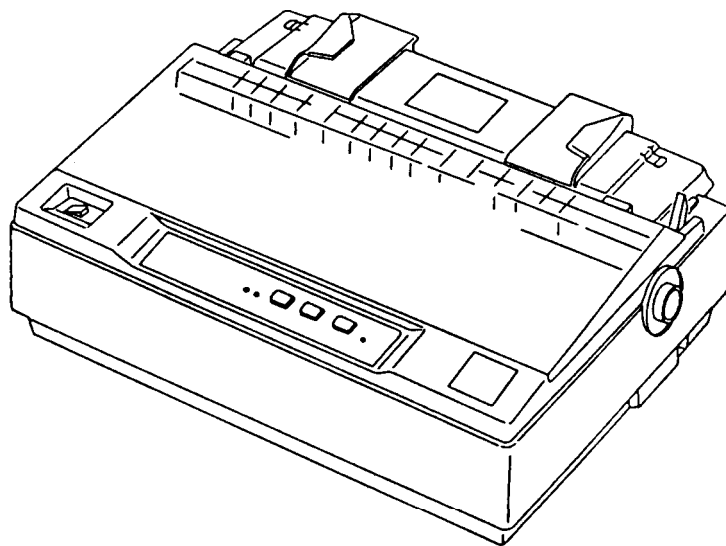


EPSON TERMINAL PRINTER
LX-300

SERVICE MANUAL



EPSON

4003276

PRECAUTIONS

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

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

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

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

DANGER

1. ALWAYS DISCONNECT THE PRODUCT FROM BOTH THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURE.
2. NO WORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIAR WITH BASIC SAFETY MEASURES AS DICTATED FOR ALL ELECTRONICS TECHNICIANS IN THEIR LINE OF WORK.
3. WHEN PERFORMING TESTING AS DICTATED WITHIN THIS MANUAL, DO NOT CONNECT THE 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 AVAILABLE POWER SOURCE, DO NOT CONNECT IT TO THE POWER SOURCE.
3. ALWAYS VERIFY THAT THE EPSON PRODUCT HAS BEEN DISCONNECTED FROM THE POWER SOURCE BEFORE REMOVING OR REPLACING PRINTED CIRCUIT BOARDS AND/OR INDIVIDUAL CHIPS.
4. IN ORDER TO PROTECT SENSITIVE MICROPROCESSORS AND CIRCUITRY, USE STATIC DISCHARGE EQUIPMENT, SUCH AS ANTI-STATIC WRIST STRAPS, WHEN ACCESSING INTERNAL COMPONENTS.
5. REPLACE MALFUNCTIONING COMPONENTS ONLY WITH THOSE COMPONENTS BY THE MANUFACTURE; INTRODUCTION OF SECOND-SOURCE **ICs** OR **OTHER** NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of LX-300.

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

CHAPTER 1. PRODUCT DESCRIPTION

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

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

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

CHAPTER 4. ADJUSTMENTS

Includes a step-by-step guide for adjustment.

CHAPTER 5. TROUBLESHOOTING

Provides Epson-approved techniques for adjustment.

CHAPTER 6. MAINTENANCE

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

APPENDIX

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

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

REVISION SHEET

Revision	Issue Date	Revision Page
Rev. A	April 6, 1994	1st issue

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CHAPTER 1 Product Description

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1.1 FEATURES

The LX-300 is a small, light-weight, 9-pin **serial** impact dot-matrix color printer suitable for personal use. The major features of this printer areas follows:

- ❑ Fast printing of **10-cpi** draft characters at 220 cps
- ❑ Compact design saves precious workspace
- ❑ Easy-to-operate panel
- ❑ Quiet printing
- ❑ Standard 8-bit parallel interface and **EIA-232D** serial interface
- ❑ Printing of up to 66 lines on **A4-size** or 62 lines on letter-size paper
- ❑ Optional color printing using a color ribbon (black, magenta, cyan, yellow)
- ❑ Detachable push and pull tractor

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

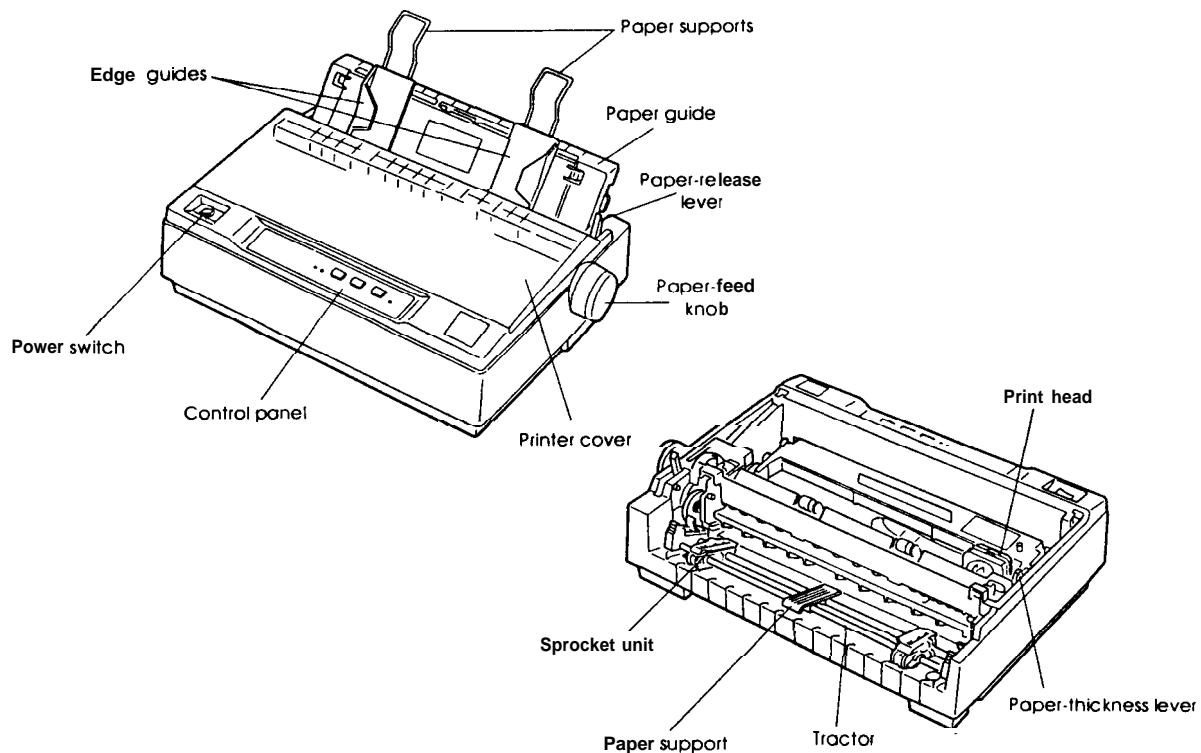


Figure 1-1. Exterior View of the LX-300

Table 1-1. Optional Units

Model	Description
#8750	Ribbon cartridge (monochrome)
#8758	Ribbon cartridge (monochrome, sub-cartridge)
S015073	Ribbon cartridge (color)
C80837*	Single-bin cut sheet feeder
C83208*	Color upgrade kit
C80030*	Pull tractor unit
#8310	Roll paper holder

1.2 SPECIFICATIONS

This section provides detailed information about the LX-300.

1.2.1 Hardware Specifications

Printing method:	Serial impact dot matrix
Pin configuration:	9 wires
Pin diameter:	0.29 mm

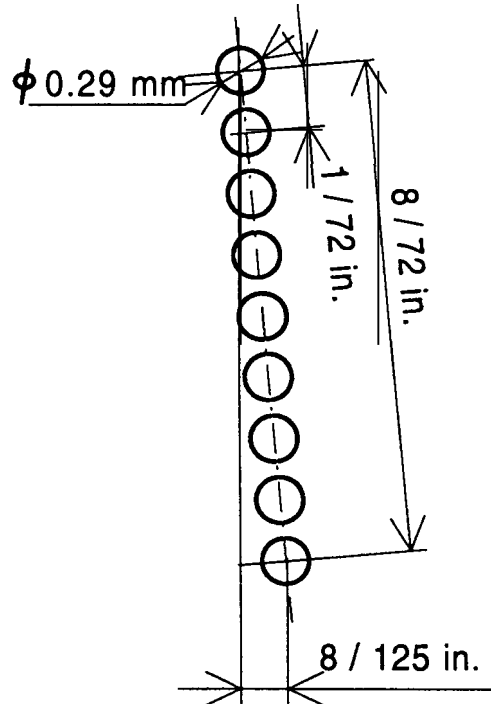


Figure 1-2. Pin Configuration

Printing direction:	Bidirectional with logic seeking for draft text with monochrome printing. Unidirectional printing for graphics, NLQ text, bit image, and color printing.
---------------------	---

1.2.1.1 Paper Handling Specifications

Feeding system:	Friction feed or tractor (push and pull) feed
Feeding method	
Cut sheets:	Manual insertion (top entry) and feeding with the optional cut sheet feeder (CSF)
Continuous paper:	Push and pull tractor feeding
Feeding pitch:	1/8 inch, 1/8 inch, or programmable feeding in increments of 1/16 inch, minimum
Paper paths	
Cut sheet path:	Top entry (manual insertion or the optional CSF)
Continuous paper paths:	Rear entry (push tractor feed) Rear entry (pull tractor feed)
Continuous paper parking:	Possible, using push tractor
CSF:	Single bin, manual insertion using optional CSF (top entry)
Paper-feeding speed:	See Table 1-2.

Table 1-2. Feeding Speed

Feeding	1/8 inch Line Feed	Continuous Feed
Friction	79 ms/line	2.78 inches/second
Tractor (single)		
Tractor (double)	96 redline	2.08 inches/second

Friction feed

- Set the release lever to the friction position.
- . When a sheet is inserted into the top slot, place its left edge at the marked position.
- . **Do not perform** reverse feeds greater than **0.27 inch (6.8 mm)**.

Push tractor feed

- . Set the release lever to the tractor position.
- . **Do not perform** reverse feeds greater than 0.27 inch (6.8 mm).
- . During printing of labels, never perform reverse feeding.
- . After printing labels, do not eject them from the rear.

Pull tractor feed

- 0 Remove the tractor unit from the push position and mount it in the pull position.
- Do not perform reverse feeding.

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

Table 1-3. Adjust Lever Settings

Lever Position	Paper Thickness
0	0.065 mm -0.16 mm (0.0026 in. -0.0063 in.)
1	0.16 mm -0.25 mm (0.0063 in. -0.0098 in.)
2	0.25 mm -0.48 mm (0.0098 in. -0.0189 in.)

1.2.1.2 Paper Specifications

Table 1-4. Specifications for Cut Sheet Paper (Manual Insertion)

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

Table 1-5. Specifications for Cut Sheet Paper (CSF)

Size	A4 (W x L: 210 mm (8.3 in.) x 297 mm (11.7 in.)) Letter (W x L: 216 mm (8.5 in.) x 279 mm (11.0 in.))
Thickness	0.065 mm -0.14 mm (0.0025 in. -0.0055 in.)
Weight	64-90 g/m ² (17 -24 lb.)
Quality	Plain paper, recycled paper

Table 1-6. Envelope Specifications

Size	NO.6 Width 166 mm x Length 92 mm (6.5 in. x 3.6 in.) No.10 Width 240 mm x Length 104 mm (9.5 in. x 4.1 in.)
Thickness	0.16 mm - 0.48 mm (0.0063 in. -0.019 in.)
Weight	45-90 g/m ² (12 -24 lb.)
Quality	Bond paper (not curled, folded, or crumpled), plain paper, airmail paper

- Notes:**
- Printing of envelopes is guaranteed only when the temperature is room temperature and humidity is normal (15 - 25° C (59 - 77° F), 20- 60% RH).
 - Variations in envelope thickness must be less than 0.25 mm (0.0098 in.).
 - When inserting envelopes, keep the longer side horizontal.

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

Width	101.6 mm - 254 mm (4.0 in. - 10.0 in.)
Total thickness	0.065 mm- 0.25 mm (0.0025 in. - 0.0098 in.)
Weights	52.3- 82 g/m ² (4-22 lb. —) not multi-part 40- 58.2 g/m ² (2 - 15 lb. —) multi-part
copies	3 sheets (1 original + 2 copies)
Quality	Plain paper, recycled paper, carbonless multi-part paper

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

Label size (W x L)	63.5 mm (min.) x 23.8 mm (min.) [2.5 in. (min.) x 15/16 in. (min.)]
Width of base paper	101.6 mm -254 mm (4.0 in. x 10.0 in.)
Thickness of base paper	0.07 mm - 0.09 mm (0.0028 in. - 0.0035 in.)
Total thickness	0.16 mm - 0.19 mm (0.0063 in. -0.0075 in.)
Weight	64g/m2(17 lb.)
Quality	Plain paper

- Notes:
- Use only continuous-type labels and use them only with the tractor.
 - Example of labels — Avery Continuous Form Labels
— Avery Mini-Line Labels
 - Printing of envelopes is guaranteed only when the temperature is room temperature and humidity is normal (15 - 25° C (59 - 77° F), 20- 60% RH).

Table 1-9. Roll Paper Specifications

Width	213 mm -219 mm (8.38 in. -8.62 in.)
Diameter	127 mm (5.0 in.)
Thickness	0.070 mm -0.090 mm (0.0028 in. - 0.0035 in.)
Weight	52- 64 g/m ² (14 -1.7 lb.)

1.2.1.3 Printable Area

Cut sheets using manual insertion

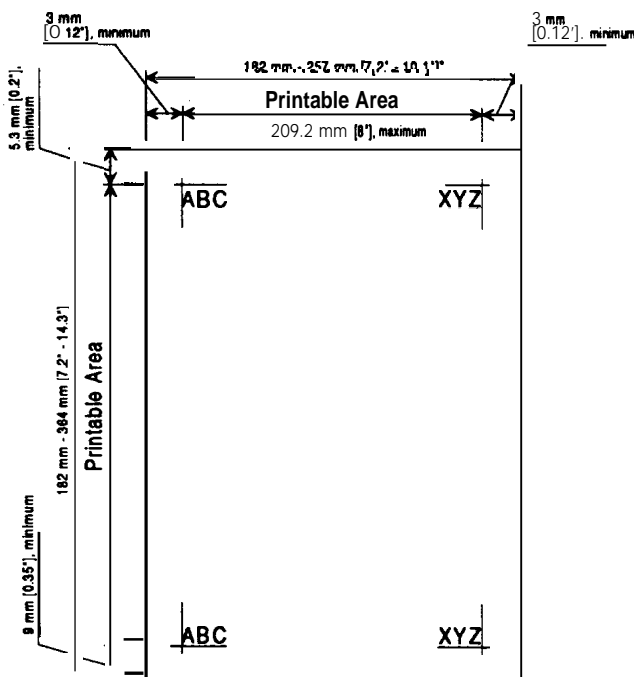


Figure 1-3. Printable Area for Cut Sheets Using Manual Insertion

Cut Sheets Using the CSF

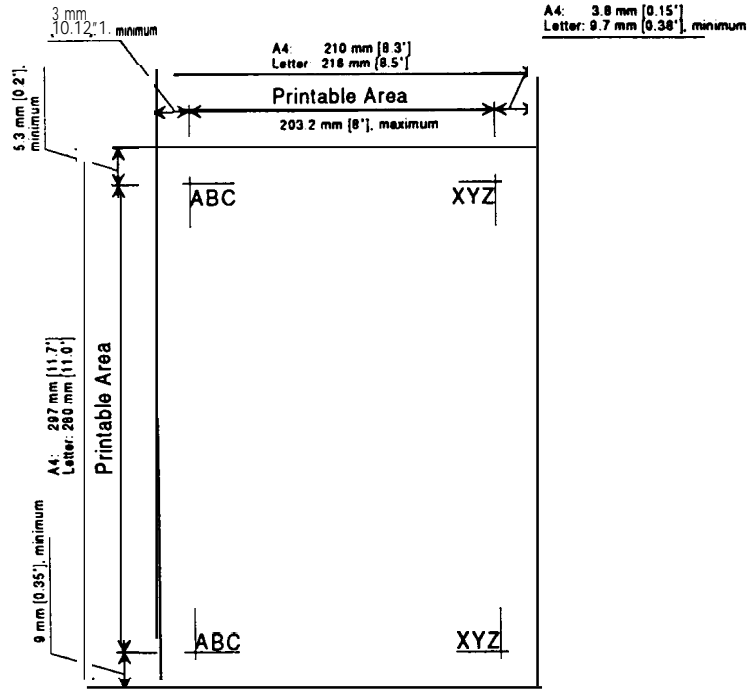
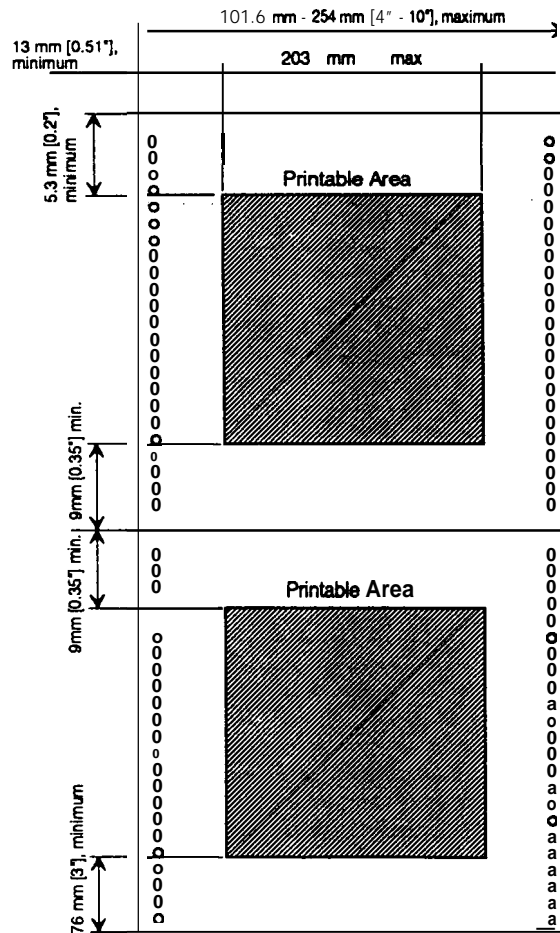


Figure 1-4. Printable Area for Cut Sheets Using the CSF

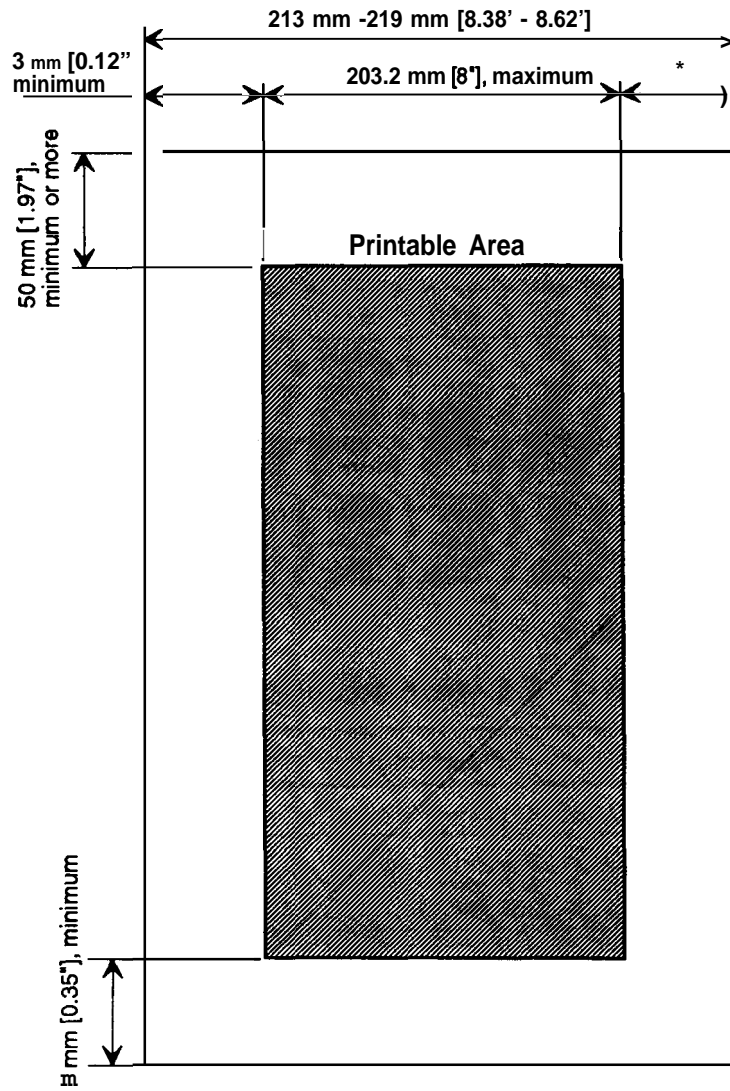
Continuous paper



* 13 mm (0.51") or more when paper width of 101.6 mm (4") to 241.3 mm (9.5") is used
 30 mm (1. W) or more when paper width of 254 mm (10") is used.

Figure 1-5. Printable Area for Continuous Paper

Roll paper



* 9.8 mm (0.39") or more when a paper width of 216 ± 3 mm is used.

Figure 1-6. Printable Area for Roll Paper

1.2.1.4 Ribbon Specifications

Ribbon cartridge (mono):	#8750
	#8758 (sub-cartridge)
Ribbon cartridge (color):	S015073
Ribbon color:	Black, magenta, cyan, yellow
Black ribbon life:	3 million characters (14 dots/character)
Color ribbon life	
Black:	1 million characters (14 dots/character)
Magenta:	0.7 million characters (14 dots/character)
Cyan:	0.7 million characters (14 dots/character)
Yellow:	0.5 million characters (14 dots/character)

1.2.1.5 Electrical Specifications

Table 1-10. Electrical Specifications

Description	120 V Version	220-240 V Version
Rated voltage	120 VAC	220-240 VAC
Input voltage range	103.5-132 VAC	198-264 VAC
Rated frequency range	50-60 Hz	
Input frequency range	49.5 -60.5 Hz	
Rated current	1.0 A	0.5 A
Power consumption	30 W (self-test in 10 cpi draft)	
Insulation resistance	10 MΩ, minimum (applying 500 VDC between AC line and chassis)	10 MΩ, minimum (applying 500 VDC between AC line and chassis)
Dielectric strength	1000 VAC ma for 1 minute or 1200 VAC rms for 1 second (between AC line and chassis)	1500 VAC rms for 1 minute (between AC line and chassis)

1.2.1.6 Environmental Conditions

Table 1-11. Environmental Conditions

Description	Operating	Storage
Temperature	5to 35° C (41 - 95° F) (*1)	-20to 55° c (-4 - 131° F) (*2)
Humidity	30 to 80% RH (*1,*3)	5 to 85% RH (*2,*3)
Resistance to vibration	0.25 G, 55 Hz (*1)	0.50 G, 55 Hz (*2)

*1= Operating conditions must be within this range.

*2= When the printer is in the shipping container.

*3 = Without condensation.

1.2.1.7 Reliability

MTBF: 4000 power on hours (POH)

Printhead life: 200 million strokes/wire (with monochrome ribbon)
100 million strokes/wire (with color ribbon)

1.2.1.8 Safety Approvals

Safety standards: U.S. version: UL1950 with D3, CSA22.2 #950 with D3
European version: EN 60950 (TÜV)
IEC950 (SEMKO, DEMKO, NEMKO, SETI)

Radio frequency interference: (RFI) U.S. version: FCC part 15 subpart B class B
European version: Vfg.243 (VDE0878 part 3, part 30)
EN55022 (CISPR PUB. 22) class B

1.2.1.9 Physical Specifications

Dimensions (W x D x H): 366 x 275 x 132 (mm) (14.4 x 10.8 x 5.20 (inches)
(without pull tractor)

Weight: 4 kg (8.8 lb.) without pull tractor

1.2.2 Firmware Specifications

Control codes: EsC/r
 Input data buffer: 4KB
 Character sets: 13 international character sets
 Character tables: See the table below.

Table 1-12. Character Tables

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

0 Supported x Not supported
 * NLSP = National Language Support

Bitmap fonts: ^{LS} EPSON NLQ Roman
 EPSON NLQ Saris Serif
 EPSON DRAFT

Character size: 10.5 points

Character matrix: Draft 10 cpi; 11 horizontal dots, 9 vertical dots
 NLQ 10 cpi; 23 horizontal dots, 18 vertical dots

Print mode

Draft mode: Double-width Condensed Emphasized
 Double-strike Underlined Italics
 Super/subscript

NLQ mode: Double-width Emphasized Underlined
 Italics Super/subscript

Printing speed: See Table 1-13.

Printable columns: See Table 1-13.

Table 1-13. Printing Speed

Printing Mode	Character Pitch	Printable Columns	Maximum Print Speed [cps]	
			Monochrome	Color
Draft	10 cpi	80	220 (165)	165 (1 65)
Draft	12 cpi	96	264 (198)	198 (198)
Draft condensed	17.1 cpi	137	188 (141)	
Draft condensed	20 cpi	160	220 (165)	
Draft emphasized	10 cpi	80	110 (83)	
Draft double width	5 cpi	40	110 (83)	
NLQ	10 cpi	80	44 (33)	
NLQ	12 cpi	96	53 (40)	
NLQ double width	5 cpi	40	22 (16)	

Notes: Data in parentheses indicates the speed on a line containing at least one of the following:

- A line containing a userdefined character.
- A line containing one of the 50 characters corresponding to hex codes BO to DF and F4 and F5.
- A line that is printing when printhead driving voltage drops from over-duty printing. (When voltage drops below the lower limit, the printer stops printing in the middle of the line, and then prints the rest of the line at a slower speed.)

Table 1-14. Resolution

Printing Mode	Horizontal Density	Vertical Density	Adjacent Dot Print
Draft	120 dpi	72 dpi	No
Draft condensed	240 dpi	72 dpi	No
Draft emphasized	120 dpi	72 dpi	Yes
NLQ	240 dpi	144 dpi	No
Bit image	60 dpi	72 dpi	Yes
	72 dpi	72 dpi	Yes
	80 dpi	72 dpi	Yes
	90 dpi	72 dpi	Yes
	120 dpi	72 dpi	Yes
	120 dpi	72 dpi	No
	240 dpi	72 dpi	No

1.3 INTERFACE SPECIFICATIONS

LX-300 has parallel interface and serial interface, one of which can be selected in default setting mode. Auto selection is also available.

1.3.1 Parallel Interface Specifications

The LX-300 is equipped with an 8-bit parallel interface, standard.

Data format:	8-bit parallel
Synchronization:	By STROBE pulse synchronization
Handshaking:	By BUSY and ACKNLG signals
Signal level:	TTL-compatible level
Adaptable connector:	%-pm 57-30360 (Amphenol) or equivalent
Data transmission timing:	See Figure 1-7.

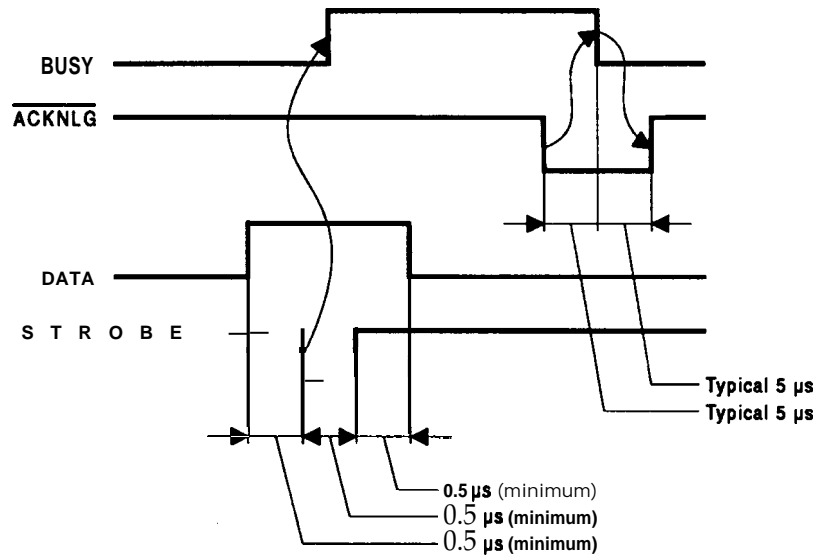


Figure 1-7. Data Transmission Timing

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

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

- During data reception (See Figure 1-7.)
- When the **input** buffer is full
- When the INIT input signal is active
- During initialization
- When the ERROR signal is active
- During the self-test mode
- During the default-setting mode

The **ERROR** signal is active (LOW) under the following conditions:

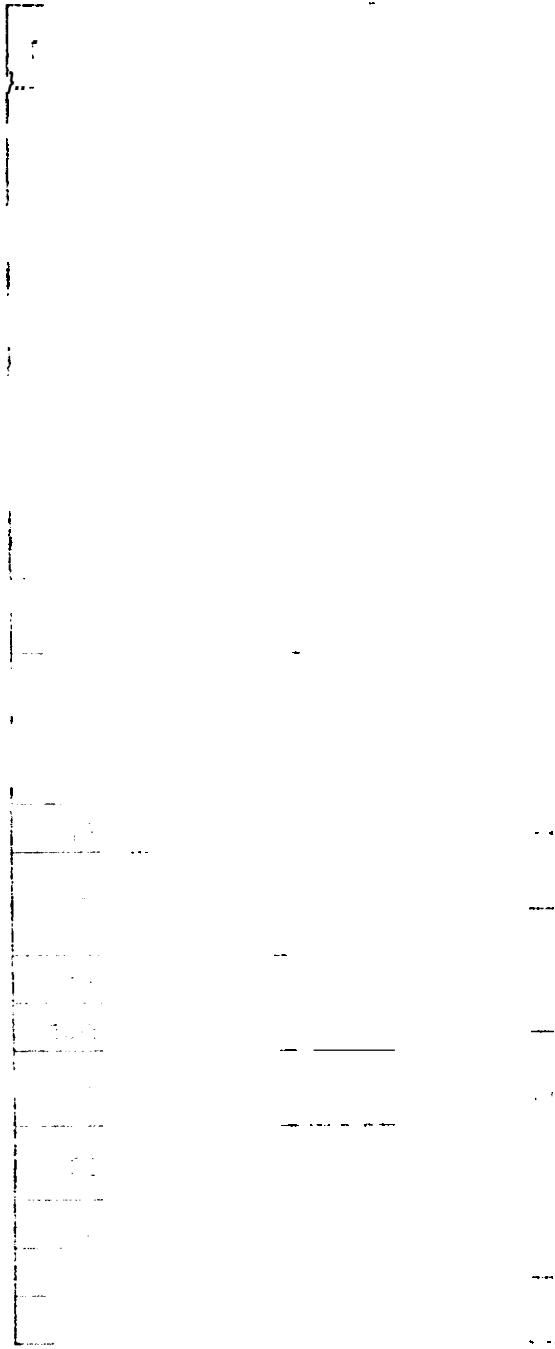
- When a paper-out error occurs
- When a release lever operation error occurs
- When a fatal error occurs

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

- When a paper-out error occurs

ts and signal functions for the 8-bit parallel interface.

Pin Assignments for Parallel Interface



Description
The STROBE pulse is used to read the input data. The pulse width must be more than 0.5 p.s. Input data is latched after the falling edge of this signal.
Parallel input data to the printer. A HIGH level means data 1. A LOW level means data 0.
This pulse indicates data has been received and the printer is ready to accept more data. The pulse width is approximately 12 pa.
HIGH indicates the printer cannot accept more data.
HIGH indicates paper-out. This signal is effective only when the ERROR signal is LOW.
Always HIGH output. (Pulled up to +5V through 3.3 KΩ resistor.)
If the signal is LOW when the printer is initialized a line feed is automatically performed upon receipt of the CR code (auto LF).
Not used.
Signal ground.
Chassis ground. In the printer, chassis ground and signal ground are short-circuited.
A HIGH level means that printer power is on.
Signal ground.
Input for printer initialization. Pulse width 50 μs minimum, active LOW.
LOW indicates that some error has occurred in the printer.
Signal ground.
Pulled up to +5V through 1 KΩ resistor.
Ignored.

of the signal as viewed from the printer.

1.3.2 Serial Interface Specifications

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

Data format: EIA-232D serial
 Synchronization: Asynchronous
 Handshaking: By DTR signal and X-ON/X-OFF protocol

DTR and X-ON/X-OFF Protocol

State	Buffer Space	DTR	X-ON/X-OFF
Busy	Less than 256 bytes	off	X-OFF
Ready	More than 512 bytes	On	X-ON

ETX/ACK Protocol

State	Buffer Space	Response Code
Busy	Less than 256 bytes	NAK
Ready	256 bytes or more	ACK

Word length

Start bits: 1 bit
 Data bits: 7 or 8 bit (selectable)
 Parity bit: 0 or 1 bit (selectable)
 Stop bits: 1 bit (transmitting)
 1 bit or more (receiving)

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

Logic level

MARK (logical 1): -3 V to -25 V
 SPACE (logical 0): **+3 v to +25 v**

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

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

Table 1-16. Signal and Connector Pin Assignments for Serial Interface

Pin No.	Signal Name	110*	Description
1	FG	—	Chassis ground.
2	TXD/SD	out	Transmit serial data.
3	RXD/RD	In	Receive serial data.
4	RTS/RS	out	<i>This signal is always at the positive EIA level.</i>
5	CTS/CS	In	Ignored.
7	SG	—	Return path for data and control signals.
11,20	DTR/ER	out	This signal is at the positive EIA level when the printer is ready to accept data entry and at the negative EIA level when the printer is not ready to accept data entry.
6,8-10,12-19,21-25	NC	—	No connection (not used).

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

1.4 OPERATING INSTRUCTIONS

This section describes control panel operation functions, self-test, hexadecimal dump, demonstration functions, and printer initialization methods.

1.4.1 Control Panel Operation

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

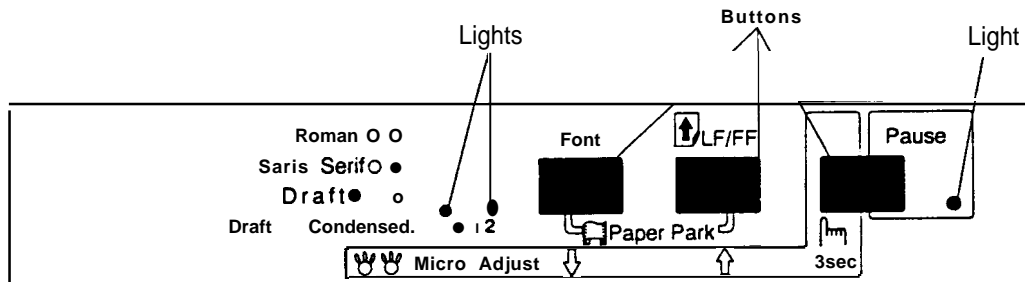


Figure 1-8. Panel Appearance

Paper Feeding

- Load: Press the **LF/FF** button.
- Load (manual insertion): Press the **LF/FF** button or the printer waits 2 seconds after insertion of a cut sheet to load paper automatically.
- Line feed: Press the **LF/FF** button once.
- Eject cut sheet: Hold down the **LF/FF** button continuously.
- Form feed (continuous): Hold down the **LF/FF** button continuously.
- Paper park (continuous): Press the **FONT** and **LF/FF** buttons at the same time.
- Tear-off (continuous): Only uses auto tear-off function.

Character Selection

- Font selection: Press the **FONT** button.
- Pitch selection: Selectable in default-setting mode: 10 **cpi.** or 12 **cpi.**
- Condensed selection: Press the **FONT** button. Only draft condensed is selectable.

Enter **Special** Mode

- Self-test mode: Hold down the **LF/FF** button and turn on the printer.
- Default-setting mode: Hold down the **FONT** button and turn on the printer.
- Hex dump mode: Hold down the **LF/FF** and **FONT** button and turn on the printer.
- Demonstration mode: Not available.

1.4.2 Self-test Function

This section explain how to run the self-test.

1. Hold down the **LF/FF** button and turn on the printer to start the self-test.
2. If paper is not loaded, the printer attempts to load it.
3. If the printer **cannot** load paper, it indicates this by turning on the **PAUSE** light. In this case, insert paper again and press the **LF/FF** button.
4. The printer prints alphanumeric characters continuously.
5. Quit self-test mode printing by pressing the **PAUSE** button and turning the printer off.

1.4.3 Hexadecimal Dump Function

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

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

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

1.4.4 Printer Status Indication

It describes how this printer indicates status and error conditions using **LEDs** and the beeper.

The symbols below describe the frequency of beeper sounds.

(●): The beeper sounds **for** 100 rns with an interval of 100 ms between beeps.

(—): The beeper sounds **for 500 ms with an interval of 100 ms** between beeps.

While initialize signal is active:	PAUSE light is on.
During initialization:	PAUSE light blinks and beeper sounds
Ready to print or printing:	PAUSE light is off
Paper-out error:	Beeper sounds (●●●) and PAUSE light blinks. (light on:off ratio= 6:1)
Tear-off:	PAUSE light blinks (light on:off ratio= 1:6)
Operating error, fatal error:	Beeper sounds (————) and PAUSE light is on.

1.4.5 Selected Font

The combination of two **FONT LEDs** (1 and 2) is used to indicate the selected font.

Table 1-17. Font Selection

Selected Font	FONT 1	FONT 2
Roman	ON	ON
Saris Serif	ON	OFF
Draft	OFF	ON
Draft condensed	OFF	OFF

1.4.6 Paper Position Adjustments

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

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

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

1.4.7 Printer Initialization

There are two types of initialization: hardware initialization and software initialization.

1.4.7.1 Hardware Initialization

Hardware initialization is performed by:

- . Turning on the printer.
- . **Sending the parallel interface the INIT signal.**
(If the INIT signal is active when the printer is turned on, hardware initialization is started when the INIT signal becomes **inactive**.)

When hardware initialization is performed:

- . The printer mechanism is initialized.
- . Print data in the input buffer is cleared.
- . Download character definitions are cleared.
- . The printer's settings are returned to the defaults.
- . The printer is set to the standby condition, if no fatal error occurs.
- . Continuous paper home-seeking is performed.

In continuous paper home-seeking:

- . The printer feeds continuous paper to the paper park position.
- The printer then loads the paper again.
- If ejection to the paper park position cannot be completed within 16 inches, paper is returned to its previous position.

1.4.7.2 Software Initialization

Software initialization is performed upon receipt of the control code **ESC @**. When software initialization is performed:

- . Print characters in the buffer are not cleared.
- . The printer setting is changed to the default, but the download character definition is not cleared.

1.4.8 Printer Settings

1.4.8.1 Selectable Printer Settings

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

Character spacing:	<u>10 cpi</u> / 12cpi
Shape of zero:	Slashed / Not slashed
1 inch skip-over-perforation:	On / <u>Off</u>
Auto line feed:	On / <u>Off</u>
Character table (Standard):	Italic (<u>USA/France/Germany/UK/Denmark 1/Sweden/Italy/Spain 1</u>)/ <u>PC437/850/860</u> /861/863 / <u>865/BRASCI/Abicom</u>
Character table (NLSP):	Italic (<u>USA/France/Germany/UK/Denmark 1/Sweden/Italy/Spain 1</u>)/ <u>PC437/850/852/853/855</u> /857/= /869/07 <u>Greek/ISO Latin IT</u> /ISO 8859-7/Code MJK/Mazowia/Bulgaria
Page length:	11/ 12/ 8.5 / 70/6 inches
Auto tear off:	On / <u>Off</u>
Tractor:	Single / Double
interface:	~/ Auto selection (30 sec wait) / Parallel / Serial
Bit rate (serial I/F):	300 / 600/ 12(MI / 2400 / 4800 / <u>9600</u> / 19200 bps
Parity bit (serial I/F):	None / Odd / Even
Data length (serial I/F):	<u>7 bits</u> / 8 bits
ETX/ACK (serial I/F):	<u>Disabled</u> / Enabled

Note: Underlines show factory setting.

1.4.8.2 Changing the Default Settings

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

- To enter the default setting mode, turn on the printer while holding down the FONT button. The printer prints out the firmware version. If paper is not loaded, insert a sheet of paper.
- The printer automatically loads the paper and prints a table of languages to choose *from*: English, French, German, Italian, and Spanish. The Footlights indicate the currently selected language, as shown in the table below.

Table 1-18. Font Lights and Language Selection

FONT Light 1	FONT Light 2	Language
OFF	ON	English
OFF	Blinks	French
ON	OFF	German
ON	ON	Italian
ON	Blinks	Spanish

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

Table 1-19. Default Options

FONT Light 1	FONT Light 2	PAUSE Light	Setting	Submenu
Blinks	OFF	OFF	Character spacing	Table 1-20
Blinks	ON	OFF	Shape of zero	Table 1-21
OFF	Blinks	OFF	Skip over perforation	Table 1-22
ON	Blinks	OFF	Character table	Table 1-23
Blinks	Blinks	OFF	Auto line feed	Table 1-24
Blinks	OFF	ON	Page length	Table 1-25
Blinks	ON	ON	Auto tear off	Table 1-26
OFF	Blinks	ON	Tractor	Table 1-27
ON	Blinks	ON	Interface	Table 1-28
Blinks	Blinks	ON	Bit rate	Table 1-29
OFF	OFF	Blinks	Parity	Table 1-30
Blinks	OFF	Blinks	Data length	Table 1-31
ON	OFF	Blinks	ETX/ACK	Table 1-32

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

Table 1-20. Character Spacing

FONT Light 1	FONT Light 2	PAUSE Light	Character Spacing
OFF	OFF	OFF	10 cpi
ON	ON	ON	12 cpi

Table 1-21. Shape of Zero

FONT Light 1	FONT Light 2	PAUSE Light	Space of Zero
OFF	OFF	OFF	o
ON	ON	ON	0

Table 1-22. Skip Over Perforation

FONT Light 1	FONT Light 2	PAUSE Light	Skip-Over-Perforation
OFF	OFF	OFF	No skip
ON	ON	ON	skip

Table 1-23. Character Table

FONT Light 1	FONT Light 2	PAUSE Light	Standard Table	NLSP Table
OFF	OFF	OFF	Italic — US	Italic — US
ON	OFF	OFF	Italic — France	Italic — France
Blinks	OFF	OFF	Italic — Germany	Italic — Germany
OFF	ON	OFF	Italic — UK	Italic — UK
ON	ON	OFF	Italic — Denmark 1	Italic — Denmark 1
Blinks	ON	OFF	Italic — Sweden	Italic — Sweden
OFF	Blinks	OFF	Italic — Italy	Italic — Italy
Blinks	Blinks	OFF	Italic — Spain 1	Italic — Spain 1
OFF	OFF	ON	Pc 437	PC 437
ON	OFF	ON	PC 850	PC 850
Blinks	OFF	ON	PC 860	PC 852
OFF	ON	ON	Pc 861	PC 853
ON	ON	ON	PC 863	Pc 855
Blinks	ON	ON	PC 865	PC 857
OFF	Blinks	ON	BRASCII	PC 866
ON	Blinks	ON	Abicomp	PC 869
Blinks	Blinks	ON	—	PC 437 Greek
OFF	OFF	Blinks	—	ISO Latin IT
ON	OFF	Blinks	—	1s0 8859-7
Blinks	OFF	Blinks	—	Code MJK
OFF	ON	Blinks	—	Mazowia
ON	OFF	Blinks	—	Bulgaria

Table 1-24. Auto Line Feed

FONT Light 1	FONT Light 2	PAUSE Light	Auto Line Feed
OFF	OFF	OFF	off
ON	ON	ON	On

Table 1-25. Page Length

FONT Light 1	FONT Light 2	PAUSE Light	Page Length
ON	OFF	OFF	11 inches
OFF	ON	OFF	12 inches
ON	ON	OFF	8.5 inches
OFF	OFF	ON	7 ⁰ / ₆ inches

Table 1-26. Auto Tear Off

FONT Light 1	FONT Light 2	PAUSE Light	Auto Tear Off
OFF	OFF	OFF	off
ON	ON	ON	On

Table 1-27. Tractor

FONT Light 1	FONT Light 2	PAUSE Light	Tractor
OFF	OFF	OFF	Single
ON	ON	ON	Double

Table 1-28. Interface

FONT Light 1	FONT Light 2	PAUSE Light	Interface
ON	OFF	OFF	Auto selection (10 me wait)
OFF	ON	OFF	Auto selection (30 rns wait)
ON	ON	OFF	Parallel
OFF	OFF	ON	Serial

Table 1-29. Bit Rate

FONT Light 1	FONT Light 2	PAUSE Light	Bit Rate
ON	OFF	OFF	300 bps
ON	ON	OFF	600 bps
ON	ON	OFF	1200 bps
OFF	OFF	ON	2400 bps
ON	OFF	ON	4800 bps
OFF	ON	ON	9600 bps
ON	ON	ON	19200 bps

Table 1-30. Parity Bit

FONT Light 1	FONT Light 2	PAUSE Light	Parity Bit
ON	OFF	OFF	None
ON	ON	OFF	Odd
ON	ON	OFF	Even

Table 1-31. Data Length

FONT Light 1	FONT Light 2	PAUSE Light	Data Length
OFF	OFF	OFF	7 bits
ON	ON	ON	8 bits

Table 1-32. ETX/ACK

FONT Light 1	FONT Light 2	PAUSE Light	ETX/ACK
OFF	OFF	OFF	off
ON	ON	ON	On

1.5 MAIN COMPONENTS

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

- C130 MAIN BOARD: Control board
- C130 PSB/PSE (120V / 220-240V) BOARD: Power supply board
- M-3G1O: Printer mechanism
- Housing

1.5.1 C130 MAIN Board

The C130 MAINboard consists of an E01A09 (CPU), a Program/CG ROM, a RAM, an EEPROM, etc.

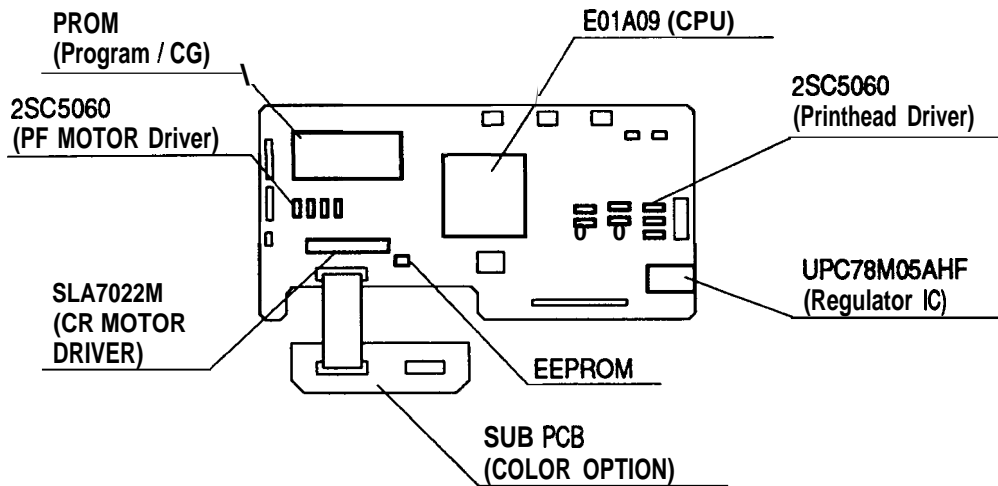


Figure 1-9. C130 MAIN Board Component Layout

1.5.2 C130 PSB/PSE Board

The C130PSB/PSE power supply board consists of a transformer, switching FETs, regulate IC, diode bridge, etc. This board has two ratings for input AC voltages.

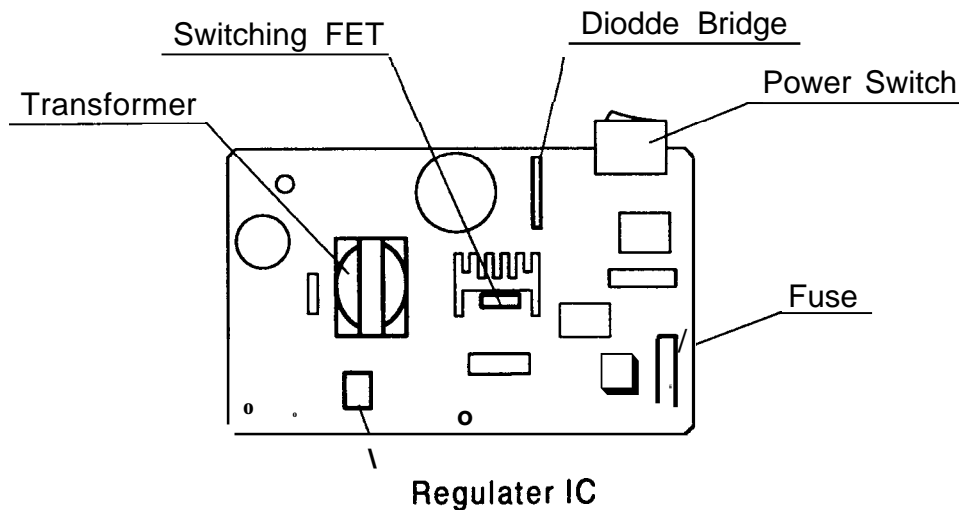


Figure 1-10. C130 PSB/PSE Board Component Layout

CHAPTER 2 Operating Principles

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2.1 PRINTER MECHANISM OPERATION

This section describes the M-3G1O printer mechanism and explains how it works.

2.1.1 Printing Mechanism

The printer mechanism is composed of the **printhead**, ink ribbon, and ribbon mask. The **printhead** is a 9-pin head for impact dot printing. Each wire has own drive coil, which causes the wire to move in and out of the **printhead** to print each dot. The four steps below describe how these driving wires work.

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

This is the sequence used to print a single dot.

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

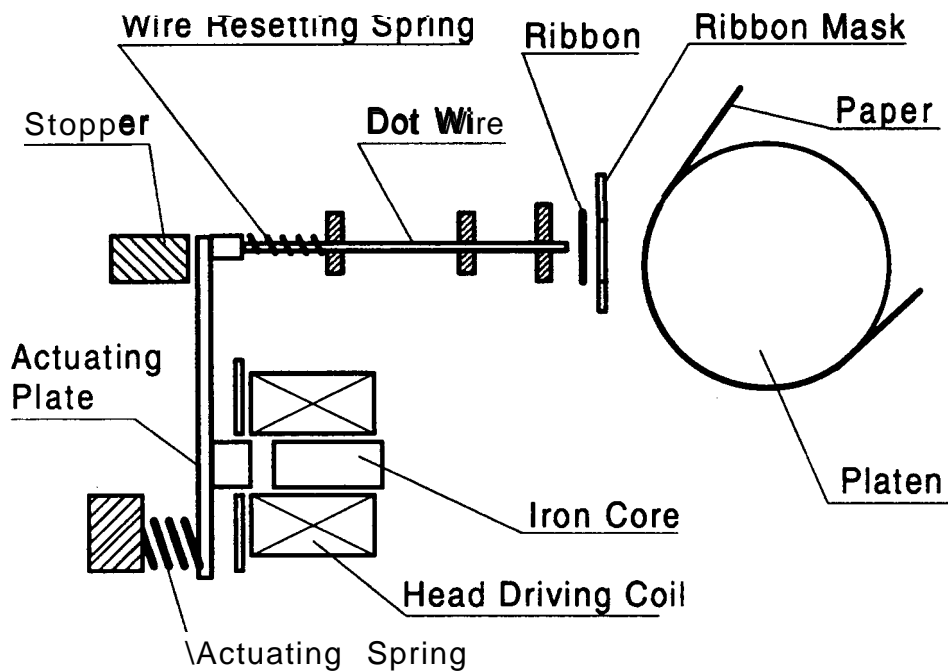


Figure 2-1. Printhead Operation Principles

2.1.2 Carriage Movement Mechanism

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

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

Table 2-1. CR Motor Assembly Specifications

Category	Requirement	
Type	4-phase, 48-pole, PM-type stepping motor	
Drive Voltage	31.5 -38.5 VDC	
Coil Resistance	180 ohms \pm 7% (per phase, at 25° C, 77° F)	
Drive Pulse Frequency	Normal Mode Draft	1320 pps
	Color Mode Draft	1980 pps
Excitation Method	Constant-voltage	2-2 phase excitation
		1-2 phase excitation

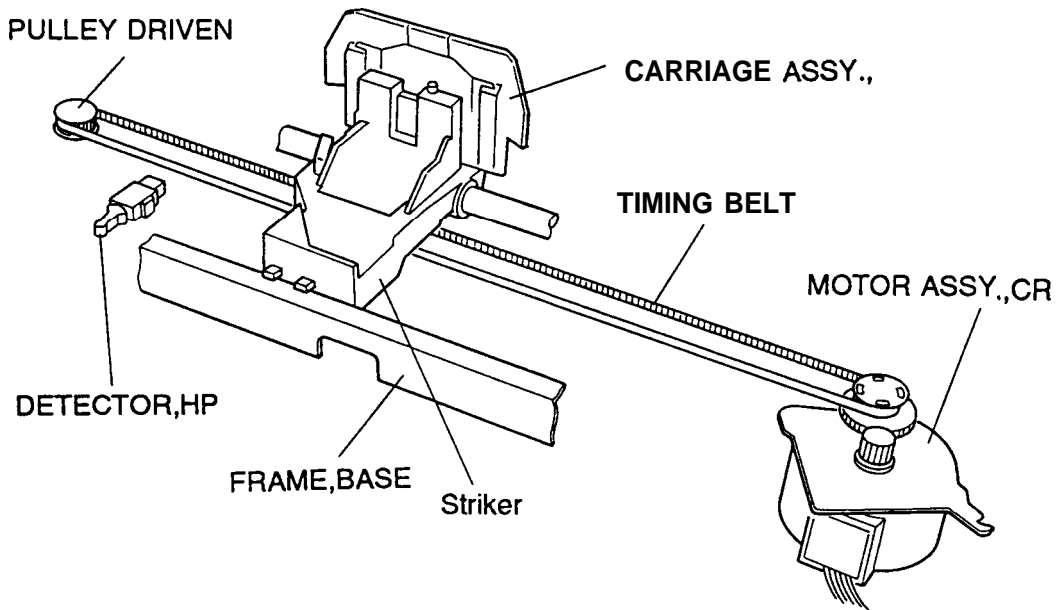


Figure 2-2. Carriage Movement Mechanism

2.1.3 Paper Handling Mechanism

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

2.1.3.1 Paper Feed Mechanisms

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

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

2.1.3.2 Paper Advance Mechanism

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

Friction Advance Method

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

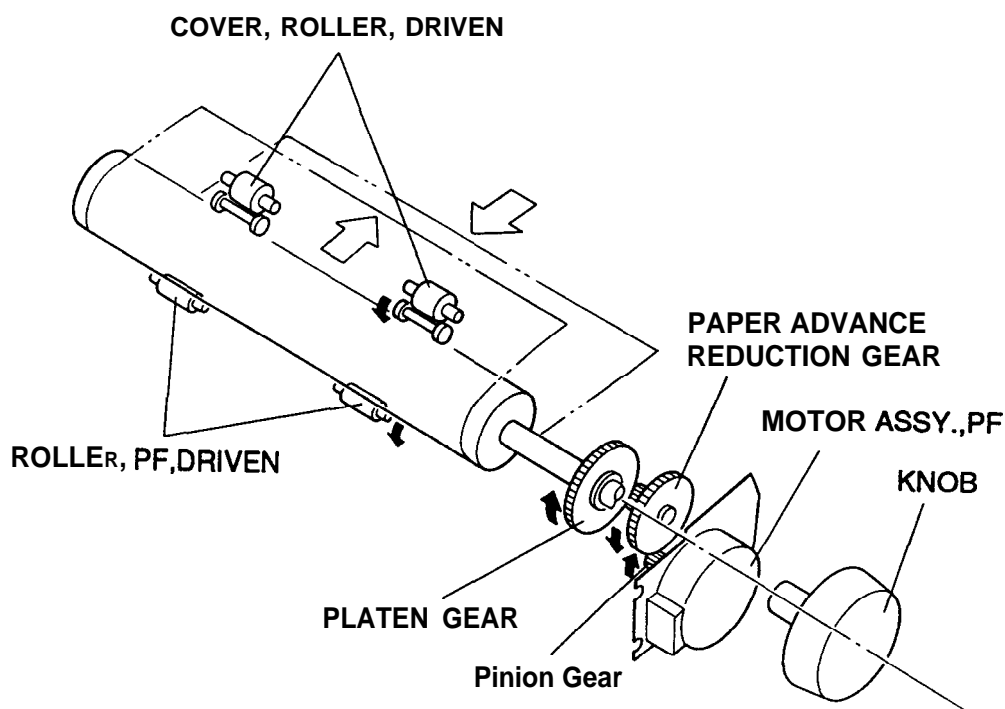


Figure 2-3. Friction Advance Mechanism

Table 2-2. PF Motor Assembly Specifications

Category	Requirement
Type	4-phase, 48-pole, PM-type stepping motor
Drive Voltage	31.5 -38.5 VDC
Coil Resistance	56 ohms \pm 5% (per phase, at 25°C, 77°F)
Drive Pulse Frequency	800,900,1000,1200,1300 pps
Excitation Method	Constant-voltage 1-2 phase excitation

Push Tractor Method

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

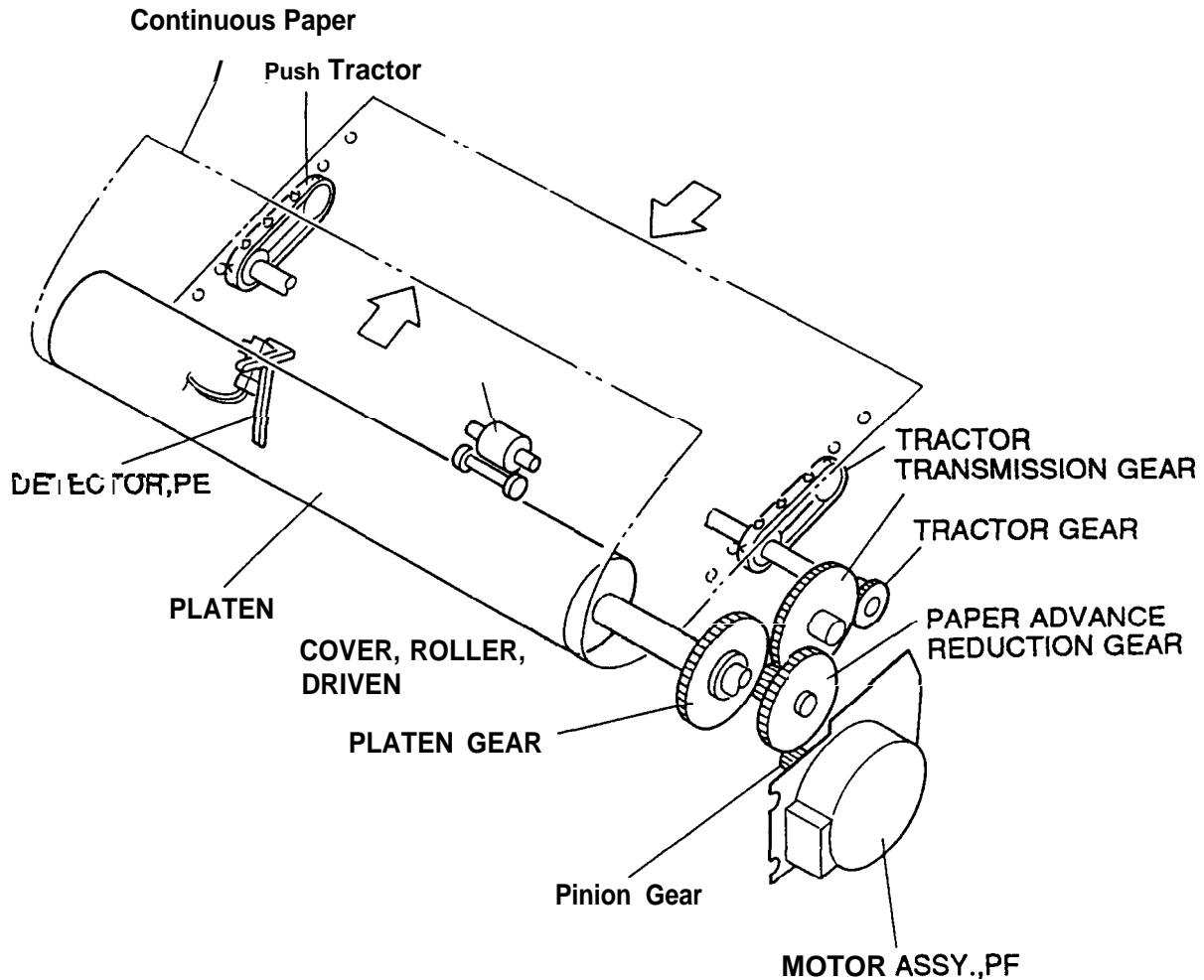


Figure 2-4. Push Tractor Paper Advance Mechanism

Pull Tractor Method

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

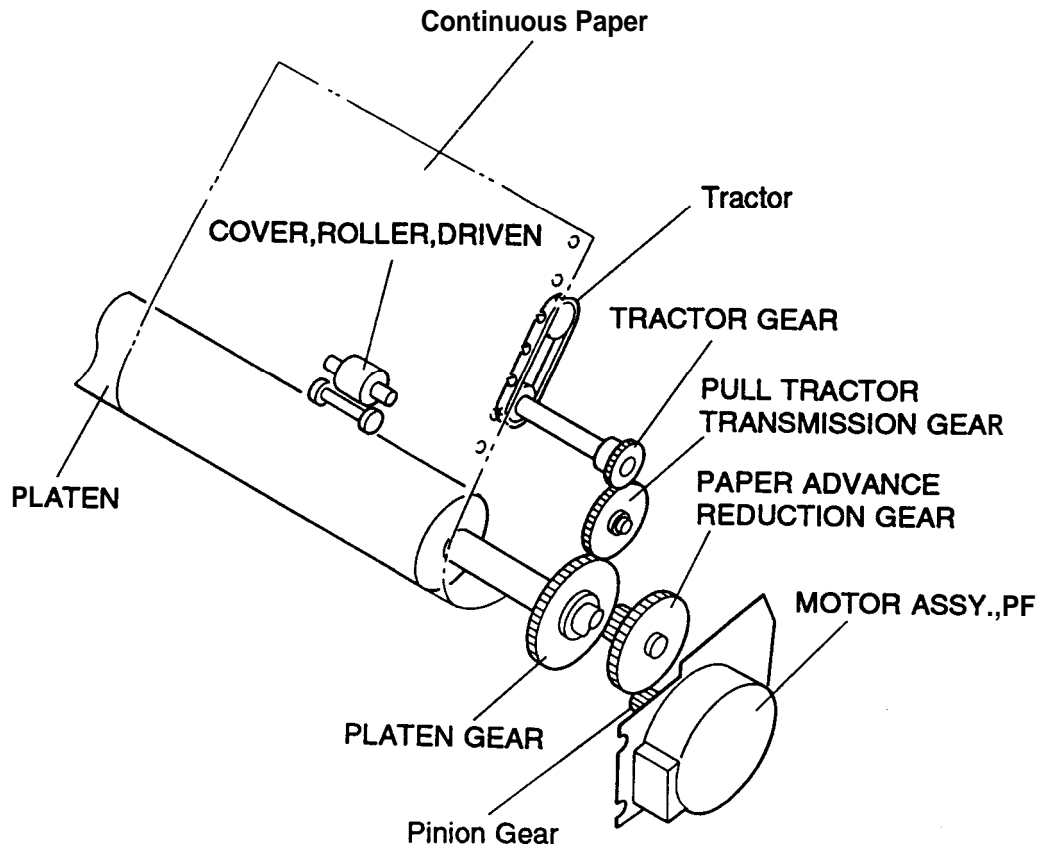


Figure 2-5. Pull Tractor Paper Advance Mechanism

Push - **Pull Tractor Method**

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

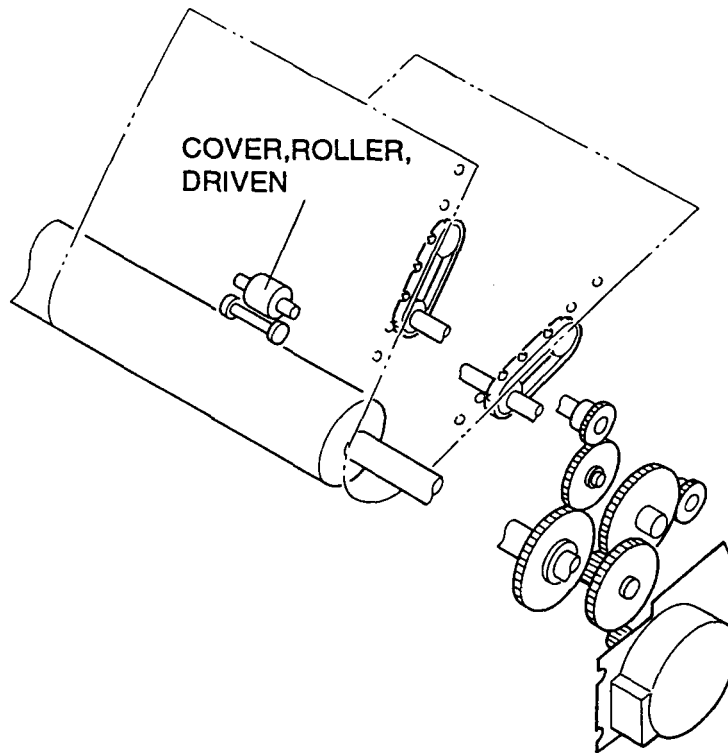


Figure 2-6. Push-Pull Tractor Paper Advance Mechanism

Disengage Lever

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

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

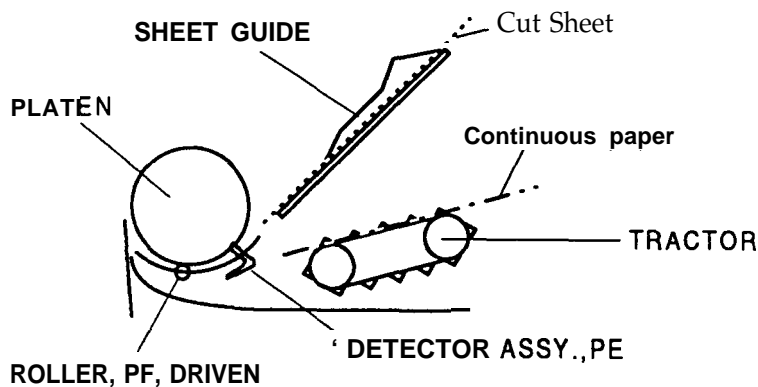


Figure 2-7. Paper Path

2.1.4 Ribbon Advance Mechanism

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

Table 2-3. Ribbon Advance Gear Linkage

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

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

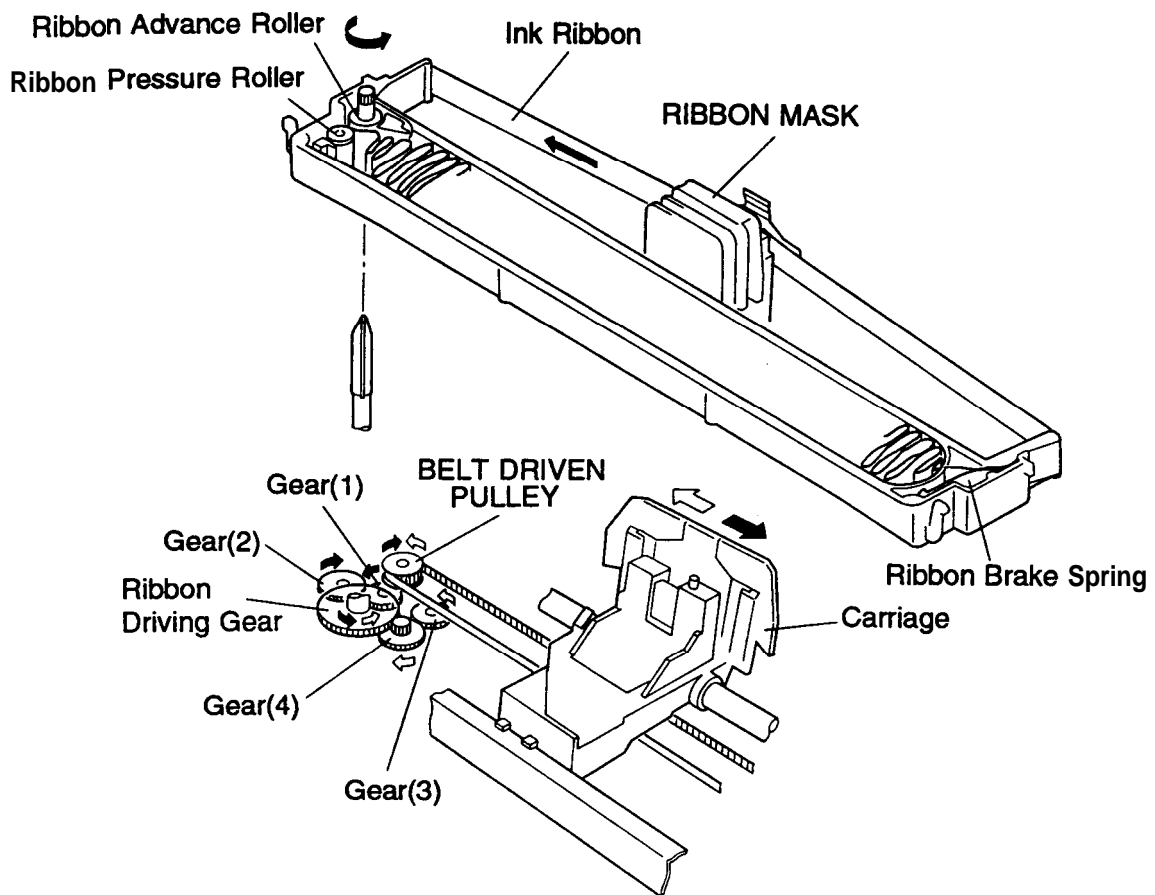


Figure 2-8. Ribbon Advance Gear Linkage

2.1.5 Ribbon Shift Mechanism

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

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

Table 2-4. CS Motor Assembly Specifications

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

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

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

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

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

Table 2-5. Coloring Sequences

Print Color	Print Ribbon	
	First Printing	Second Printing
Black	Black	—
Magenta	Magenta	—
Cyan	cyan	—
Yellow	Yellow	—
Green	Yellow	cyan
Orange	Yellow	Magenta
Violet	Magenta	Cyan

Note: The printer prints the brighter color first to prevent the ribbon from being stained

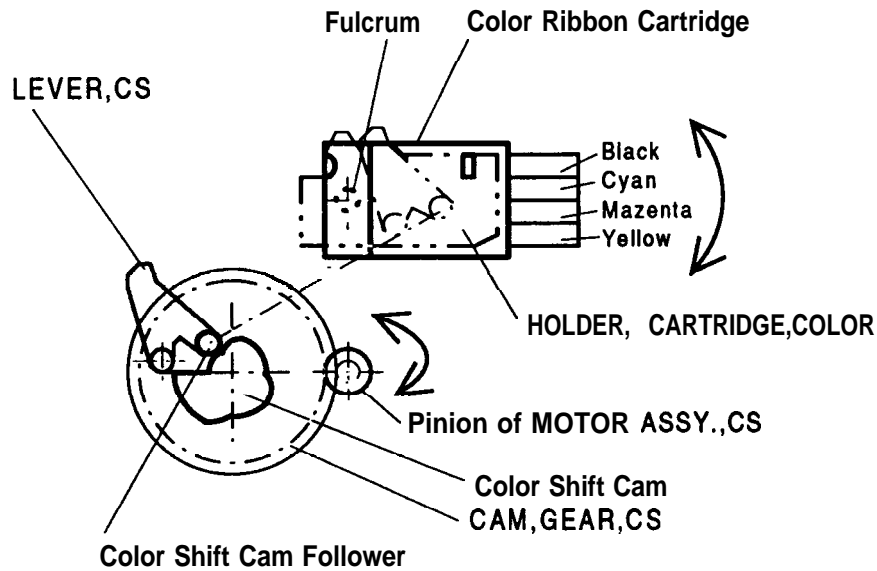


Figure 2-9. Color Shift Mechanism

2.1.6 Platen Gap Adjustment Mechanism

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

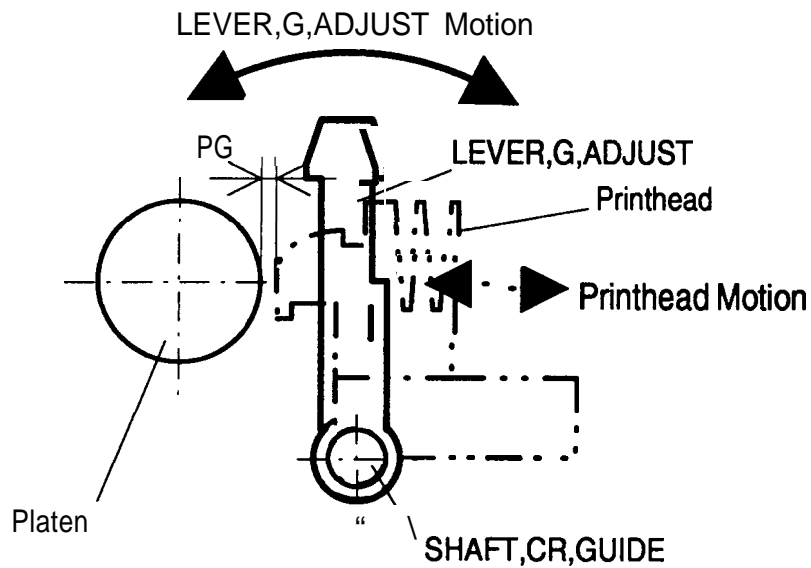


Figure 2-10. Platen Gap Adjustment Mechanism

2.2 POWER SUPPLY OPERATION

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

Table 2-6. Power Supply Board

Board	Input Voltage	Fuse F1 Rating
C130 PSB	100.5-132 VAC	2.5A / 125V, 250V
C130 PSE	198-284 VAC	1.25A 1250V

2.2.1 Power Supply Overview

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

Table 2-7. Power Supply Output Voltages and Applications

Output Supply Voltage (DC)	Applications
+35 v (VP)	CR motor drivers
	PF motor drivers
	Printhead drivers
	CS rnotordrivers
+9 V (VL)	I Main board assembly logic circuitry
	Various sensors
	Control panel LED
	PF motor/ CS motor hold

2.2.2 Power Supply Circuit Operation

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

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

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

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

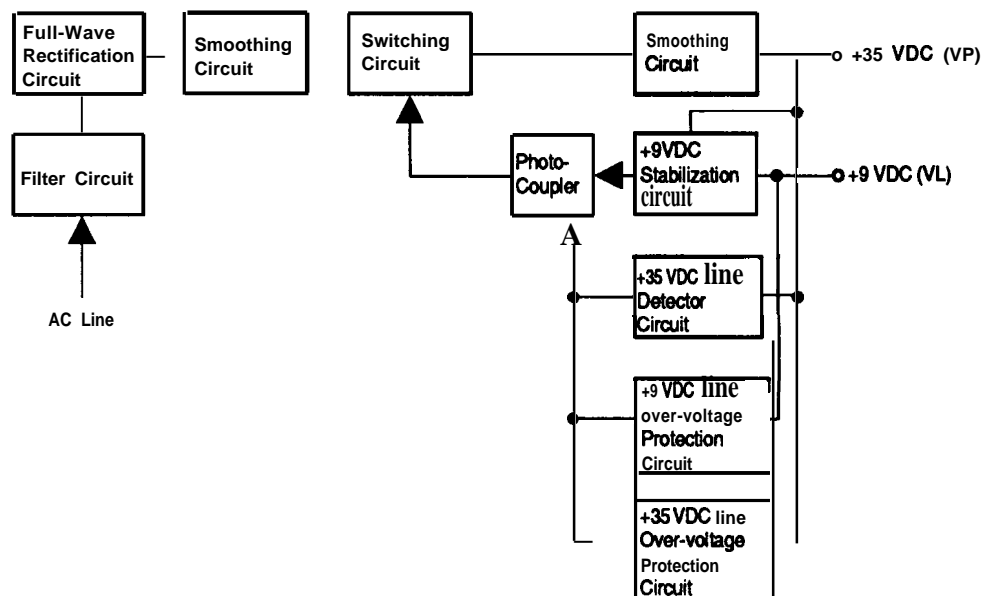


Figure 2-11. Power Supply Circuit Block Diagram

2.3 CONTROL CIRCUIT

The control circuit consists of the C130 MAIN board assembly. This section describes the major components and explains how the board works.

2.3.1 Control Circuit Operation Overview

The printer's system IC contains a CPU (μ PD78C10A-type) that runs at 14.74 MHz, a gate array (E05A79-type) and a main RAM (8KB SRAM). It oversees control of all the components in the printer. The printer uses the E05A90 gate array to control address decoding, parallel communications, PF motor drive signals, etc. Table 2-5 shows functions of main IC and circuits. Figure 2-18 shows the control circuits in block diagram form.

Table 2-8. Functions of the Main IC

IC	Location	Function
SYSTEM IC	IC1	CPU Block: Receives data from the host computer and sends it to the input buffer in RAM (under interrupt processing control). Extends the input data held in the buffer to create image data. Loads this image data to the image buffer in RAM. Transfers the image data to the printhead drive circuit. Also controls various parts of the printer mechanism, such as PF motor control and color select motor control
		Gate Array Block: Controls the functions below. <ul style="list-style-type: none"> • Address decoding • Parallel communications • Impact head drive control • CR motor control
		Main RAM Block: Holds the CPU working area and various buffers.
ROM	E1	Contains the program that runs the CPU and holds the character design (also called the character generator).
RESET IC	A2	Hardware reset function
EEPROM	A3	An electrically writable and erasable ROM used to hold such information as the TOF position and bidirectional adjustment value.
Serial I/F IC	IC2	Driver / receiver

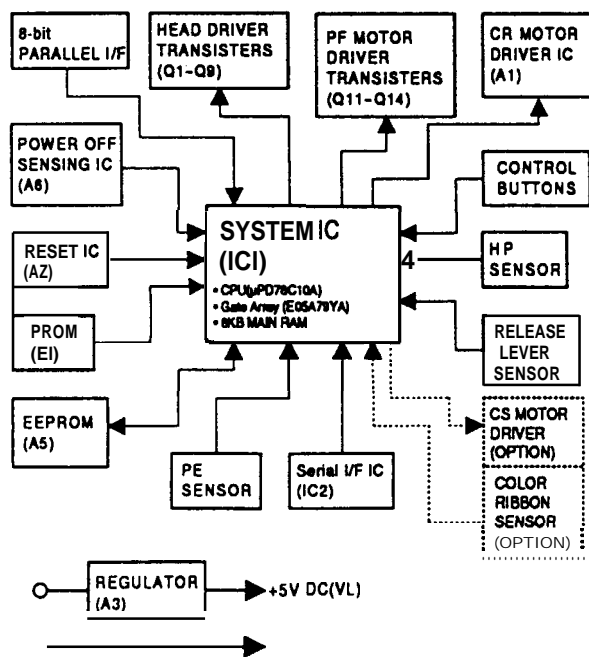


Figure 2-12. Control Circuit Block Diagram

2.3.2 Power On Reset Circuit

When the power supply is turned on, the VL goes up to +9 VDC immediately, but reset IC output (IC A2, Pin 6) is delayed for approximately 80- 1 ma before going up to +9 VDC. The system IC receives this LOWlevel signal **from** the reset IC and resets itself.

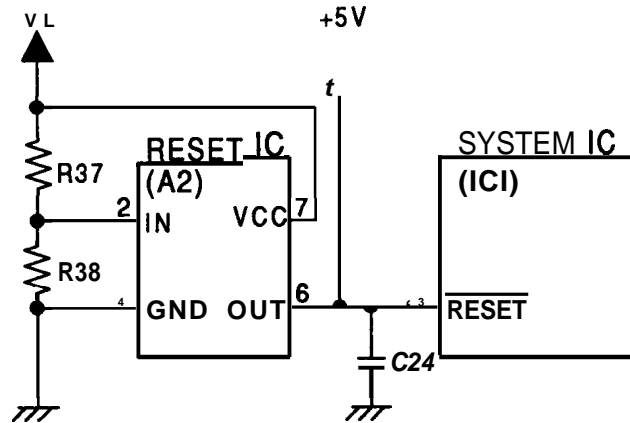


Figure 2-13. Power On Reset Circuit Diagram

2.3.3 Home Position Sensor Circuit

This printer has a connector switch to sense the carriage home position. The system IC receives a signal (HIGH or LOW) from the HP sensor and **recognizes** the carriage home position when the printer is turned on. The **connector** switch is closed (LOW) when the carriage is in the home position and is open (HIGH) when the carnage is out of home position.

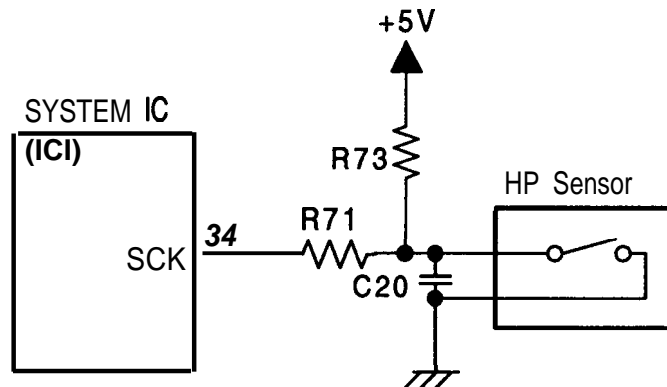


Figure 2-14. Home Position Sensor Circuit Diagram

2.3.4 Paper End Sensor Circuit

This printer has a connector switch for sensing the paper end. The system IC receives a signal (HIGH or LOW) from the connector switch and recognizes a paper end. The connector switch is closed (LOW) when there is no paper on the platen and is open (HIGH) when paper is present.

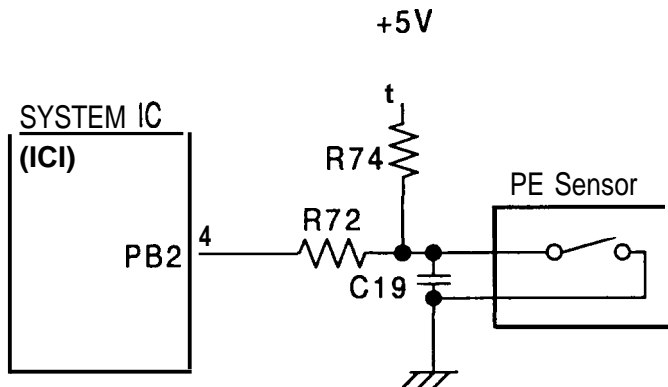


Figure 2-15. Paper End Sensor Circuit Diagram

2.3.5 Release Lever Position Sensor Circuit

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

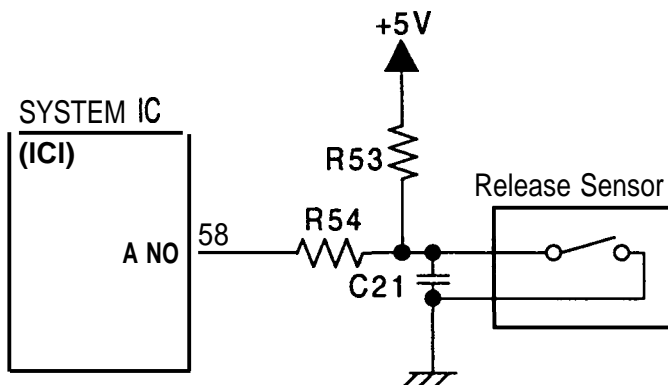


Figure 2-16. Release Lever Position Sensor Circuit Diagram

2.3.6 Carriage Motor Driver Circuit

Figure 2-17 shows the carriage motor driver circuit. The carriage motor driver uses an open-loop, constant-current drive arrangement. The motor is driven with 2-2 phase excitation and 1-2 phase excitation.

The carriage motor driver IC (A1) detects the amount of current in the carriage motor coils and regulates the current. The amount of current flowing in the coils varies, depending on the speed of the carriage motor. The amount of the current is set by the system IC (IC1). Signals are sent to CR11 and CR12 on the system IC. The motor driver IC sets the coil current to correspond to the carriage motor speed. Ports PA0 - PA3 on the CPU block control the stepping motor via the gate array block in IC1.

Table 2-9. Carriage Motor Drive Modes

Driver Mode	Excitation Type	Drive Frequency Type	Standard Print Character
3 x speed	2-2 phase	1080 pps	60 dpi printing (draft)
2 x speed	1-2 phase	1600 pps	80 dpi printing
1 x speed	1-2 phase	800 pps	180 dpi printing (LQ) 120,90 dpi printing
2/3 x speed	1-2 phase	533 pps	180,120,90 dpi printing
7/8 x speed	1-2 phase	830 pps	Home position seek

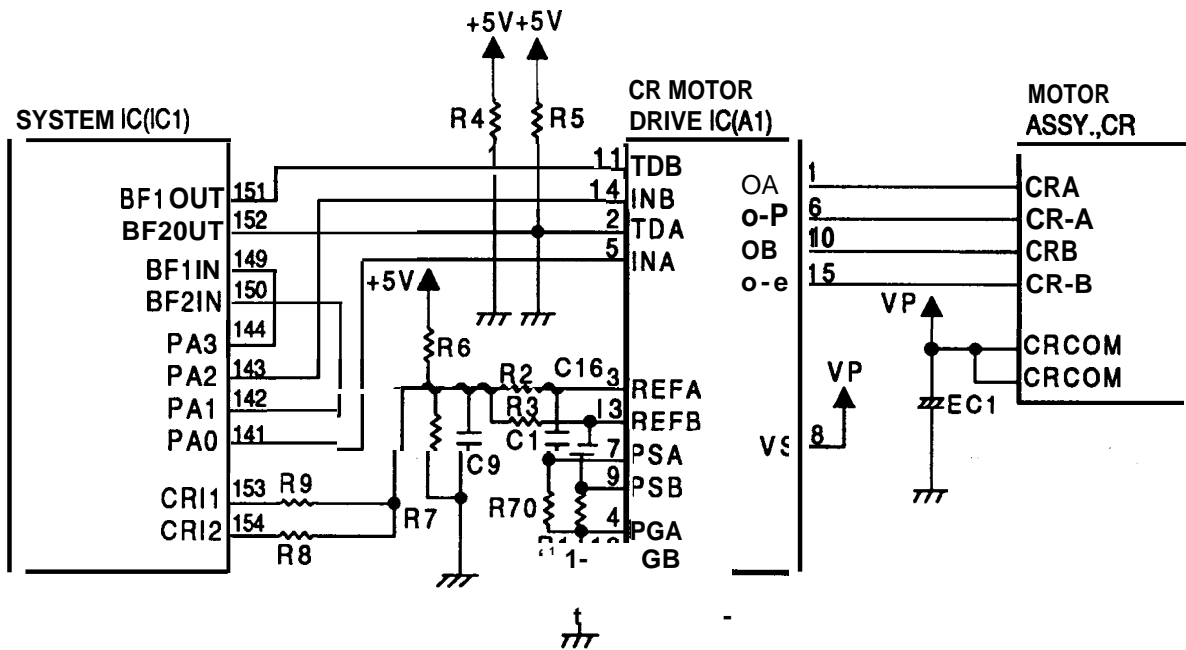


Figure 2-17. Carriage Motor Driver Circuit Diagram

2.3.7 Paper Feed Motor Driver Circuit

Figure 2-18 shows the paper feed motor driver circuit, an open-100P, constant-voltage drive with 1-2 phase excitation.

The ports (pins 137- 140) on the system IC (ICI) are used to control the stepping motor. The pulse signal from the IC1 controls four transistors and the stepping motor. The motor is driven at five speeds, 800, 900, 1000, 1200, and 1300 pps, to correspond to the idling voltage and the paper handling condition. The IC1 controls motor speed. At the holding time, The PFCOM voltage is changed VP into VL via A4 by the IC1.

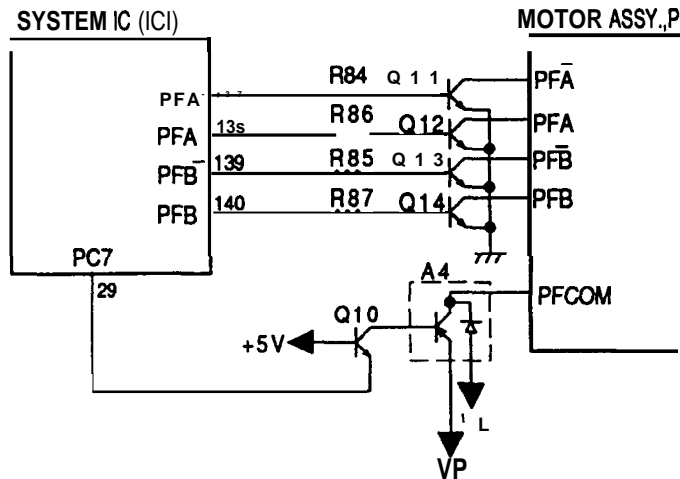


Figure 2-18. Paper Feed Motor Driver Circuit Diagram

2.3.8 Printhead Driver Circuit

Figure 2-19 shows the printhead driver circuit block diagram. Print data, already expanded into image data, is split by the CPU block and transferred to the latch circuit in the gate array block in the system IC (ICI). Port AN6 (pin 66) of ICI samples the voltage of the +35 VDC line via the A/D converter. By sampling the +35 VDC 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 from the +35 VDC line is HIGH, ICI shortens the output pulse. If the voltage from the +35 VDC line is LOW, ICI lengthens the output pulse.

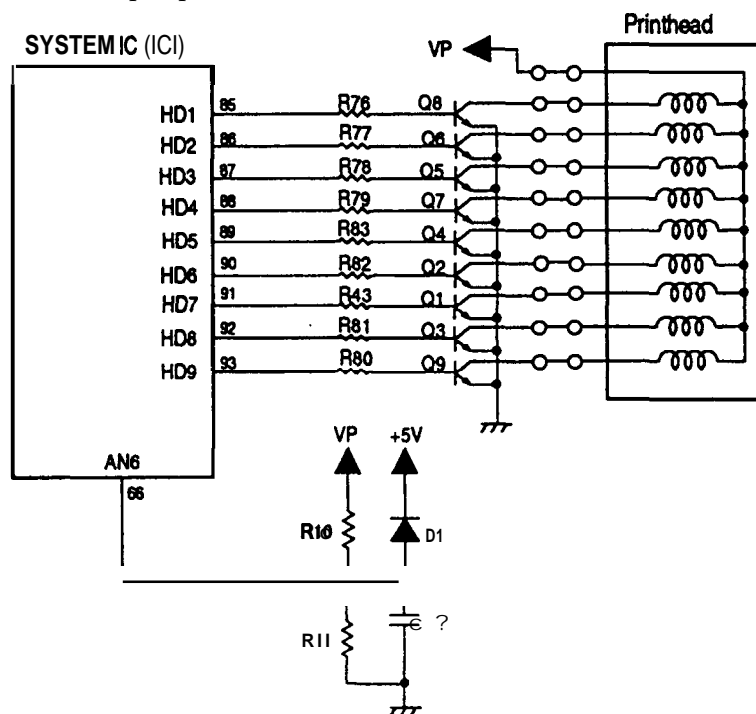


Figure 2-19. Printhead Driver Circuit Diagram

2.3.9 Interface Circuit

Figure 2-20 shows the parallel interface circuit block diagram. Data from the host **computer** is latched within the system **IC** by a WOOSTROBE signal. The system **IC** outputs a BUSY signal automatically to stop the host computer from sending further data. The CPU block reads the data latched in the gate array block periodically without generating an interrupt.

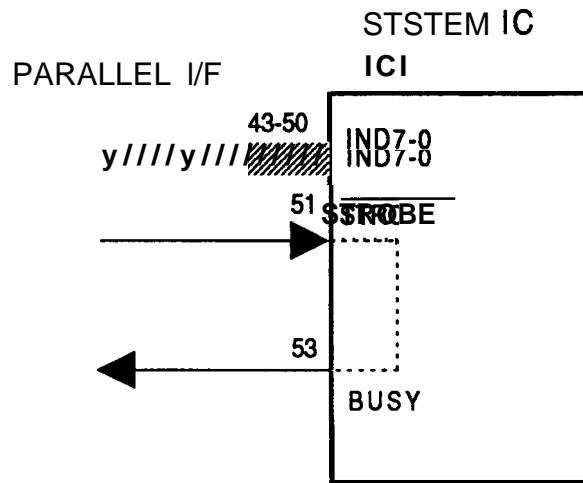


Figure 2-20. Parallel Interface Block Diagram

Figure 2-21 shows **the** serial interface circuit block diagram. **The** serial interface conforms to **EIA-232D**. **RXD** is data received **by** the serial I/O of the CPU block from the host **computer** via driver/receiver **IC2**. Data is **transmitted** to an **input** buffer in the system **IC** from the **CPU** block. Printing starts when a CR code is received or **when** the input **buffer is** filled.

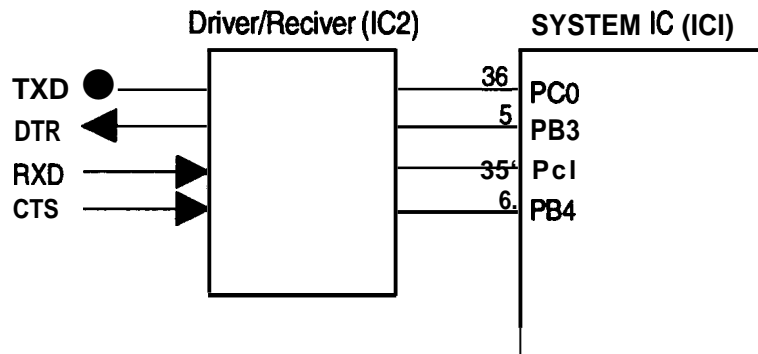


Figure 2-21. Serial Interface Block Diagram

2.3.10 EEPROM Control Circuit

Figure 2-22 shows the EEPROM control circuit block diagram. The EEPROM (A5) contains such information as the top-of-form position. The EEPROM is non-volatile memory, so information is not lost if the printer is powered off. Since the EEPROM is a serial I/O-type device, the CPU converts 8-bit data into serial data.

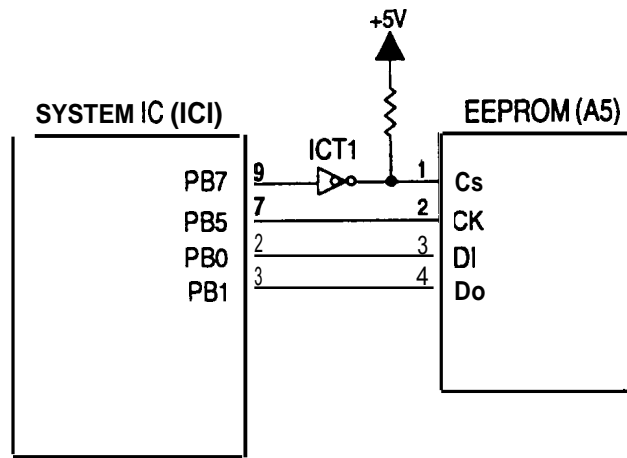


Figure 2-22. EEPROM Control Circuit Diagram

2.3.11 CS Motor Assembly Circuit

Figure 2-23 shows a block diagram of the CS motor assembly circuit in the optional color upgrade kit. The CS motor assembly is a permanent magnet (PM) stepping motor, driven with 2-2 phase excitation in proportion to the desired rotational speed. This motor can be rotated in either direction and stopped at any position. Four phase signals are directly output from the system IC and pass through a transistor array. The drive voltage is constant (i.e., +35 VDC from the VP line).

Source Voltage 35 VDC \pm 10 %
 Current Consumption 245 mA (peak)

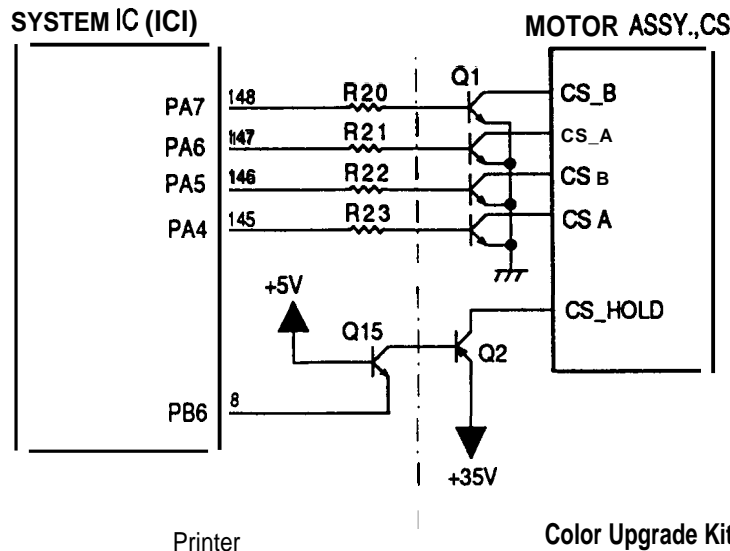


Figure 2-23. CS Motor Assembly Circuit Diagram

2.3.12 Color Ribbon Sensor Circuit

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

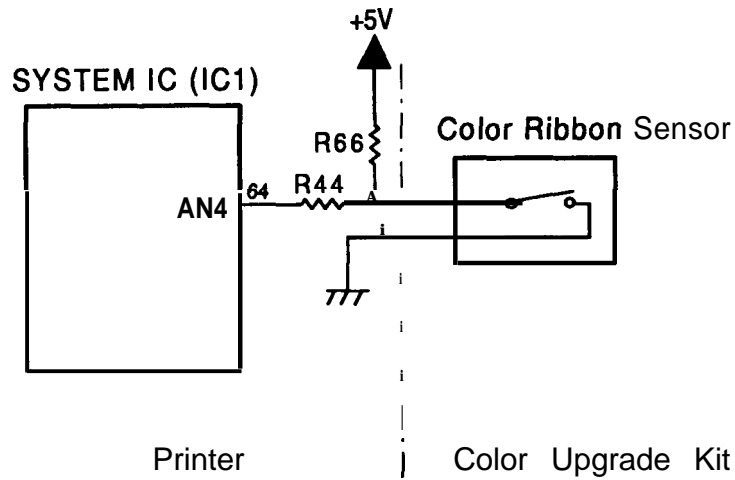


Figure 2-24. Color Ribbon Sensor Circuit Diagram

CHAPTER 3 Disassembly and Assembly

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3.1 OVERVIEW

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

3.1.1 Disassembly Precautions

Follow the precautions below when disassembling the printer.

WARNING

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

CAUTION

To maintain efficient printer operation:

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

3.1.2 Tools

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

Table 3-1. Recommended Tools

Tool	Part No.
Round-nose pliers	B740400100
Nippers	B740500100
Tweezers	B741000100
Soldering iron	B740200100
E-ring holder #2.5	B740800400
Phillips screwdriver No.2	B743800200
Normal screwdriver	B743000100
Thickness gauge	—

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

Table 3-2. Equipment Required for Maintenance

Description	Specification
Multimeter	
Oscilloscope	50 MHz

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

3.1.3 Service Checks After Repair

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

Table 3-3. Inspection Checklist for Repaired Printer

Category	Component	Item to Check	Is Check Required?
Printer units	Printhead	Are any wires broken?	<input type="checkbox"/> Chsck@ <input type="checkbox"/> Not necessary
		Are any wires worn out?	<input 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 type="checkbox"/> Not necessary
		Is the CR motor assembly at the correct temperature (not overheating)	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Paper advance mechanism	Is paper advancing smoothly? <input type="checkbox"/> Movement noisy <input type="checkbox"/> Mechanism dirty <input type="checkbox"/> Mechanism oily	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
		Is the paper advance motor running at the correct temperature (not overheating)	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Paper path	Is the type of paper in the printer feeding smoothly?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
		Is the tractor feeding the paper correctly?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
		Is the paper path clear of all obstructions?	<input type="checkbox"/> Chackedn Not necessary
		Is the platen free of damage?	<input type="checkbox"/> Chackad <input type="checkbox"/> Not necessary
	Ribbon mask	Is the ribbon mask free of distortion?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Self-print test	Was the self-print successful?	<input type="checkbox"/> Checked D Not necessary
	On-line test	Was the on-line test successful?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
Adjustment	Printhead printing	Is the platen gap adjusted correctly?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
		Is the bidirectional print position adjusted correctly?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
	Default setting	Have user changeable settings been reset to the default value?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
System upgrade	ROM version	ROM version _____	<input type="checkbox"/> Checkecf <input type="checkbox"/> Not necessary
	Shipment	Has the ribbon been removed?	<input type="checkbox"/> Checked <input type="checkbox"/> Not necessary
		Have all relevant parts been included in the shipment?	<input type="checkbox"/> Chalked <input type="checkbox"/> Not necessary

3.1.4 Specifications for Screws

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

Table 3-4. Screw Abbreviations

Abbreviation	Part Name
CPB	Cross-recessed pan head B-tight screw
CBB	Cross-recessed bind head B-tight screw
CBS	Cross-recessed bind head S-tight screw
CBC	Cross-recessed bind head C-Lamitite screw
CTB	Cross-recessed bind head tapping screw
CB(O)	Cross-recessed bind head with outside toothed lock washer
CTBP	Cross-recessed bind head tapping screw with fiat washer
CF	Cross-recessed countersunk screw

3.2 DISASSEMBLY AND ASSEMBLY

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

CAUTION

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

Disassembly includes the following seven procedures:

1. Removing the printhead
2. Removing the HOUSING ASSY.,UPPER
3. Removing the BOARD ASSY.,MAIN and PSB/PSE
4. Removing the Printer Mechanism
5. Removing the BOARD ASSY.,INTERFACE
6. Disassembling the ROLLER ASSY.,DRIVEN
7. Disassembling the Optional Color Upgrade Kit

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

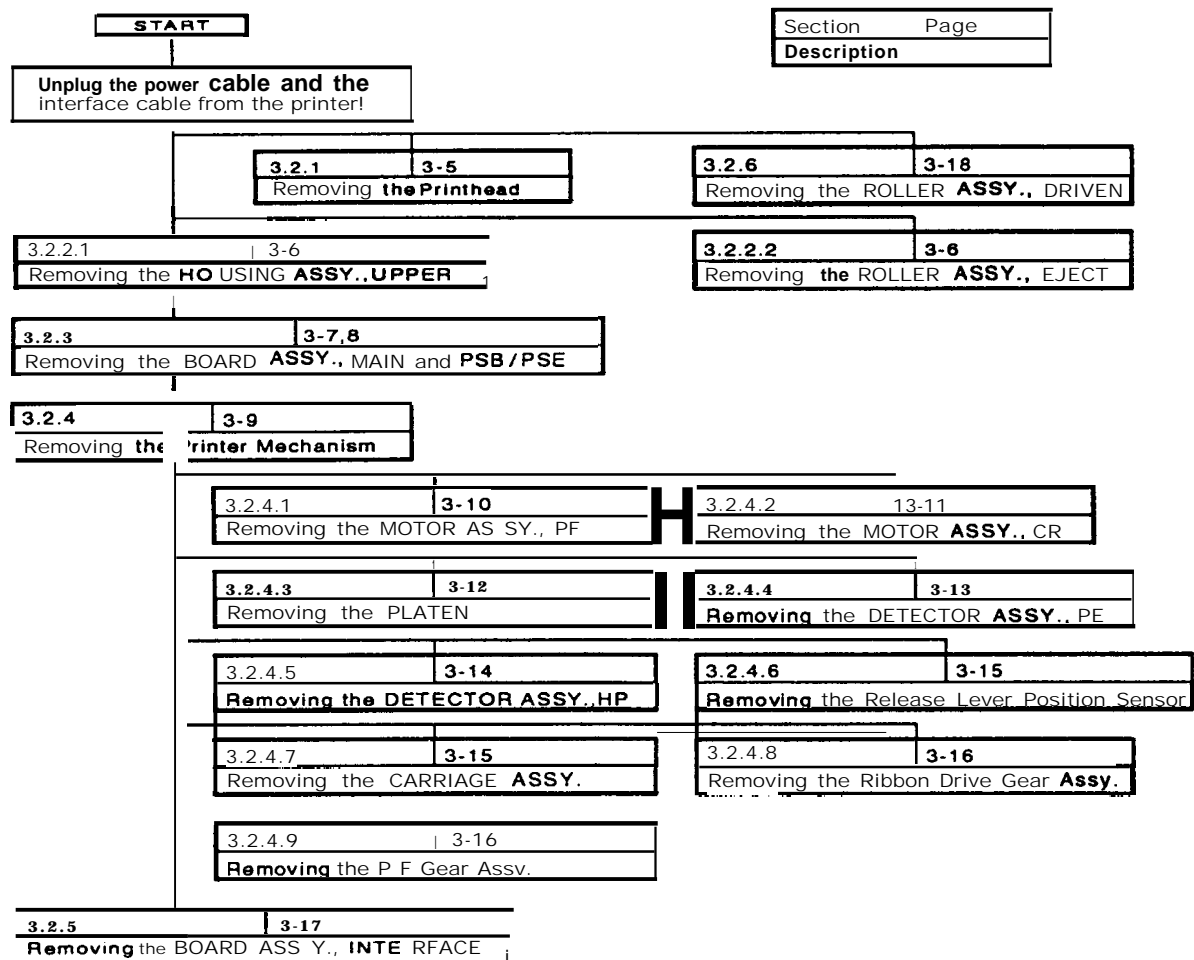


Figure 3-1. Procedure for Disassembling the Printer

3.2.1 Removing the Printhead

1. Remove the COVER ASSY., PRINTER, EDGE GUIDE ASSY., ribbon cartridge, TRACTOR ASSY., PLATEN KNOB, and optional color upgrade kit.
2. Remove the CPB (M3 x 14) screw attaching the printhead.
3. Remove the printhead.
4. Remove the flexible flat cable (FFC) from the printhead.

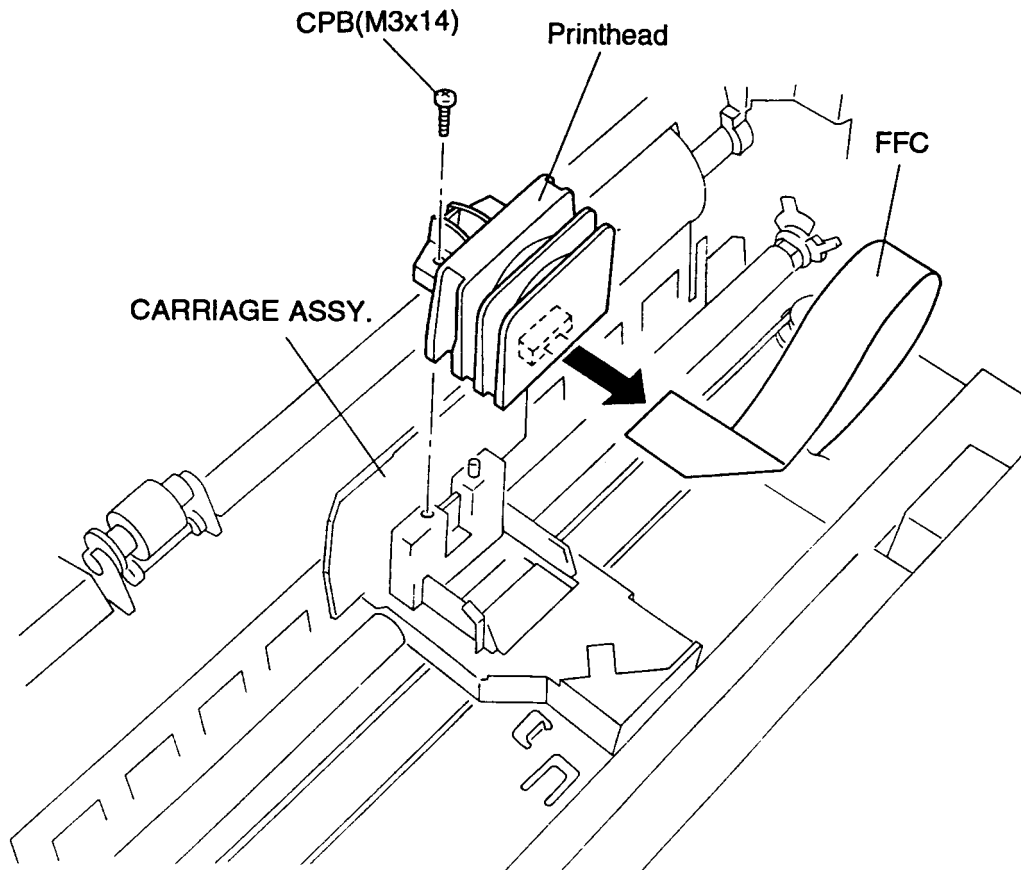


Figure 3-2. Removing the Printhead

3.2.2 Removing the HOUSING ASSY.,UPPER

1. Remove the COVER ASSY.,PRINTER, EDGE GUIDE ASSY., ribbon cartridge, TRACTOR ASSY., PLATEN KNOB, and optional color upgrade kit.
2. Remove the 4 CPB (M4 x 14) screws attaching the HOUSING ASSY.,UPPER to the HOUSING,LOWER.
3. Liftoff the HOUSING ASSY.,UPPER.

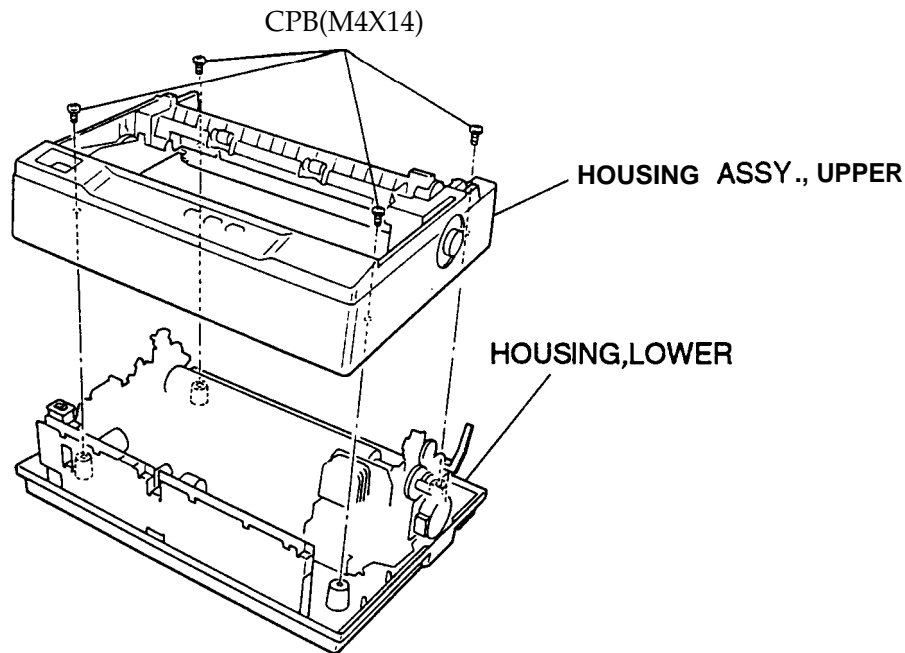


Figure 3-3. Removing the HOUSING ASSY.,UPPER

3.2.2.1 Removing the ROLLER ASSY.,EJECT

1. Remove the HOUSING ASSY.,UPPER. (see Section 3.2.2.1).
2. Lift the ROLLER ASSY.,EJECT up and at an angle from the HOUSING ASSY.,UPPER.

Note: When removing the ROLLER ASSY.,EJECT, the SPRING,500 may pop out.

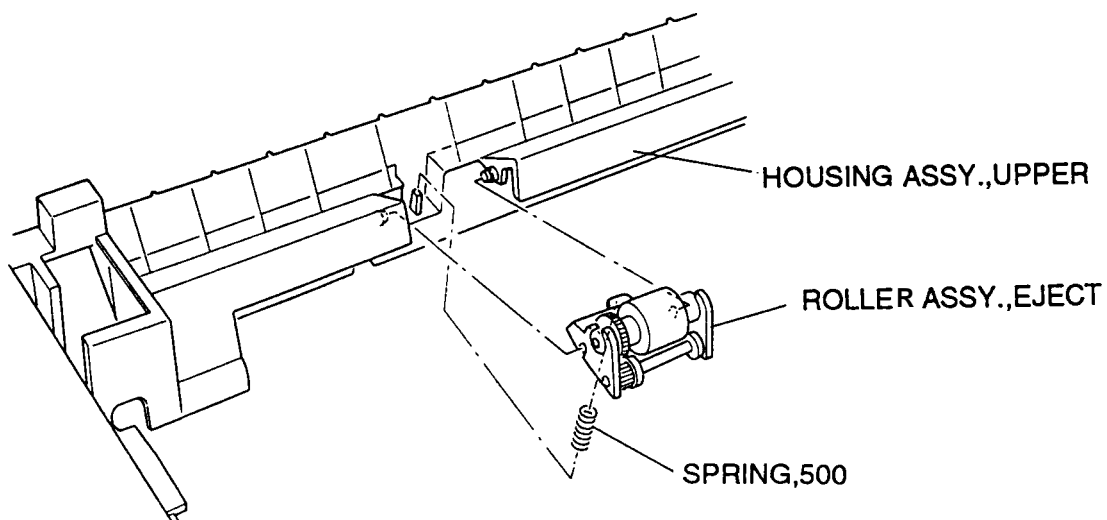


Figure 3-4. Removing the ROLLER ASSY.,EJECT

3.2.3 Removing the BOARD ASSY.,MAIN and PSB/PSE

1. Remove the COVER ASSY.,PRINTER, EDGE GUIDE ASSY., ribbon cartridge, TRACTOR ASSY., PLATEN KNOB, and optional color upgrade kit.
2. Remove the HOUSING ASSY.,UPPER (see Section 3.2.2).
3. Disconnect the 3 flexible flat cables (FFCs) and 6 connectors from the BOARD ASSY.,MAIN and PSB/PSE.
4. Remove the 4 CBB(M3 x 8) screws attaching the shield plate to the main board assembly and PSB/PSE, the CBB(M3 x 8) screw attaching the CS BOARD and the CBC(M4 x 8) screw attaching the ground wire of the POWER CABLE.
5. Disengage the SHIELD PLATE and BOARD ASSY.,MAIN and PSB/PSE from the GROUNDING PLATE.

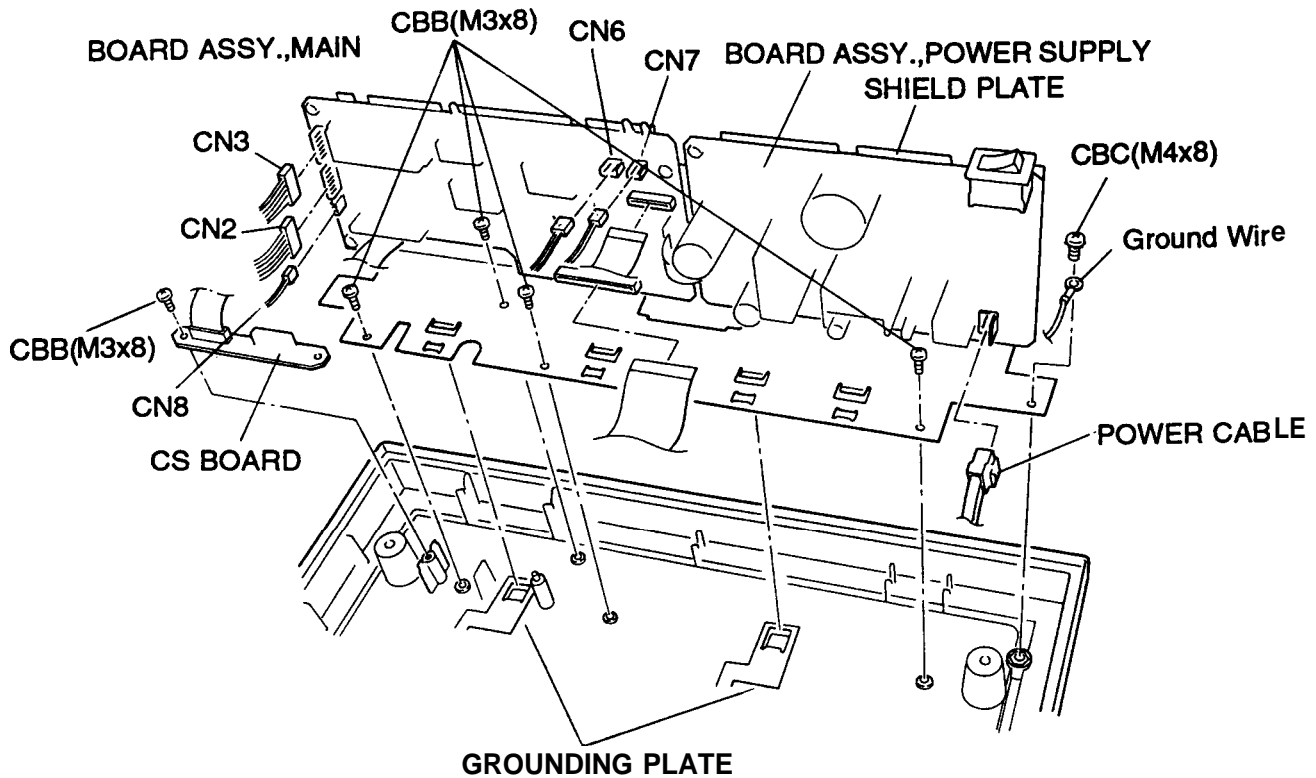


Figure 3-5. Removing the SHIELD PLATE

3.2.3.1 Removing the BOARD ASSY.,MAIN

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

3.2.3.2 Removing the BOARD ASSY.,PSB/PSE

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

Assembly Note

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

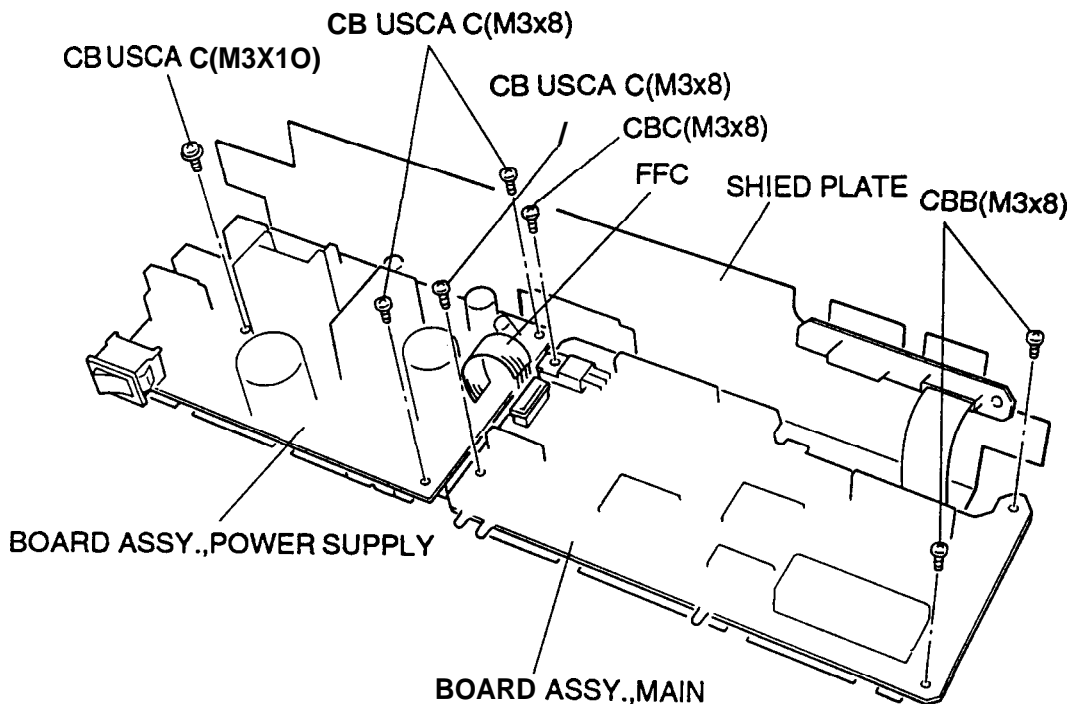


Figure 3-6. Removing the BOARD ASSY.,MAIN and PSB/PSE

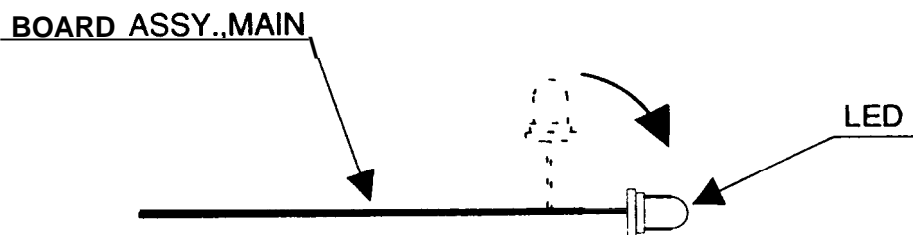


Figure 3-7. Bending the LED Lead Wires

3.2.4 Removing the Printer Mechanism

1. Remove the COVER ASSY.,PRINTER, EDGE GUIDE ASSY., ribbon cartridge, TRACTOR ASSY., PLATEN KNOB, and optional color upgrade kit.
2. Remove the HOUSING ASSY.,UPPER (see Section 3.2.2).
3. Remove the connectors and FFCs from the BOARD ASSY.,MAIN.
4. Remove the3 SHAFT,HOUSING,LOWER (1018296).
5. Remove the SHAFT,HOUSING,LOWER (1015457). Note that this shaft is different from the three described in the previous step.
- 6 Remove the printer mechanism.

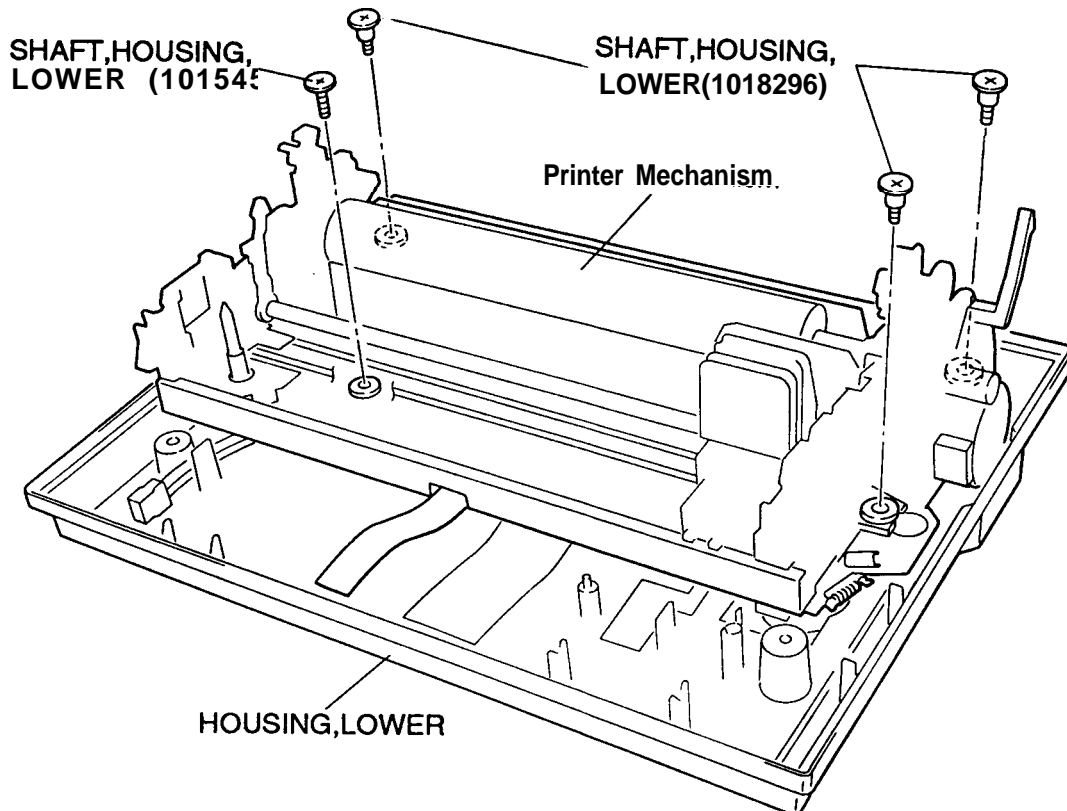


Figure 3-8. Removing the Printer Mechanism

3.2.4.1 Removing the MOTOR ASSY.,PF

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the GROUNDING SPRING,PLATEN that secures the platen shaft. (see Section 3.2.43)
3. Remove the CBB (M3 x 8) screw attaching the MOTOR ASSY.,PF to the FRAME,LIGHT.
4. Release the clip holding the MOTOR ASSY.,PF from the FRAME,RIGHT.
5. Remove the MOTOR ASSY.,PF from the FRAME,RIGHT.

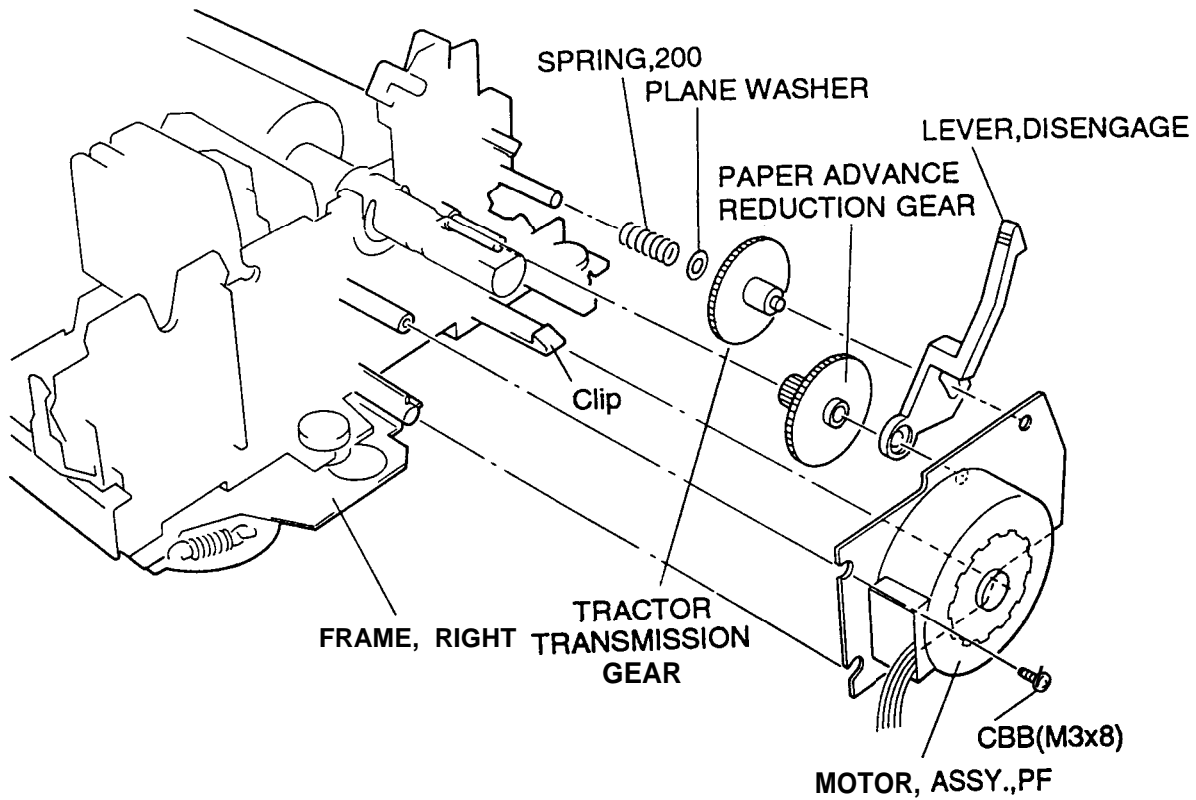


Figure 3-9. Removing the MOTOR ASSY.,PF

3.2.4.2 Removing the MOTOR ASSY.,CR

1. Remove the Printer Mechanism (see Section 3.2.4).
2. Remove the BELT TENSION SPRING from the hook on the MOTOR ASSY.,CR and the hook on the FRAME, BASE.
3. Remove the TIMING BELT from the PULLEY DRIVE.
4. Remove the E-ring, PULLEY WASHER, BELT PULLEY FLANGE, and PULLEY DRIVE from the MOTOR ASSY.,CR.
5. Rotate the MOTOR ASSY.,CR counterclockwise and remove it.

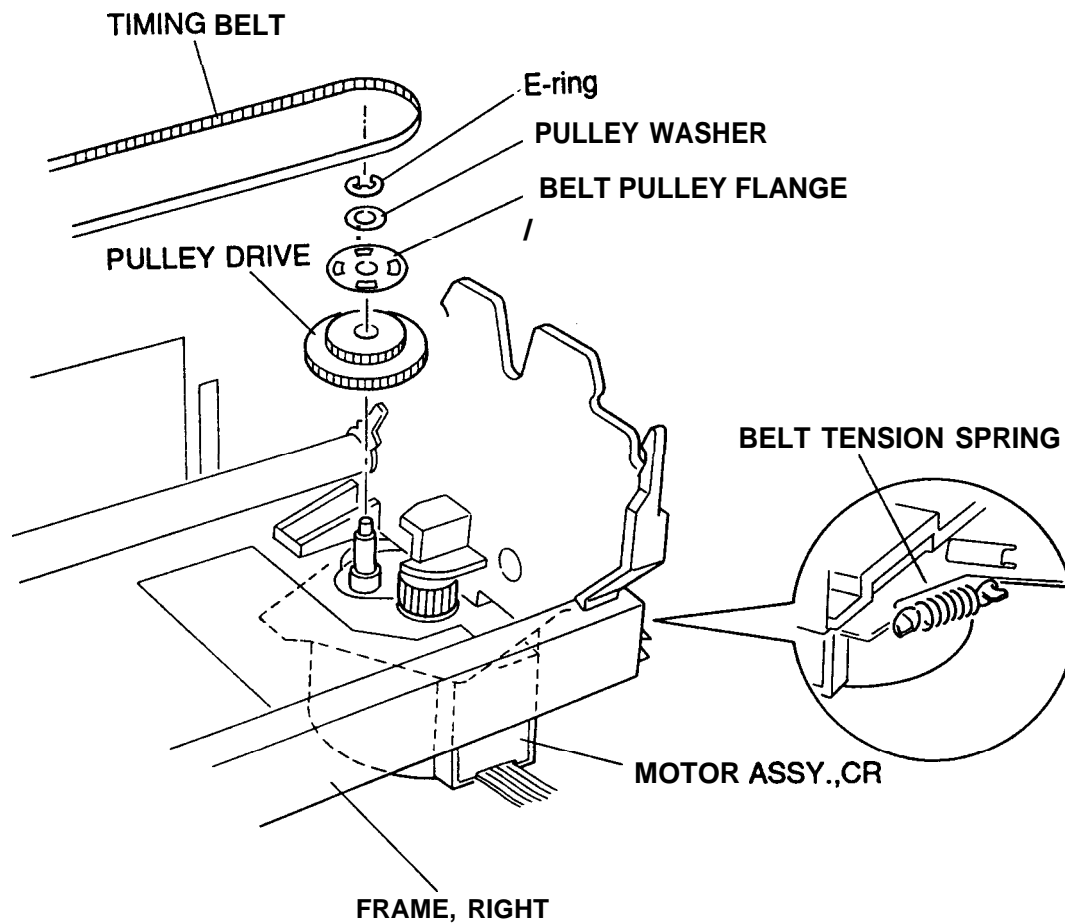


Figure 3-10. Removing the MOTOR ASSY.,CR

3.2.4.3 Removing the PLATEN

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the **GROUNDING SPRING, PLATEN** that secures the platen shaft.
3. Remove the **GEAR, 25** from the **FRAME, RIGHT**.
4. Disengage the teeth of the 2 **BUSHING 11s** and rotate them.
5. Rotate the **PLATEN** and remove it.

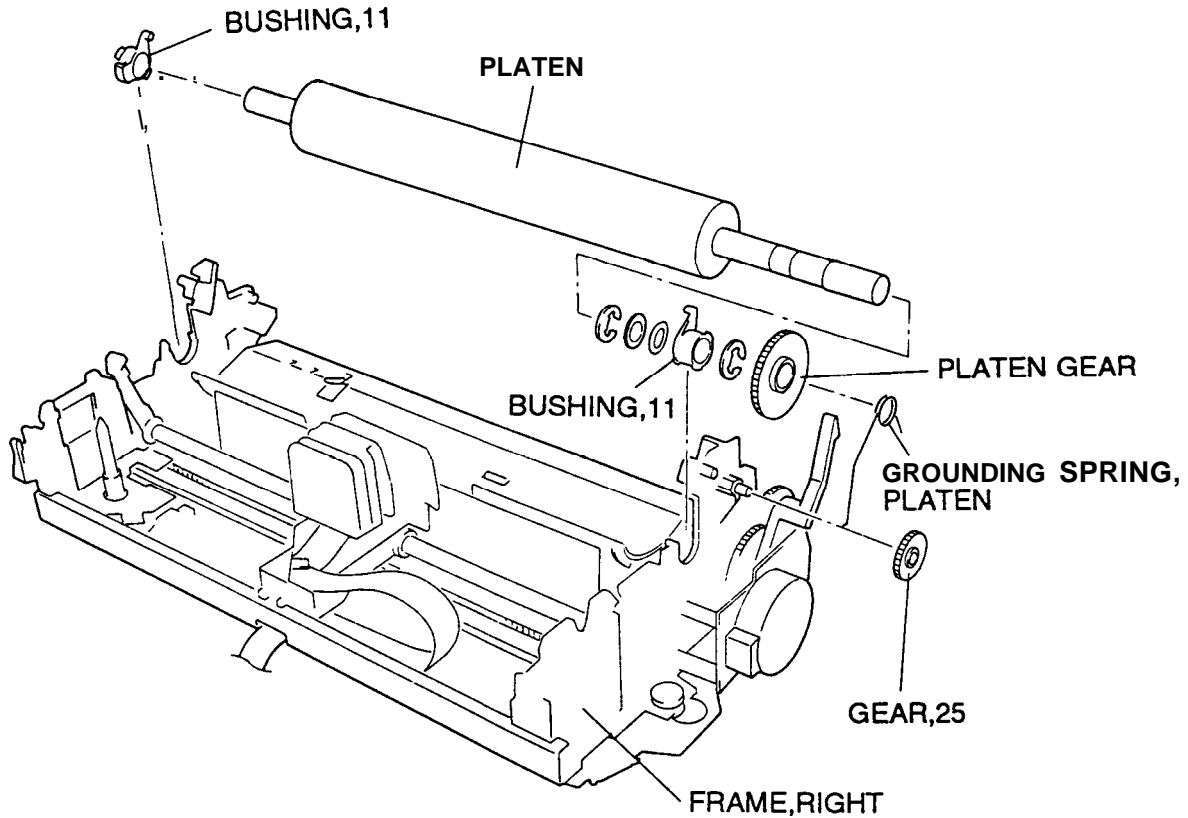


Figure 3-11. Removing the **PLATEN**

3.2.4.4 Removing the DETECTOR,PE

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the PLATEN (see Section 3.2.4.3).
3. Release the SHAFT FRICTION of the PAPER GUIDE,UPPER from the clips on the FRAME,RIGHT and LEFT.
4. Remove the PAPER GUIDE,UPPER from the FRAME,RIGHT and LEFT.

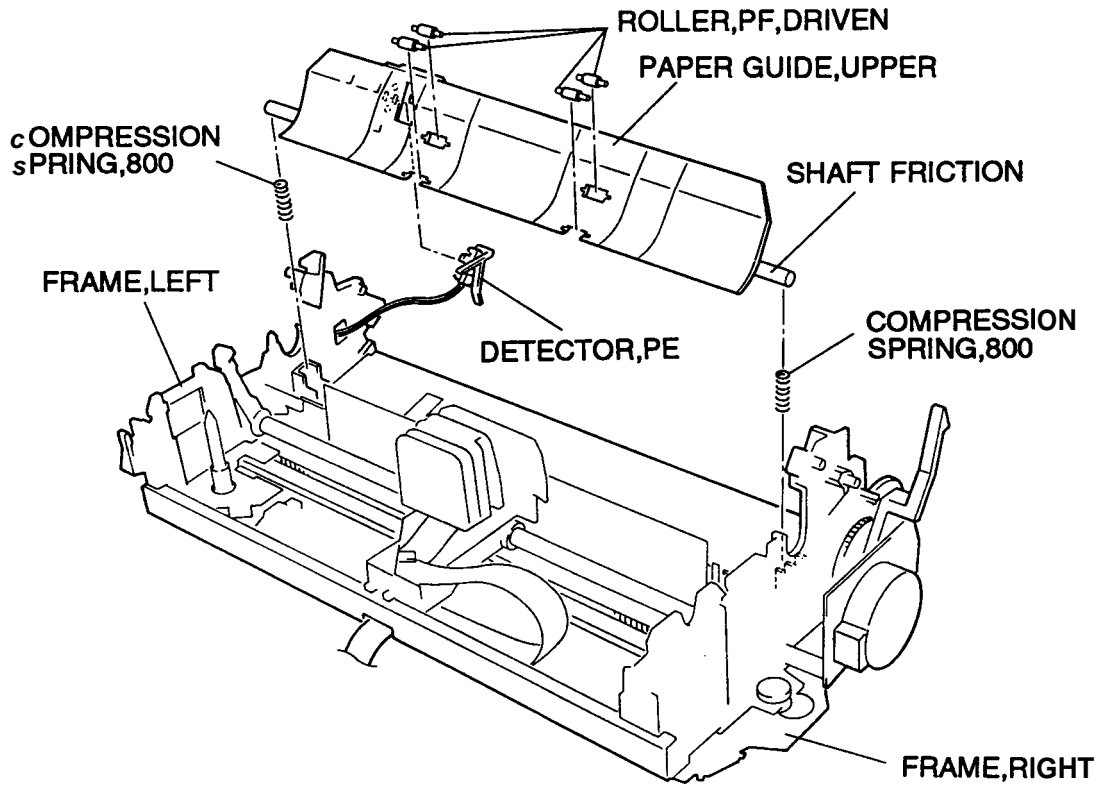


Figure 3-12. Removing the DETECTOR,PE

5. Release the 2 clips securing the DETECTOR,PE and remove it.

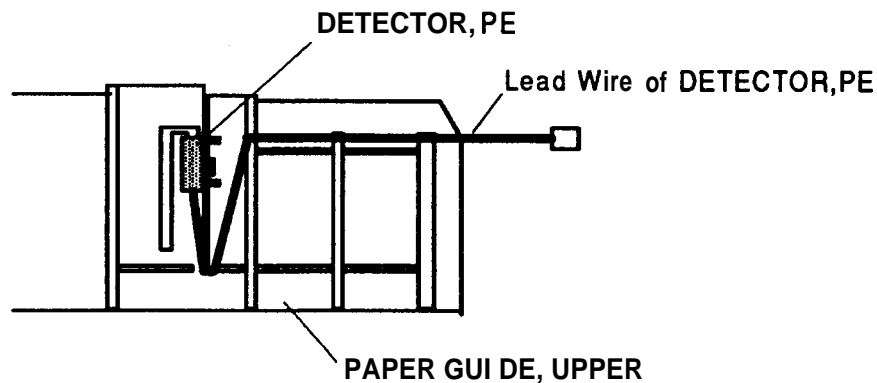


Figure 3-13. Wiring of the PE Sensor

3.2.4.5 Removing the DETECTOR,HP

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

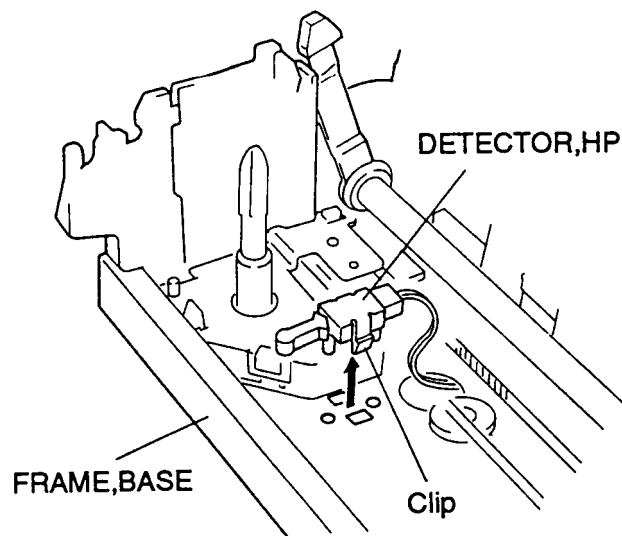


Figure 3-14. Removing the **DETECTOR,HP**

3.2.4.6 Removing the Release Lever Position Sensor

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

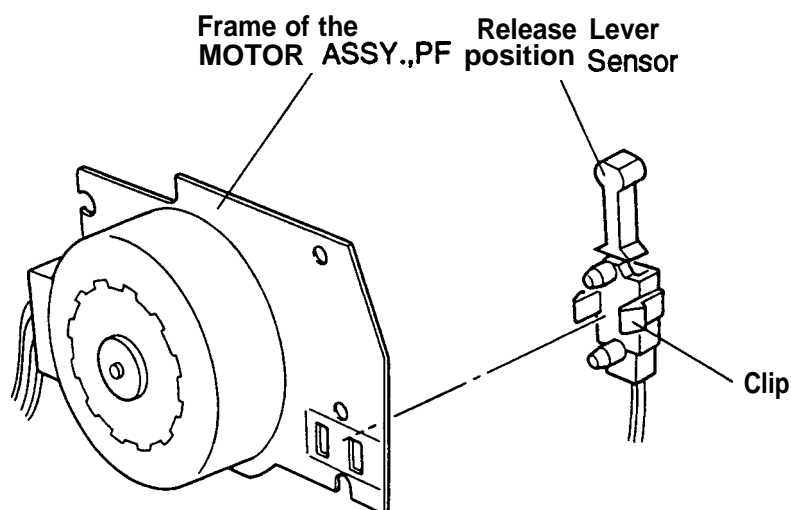


Figure 3-15. Removing the Release Lever Position Sensor

3.2.4.7 Removing the CARRIAGE ASSY.

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the BELT TENSION SPRING from the hook on the MOTOR ASSY.,CR (see Section 3.2.4.2), and remove the TIMING BELT of the CARRIAGE ASSY. from the PULLEY DRIVE.
3. Release the hook that attaches the SHEET,CABLE,HEAD to the FRAME,BASE. Slide the cable to the left and remove it.
4. Remove the printhead FFC from the FRAME,BASE.
5. Remove the GROUNDING PLATE,SHAFT,CR from the left side of the printer mechanism.
6. Rotate both sides of the BUSH,PARALLEL ADJUST and remove them from the FRAME,LEFT and RIGHT.
7. Remove the SHAFT ASSY.,CR GUIDE and the CARRIAGE ASSY.

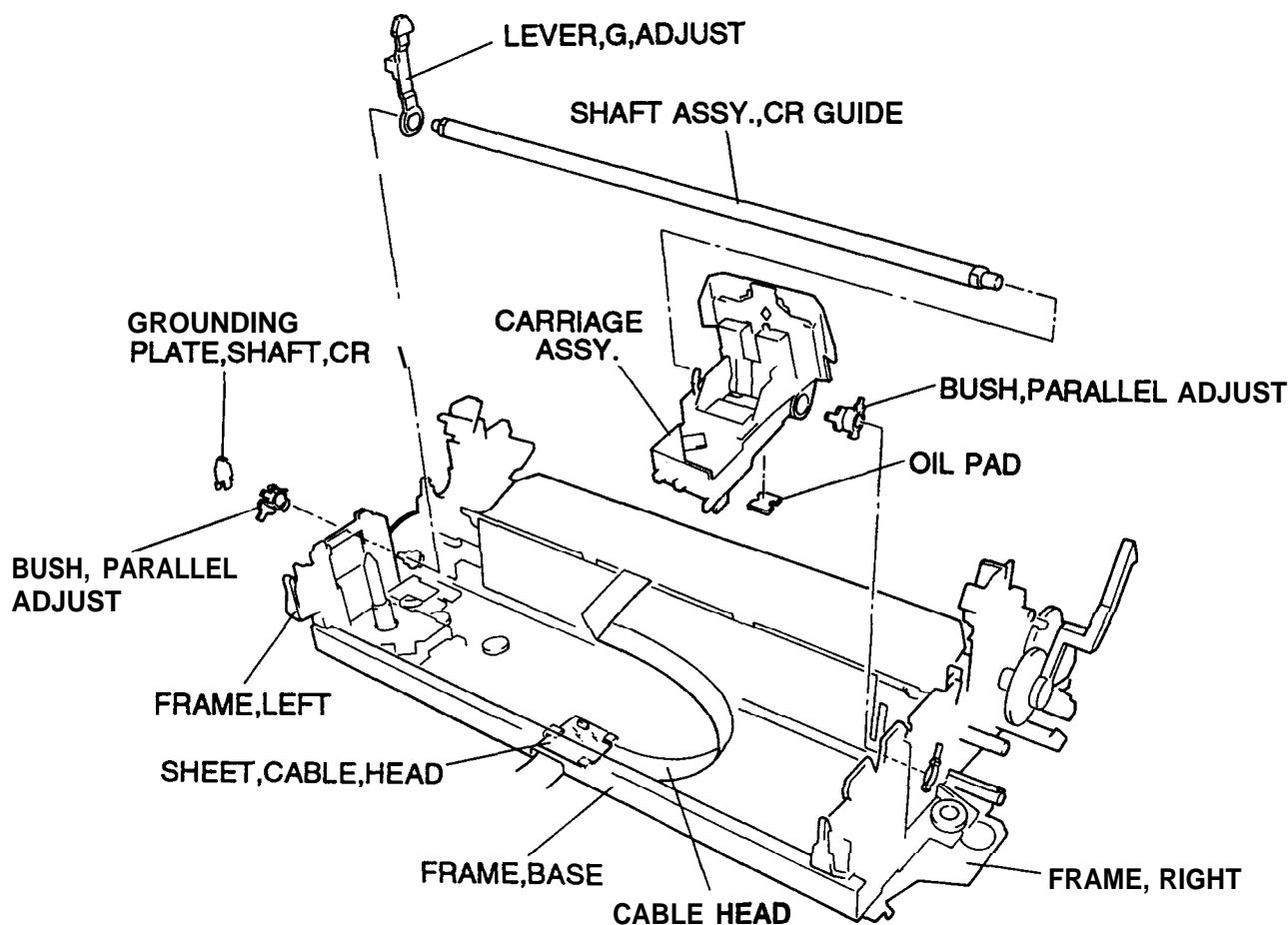


Figure 3-16. Removing the CARRIAGE ASSY.

3.2.4.8 Removing the Ribbon Drive Gear Assembly

1. Remove the printer mechanism (see Section 3.2.4).
2. Release the 3 hooks attaching the **COVER,RD** to the **FRAME,LEFT**.
3. Remove the **COVER,RD**.
4. Remove the **BELT TENSION SPRING** between the hook on the **MOTOR ASSY.,CR** and the hook on the **FRAME,BASE** (see Section 3.2.4.2).
5. Remove the **TIMING BELT** from the **PULLEY DRIVEN**.

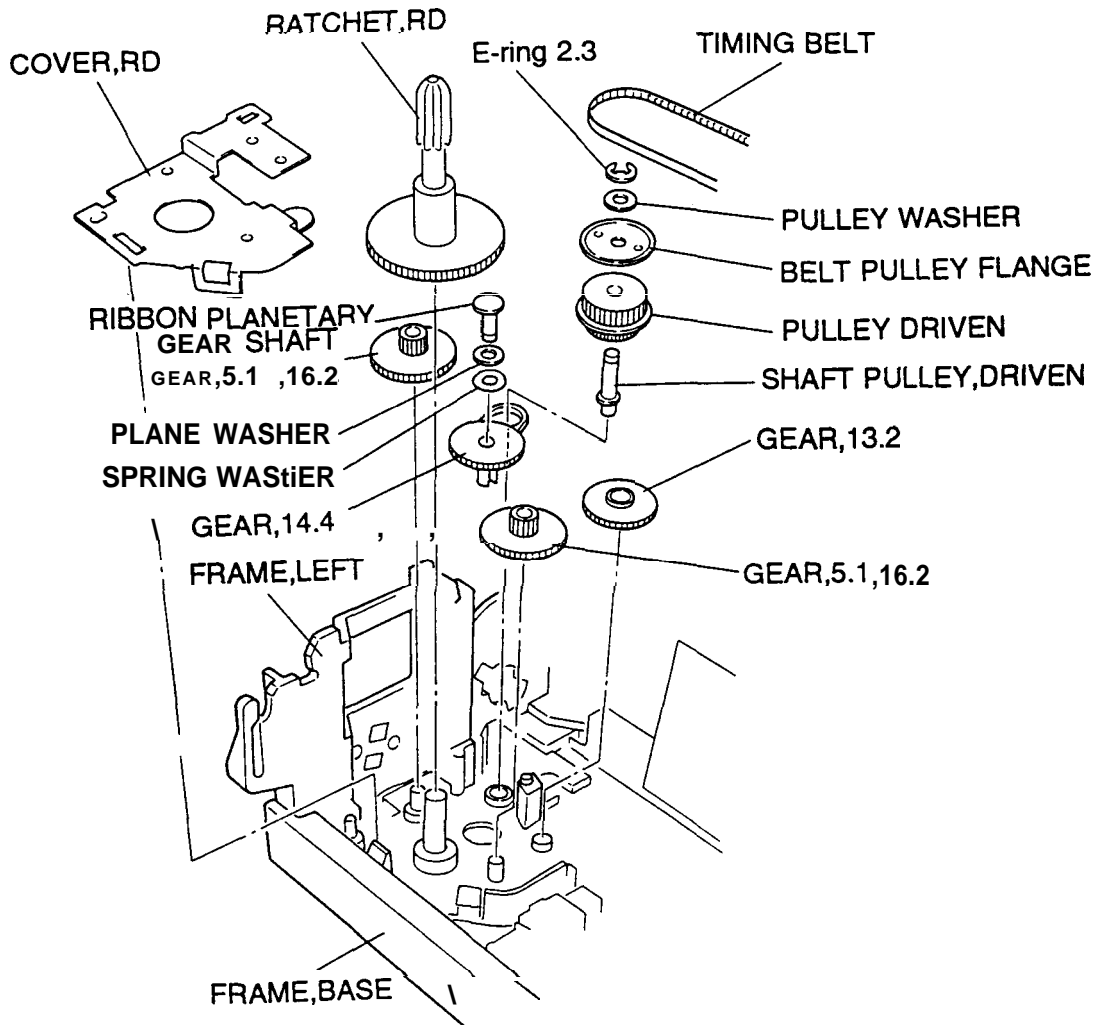


Figure 3-17. Removing the Ribbon Drive Gear Assembly

Assembly Note

*Make sure not to put the **TIMING BELT** between the **COVER,RD** and the **FRAME,LEFT**.*

3.2.4.9 Removing the PF Gear Assembly

1. Remove the **MOTOR ASSY.,PF** (see Section 3.2.4.1).
2. Remove the PF gear train and the release lever.

3.2.5 Removing the BOARD ASSY.,INTERFACE

1. Remove the printer mechanism (see Section 3.2.4).
2. Remove the GROUNDING PLATE connecting the SHIELD PLATE,INTERFACE and the SHIELD PLATE.
3. Remove the CBB (M3 x8) screw and the CBT (M3 x 10) screw attaching the COVER,BOTTOM to the HOUSING,LOWER.
4. Remove the 2 CBB (M3 x 8) screws attaching the BOARD ASSY.,INTERFACE to the HOUSING,LOWER.
5. Remove the COVER,BOTTOM and the BOARD ASSY.,INTERFACE.

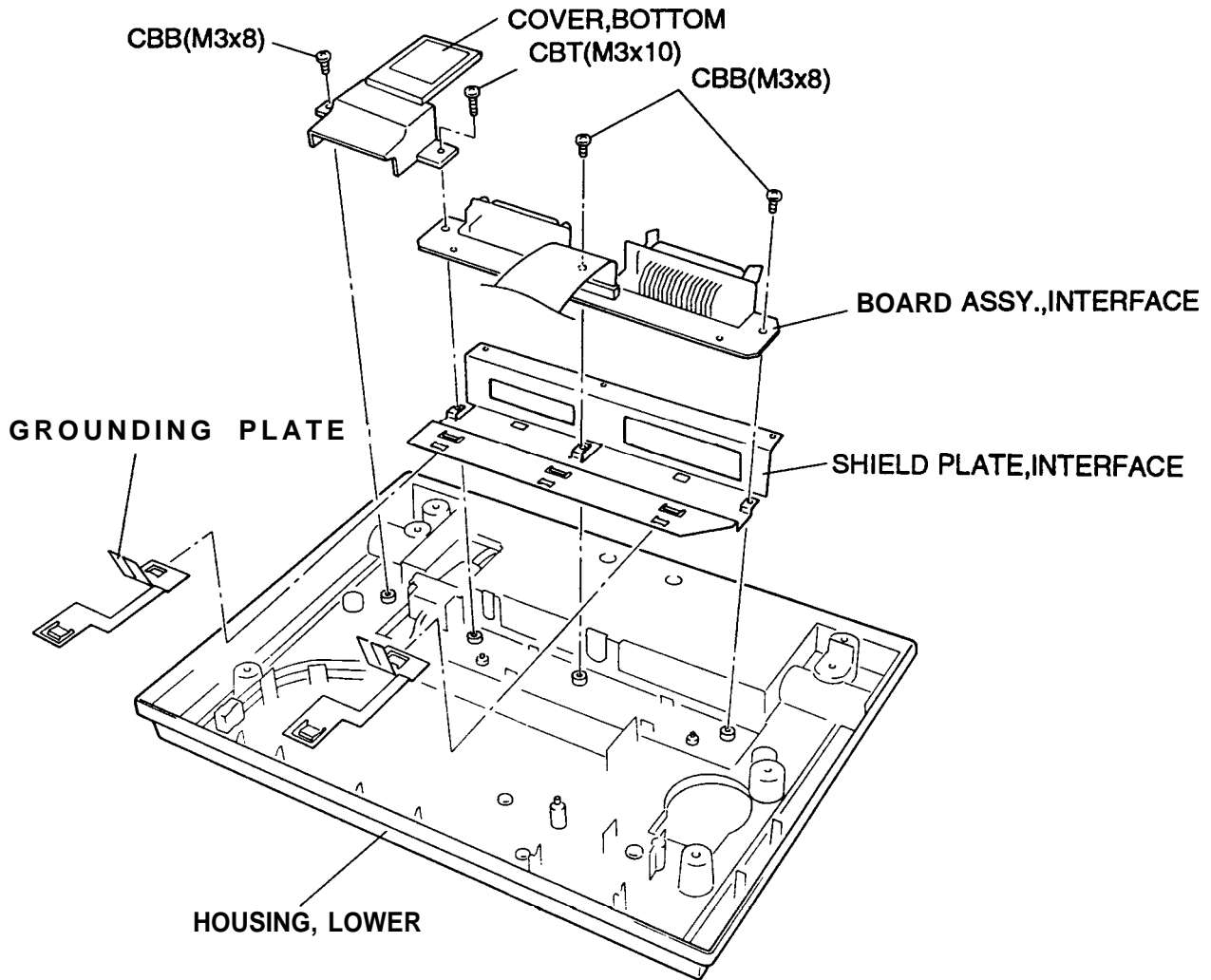


Figure 3-18. Removing the BOARD ASSY.,INTERFACE

3.2.6 Removing the ROLLER ASSY.,DRIVEN

1. Remove the COVER,PRINTER.
2. Remove the CF (M2.6 x 8) screw attaching the ROLLER ASSY.,DRIVEN.
3. Remove the ROLLER ASSY.,DRIVEN.

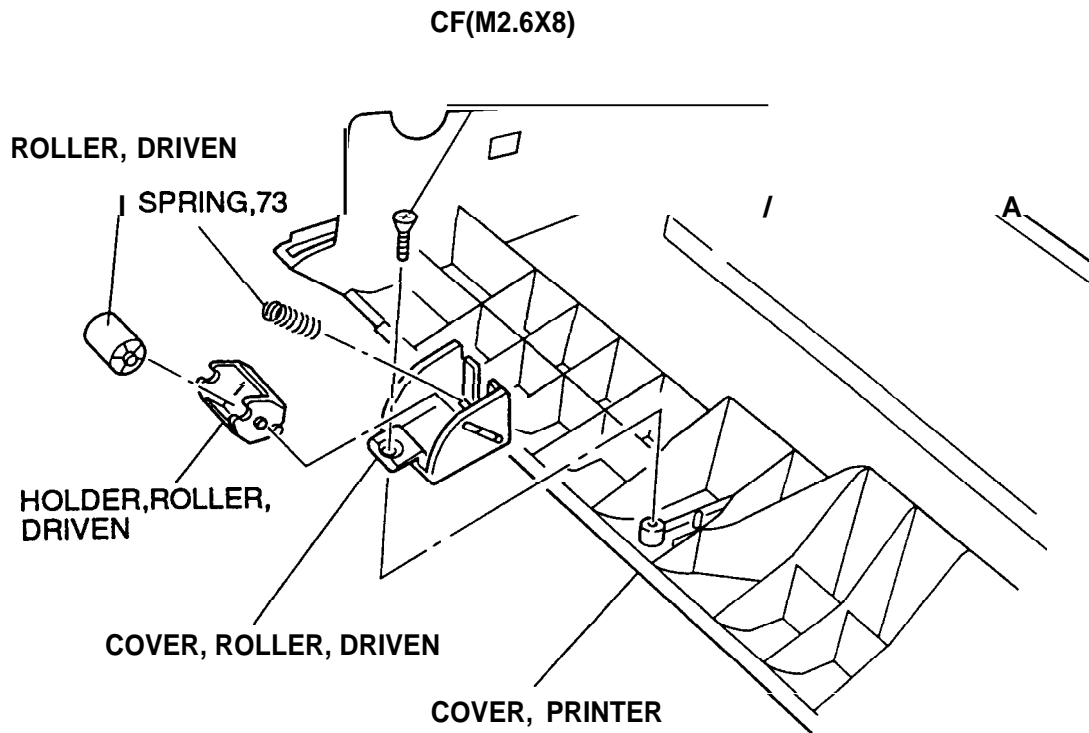


Figure 3-19. Removing the ROLLER ASSY.,DRIVEN

3.2.7 Disassembling and Assembling the Optional Color Upgrade Kit

3.2.7.1 Removing the MOTOR ASSY.,CS

1. Remove the CBB (M3 x 8) screw attaching the MOTOR ASSY.,CS to the COVER,CS.
2. Release the 2 clips attached to the COVER,CS.
3. Remove the MOTOR ASSY.,CS with the BOARD ASSY.,CS from the COVER,CS.

3.2.7.2 Remove the GEAR,CAM,CS

1. Remove the MOTOR ASSY.,CS (see Section 3.2.7.1).
2. Remove the E-ring 3 from the color cam shaft.
3. Remove the GEAR,CAM,CS.

3.2.7.3 Removing the Color Ribbon Sensor

1. Remove the MOTOR ASSY.,CS and the BOARD ASSY.,CS (see Section 3.2.7.1).
2. Remove the E-ring 4 from the cartridge holder shaft.
3. Remove the HOLDER,CARTRIDGE,COLOR from the MOTOR ASSY.,CS.
4. Release the clip that attaches the HOLER,CARTRIDGE,COLOR to the color ribbon sensor.
5. Remove the color ribbon sensor connector from the BOARD ASSY.,CS.

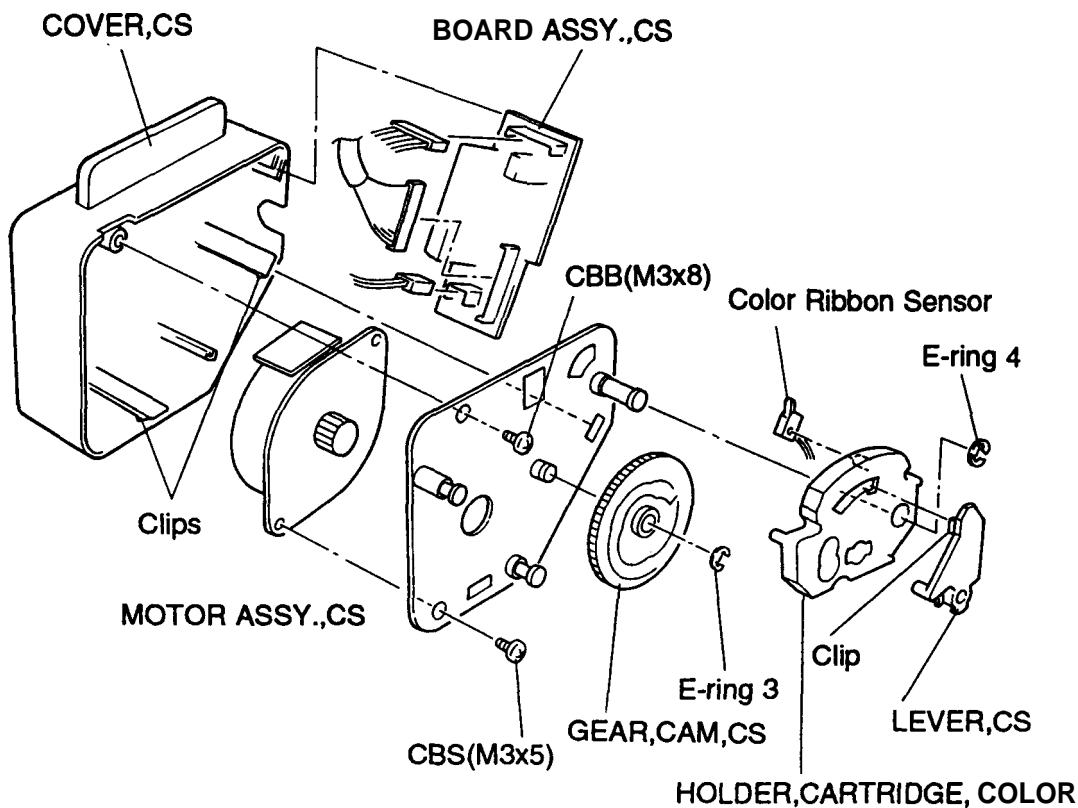


Figure 3-20. Disassembling the Optional Color Upgrade Kit

CHAPTER 4 Adjustments

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4.1 ADJUSTING THE PRINTER MECHANISM

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

4.1.1 Platen Gap Adjustment

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

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

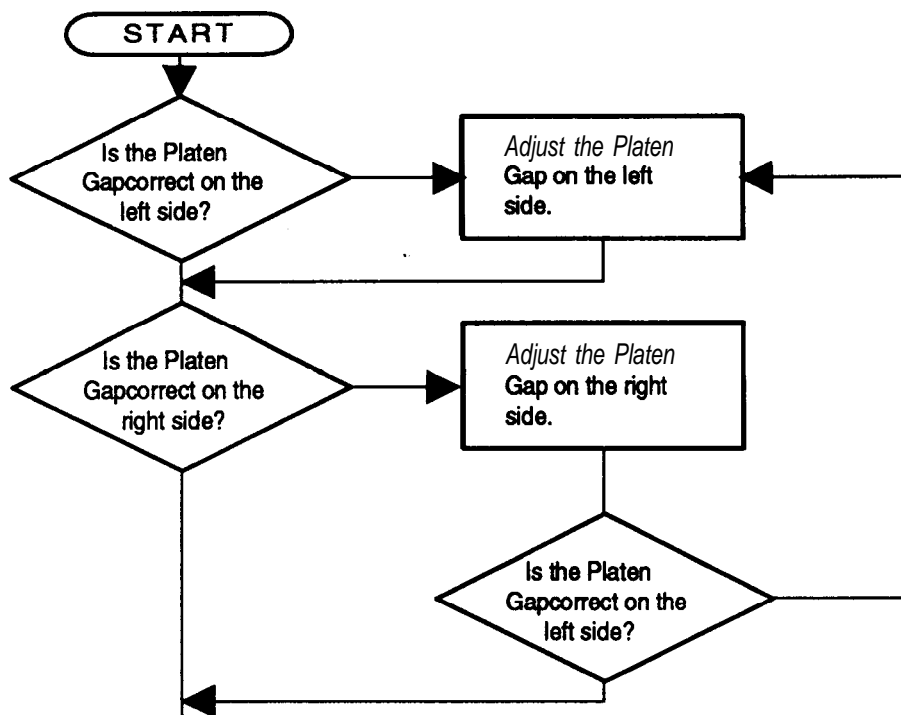


Figure 4-1. The Flowchart of the Platen Gap Adjustment

4.2 DEFAULTS, MACHINE INFORMATION SETTINGS, AND BIDIRECTIONAL ADJUSTMENT

4.2.1 Defaults and Machine Information Settings

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

1. **Connect the** printer to a PC.
2. Turn the printer on.
3. Load paper into the printer by pressing the **LF/FF** button. You can use either **cutsheet** or continuous paper.
4. Load the **GW BASIC** program onto the PC.
5. Insert a diskette containing the LX-300 Adjustment Program into the PC's diskette drive.
6. Load the LX-300 Adjustment Program named "**LX300.**"
7. When you run the program, the following message appears on the display:

```

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

8. Press 2, then Enter to select *Defaults & Machine Information Settings*.
9. *The* following message appears on the display:

```

Which destination do you want to select?
EAI : 1 EDG : 2 EIS : 3 EFS : 4 EHK : 5
ESP : 6 ESP : 7 EUL : 8 EIB : 9 EAL : A
ETT : B
Press 1- B and the Enter key.
```

10. The following message appears on the display:

```

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

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

Before **proceeding**, confirm the following

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

If ready, press Y and the Enter key. -

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

No.	Add Function	SW& Valid
1	Message language	English
2	Tractor control	Single
3	Character table	PC-437
4	Page length	11 inch
5	1 inch skip over perforation	OFF
6	Interface selection	OFF
7	Bit rate	9600 bps
8	Prii bit	NONE
9	Date Length	7 bit
10	ETX/ACK protocol	DISABLE
11	Auto tear off	OFF
12	Character spacing	10 cpi
13	Auto line feed	OFF
14	Shape of zero	Not slashed

These are the factory defaults programmed into this printer.

12. Press Y, then Enter to confirm these settings and return to the initial menu.

13. Exit the program by pressing 3, then Enter.

14. The following message appears on the display:

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

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

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

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

Bi-D INPUT
Draft: -

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

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

LQ : -

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

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

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

13. If your printed pattern is aligned vertically, press Y and Enter to complete the **Bi-D** adjustment. Otherwise, press N to return to step 9 to specify another adjustment value.

Chapter 5 Troubleshooting

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5.1 OVERVIEW

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

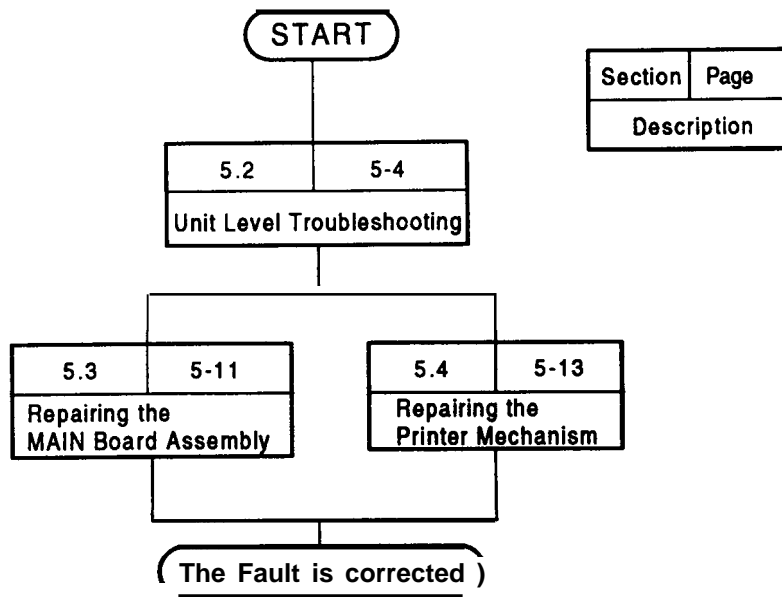


Figure 5-1. Troubleshooting Procedure

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

The following tables provide troubleshooting information.

Table 5-1. Printhead Coil Resistance

Part	Specification
Printhead	Coil resistance 33.3 Ω ± 3.3 Ω at 25° C (77° F)

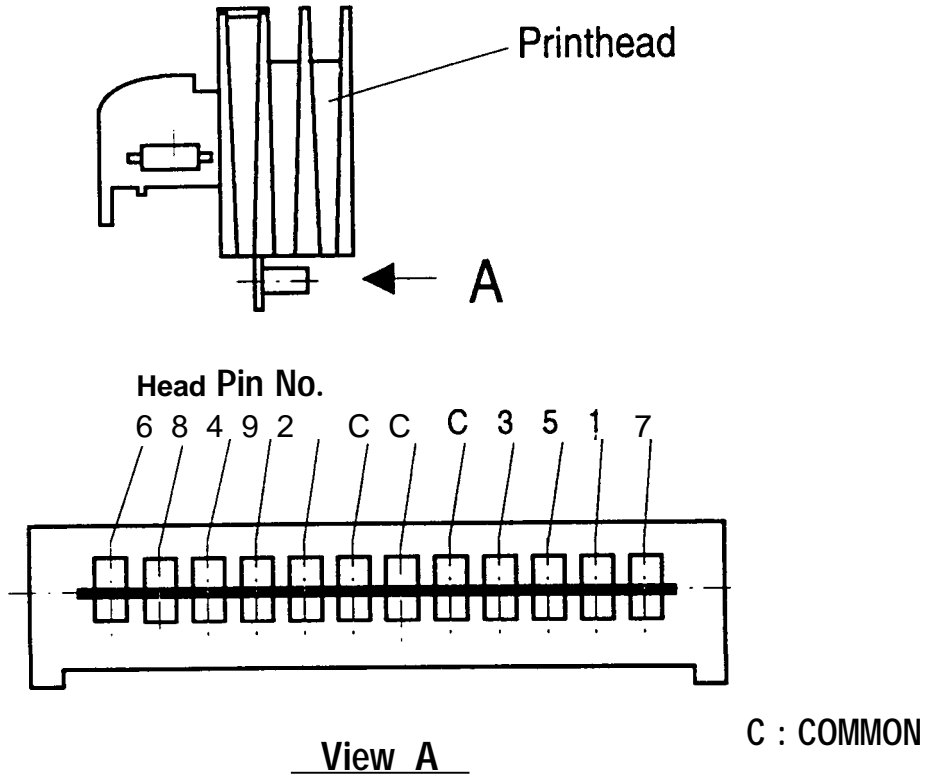


Figure 5-2. Printhead Connector Pin Alignment

Table 5-2. Printhead Driver Test Points

Transistor Numbers	Test Method (Set Meter to Diodes. Check with Power Off.)	Meter Reading
Q1 ,Q2,Q3,Q4 Q5,Q6,Q7,Q8, Q9	Check from base to collector. Check from base to emitter. Reverse leads and test again.	Not open and not shorted from base to collector, base to emitter.

Table 5-3. Motor Driver Test Points

Transistor Numbers	Test Method (Set Meter to Diodes. Check with Power Off.)	Meter Reading
PF Motor Driver (Q11,Q12,Q13, Q14)	Check from base to collector and from base to emitter. Reverse leads and test again. (Emitter and base are marked on the main board assembly.)	Neither open nor shorted from base to collector or base to emitter.

Table 5-4. Motor Coil Resistance Test Points

Motor Connector Number	Common Pin Number	Test Pin Number	Test Method (Set Meter to Ohms. Disconnect Motor from Main Board and Check it with Printer Power Off.)	Meter Reading
CR Motor Assembly (CN2)	3,4	1,2,5,6	Place one lead on pin 3 or 4 and the other lead on each of the 4 test pins to check the two motor phases.	$18\Omega \pm 7\%$ (at 25° C, 77° F)
PF Motor Assembly (CN3)	3,4	1, 2, 5, 6	Place one lead on pin 4 and the other lead on each of the two test pins to check the two motor phases.	$56\Omega \pm 5\%$ (at 25° C, 77° F)
CS Motor Assembly (CS Board Assembly)	5	1, 2, 5, 6	Place one lead on pin 5 (brown) and the other lead on each of the 4 test pins to check the 4 motor phases. (Pin 3 is a common pin.)	$150\Omega \pm 5\%$ (at 25° C, 77° F)

Table 5-5. Sensor Test Points

Sensor Connector Number	Test Method Set Meter to Ohms. Check Printer with Power Off.)	Method Reading
HP sensor (CN7)	Place one lead on pin 1 and the other lead on pin 2. Toggle the sensor position,	Meter should toggle between open and short. (Closed = active.)
PE sensor (CN6)	Place one lead on pin 1 and the other lead on pin 2. Toggle the sensor by inserting and removing a sheet of paper.	Meter should toggle between open and short. (Open = active.)
Release Lever Position Sensor (CN3)	Place one lead on pin 1 and the other lead on pin 2. Change the paper-release lever position.	Meter should toggle between open and short. (Open = continuous paper.)
Color Ribbon Sensor (CS Board Assembly)	Place one lead on pin 1 and the other lead on pin 2. Toggle sensor position.	Meter should toggle between open and short. (Open = active.)

Table 5-6. Error State Indication

Error Indication	Error Status	Cause
The printer beeps (•••) and the PAUSE light blinks	Paper-out error.	Paper is not installed
The printer beeps (---) and the PAUSE light stays on	Operating error.	<ul style="list-style-type: none"> . The release lever is set to the TRACTOR position before the cut sheet is ejected. . The release lever is set to the FRICTION position before the continuous paper is ejected.
	Fatal error.	Power supply voltage is abnormal.

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

(=) The printer beeps for 1/2 of a second with a 1/10-second pause.

5.2 UNIT LEVEL TROUBLESHOOTING

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

Table 5-7. Symptoms and Problems

Symptom	Problem	See Page
Printer fails to operate when the power is on.	<ul style="list-style-type: none"> • Carriage does not move. • Control panel indicator LEDs do not light. 	5-5
Abnormal carriage operation.	<ul style="list-style-type: none"> • Carriage moves away from home position at power on. • The carriage returns to home position correctly, but the printer then fails to enter the READY mode. 	5-6
Printing is faulty during self-test, but carriage operation is normal.	<ul style="list-style-type: none"> • No printing at all. • Faulty printing — some of the dot are not printing. 	5-7
Abnormal paper feed.	<ul style="list-style-type: none"> • The printer prints but paper feeds incorrectly. 	5-8
Abnormal control panel operation.	<ul style="list-style-type: none"> • When the LF/FF button is pressed, no paper is fed. 	5-9
Data sent by the host computer is printed incorrectly.	<ul style="list-style-type: none"> • Carriage operates normally at power up, and self-test is executed correctly, but data is not printed. • Data from the computer is printed incorrectly. 	5-10

The repair procedure flowcharts use the following symbols:

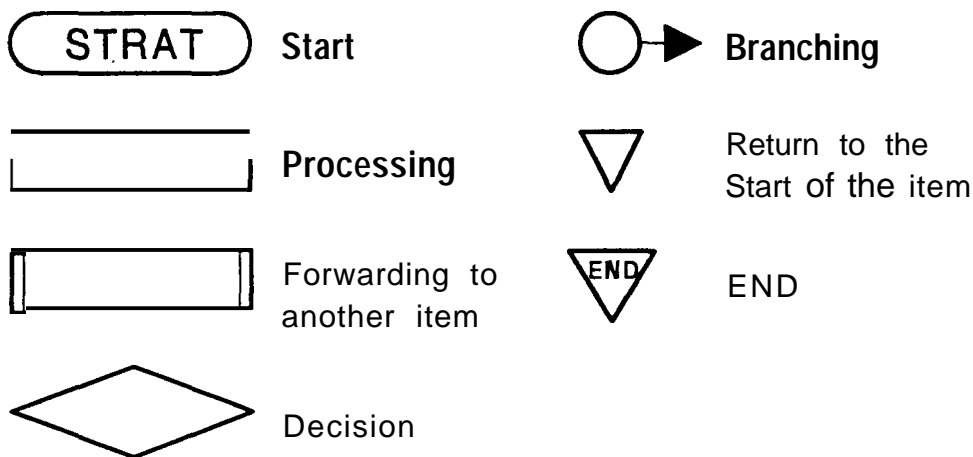
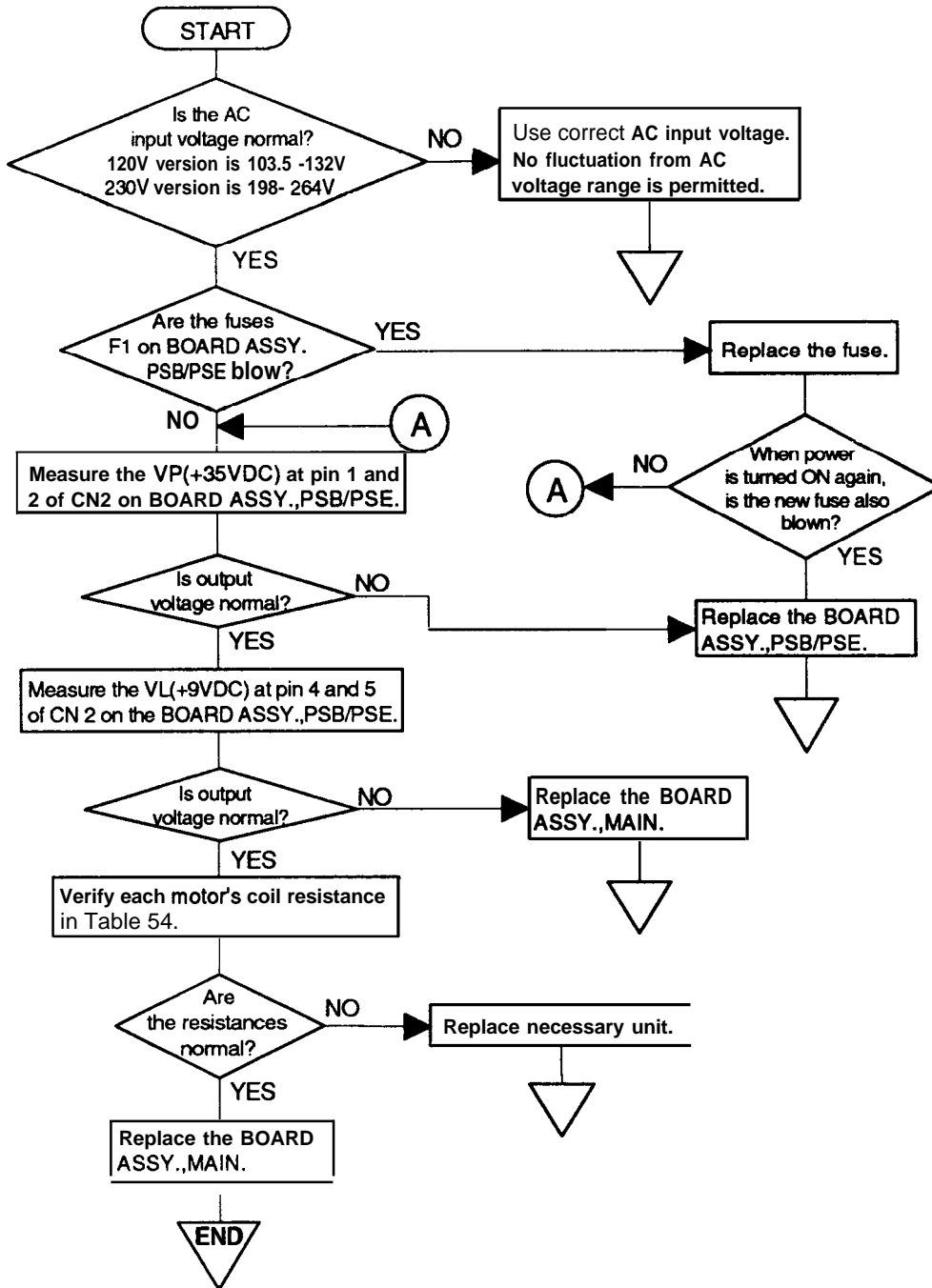
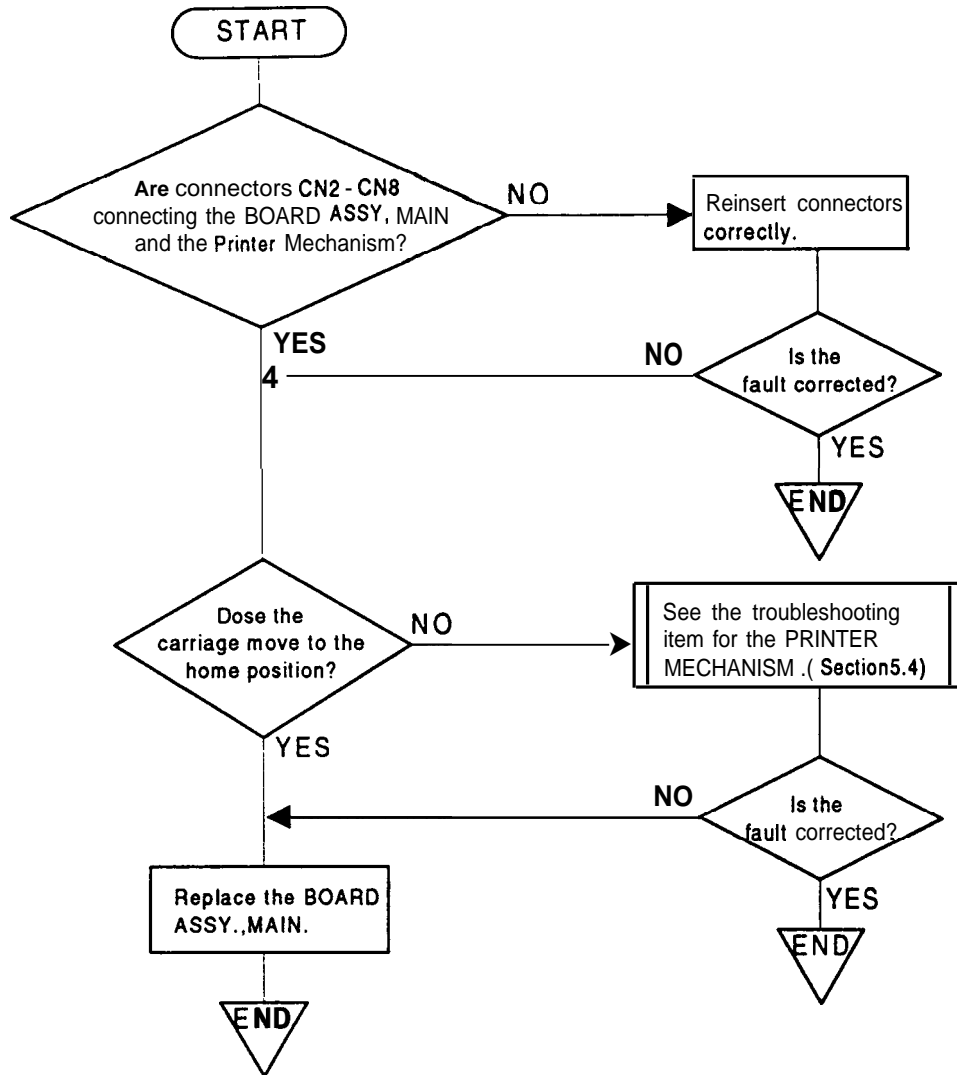


Figure 5-3. Flowchart Symbols

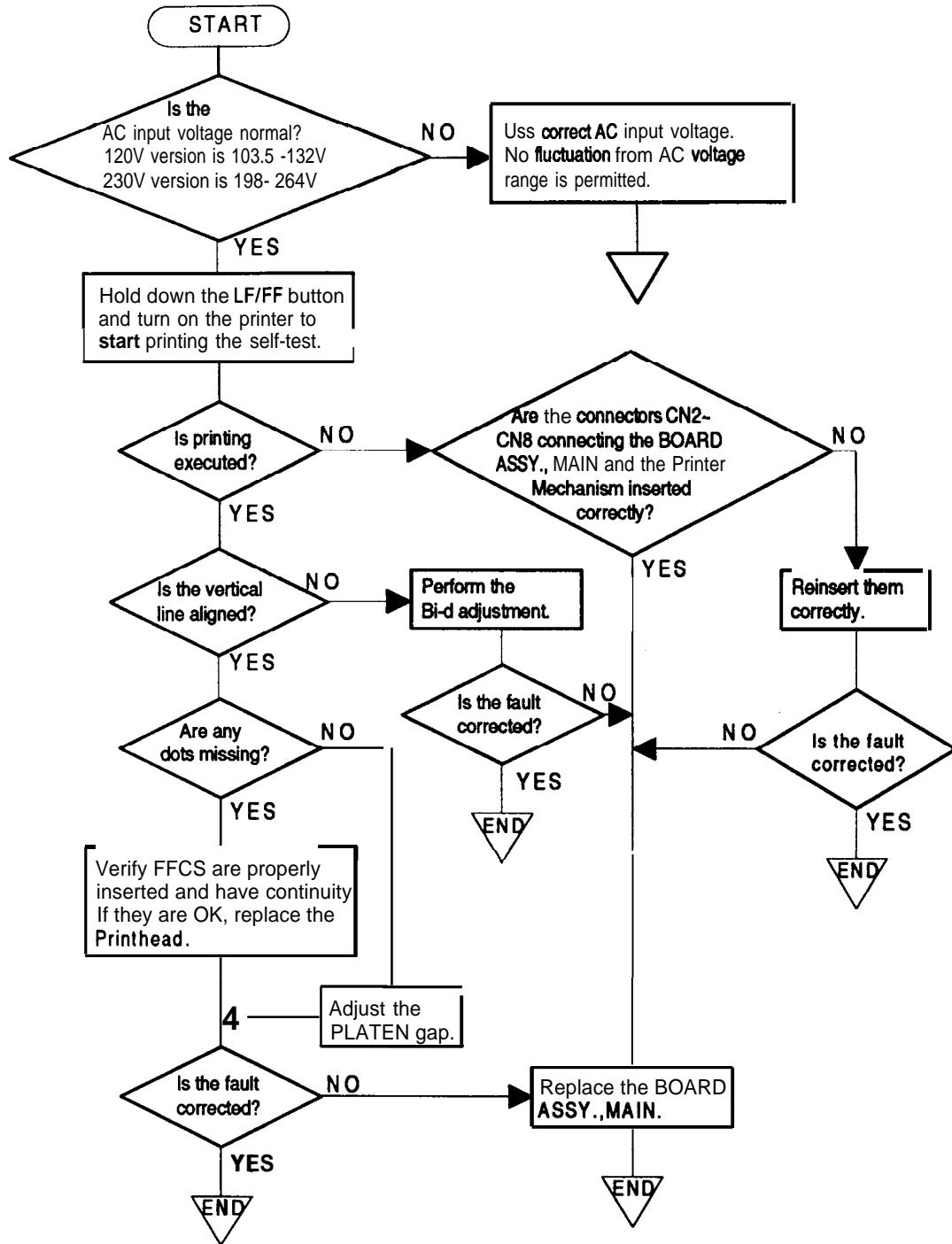
1. Printer fails to operate when the power is on.



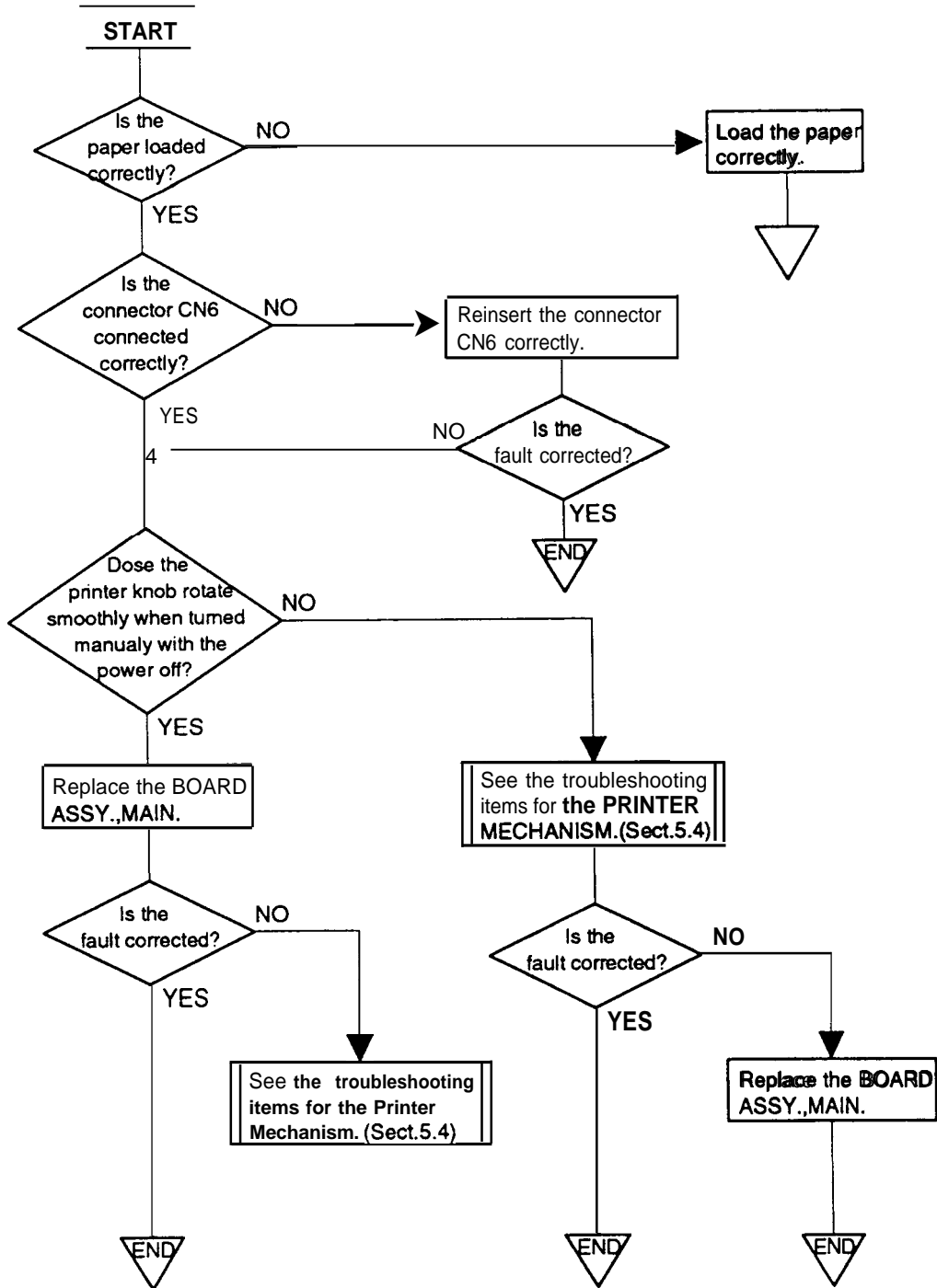
2. Abnormal carriage operation.



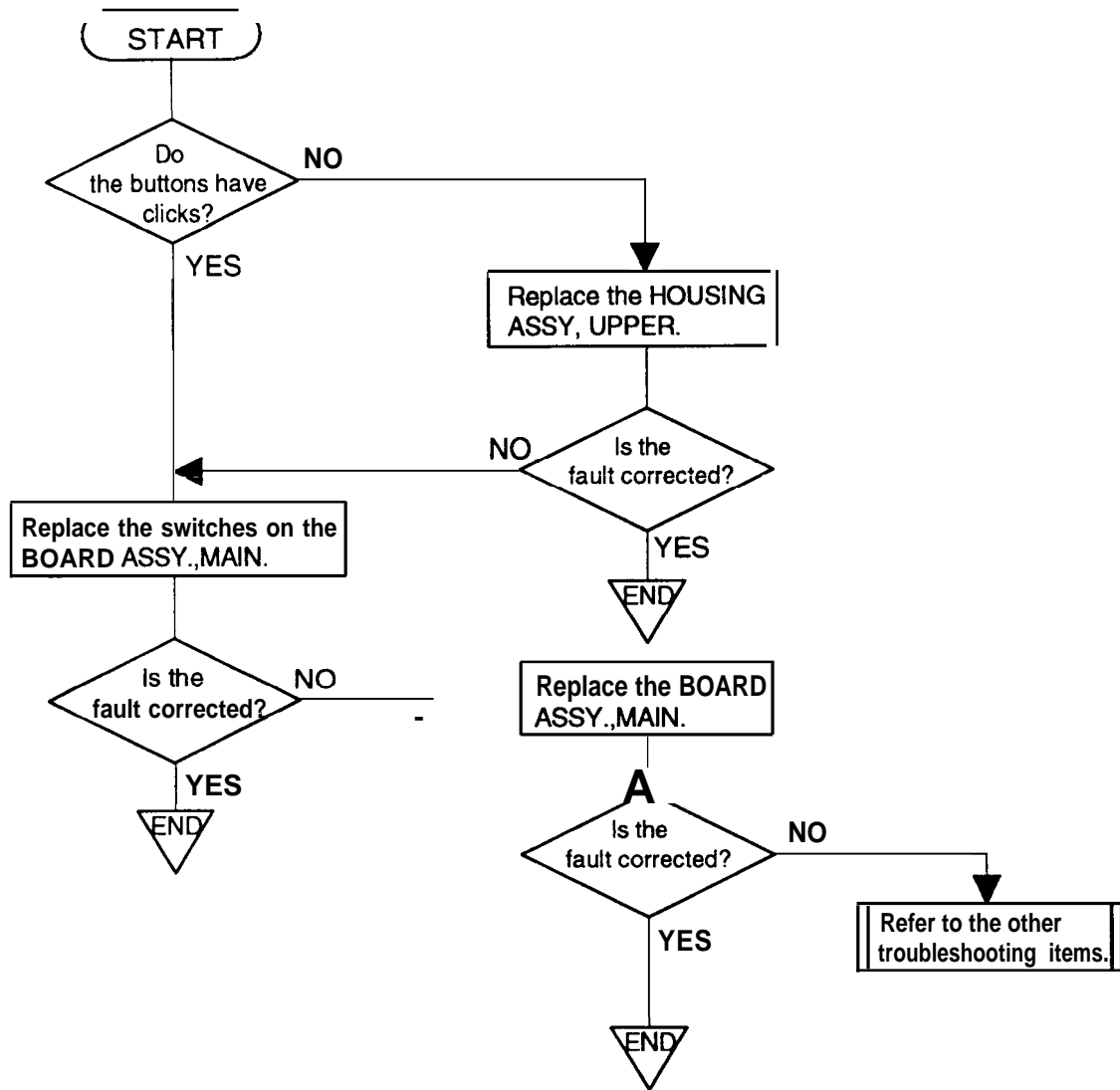
3. Printing is faulty during self-test, but carriage operation is normal.



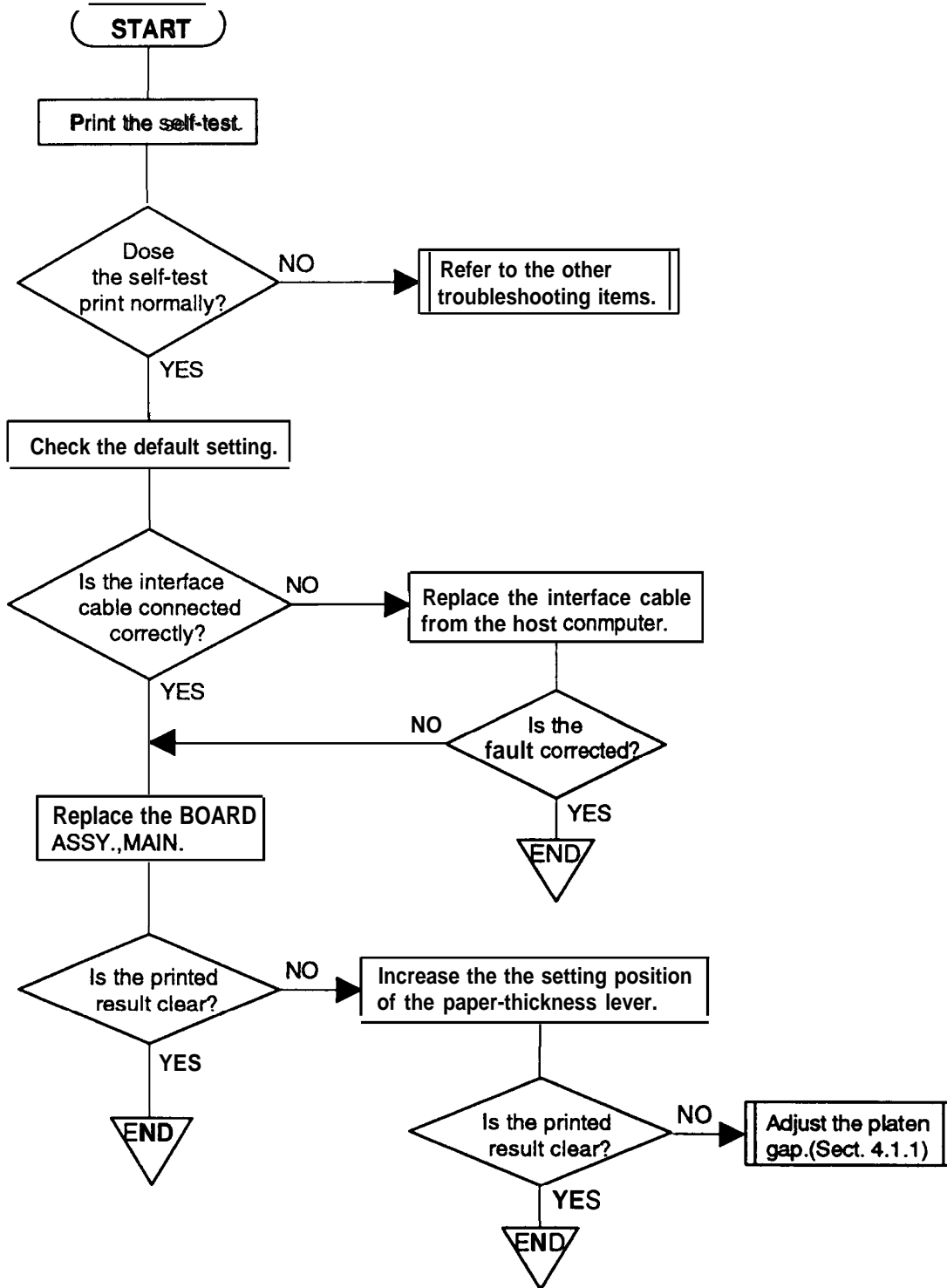
4. Abnormal paper feed.



5. Abnormal control panel operation.



6. Data sent by the host compute?' is printed incorrectly.



5.3 REPAIRING THE MAIN BOARD ASSEMBLY

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

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

Table 5-8. Repairing Problems in the Main Board Assembly

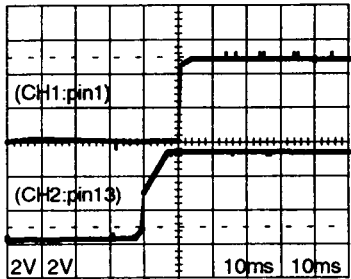
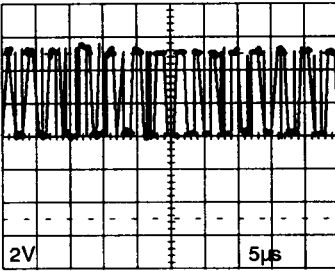
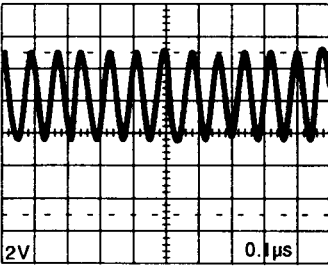
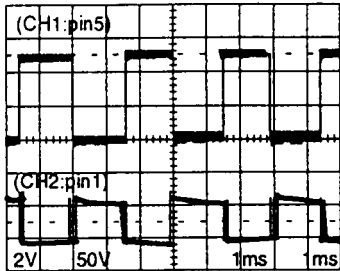
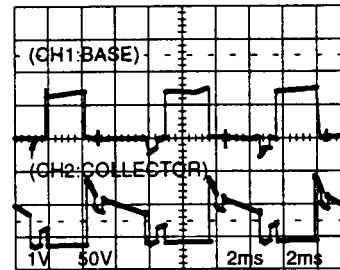
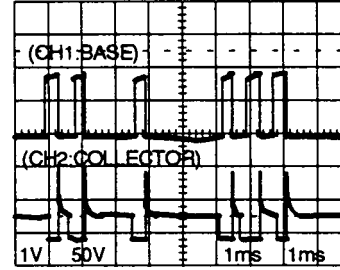
Problem	Symptom	Cause	Checkpoint	Solution
The printer does not operate at all.	The CPU does not operate.	The reset circuit is not operational.	<p>Check the voltage waveforms for the +5 VDC line (IC1, pin 1) and for the reset signal (IC1, pin 13) when the power is on.</p> 	Replace IC A2. Otherwise, replace the main board assembly.
		Selection control ROM is abnormal.	<p>Check that pin 105 of IC 1 change from HIGH to LOW.</p> 	Replace IC E3. Otherwise, replace the main board assembly.
		The CPU is defective.	<p>Check the oscillator signal at either pin 158 or 159 of the CPU.</p> 	If a signal is detected, replace CR1. Otherwise, replace the main board assembly.

Table 5-8. Repair of Problem in the main board assembly (Continued)

Problem	Symptom	Cause	Checkpoint	Solution
The carriage operates abnormally.	The carriage does not operate at all.	IC A1 is defective.	<p>Check the CR motor assembly phase signal at pin 5 and output signal at pin 1 of IC A1.</p> 	Replace IC A1. Otherwise, replace the main board assembly.
The paper feeds abnormally.	The paper does not feed at all.	One or more of the following transistors is defective: Q11, Q12, Q13, Q14.	<p>Check the signal at the collector and base of Q11, Q12, Q13 or Q14.</p> 	Replace any of these transistors that are defective: Q11, Q12, Q13 or Q14. Otherwise, replace the main board assembly.
Self-test printing is abnormal.	The self-test is not executed or a particular dot is not being printed.	Any transistor from Q1-Q9, are defective.	<p>Check the input signal at the collector and base of Q1-Q9.</p> 	Replace any of these transistors that are defective: Q1-Q9. Otherwise, replace the main board assembly.
Data from the host computer is printed incorrectly.	Data corruption occurs when the interface is used.	IC1 or IC2 is defective.		Replace IC2 or the main board assembly.

5.4 REPAIRING THE PRINTER MECHANISM

For detailed procedures for replacing or adjusting parts, refer to Chapter 3, *Disassembly and Assembly*, and Chapter 4, *Adjustments*. If a problem or symptom recurs following an attempted repair, refer to Table 5-10 to try find other potential causes.

Table 5-9. Repairing the Printer Mechanism

Problem	Symptom	Cause	Check Point	Solution
The CR motor assembly fails to operate after power on.	The CR motor assembly fails to operate the timing belt after power on.	Foreign substances are lodged in the gears or elsewhere in the mechanism.	Manually move the timing belt to see if the motor can rotate freely.	Remove the foreign substances.
		The CR motor assembly is defective.	Measure the motor coil resistance. It should be about 18 ohms. If the motor is shorted, also check the CR motor assembly drivers on the main board.	Replace the CR motor assembly (and drivers, if necessary).
The carriage does not operate when turned on (after the carriage has been manually centered prior to power on.)	The CR motor assembly rotates, but the carriage does not move.	The belt pulleys are defective.	Check for broken or worn pulleys.	Replace the belt pulleys.
		The timing belt is defective.	Check that the timing belt is inserted correctly into the bottom of the carriage.	Reinsert the timing belt.
			Check for a broken timing belt.	Replace the timing belt.
	The carriage moves to the left slightly, then stops.	The carriage movement is not smooth.	Check whether the carriage moves smoothly when moved manually.	Clean and lubricate the CR guide shaft assembly. Replace the CR motor assembly.
	The carriage moves to the left or right end, then stops.	The HP sensor is defective.	Use a multimeter to check the HP sensor.	Replace the HP sensor.
Self-test printing is not executed.	The carriage moves, but does not print.	The printhead FFC common wires are disconnected.	Check the common wires for the printhead FFC.	Replace the FFC.
		The printhead is bad.	Measure the printhead coil resistance. It should be approximately 33.3 ohms. If the printhead is shorted, also check the drivers.	Replace the printhead (and drivers, if necessary).

Table 5-9. Repairing the Printer Mechanism (Continued)

Problem	Symptom	Cause	Check Point	Solution
Self-test printing is abnormal.	A particular dot is missing.	The printhead is defective.	Measure the printhead coil resistance. It should be approximately 33.3 ohms. If the printhead is shorted, also check the drivers.	Replace the printhead (and drivers, if necessary).
			Check to see if the dot wires are worn.	Replace the printhead.
	The printing is too light, or the print density is not uniform.	The printhead is defective.	Check whether the tips of the wires are worn.	Replace the printhead.
		The platen gap is not properly adjusted.	Set the gap adjustment lever to the first position, and check the platen gap. The appropriate value is 0.45 mm.	Adjust the gap. Refer to Section 4.1.1, <i>Platen Gap Adjustment</i> .
Paper feed is abnormal.	Printing is performed but the paper is not fed or is not fed uniformly.	Foreign substances are lodged in the paper path.	Perform a visual check of the paper path.	Remove any foreign substances.
		The PF motor assembly is not driving the gear correctly.	Check that no foreign substance is lodged between the gears and that the gears are not broken or worn.	Remove any foreign substances. Replace the PF motor assembly reduction gears. Replace the paper pickup gears.
		The PF motor assembly is defective.	Measure the coil resistance for the PF motor assembly. The approximate value should be 56 ohms. If the motor is shorted, also check the drivers.	Replace the PF motor assembly (and drivers, if necessary).
The ribbon feed is abnormal.	The ribbon is not turning.	The ribbon cartridge is defective.	Remove the ribbon cartridge, rotate its knob manually, and see if the ribbon feeds normally.	Replace the ribbon cartridge.
		Foreign substances are caught in the gears.	Check whether the RD ratchet rotates when the carriage is moved manually.	Remove any foreign substances. Replace the ribbon feed mechanism.

Table 5-9. Repairing the Printer Mechanism (Continued)

Problem	Symptom	Cause	Check Point	Solution
The ribbon feed is abnormal.	The ribbon feeds properly only when the carriage moves in one direction (i.e., it fails to feed when the carriage moves in the other direction).	The planetary gear is defective	Move the carriage manually; check whether the planetary gear turns in reverse and engages the gear.	Replace the ribbon feed mechanism.
	Paper becomes stained with ink.	The ribbon mask is positioned incorrectly.	Make sure the ribbon mask is in the correct position.	Reinstall the ribbon mask.
The platen gap is not adjusted correctly.		Set the gap adjustment lever to the first position, and check the platen gap. The appropriate value is 0.47 mm.	Adjust the gap. Refer to Section 4.1.1, <i>Platen Gap Adjustment</i> .	
Printing continues after the paper ends or when no paper is loaded.	Printing continues past the end of the page.	The PE sensor is defective.	Check the PE sensor.	Replace the PE sensor.
Color printing is abnormal.	The color does not change.	The CS motor assembly is defective.	Measure the coil resistance for the CS motor assembly. It should be approximately 150 ohms. If the motor is shorted, also check the drivers on the driver board.	Replace the CS motor assembly (and drivers, if necessary).
		The ribbon is caught in the ribbon mask.	Check to see if the ribbon mask is defective.	Replace the ribbon mask.
	The color ribbon is not advanced.	The CS motor assembly is defective.	Measure the CS motor assembly coil resistance. It should be approximately 150 ohms. If the motor is shorted, also check the drivers on the driver board.	Replace the CS motor assembly (and drivers, if necessary).
		The color ribbon feed gears are defective.	Check whether the ribbon advances when the printer is turned on.	Replace the ribbon feed mechanism.

CHAPTER 6 Maintenance

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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 APPLYING LUBRICATION

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

Table 6-1. Lubrication

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

Table 6-2. Lubrication Points

Ref. No.	Lubrication Pointa	Lubricant
(1)	The hooks that attach the CR motor assembly to the base frame. (3 places)	G-26
(2)	The shafts for the gear train on the left frame.	G-26
(3)	The shafts for the gear train on the right frame.	G-26
(4)	The contact surface of the release lever and tractor transmission gear.	G-26
(5)	The oil pad in the carriage assembly.	o-2
(6)	The teeth of gear 34.	G-26
(7)	The point at which the platen ground spring contacts the platen shaft.	G-20
(8)	The portions of the carriage assembly that contacts the CR guide frame.	G-26
(9)	The contact portion of the left tractor frame and tractor shaft.	G-26
(10)	The contact point of the right tractor frame and tractor shaft.	G-26
(11)	The contact point of the driven pulley shaft and drive pulley.	G-26
(12)	The contact point of the driven pulley shaft and drive pulley.	G-26

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

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A.1 CONNECTOR SUMMARY

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

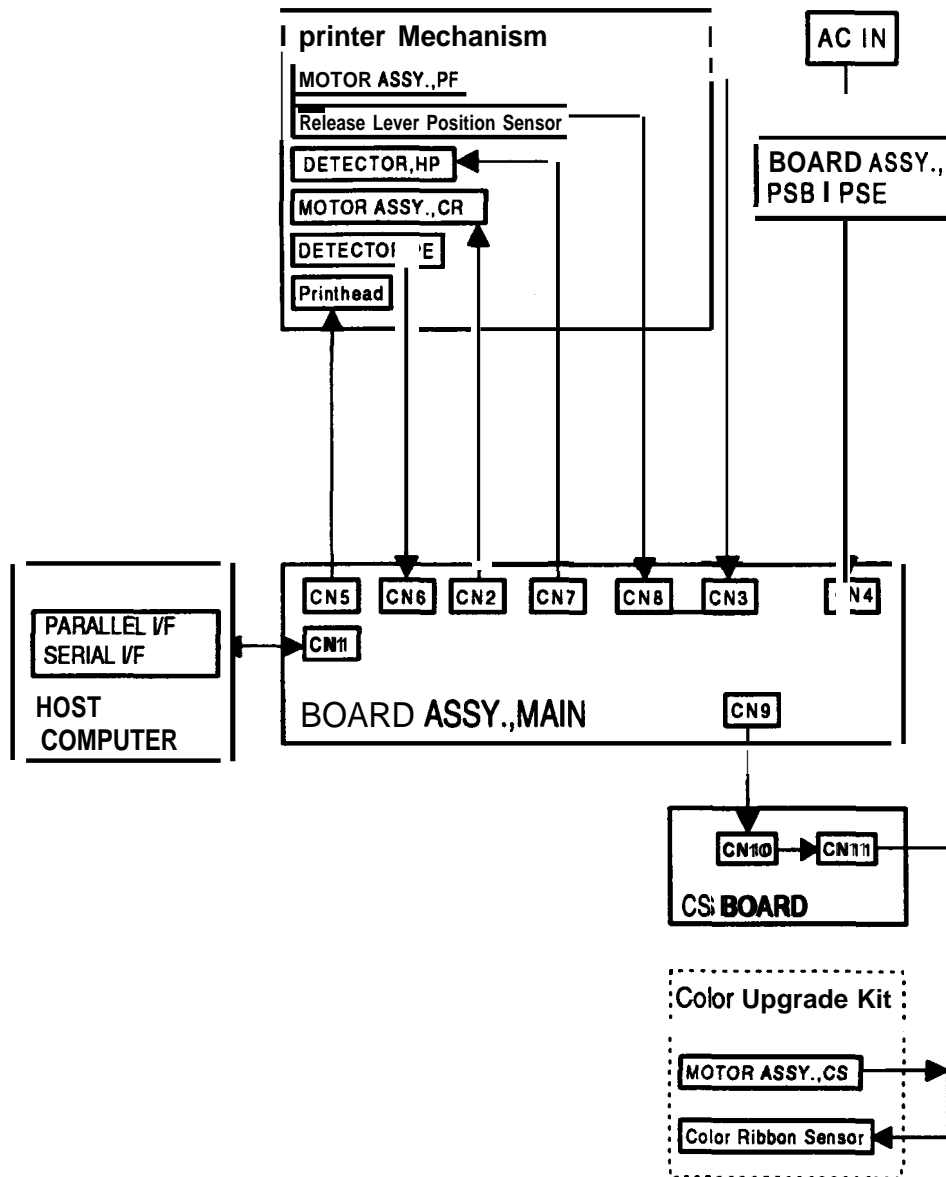


Figure A-1. Cable Connections

Table A-1. Connector Summary

Board	Connector	Function	Pins
Main Board Assembly	CN1	Parallel, serial interface	—
	CN2	CR motor assembly	6
	CN3	PF motor assembly	6
	CN4	PSB/PSE board assembly	5
	CN5	Printhead	12
	CN6	PE sensor	2
	CN7	HP sensor	2
	CN8	Release lever position sensor	2
	CN9	CS motor assembly (optional) Color ribbon sensor (optional)	10
	CN10	CS motor assembly (optional) Color ribbon sensor (optional)	10
	CN11	CS motor assembly (optional) Color ribbon sensor (optional)	10

Table A-2. Connector Pin Assignments - CN2

Pin	I/O	Signal Name	Function
1	0	CR A	CR motor assembly Phase A
2	0	CR B	CR motor assembly Phase B
3	-	CRCOM	CR motor assembly Common
4	-	CRCOM	CR motor assembly Common
5	0	CR-A	CR motor assembly Phase -A
6	0	CR-B	CR motor assembly Phase -B

Table A-3. Connector Pin Assignments - CN3

Pin	I/O	Signal Name	Function
1	0	PF A	PF motor assembly Phase A
2	0	PF B	PF motor assembly Phase B
3	-	PFCOM	PF motor assembly Common
4	-	PFCOM	PF motor assembly Common
5	0	PF_A	PF motor assembly Phase -A
6	0	PF -B	PF motor assembly Phase -B

Table A-4. Connector Pin Assignments - CN4

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

Table A-5. Connector Pin Assignments - CN5

Pin	I/o	Signal Name	Function
1	0	HD 7	Head data 7
2	0	HD 1	Head data 1
3	0	HD 5	Head data 5
4	0	HD 3	Head data 3
5	-	HDCOM	Common (VP)
6	-	HDCOM	Common (VP)
7	-	HDCOM	Common (VP)
8	0	HD 2	Head data 2
9	0	HD 9	Head data 9
10	0	HD 4	Head data 4
11	0	HD 8	Head data 8
12	0	HD 6	Head data 6

Table A-6. Connector Pin Assignments - CN6

Pin	I/o	Signal Name	Function
1	I	PE	PE sensor
2	-	GND	Signal ground

Table A-7. Connector Pin Assignments - CN7

Pin	I/o	Signal Name	Function
1	I	HP	HP sensor
2	-	GND	Signal ground

Table A-8. Connector Pin Assignments - CN8

Pin	I/O	Signal Name	Function
1	I	RELSW	Release Lever Position Sensor
2	-	GND	Signal Ground

Table A-9. Connector Pin Assignments - CN9,CN10,CN11

Pin	I/o	Signal Name	Function
1	-	+35	+35 VDC
2	-	CS_HOLD	+5 VDC
3	-	+5V DC	+5 VDC
4	0	CS A	CS motor assembly Phase A
5	0	CS_A	CS motor assembly Phase -A
6	0	CS B	CS motor assembly Phase B
7	0	CS_B	CS motor assembly Phase -B
8	-	GP	Signal ground
9	I	Ccsw	Color ribbon sensor
10	-	GND	Signal ground

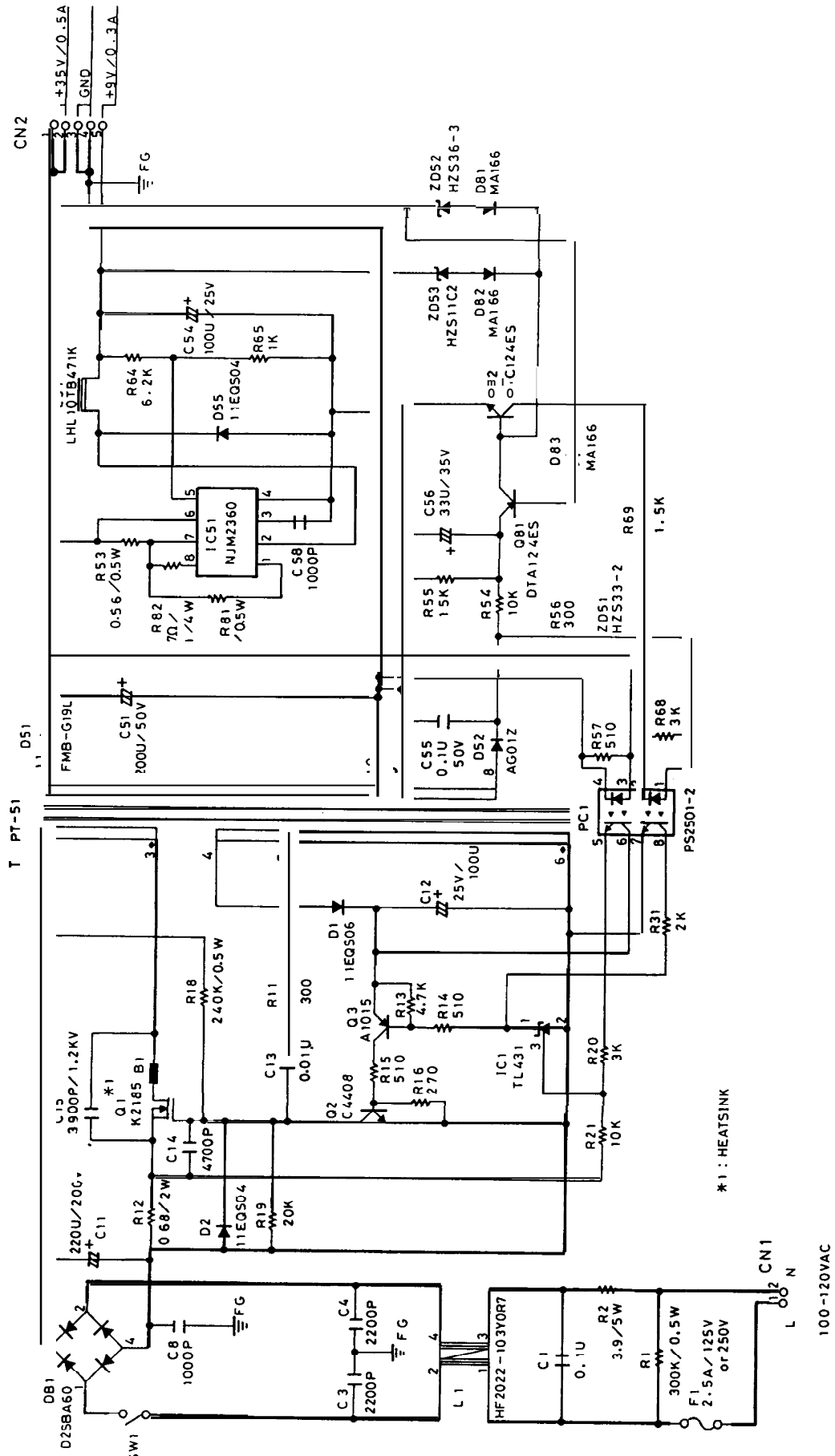


Figure A-3. C130 PSB Board Assembly Circuit Diagram

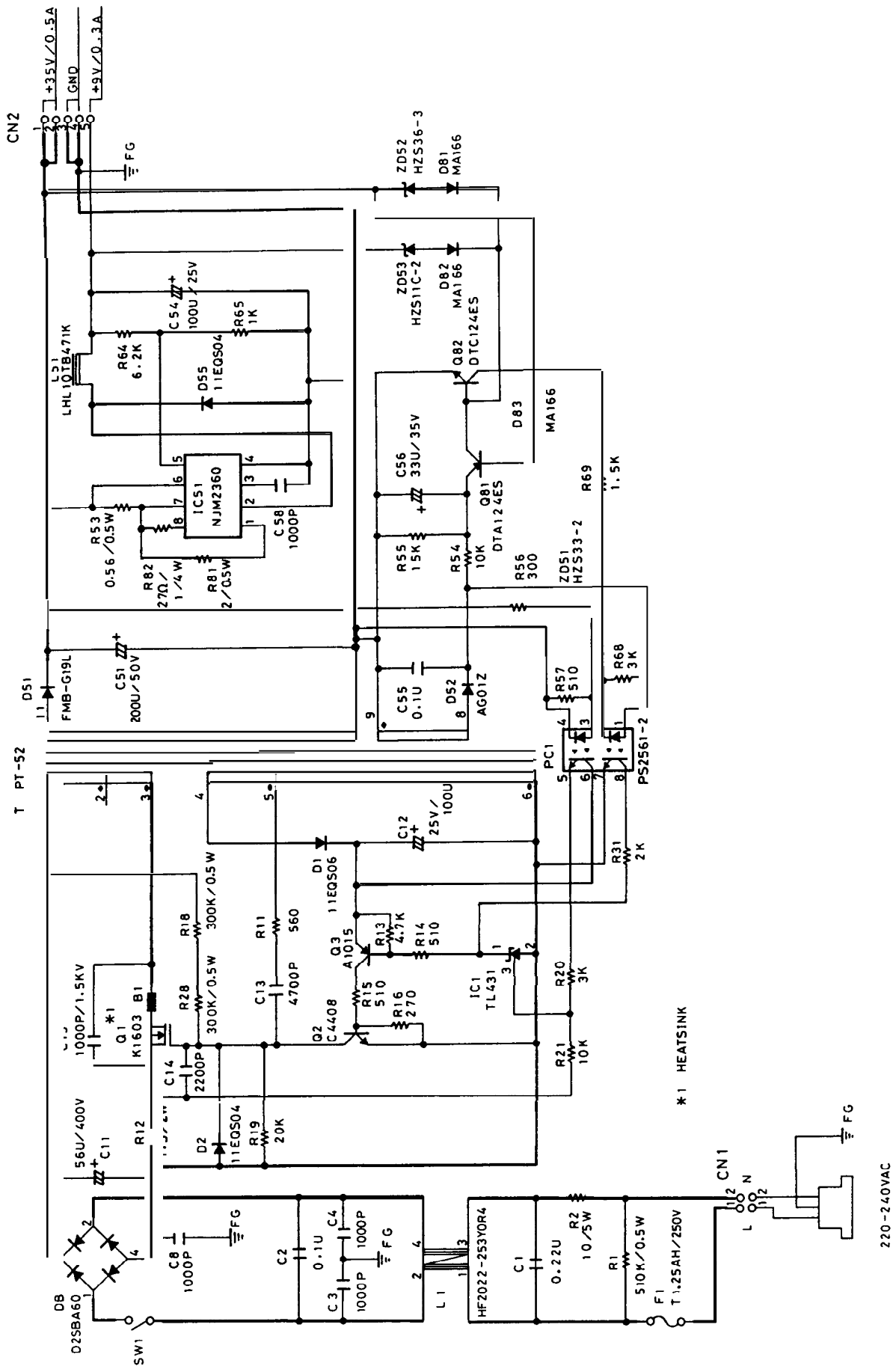


Figure A-4. C130 PSE Board Assembly Circuit Diagram

A.3 CIRCUIT BOARD COMPONENT LAYOUT

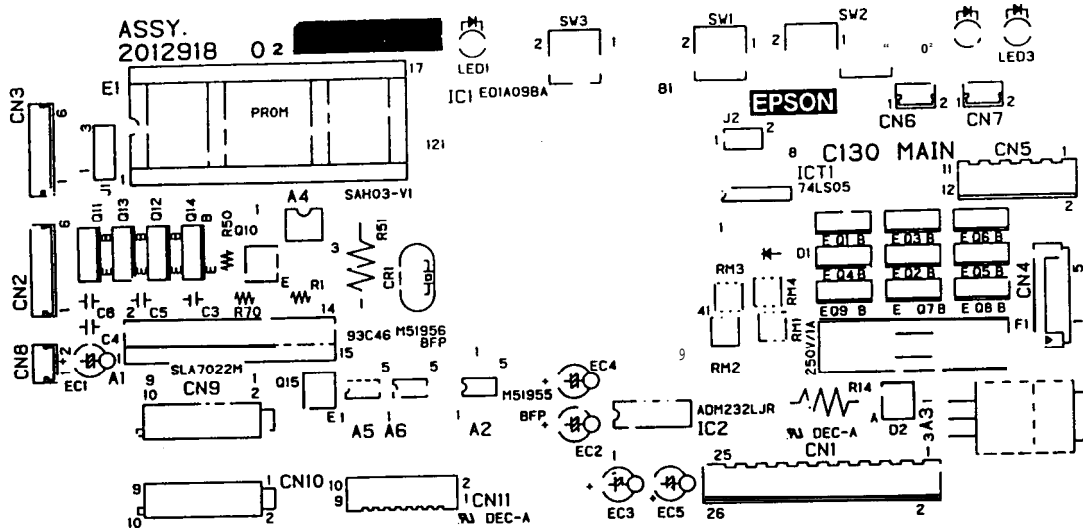


Figure A-5. C130 MAIN Board Assembly Component Layout

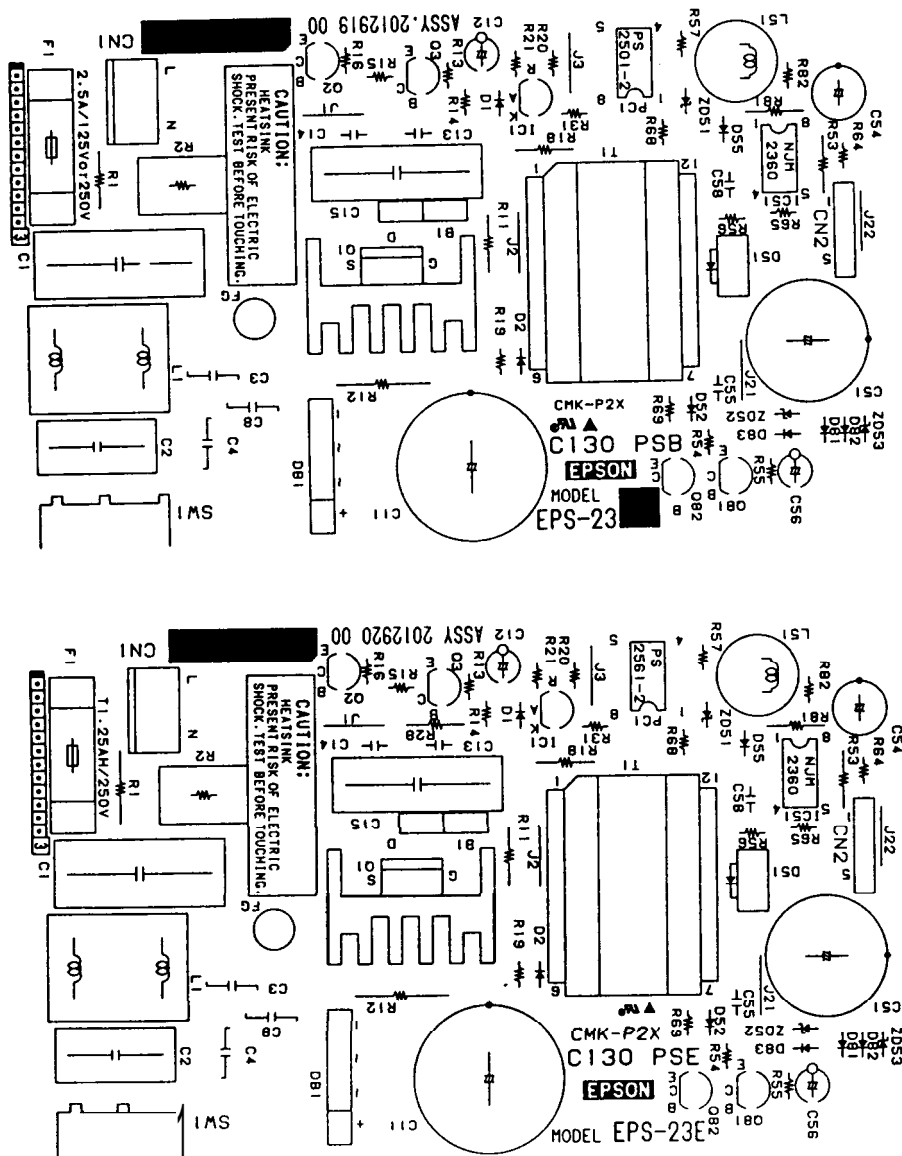


Figure A-6. C130 PSB/PSE Board Assembly Component Layout

A.4. EXPLODED DIAGRAM

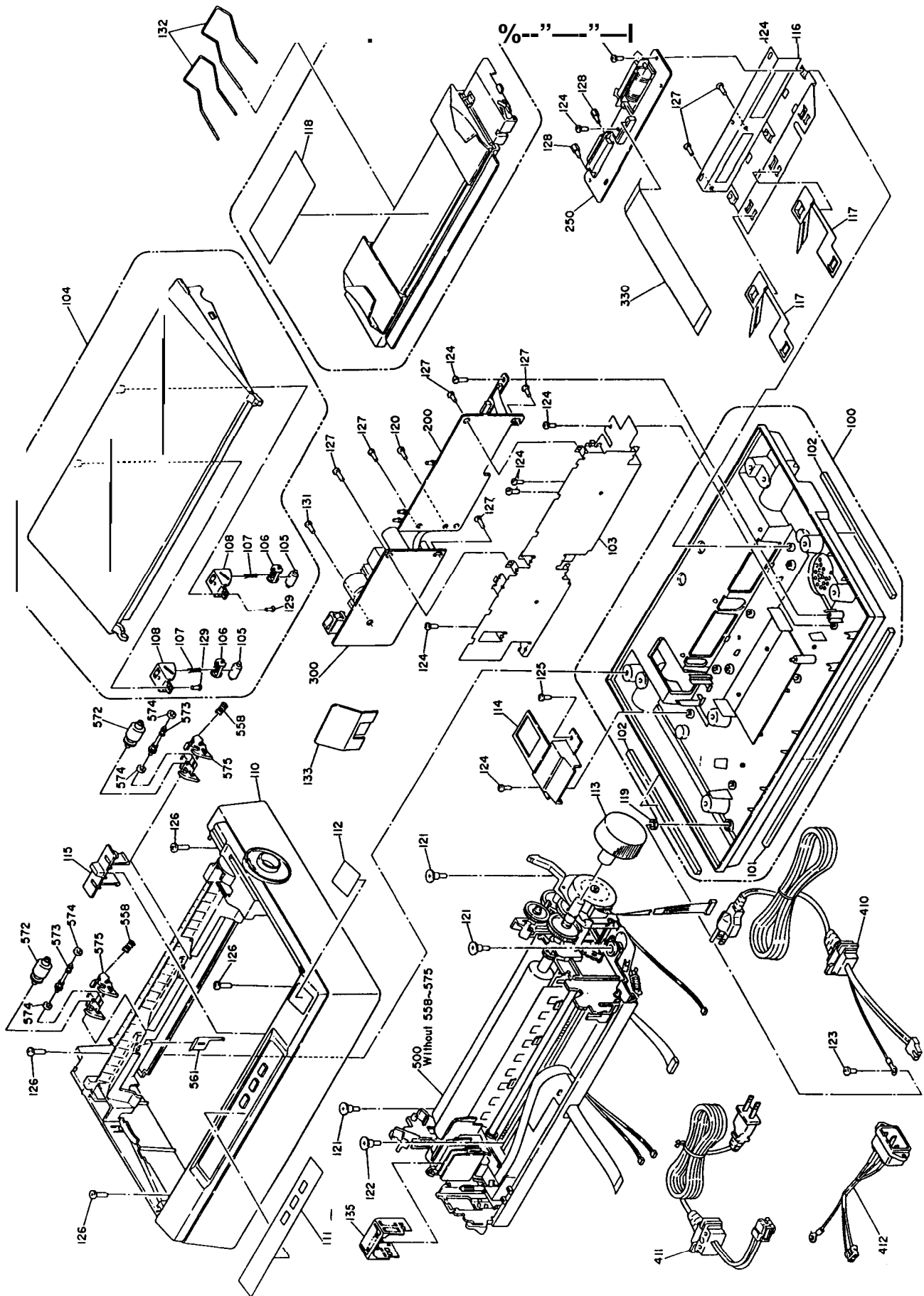


Figure A-7. LX-300 Exploded Diagram (1)

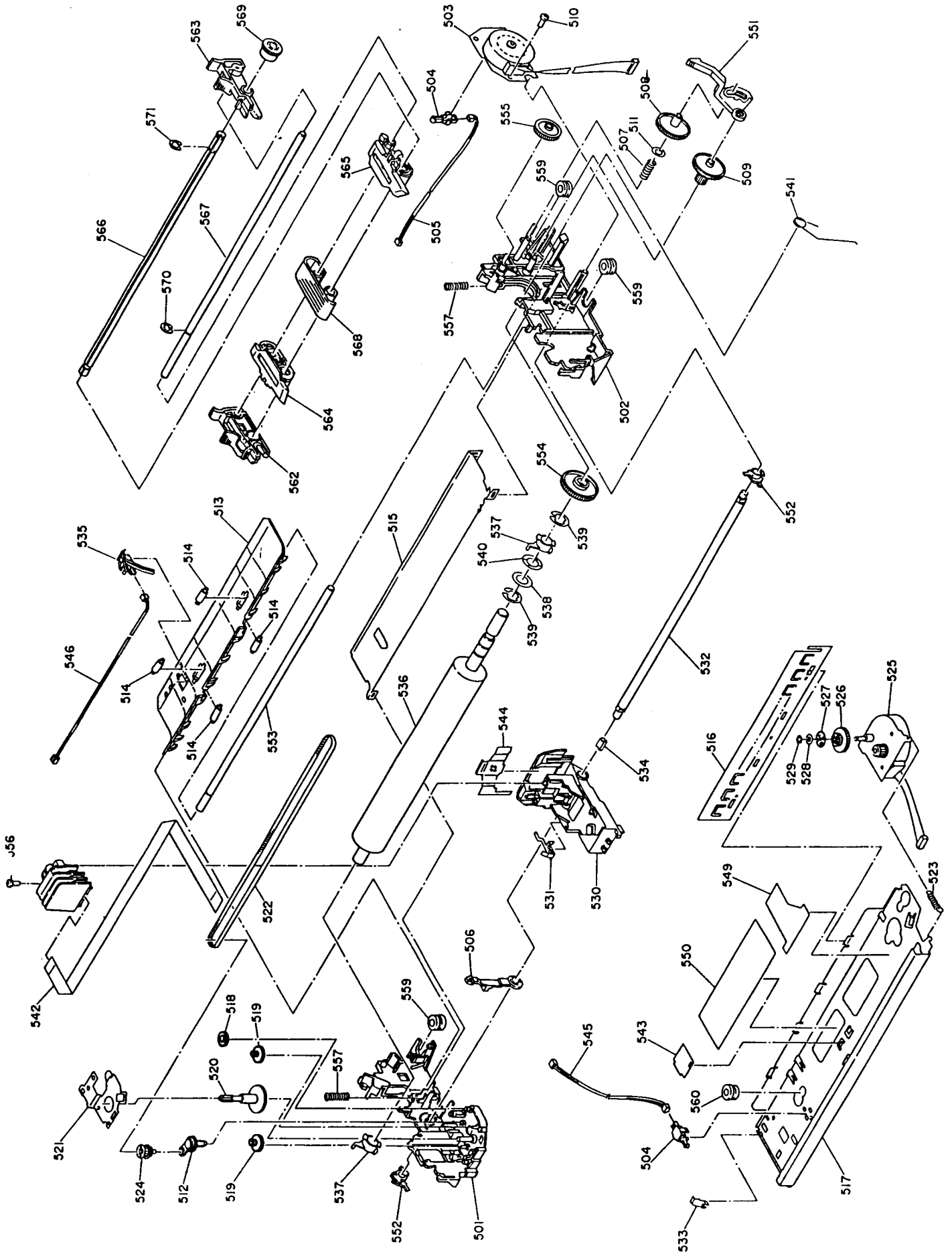


Figure A-8. LX-300 Exploded Diagram (2)

Table A-10. Part No. Reference Table

Ref.No.	Description	Ref. No.	Description
100	HOUSING ASSY.,LOWER	504	DETECTOR, LEAF,B1
101	INSULATOR	505	HARNESS,TR
102	INSULATOR	506	LEVER, DISENGAGE
103	SHIELD PLATE	507	COMPRESSION SPRING,200
104	COVER ASSY.,PRINTER	508	TRACTOR REDUCTION GEAR
105	ROLLER, DRIVEN	509	PAPER FEED REDUCTION GEAR
106	HOLDER, ROLLER, DRIVEN	510	C.B.B. SCREW (M3 x 8)
107	COMPRESSION SPRING,73	511	PLAIN WASHER (5.2 x 0.3X 10)
108	COVER, ROLLER, DRIVEN	512	LEVER ASSY.,PLANETARY
109	EDGE GUIDE ASSY.	513	PAPER GUIDE,UPPER
110	HOUSING, UPPER	514	ROLLER, PF,DRIVEN
111	SHEET,PANEL	515	PAPER GUIDE, LOWER
112	LOGO PLATE	516	PAPER GUIDE SUPPORT
113	KNOB	517	FRAME,BASE
114	COVER, BOTTOM	518	SPURGEAR,13.2
115	COVER, CONNECTOR,CS	519	COMBINATION GEAR,5.1 ,16.2
116	SHIELD PLATE,1/F	520	RACHET,RD
117	GROUNDING PLATE	521	COVER,RD
118	LABEL, POSITION	522	TIMING BELT
119	HEXAGON NUT	523	BELT TENSION SPRING
120	C. B. C-LAMITITE (M3 x 8)	524	PULLEY ASSY.,DRIVEN
121	SHAFT, HOUSING, LOWER	525	MOTOR,CR
122	SHAFT,HOUSING,LOWER	526	PULLEY, DRIVE
123	C. B.(O) SCREW (M4 x 8)	527	BELT PULLEY FLANGE
124	C.B.B. SCREW (M3 x 8)	528	PLAIN WASHER
125	C.B.B. SCREW (M3 x 10)	529	RETAINING RING TYPE-E(2.3)
126	C.B.B. SCREW (M4 x 12)	530	CARRIAGE ASSY.,
127	C. B.USCA C (M3 x 8)	531	GROUNDING PLATE,HEAD
128	JACK-SOCKET	532	SHAFT ASSY.,CR,GUIDE
129	JACK-SOCKET	533	GROUNDING PLATE, SHAFT,CR
131	C. B. USCA-C (M3 x 10)	534	OIL PAD
132	GUIDE,STACKER	535	DETECTOR,PE
133	STACKER	536	PLATEN
135	COVER,HEAT SINK	537	BUSHING,1 I
200	BOARD ASSY., MAIN	538	PLAIN WASHER
250	BOARD ASSY.,1/F	539	RETAINING RING TYPE-E(8)
300	BOARD ASSY.,PSB/PSE	540	U-TYPE,1 1.2X 0.13X 16S/NA
330	WIRE HARNESS	541	GROUNDING WIRE, PLATEN
410	POWER CABLE ASSY.	542	CABLE,HEAD
411	POWER CABLE ASSY.	543	SHEET,CABLE,HEAD
412	POWER CABLE ASSY.	544	RIBBON MASK
500	PRINTER MECHANISM(M-3G1 O)	545	HARNESS,HP
501	FRAME,LEFT	546	HARNESS,PE
502	FRAME, RIGHT	549	PAD, FRAME,BASE
503	MOTOR,PF	550	SHEET,FRAME,BASE

Table A-10. Part No. Reference Table (Continued)

Ref. No.	Description	Ref.No.	Description
551	LEVER, G, ADJUST	EI	P-ROM TCNOO
552	BUSHING, PARALLEL, ADJUST	564	TRACTOR,LEFT
553	SHAFT,FRICTION	565	TRACTOR, RIGHT
554	GEAR,34	566	SHAFT,TR
555	SPURGEAR,25	567	SHAFT,GUIDE,TR
556	C.P.B. SCREW (M3 x 8)	568	PAPER SUPPORT
557	COMPRESSION SPRING,800	569	SPURGEAR,17
558	COMPRESSION SPRING,500	570	RETAINING RING TYPE-E(5)
559	DAMPER	571	RETAINING RING TYPE-E(6)
560	DAMPER,BASE	572	ROLLER, SUB ASSY.,EJ
561	SHEET,PE DETECTOR	573	ROLLER, EJ,TRANSMISSION
562	FRAME,TR,LEFT	574	ROLLER, EJ,SUPPORT
563	FRAME,TR,RIGHT	575	HOLDER, EJ,ROLLER

A.5 CASE OUTLINE DRAWING

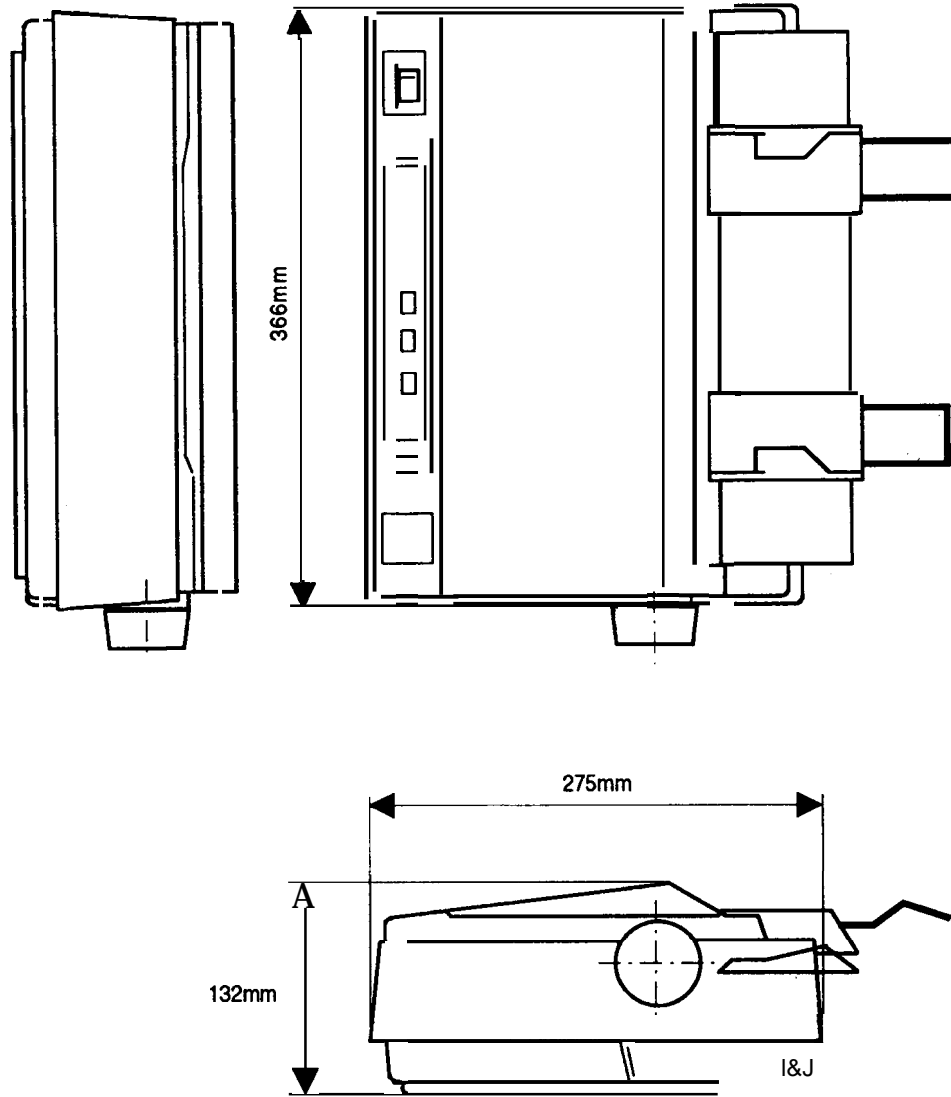


Figure A-9. LX-300 Case Outline Drawing