessary to drive the printer control circuits and printer drive mechanism. Table 2-3 shows the input voltages and fuse ratings for these boards.

Table 2-3. Power Supply Boards

Board	input Voltage (VAC)	Fuse F1 Rating
C062 PSB	103.5 to 132	2.5A / 125 V
C062 PSE	198 to 264	1.25A / 250 V

### 2.2.1 Power Supply Overview

The power supply board has two power output lines that supply power to the various control circuits and drive mechanisms. Table 2-4 lists the parts of the printer that run off these two DC output supply voltages.

Table 2-4. Power Supply Output Voltages and Applications

Output Supply Voltage (DC)	Applications
+35 v	MOTOR, CR drive MOTOR, PF drive Printhead drive
+5 v	C062 MAIN board logic circuitry Various sensors Control panel LEDs MOTOR, PF hold

### 2.2.2 Supply Circuit Operation

Figure 2-16 shows the power supply circuitry in block diagram form. AC power feeds into the printer from the 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 circuit is connected to the switching circuit. This feedback control arrangement ensures that the +35 VDC supply is kept stabilized.

The + 5 VDC supply is achieved by feeding the +35VDC line through the +5VDC power supply circuit. This circuit further steps down the +35 VDC voltage and outputs a stabilized +5 VDC supply.

There are two main features of the power supply circuit. First, the power supply switch is in the secondary circuitry. When this switch is turned off, the switching circuit is de-energized and output of the +35 VDC supply stops. However, since the switch is in the secondary circuitry, while the printer remains plugged into the external AC supply current continues to flow in the primary circuitry, whether the power supply switch is turned off or on. For this reason, before you perform any maintenance work, you must disconnect the printer from the external AC power supply by unplugging it from the power source.

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Second, there are four circuits to protect the supply circuitry and avoid danger. The +5 VDC line contains a current overload protection circuit and a voltage overload protection circuit. The current overload protection circuit is part of the + 5 VDC supply circuit. It cuts the + 5 VDC line if the current is too great. The + 5 V voltage overload protection circuit cuts the supply if the voltage reaches or exceeds + 7 VDC. It stops the switching circuit operation, which stops the output of the +35 VDC line.

The +35 VDC line has a voltage overload protection circuit and a voltage drop protection circuit. The +35 V voltage overload protection circuit cuts the supply if the voltage reaches or exceeds +36 VDC. It stops the switching circuit operation, which stops the output of the +35 VDC line. The voltage drop protection circuit protects the printer from such damage as might occur from short circuiting in the secondary circuitry of the +35 VDC line. If a voltage drop is detected, it stops the switching circuit operation, which stops the output of the +35 VDC line.

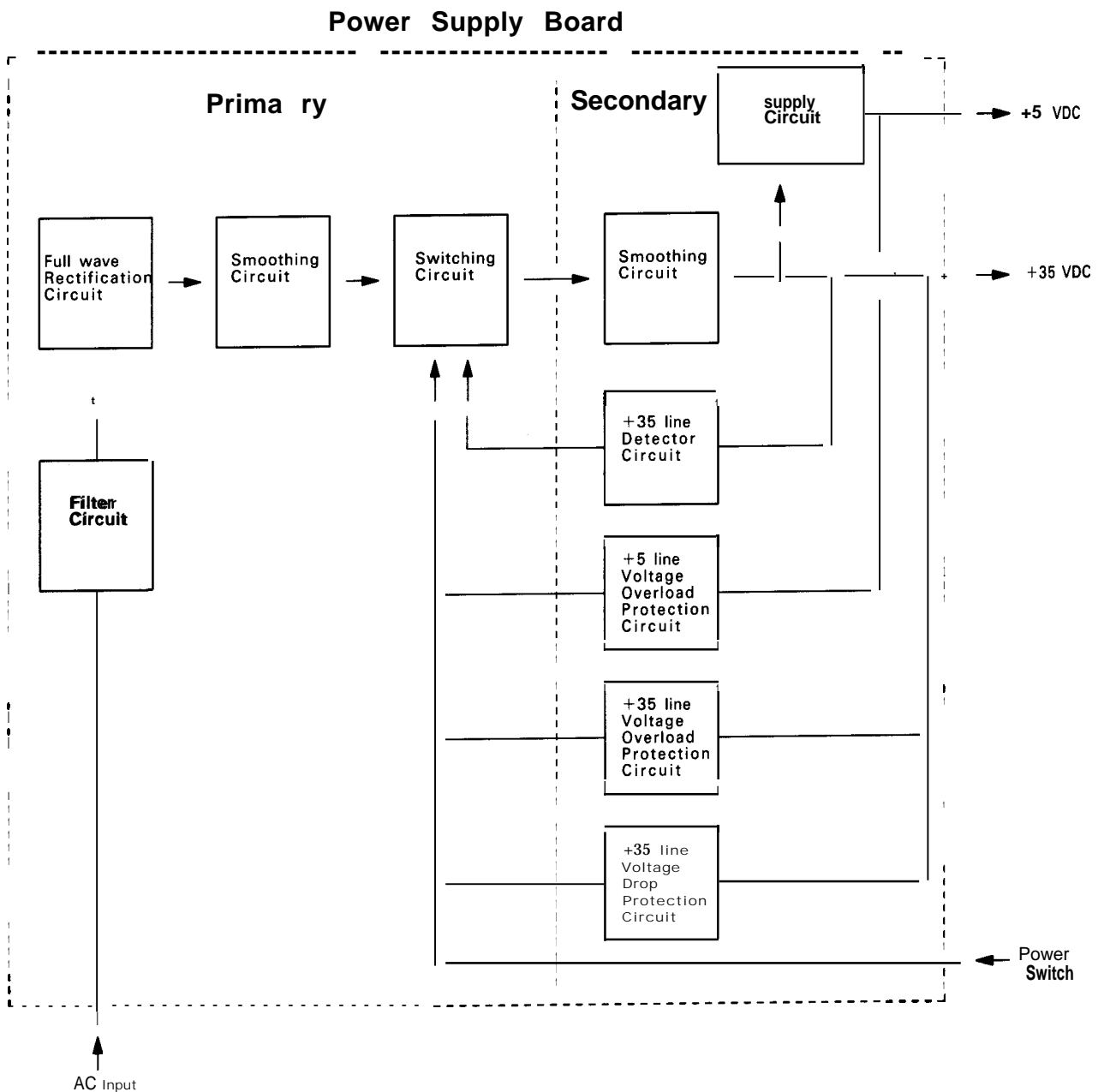


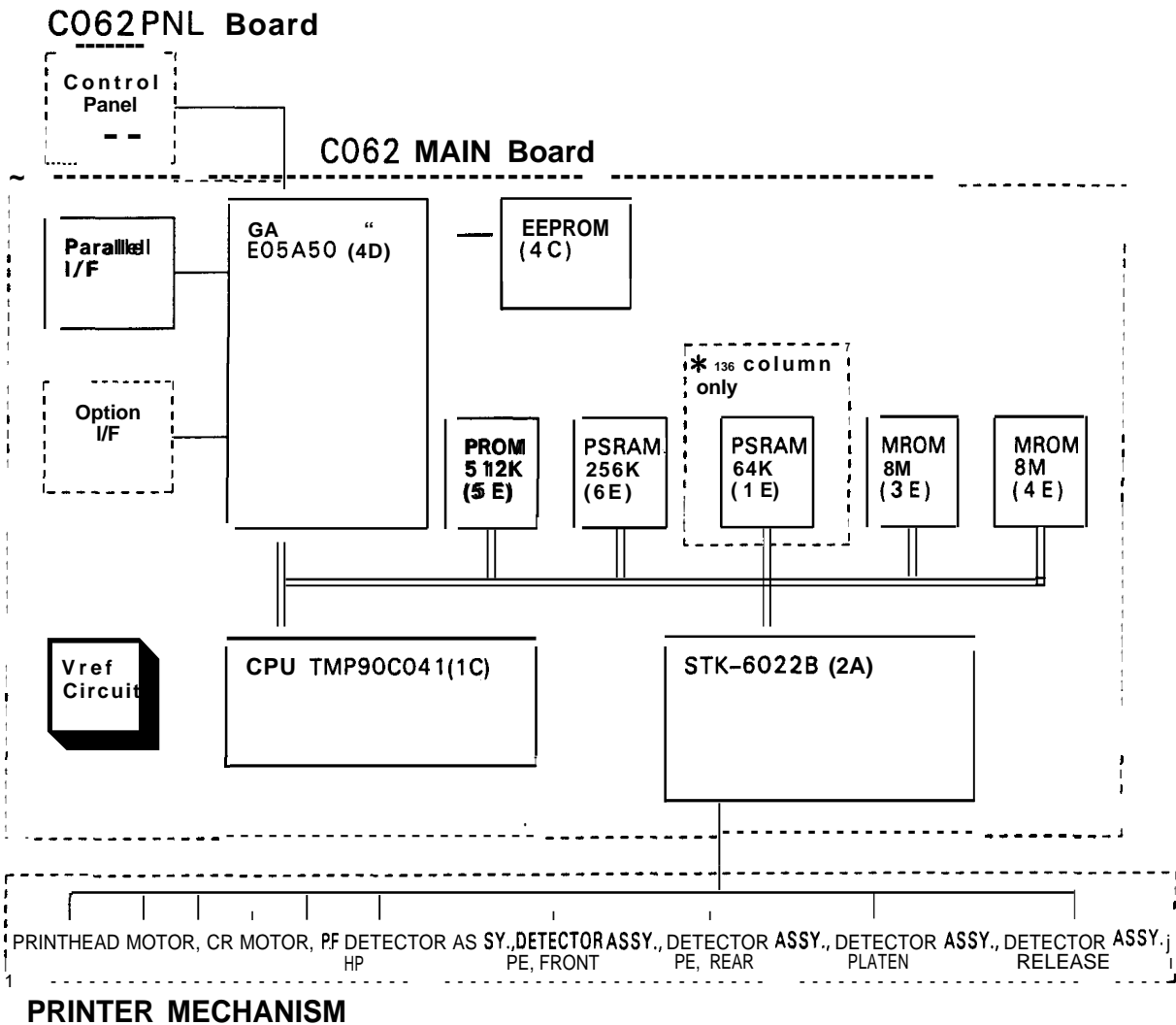
Figure 2-16. Power Supply Circuit **Block Diagram**

## 2.3 CONTROL CIRCUIT OPERATION

The control circuit consists of two boards: the C062 MAIN board, which acts as the main board, and the C062PNL board, which acts as the control panel board. This section describes how these boards work.

### 2.3.1 Control Circuit Operation Overview

The printer CPU is an 8-bit CPU TMP90C041 running at 10 MHz. It oversees control of all the components of the printer. The E05A50 gate array contains various memory management functions that control the assignment of the memory and I/O areas. Rationalization and simplification of the circuitry is achieved through use of the STK-6022B, which holds all the driver circuits for driving the PRINTER MECHANISM on a single chip. Figure 2-17 shows the control circuits in block diagram form. I



GA	Gate array	DETECTOR ASSY., HP	Home position sensor
DETECTOR ASSY., RELEASE	Platen gap sensor	MOTOR, CR	Carriage motor
DETECTOR ASSY., RELEASE	Release sensor	MOTOR, PF	Paper advance motor
DETECTOR ASSY., PE, FRONT	Front paper-out detector (positioned in front of the PRINTER MECHANISM)		
DETECTOR ASSY., PE, REAR	Rear paper-out detector (positioned behind the PRINTER MECHANISM)		

Figure 2-17. Control Circuit Block Diagram

Table 2-5 lists the functions of the main components and circuits of the printer. The CPU converts the print data sent from the host computer to image data (the print image). The image data is then loaded to RAM. Each line of data is processed sequentially. The CPU transfers the print data to the printhead drive circuit. The CPU sends the printhead drive pulse to the printhead drive circuit. The length of this pulse corresponds to the printhead drive voltage. The head drive circuit then outputs the head drive signal.

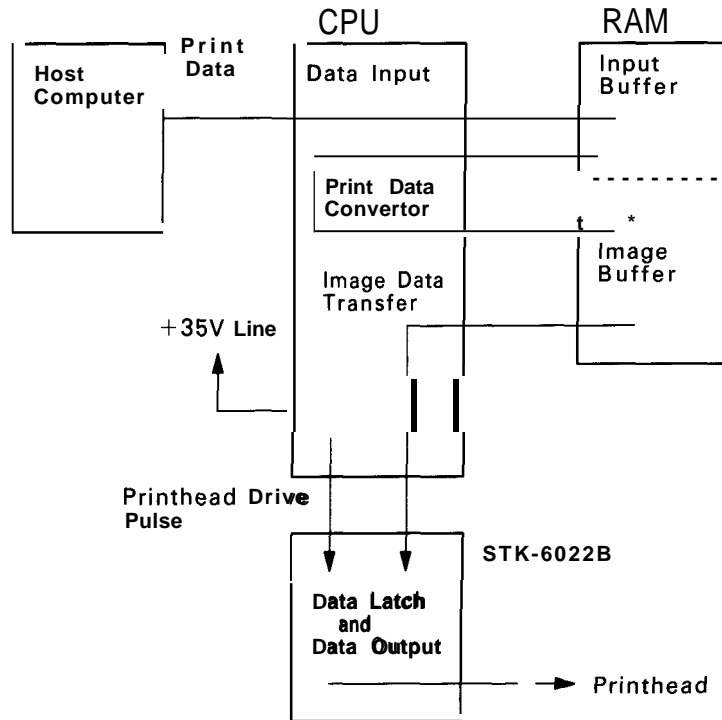


Figure 2-18. Data Flow

Table 2-5. Functions of the Main IC and Circuits

IC or Circuit	Location	Functions
TMP90C041	1C	<p>Receives data from the host computer and loads the data to the input buffer in RAM (under interrupt processing control). Expands 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 the motors.</p>
E05A50	4D	<p>This is a gate array consisting of three components configured on a single chip:</p> <p><b>Memory Management Unit</b> Handles CPU memory in ROM, RAM, and mask ROM, and assigns addresses for other devices.</p> <p><b>Parallel Interface (Parallel I/F)</b> Holds the parallel interface functions.</p> <p><b>Reset Circuit</b> Contains the circuit that generates the RESET signal.</p>

Table 2-5. Functions of the Main IC and Circuits (Cont.)

IC or Circuit	Location	Functions
STK-6022B	2A	This is a <i>single</i> chip that houses drive circuits for the printhead, MOTOR, CR and MOTOR, PF of the PRINTER MECHANISM. The chip also includes the various sensor input circuits for the PRINTER MECHANISM.
PROM	5E	PROM contains the program that runs the CPU.
RAM	6E 1E	Holds the CPU working area and the various buffers. (1 E is not used for an 80-column device and is not installed.)
MROM (Mask ROM)	3E 4E	Holds the character design (also called the character generator).
EEPROM	4C	EEPROM is an electronically writable and erasable ROM used to hold such information as the TOF position.
Vref Circuit	—	This is a circuit for generating the reference voltage used in the A/D convertor within the CPU.

2.3.2 Reset Circuit

Figure 2-19 shows the reset circuit in block diagram form. The reset circuit issues the  $\overline{\text{RESET}}$  signal. Each part of the control circuits is initialized when this  $\overline{\text{RESET}}$  signal is received. The conditions when the  $\overline{\text{RESET}}$  signal is output are described below.

When turning on the power supply

Immediately after the power has been turned on, STK-6022B (2A) outputs the  $\overline{\text{VCCON}}$  pulse. E05A50 (4D) receives this pulse and then outputs the  $\overline{\text{DISC}}$  pulse. The electrical charge in the condenser within the STK-6022B is then discharged. After this, STK-6022B outputs the THLD signal, and E05A50 then outputs the  $\overline{\text{RESET}}$  signal. After a certain time has elapsed, the charge in the condenser in the STK-6022B builds up again. The THLD signal is canceled and then the  $\overline{\text{RESET}}$  signal is canceled.

Resets performed by the CPU itself (CPU self-reset)

The CPU outputs the  $\overline{\text{RESET}}$  signal if there is a  $\overline{\text{RESET}}$  request for E05A50 and if E05A50 has output the  $\overline{\text{DISC}}$  pulse.

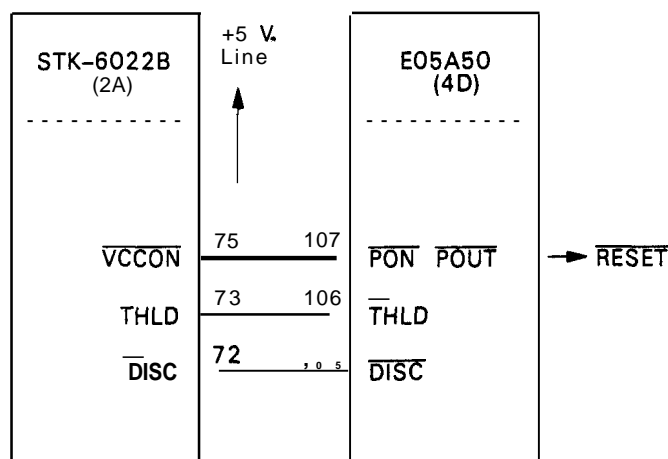


Figure 2-19. Reset Circuit Block Diagram

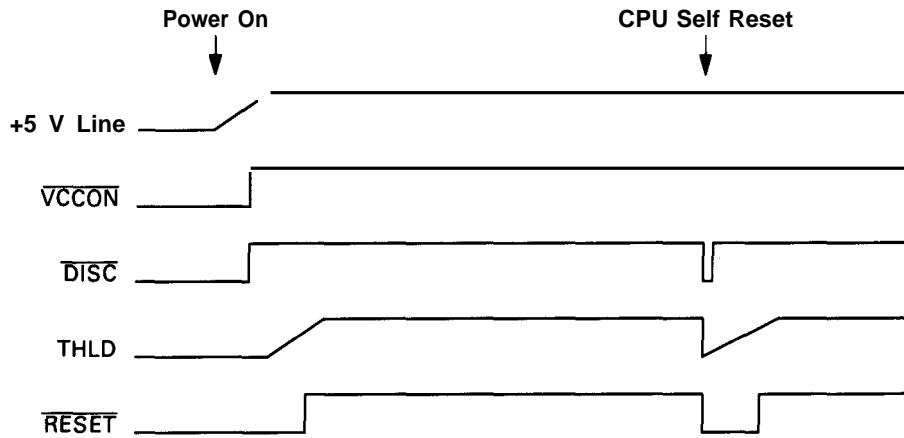


Figure 2-20.  $\overline{\text{RESET}}$  Signal Timing

2.3.3 Sensor Circuits

Figure 2-21 shows the sensor circuits in block diagram form. Detection of any excessive printhead temperature causes the TEMP2 signal to be sent directly to the CPU. Other signals, such as the CRHOME signal, pass through the STK-6022B unit before reaching the CPU. Terminals P50 to P55 on the CPU are used for the A/D convertor.

The Vref circuit generates the A/D convertor reference voltage Vref.

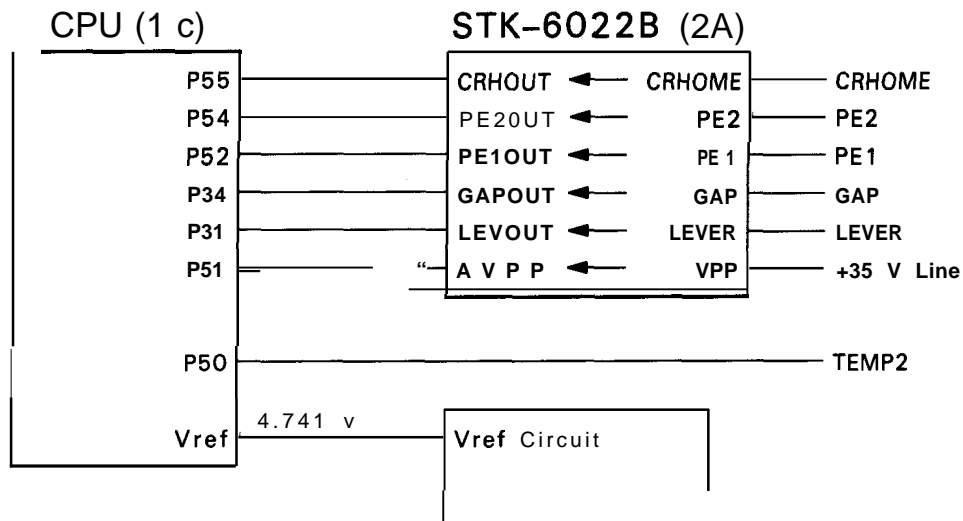


Figure 2-21, Sensor Circuit Block Diagram

2.3.4 MOTOR, CR Drive Circuit

Figure 2-22 shows the MOTOR, CR drive circuit. An open-loop, constant-current drive arrangement is used for running the MOTOR, CR. The motor is driven by 2-2 phase excitation and 1-2 phase excitation. 2-2 phase excitation corresponds to two 1-2 phase excitation steps. Thus, for each single step phase change of a 2-2 phase excitation motor, the carriage moves 1/1 20 inch. For each single step phase change of a 1-2 phase excitation motor, the carriage moves 1/240 inch.

The MOTOR, CR drive circuit of the STK-6022B detects the amount of current flowing in the MOTOR, CR coil and regulates this current. The current flowing through the coil varies, depending on the speed of the MOTOR, CR. The amount of current is set by the CPU via the E05A50I/O port. Signals are sent to SELR 1 to SELR4 on the STK-6022B. The STK-6022B sets the coil current to correspond to the MOTOR, CR speed.

Ports P60 to P63 on the CPU are used exclusively as control ports for the stepping motor.

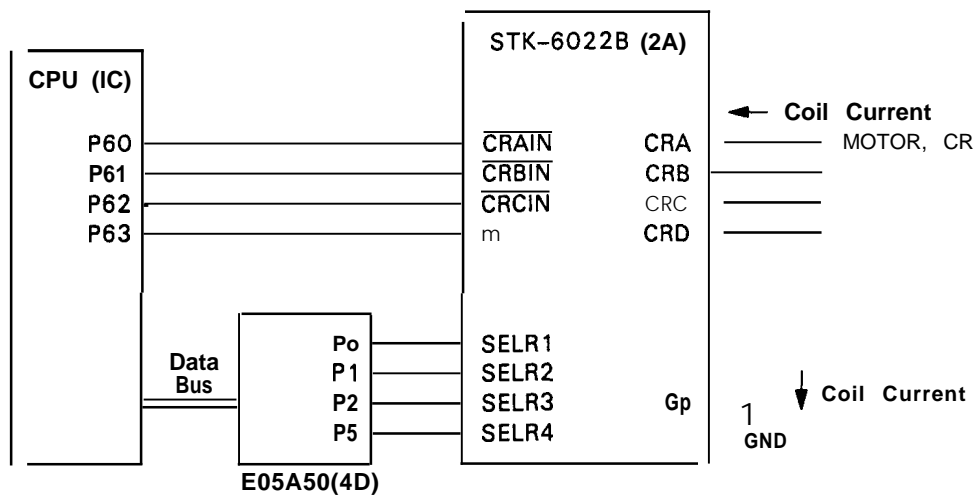


Figure 2-22. MOTOR, CR Drive Circuit

Table 2.6. MOTOR, CR Drive Modes

Drive Mode	Excitation Type	• Drive Frequency Type	Standard Print Character
3.214 X speed	2-2 phase	2700 pps	High Speed Draft
3 X speed	2-2 phase	2520 pps	
2 X speed	2-2 phase	1680 pps	LQ
1.5 X speed	1-2 phase	2520 pps	
4/3 X speed	1-2 phase	2240 pps	
1 X speed	1-2 phase	1680 pps	
2/3 X speed	1-2 phase	1120 pps	
1/2 X speed	1-2 phase	840 pps	

2.3.5 MOTOR, PF Drive Circuit

The printer uses a stepping motor to advance the paper. The minimum amount of paper that can be advanced is 1/360 inch. The motor is a 2-2 phase or 1-2 phase, constant-voltage drive type. P70 to P73 on the CPU are the control ports for the stepping motor. MOTOR, PF phase data is output through these ports. PFA to PFD are turned on and off within the STK-6022B according to this phase data sent from the CPU.

When the MOTOR, PF is running, the voltage supplying the coil of the MOTOR, PF is +35 V. When the MOTOR, PF is not running and is in hold status, the supply voltage to the coil is + 5 V. Switching between these two supply voltages occurs at the PFCOM terminal of the STK-6022B when  $\overline{\text{PFENB}}$  is turned on or off.

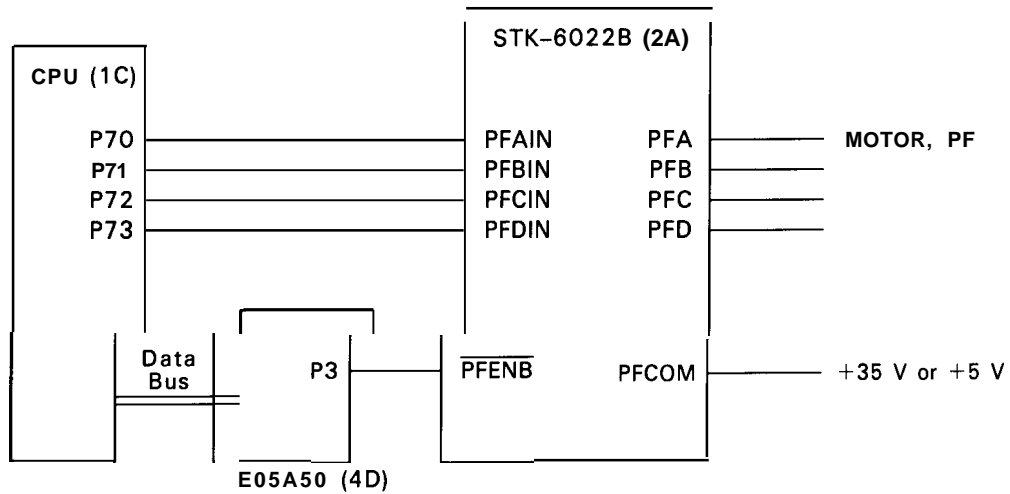


Figure 2-23. MOTOR, PF Drive Circuit



2.3.6 Printhead Drive Circuit

Figure 2-24 shows the printhead drive circuit in block diagram form. The print data already has been expanded to create the image data. The CPU splits up this data three times and transfers this information to the latch circuit within the STK-6022B. The CPU samples the voltage of the +35 V line via the A/D convertor (see Section 2.3.3).

The CPU outputs a pulse via the CPU time output port P83. The length of this pulse corresponds to the voltage of the +35 V line. This pulse becomes the head drive signal. In this way, STK-6022B outputs head drive signals (signals HD 1 to HD24) that relate to voltage levels through the length of the pulses. These signals are output to the head for each of the sections of print data that were created by subdividing the data three times before sending.

By sampling the +35 V line voltage and determining 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 of the +35 V line is HIGH, the CPU shortens the output pulse. If the voltage of the +35 V line is LOW, the CPU lengthens the output pulse.

Figure 2-25 shows the timing of the output of the head drive signal.

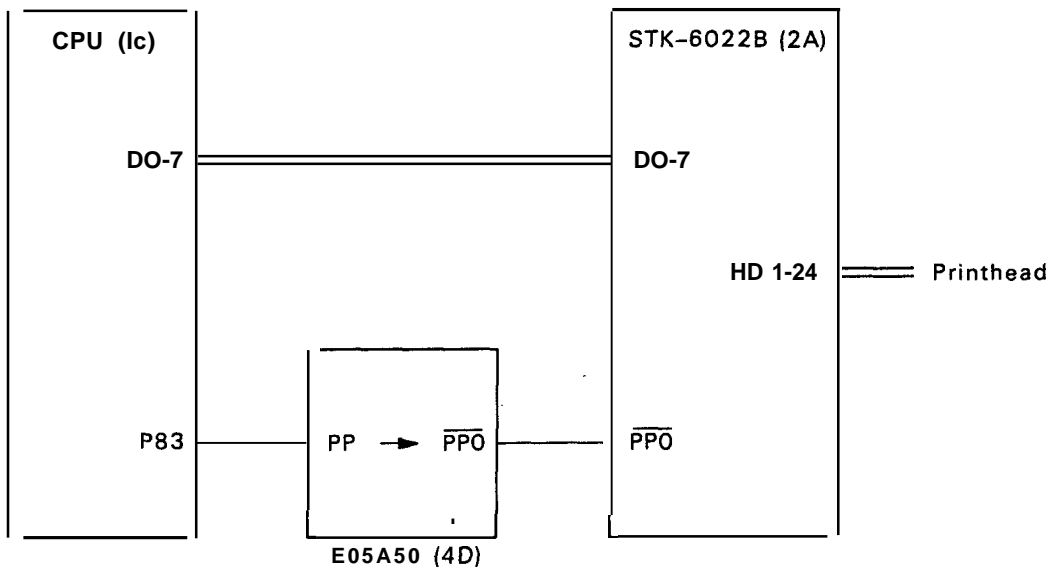


Figure 2-24. Printhead Drive Circuit



Figure 2-25. Head Drive Signal Output Timing

### 2.3.6 Printhead Drive Circuit

Figure 2-24 shows the printhead drive circuit in block diagram form. The print data already has been expanded to create the image data. The CPU splits up this data three times and transfers this information to the latch circuit within the STK-6022B. The CPU samples the voltage of the +35 V line via the A/D convertor (see Section 2.3.3).

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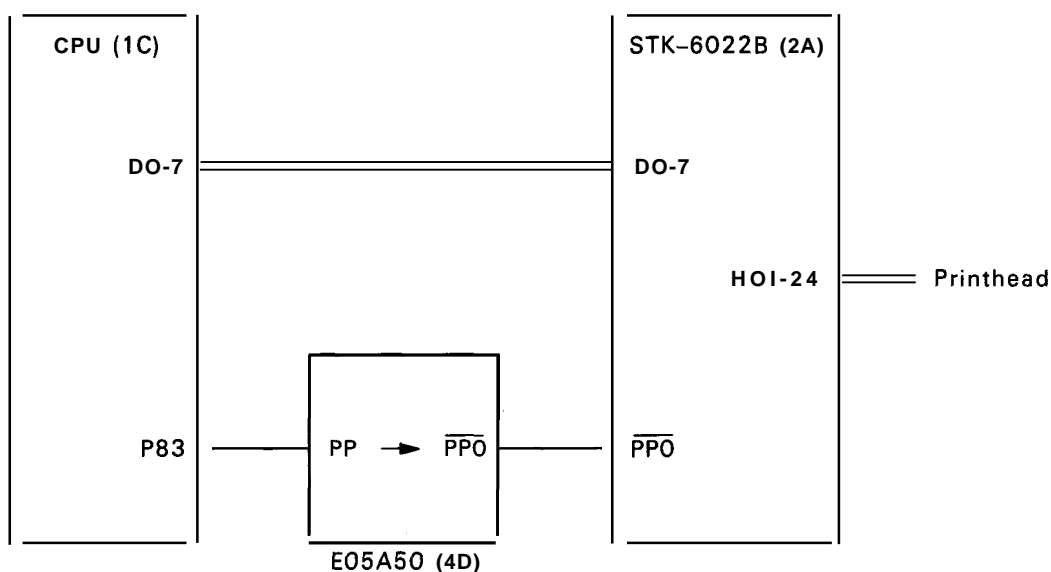


Figure 2-24. Printhead Drive Circuit



Figure 2-25. Head Drive Signal Output Timing

# CHAPTER 3

## DISASSEMBLY AND ASSEMBLY

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## 3.1 OVERVIEW

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

### 3.1.1 Precautions for Disassembling the Printer

Follow the precautions below when disassembling the printer.

#### WARNING

Before disassembling, assembling, or adjusting the printer, disconnect the power supply cable from the external AC power socket. Failure to do so risks personal injury. The power supply switch for the printer is wired into the secondary circuitry. As a result, the printer still remains live with current flowing even when this switch is off.

#### 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 various recommended tools that are needed when disassembling, assembling, or adjusting the printer. Use only tools that meet these specifications.

Table 3-1. List of Recommended Tools

Tool	Part No.
Round-nose pliers	B740400 100
Nippers	B740500100
Tweezers	6741000100
Soldering iron	B740200 100
E-ring holder # 2.5	B740800400
E-ring holder # 5	B740800700
E-ring holder # 6	B740800800
Phillips screwdriver No. 2	6743800200
Normal screwdriver	6743000100
Box driver (7 mm across)	B74 1700200
Thickness gauge (0.44 mm)	—
Thickness gauge (0.47 mm)	—

#### NOTE

All tools are commercially available.

Table 3-2. Equipment Required for Maintenance

Description	Specification
Multimeter	20 MHz
Oscilloscope	

3.1.3 Service Checks After Repair

When printer components are to be sent back to the customer after servicing, first use the checklist shown in Table 3-3 to note the current state of the components. This checklist provides a record to make servicing and shipping more efficient.

Table 3-3. Inspection Checklist for Repaired Printer

Category	Component	Item to Check	Is Check Required?
Printer features	Printhead	Are any wires broken?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
		Are any wires worn out?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
	Carriage mechanism	Does the carriage move smoothly? <input type="checkbox"/> Movement noisy, <input type="checkbox"/> Mechanism dirty, <input type="checkbox"/> Mechanism oily	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
		Is the carriage motor running at the correct temperature and not overheating?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
		<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary	
	Paper advance mechanism	Is the paper advancing smoothly? <input type="checkbox"/> Movement noisy, <input type="checkbox"/> Mechanism dirty, <input type="checkbox"/> Mechanism oily	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
		Is the paper advance motor running at the correct temperature and not overheating?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
	Paper path	Is the type of paper in the printer feeding smoothly?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
		Is the tractor feeding the paper correctly?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
		Is the paper path clear of all obstructions?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
		Is the platen free of damage?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
	Ribbon mask	Is the ribbon mask free of distortion?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
Self-print test	Was the self-print test successful?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary	
On-line test	Was the on-line test successful?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary	
Adjustment	Printhead	Is the platen gap adjusted correctly?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
	Printing	Is the bidirectional print position adjusted correctly?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
	DIP switch settings	Have DIP switches been reset to their factory shipment settings?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
System upgrade	ROM version	The ROM version is XXX.	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary
Shipment		Has the ribbon been removed?	<input checked="" type="checkbox"/> Checked, <input type="checkbox"/> Not necessary
		Have all relevant parts been included in the shipment?	<input type="checkbox"/> Checked, <input checked="" type="checkbox"/> Not necessary


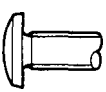





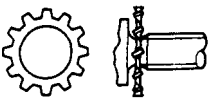
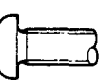

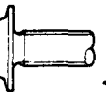



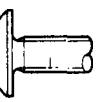

3.1.4 Specifications for Screws

In the following sections, abbreviations are used for small parts, such as screws and washers. Tables 3-4 and 3-5 list these abbreviations.

Table 3-4. Abbreviations Used for Screws

Abbreviation	Part Name
CBS(C)	Cross-recessed Bind head Cone point S tight screw
CBB(C)	Cross-recessed Bind head Cone point B tight screw
CB	Cross-recessed Bind head screw
CBS(0)	Cross-recessed Bind head S tight with screw with Outside toothed lock washer

Table 3-5. Types of Screws and Abbreviations

Heed		Body	Washer (assembled)
Top	Side		
. <u>C</u> ross-recessed hea	. <u>B</u> ind	. <u>N</u> ormal	1. <u>P</u> lain washer
			
. <u>S</u> lotted head	(with <u>N</u> otch)	. <u>S</u> -tight	2. <u>O</u> utside toothed lock washer
			
	. <u>P</u> an	3. <u>B</u> -tight	
			
	. <u>C</u> up	. <u>T</u> apping	3. <u>S</u> pring washer
			
	. <u>T</u> russ		
			

### 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 into the printer is simply the reverse of the procedure for removing the component, no description of how to install the component is given.

Any points of special concern when assembling or adjusting a component part are given after the description of the procedure. It is important to take note of these points.

**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 five procedures:

1. Removing the printhead
2. Removing the case
3. Removing the electrical circuits
4. Removing the printer mechanism
5. Disassembling the printer mechanism

Diagrams in the appendix show how the components fit together. Refer to them as necessary.

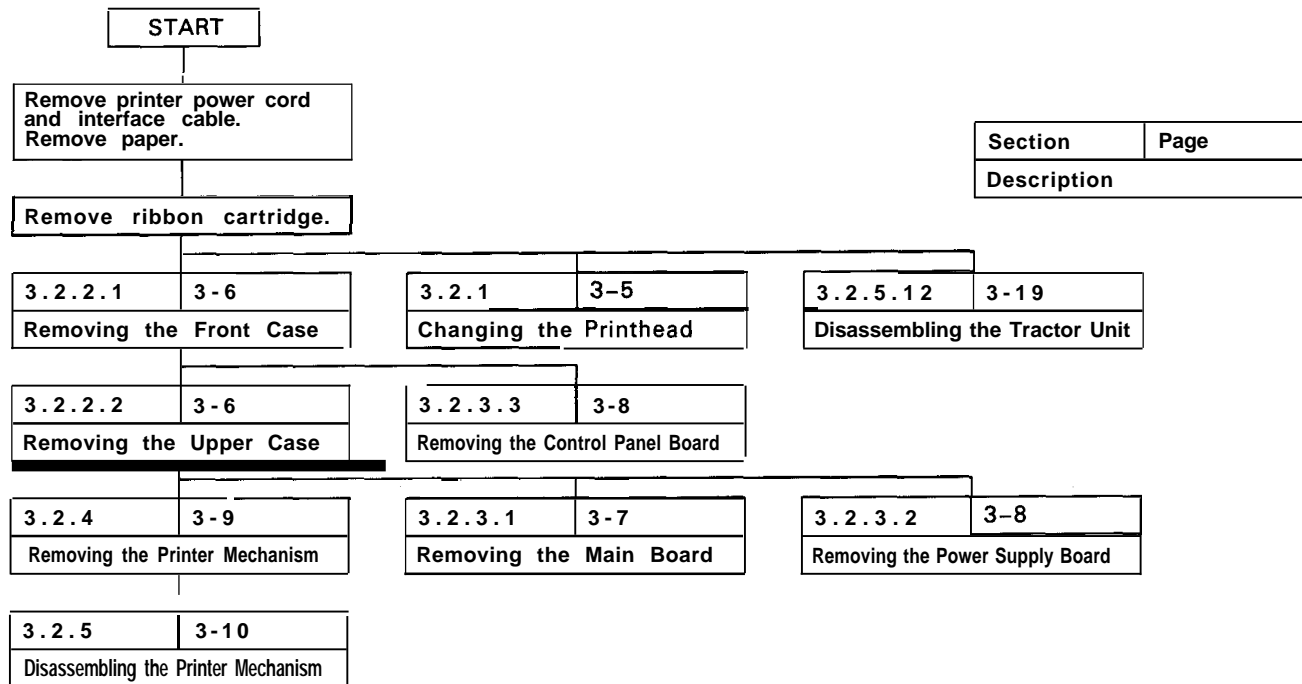
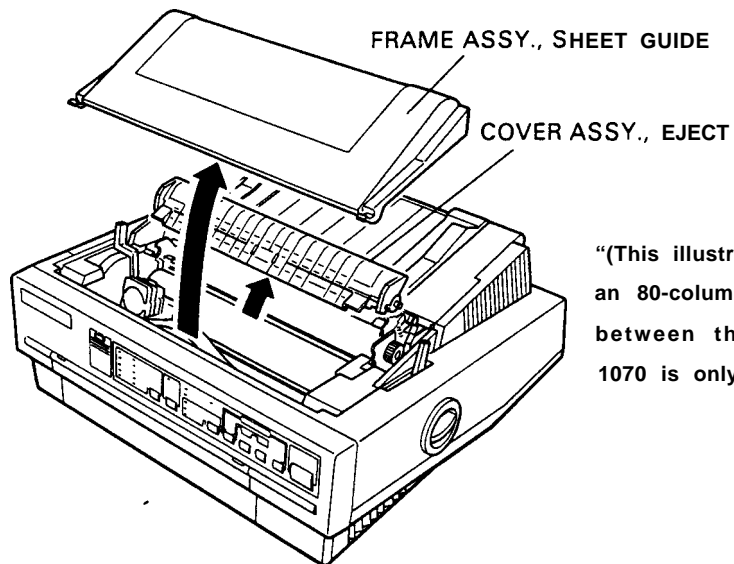


Figure 3-1. Flowchart for Disassembling the Printer



### 3.2.1 Changing the Printhead

1. Remove the FRAME ASSY., SHEET GUIDE.
2. Remove the COVER ASSY., EJECT.



“(This illustration shows the LQ-570, an 80-column printer. The difference between the LQ-570 and the LQ-1070 is only in carriage width.)”

Figure 3-2. Removing the FRAME ASSY., SHEET GUIDE and the COVER ASSY., EJECT

3. Release the two levers that hold the printhead to the carriage. Lift out the printhead.
4. Remove the two FFCS (CABLE, HEAD, FRONT(,REAR)) from the printhead.

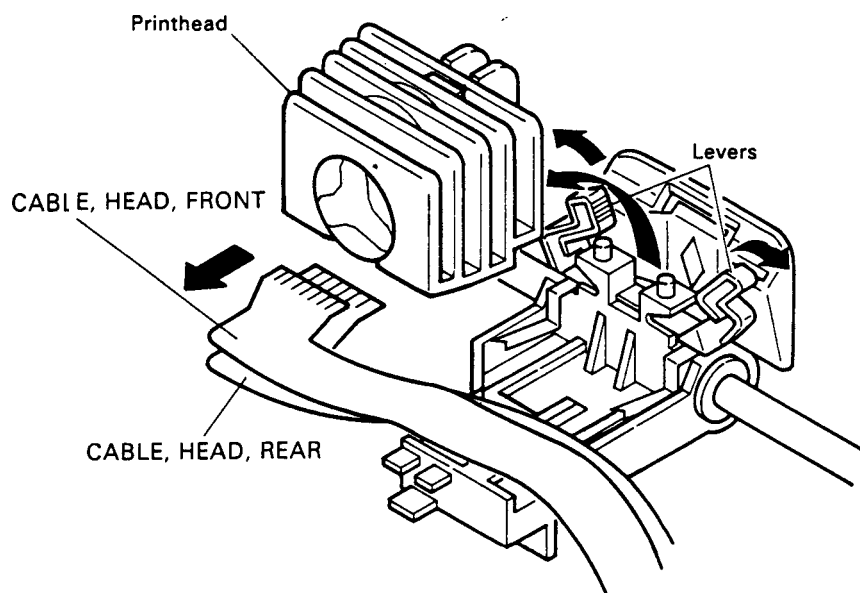


Figure 3-3. Removing the Printhead

### 3.2.2 Removing the Printer Case

This section describes how to remove the front case and HOUSING ASSY., UPPER.

#### 3.2.2.1 Removing the HOUSING, FRONT

1. Remove the COVER ASSY., PRINTER, FRONT.
2. Remove the HOUSING, FRONT.
3. Use a screwdriver to release the clips that hold the front case to the HOUSING ASSY., UPPER. Open the HOUSING, FRONT. Remove connector CN1 on the BOARD ASSY., PANEL (C062 PNL). Remove the HOUSING, FRONT.

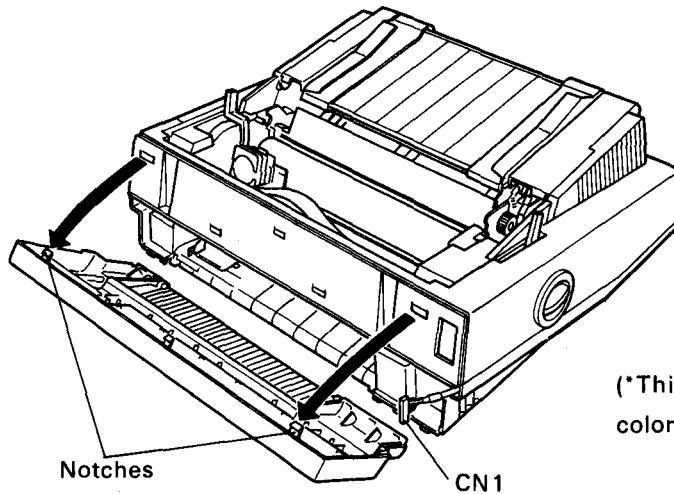


Figure 3-4. Removing the HOUSING, FRONT

#### 3.2.2.2 Removing the HOUSING ASSY., UPPER

1. Remove the COVER ASSY., PRINTER, FRONT, the COVER ASSY., EJECT, the TRACTOR ASSY, and the KNOB.
2. Remove the two CBS(C) (M3 X 10) screws that hold the optional interface card cover. Remove the cover.

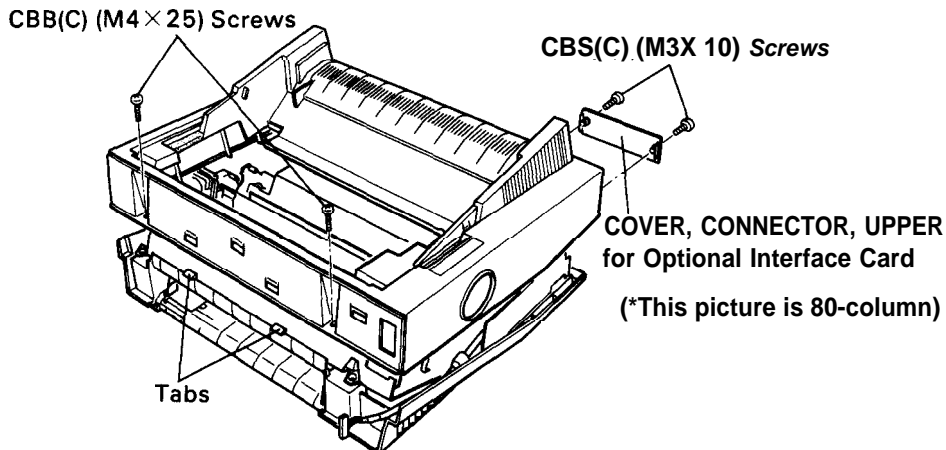


Figure 3-5. Removing the COVER, CONNECTOR, UPPER for the Optional Interface Card

3. Remove the HOUSING, FRONT (see Section 3.2.2. 1).
4. Remove the two CBB(C)(M4 X 25) screws that hold the HOUSING ASSY., UPPER to the HOUSING ASSY., LOWER.
5. Depress the two clips that hold the HOUSING ASSY., UPPER to the FRAME ASSY., SHEET GUIDE. Remove the HOUSING ASSY., UPPER.

### 3.2.3 Removing the Circuit Boards

This section describes how to remove the BOARD ASSY., MAIN (C062 MAIN board), the BOARD ASSY., POWER SUPPLY (C062PSB/PSE board) and the BOARD ASSY., PANEL (C062 PNL board).

#### 3.2.3.1 Removing the BOARD ASSY., MAIN (C062 MAIN Board)

1. Remove the HOUSING ASSY.,UPPER (see Section 3.2.2.2).
2. Remove the CB(M3 X 6) screws that hold the HOLDING PLATE, FFC to the SHIELD PLATE, MAIN BOARD . Remove the HOLDING PLATE, FFC.
3. Disconnect the FFC (CABLE, HEAD, FRONT (, REAR)) removing the cables for the CN6 and CN7 connectors on the main board.
4. Remove the three CBB (C) (M3 X 10) screws that hold the SHIELD PLATE, MAIN BOARD to the BOARD ASSY., MAIN. Remove the SHIELD PLATE, MAIN BOARD.

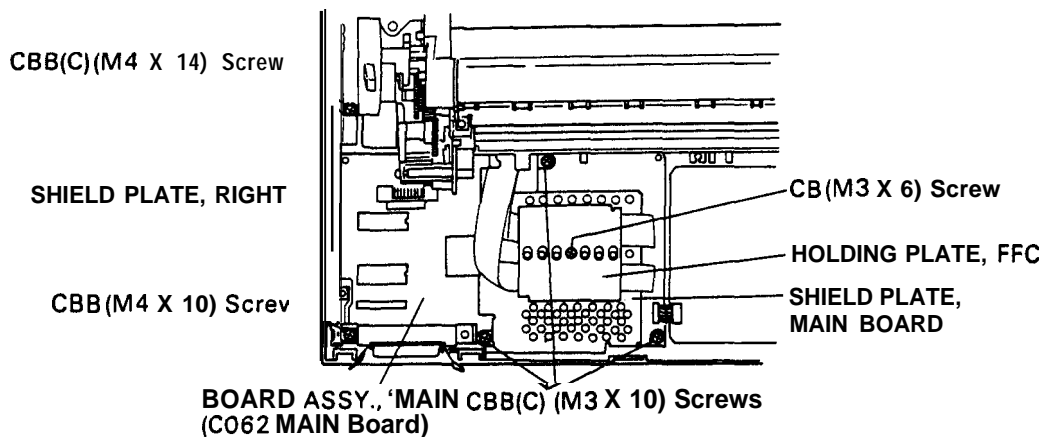


Figure 3-6. Removing the SHIELD PLATE, MAIN BOARD

5. Remove the CBB (M4X 10) screw that holds the SHIELD PLATE, RIGHT to the BOARD ASSY., MAIN. Remove the CBB(C)(M4 X 14) screw that holds it to the HOUSING ASSY., LOWER. Remove the SHIELD PLATE, RIGHT.
6. Remove the cables for the following BOARD ASSY., MAIN connectors: CN3 (brown 12-pin), CN4 (white 5-pin), CN5 (white 6-pin), CN8 (yellow 2-pin), CN9 (black 2-pin), CN 10 (blue 2-pin), CN 11 (white 2-pin), and CN 12 (red 2-pin).
7. Remove the three CBB(C)(M3 X 10) screws and CB (M3 X 8) screws that hold the BOARD ASSY., MAIN to the HOUSING ASSY., LOWER. Remove the BOARD ASSY., MAIN.

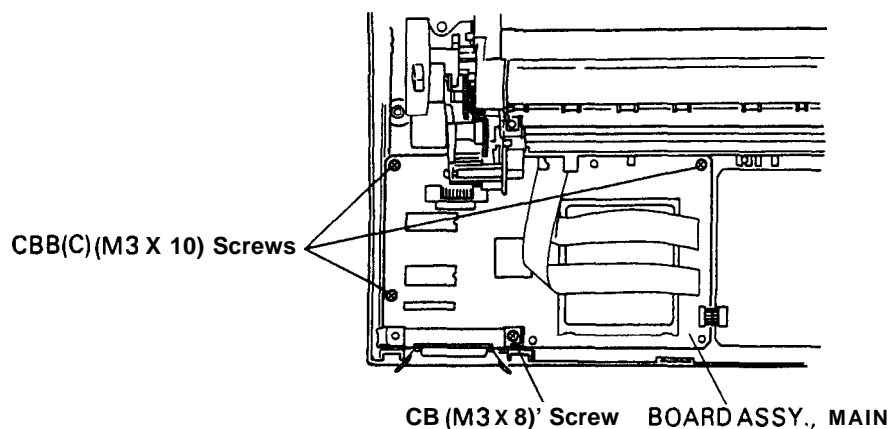


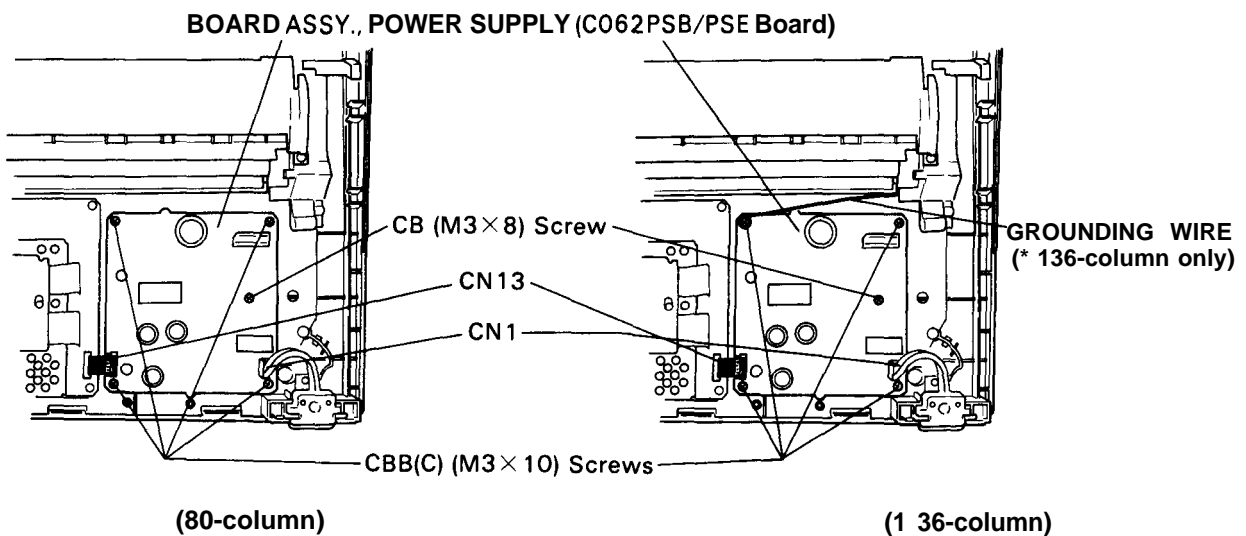
Figure 3-7. Removing the BOARD ASSY., MAIN

Point to Note for Assembly and Adjustment

After replacing the BOARD ASSY., MAIN, you must adjust the bidirectional print position again to ensure bidirectional printing is correctly aligned (see Section 4.2).

**3.2.3.2 Removing the BOARD ASSY., POWER SUPPLY (C062PSB/PSE Board)**

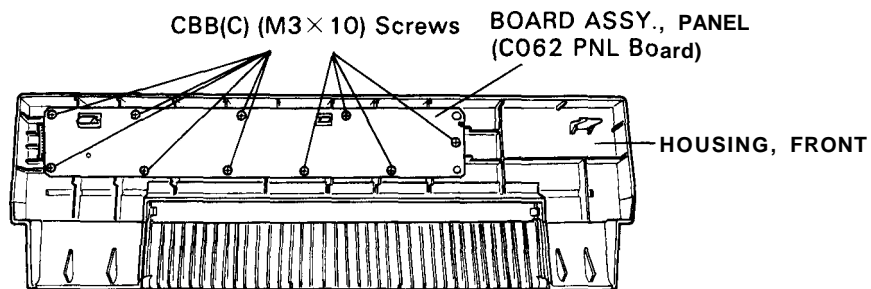
1. Remove the HOUSING ASSY., UPPER (see Section 3.2.2.2).
2. Remove the cable for connector CN 13 from the BOARD ASSY., MAIN,
3. Remove the cable for connector CN 1 from the BOARD ASSY., POWER SUPPLY.
4. Remove the four CBB(C) (M3×10) screws and the CB (M3×8) screws that hold the BOARD ASSY., POWER SUPPLY to the HOUSING ASSY., LOWER. Remove the BOARD ASSY., POWER SUPPLY.



(80-column) (1 36-column)  
**Figure 3-8. Removing the BOARD ASSY., POWER SUPPLY**

**3.2.3.3 Removing the BOARD ASSY., PANEL (C062 PNL Board)**

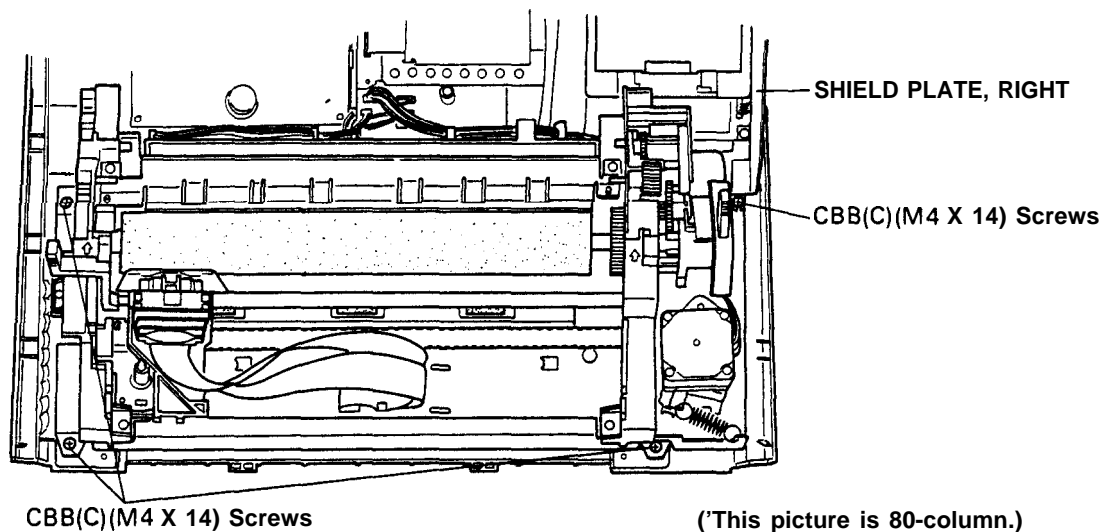
1. Remove the HOUSING, FRONT (see Section 3.2.2.1).
2. Remove the 10 CBB(C) (M3×10) screws that hold the BOARD ASSY., PANEL to the HOUSING, FRONT. Remove the BOARD ASSY., PANEL.



**Figure 3-9. Removing the BOARD ASSY., PANEL**

### 3.2.4 Removing the PRINTER MECHANISM

1. Remove the HOUSING ASSY., UPPER (see Section 3.2.2.2).
2. Remove the CB (M3X 6) screws that attach the HOLDING PLATE., FFC to the SHIELD PLATE, MAIN BOARD. Remove the HOLDING PLATE,FFC.
3. Disconnect the 2 FFCs(CABLE, HEAD, FRONT,(REAR))from the CN6 and CN7 connectors on the BORAD ASSY., MAIN. Remove the cables for the following BOARD ASSY., MAIN connectors: CN3 (brown 12-pin), CN4 (white 5-pin), CN5 (white 6-pin), CN8 (yellow 2-pin), CN9 (black 2-pin), CN10 (blue 2-pin), CN 11 (white 2-pin) and CN12 (red 2-pin).
4. Remove the CBB(C)(M4 X 10) screw that holds the SHIELD PLATE., RIGHT to the BOARD ASSY., MAIN (see Figure 3-6). Remove the CBB(C)(M4 X 14) screws that hold it to the HOUSING ASSY., LOWER. Remove the SHIELD PLATE., RIGHT.
5. Remove the three CBB(C)(M4 X 14) screws that hold the PRINTER MECHANISM to the HOUSING ASSY., LOWER. Remove the PRINTER MECHANISM.



(This picture is 80-column.)

Figure 3-10. Removing the PRINTER MECHANISM

#### Point to Note for. Assembly and Adjustment

After replacing the PRINTER MECHANISM, you must adjust the bidirectional print position to ensure bidirectional printing is correctly aligned (see Section 4.2).

### 3.2.5 Disassembling the PRINTER MECHANISM

This section describes how to disassemble the main components of the PRINTER MECHANISM.

#### 3.2.5.1 Removing the MOTOR, CR

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the printer spring (778 gm) from the base frame and the MOTOR, CR frame.
3. Remove the TIMING BELT from the BELT PULLEY.
4. Remove the MOTOR, CR frame from the HOUSING ASSY., LOWER.
5. Remove the two CBS(0) (M3×6) screws that hold the MOTOR, CR to the FRAME ASSY., CR, MOTOR.  
Remove the MOTOR, CR .

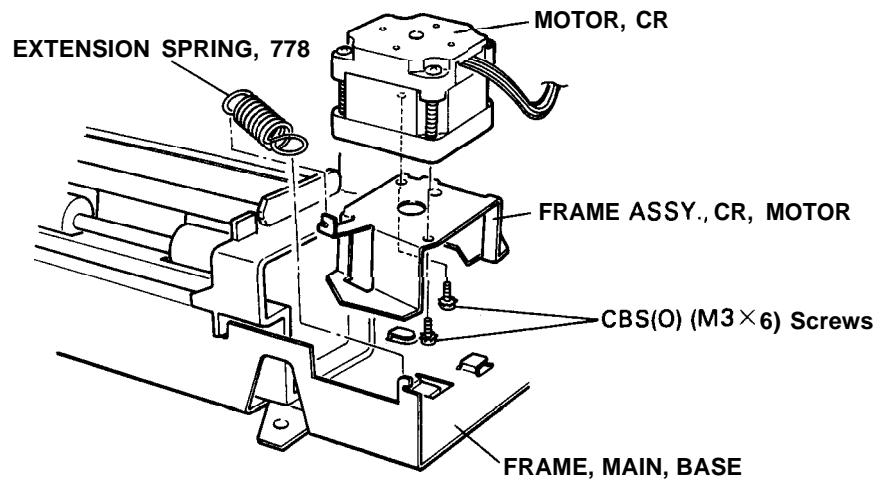


Figure 3-11. Removing the MOTOR, CR

#### Points to Note for Assembly and Adjustment

See Section 3.2.5.13 for details on arranging and positioning the motor cable.

After removing the MOTOR, CR from the FRAME ASSY., CR, MOTOR, you must adjust the MOTOR, CR backlash (see Section 4.1. 1). You also must adjust the bidirectional print position to ensure bidirectional printing is correctly aligned (see Section 4.2).

### 3.2.5.2 Removing the MOTOR, PF

1. Remove the **PRINTER MECHANISM** from the **HOUSING ASSY., LOWER**(see Section 3.2.4).
2. Remove the **COMPRESSION SPRING, 200** that holds the platen shaft.
3. Release the two clips holding the **MOTOR, PF** to the **FRAME, MAIN, RIGHT**.
4. Remove the **MOTOR, PF** from the **FRAME, MAIN, RIGHT**.

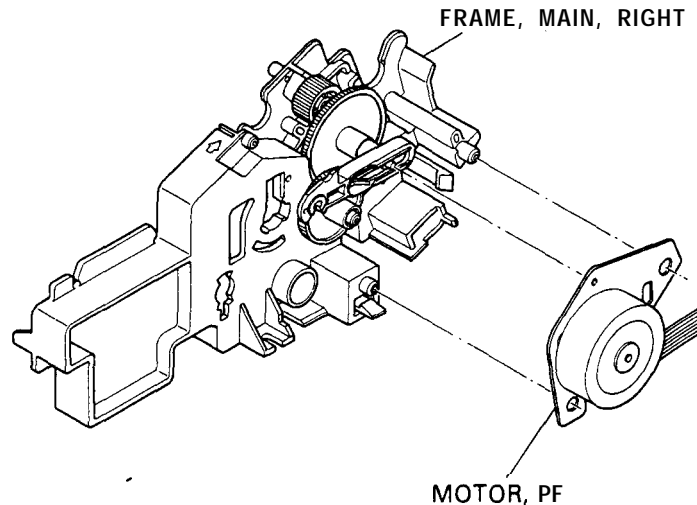


Figure 3-12. Removing the **MOTOR, PF**

#### Point to Note for Assembly

See Section 3.2.5.13 for details on arranging and positioning the motor cable.

### 3.2.5.3 Removing the FFC (CABLE, HEAD, FRONT(,REAR))

1. Remove the printhead (see Section 3.2. 1).
2. Remove the **PRINTER MECHANISM** from the **HOUSING ASSY., LOWER** (see Section 3.2.4).
3. Remove the **FFC** from the clips that hold it along the rear side of the **PRINTER MECHANISM**. Make sure that the **FFC** is free.
4. Remove the **FFC** from clip on the **HOLDING PLATE, FFC** at the rear of the **PRINTER MECHANISM**.
5. Remove the four clips that hold the **HOLDING PLATE, FFC** to the base frame. Remove the **FFC** together with the **HOLDING PLATE, FFC**.

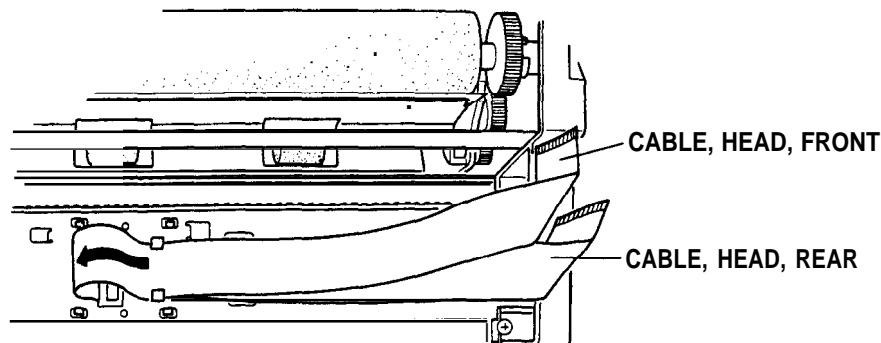


Figure 3-13. Removing the **FFC Cable**

#### Point to Note for Assembly

See Section 3.2.5.13 for details on arranging and positioning the **FFC**.

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#### 3.2.5.4 Removing the Carriage

1. Remove the FFC (CABLE, HEAD, FRONT,(REAR)) (see Section 3.2.5.3).
2. Remove the TIMING BELT from the carriage.
3. Use the box driver to rotate and free the adjusting bushing. This bushing holds the SHAFT, CR, GUIDE to the FRAME, MAIN, RIGHT. Remove the bushing.
4. Remove the carriage unit together with the SHAFT, CR, GUIDE by pulling the SHAFT, CR, GUIDE a little to the right.

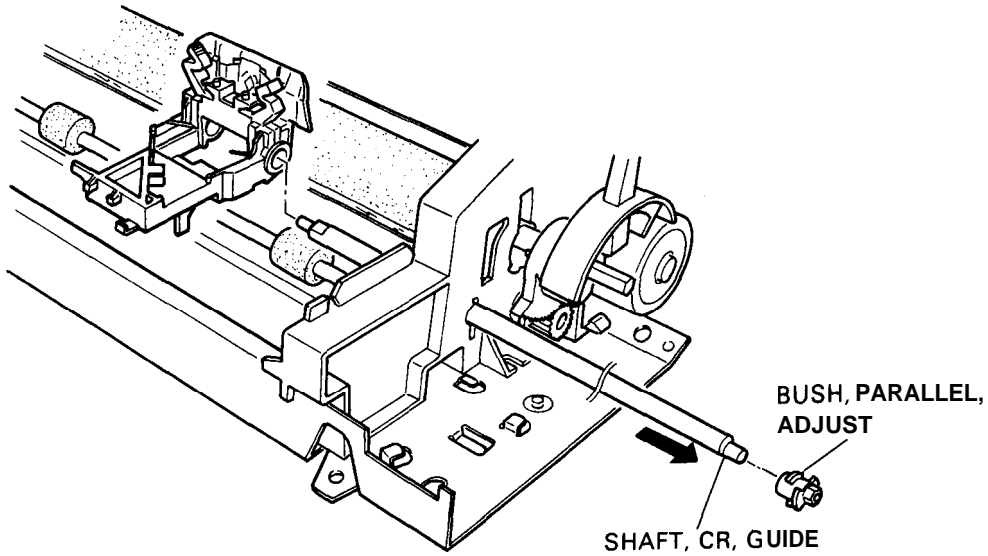


Figure 3-14. Removing the Carriage Unit

#### Point to Note for Assembly and Adjustment

After removing or rotating the adjusting bushing, you must adjust the platen gap (see Section 4.1 .2).



### 3.2.5.5 Removing the PLATEN

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the two CBP(C)(M3 X 10) screws that hold the COVER, PLATEN, LOWER to the left and FRAME, MAIN, RIGHT. Remove the COVER, PLATEN, LOWER.
3. Remove the COMPRESSION SPRING, 200 that holds the platen shaft (see Section 3.2.5.2, step 2).
4. Set the head LEVER, G, ADJUST to the most forward position.
5. Remove the two clips that hold the LEVER, RELEASE to the platen shaft. Remove the LEVER, RELEASE from the platen shaft.
6. Rotate the bushing by using the tweezers that holds the platen to the FRAME, MAIN, LEFT. Remove this BUSHING, 8 with the GROUND SPRING.
7. Rotate the BUSHING, 8 by using the tweezers that holds the platen to the FRAME, MAIN, RIGHT. Remove the PLATEN by lifting it up toward the right.

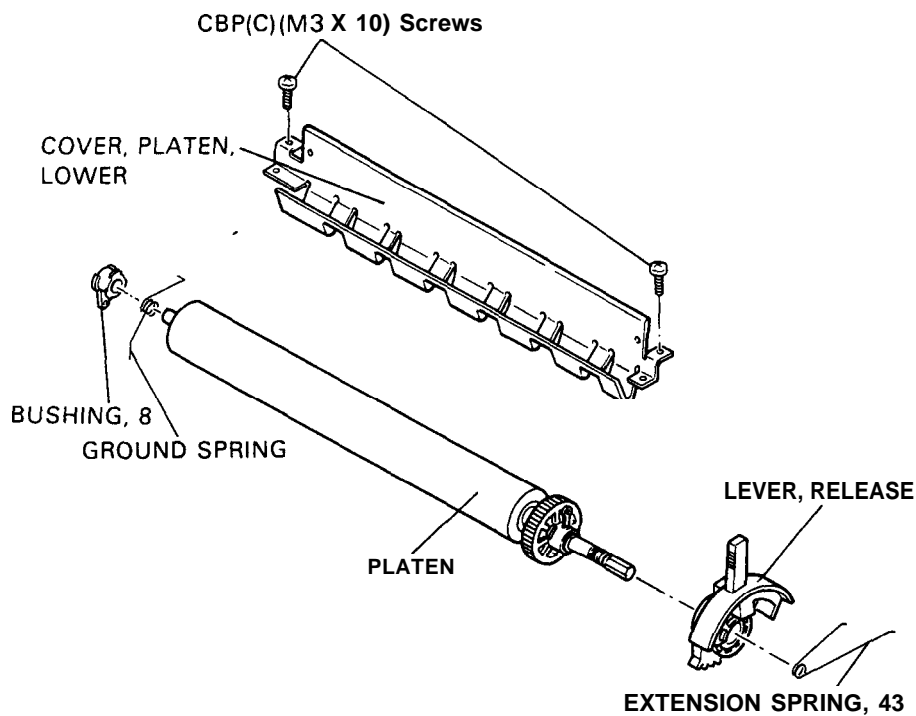


Figure 3-15. Removing the PLATEN

#### Point to Note for Assembly

When inserting the LEVER, RELEASE onto the platen shaft, mesh the LEVER, RELEASE with the mechanism correctly by positioning it at the mark on the auxiliary release shaft.

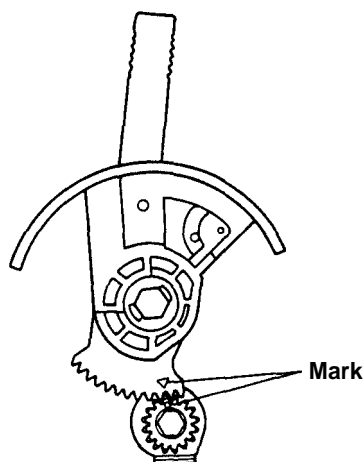


Figure 3-16. LEVER, RELEASE Insertion Positioning

**3.2.5.6 Removing and Disassembling the FRAME, MAIN, RIGHT**

1. Remove the **PRINTER MECHANISM** from the **HOUSING ASSY., LOWER** (see Section 3.2.4).
2. Remove the **PLATEN** from the **PRINTER MECHANISM** (see Section 3.2.5.5).
3. Remove the **MOTOR, CR** from the **FRAME, MAIN, BASE** (see Section 3.2.5. 1).
4. Remove the two **CBS(C)(P) (M3 X 10)** screws that hold the **FRAME, MAIN, RIGHT** to the **FRAME, MAIN, BASE**. Remove the **FRAME, MAIN, RIGHT** from the **FRAME, MAIN, BASE**.
5. Remove the following items from the **FRAME, MAIN, RIGHT** in the specified order: **MOTOR, PF** (see Section 3.2.5.2), **CAM, CLUTCH, TRACTOR**, **COMBINATION GEAR, 8.5, 30**, **SPUR GEAR, 16**, **PLAIN WASHER**, **COMPRESSION SPRING, 200**, and **SPUR GEAR, 40**.

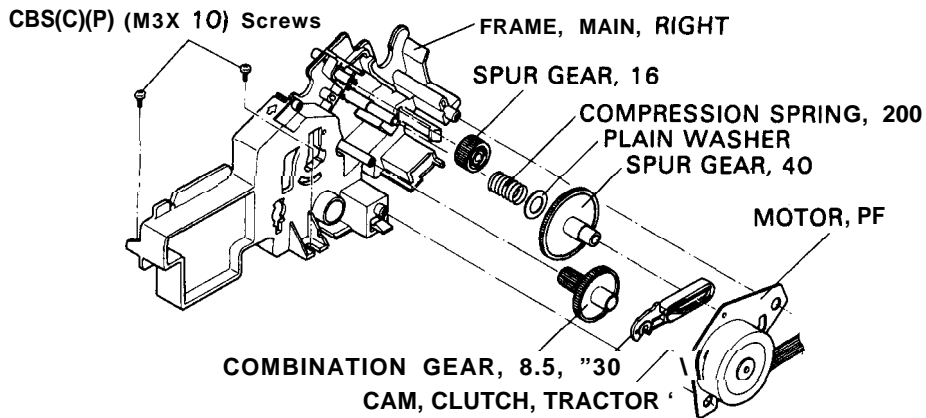


Figure 3-17. Disassembling the FRAME, MAIN, RIGHT

**Point to Note for Assembly**

When installing the **PLAIN WASHER**, insert it from the front in the direction indicated by the mark.

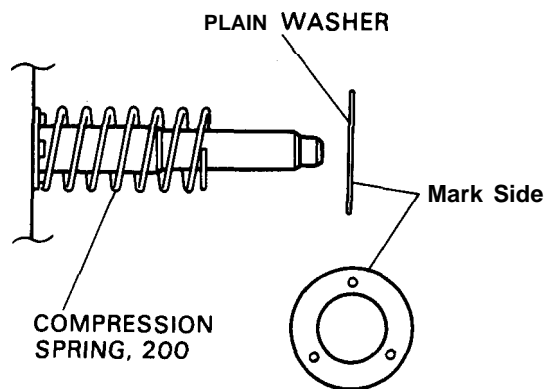
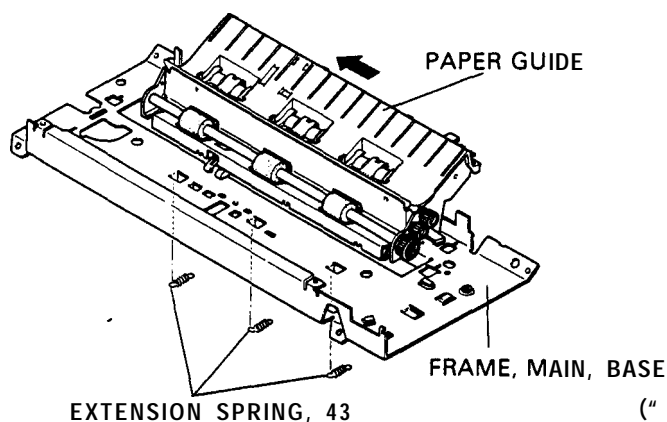


Figure 3-18. Direction for Inserting the PLAIN WASHER

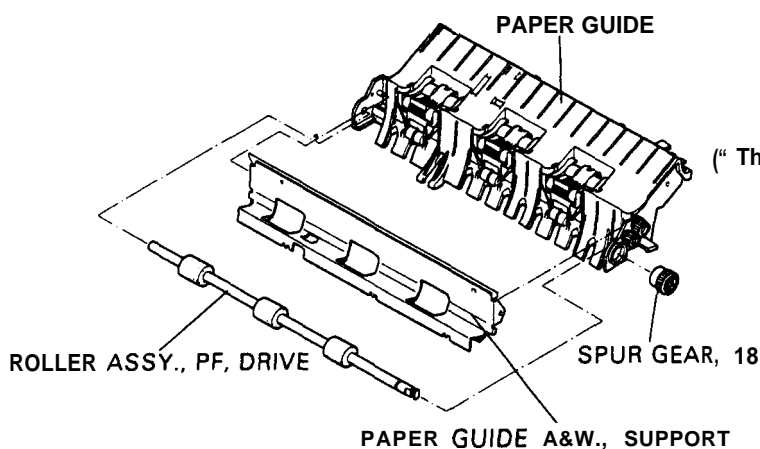
- 3.2.5.7 Removing and Disassembling the PAPER GUIDE (Including the DETECTOR ASSY., HP)
1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
  2. Remove the PLATEN from the PRINTER MECHANISM (see Section 3.2.5.5).
  3. Remove the FRAME, MAIN, RIGHT from the FRAME, MAIN, BASE (see Section 3.2.5.6).
  4. Remove the three springs (32 gm) from the lower side of the PRINTER MECHANISM . (These springs join the PAPER GUIDE support to the FRAME, MAIN, BASE.)
  5. While holding open the clips that secure the PAPER GUIDE to the FRAME, MAIN, BASE, slide the PAPER GUIDE to the left. Remove the PAPER GUIDE.



(" This picture is 80-column)

Figure 3-19. Removing the PAPER GUIDE

6. Open the clips that hold the SPUR GEAR, 18 to the ROLLER ASSY.,PF, DRIVE. Remove the SPUR GEAR, 18 from the ROLLER ASSY.,PF, DRIVE.
7. Remove the ROLLER ASSY.,PF, DRIVE from the PAPER GUIDE.
8. Slide the PAPER GUIDE support to the right. Remove the PAPER GUIDE support from the PAPER GUIDE.



(" This picture is 80-column)

Figure 3-20. Removing the PAPER GUIDE ASSY., SUPPORT

- 9. While holding down the three LEVER ASSY., PF, pull out and remove the SHAFT, RELEASE Remove the LEVER ASSY., PF and the COMPRESSION SPRING, 1300 from the PAPER GUIDE.
- 10. While holding open the clips that secure the DETECTOR ASSY., RELEASE to the PAPER GUIDE, remove the DETECTOR ASSY., RELEASE.

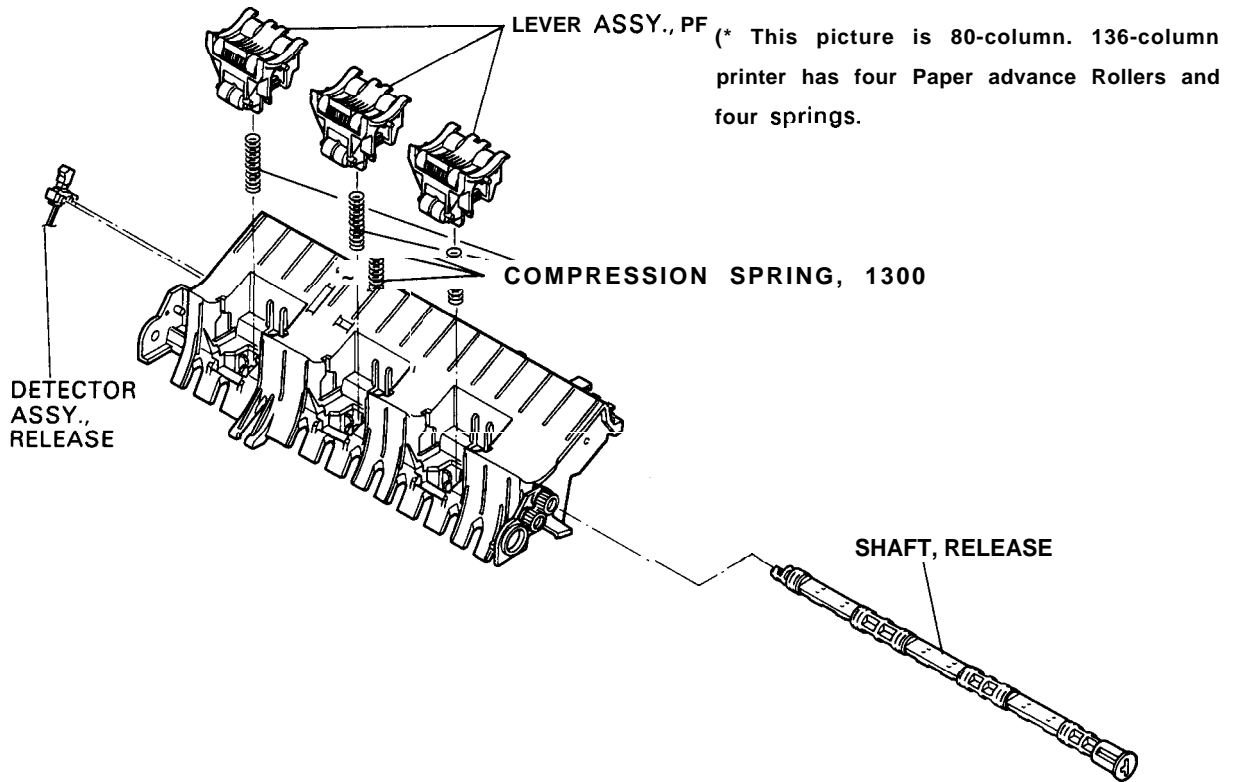


Figure 3-21. Removing the LEVER ASSY., PF

Point to Note for Assembly

Insert the SHAFT, RELEASE in the PAPER GUIDE in the way shown in the diagram below.

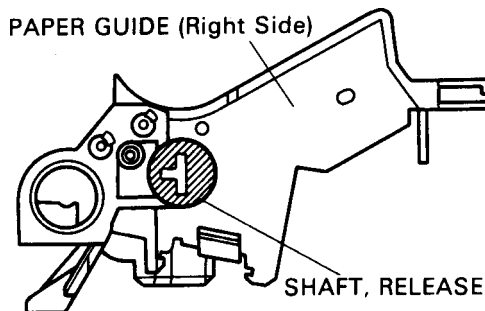


Figure 3-22. How to Insert the SHAFT, RELEASE

### 3.2.5.8 Removing the DETECTOR ASSY., HP

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the clips from the rear side of the FRAME, MAIN, BASE that hold the DETECTOR ASSY., HP. Remove the DETECTOR ASSY., HP from the rear of the FRAME, MAIN, BASE.

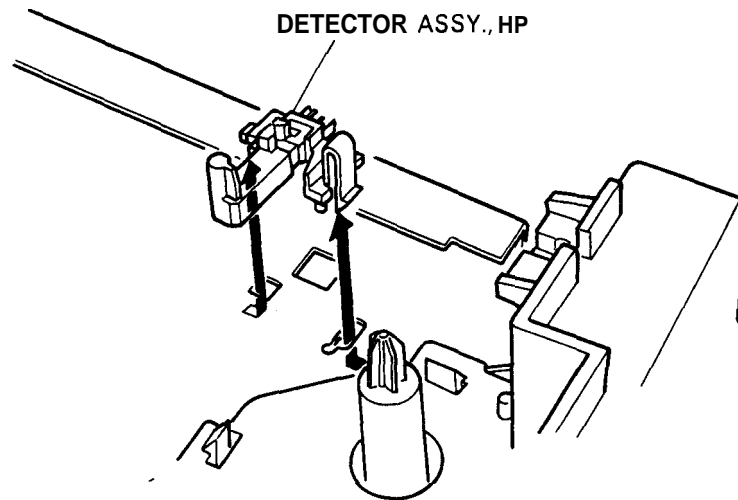


Figure 3-23. Removing the DETECTOR ASSY., HP

### 3.2.5.9 Removing the DETECTOR ASSY., PE, REAR

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the two CBP(C) (M3 X 10) screws that hold the COVER, PLATEN, LOWER to the frame. Remove the COVER, PLATEN, LOWER.
3. Remove the clips that hold the DETECTOR ASSY., PE, REAR in the PAPER GUIDE. Remove the DETECTOR ASSY., PE, REAR .

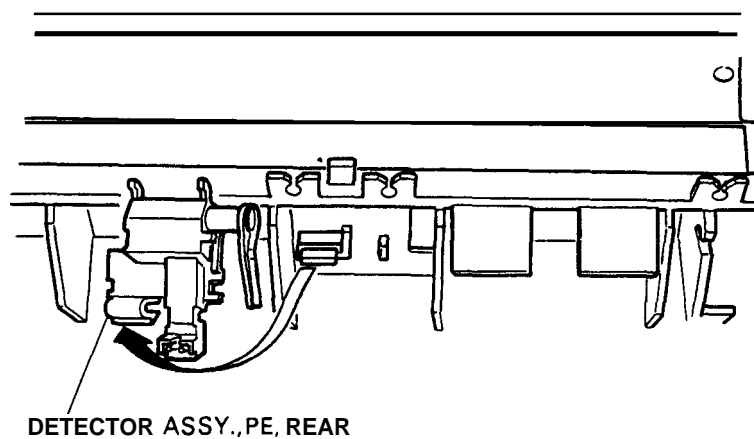


Figure 3-24. Removing the DETECTOR ASSY., PE, REAR

**3.2.5.10 Removing the DETECTOR ASSY.,PE, FRONT**

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Open the clips that hold the DETECTOR ASSY.,PE, FRONT to the FRAME, MAIN, BASE. Remove the DETECTOR ASSY.,PE, FRONT.

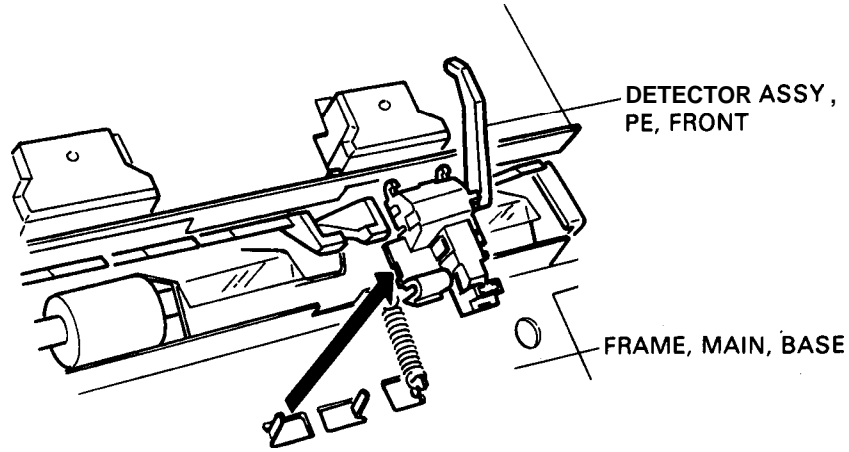


Figure 3-25. Removing the DETECTOR ASSY.,PE, FRONT

**3.2.5.11 Removing the DETECTOR ASSY., PLATEN**

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the clips that hold DETECTOR ASSY., PLATEN to the FRAME, MAIN, LEFT. Remove the DETECTOR ASSY., PLATEN.

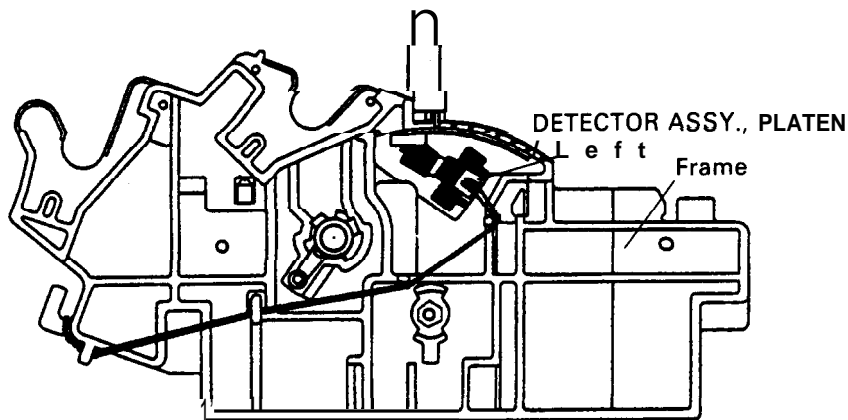


Figure 3-26. Removing the DETECTOR ASSY., PLATEN

### 3.2.5.12 Disassembling the TRACTOR ASSY.

1. Remove the TRACTOR ASSY. from the printer.
2. Remove the SPUR GEAR, 17 from the SHAFT, TRACTOR.
3. Remove the FRAME, TRACTOR, RIGHT from the SHAFT, TRACTOR and the SHAFT, TRACTOR, GUIDE.
4. Remove RETAINING RING from the SHAFT, TRACTOR.
5. Remove the TRACTOR ASSEMBLY (RIGHT), the PAPER SUPPORT unit, and the TRACTOR ASSEMBLY [LEFT] from the SHAFT, TRACTOR and SHAFT, TRACTOR, GUIDE.

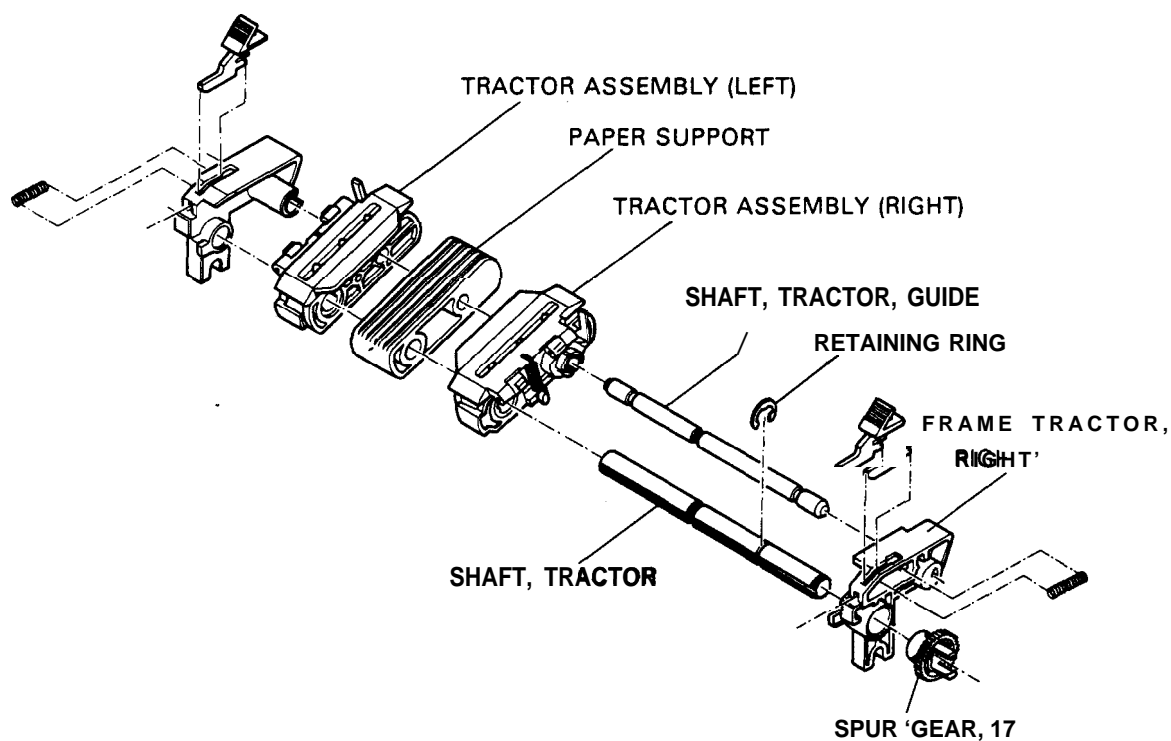
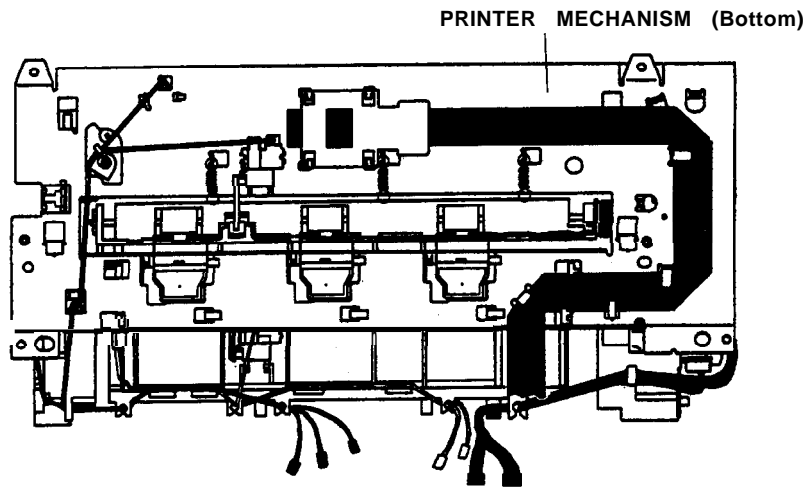


Figure 3-27. Disassembling the TRACTOR ASSY.

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### 3.2.5.13 Arranging the Cables

Figure 3-28 shows how the cables are arranged for the PRINTER MECHANISM. When assembling the printer, make sure that the cables are laid out as shown in this figure.



(\*This is an 80-column printer.)

Figure 3-28. Arranging the Cables



# CHAPTER 4

## ADJUSTMENTS

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## 4.1 ADJUSTING THE PRINTER MECHANISM

This section describes the various adjustments you may need to make to the PRINTER MECHANISM.

### 4.1.1 MOTOR, CR Backlash Adjustment

In the MOTOR, CR backlash adjustment, the pinion gear of the MOTOR, CR is meshed smoothly with the BELT PULLEY cog. If the pinion gear is poorly aligned, printer operation becomes noisy, and the accuracy of character alignment during printing suffers.

1. Remove the MOTOR, CR, along with the FRAME ASSY., CR, MOTOR, from the PRINTER MECHANISM (see Section 3.2.5.1).
2. Loosen the two CBS(0) (M3X 6) screws that hold the MOTOR, CR to the FRAME ASSY., CR, MOTOR.
3. Check the alignment of the MOTOR, CR pinion gear with the BELT PULLEY cog. Move the MOTOR, CR until you judge that there is a gap of about 0.05 -0.15 mm between the two. Tighten the two CBS(0) (M3 X 6) screws.

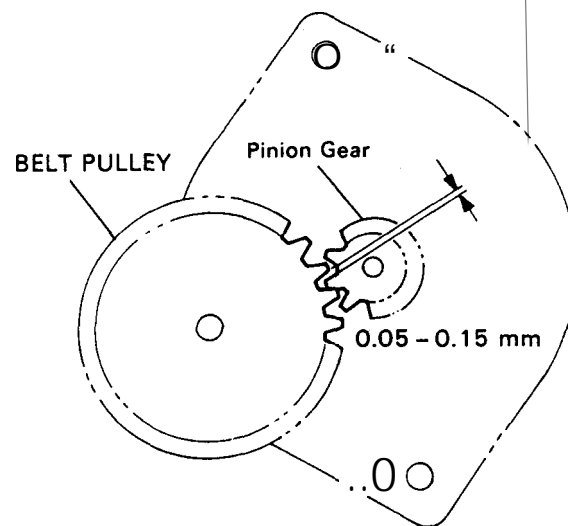


Figure 4-1. MOTOR, CR Backlash Adjustment

#### 4.1.2 Platen Gap Adjustment

If you have rotated or reassembled the SHAFT, CR, GUIDE or the adjusting bushing, or if printing is abnormal, you must adjust the gap between the PLATEN and the printhead.

1. Remove the PRINTER MECHANISM from the HOUSING ASSY., LOWER (see Section 3.2.4).
2. Remove the printhead from the carriage (see Section 3.2. 1).
3. Use tweezers to remove the RIBBON MASK from the carriage.

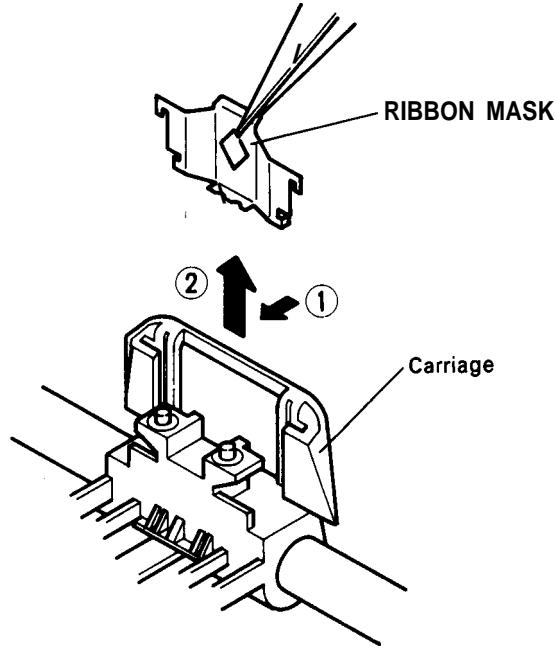


Figure 4-2. Removing the RIBBON MASK

4. Remount the printhead on the carriage.
5. Set the paper-thickness LEVER, G, ADJUST to position O (the second step position).
6. Move the LEVER, RELEASE back to the friction setting.
7. Move the carriage until the edge of the printhead is at the 5th column print position.
8. Use the box driver (7 mm) to rotate the adjusting bushing on the FRAME, MAIN, RIGHT of the PRINTER MECHANISM.

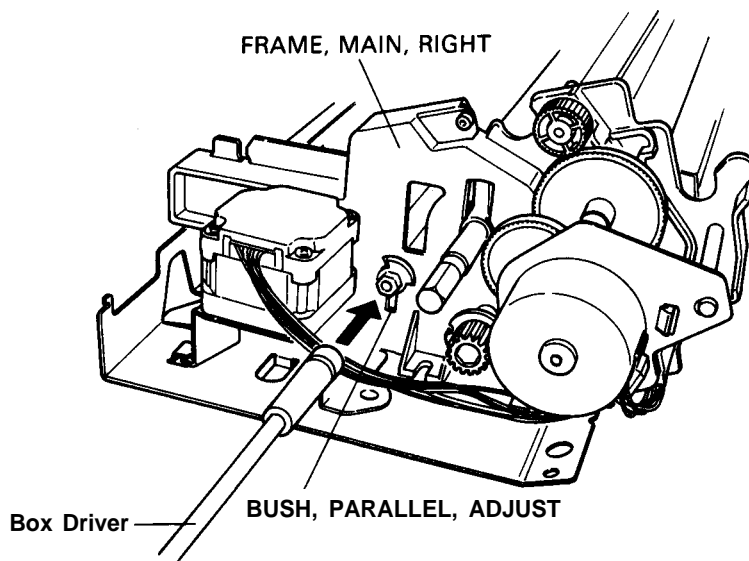


Figure 4-3. The Adjusting Bushing

9. Rotate the adjusting bushing until the platen gap is large enough for a thickness gauge of 0.44 mm thickness but too narrow for one of 0.47 mm thickness.

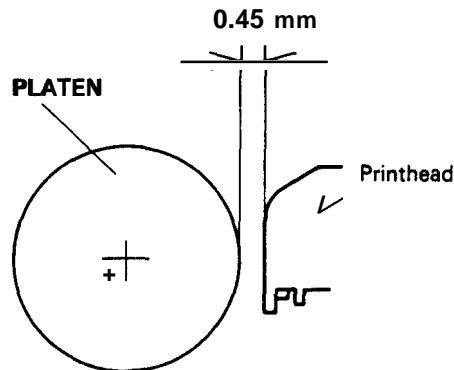


Figure 4-4. Platen Gap

10. Move the carriage until the edge of the printhead is at the 75th column print position.
11. Use the box driver (7 mm) to rotate the adjusting bushing on the FRAME, MAIN, RIGHT of the PRINTER MECHANISM.
12. Rotate the adjusting bushing until the platen gap is large enough for a thickness gauge of 0.44 mm thickness but too narrow for one of 0.47 mm thickness.
13. Move the printhead back again so that the edge of the printhead is at the 5th column print position. Check the platen gap again with the thickness gauge. It should still be large enough for a thickness gauge of 0.44 mm thickness but too narrow for one of 0.47 mm thickness. If this is not the case, go back to step 8.
14. Center the carriage. Check the platen gap again with the thickness gauge. It should still be large enough for a thickness gauge of 0.44 mm thickness but too narrow for one of 0.47 mm thickness. If this is not the case, go back to step 8.
15. Remove the printhead, install the RIBBON MASK and then replace the printhead.

## 4.2 BIDIRECTIONAL PRINT POSITION ADJUSTMENT

This section describes how to adjust the bidirectional print position to ensure correct printing alignment.

### 4.2.1 Overview of Bidirectional Print Position Adjustment

This printer prints characters when the carriage is moving in either direction (i.e., from left to right or from right to left).

Adjustment is necessary to ensure that the printing of characters in one direction is properly aligned with the printing of characters in the opposite direction. For example, if the print position is out of alignment, printing of a vertical line shows staggering because of the skew effect.

It is important to readjust the bidirectional print position if anything has been done to the gear arrangement that might affect this printing alignment. By making the timing lag a fraction during printing while the carriage moves from right to the left, it is possible to line up the printing done in this direction so that it will match the printing done in the left to right direction. This procedure to alter the timing is called bidirectional print position adjustment.

The degree of bidirectional printing skew differs, depending on the unique characteristics of each PRINTER MECHANISM. For this reason, there is no standard skew correction value that can be applied to each printer. The unique skew correction value for each printer has to be written to EEPROM on the BOARD ASSY., MAIN (C062 MAIN BOARD).

Whenever the PRINTER MECHANISM, or the BOARD ASSY., MAIN (C062 MAIN BOARD) itself, is changed during servicing, the bidirectional print position must be readjusted and a new bidirectional skew correction value must be written to EEPROM.

### 4.2.2 Bidirectional Print Position Adjustment Procedure

#### Initial operation

Before performing the bidirectional alignment adjustment, complete the initial operation below:

- \* Position the LEVER, G, ADJUST at position O. \* Verify that the DIP switch 1-6 is on).
- \* Verify that the DIP switch setting for country is U.S. (DIP switches 1-1, 1-2, 1-3 are on).
- \* Load paper.
- Feed at least 10 lines.
- Turn the printer off.

**NOTE:** The printer enters unidirectional printing mode automatically from the top of form to the line 10 position on the paper, because this improves paper-feed accuracy. Therefore, you must perform the bidirectional alignment adjustment after 10 lines or more have been fed.

#### Adjustment operation

The alignment procedure is as follows:

1. Turn the printer power on while pressing the ALT, LF/FF, and LOAD\ EJECT buttons.
2. The printer enters draft mode and prints the reference value and “|” characters for 4 lines.

Are the characters aligned vertically? NO → GO TO STEP 3.  
YES → GO TO STEP 4.

3. Referring the odd-numbered lines (1st and 3rd), adjust the even-numbered lines (2nd and 4th).

“ If the even-numbered lines are shifted to the right:

→ Press the LOAD/EJECT button once while pressing the ALT button. (The reference value increases + 1 and even lines shift to the left.)

•If the even-numbered lines are shifted to the left:

→ Press the LF/FF button once while pressing the ALT button. (The reference value decreases — 1 and even lines shift to the right.)

4. Press the ALT, LF/FF, and LOAD/EJECT buttons at the same time.

5. The printer enters LQ mode, and the printer prints the reference value and the “|” characters for 4 lines.

Are the characters aligned vertically? NO → GO TO STEP 6.  
YES → GO TO STEP 7.

6. Referring to the odd-numbered lines (1st and 3rd), adjust the even-numbered lines (2nd and 4th).

•If the even-numbered lines are shifted to the right:

→ Press the LOAD/EJECT button once while pressing the ALT button. (The reference value increases + 1 and even lines shift to the left.)

•If the even-numbered lines are shifted to the left:

→ Press the LF/FF button once while pressing the ALT button. (The reference value decreases — 1 and even lines shift to the right.)

7. Turn printer power off.

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## 4.3 CIRCUIT ADJUSTMENT

| The BOARD ASSY., MAIN (C062 MAIN BOARD) contains variable resistor VR1, which is used for balancing the circuitry. When any of the following parts are replaced, the circuitry must be balanced again by adjusting this variable resistance:

R14, RI 5, R13, C8, and VR 1

If the circuitry is not correctly balanced in this way, the CPU A/D converter fails to function normally and printer operation is affected.

### 4.3.1 Adjustment Process

| Attach a digital multimeter to the check terminal TP2 (Vref voltage) on the BOARD ASSY., MAIN (C062 MAIN BOARD). Turn on printer power and turn variable resistor VR1 until a reading of 4.741 V is obtained.

# CHAPTER 5

## TROUBLESHOOTING

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## 5.1 OVERVIEW

Problems in the printer may exhibit a variety of symptoms, which can complicate the task of troubleshooting, unless you follow the procedure shown in the flowchart below.

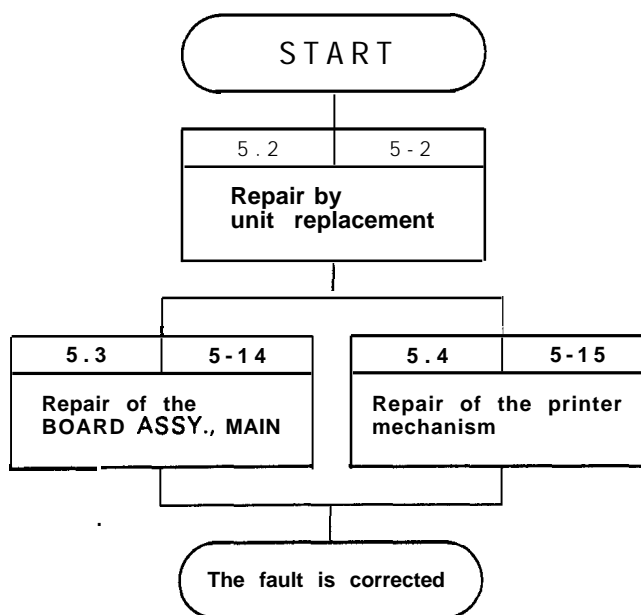


Figure 5-1. Troubleshooting Procedure

The following tables provide troubleshooting information.

Table 5-1. Motor and Printhead Coil Resistance

Part	Specifications
MOTOR, CR	Coil resistance 19.5 ohms $\pm$ 7% at 25 degrees C (77 degrees F)
MOTOR, PF	Coil resistance 79.0 $\pm$ 5 ohms at 25 degrees C (77 degrees F)
Printhead	Coil resistance 45.5 $\pm$ 3.2 ohms at 25 degrees C (77 degrees F)

Table 5-2. Error Codes

Error Display	Error	Cause
Buzzer beeps 3 times for 0.1 second, with 0.1-second intervals.	Paper-out error	<ul style="list-style-type: none"> <li>• Printer is out of paper.</li> <li>• DETECTOR ASSY., PE, FRONT (, REAR)</li> </ul>
Buzzer beeps 5 times for 0.5 second, with 0.5-second intervals.	Carriage error	<ul style="list-style-type: none"> <li>• MOTOR, CR malfunction.</li> <li>• Carriage mechanism malfunction.</li> <li>• MOTOR, CR driver current malfunction.</li> </ul>

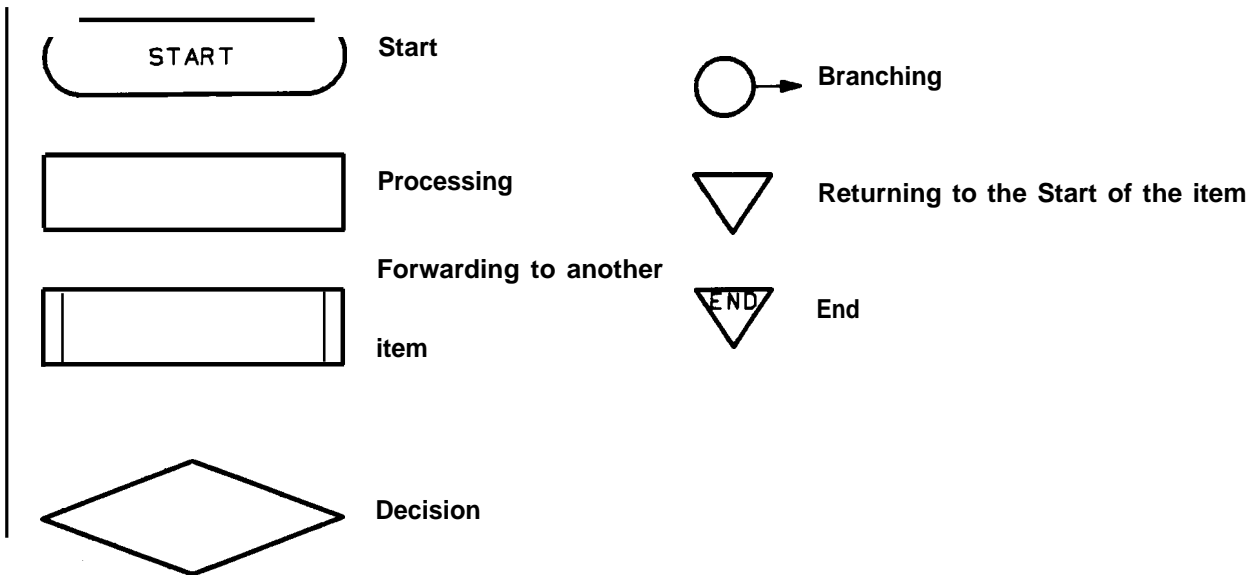
## 5.2 REPAIR BY UNIT REPLACEMENT

For most problems, it is sufficient for you to determine the difficulty to the unit level. Refer to Table 5-3, identify what the problem is, then perform the checks according to the corresponding flowchart.

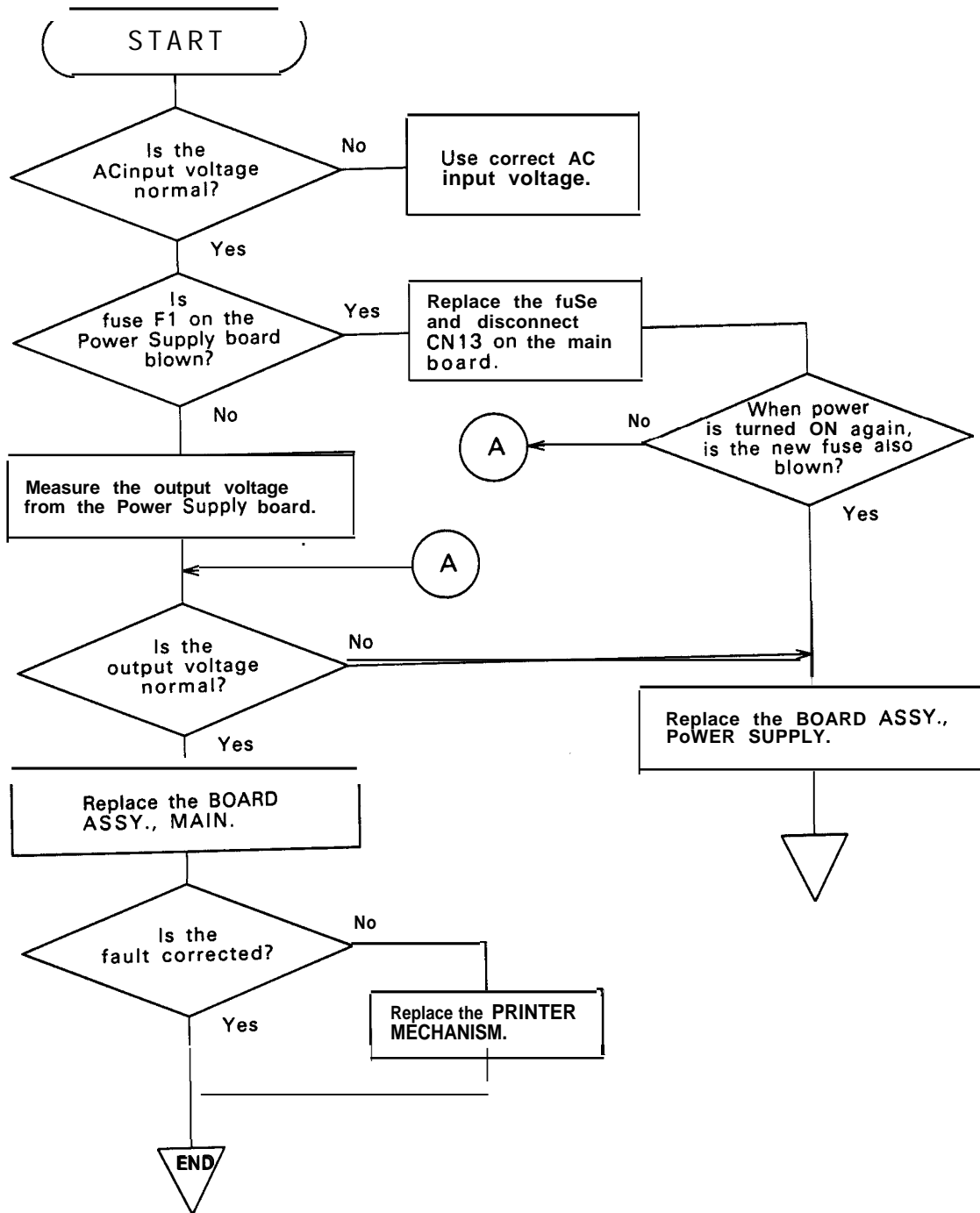
**Table 5-3. Symptoms and Reference Pages**

Symptom	Problem	See Page
Printer fails to operate when power is on.	<ul style="list-style-type: none"> <li>• Carriage does not move.</li> <li>• Control panel indicator lamp does not light.</li> </ul>	5-3
Carriage operation is abnormal.	<ul style="list-style-type: none"> <li>• Carriage moves away from home position at power on.</li> <li>• The carriage returns to the home position correctly, but the printer then fails to enter the READY mode.</li> </ul>	5-4
Printing is faulty during self-test, but carriage operation is normal.	<ul style="list-style-type: none"> <li>• No printing at all.</li> <li>• Faulty printing - some of the dots are not printed.</li> </ul>	5-5
Paper feeding is abnormal.	<ul style="list-style-type: none"> <li>• No paper is fed.</li> <li>• Regular paper feed, but with variations in the separations between lines.</li> </ul>	5-9
Control panel operation is abnormal.	<ul style="list-style-type: none"> <li>• When the LF switch is activated, no paper is fed.</li> </ul>	5-12
Printing of data sent by the host computer is faulty.	<ul style="list-style-type: none"> <li>• Carriage operates normally at power on, and self-test is executed correctly.</li> <li>• Print data from the computer, however, is not printed correctly.</li> </ul>	5-13

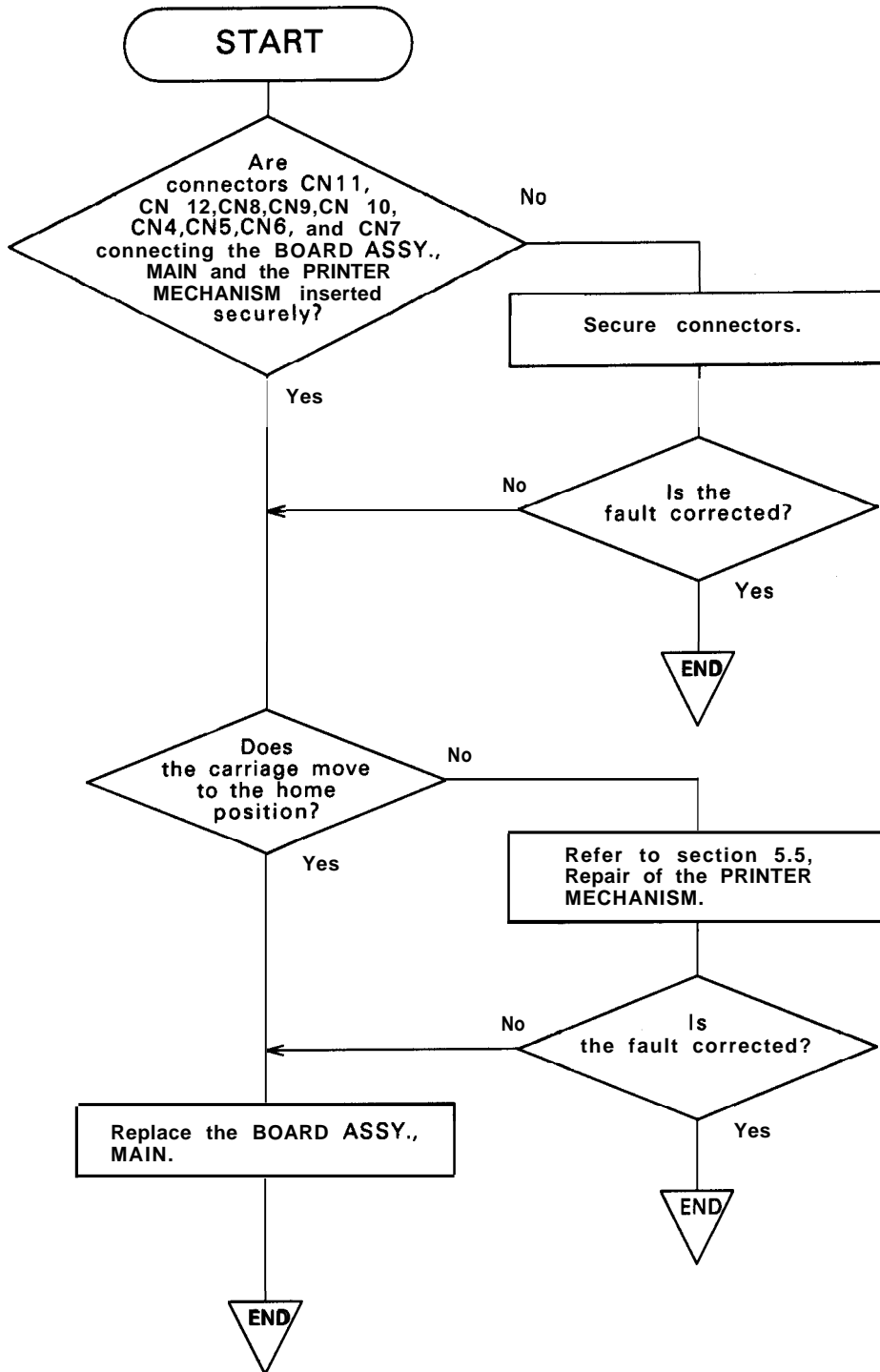
The repair procedure flowcharts are represented using the following symbols:



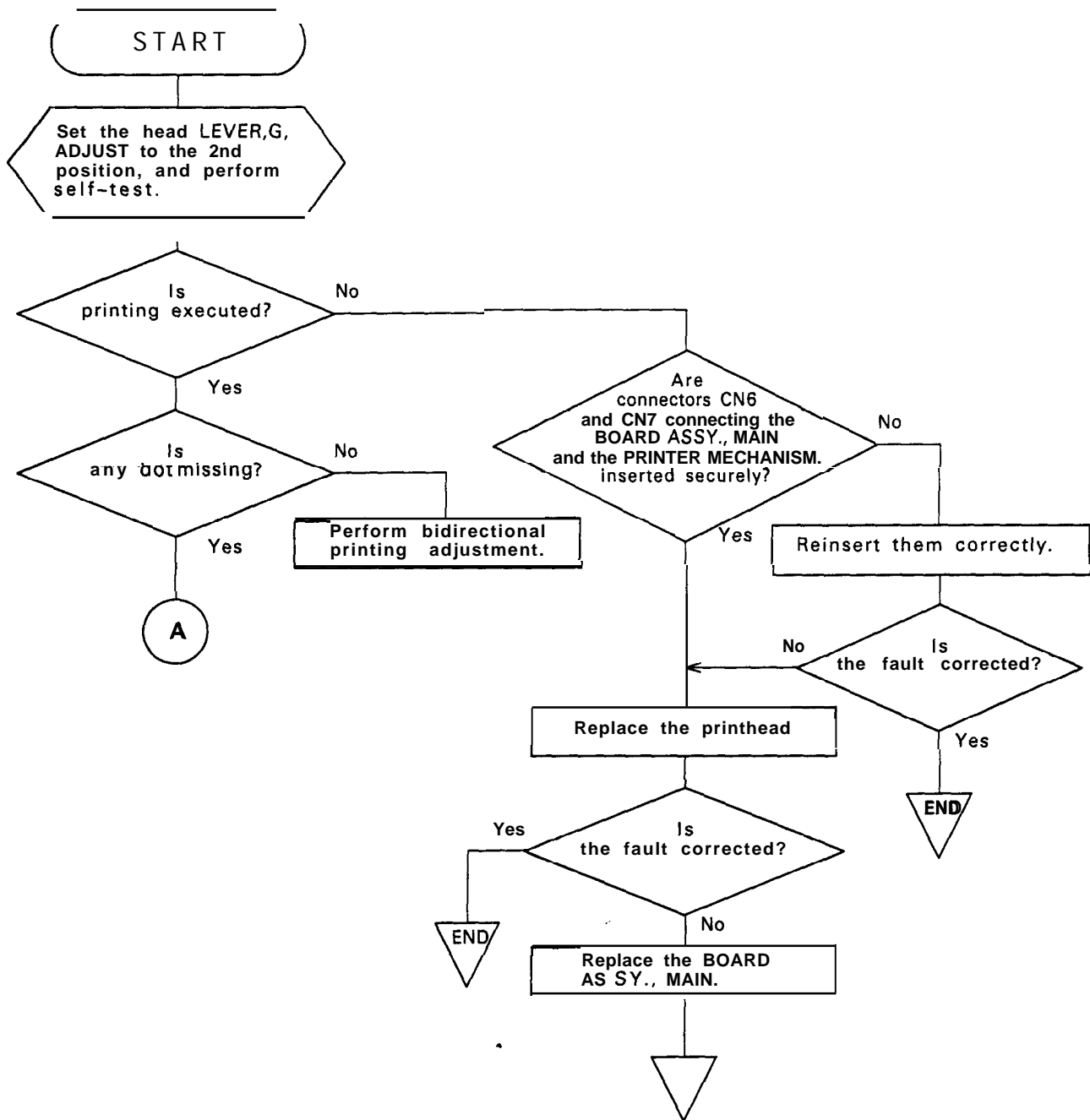
(1) Printer Fails to Operate when Power is On

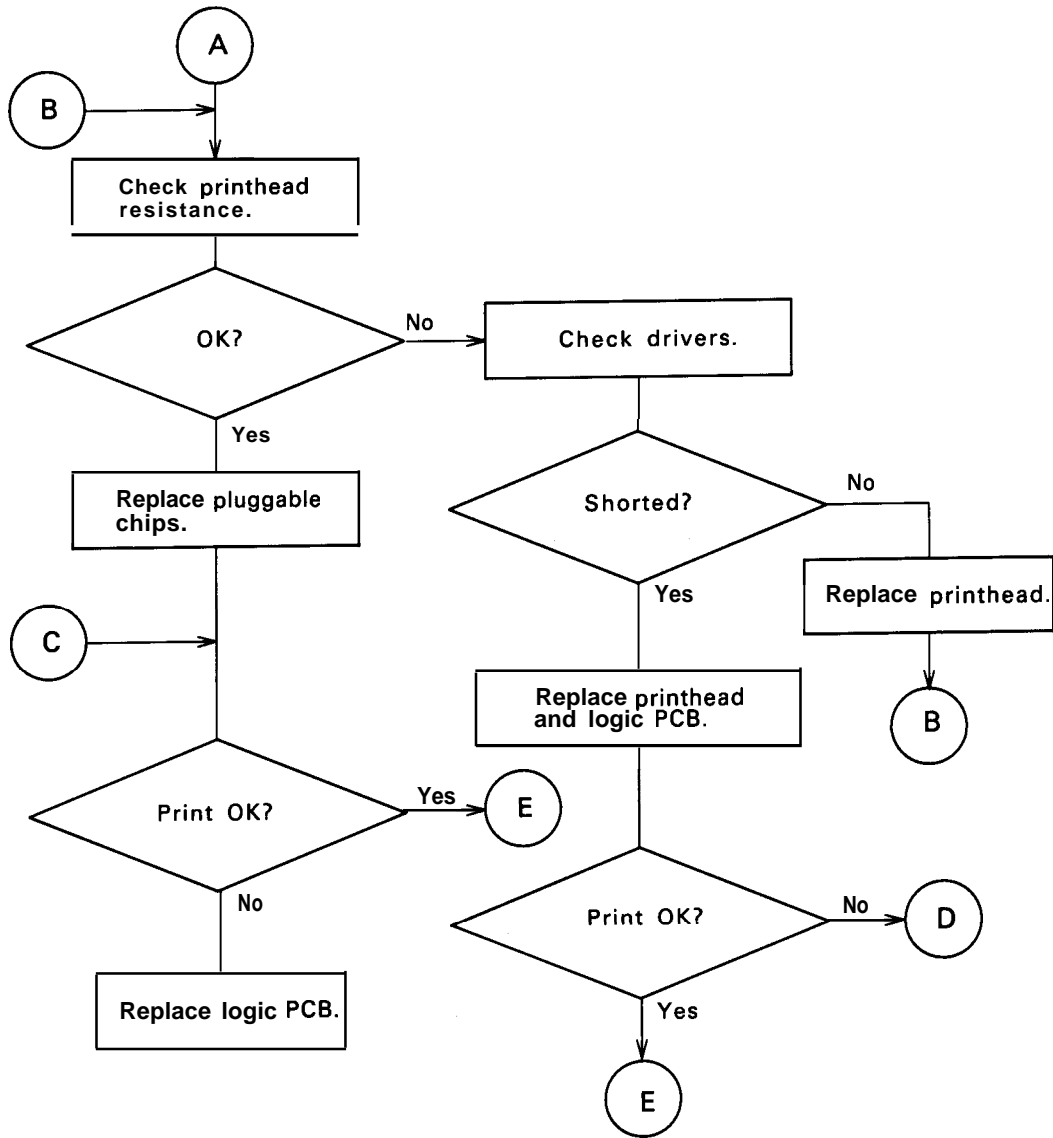


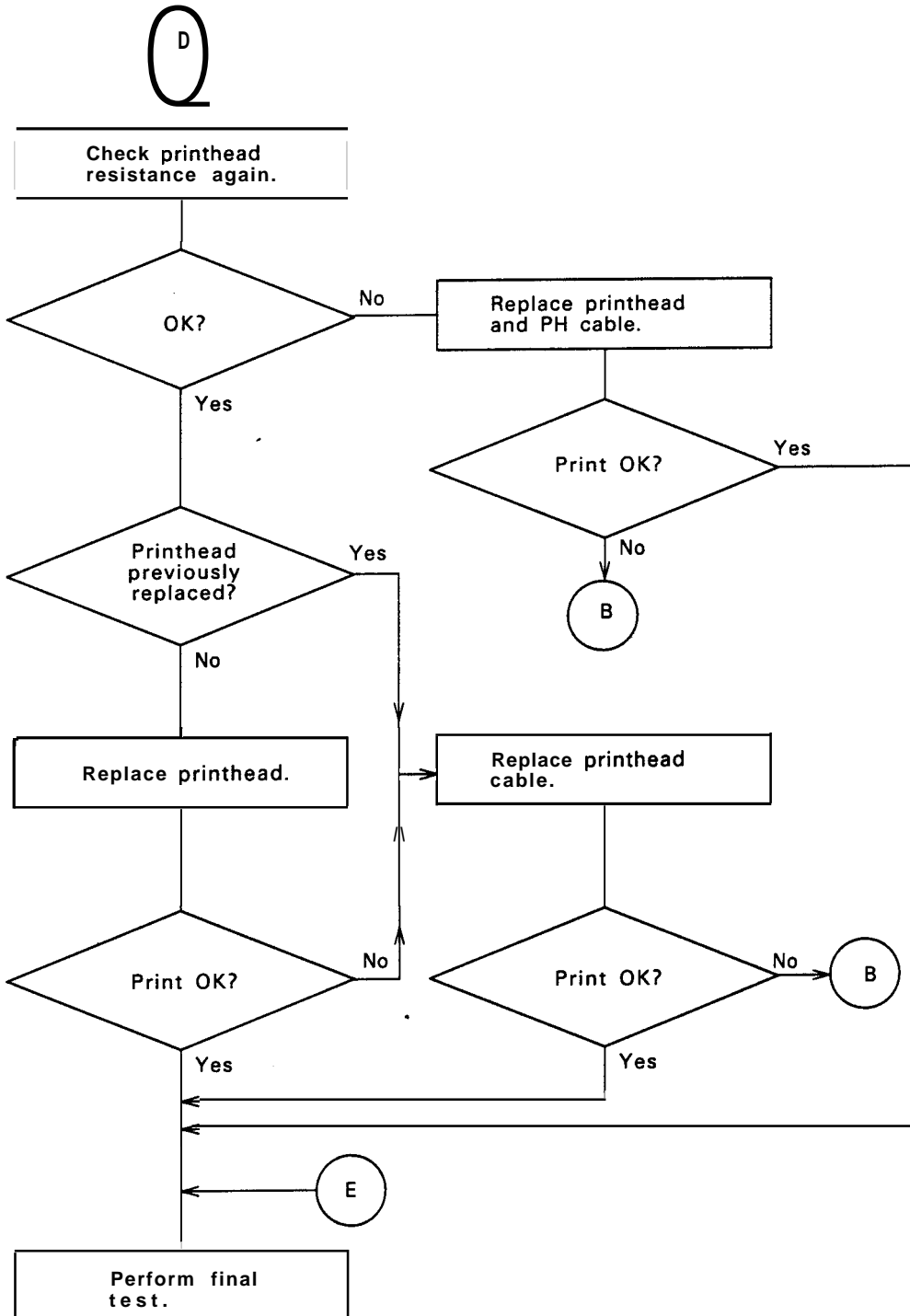
(2) Carriage Operation is Abnormal



(3) Printing is Faulty During Self-Test, but Carriage Operation is Normal







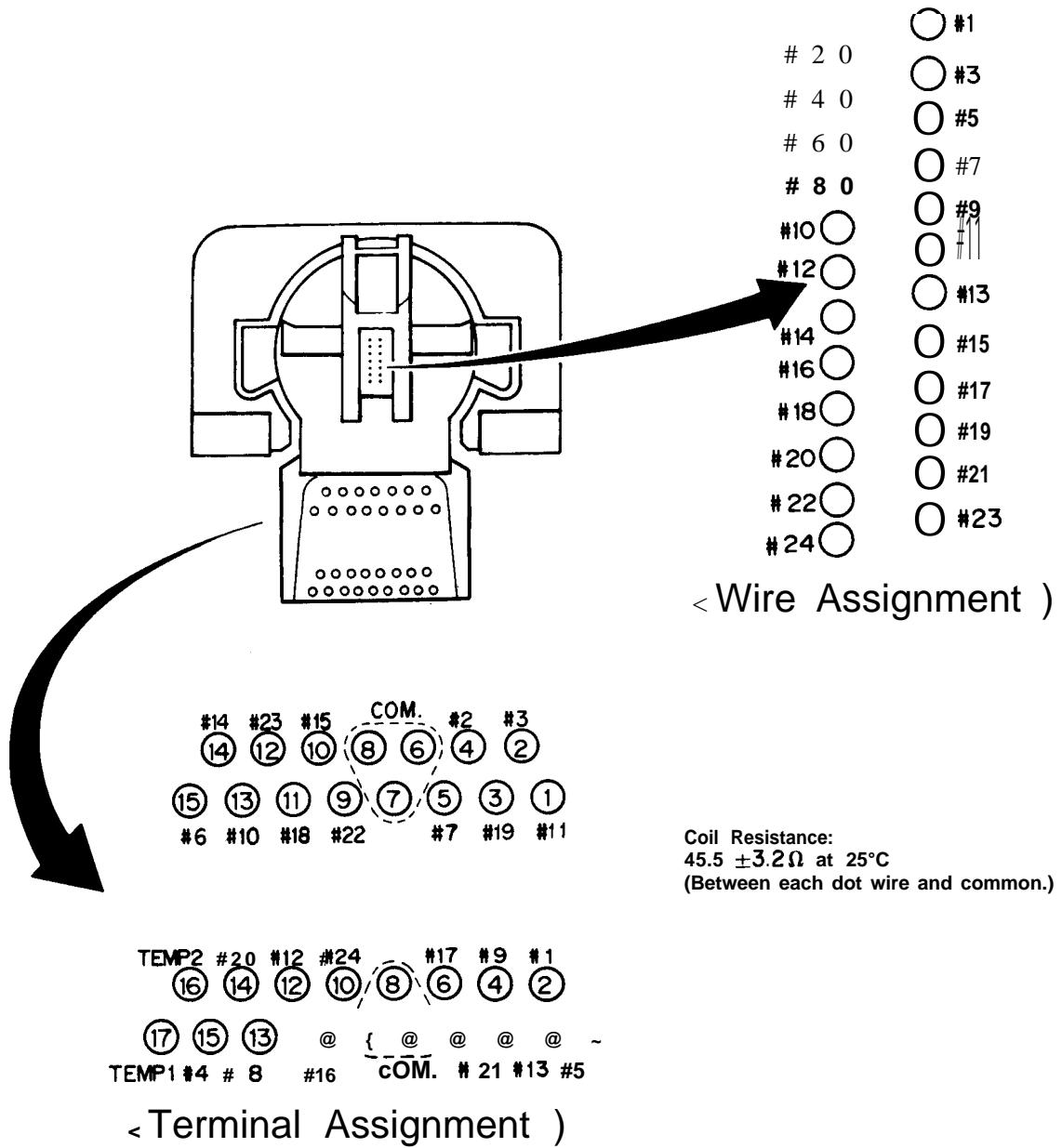
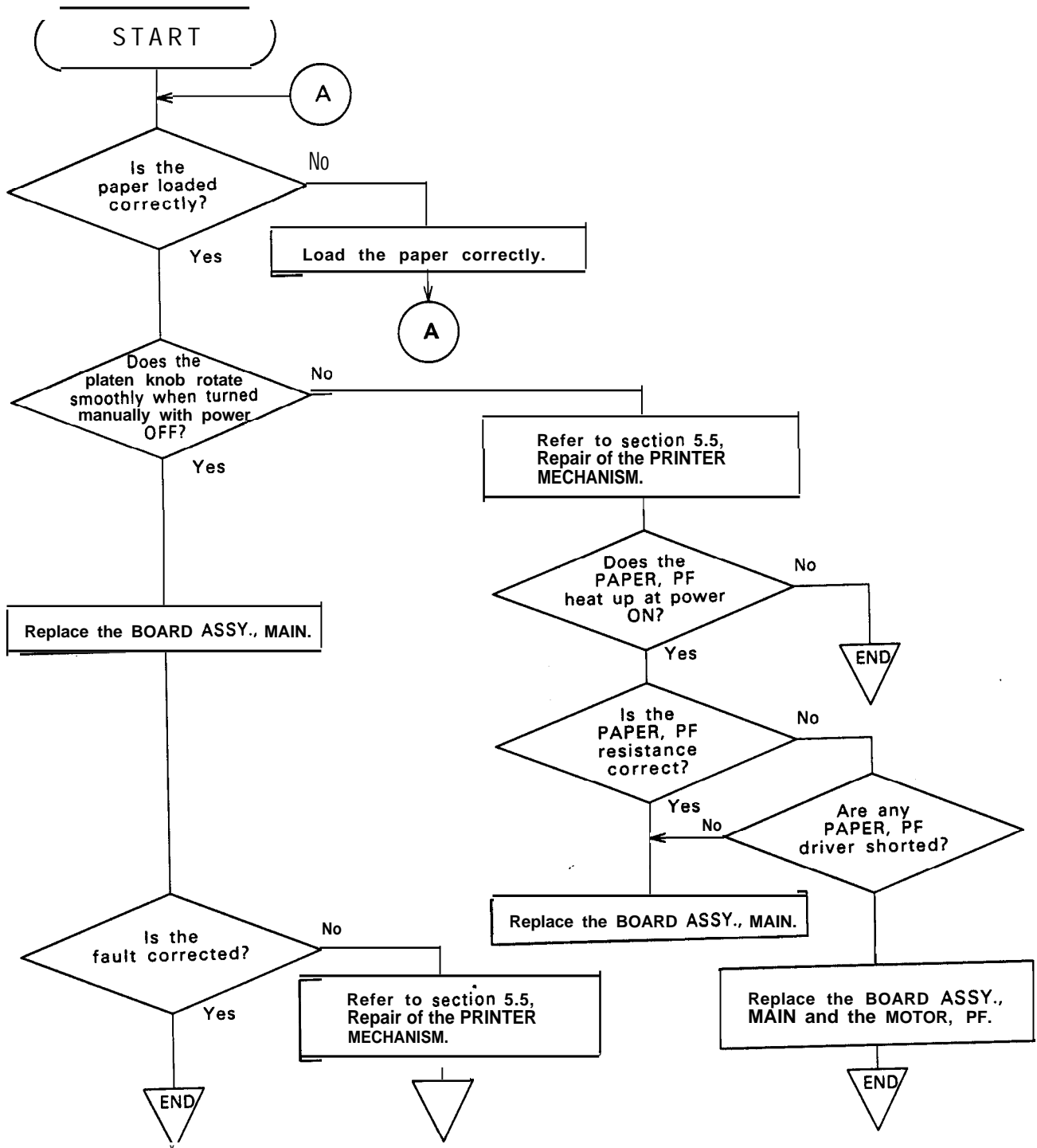
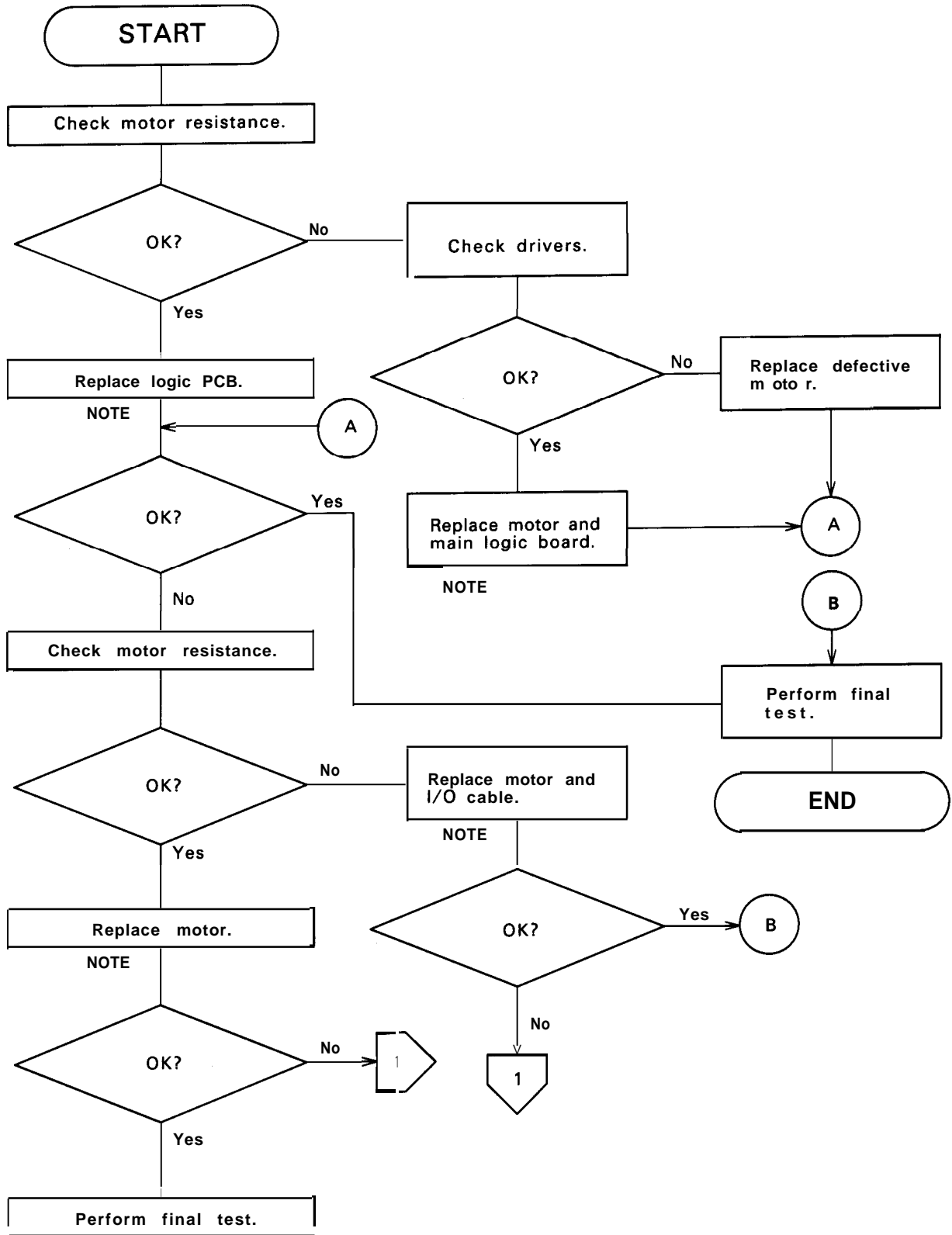


Figure 5-2. Printhead Resistance

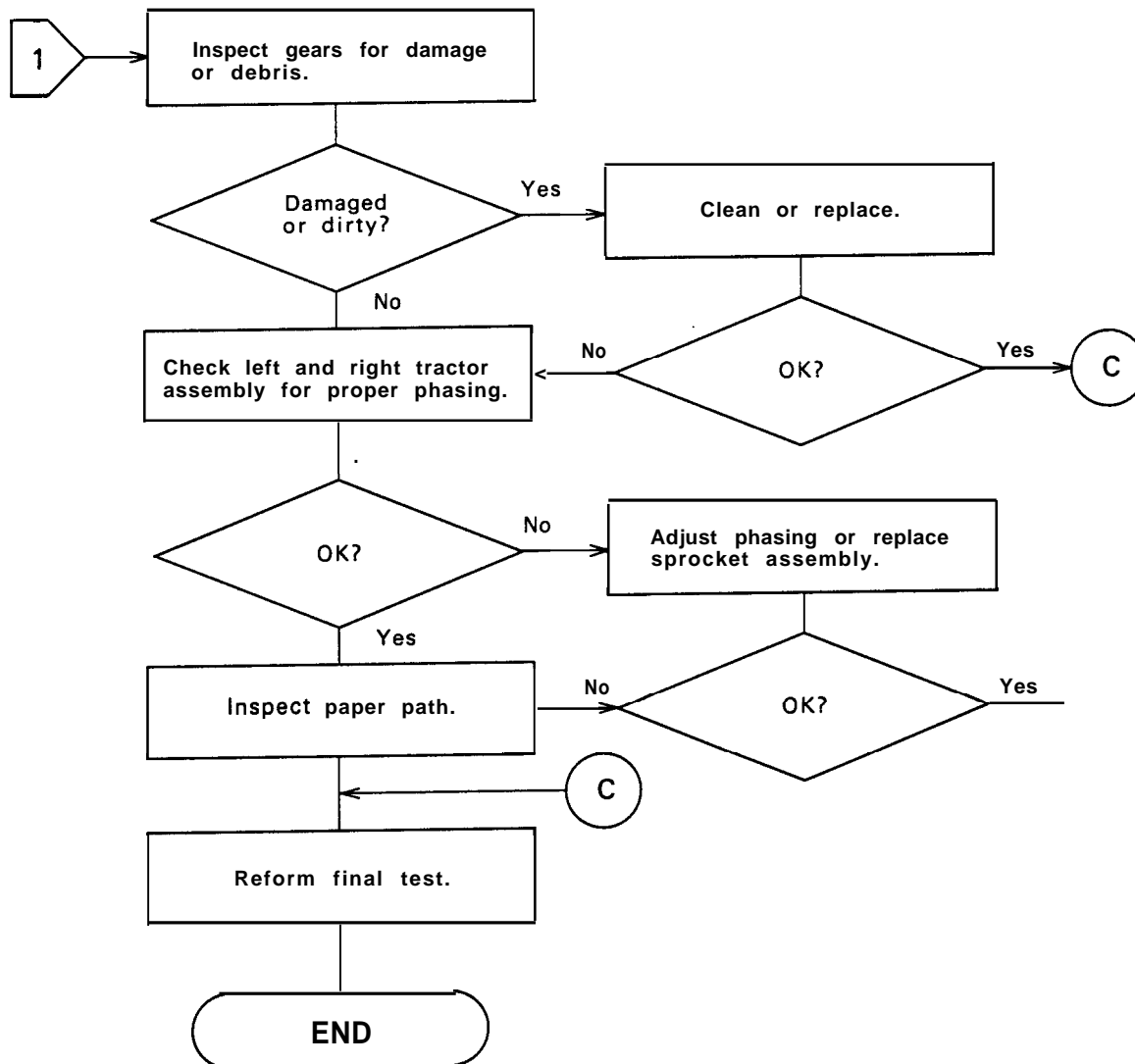


(4) Paper Feeding is Abnormal (but Printing is Normal)

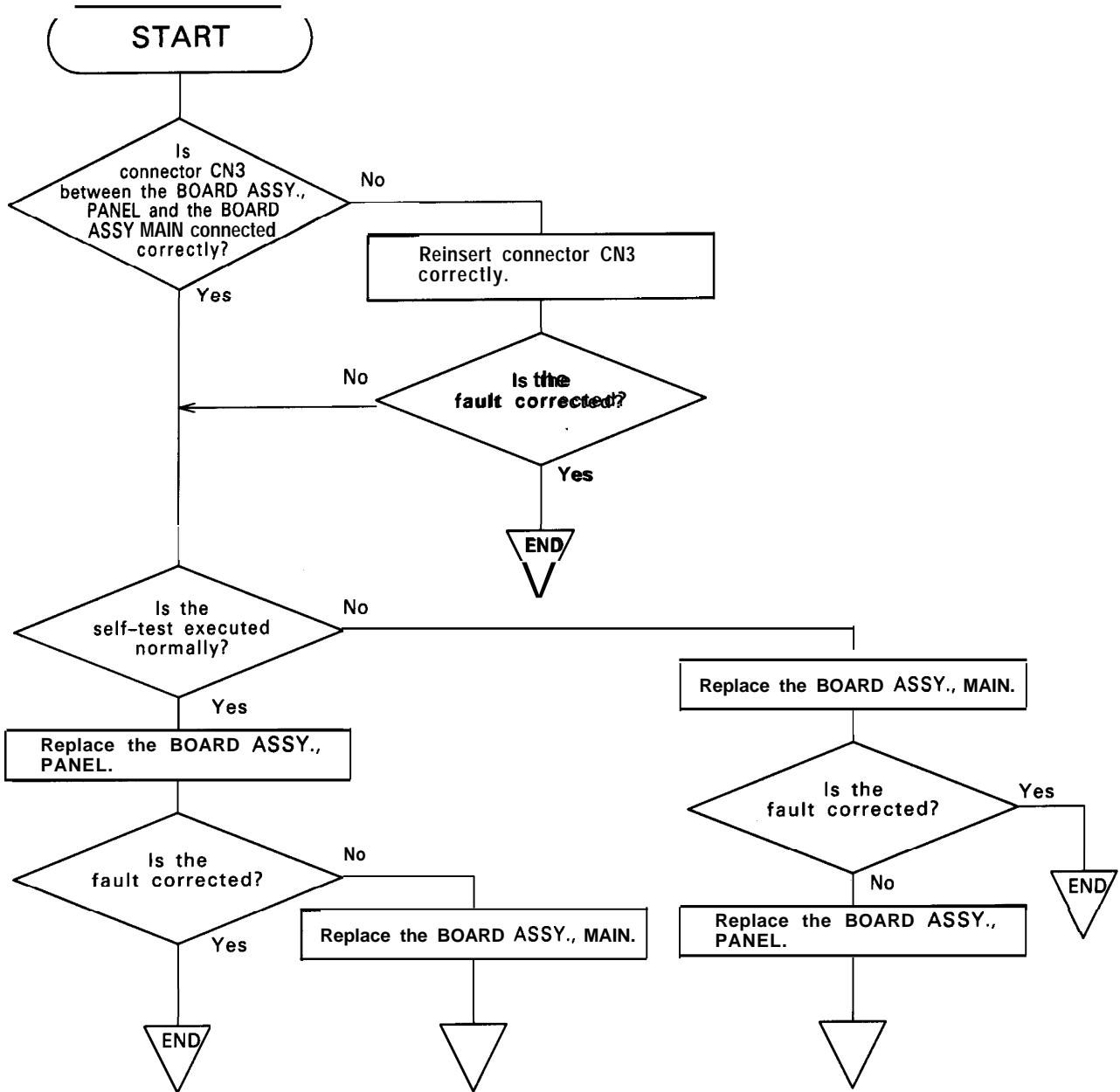




NOTE: Perform bidirectional print alignment adjustment.

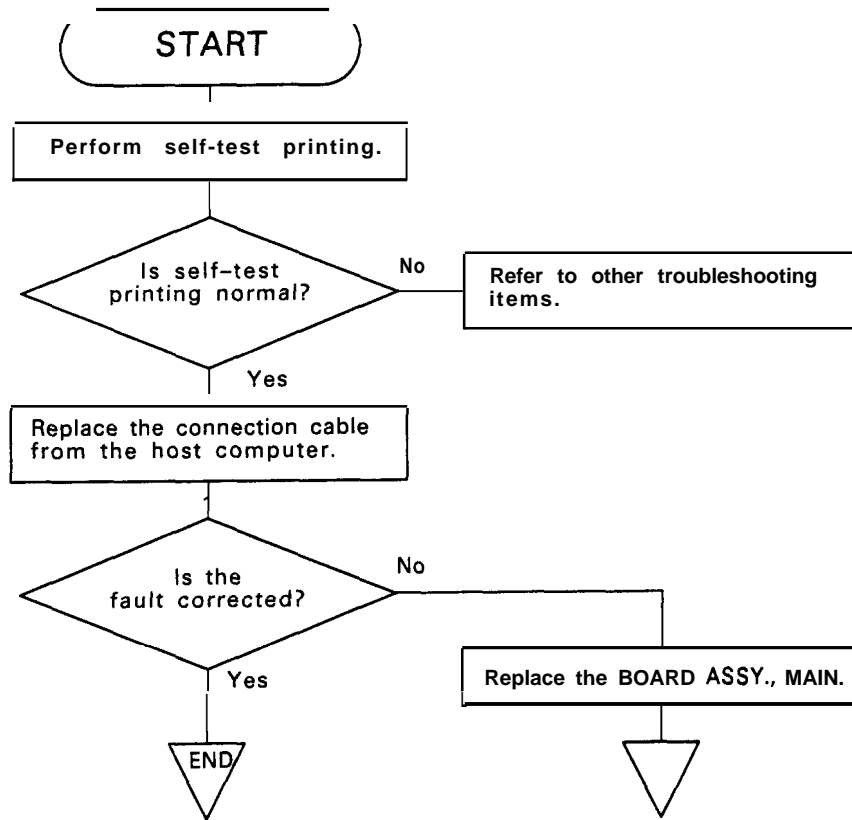


(5) Control Panel Operation is Abnormal



(6) Printing of Data Sent by the Host Computer is Faulty

NOTE: It is assumed here that the host computer is operating normally.



### 5.3 REPAIR OF THE MAIN BOARD

This section provides instructions for repairing the BOARD ASSY., MAIN when it is defective and describes various symptoms, likely causes, and checkpoints. Checkpoints refer to proper waveforms, resistance values, and other values to be checked to evaluate the operation of any component that might be bad. Check these values and take the appropriate action.

Table 5-4. Repair of a Problem in the BOARD ASSY., MAIN

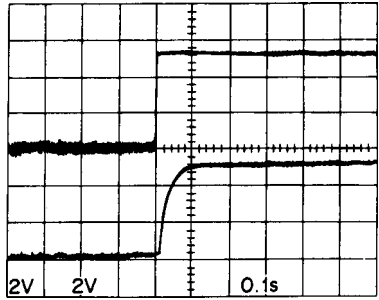
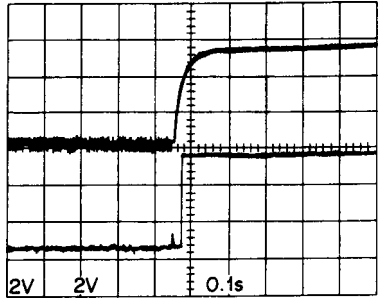
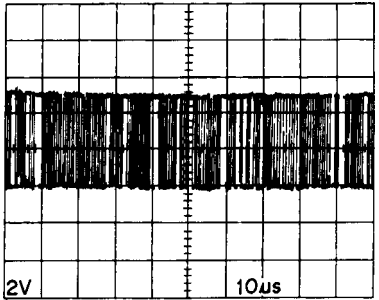
Problem	Symptom	Cause	Checkpoint	Solution
The printer does not operate at all.	The CPU does not operate.	The reset circuit is not operational.	Check the voltage waveforms for the +5V line (IC2A pin 52) and for the THLD signal (IC2A pin 73) when power is on. 	Replace IC2A.
			Check the voltage waveforms for the THLD signal (IC2A pin 73) and for the RESET signal (IC4D pin 4) when power is on. 	Replace IC4D.
		Selection of control ROM is abnormal.	Check pin 21 of IC1C for a HIGH Vx voltage (NM I signal).	Replace IC 1 C.
			Check pin 36 of IC4D for a change in the signal HIGH/LOW. 	Replace IC4D.

Table 5-4. Repair of a Problem in the BOARD ASSY., MAIN (Cont.)

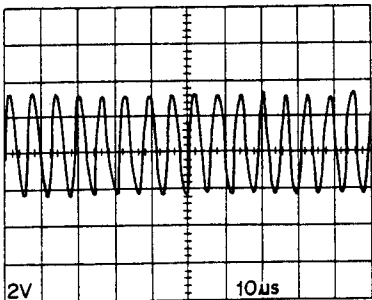
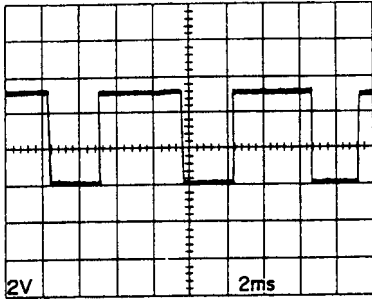
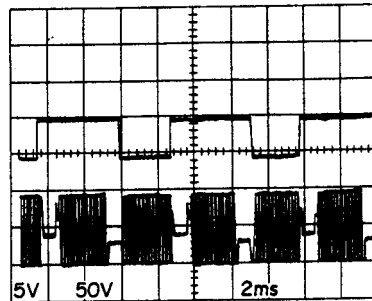
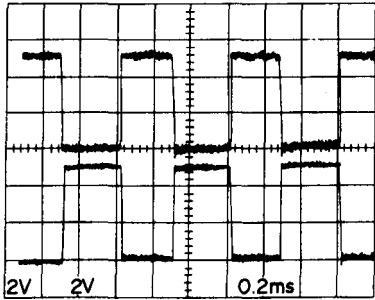
Problem	Symptom	Cause	Checkpoint	Solution
The printer does not operate at all.	The CPU does not operate.	Either ROM or RAM is defective.		Replace IC5E or IC6E.
		The CPU is defective.	Check the oscillator signal at either pin 33 or pin 34 of the CPU.  	If a signal is detected, replace IC1C. Otherwise, replace CR1.
The carriage operates abnormally.	The carriage does not operate at all.	IC1C is defective.	Check the MOTOR, CR phase signal at pins 9, 10, 11, and 12 of IC1C.  	Replace IC1C.
		IC2A is defective.	At IC2A, check the input signal for pin 90 and the output waveform for pin 100.  	Replace IC2A.
	Carriage operation is unstable (lack of torque).	IC2A is defective.		Replace IC2A.

Table 5-4. Repair of a Problem in the BOARD ASSY., MAIN (Cont.)

Problem	Symptom	Cause	Checkpoint	Solution
Self-test printing is abnormal.	Self-test is not executed.	The CPU can't measure the voltage on the +35V line.	Measure the voltage at Vref (pin 1) of IC 1 C. The normal voltage is 4.741 V.	Adjust VR 1.
		IC4D is defective.	At IC4D, check the input signal at pin 101 and the output signal at pin 46.  	Replace IC4D.
	A particular dot is not being printed.	IC2A is defective.		Replace IC2A.
'a per is not 'ed normally.	The paper does not feed, or the feed pitch is abnormal.	IC2A is defective.		Replace IC2A.
Printing of data from the host computer is faulty.	Data corruption occurs when the parallel interface is used.	IC4D or IC5D is defective.		Replace IC4D or IC5D.



## 5.4 REPAIR OF THE PRINTER MECHANISM

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

Table 5-5. Repair of the PRINTER MECHANISM

Problem	Symptom	Cause	Checkpoint	Solution
The MOTOR, CR fails to operate.	The MOTOR, CR completely fails to activate at power on.	Foreign substances are lodged in the gears or elsewhere in the mechanism.	Manually move the TIMING BELT to see if this causes the motor to rotate.	Remove any foreign substances.
		The MOTOR, CR is defective.	Measure the coil resistance of the motor. The resistance should be about 19.5 ohms.	Replace the MOTOR, CR.
The carriage does not operate normally at power on [after the carriage has been manually centered prior to power on).	The MOTOR, CR rotates, but the carriage does not move.	The BELT PULLEY is defective.	Check for broken or worn pulley.	Replace the BELT PULLEY.
		The TIMING BELT is defective.	Check that the TIMING BELT is correctly inserted into the bottom of the carriage.	Reinsert the TIMING BELT.
	Check for a broken timing belt.		Replace the timing belt.	
	The carriage moves left slightly, then stops.	Carriage movement is not smooth.	Check whether the carriage moves smoothly when moved manually.	Clean and lubricate. Replace the MOTOR, CR.
The carriage moves to the left or right end, then stops.	The DETECTOR ASSY., HP is defective.	Use a multimeter to check the DETECTOR ASSY., HP.	Replace the DETECTOR ASSY., HP.	
Self-test printing does not execute.	The carriage moves, but no printing is performed.	The printhead FFC (CABLE, HEAD, FRONT (, REAR) ) common wires are disconnected.	Check the common wires for the printhead FFC (CABLE, HEAD, FRONT (, REAR) ).	Replace the FFC (CABLE, HEAD, FRONT (, REAR) ).

Table 5-5. Repair of the PRINTER MECHANISM (Cont.)

Problem	Symptom	Cause	Checkpoint	Solution
Self-test printing is abnormal.	A particular dot fails to print.	The printhead is defective.	Measure the coil resistance of the printhead. The normal value is approximately 45.5 ohms.	Replace the printhead.
			Check whether the dot wire is worn.	Replace the printhead.
	The printing is too light, or the print density is not uniform.	The printhead is defective.	Check whether the tip of the dot wire is worn.	Replace the printhead.
		The platen gap is not properly adjusted.	Set the gap LEVER, G, ADJUST to the second position, and check the gap between the tip of the printhead and the PLATEN. The appropriate value is 0.46 mm.	Adjust the gap. Refer to Section 4.1.2, <i>Platen Gap Adjustment</i> .
Paper feeding 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 substance.
		The MOTOR, PF 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.	<ul style="list-style-type: none"> <li>. Remove any foreign substance.</li> <li>. Replace the paper-feed reduction gear.</li> <li>• Replace the platen gear.</li> </ul>
		The MOTOR, PF is defective.	Measure the coil resistance for the MOTOR, PF. The approximate value should be 79 ohms.	Replace the MOTOR, PF.

Table 5-5. Repair of the PRINTER MECHANISM (Cont.)

Problem	Symptom	Cause	Checkpoint	Solution
The ribbon feed is abnormal.	The ribbon is not fed.	The ribbon cartridge is defective.	Dismount the ribbon cartridge, rotate its knob manually, and check whether the ribbon feeds normally.	Replace the ribbon cartridge.
		Foreign substances are caught in the gears.	Check whether the ribbon driving gear rotates when the carriage is moved manually.	<ul style="list-style-type: none"> <li>• Remove any foreign substance.</li> <li>• Replace the ribbon-feed mechanism.</li> </ul>
	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 lever is defective.	Move the carriage manually, and check whether the planetary lever turns in reverse and engages the gear.	Replace the ribbon cartridge.
Paper becomes stained.	Ink stains appear on areas where there is pinting.	The RIBBON MASK is not correctly positioned.	Check whether the RIBBON MASK is in the correct position.	Reinstall the RIBBON MASK.
		The platen gap is not adjusted.	Set the gap adjust lever to the second position, and check the gap between the tip of the print-head and the PLATEN. The appropriate value is 0.46 mm.	Adjust the gap. Refer to Section 4.1.2, <i>Platen Gap Adjustment</i> .
Printing continues after the paper ends or when no paper is loaded.	Printing continues past the paper end.	The DETECTOR ASSY., PE, FRONT (, REAR)	Check the DETECTOR ASSY., PE, FRONT (, REAR)	Replace the DETECTOR ASSY., PE, FRONT (, REAR)

# CHAPTER 6 MAINTENANCE

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

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Figure 6-2. LQ-570 Lubrication Points ..... 6-3  
Figure 6-3. LQ-1070 Lubrication Points ..... 6-4

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## 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 returning 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 LUBRICATION AND ADHESIVE APPLICATION

EPSON recommends that the printer be lubricated at the points illustrated in Figure 6-2. Table 6-2 lists each point together with its recommended lubricant. The three recommended lubricants are EPSON O-2, G-20, and G-26, 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 related parts.

Adhesive application is necessary at the point described in Table 6-3. Figure 6-1 indicates the point at which adhesive must be applied following disassembly or replacement. EPSON recommends that Neji lock #2 (G) adhesive be applied to the point illustrated. Avoid overflow to adjacent parts.

Table 6-1. Lubricants and Adhesive

Type	Name	Quantity	Availability	Part No.
Oil	o-2	40 cc	E	B7 10200001
Grease	G-20	40 gm	E	B702000001
Grease	G-26	40 gm	E	B702600001
Adhesive	Neji lock #2 (G)	1000 gm	E	B730200200

E: EPSON-exclusive product

Table 6-2. Lubrication Points (Refer to Figure 6-2)

Ref. No.	Lubrication Points	Lubricant
1	1/4 of the perimeter of the top edge of the gear (8.5 mm, 30 mm)	G-26
2	1/3 of the perimeter of the top edge of the gear (40 mm)	G-26
3	1/3 of the perimeter of the top edge of the platen gear	G-26
4	Portion of carriage that contacts base frame	G-26
5	Oil pad	0-2
6	Portion of platen shaft that contacts ground spring	G-20
7	Gear (40 mm) shaft	G-26
8	Gear (8.5, 30 mm) shaft	G-26
9	Ribbon-feed gear shafts	G-26
10	Gear (1 1.5 mm) shaft	G-26
11	Portion of paper guide that contacts gear (18 mm)	G-26
12	Portion of paper guide that contacts sub paper guide	G-26
13	Portion of release shaft that contacts paper guide	G-26
14	Portion of paper tension roller shaft that contacts paper tension frame	G-26
15	Portion of tractor shaft that contacts tractor frame (left)	G-26
16	Tractor clutch cam	G-26

NOTE: Lubrication must be applied during the reassembly process.

Table 6-3. Adhesive Application Point (Refer to Figure 6-1.)

Adhesive Application Point	No. of Points
Portion where timing belt engages the carriage	1



Figure 6-1. Correct Adhesive Application

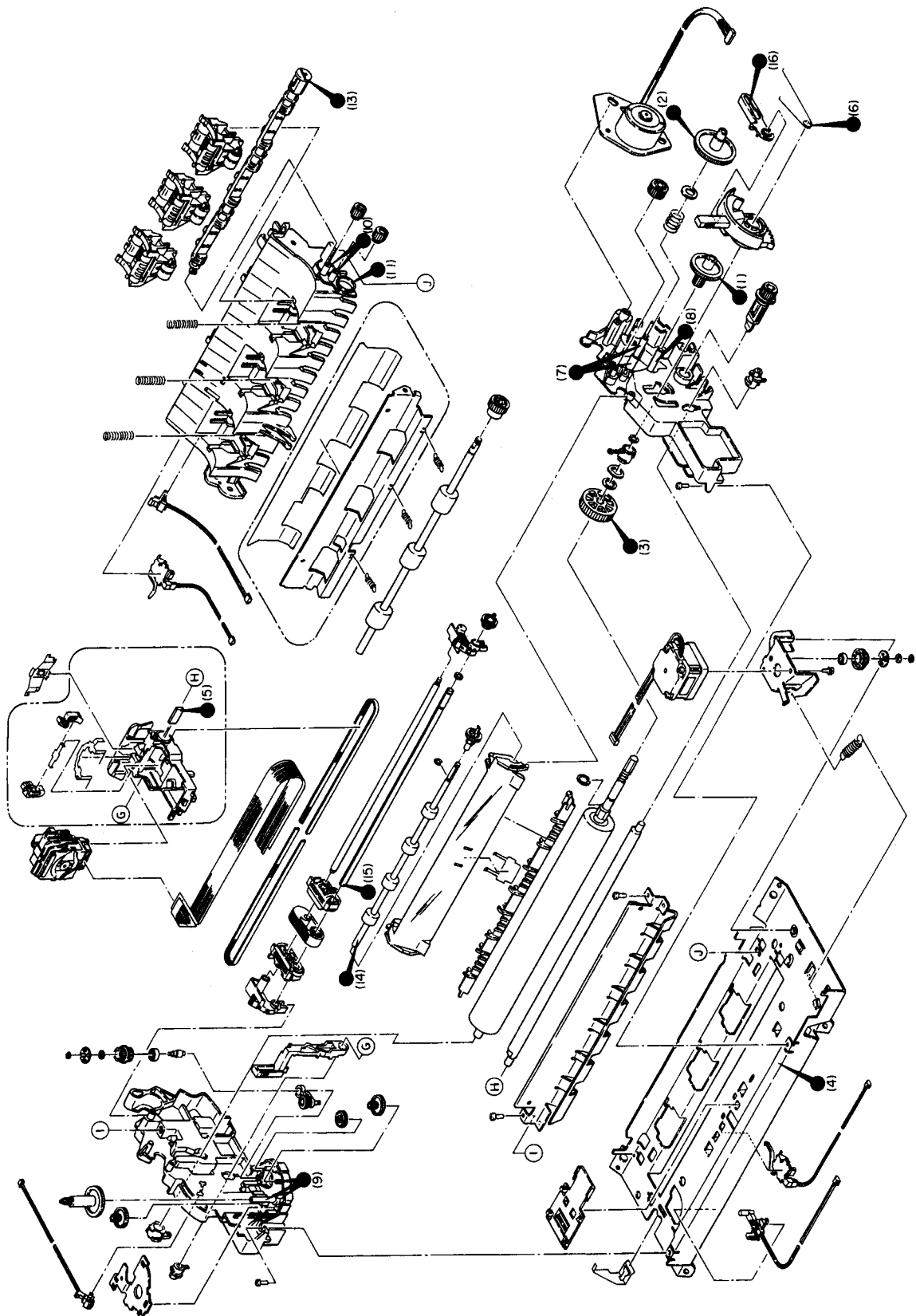


Figure 6-2. LQ-570 Lubrication Points

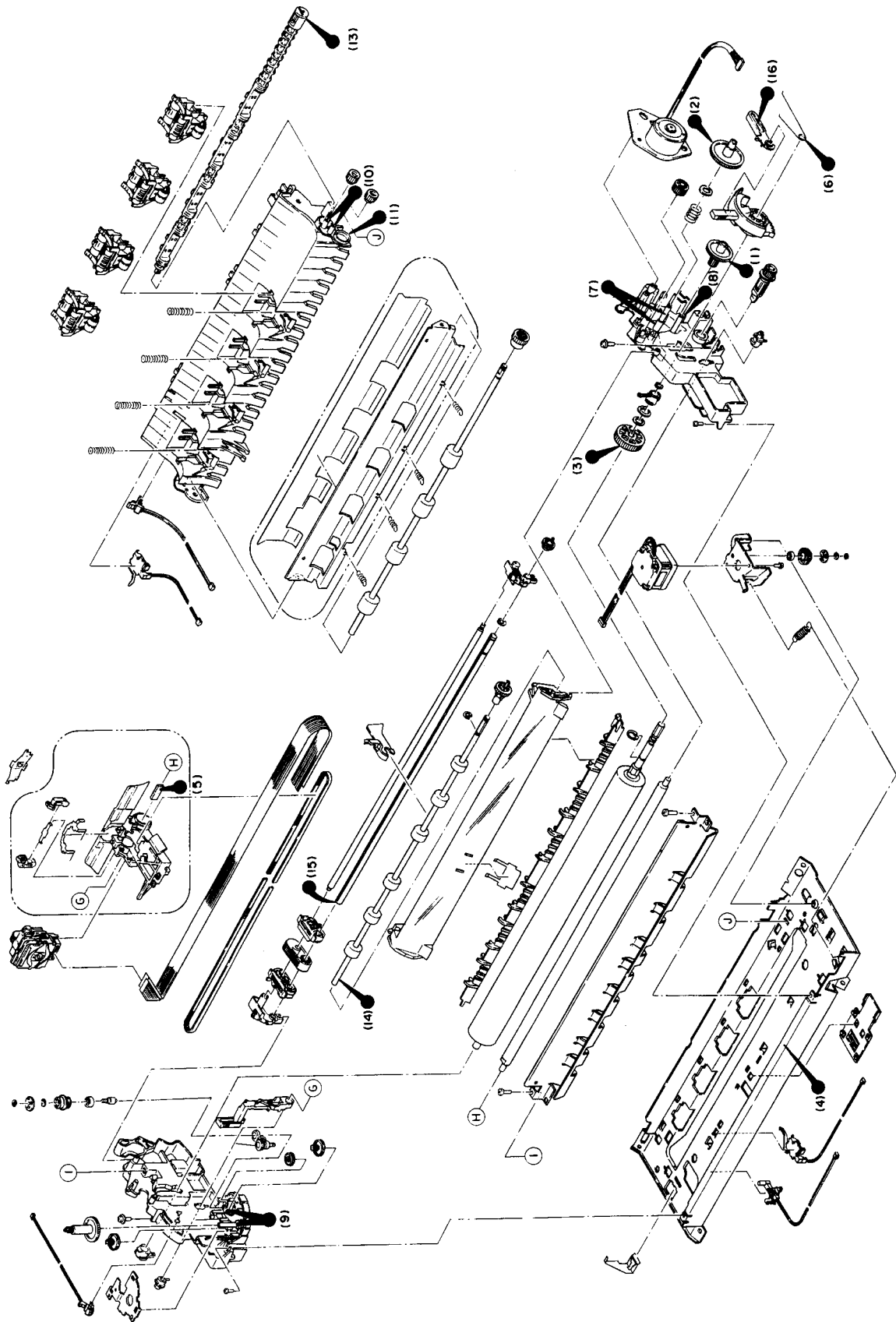


Figure 6-3. LQ-1070 Lubrication Points



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## A.1 CONNECTOR SUMMARY

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

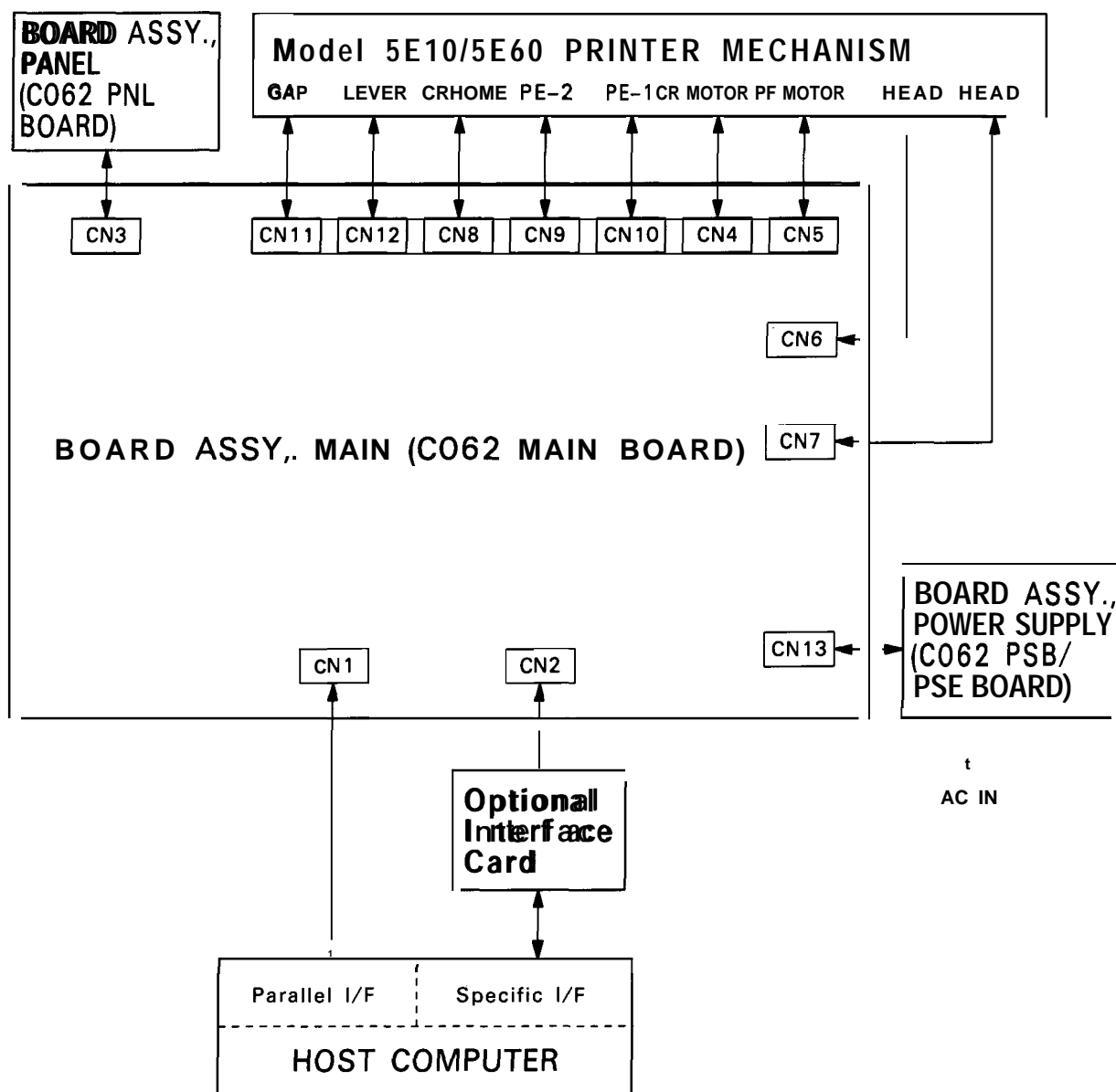


Figure A-1. Cable Connections

Table A-1. Board Connector Summary

Board	Connector	Function	Pins
BOARD ASSY., MAIN (C062 MAIN BOARD)	CN1	Parallel interface	36
	CN2	Optional interface card	36
	CN3	Control panel	12
	CN4	MOTOR, CR	5
	CN5	MOTOR, PF	5
	CN6	Printhead	17
	CN7	Printhead	15
	CN8	DETECTOR ASSY., HP (HP sensor)	2
	CN9	DETECTOR ASSY.,PE, REAR	2
	CN 10	DETECTOR ASSY.,PE, PRONT	2
	CN 11	DETECTOR ASSY., PLATEN	2
	CN 12	DETECTOR ASSY., RELEASE	2
	CN 13	DC power input BOARD ASSY., (POWER SUPPLY);(C062PSB/PSE board)	11
BOARD ASSY., POWER SUP- PLY (C062PSB/PSE BOARD)	CN 1	AC power input	2
	CN2	DC power output (BOARD ASSY., MAIN): (C062 MAIN board)	11
BOARD ASSY., PANEL (C062 PNL BOARD)	CN 1	BOARD ASSY., MAIN (C062 MAIN board)	1 2

Table A-2. CN2 BOARD ASSY., MAIN (C062 MAIN) Table A4. CN4 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	-	+5	+5 VDC
2	-	+5	+5 VDC
3	-	+5	+5 VDC
4	-	+5	+5 VDC
5	-	+5	+5 VDC
6	-	+5	+5 VDC
7	0	TXD	Transmit data
8	0	/READY	Ready to receive data
9		RXD	Receive data
10	-	NC	No connection
11	0	/RST	Reset
12	0	INH	Inhibit
13		/CMREQ	Command request
14		/WRRDY	Write ready
15		/RDREQ	Read request
16	0	/WR	Write
17	0	/RD	Read
18	0	/CS	Chip select
19	-	GND	Signal ground
20	-	GND	Signal ground
21	-	GND	Signal ground
22	-	GND	Signal ground
23	-	GND	Signal ground
24	-	GND	Signal ground
25	0	A3	Address bus bit 3
26	0	A2	Address bus bit 2
27	0	A1	Address bus bit 1
28	0	A0	Address bus bit 0
29	I/O	D7	Data bus bit 7
30	I/O	D6	Data bus bit 6
31	I/O	D5	Data bus bit 5
32	I/O	D4	Data bus bit 4
33	I/O	D3	Data bus bit 3
34	I/O	D2	Data bus bit 2
35	I/O	D1	Data bus bit 1
36	I/O	D0	Data bus bit 0

No.	I/O	Signal Name	Function
1	0	CRA	MOTOR, CR phase A
2	0	CRB	MOTOR, CR phase B
3	0	CRC	MOTOR, CR phase C
4	0	CRD	MOTOR, CR phase D
5	0	CRCOM	MOTOR, CR common

Table A-5. CN5 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	0	PFA	MOTOR, PF phase A
2	0	PFB	MOTOR, PF phase B
3	0	PFC	MOTOR, PF phase C
4	0	PFD	MOTOR, PF phase D
5	0	PFCOM	MOTOR, PF common
6	0	PFCOM	MOTOR, PF common

Table A-6. CN6 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	0	HD5	Head data 5
2	0	HDI	Head data 1
3	0	HD13	Head data 13
4	0	HD9	Head data 9
5	0	HD21	Head data 21
6	0	HD17	Head data 17
7	-	COM	Common
8	-	COM	Common
9	-	COM	Common
10	0	HD24	Head data 24
11	0	HD16	Head data 16
12	0	HD12	Head data 12
13	0	HD8	Head data 8
14	0	HD20	Head data 20
15	0	HD4	Head data 4
16		TEMP2	Head temperature
17	-	TEMP1	+VU

Table A-3. CN3 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1		/PAUSE	Pause switch
2	-	/READY	Fixed GND
3	0	TXS	Transmit signal (LED)
4	0	/LDLED	LED data latch
5	0	/CKS	Shift clock
6	0	/LDSW	Load switch data
7		RXS	Receive data (switch)
8	-	+5	+5 VDC
9	-	GND	Signal ground
10	-	SHLD	Shield ground
11		POWER1	Power switch
12	-	POWER2	Fixed GND

I Table A-7. CN7 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	0	HD3	Head data 3
2	0	HD 11	Head data 11
3	0	HD2	Head data 2
4	0	HD 19	Head data 19
5	0	HD7	Head data 7
6	-	COM	Common
7	-	COM	Common
8	-	COM	Common
9	0	HD22	Head data 22
10	0	HD 15	Head data 15
11	0	HD 18	Head data 18
12	0	HD23	Head data 23
13	0	HD 10	Head data 10
14	0	HD14	Head data 14
15	0	HD6	Head data 6

Table A-13. CN13 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	0	Psc	Power switch signal
2	-	+5	+5 VDC
3	-	+5	+5 VDC
4	-	GND	Signal ground
5	-	GND	Signal ground
6	-	GND	Signal ground
7	-	GND	Signal ground
8	-	GND	Signal ground
9	-	+35	+35 VDC
10	-	+35	+35 VDC
11	-	+35	+35 VDC

I Table A-8. CN8 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	I	CRHOME	DETECTOR ASSY.,HP
2	-	GND	Signal ground

I Table A-9. CN9 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	I	PE2	DETECTOR ASSY.,PE, REAR
2	-	GND	Signal ground

I Table A.10. CN10 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	I	PE1	DETECTOR ASSY.,PE,FRONT
2	-	GND	Signal ground

I Table A-11. CN11 BOARD ASSY.,MAIN(C062 MAIN)

No.	I/O	Signal Name	Function
1	I	GAP	DETECTOR ASSY., PLATEN
2	-	GND	Signal ground

I Table A-12. CN12 BOARD ASSY., MAIN (C062 MAIN)

No.	I/O	Signal Name	Function
1	I	LEVER	DETECTOR ASSY., RELEASE
2	-	GND	Signal ground



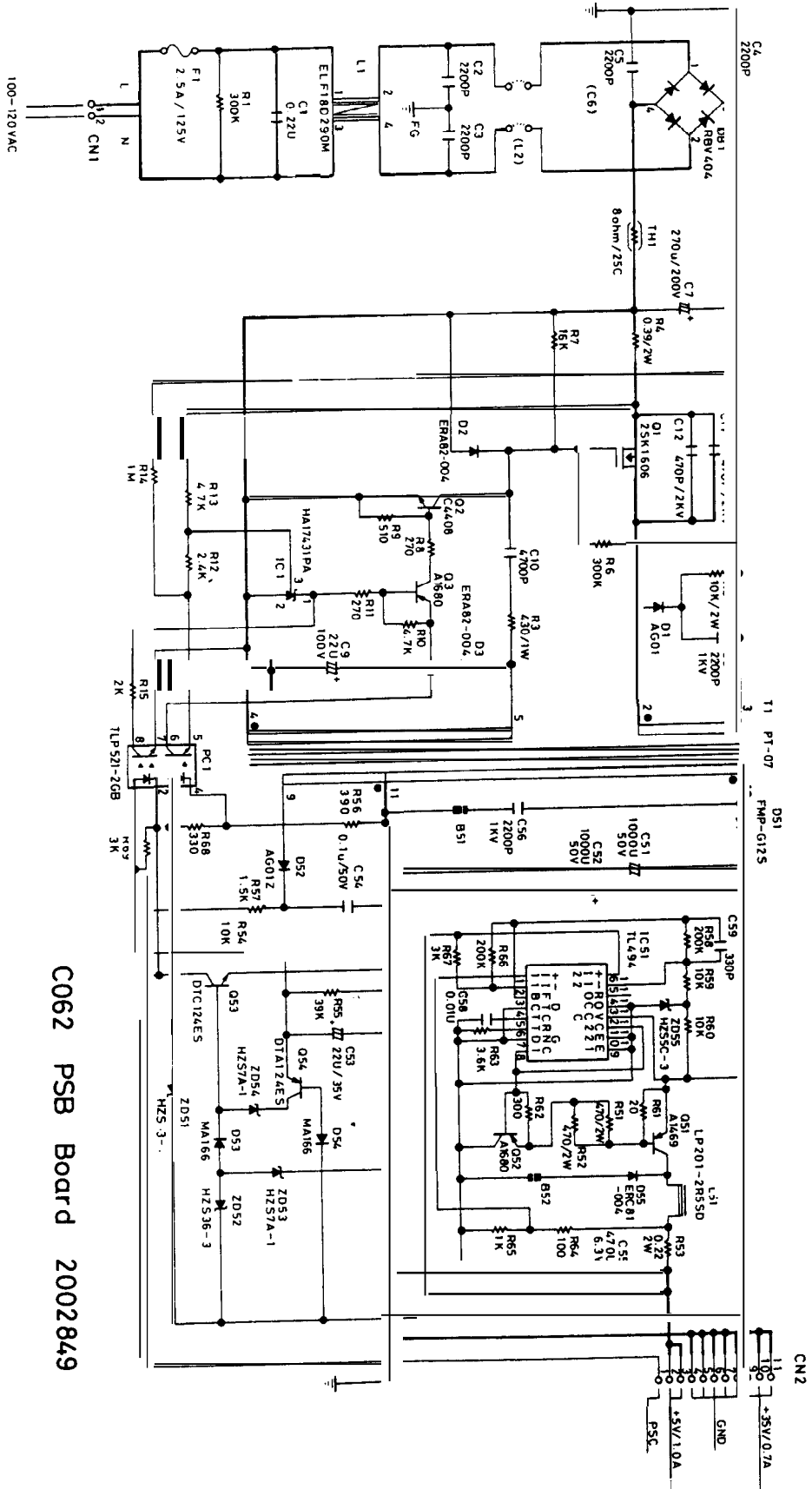


Figure A-5. BOARD ASSY., POWER SUPPLY (C062 PSB Board) Circuit Diagram



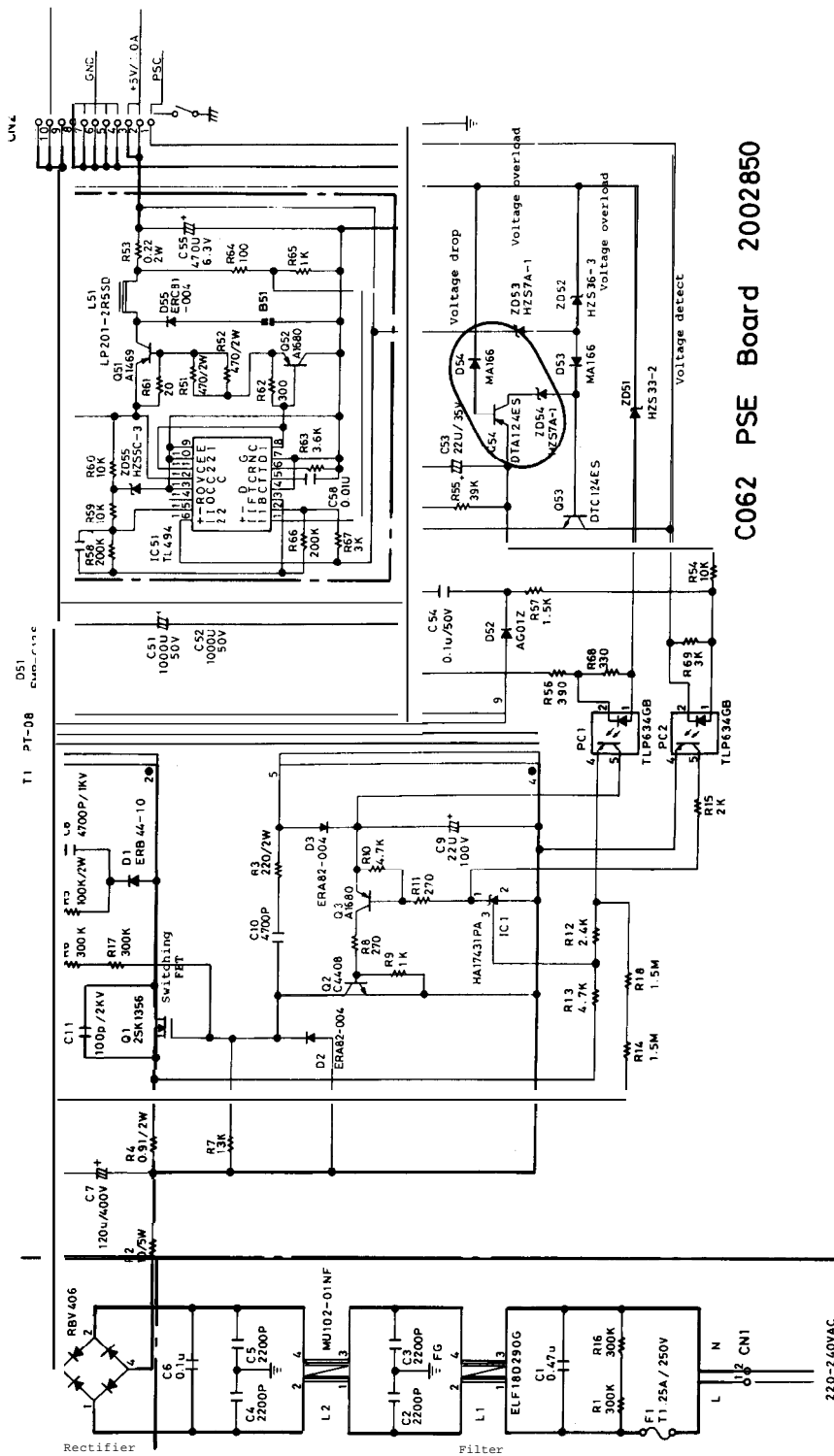


Figure A-6. BOARD ASSY., POWER SUPPLY (C062 PSE BOARD) Circuit Diagram (Annotated) 1

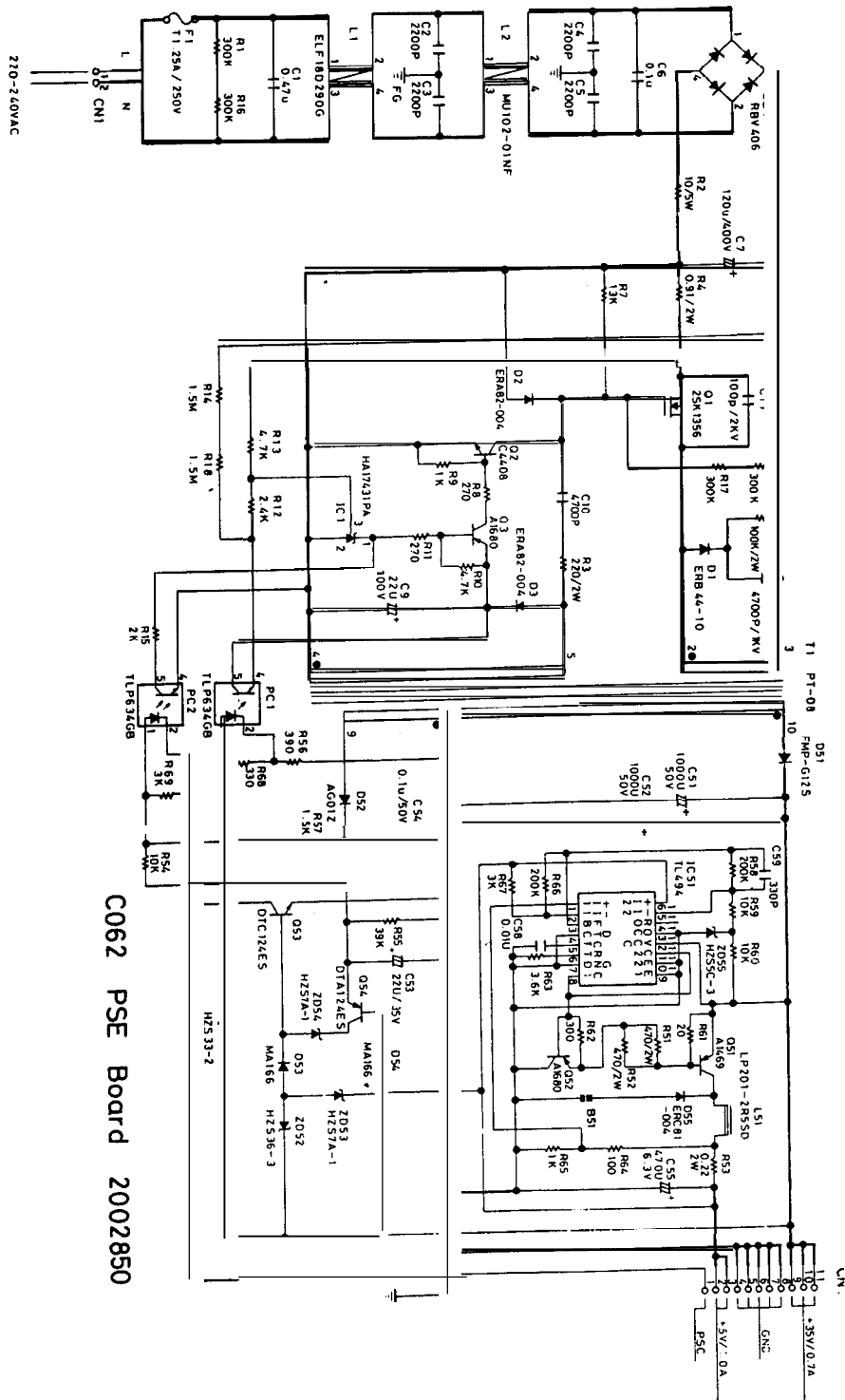


Figure A-7. BOARD ASSY., POWER SUPPLY (C062 PSE Board) Circuit Diagram

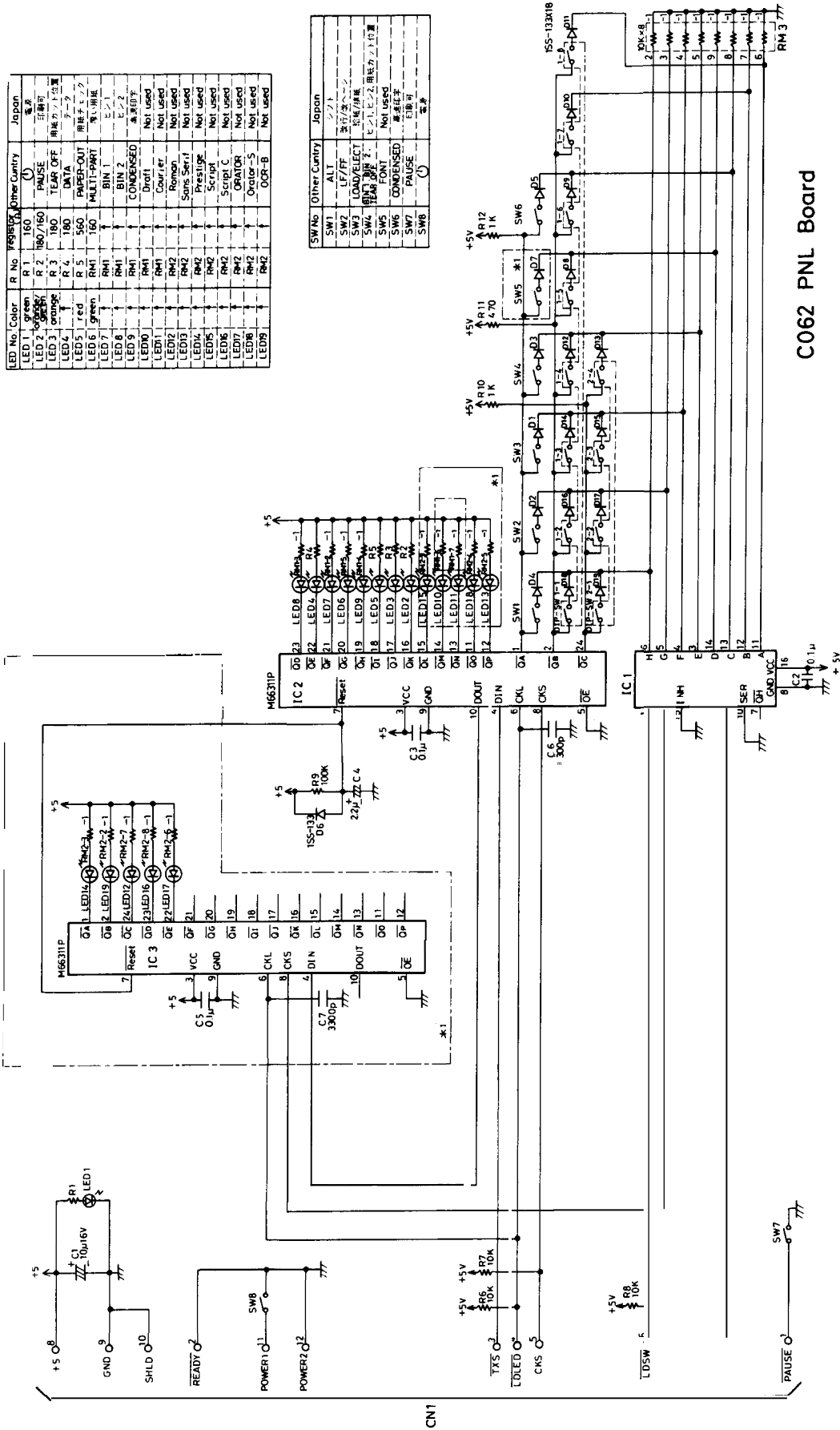


Figure A-8. BOARD ASSY., PANEL (C062 PNL BOARD) Circuit Diagram

# A-3. CIRCUIT BOARD COMPONENT LAYOUT

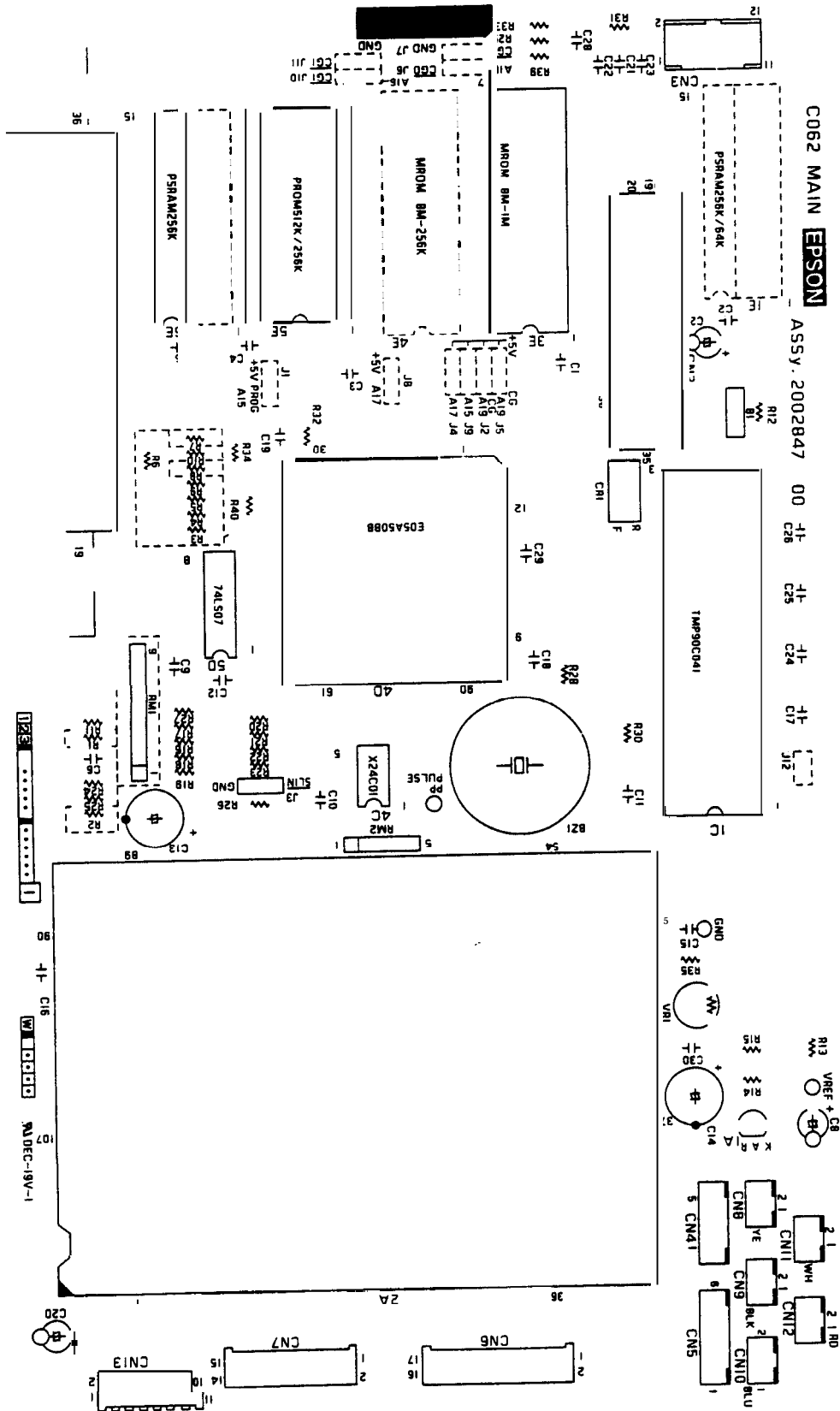


Figure A-9. BOARD ASSY., MAIN (C062 MAIN Board) Component Layout

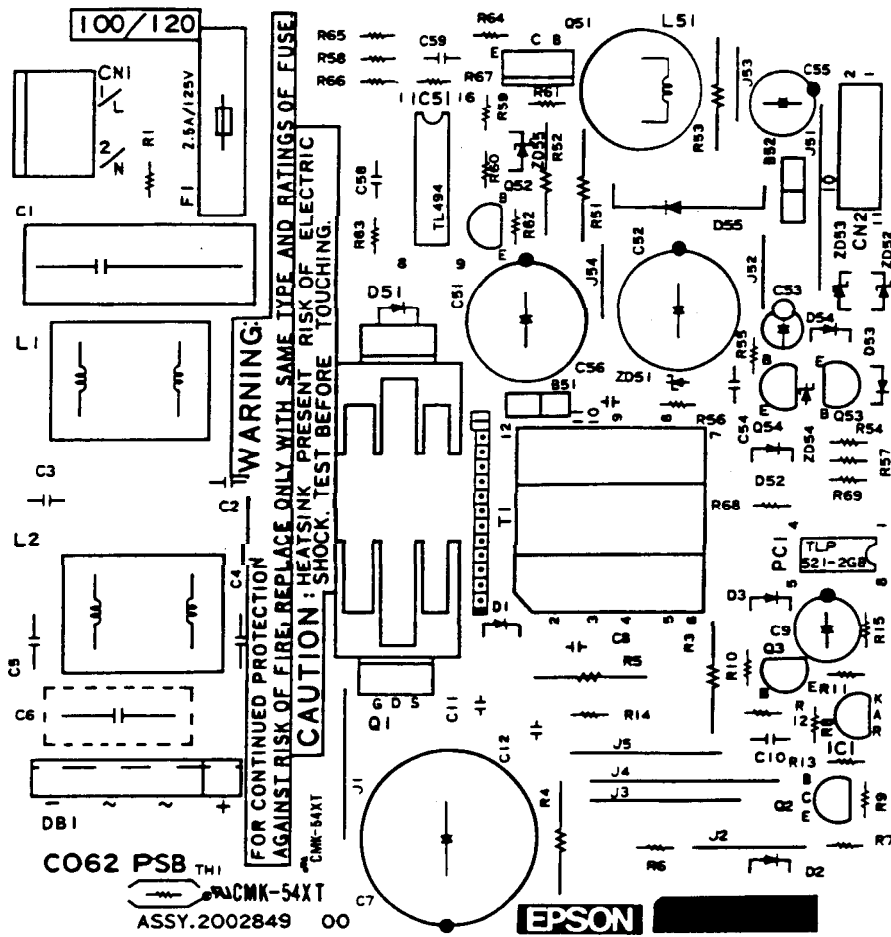


Figure A-10. BOARD ASSY., POWER SUPPLY (C062 PSB BOARD) Component Layout

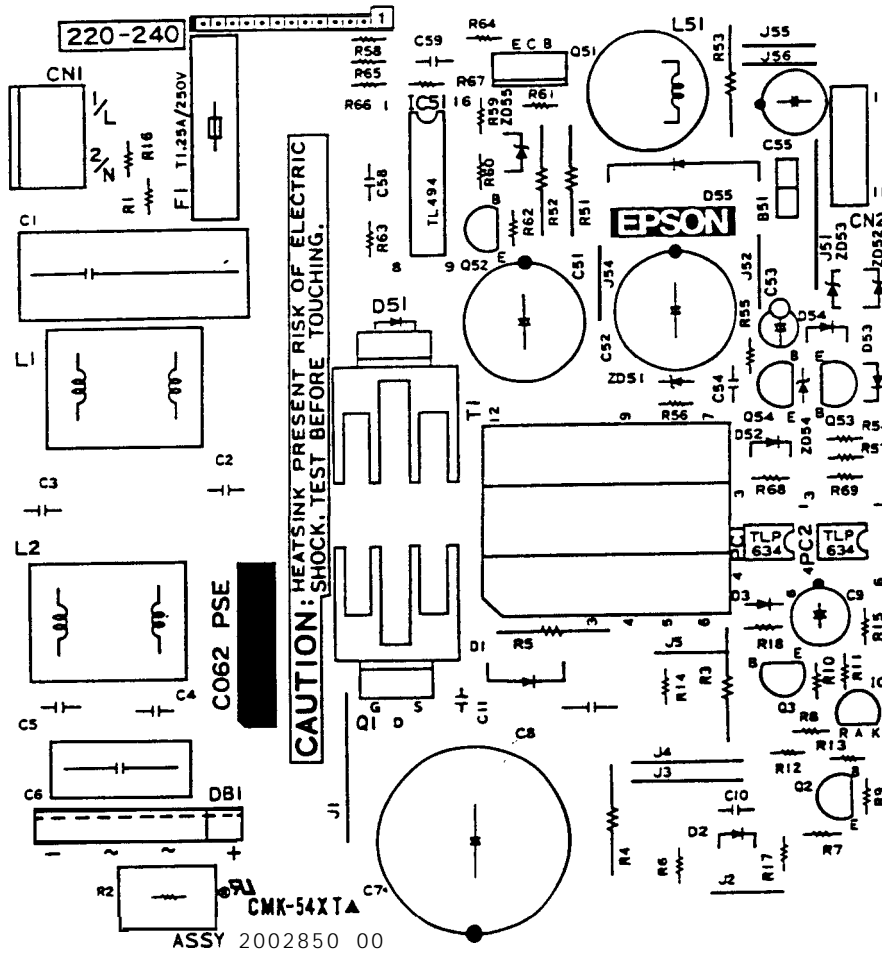


Figure A-1 1. BOARD ASSY., POWER SUPPLY (C062 PSE Board) Component Layout

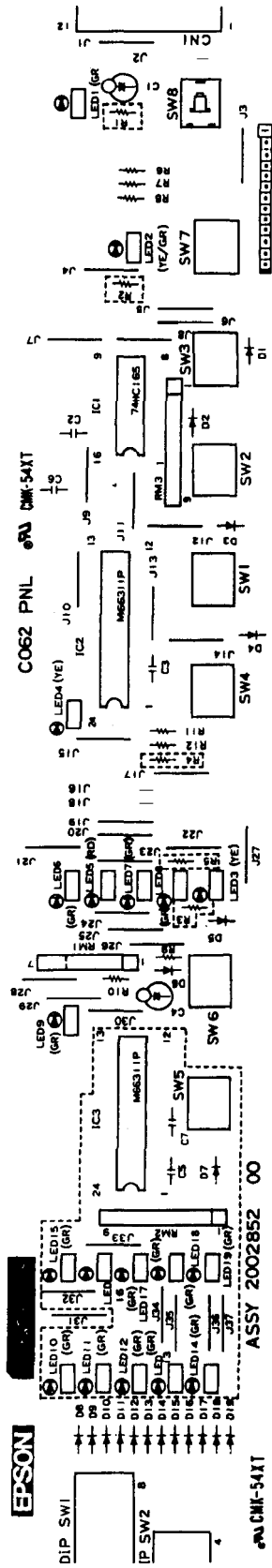


Figure A-1 2. BOARD ASSY., PANEL (C062 PNL BOARD) Component Layout

# A.4 EXPLODED DIAGRAM

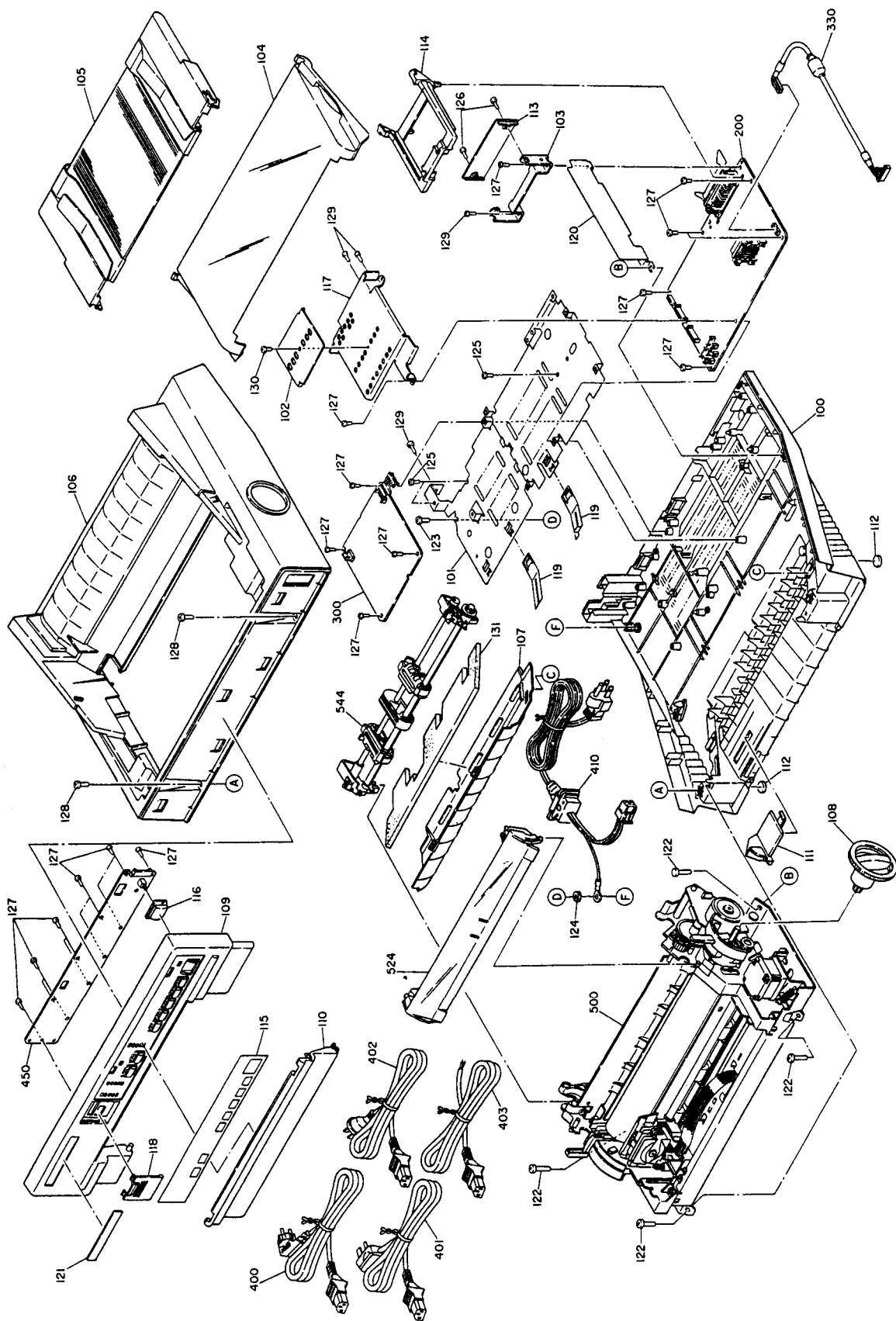


Figure A-1 3. LQ-570 Exploded Diagram



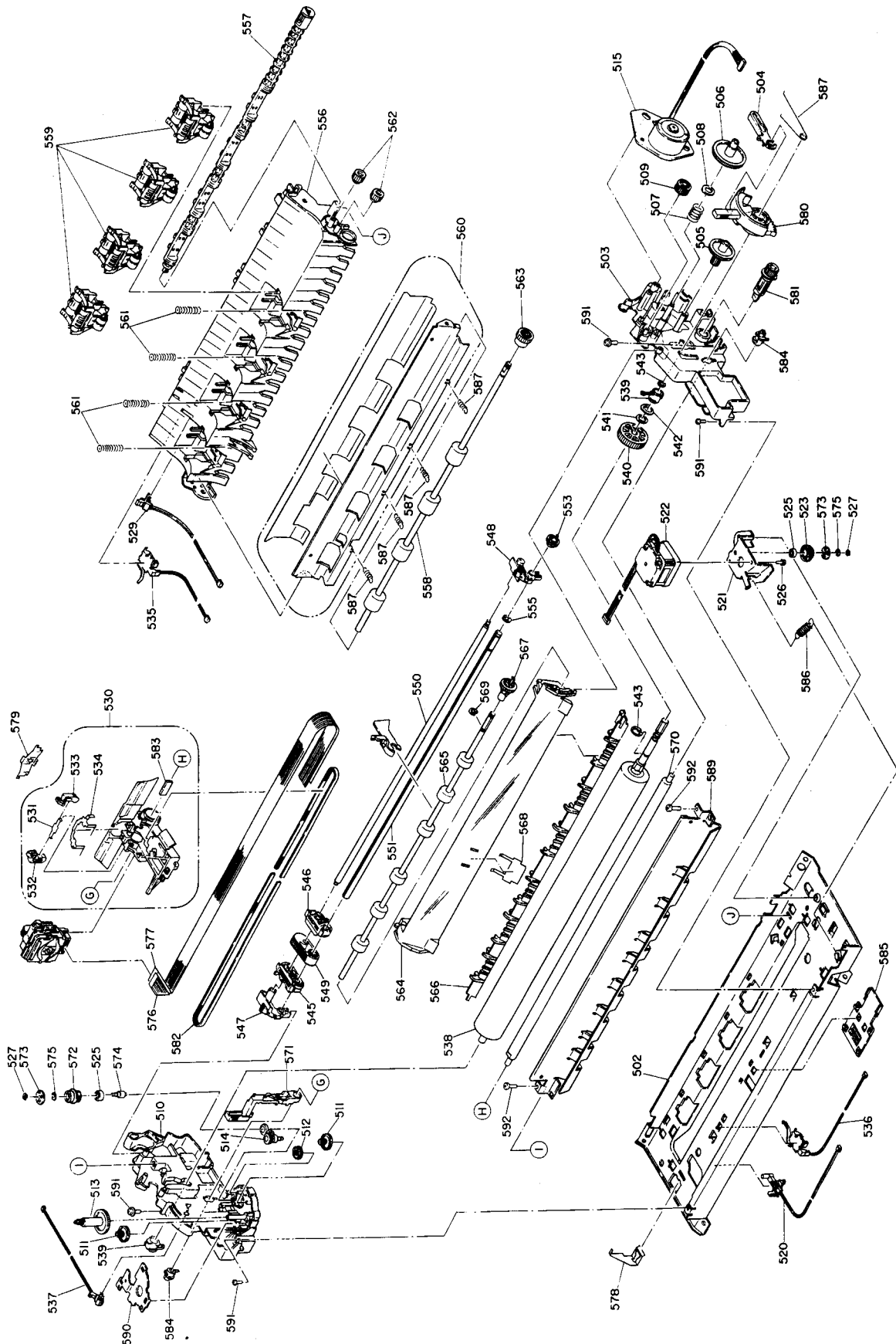


Figure A-16. Model-5E60 Exploded Diagram

Table A-1A Part No. Reference Table

Ref. No.	Description	Ref. No.	Description
100	HOUSING ASSY., LOWER	507	COMPRESSION SPRING, 200
101	SHIELD PLATE, BOTTOM	508	PLAIN WASHER (M5 X 16)
102	HOLDING PLATE, FFC	509	SPUR GEAR, 40
103	GROUNDING PLATE, I/F	510	FRAME, MAIN, LEFT
104	COVER ASSY., PRINTER FRONT	511	COMBINATION GEAR
105	FRAME ASSY., SHEET GUIDE	512	SPUR GEAR, 13.2
106	HOUSING ASSY., UPPER	513	RATCHET, RD
107	PAPER GUIDE, FRONT	514	LEVER ASSY., RIBBON PLANET
108	KNOB	515	MOTOR, PF
109	HOUSING, FRONT	520	DETECTOR, HP
110	COVER, FRONT	521	FRAME ASSY., CR, MOTOR
111	EDGE GUIDE, FRONT	522	MOTOR, CR
112	RUBBER FOOT	523	BELT PULLEY
113	COVER, CONNECTOR, UPPER	524	COVER ASSY., E
114	GUIDE, I/F BOARD	525	BALL BEARING
115	SHEET, PANEL	526	C. B.S.(O) SCREW
116	KEY TOP, POWER SWITCH	527	RETAINING RING TYPE-E(2.3)
117	SHIELD PLATE, MAIN BOARD	529	DETECTOR, RELEASE
118	COVER, DIP SWITCH	530	CARRIAGE ASSY.
119	GROUNDING PLATE	531	HEAD LOCK LEVER SPRING
120	SHIELD PLATE, RIGHT	532	HEAD LOCK LEVER (LEFT)
121	LOGO PLATE	533	HEAD LOCK LEVER (RIGHT)
122	C. B. B-TITE C. SCREW (M4 X 14)	534	GROUNDING PLATE, HEAD
123	C. B.(O) SCREW (M4 X 8)	535	DETECTOR, PE, REAR
124	HEXAGON NUT (M4)	536	DETECTOR, PE, FRONT
125	C. B. B(C). SCREW(M3 X 10)	537	DETECTOR, PLATEN
126	C. B. S-TITE C. SCREW (M3 X 10)	538	PLATEN
127	C. B. B(P). SCREW(M3 X 12)	539	BUSHING, 8
128	C. B. B(P). SCREW(M4 X 25)	540	SPUR GEAR, 34
129	C. B.A-LAMITITE(M3 X 6)	541	PLAIN WASHER 8X0.5 X 15
130	C.B. SCREW (M3 X 6)	542	LEAF SPRING 8.2X0. 15X 15
131	SOUND ABSORBER	543	RETAINING RING TYPE-C
200	BOARD ASSY., MAIN	544	TRACTOR ASSY.
300	BOARD ASSY., POWER SUPPLY	545	TRACTOR ASSEMBLY (LEFT)
301	FUSE	5 4 6	TRACTOR ASSEMBLY (RIGHT)
302	C.B.S. SCREW (M3 X 8)	547	FRAME, TRACTOR, LEFT
330	WIRE HERNESS	548	FRAME, TRACTOR, RIGHT
400	POWER CABLE VD3 1303SA-1 OA	549	PAPER SUPPORT
401	POWER CABLE (BS3 1303SA-SR)	550	TRACTOR GUIDE SHAFT
402	POWER CABLE (AS3 1303S1)	551	SHAFT, TRACTOR
403	POWER CABLE VDO0303SA-1 OA	552	LEVER, TR, FRAME
410	POWER CABLE ASSEMBLY	553	SPUR GEAR, 17
411	POWER CABLE ASSEMBLY	554	COMPRESSION SPRING, 150
412	WIRE HERNESS	555	RETAINING RING TYPE-E(6)
450	BOARD ASSY., PANEL	556	PAPER GUIDE
500	PRINTER MECHANISM M-5E10	557	SHAFT, RELEASE
502	FRAME, MAIN, BASE	558	ROLLER ASSY., PF, DRIVE
503	FRAME, MAIN, RIGHT	559	LEVER ASSY., PF
504	CAM, CLUTCH, TRACTOR	560	PAPER GUIDE ASSY., SUPPORT
505	COMBINATION GEAR, 8.5, 30	561	COMPRESSION SPRING, 1300
506	SPUR GEAR, 40	562	SPUR GEAR, 11.5
		563	SPUR GEAR, 18
		5 6 4	COVER, EJ
		5 6 5	ROLLER ASSY., EJ
		5 6 6	COVER, PLATEN, UPPER

Table A-14. Part No. Reference Table (Cont.)

Ref. No,	Description	Ref. No,	Description
567	SPUR GEAR, 17		
568	PAPER TENSION SPRING		
569	RETAINING RING TYPE-E(5)		
570	SHAFT, CR, GUIDE		
571	LEVER, G, ADJUST		
572	PULLEY, DRIVEN		
573	BELT PULLEY FLANGE		
574	SHAFT, DRIVEN, PULLEY		
575	PLAIN WASHER 3.2 XO.5 X 7		
576	CABLE, HEAD, FRONT		
577	CABLE, HEAD, REAR		
578	GROUNDING PLATE, CR		
579	RIBBON MASK		
580	LEVER, RELEASE		
581	SHAFT, RELEASE, SUPPORT		
582	TIMING BELT		
583	OIL PAD		
584	BUSH, PARALLEL, ADJUST		
585	HOLDER, HEAD CABLE		
586	EXTENSION SPRING, 778		
587	EXTENSION SPRING, 32		
589	COVER, PLATEN, LOWER		
590	COVER, RD		
591	C. B. S-TITEC.(P2) SCREW (M3 X 10)		
592	C. B. P-TITE C. SCREW (M3x 10)		

REV.-A

# A.5 CASE OUTLINE DRAWING

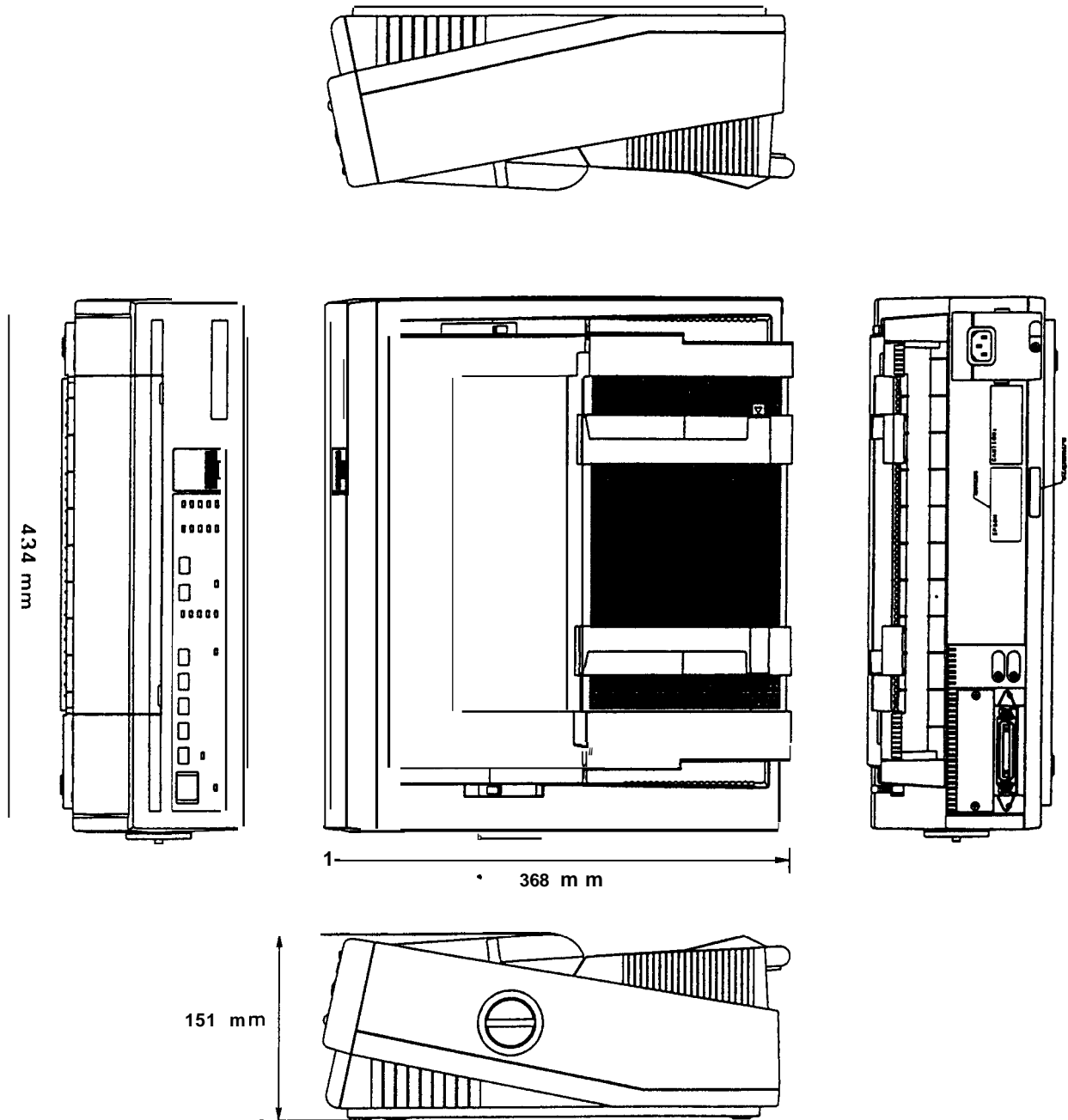


Figure A-1 7. LQ-570 Case Outline Drawing

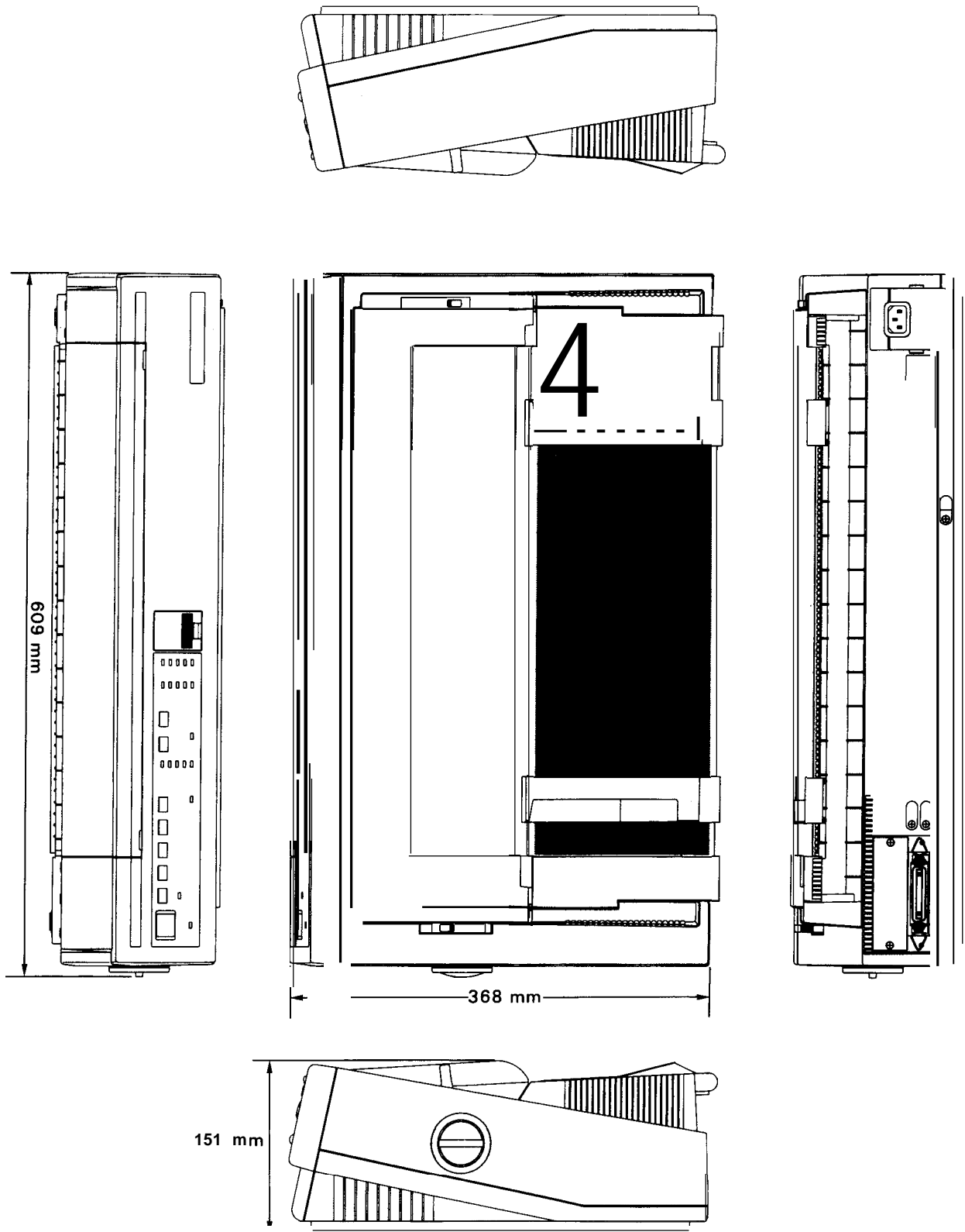


Figure A-1 8. LQ-1070 Case Outline Drawing

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