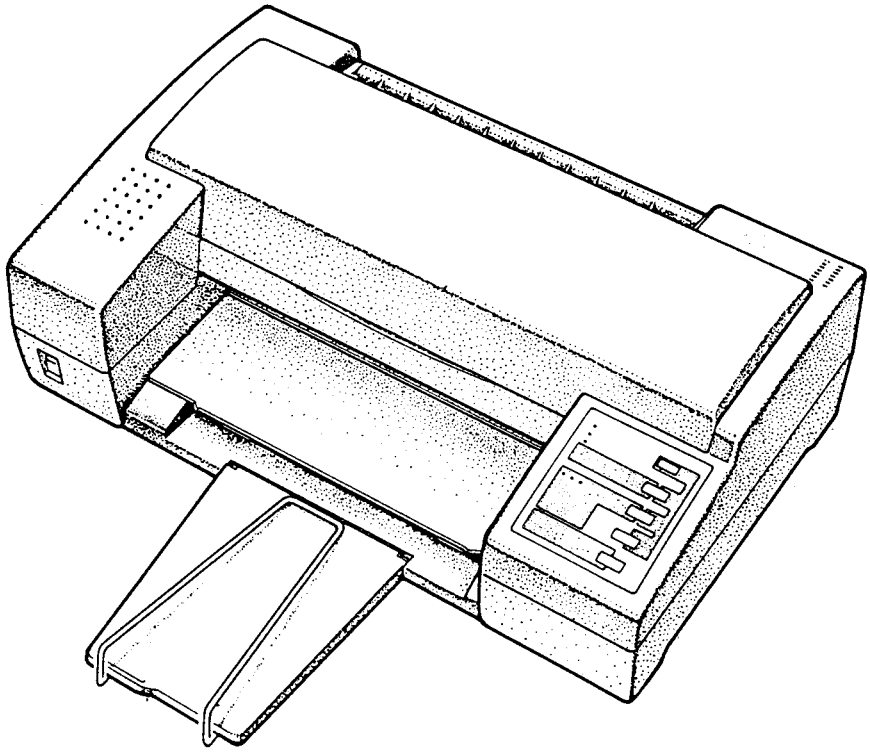
EPSON TERMINAL PRINTER

Stylus™ 800

SERVICE MANUAL



EPSON

4001968
Rev. A

NOTICE

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

All efforts have been made to ensure the accuracy of the contents of this manual. However, should any errors be detected, SEIKO EPSON would greatly appreciate being informed of them.

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

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PRECAUTIONS

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

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

WARNING Signals a precaution which, if ignored, could result in 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

PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of stylus 800.
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. GENERAL DESCRIPTION

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

CHAPTER 2. OPERATING PRINCIPLES

Describes the theory of printer operation.

CHAPTER 3. DISASSEMBLY AND ASSEMBLY

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

CHAPTER 4. 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	December 18, 1992	First issue
Rev. B	May 7, 1993	Added information: Chapter 2 (Page 2-23) Chapter 3 (Page 3-5/6) Chapter 6 (Page 6-1/2)
Rev. C	June 11, 1993	Corrected the figure: Chapter 2 (Page 2-8)
Rev. D	March 10, 1994	Added information: Appendix (Page A-i, A-5', A-7', A-8', A-9', A-1 O')

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Chapter 1 General Description

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1.1 FEATURES

The Stylus 800 is a serial inkjet printer that uses a newly developed inkjet technology to accomplish a superb quality output with high-speed printing. The major features of this printer are:

- ❑ High print quality from a new inkjet technology.

Cl Fast printing of LQcharacters at 150 cps.

- ❑ Compact design saves precious work space.
- ❑ Built-in auto sheet feeder with a capacity fora maximum of 100 cut sheets (either A4 or Letter).
- ❑ Equipped with 4 scalable fonts and 15 bit-mapped fonts, standard.
- ❑ 8 character tables for the U.S.
  6 character tables for Pacific countries.
  16 character tables for European countries.

The figure below shows a view of the printer.

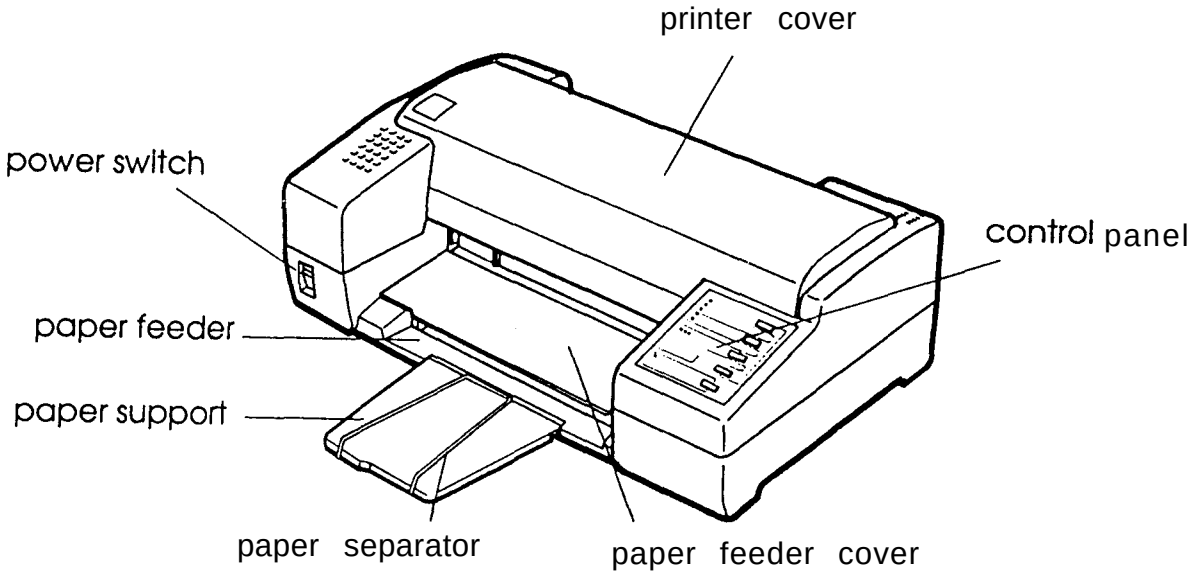

Figure 1-1. View of the Stylus 800

1.2 SPECIFICATIONS

This section provides detailed statistics for this printer.

1.2.1 Printing Specification

Print system: On-demand ink jet system

Nozzle configuration: 48 nozzles (12 nozzles x 4 staggered columns)

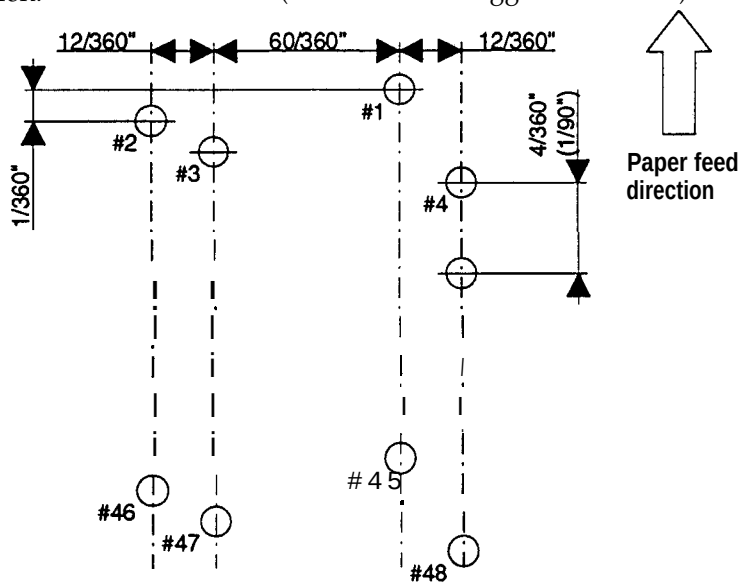

Figure 1-2. Nozzle Configuration

Printer direction: Bidirectional printing with logical seeking control

PMt speed: See Table 1-1.

Printable columns: See Table 1-1.

Table 1-1. Print Speed and Printable Columns

Character Pitch	Printable Columns	Print Speed (LQ)
10 cpi	80	150 cps
12 cpi	96	180 cps
15 cpi	120	225 cps
17 cpi (I 0 cpi/Condensed)	137	257 cps
20 cpi (12 cpi/Condensed)	160	300 cps

Character sets: Legal and 14 international character sets.

Character tables: See Table 1-2.

Table 1-2. Character Tables

Character Table	US Version	European Version	Pacific Version
ITALIC	o	0	0
PC437 (U.S./Standard Europe)	o	0	0
PC850 (Multilingual)	o	0	0
PC860 (Portuguese)	o	0	0
PC863 (Canadian-French)	o	0	0
PC865 (Nordic)	o	o	o
PC437 Greek	x	o	x
PC851 (Greek)	x	o	x
PC852 (East Europe)	x	o	x
PC853 (Turkish)	x	o	x
PC855 (Cyrillic)	x	o	x
PC857 (Turkish)	x	o	x
PC866 (Russian)	x	o	x
ABICOMP	o	x	x
BRASCII	o	x	x

Fonts:

[Bit-mapped fonts]
- EPSON Roman (10cpi/12cpi/15cpi/Proportional)
- EPSON Sans serif (10/12/15/Proportional)
- EPSON Courier (10/12/15)
- EPSON Prestige (10/12)
- EPSON Script (10/12)

[Scalable fonts]
- EPSON Roman **8-32 points (Unit= 2 points)**
- EPSON Sans serif **8-32 points (Unit= 2 points)**
- EPSON Roman T **8-32 points (Unit= 2 points)**
- EPSON Sans Serif H **8-32 points (Unit= 2 points)**

Print mode:

[For Bit-mapped fonts]
Selection and mixture of the following mode are allowed.
- Print quality (LQ)
- Character pitch (10/12/15 cpi or proportional)
- Condensed (not available with 15 cpi character pitch)
- Double width
- Double height
- Emphasized
- Double strike
- Italic
- Underline
- Double underline
- Overscore
- Strike through
- Shadow / outline

[For scalable fonts]
- Emphasized
- Double strike
- Italic
- Underline
- Double underline
- Overscore
- Strike through
- Shadow / outline

Control codes: ESC/P2

1.2.2 Paper Handling Specification

Feeding system: Friction feed from built-in sheet feeder or manual insertion slot.

Notes: The following operation are not allowed.

1. Reverse feeding within 3 mm (O. 12 inches) from the top edge of the paper or 16 mm (0.63 inches) from the bottom edge of the paper.

2. Reverse feeding beyond 7.9 mm (0.3 inches).

Feeding pitch: 1/6, 1/8 inch feed or programmable with a 1/360 inch minimum increment.

Paper path: Built-in sheet feeder (front entry)
Manual insertion slot (Top-rear entry)

Feeding speed: 87 msec. (at 1/6 inch feed pitch)

1.2.3 Paper Specification

Usable paper:

Cut sheet [With Built-in sheet feeder]

Size:	For European/Pacific version: A4 (W x L : 210 mm (8.3") x 297 mm (11.7"))
	For U.S. version: Letter (W x L: 216 mm (8.5") x 279 mm (11.0"))
Thickness:	0.065-0.14 mm (0.0026 - 0.0055")
Wight:	64 - 90 g/m^2 (18 -24 lb./55 - 78 Kg)
Quality:	Bond Paper, Photocopier paper

[With manual insertion]

Width:	182-216 mm (7.2 - 8.5")
Length:	257- 297 mm (10.1 - 11.7")
Thickness:	0.065-0.11 mm (0.0026- 0.0043")
Wight:	52- 90 g/m^2 (14 -24 lb / 45- 78 Kg)
Quality:	Bond Paper, Photocopier paper

<Envelope>

Size:	#6 (W X L : 166 mm (6½") x 92 mm (35/8")) #10 (W x L: 240 mm (914") x 104 mm (4⅛"))
Thickness:	0.16-0.52 mm (0.0063 - 0.0197")

Note: The variation in paper thickness within the printable area must be 0.25 mm (0.0098") or less.

Weight:	45-90 g/m^2 (12 -24 lb.)
Quality:	Bond paper, Airmail, Photocopier paper

Notes 1. Envelopes are usable only with manual insertion feed.

2. Printing with envelopes guaranteed only under normal temperature and humidity condition.

3. Insert envelopes into the manual insertion slot sideways.

Printable area: Cut Sheet (with built-in sheet feeder)

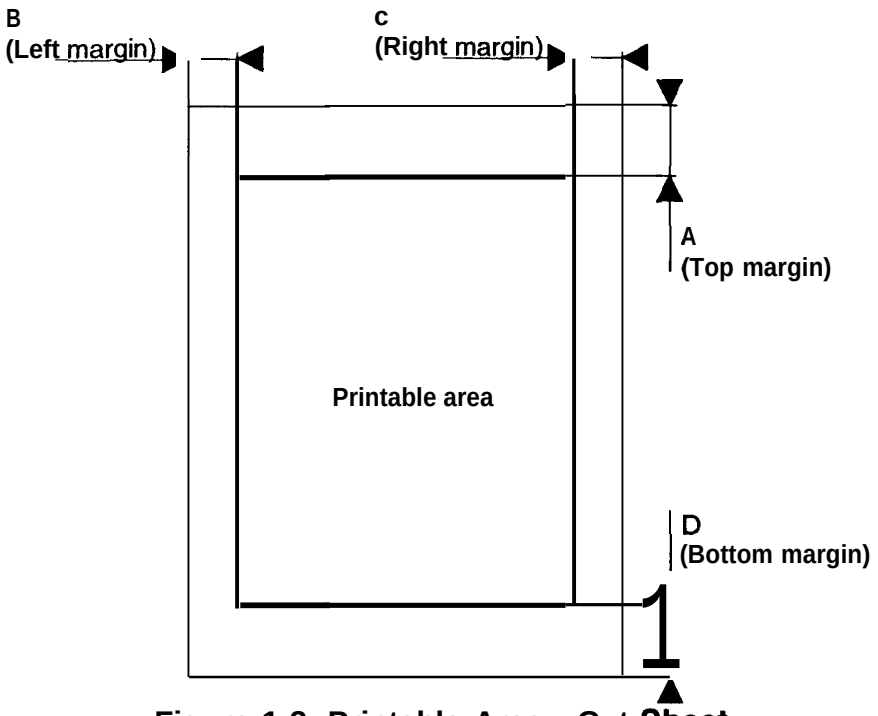

Figure 1-3. Printable Area - Cut Sheet (Built-in Sheet Feeder)

Cut Sheet / Envelope (with the manual insertion slot)

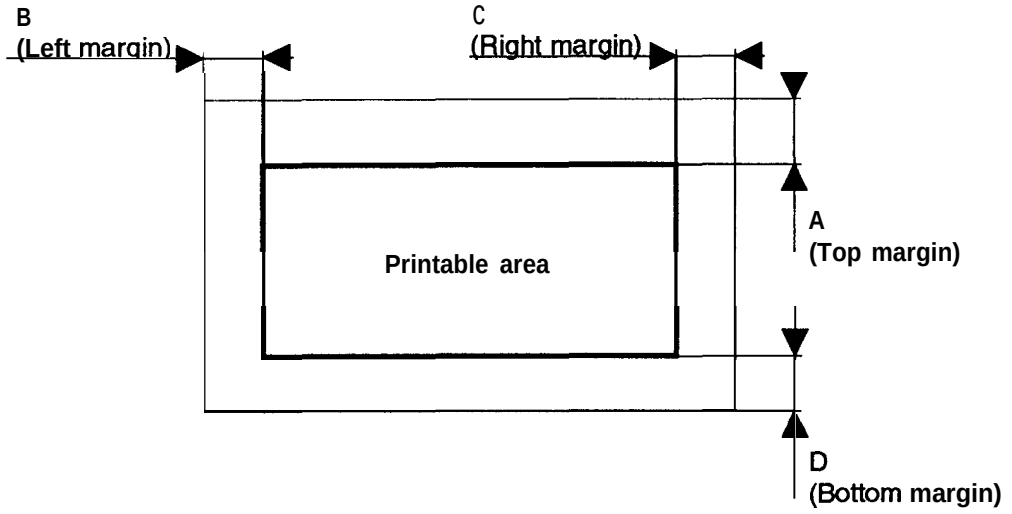

Figure 1-4. Printable Area - Cut Sheet/ Envelope (Manual Insertion Slot)

Note: ***A: The minimum top margin=*** *3* ***mm*** *(0.12″)*
B: The minimum left margin= 3 mm (O. 12")
C: The minimum right margin is: ***A4 size= 3.8*** mm (O. *15″*)
Letter size = 9.7mm (0.38')
Manual insertion = 3 mm (O.12")
D: The minimum bottom margin= 13 mm (0.51')

Adjust lever settings: The adjust lever, attached to the carnage unit, must be set to proper position for the paper thickness, as shown in Table 1-3.

Table 1-3. Adjust Lever Settings

Lever **Position**	**Paper Type**	**Paper Thickness**
LEFT	**Cut Sheets**	0.065 ~ 0.11 mm (0.0026 ~ 0.0055")
RIGHT	**Envelopes**	0.16- 0.52 mm (0.0063- 0.020")

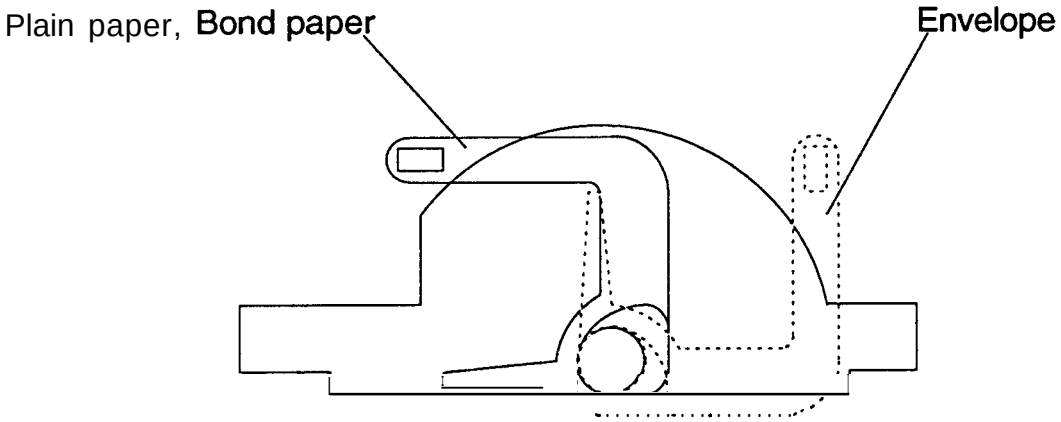

Figure 1-5. Adjust Lever

1.2.4 Ink Cartridge

Type: Exclusive cartridge **(S020025)**

Ink color: Black

Print capacity: 0.7 million characters (LQ)

Note: This figure is equivalent to a 700page print volume when printing is performed at 1000 characters perpage on letter or A4-size paper.

Ink Capacity: ***29.0*** +0.5/-1.0 cc

Life: The effective life from the indicated production date is:
-2 years (total period of time in package and after unpacking)
-6 months (after unpacking)

Temperature conditions: [Storage] -30- 40"C (-22 -104 'F)
(Up to 1 month at 40'C (140 "F))
[Transport] -30 ~ 60"C (-22 -140 "F)
(Up to 1 month at40"C (104 "F) or 120 hoursat60"C **(140 'F))**

Note: The ink inside the ink cartridge freezes if it kept below -3°C (26.6°F). It requires several hours to unfreeze at room temperature (25 °C (77°F)).

Dimension: Width 28.5 mm (1.12")
Depth 54.5 mm (2.15")
Height 38.5 mm (1.52")

1.2.5 Environmental Conditions

Table 1-4. Environmental Conditions

Description	Operating	Storage
Temperature	10-35 'c (50 - 95 'I=)(*1)	-20- 60 °C (-4 - 140 °F) (*2)
Humidity	20- 80% RH (*1,*3)	5- 85% RH (*2,*3)
Resistance to shock	1 G, within 1 msec.	2 G, within 2 msec. (*2)
Resistance to vibration	0.15 G, 10-55 Hz	0.50 G, 10-55 Hz (*2)

Note: ● *1 = Operating conditions must be in this range.*
**2= When the printer is in the shipping container.*
I3 = Without condensation.

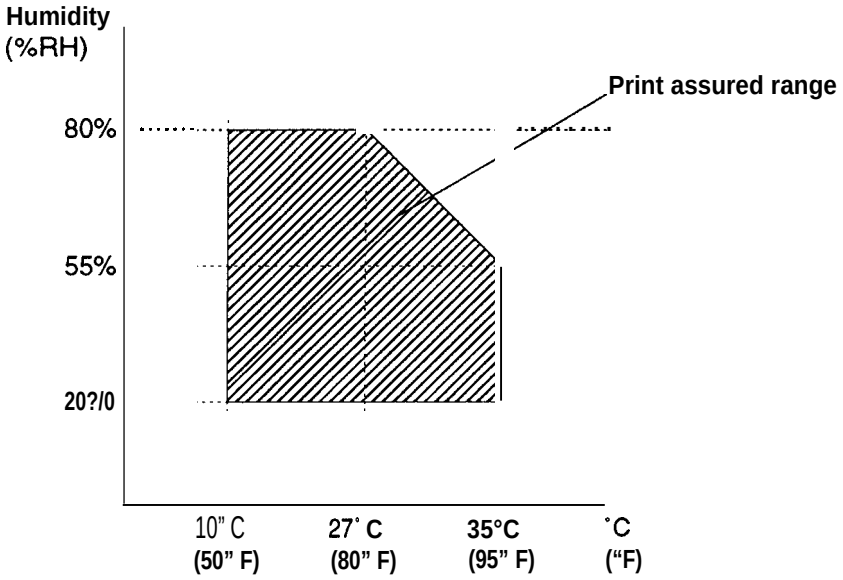

Figure 1-6. Temperature/ Humidity Range

1.2.6 Electrical Specifications

Table 1-5. Electrical Specifications

Item	120V Version	220- 240V Version
Rated voltage	120V AC	220- 240V AC
Input voltage range	103.5- 132V	198- 264V
Rated frequency range	50- 60 Hz	50- 60 Hz
Input frequency range	49.5- 60.5 Hz	49.5- 60.5 Hz
Rated current	0.5 A	0.3 A
Power consumption	Approx. 13W (self test with 10 cpi LQ characters)	Approx. 13W (self test with 10 cpi LQ characters)
Insulation resistance	10 MΩ, minimum (applying 500VDC between AC line and chassis)	10 MΩ, minimum (applying 500VDC between AC line and chassis)
Dielectric strength	10OOVAC rms -1 minute or 1200VAC rms -1 second (between AC line and chassis)	1500VAC rms -1 minute (between AC line and chassis)

1.2.7 Reliability

MTBF:	4000 power on hours (POH) at a duty cycle of 10%
MCBF:	3 million lines (excluding the printhead)
Printhead life:	1 billion dots per nozzle
Total print volume:	75000 pages (with A4 or Letter size paper)

1.2.8 Safety Approval

Safety standards:	US version:	UL1950 with D3 CSA22.2 #220
	European version:	EN 60950 (TÜV) IEC 950 (SEMKO, DEMKO, NEMKO, SETI)
Radio frequency interface (RFI):		
	US version:	FCC part 15, subpart B, class B
	European version:	Vfg. 243 (VDE 0878 part 3, part 30) EN 55022 (CISPR Pub.22) class B

1.2.9 Physical Specification

Size (W x D x H):	435 x 264X 154 (mm) (17.1X 10.4X 6.1 (inch))
Weight	Approx. 5.0 Kg (excluding ink cartridge)

1.3 INTERFACE SPECIFICATION

The Stylus 800 is equipped with an 8 bit parallel interface, standard.

Data format:	8 bit parallel
Synchronization:	STROBE pulse synchronization
Handshaking:	By BUSY and ACKNLG signals
Signal level:	TTL-compatible level
Adaptable connector:	36-pin 57-30360 (Amphenol) or equivalent
Data transmission timing:	See Figure 1-7.

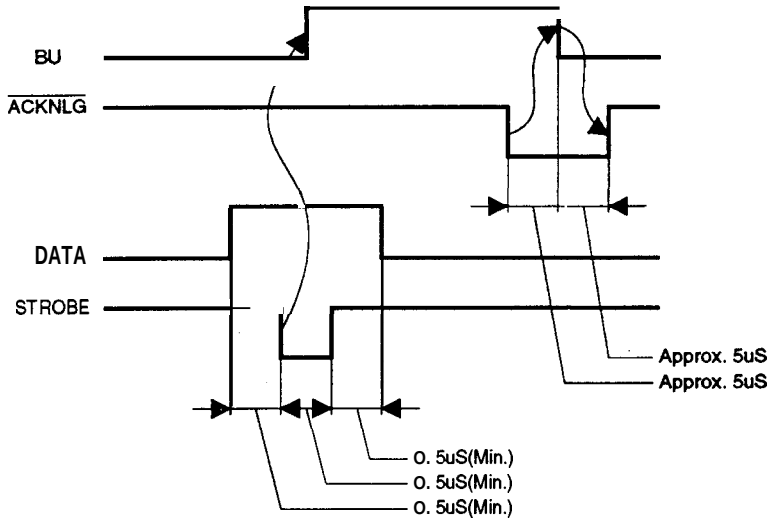

Figure 1-7. **Data Transmission Timing**

Table 1-6 shows the connector pin assignments and signal functions of the 8-bit parallel interface.

Table 1-6. Signal and Connector Pin Assignments

Pin No.	Signal Name	1/0	Description
1	$\overline{\text{STROBE}}$	I	The $\overline{\text{STROBE}}$ pulse is used to read data from the host computer. The pulse width must be 0.5@ or more. Normally, it is HIGH, and data is latched with rising edge of this signal.
2-9	DATA 1-8	I	DATA 1-8 are parallel data bits. When one of these signals is HIGH, the data bit is 1; when LOW, the data bit is O. The most significant bit (MSB) is DATA 8. The signal state must be maintained for 0.5 µS on either side of STROBE signal's active edge.
10	$\overline{\text{ACKNLG}}$	O	$\overline{\text{ACKNLG}}$ is an acknowledge pulse with a width of approximately 10 µS. This signal goes LOW upon the completion of data reception, to indicates that the printer is ready to receive further data.
11	BUSY	O	The BUSY signal informs the host computer of the printer's status. When this signal is HIGH, the printer cannot accept further data.
12	PE	O	This signal indicates whether paper is available in the printer or not. A HIGH level indicates a no paper condition.
13	SLCT	O	Pulled up to +5V through a 1.0 KΩ resistor in the printer.
14	$\overline{\text{AFXT}}$	I	If this signal is set to LOW, the printer automatically performs one line feed upon receipt of a CR (carriage return) code. The status of this signal is checked only at power on and initialization.
15	NC		Not used.

Table 1-6. Signal and Connector Pin Assignments (Continued)

Pin No.	Signal Name	I/o	Description
16	GND		Signal ground.
17	CHASSIS-GND	-	Chassis ground. (Both chassis ground and signal ground are connected in the printer.)
18	NC		Not used.
19-30	GND		Twisted-pair return signal ground.
31	$\overline{\text{INIT}}$	I	If this signal goes LOW, the printer is initialized. The pulse width of this signal must be 50 µS or more.
32	$\overline{\text{ERROR}}$	O	This signal goes LOW if the printer: - has a fatal error. - runs out of paper.
33	GND	·	Signal ground.
34	NC	·	Not used.
35	+5V	·	Pulled up to +5 V through 1.0 KW resistor in the printer.
36	-	·	Not used. (* Reserved.)

Note: The direction of the signal is as viewed from the printer.

1.4 PRINTER OPERATIONS

This section describes the basic operations of the printer.

1.4.1 Control Panel

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

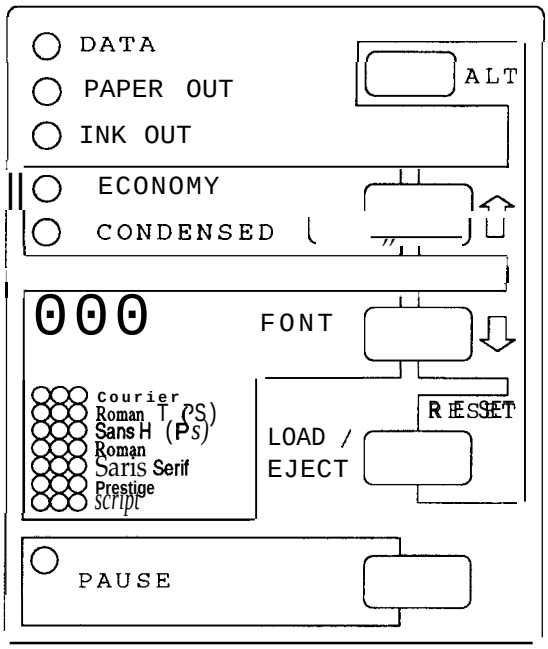

Figure 1-8. Control Panel

[Buttons]

PAUSE	Switches printer status between printing and no printing, if any print dataexists in the input buffer.
ECONOMY/CONDENSED	Selects ECONOMY printing mode or CONDENSED printing mode alternately. Also works as a reverse micro feed button, if the ALT button has been pressed.
FONT	Selects one of the available fonts. Also works as a forward micro feed button, if the ALT button has been pressed.
LOAD/EJECT	When you press this button, the printer either loads new paper into the printer or ejects paper currently in the printer paper path. Also works as a RESET button, if the ALT button has been pressed.
ALT	This button alternates the function of certain buttons. When you hold down this button in PAUSE mode for 5 seconds, the printer moves the carriage to the ink cartridge installation/replacement position.

[Indicators]

PAUSE	Lights when the printer is in PAUSE mode.
DATA	Lights when there is print data in the input buffer.
PAPER OUT	Lights when the printer is out of paper. Blinks if a paper jam has occurred.
INK OUT	Lights when the printer detects ink end in the ink cartridge. Blinks when the ink level becomes low.
ECONOMY/CONDENSED	This LED shows the currently selected mode.
FONT	Indicates the currently selected font.

1.4.2 Panel Operation at Power On

The following functions can be activated at power on by holding down the specified button on the control panel.

Self-test mode:	Start the self-test printing mode by turning the printer on while holding down the FONT button.
Hex dump mode:	Start the built-in hexadecimal data dump print mode by returning the printer on while holding down the FONT and LOAD/EJECT buttons. Once this mode is selected, the printer prints all received print data in hexadecimal form.
Demonstration mode:	Start printing of a demonstration page by returning on the printer while holding down the ALT button.

Other functions that can be activated with the control panel at power on, such as the default setting mode and the initial ink charge mode, are described in the sections that follow.

1.4.3 Default Setting

The printer can memorize certain number of printer setting parameters that defines its functions at the initialization. You can change these parameters with the default setting mode for your specific preference of the printer setting.

1.4.3.1 Default Setting Item

The settings listed in the table below can be made with the default setting mode. The default-setting mode can be activated by hold down the ECONOMY/CONDENSED button while turning on the printer. (Refer to the user's guide for the detail operation of the default-setting mode.)

Table 1-7. Default Setting Item

Menu Contents	Description	Factory Setting
Character Table	Select the character table	
Auto Print Direction	ON: Print direction is automatically selected as to maintains optimal print quality (alignment). OFF: Depends on the command 'ESC U'.	ON
Network I/F Mode	ON: For network environment, such as LocalTalk. (Time-out printing is disabled.) ON: For normal environment. (Time-out printing is enabled.)	OFF
Mixed Text/Graphics Mode	ON: To ensure proper printing of the image containing graphics and scalable font, with certain applications, such as MS Word, WordPerfect V.5. I or earlier. ● 1 OFF: For normal use.	OFF
Auto Line Feed	ON: Line feed operation is automatically performed by CR code input. OFF:NO line feed operation with single CR code.	OFF

*Note: *1= If set to ON, the capacity of input buffer is limited to 8 Kbyte.*

1.4.4 Initial ink Charge

When the printer is to be set up for primary use, whole ink supply path of the printer must be filled with a new ink, by performing the initial ink charge operation.

[Step 1] Turn the printer on and press the PAUSE button to pause the printer.

[Step 2] Open the printer cover and hold down the ALT button until the printhead moves to the ink cartridge replace position.

[Step 3] Install the ink cartridge on the printhead, and press the ALT button again to move the printhead to capping position. Then, turn off the printer.

[Step 4] Turn the printer on while holds down the ALT and the PAUSE buttons to start the initial charge operation.

The PAUSE LED blinks while the initial ink charge operation is in progress, and when it completes, the printer automatically becomes ready state.

CAUTION

- *The ink cartridge must be installed just after unpacking the package.*
- *The initial ink charge operation should not be performed more than twice on the same printer. It, otherwise, consumes too much ink in the ink cartridge and shorten the waste ink tank life.*

1.4.5 Error Conditions

The printer detects various errors and indicates them with the LED indicators and the buzzer.

Table 1-8. Error Codes

Error	PAPER LED	INK END LED	PAUSE LED	Buzzer	Recovery
Paper out	ON	OFF	OFF	♥♣ x 3 times	Load the paper and press the buttons as follows: 1. PAUSE 2. LOAD/EJECT
Paper jam	BLINKS	OFF	OFF	♥♣ x 3 times	Same as above.
Ink low ● 1	OFF	BLINKS		No beeps	Press PAUSE button and replace the ink cartridge with a new one. Then, press PAUSE button again to resume printing. ● 2
Ink end	OFF	ON	OFF	♥♣ × 3 times	Replace the ink cartridge and press PAUSE button.
No ink cartridge	OFF	ON	OFF	♥♣ × 3 times	Install the ink cartridge and press PAUSE button.
Carriage Error	OFF	OFF	OFF	♠♦ × 5 times	Turn off the printer, and turn it on again.
Waste ink tank over-flow	OFF	ON	BLINKS	♥♣ x 3 times	Service maintenance required. (Replace the waste ink absorbing material and reset the protect counters.)

Notes: ***V : 0.1 second beep 4 : 0.5 second beep***
♣ : 0.1 second interval ♦ : 0.2 second interval

1: This is* ***not treated as an error.*
2:* ***It is not necessary to replace the ink cartridge until the printer detects the 'Ink End' error.*

1.5 MAIN COMPONENTS

The main components of this printer are:

- Printer mechanism (M-481O)
- Main control board (C106 MAIN BOARD)
- Power supply unit (C106 PSB/PSE BOARD)
- Control panel
- Housing

1.5.1 Main Control Board (C106 MAIN BOARD)

The C106 MAIN BOARD is the main controller of the Stylus 800. It takes charge of interfacing with the host computer and processing of received print data, as well as control of the whole printer mechanism. This board consists of the following components.

CPU (IC1):	8-bit CPU (TMP96C141F-20) 19.6608 MHz operating clock
Gate-array (IC3):	Includes the following functions: - MMU (Memory Management Unit) - IFU (Interface Control Unit) - BMU (Bit Manipulation Unit) - PCU (1/0 Port Control Unit) - Head control unit (2 channel: HCU1, HCU2)
Program ROM (IC4):	1 Mbit EPROM
CG ROM (IC7/8):	4 Mbit Mask ROM (IC8 / for US, Pacific version) 8 Mbit Mask ROM (IC7 / for European version)
RAM (IC5):	1 Mbit PSRAM
EEPROM (IC1O):	1 Kbit (64 x 16 Bit) EEPROM 3 lines serial bus
CR Motor driver (IC13):	Hybrid IC SMA7024MEL Constant current unipolar drive
PF Motor driver (QM1):	Hybrid IC SMA6501 Constant voltage unipolar drive

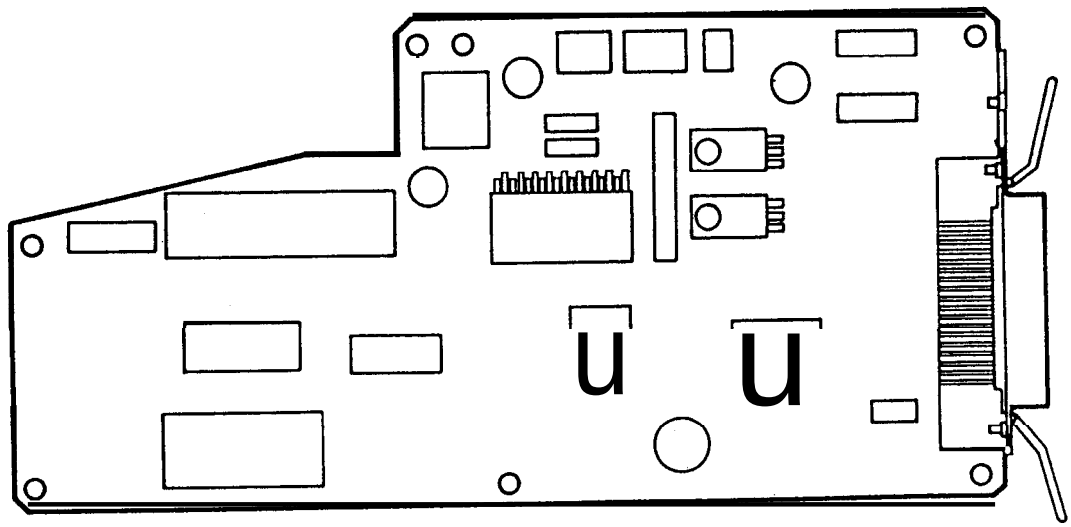

Figure 1-9. C106 MAIN BOARD Component Layout

1.5.2 Power Supply Unit (C106 PSB/PSE BOARD)

The power supply unit converts input AC voltage and generates different DC voltages required by the printer mechanism and other electrical circuities. The C106 PSB BOARD is for 120VAC input, and the C106 PSE BOARD is for 220 to 240VAC input.

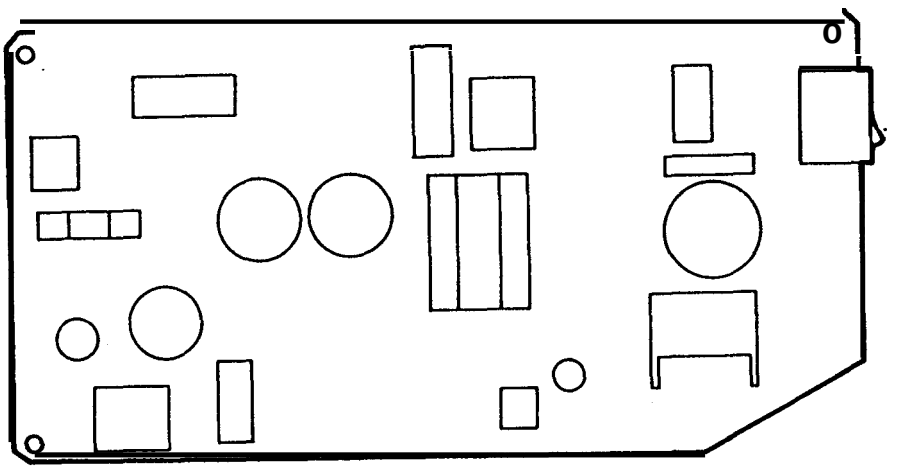

Figure 1-10. C106 PSB/PSE BOARD Component Layout

1.5.3 Printer Mechanism (M-4810)

This printer mechanism M-4810 is specifically designed for the Stylus 800, and it consists of the carriage assembly, which includes the printhead and the ink supply system, the carriage motor, the paper feed motor, the paper feeding mechanism, and the pump mechanism.

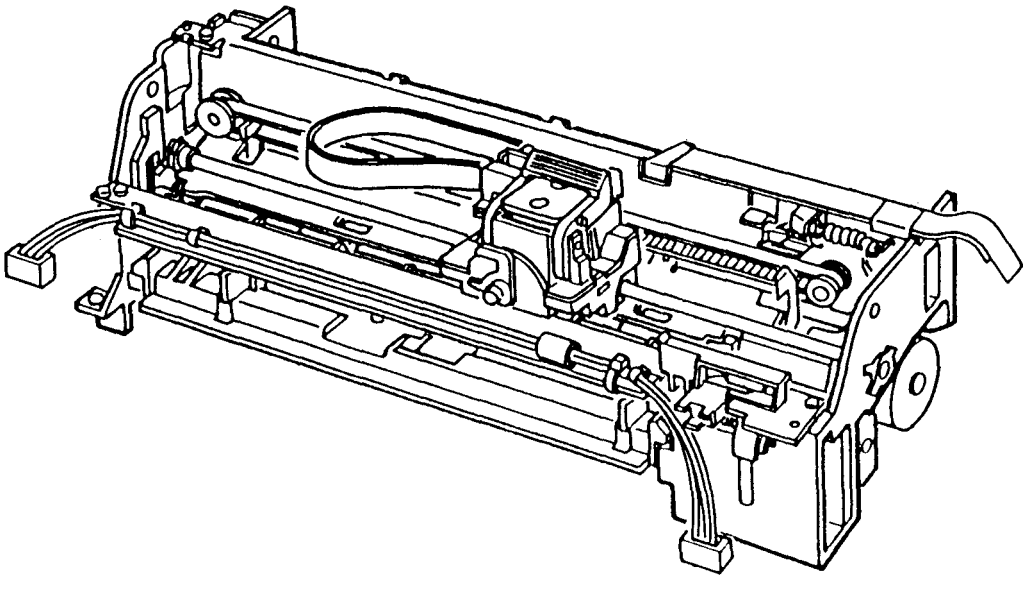

Figure 1-11. Printer Mechanism (M-4810)

Chapter 2 Operating Principles

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2.1 OVERVIEW

This section describes the operating principles of the printer mechanism and the electrical circuits of the Stylus 800.

2.2 OPERATING PRINCIPLES OF THE PRINTER MECHANISM

The Stylus 800 printer mechanism is composed of the printhead unit, paper feed mechanism, carriage drive mechanism, pump mechanism, and various sensors. The figure below shows a functional block diagram of the printer mechanism.

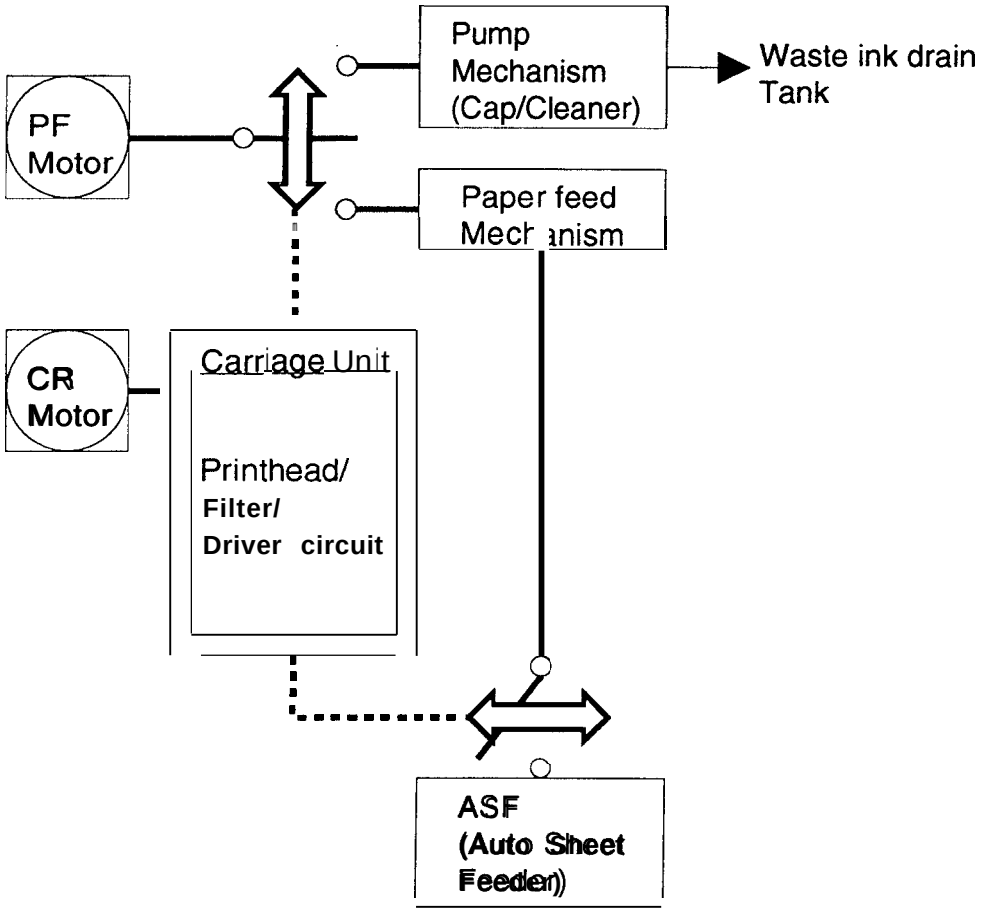


Figure 2-1. Functional Block Diagram of the Printer Mechanism

2.2.1 Printer Mechanism

The printer mechanism of this printer uses a drop-on-demand ink jet system similar to the system used on all other Epson ink jet printers. However, the printhead in this system is completely redesigned to make it compact and highly reliable. The figure below shows the structure of the printhead and ink supply system.

- MLP — MLP is the abbreviation for Multi-Layer Piezoelectric element. When a drive pulse (voltage) is applied, this element pushes the vibration plate, compressing the cavity for ink injection from the nozzle.
- Cavity — Ink supplied from the ink cartridge is stored in this space and is injected from the nozzles when the vibration plate compresses this area.
- Nozzles — These inject ink against the paper's surface in response to the application of the print signal. There are 48 individual nozzles making up this printhead.

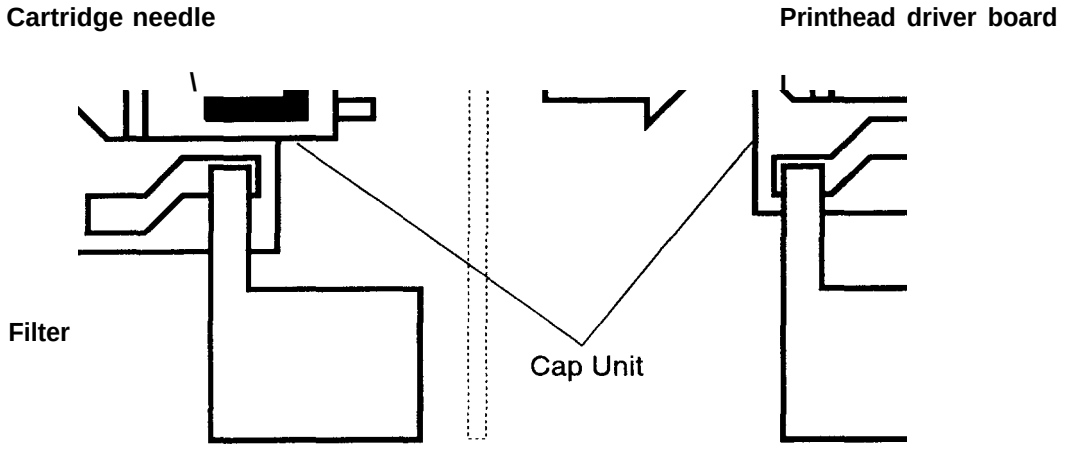


Figure 2-10. Cap Mechanism

(Multi-Layer

Cavity set
(Nozzle)

Nozzle plat

nk supply tank

p

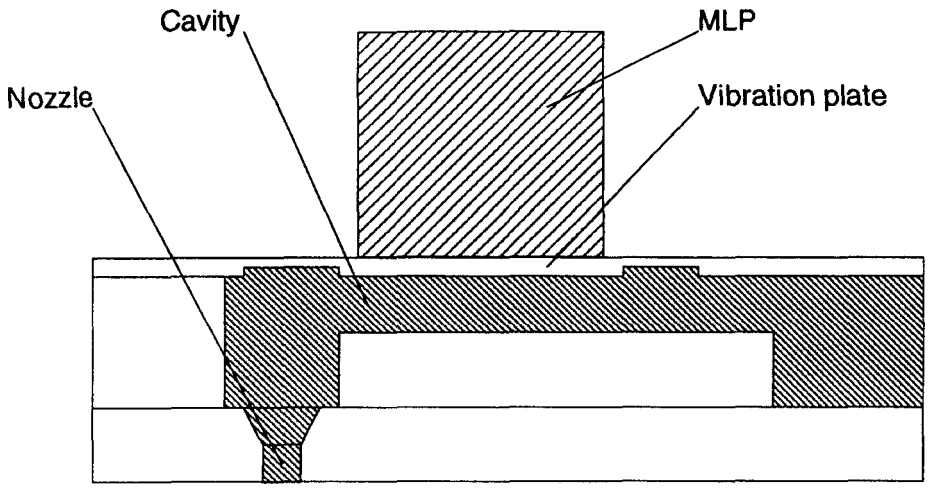
Figure 2-2. Structure of

Principles of the Printing Operation

The operation of the printhead to inject ink from each nozzle is:

(1) Normal state

No electrical charge is applied to the MLP (Multi-Layer Piezoelectric) element attached to the back of the cavity, and pressure inside the cavity is kept at constant level.



(2) Injecting state

The head data signal is applied to the specific nozzle control line to select the active nozzle for printing, and the MLP element is gradually charged by the drive voltage. By charging the MLP element, the vibration plate is bent to compress the cavity. Then, ink is injected from the nozzle.

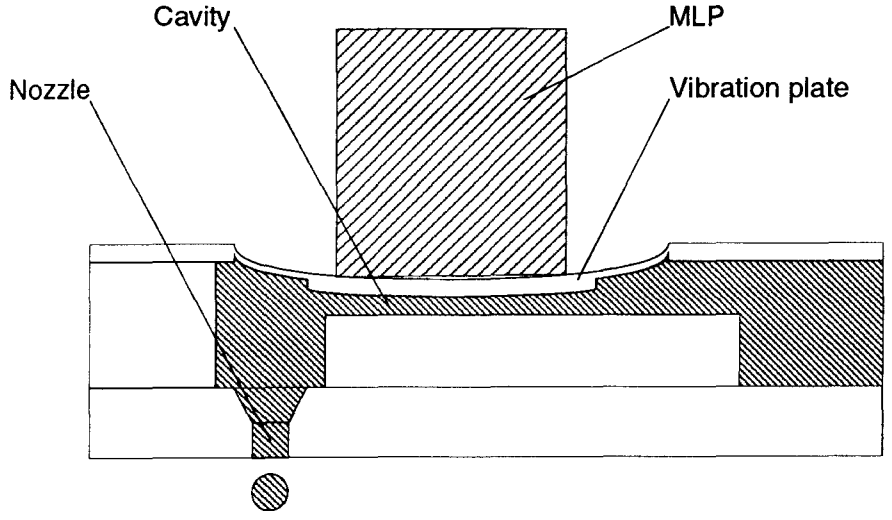


Figure 2-3. Principles of the Printing Operation

When the ink charge or printhead cleaning operation is performed, the ink in the cavity is vacuumed out with the pump mechanism. During printing, on the other hand, the ink is simultaneously supplied from the ink cartridge and injected from the nozzle, according to the change of volume in the cavity.

A thermistor is attached to the printhead drive board to monitor the temperature, because the viscosity of the ink varies, depending on the temperature. The detected temperature level is fed back to the printhead drive voltage control circuit to regulate the drive voltage to a proper level.

2.2.2 Carriage Drive Mechanism

The timing belt attached to the base of the carriage unit is driven by the carriage motor, causing the carriage unit to move along the carriage guide shaft left to right, or vice versa. The carriage drive motor on this printer is a 4-phase, 200-pole, hybrid-type stepping motor mechanism, allowing the printer to stop the carriage or change the carriage movement at any position. The position of the carriage is recognized by the home position sensor and position information is fed back to the carriage drive control circuit to determine the motor phase switching mode.

Table 2-1. Carriage Drive Motor Specifications

Item	Description
Motor Type	4-phase 200-pole hybrid-type stepping motor
Drive Voltage	35 V 10Yo (31.5 -38.5 V)
Coil Resistance	10.0 (\ 7%/ pole (at 25° C, 77°
Drive Frequency	960 -5400 pps
Excitation Mode	1-2 phase excitation

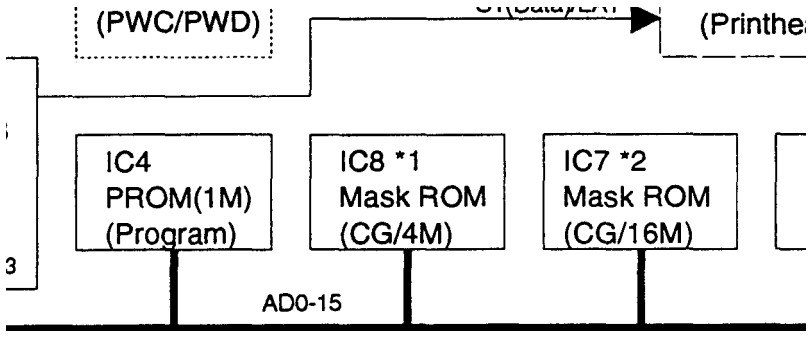


Figure 2-4. Carriage Drive Mechanism

2.2.2.1 Platen Gap Adjust Lever

Set the platen gap adjust lever, attached to the carriage unit, to an appropriate position for the paper thickness used for printing.

Table 2-2. Platen Gap Adjust Lever Position

Paper Type	Lever Position	Platen Gap
Cut sheet	Horizontal (A)	—
Envelope	Vertical (B)	+0.7 mm

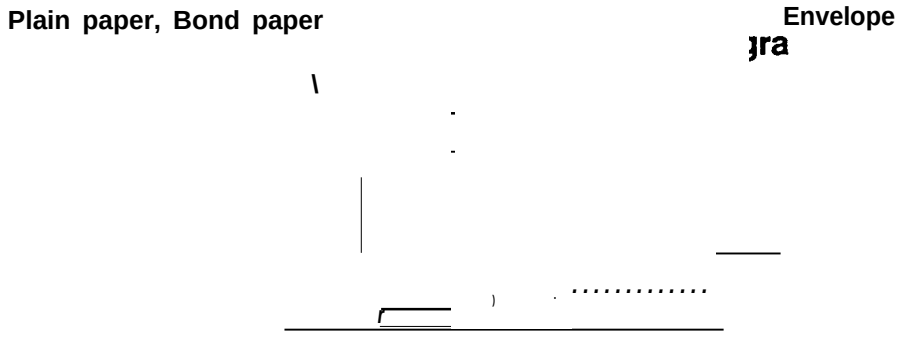


Figure 2-5. Platen Gap Adjust Lever

2.2.3 Paper Feed Mechanism

This printer's paper feed mechanism can feed paper either from the built-in ASF (auto sheet feeder) or the manual feed slot. The paper feed drive motor is a 4-phase, 48-pole, PM-type stepping motor that directly drives the paper feed mechanism (paper advancing operation, paper pick-up operation). This motor also drives the pump mechanism, but only when the printer is in the cleaning state.

Table 2-3. Paper Feed Drive Motor Specification

Item	Description
Motor Type	4-phase / 48-pole PM-type stepping motor
Drive Voltage	35 V ± 10% (31.5 - 38.5 V)
Coil Resistance	54 ± 3 Ω/ pole (at 25° C, 77° F)
Drive Frequency	650-800 pps
Excitation Mode	2-2 phase excitation

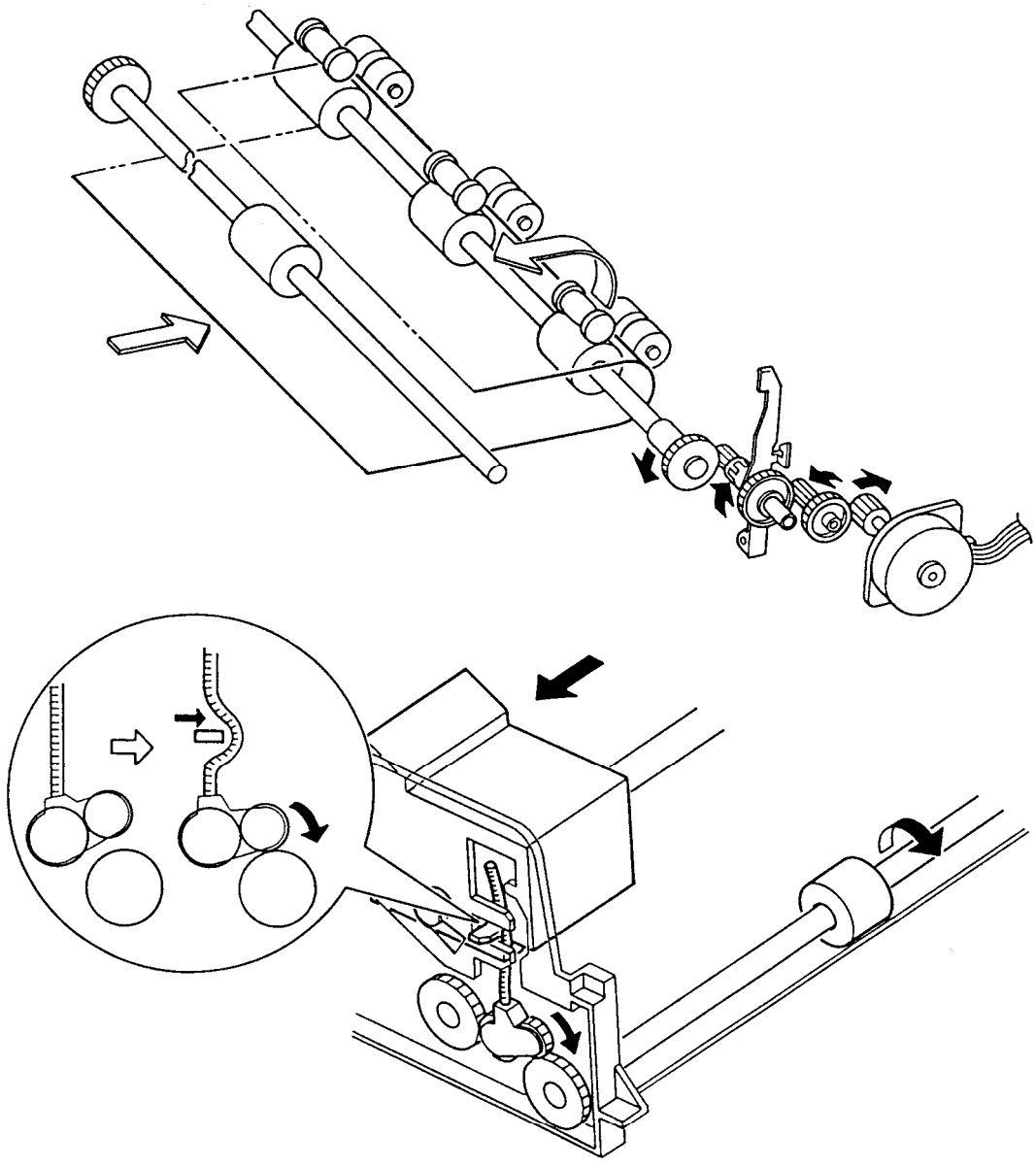


Figure 2-6. Paper Feed Mechanism

2.2.4 Ink System

This printer's ink system is composed of the following mechanisms:

- Ink cartridge
- Pump mechanism
- Cap mechanism
- Printhead cleaning mechanism
- Waste ink drain tank

The figure below shows a diagram of the ink system.

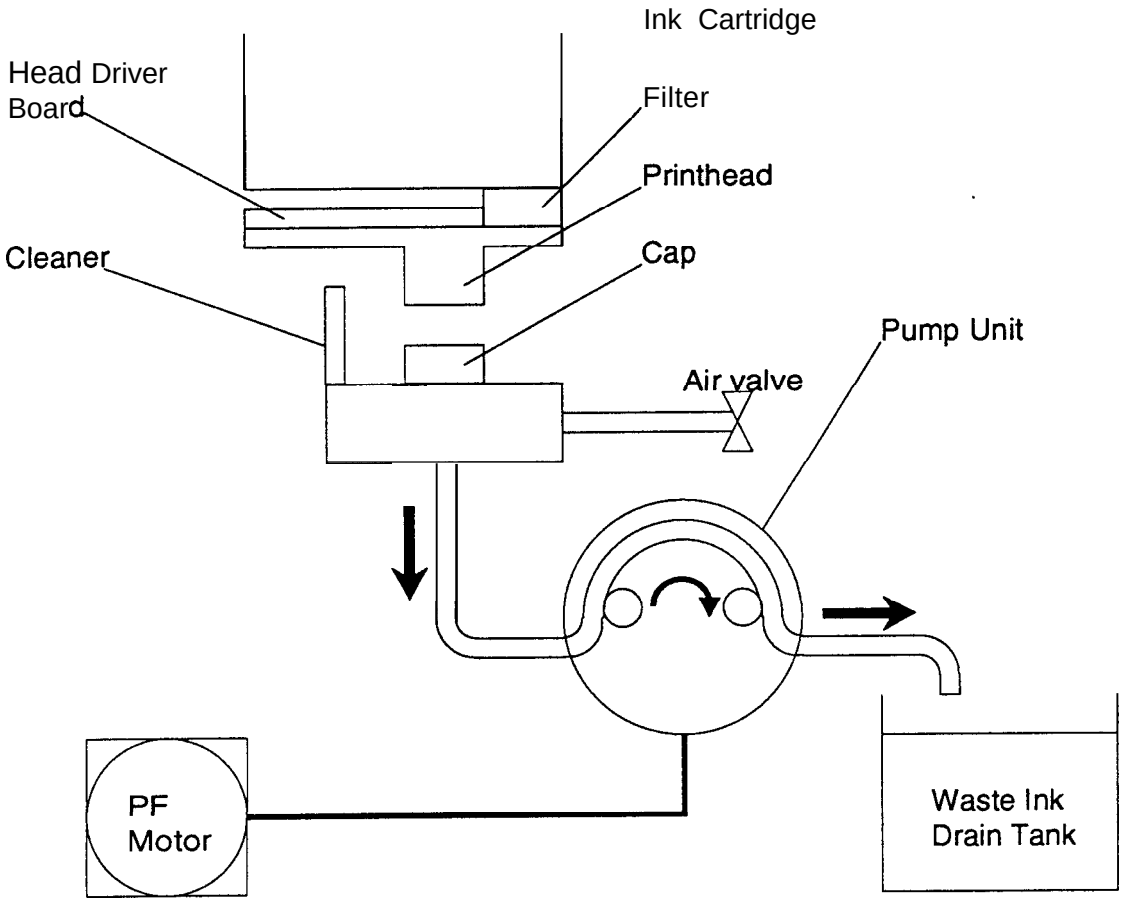


Figure 2-7. Diagram of the Ink System

2.2.5 Pump Mechanism

The paper feed motor drives the pump mechanism when the transmission gear is moved to the position where the paper feed motor engages the pump mechanism gear trains, when the carriage unit is at the ink **system home** position. The figure below shows a block of the pump mechanism. Pump system operation depends on the rotational direction of the paper feed drive motor, as shown in table below.

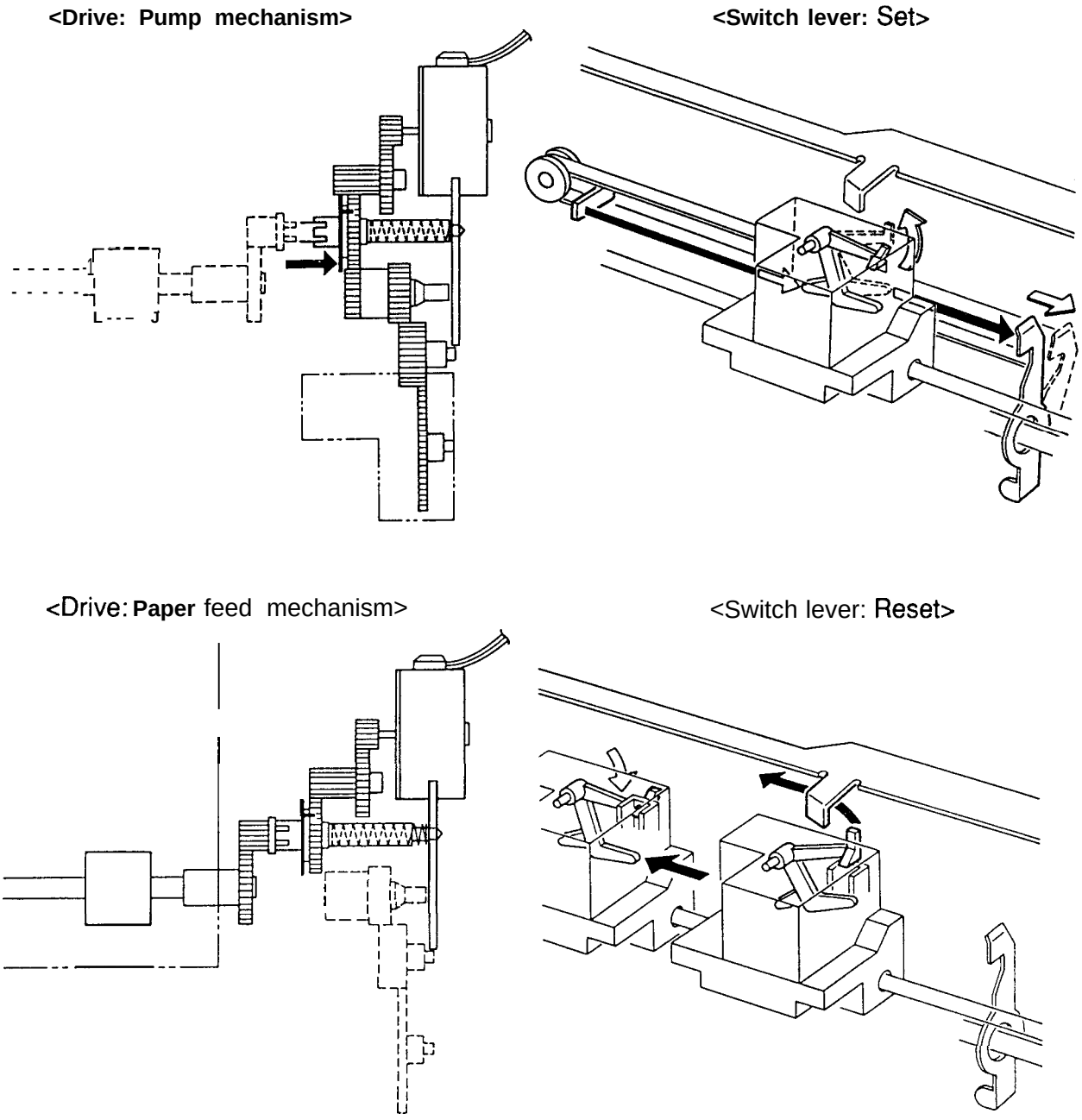


Figure 2-8. Pump Mechanism Block

Table 2-4. Pump Mechanism Operation

PF Motor Rotational Direction	Operation
CW (forward rotation)	Pumping Pseudo-pumping (False absorbing) Gear backrush compensation
CCW (backward rotation)	Pump pulley reset Gear backrush compensation

The pump draws ink from the printhead nozzles and drains it into the waste ink drain tank. The printer performs this operation to eliminate dust or bubbles *within the nozzles.* Figure 2-9 illustrates the pump operation. When the paper feed drive motor rotates CW (forward), the pulley pumps in the wheel pump unit rotate in the direction of the arrow while squeezing the ink tube to push the ink inside the tube out to the waste ink drain tank. On the other hand, when the motor rotates CCW, the pulley pumps move inward along the grooves of the wheel pump so that pressure applied to the ink tube is released.

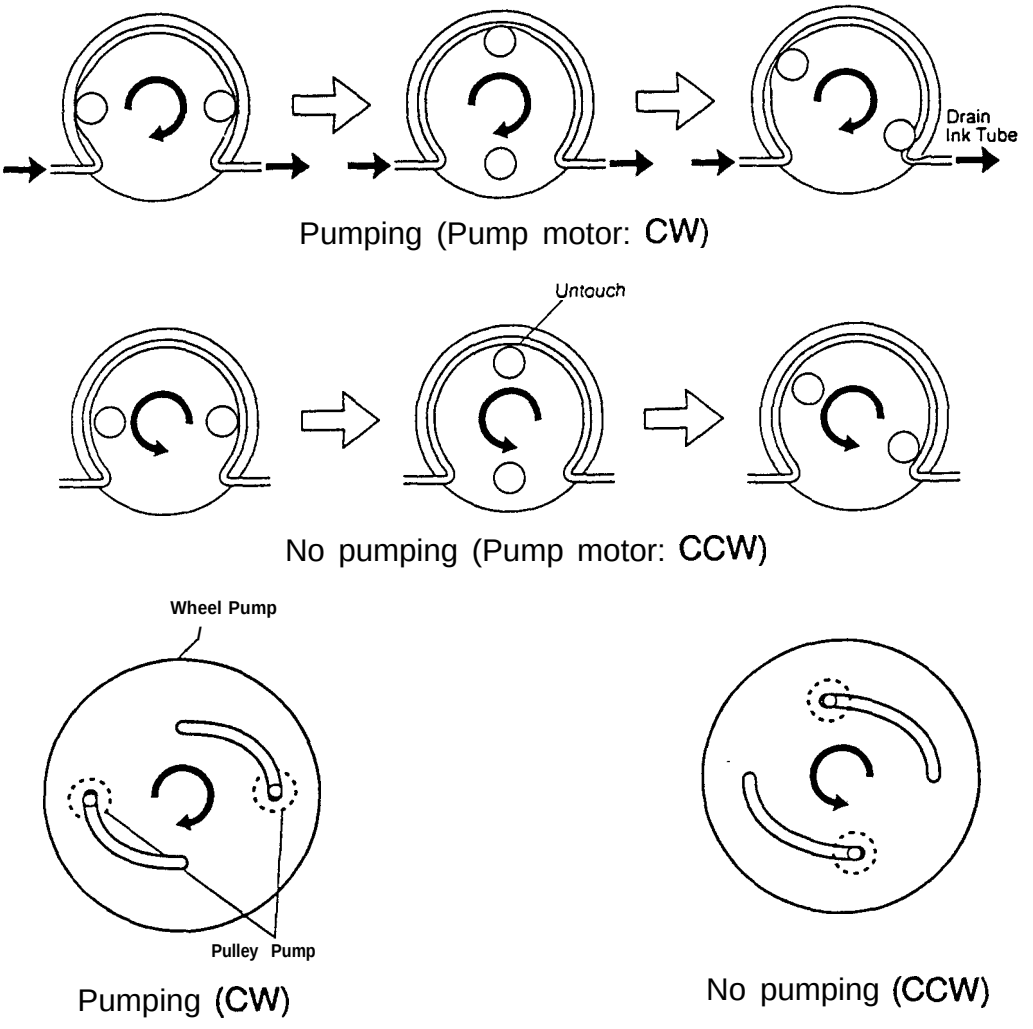


Figure 2-9. Pump Operation

2.2.6 Cap Mechanism

The **cap mechanism** prevents the printhead nozzles from drying or bubbles from forming inside the nozzle while the printer is not in use. The printhead capping operation is performed automatically so that a cap closely contacts the printhead surface when the carriage unit is moved to the ink **system home position.**

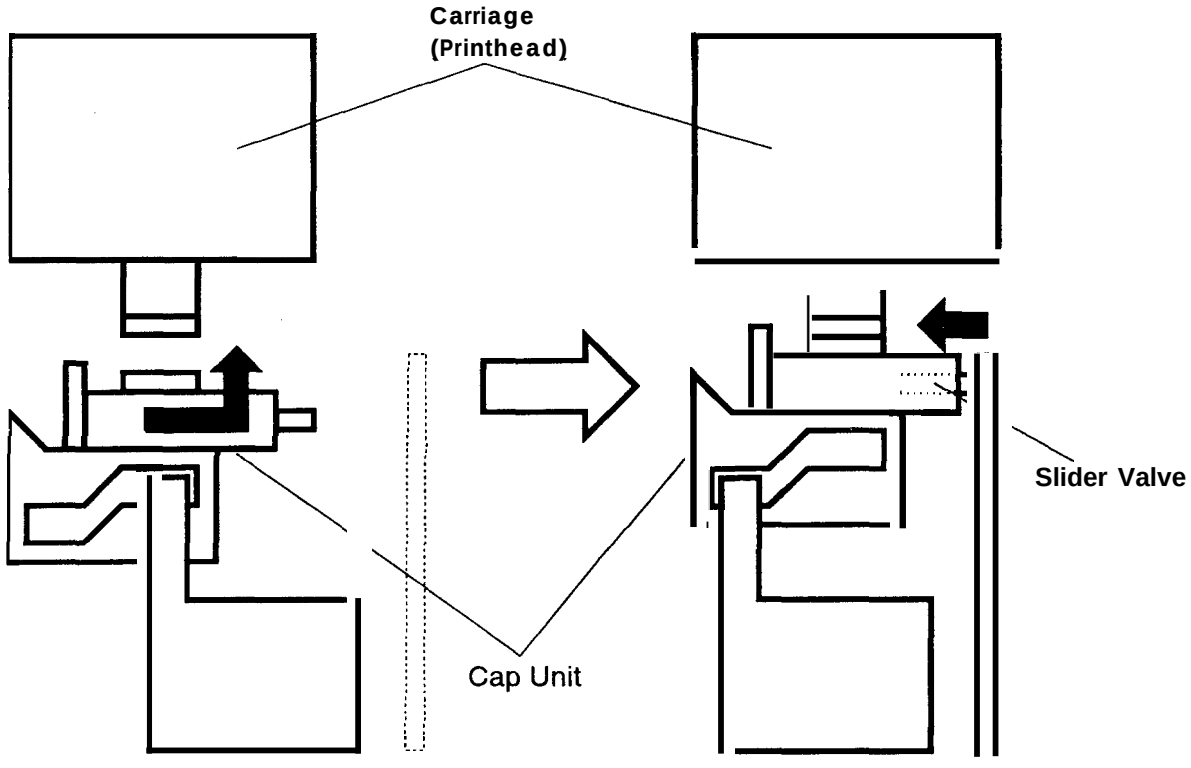


Figure 2-10. Cap Mechanism

2.3 OPERATING PRINCIPLES OF THE ELECTRICAL CIRCUITRIES

The Stylus **800 contains the** following circuit board units:

- C106 MAIN BOARD (Main control circuit board)
- C106 PSB/PSE BOARD (Power supply circuit board)

In addition to the circuit boards above, part of the printhead drive circuit is built on a separate circuit board installed in the carriage unit, and the printhead is attached directly to this board. The figure below shows a block diagram of the electrical circuitries.

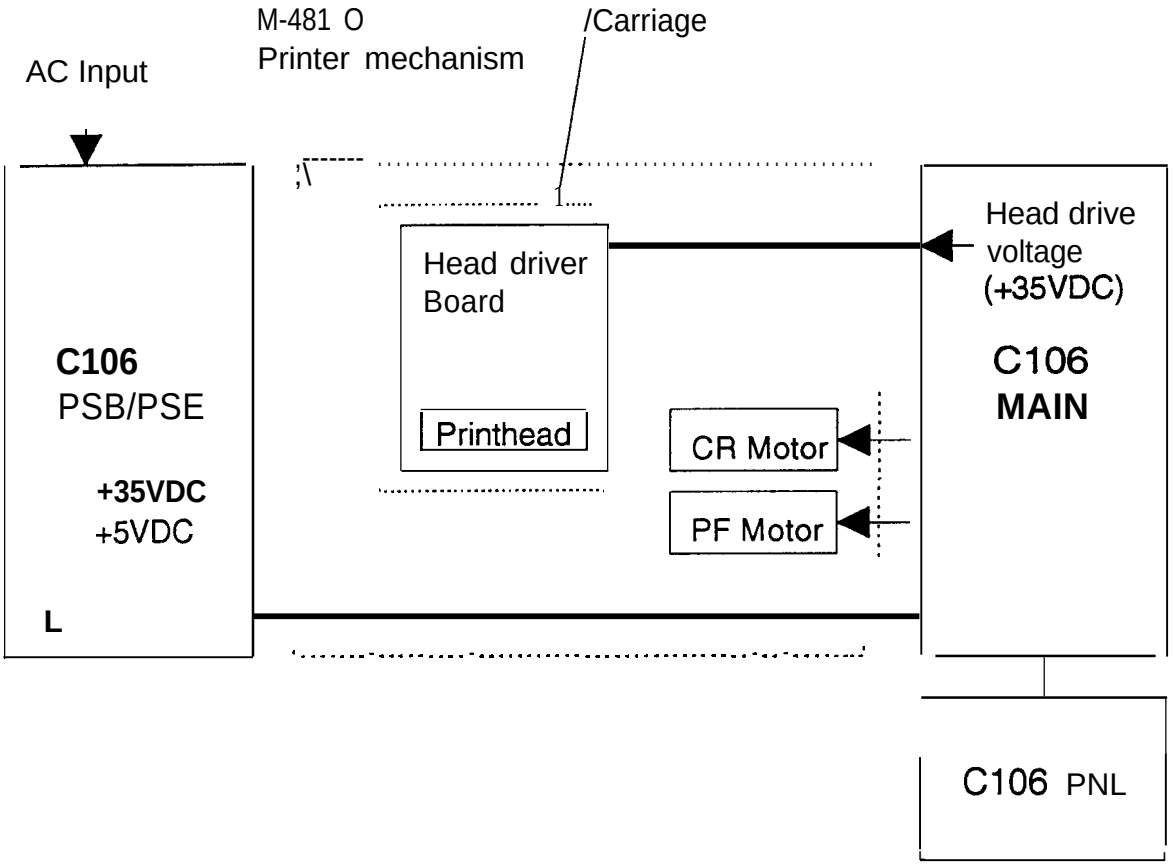


Figure 2-11. Block Diagram of the Electrical Circuities

2.3.1 Operating Principles of the Power Supply Circuit

The power supply circuitry for this printer is provided either by the C106 PSB BOARD (120 VAC) or the C106 PSE BOARD (220-240 VAC). Both boards are identical in design and functionality, except for components in the primary circuit that accommodate the specified input voltage. The input voltage and the application of output voltages are summarized in table below.

Table 2-5. DC Voltage Distribution

Voltage	Application
+35 VDC	Motor drive (carriage and paper feed) Printhead (through the drive voltage generation circuit)
+5 VDC	C106 MAIN BOARD Sensors (home position and paperend) Control panel (PF motor holding voltage)

The figure below shows a block diagram of the power supply circuit (C106 PSB/PSE). This power supply circuit employs the RCC (ringing choke converter) switching control system. The input AC voltage supplied from the external AC source is first input to the filter circuit for higher harmonics absorption. The AC voltage is then input to the rectification and smoothing circuit, converting it into DC voltage. This DC voltage is input to the switching circuit for switching operation. Along with the switching operation on the primary side, +35 VDC is generated after passing through the smoothing circuit. The +35 VDC level is fed back to the primary switching circuit through the +35 V line voltage detection circuit and, thus, the +35 VDC output level is stabilized. This +35 VDC is also input to the +5 VDC generation circuit to generate a stable +5 VDC.

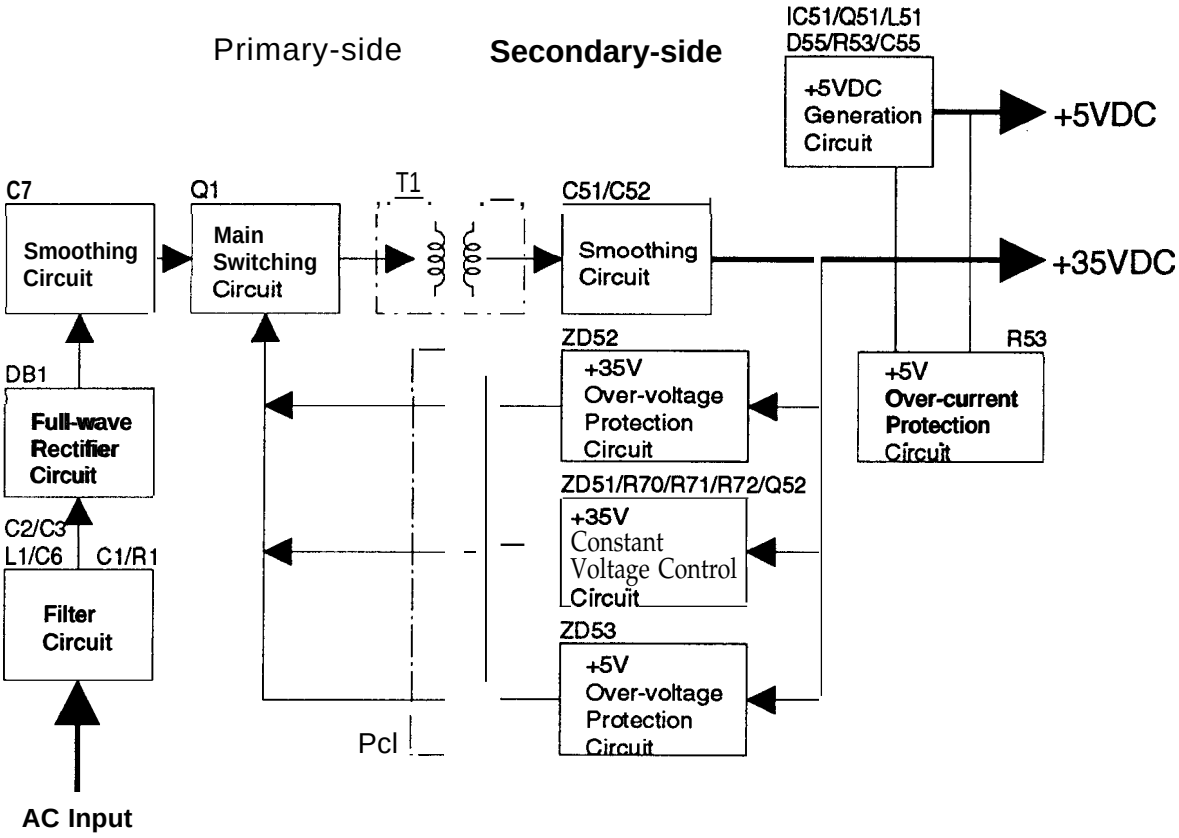


Figure 2-12. Power Supply Circuit Block Diagram

This circuit contains the protection circuits described below.

1) +5 VDC line over voltage protection circuit
The output voltage level of +5 V line is monitored with a Zener diode (ZD53) and if the voltage level exceeds predefined level (+7 V), the status is fed back to the primary switching circuit through a photocoupler (PC1) to stop the +35 V generation.

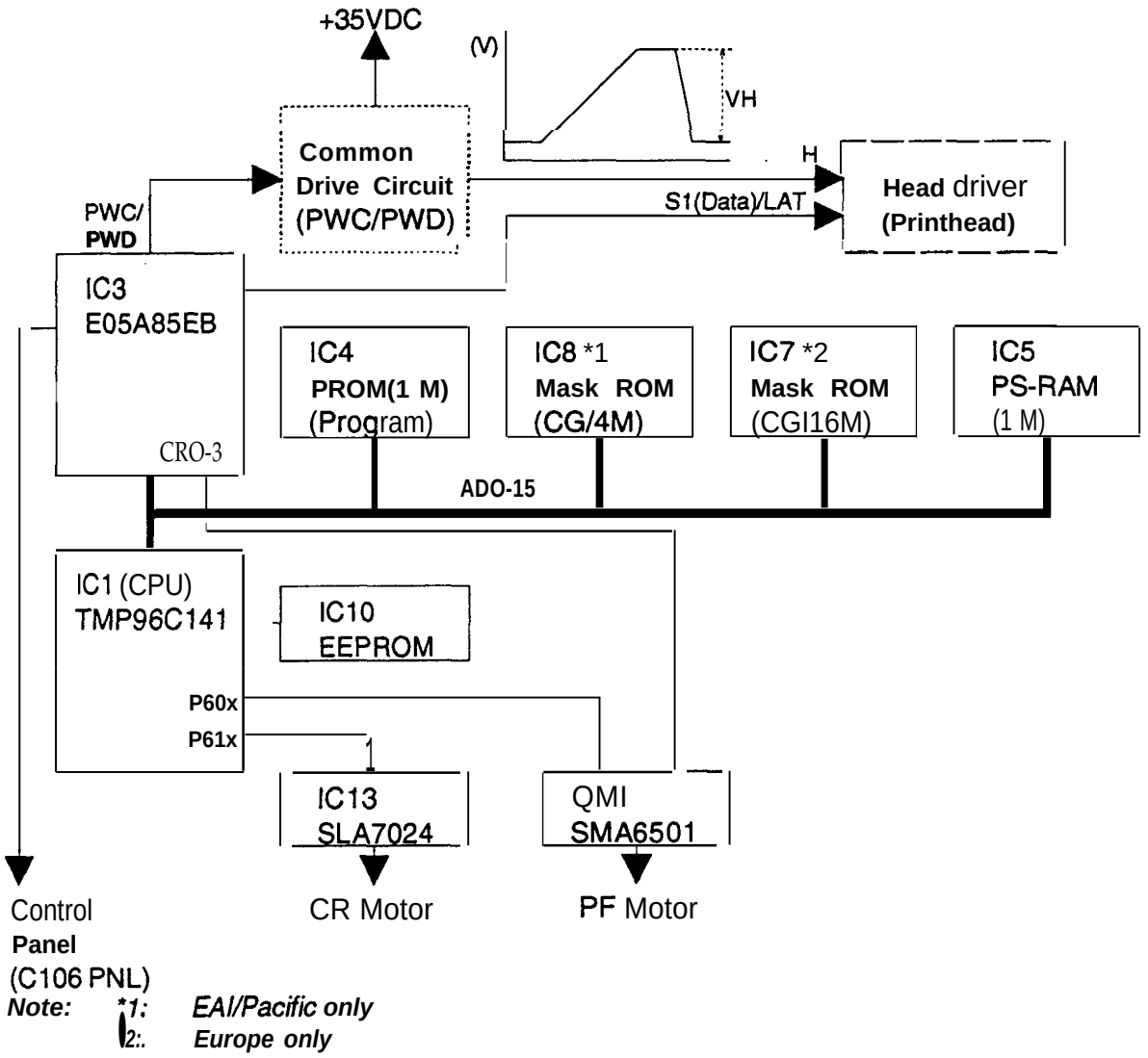
2) +5 VDC line over current protection circuit
The output current is monitored with a detection resistor (R53) and fed back to the +5 VDC generation switching control IC (IC51). If the current level exceeds the limit, the control IC shortens the ON time of the switching transistor (Q51) to decrease the output voltage level (constant current operation).

3) +35 VDC line over voltage protection circuit
The output level is monitored with a Zener diode (ZD36). If the voltage level exceeds the limit level (+36 V), it activates a photocoupler (PC1), and this stops the primary switching circuit operation.

4) +35 VDC line constant voltage output control circuit
The output level of +35 VDC line is monitored by a detection circuit that consists of a Zener diode (ZD51), a transistor (Q52), and resistors (R70, R71, R72). This circuit feeds back the output voltage level status through a photocoupler to the primary switching circuit to control the ON/OFF time of the switching transistor for constant output voltage control.

2.3.2 Operating Principles of the Main Control Circuit

The main control circuit of this printer is the C106 MAIN BOARD. This circuit is *controlled* by the 8-bit CPU TMP96C141F (ICI), running at 19.6608 MHz. This CPU has a unique architecture capable of handling data on the data bus at either an 8-bit bus width or a 16-bit bus width. Due to this, a 16-bit data bus width-type ROM is used on this board, increasing the internal processing speed. Gate array E05A85EB (IC3) manages printhead drive control, external I/F control (Centronics parallel I/F), and the control panel. The CPU directly controls both the carriage drive motor and the paper feed motor. This board is also equipped with EEPROM 93C46 (IC1O) to store certain parameters, such as the printer mechanism control parameter, default setting parameters, as well as a special counter value used for printhead protection.



Note: ****1:*** ***EAI/Pacific only***
****2:*** ***Europe only***

Figure 2-13. Main Control Circuit Block Diagram

2.3.2.1 Reset Circuits

The **C106** MAIN BOARD contains two reset circuits: the +5 V monitor reset circuit and the +35 V monitor reset circuit. The +5 V monitor reset circuit monitors the voltage level of the +5 V line, using reset IC PST592 (IC12), and outputs a reset signal to both the CPU (ICI, TMP96C141) and the E05A85EB gate array (IC3), when the voltage level drops below +4.2 V. The +35 V monitor reset circuit, on the other hand, monitors the voltage level of the +35V line, using reset IC 51955BFP (IC11), and outputs a reset signal to the CPU. The reset signal is generated when the voltage level drops below +28 V, and this causes a non-maskable interrupt (NMI).

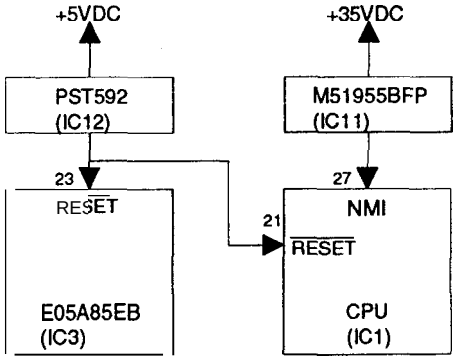


Figure 2-14. Reset Circuit Block Diagram

2.3.2.2 Sensor Circuits

The following sensor circuits enable the main board to monitor printer mechanism status:

1) HP sensor — A photocoupler-type HP (home position) sensor is attached to the back of the carriage unit to detect the carriage home position as a print reference position. A HIGH level from the signal indicates that the carriage is in home position.

2) PE sensor — A mechanical switch PE (paper end) sensor is built into the printer mechanism to determine whether there is paper in the printer or not.

3) IE sensor — Two electrical contacts are attached to the ink cartridge holder in the carriage unit, and when the ink cartridge is installed, the metal pins built into the ink cartridge touch these contacts. The IE (ink end) sensor circuit applies a HIGH level signal when performing the ink end status detection operation. The ink level is determined by the resistance between the two contacts by measuring the input signal level with analog port ANO (pin 73) of CPU.

4) Thermistor — A thermistor is attached to the printhead unit to monitor its temperature. The CPU changes the printhead drive signal's pulse width (charge pulse width) based on the temperature level.

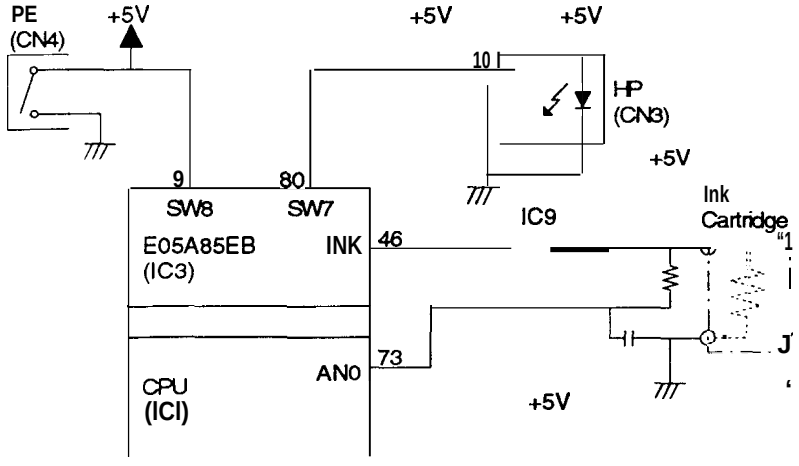


Figure 2-15. Sensor Circuit Block Diagram

2.3.2.3 Ink End Detection

The IE (Ink End) sensor attached to the carriage detects, not only the ink end, but also when ink is low and whether an ink cartridge is installed. The detected status is classified to five modes according to the output voltage level of the IE sensor.

- ❑ Mode A: No I/C (Abnormal conduction) (not printable)
- ❑ Mode B: Ink is low (printable)
- ■ Mode C: Ink end (During pump operation) (not printable)
- ■ Mode D: Ink end (During printing) (not printable)
- ■ Mode E: No I/C (not installed) (not printable)

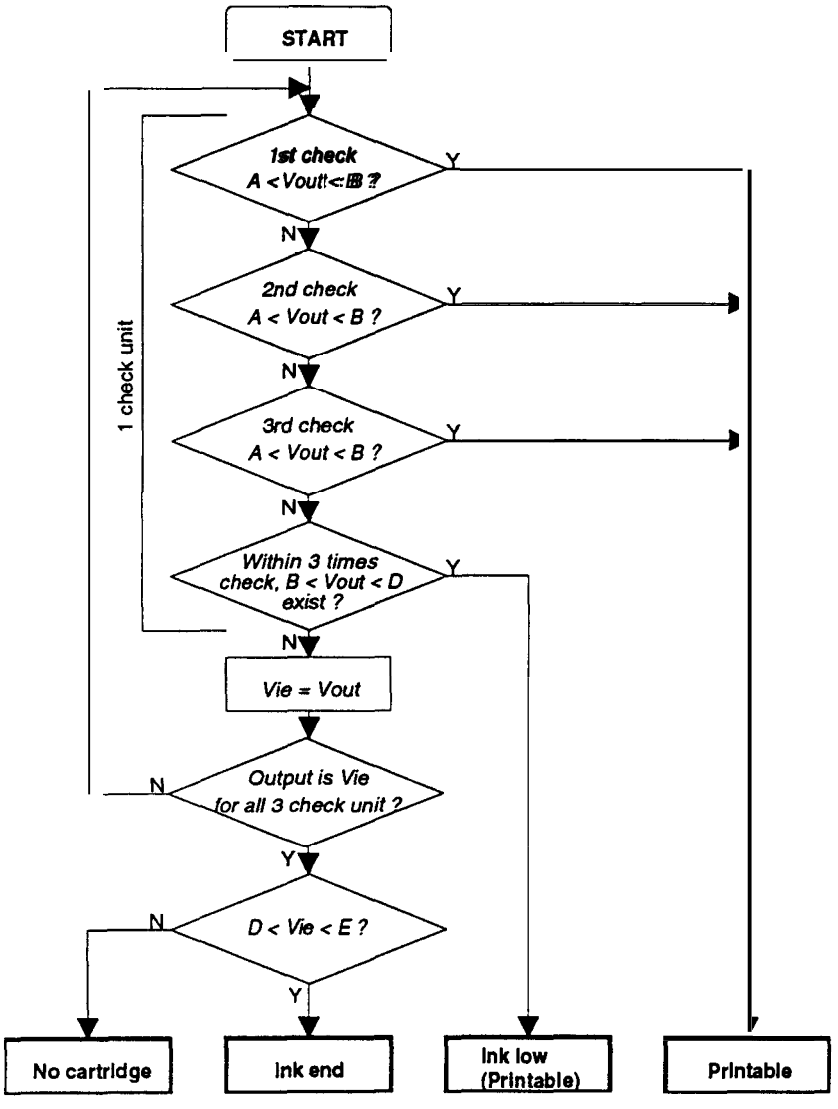


Figure 2-16. Ink End Detection Sequence

When the ink end detection operation has determined ink status, the printer indicates the status on the control panel, as described below:

1) During printing: If Mode D (ink end) or Mode A or E (no I/C) is detected, the printhead is capped and the control panel indicates an "INK END" error.

2) During pump operation: If Mode C is detected, the printer indicates an "INK END" error after the detection operation sequence completes and interrupts pump operation.

If Mode A or E is detected, the printer indicates an "INK END" error after interrupting the pump operation.

3) In stand-by state: If Mode D or Mode A or E is detected, the printer indicates an "INK END" error on the control panel.

2.3.2.4 Carriage Motor Drive Circuit

Carriage motor drive IC SLA7024 (IC13) drives the carriage motor for the printer mechanism by a constant current, unipolar drive system. Gate array E05A85EB (IC3) selects the motor phase drive current level using the output signals from ports CR0 to CR3 (pins 75 to 78). The phase switching operation is directly controlled by the phase control signals output from ports P600 to P603 (pins 1 to 4) of the CPU. The table below shows the carnage m-otor drive modes.

Table 2-6. Carriage Motor Drive Modes

CR speed (CPS)	Drive Frequency (PPS)	Phase Excitation	Acceleration Current (A/Phase)	Normal/Deceleration Current (A/Phase)
225	5400	1-2 phase	0.80	0.45/0.80
150	3600	1-2 phase	0.60	0.30/0.60
83	2000	1-2 phase	0.80	0.80
40	960	1-2 phase	0.45	0.30/0.45
HOLD	—	2 phase	Approx. 0.15	

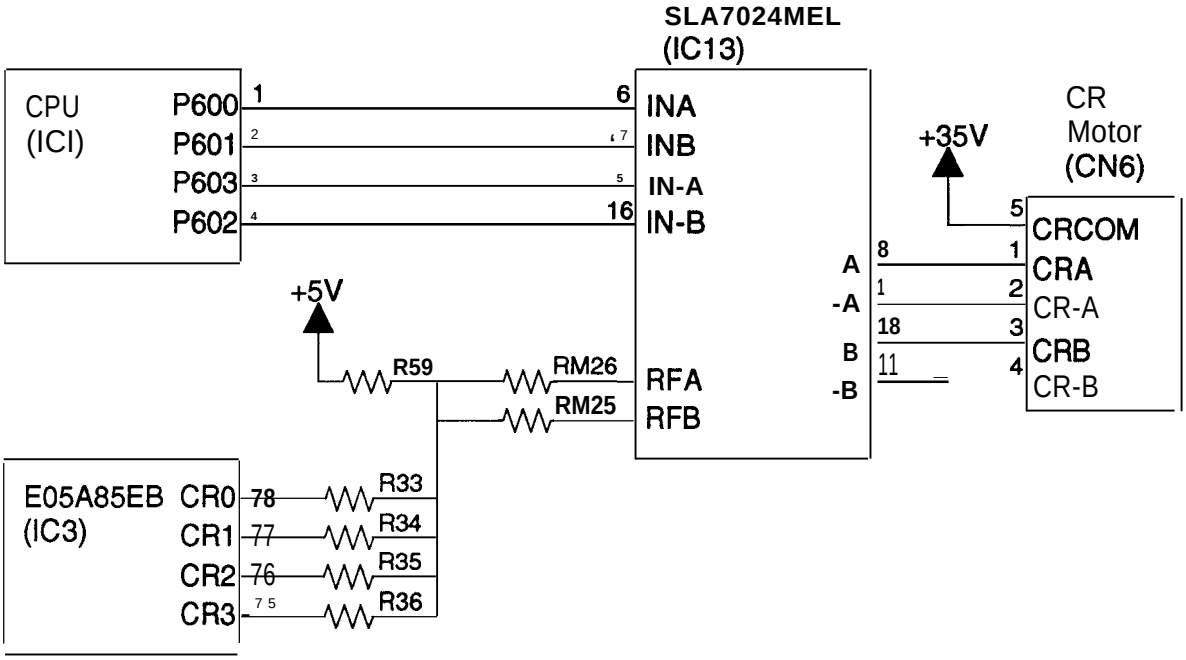


Figure 2-17. Carriage Motor Drive Circuit Block Diagram

2.3.2.5 Paper Feed Motor Drive Circuit

The paper feed motor for this printer drives the following mechanisms:

- Paper feed mechanism
- Paper pickup mechanism
- Pump mechanism

Driver IC SMA6501 (QM1) drives the paper feed motor by a constant voltage, unipolar drive system. The CPU outputs phase control signals from ports P610 to P613 (pins 5 to 8) for the phase switching operation. The CPU also outputs the supply voltage switching control signal from port TO3 (pin 12) to switch the supply voltage to +5 V-DC when the paper feed motor control is in HOLD mode. The drive modes are shown in table below.

Table 2-7. Paper Feed Motor Drive Modes

Mode	Phase Excitation	Drive Frequency (PPS)
Continuous feed	2-2 phase	800
Pump drive	2-2 phase	650

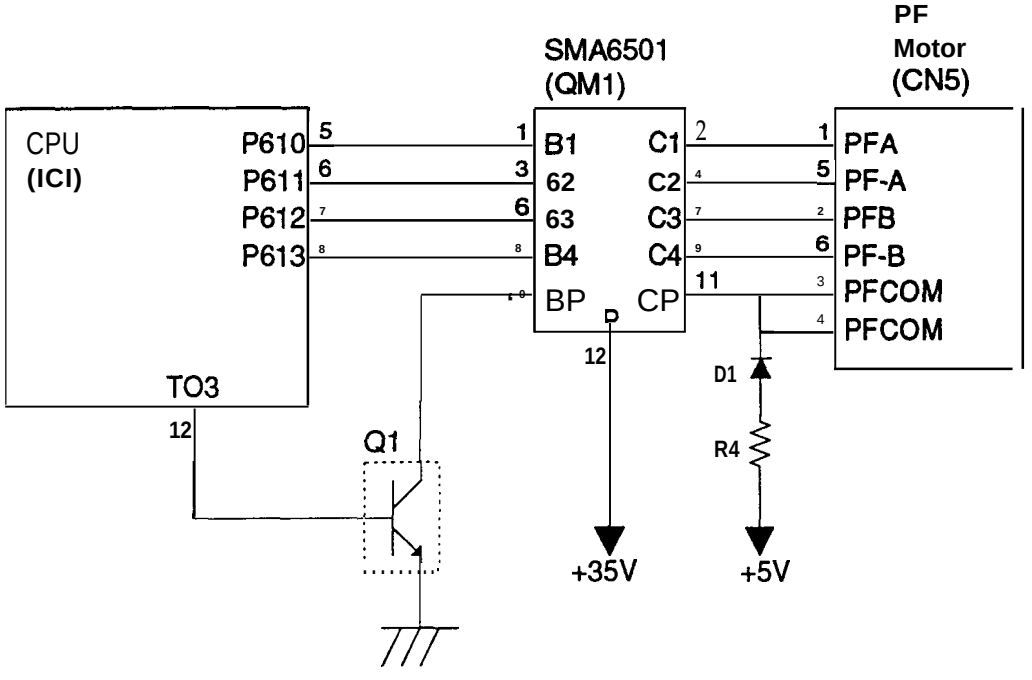


Figure 2-18. Paper Feed Motor Drive Circuit Block Diagram

2.3.2.6 **Printhead Drive Circuit**

The printhead drive circuit for this printer is composed of the following two parts:

- ❑ Common drive circuit (trapezoidal drive pulse generation)
- ■ Head drive circuit (nozzle control built on the printhead)

The 64-bit thermal head driver SED5620D in the head drive circuit on the printhead is used as a nozzle selector to drive the printhead nozzles selectively. Print data is converted into serial data by gate array E05A85EB (IC3) and is output from port S1 (pin 63) to the head drive circuit on the printhead as data for each nozzle. Then, head driver SED5620D latches the head data when gate array E05A85BE outputs the LAT signal, and the latched data becomes 48-bit parallel data, with one bit corresponding to each nozzle of the printhead. When data transfer and nozzle selection is complete, gate array E05A85BE outputs the common drive pulse PWC (charge pulse) and PWD (discharge pulse) to the common drive circuit. The common drive circuit then generates the trapezoidal pulse and applies it to the printhead as a common drive pulse. After this, the nozzle selected by the head data is activated to inject ink by energizing the MLP element drive with the applied trapezoidal drive pulse.

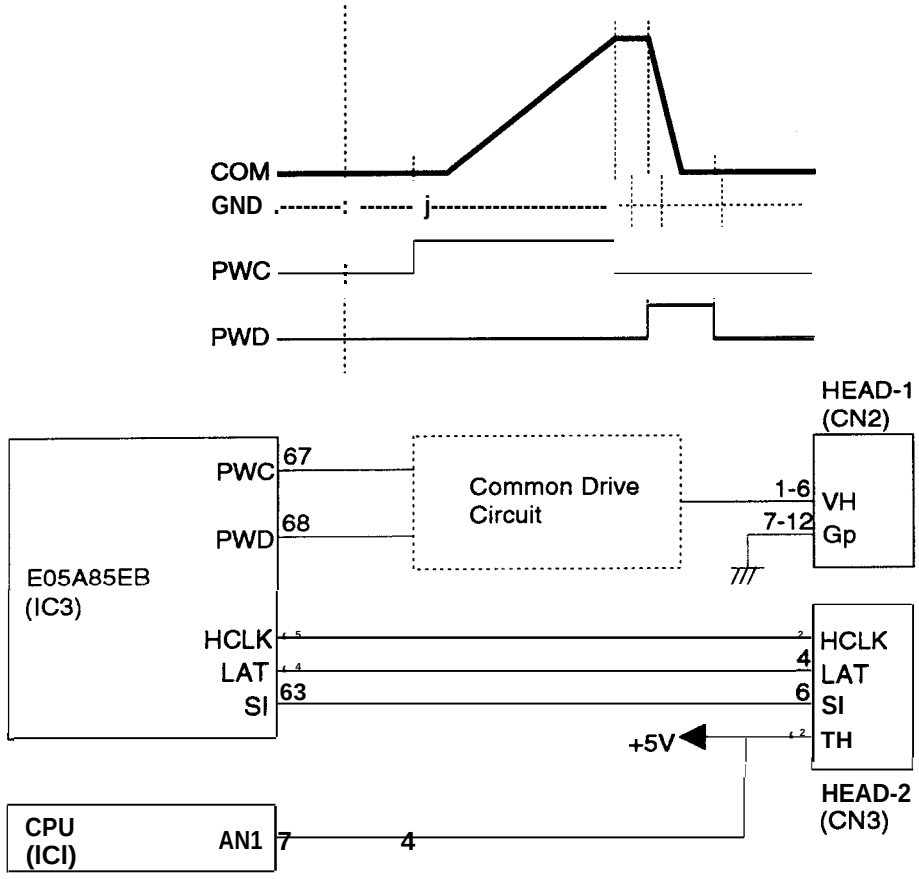


Figure 2-19. Printhead Drive Circuit Block Diagram

2.4 INK SYSTEM MANAGEMENT

This section explains how the ink system is controlled to protect the printhead and the ink supply system and to ensure high-quality output. The ink system control is composed of the following operations:

- Power on
- Cleaning
- Standby
- Refresh
- False absorbing
- Cleaner blade
- Ink end process

These ink system operations are controlled with the values indicated by the following counters and timers:

- Refresh timer
- Flashing counter
- Protect counter

The figure below shows how the carriage position determines which ink system operation is to be executed.

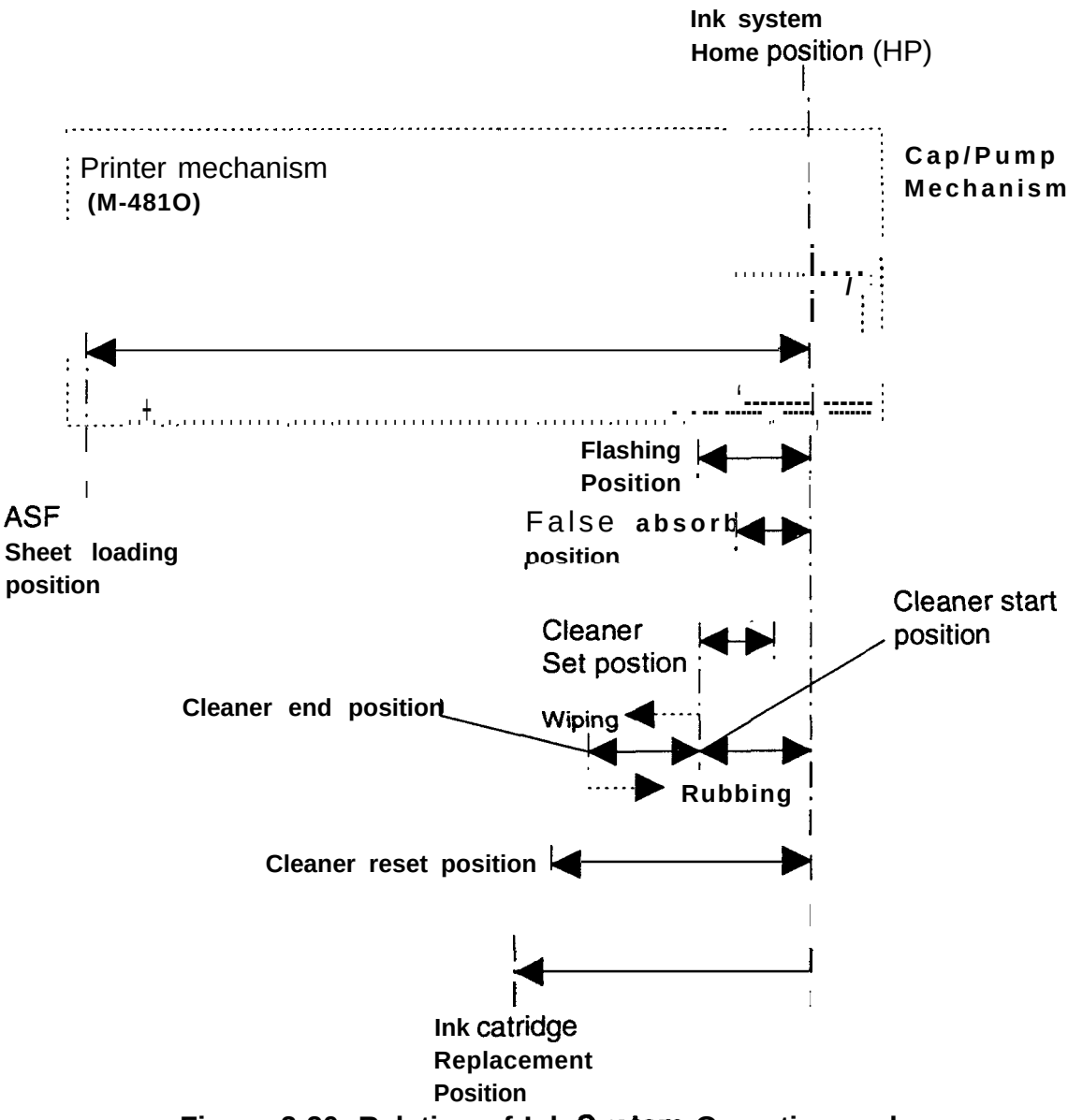


Figure 2-20. Relation of Ink System Operation and Carriage Position

2.4.1 Ink Operations

There are various ink operations that can be performed selectively by the printer.

2.4.1.1 Power on Operation

Power on consists of the following operations, and only one of these operations is performed, depending on the position of the carnage when the printer is turned on.

■ At ink system home position

1) Moves the carriage to the flushing position and performs the flushing operation.
2) Returns the carnage to the home position (standby for printing).

Note: The false absorbing operation is performed preceding the above-mentioned sequence, depending on the protect counter R value.

■ Notat ink system home position

1) Returns the carriage to home position.
2) Performs cleaner blade- I operation.
3) Performs ink absorbing operation.
4) Performs pressure release operation.
5) Performs micro absorbing operation.
6) Performs false absorbing operation.
7) Performs cleaner blade-II operation (including the flushing operation).
8) Moves the carriage to the standby position.

2.4.1.2 Cleaning Operation

This operation is performed when cleaning is selected by pressing the ALT and PAUSE buttons simultaneously. There are three cleaning modes, each of which is selectively performed, depending on the cleaning counter K value and the number of printed lines from the previous cleaning operation.

■ CL1 (Normal)

1) If the carriage is out of home position, return it to the home position.
2) Cleaner blade - I operation.
3) Change the gear engagement. (pump drive ON)
4) Ink absorbing operation.
5) Performs pressure release operation and micro absorbing operation.
6) Cleaner blade -II operation. (including the flashing operation)
7) Move the carnage to the stand-by position, and change the printer state to the PAUSE state.

■ CL2 (Intensive)

1) If the carriage is out of home position, return it to the home position,
2) Cleaner blade - I operation.
3) Change the gear engagement (pump drive ON)
4) Ink absorbing operation.
5) Pressure release operation.
6) False absorbing operation.
7) Rubbing operation.
8) Change the gear engagement. (pump drive ON)
9) Micro absorbing operation.
10) False absorbing operation.
11) Cleaner blade - II operation. (including the flashing operation)
12) Move the carriage to the stand-by position.

■ CL3 (False)

The same operation as CL1, except that the carriage is moved to the false absorbing position and the false absorbing operation is performed at step 4).

2.4.1.3 Standby Operation

The standby operation prevents an increase in the viscosity of the ink held inside the printhead nozzles. This operation is performed automatically if no data is received for more than three seconds from the last print data.

1) Counts the number of flushing operations from the last standby operation, using the combined print counter N. And performs the flushing based on the counter value.

2) Moves the carriage to the home position.

2.4.1.4 Initial Charge Operation

This operation, performed when initial charge mode is selected, charges the printhead with ink . The operation has two modes, depending on the value held by protect counters B and C.

■ Initial Charge

1) If the carriage is not at home position, returns it to home position.
2) Performs cleaner blade - I operation.
3) Changes the gear engagement (pump drive on).
4) Performs ink absorbing operation (absorption= high).
5) Performs pressure release operation.
6) Performs ink absorbing operation (absorption= middle).
7) Performs pressure release operation.
8) Performs rubbing operation.
9) Performs micro absorbing operation.
10) Performs false absorbing operation.
11) Performs cleaner blade - II operation (including the flushing operation)
12) Moves the carriage to the standby position.

■ False Charge

This operation is identical with the initial charge operation, except that the operations for steps 4) and 6) are changed as follows:

. Moves the carriage to the false absorbing position, and performs the false absorbing operation. Then, moves the carriage to home position after step 8).

2.4.1.5 Refresh Operation

This operation prevents an increase in the viscosity of the ink inside the printhead, as well as to eliminate any ink attached to the nozzle plate surface. Refresh consists of the following operations:

■ Refresh - I operation

This operation is activated by the REFRESH-I signal, which outputs every 20 seconds during continuous printing.

1) Returns the carriage to home position.
2) Moves the carnage to the flushing position.
3) Performs flushing operation.
4) Performs cleaner blade-III operation (including the flushing), based on the value of the combined print counter N.
5) Performs false absorbing operation, if the ink level counter R value exceeds 5600.
6) Returns to the previous state.

■ Print start

This operation ejects high-viscosity ink inside the nozzles when the printing starts from the standby state.

1) Moves the carriage to the flushing position and performs flushing.
2) Starts printing operation.

■ False absorbing

This operation absorbs ink inside the cap and eliminates ink attached to the nozzle plate surface.

1) Moves the carriage to the false absorbing position.
2) Performs false absorbing operation.
3) Resets the pump pulley.
4) Release a mechanical pressure of the pump drive mechanism.
5) Adjusts the phase with paper feeding mechanism gears.
6) Returns the carriage to the home position.

2.4.1.6 Cleaner Blade Operation

The cleaner blade operation eliminates any dust or ink attached to the nozzle plate surface. This operation consists of the following separate operational modes.

■ Cleaner blade - I This operation eliminates any dust attached to the nozzle plate surface before the ink absorbing operation is performed.

1) Sets the cleaner blade.
2) Moves the carriage to the cleaner start position.
3) Moves the carriage to the cleaner end position (head surface is wiped off with the cleaner blade).
4) Resets the cleaner blade.
5) Returns the carriage to the home position.

■ Cleaner blade -II This operation eliminates any dust or ink attached to the nozzle plate surface after the ink absorbing operation is performed.

1) Sets the cleaner blade.
2) Moves the carriage to the cleaner start position.
3) Moves the carnage to the cleaner end position (head surface is wiped off with the cleaner blade).
4) Resets the cleaner blade.
5) Moves the carnage to the flushing position and performs flushing.
6) Moves the carnage to the home position.

■ Cleaner blade - III This operation removes any dust or ink attached to the nozzle plate surface during printing.

1) Sets the cleaner blade.
2) Moves the carriage to the cleaner start position.
3) Moves the carriage to the cleaner end position (head surface is wiped off with the cleaner blade).
4) Resets the cleaner blade.
5) Moves the carnage to the flushing position and performs flushing.
6) Moves the carriage to home position.

■ Rubbing This operation removes dust or ink that adheres to the head surface.

1) Sets the cleaner blade.
2) Moves the carriage to the cleaner start position.
3) Moves the carriage to the cleaner end position (wiping = rubber side)
4) Moves the carriage to the flashing position (wiping = felt side).
5) Moves the carriage to the home position. (This resets the cleaner blade.)

2.4.1.7 I/C Replacement Operation

This operation is performed when the ink cartridge (1/C) is replaced.

1) Moves the carriage to the I/C replacement position.
2) Replace the ink cartridge.
3) Performs the cleaner blade-I operation.
4) Performs the ink absorbing operation with a selected absorption amount according to the ink status of the previous I/C (ink end or ink low).
5) Performs the micro absorbing operation.
6) Performs the false absorbing operation.
7) Performs the cleaner blade-11 operation.

2.4.1.8 Disengage ON Operation

This operation sets the switch lever to the position where it transmits the PF motor drive to the pump mechanism.

1) Moves the carriage to the position D where the lever is set to the specified position.
2) Moves the carriage to the position B.
3) Release a mechanical pressure of the paper feed drive mechanism. (Generates a backlash.)
4) Moves the carriage to the false absorbing position.
5) Adjusts the gear phase with the pump drive mechanism gears.
6) Moves the carriage to home position.

2.4.1.9 Micro Absorbing Operation

A small amount of air possibly gets into the ink path as a form of tiny bubble when the ink cartridge is removed from the carriage after once it is installed. Such a small air bubble blocks the ink path to obstacle an ink injection from the nozzle. This operation eliminates small air bubble from the cavity of the printhead.

1) Performs the false absorbing operation.
2) Performs the micro absorbing operation.

2.4.2 Counter and Timer

EEPROM LE93C46 (IC1O) on the main board stores certain counter and timer values that are used for control of the ink system operation.

2.4.2.1 Refresh - I Timer

This timer is used to prevent an increase in viscosity of the ink inside the nozzle. It counts every30 seconds during the printing operation. It resets when:
■ the flashing operation completes preceding a printing.
■ the refresh - I operation completes.

2.4.2.2 Flushing Counter

The flushing counter consists of the following counters.

■ Ink level counter R — This counter indicates the amount of ink that exists in the cap, in proportion to the number of flushing operations. When the counter value exceeds or equals 5600 (R ≥ 5600), the printer performs the false absorbing operation.

■ Combined print counter N — This counter is used to: 1) keep a wet condition inside the cap, 2) perform the wiping operation regularly to remove dust or ink that is attached to the head surface. The "operations activated by this counter differ for 1) and 2) as follows:

1) The flushing operation is performed based on the counter N value at the flushing position, when the printer is in the standby state.
2) Wiping is performed when counter N value is equal to an integral multiple of 60.

2.4.2.3 CL Counter K

This counter is used to switch cleaning operation mode, to prevent an excessive ink drainage. The counter value is changed when CL1 or CL2 cleaning operation is performed.

2.4.2.4 Protect Counter

There are four protect counters to manage the amount of ink draining to the waste ink drain tank. The value of these counters is stored in EEPROM on the main board upon power off.

- **Protect counter A** — This counter is used to manage the total amount of drained ink. If the counter value is equal to or exceeds 25000 (A ≥ 25000), the printer indicates the error on the control panel and maintenance is required.
- **Protect counter B** — This counter prevents excessive ink drainage to the waste ink drain tank by limiting the total number of the initial charge operations. If the operation is selected when the counter value is equal to or exceeds 10 (B ≥ 10), the printer only performs the false charging operation.
- **Protect counter C** — This counter is used to prevent a continual initial charge operation. If the operation is selected while the counter value is 1 (C=1), the printer only performs the false charging operation.
- **Ink counter R** — This counter counts the amount of ink inside the cap.

Chapter 3 Disassembly and Assembly

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3.1 OVERVIEW

This section describes procedures for disassembling the main components of this printer. Unless otherwise specified, the disassembled unit or components can be reassembled simply by reversing the disassembly procedure. The assembly procedure is, therefore, omitted. Precautions for any disassemble or assembly Procedure are titles "Disassemblv/Assemblv points". Adjustments required after assembling the unit are titled "Required Adjustments".

3.1.1 Precautions for Disassembling the Printer

Refer to the precautions below when disassembling the printer.

WARNING

- *Disconnect the power cable before disassembling or assembling the printer.*
- *Wear protective goggles to protect your eyes from ink. If ink gets in your eyes, wash it away with fresh water and see a doctor immediately.*
  If the ink comes into contact with skin (i.e, hands), wash it off with soap and water. If irritation occurs, contact a physician.

CAUTION

- *Never remove the ink cartridge from the carriage unless specified to do so.*
- *When transporting the printer after installing the ink cartridge, be sure to pack the printer for transportation without removing the ink cartridge.*
- *Use only recommended tools for disassembling, assembling, or adjusting the printer.*
- *Apply lubricants and adhesives as specified. (See Chapter 6.)*
- *Make specified adjustments when you disassemble the printer. (See Chapter 4.)*

3.2 DISASSEMBLY AND ASSEMBLY

WARNING

Follow the instruction in Section 3.1.1 to disassemble the printer.

This section consists of the subheads shown in the diagram below. Refer to the exploded view of the printer in the Appendix, if necessary.

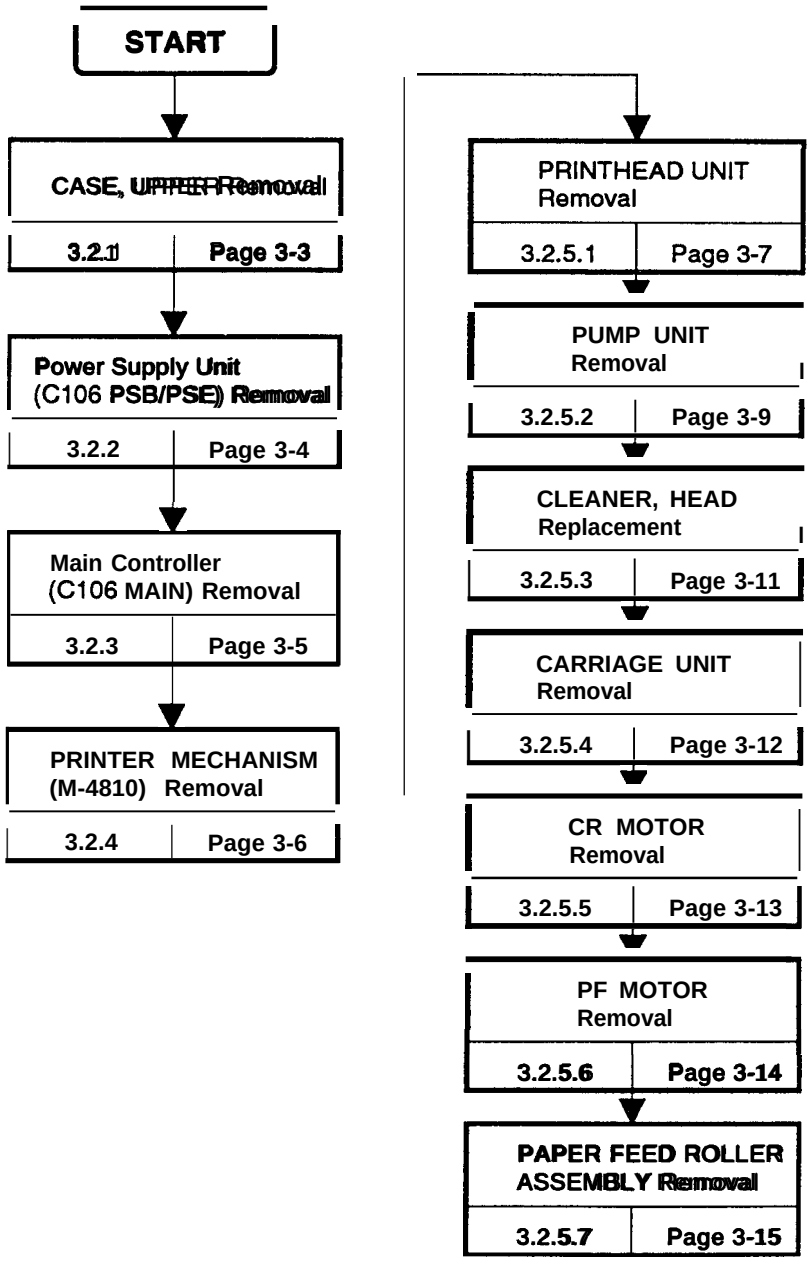

Figure 3-1. Disassembly Flowchart

3.2.1 CASE, UPPER Removal

[Step 1] Remove the COVER, PRINTER by releasing the tabs holding it to the CASE, UPPER.

[Step 2] Remove the SUPPORT, PAPER by releasing the tabs holding it to the CASE, LOWER.

[Step 3] Remove the GUIDE, PAPER, REAR.

[Step 4] Remove the CONTROL PANEL. (Release the tab by inserting a screwdriver into the hole in the CASE, UPPER, as shown in figure below.)

[Step 5] Remove 2 screws (CBB screw (M3 x 12) x 2).

[Step 6] Release 3 tabs by inserting a flathead screwdriver into the holes at the bottom of the CASE, LOWER, as shown in figure below.

DISASSEMBLY/ASSEMBLY POINT

*Holds the upper case **firmly** and pulling it as to remove, while you releasing the tabs.*

[Step 7] Remove the CASE, UPPER by lifting the front side.

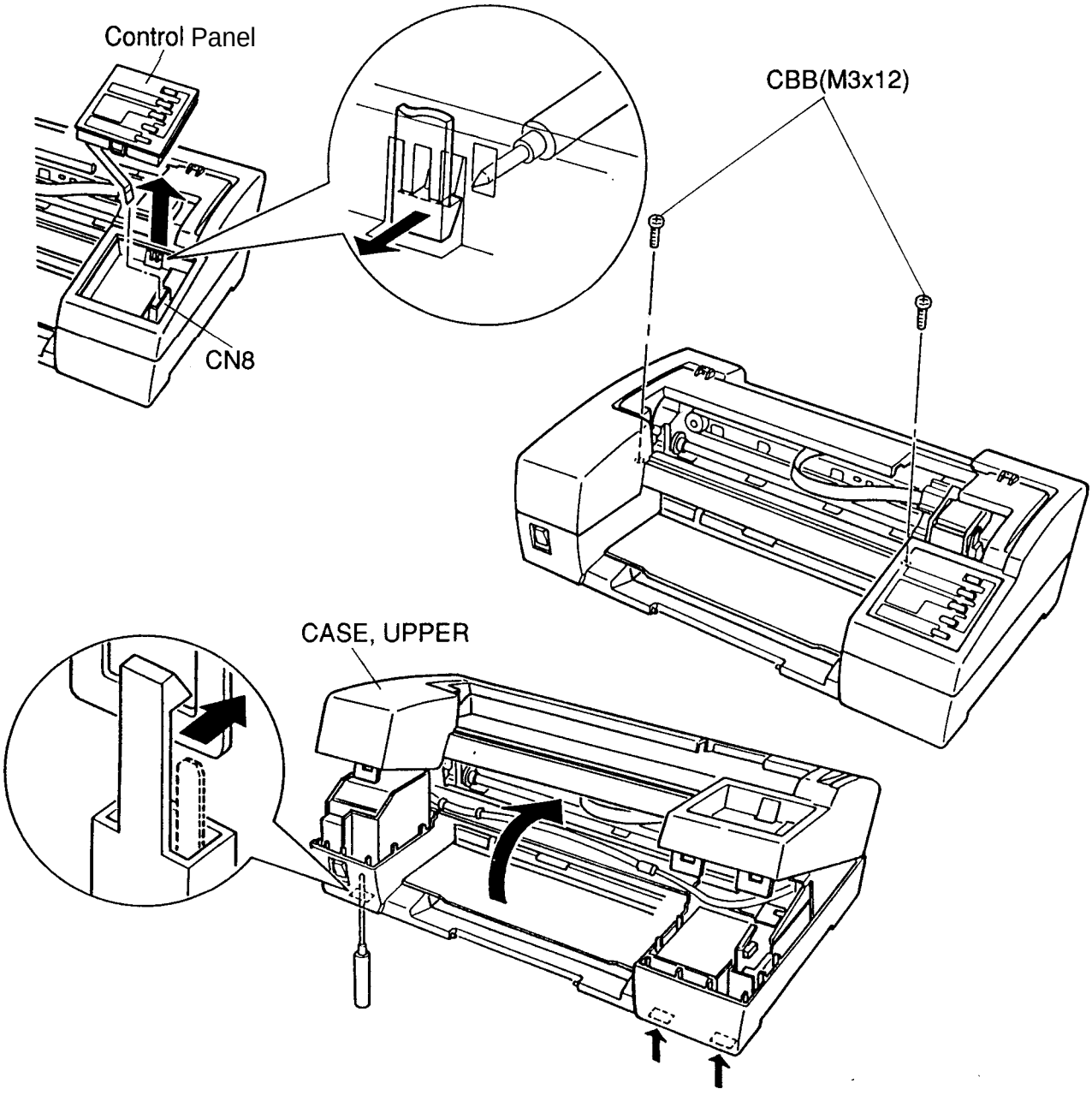

Figure 3-2. CASE, UPPER Removal

3.2.2 Power Supply Unit (C106 PSB/PSE BOARD) Removal

[Step 1] Remove the CASE, UPPER. (Refer to Section 3.2.1.)

[Step 2] Disconnect the cables from connectors CN1 and CN2 of the C106 PSB/PSE BOARD.

[Step 3] Remove 4 screws (CBB screw (M3 x 6) x 2, CBS screw (M3 x 6), CB(O) screw (M4 x 8)) fixing the power supply unit to the lowercase, as shown in figure below.

[Step 4] Push in the locking tab and take out the power supply unit by sliding it toward the back of the printer.

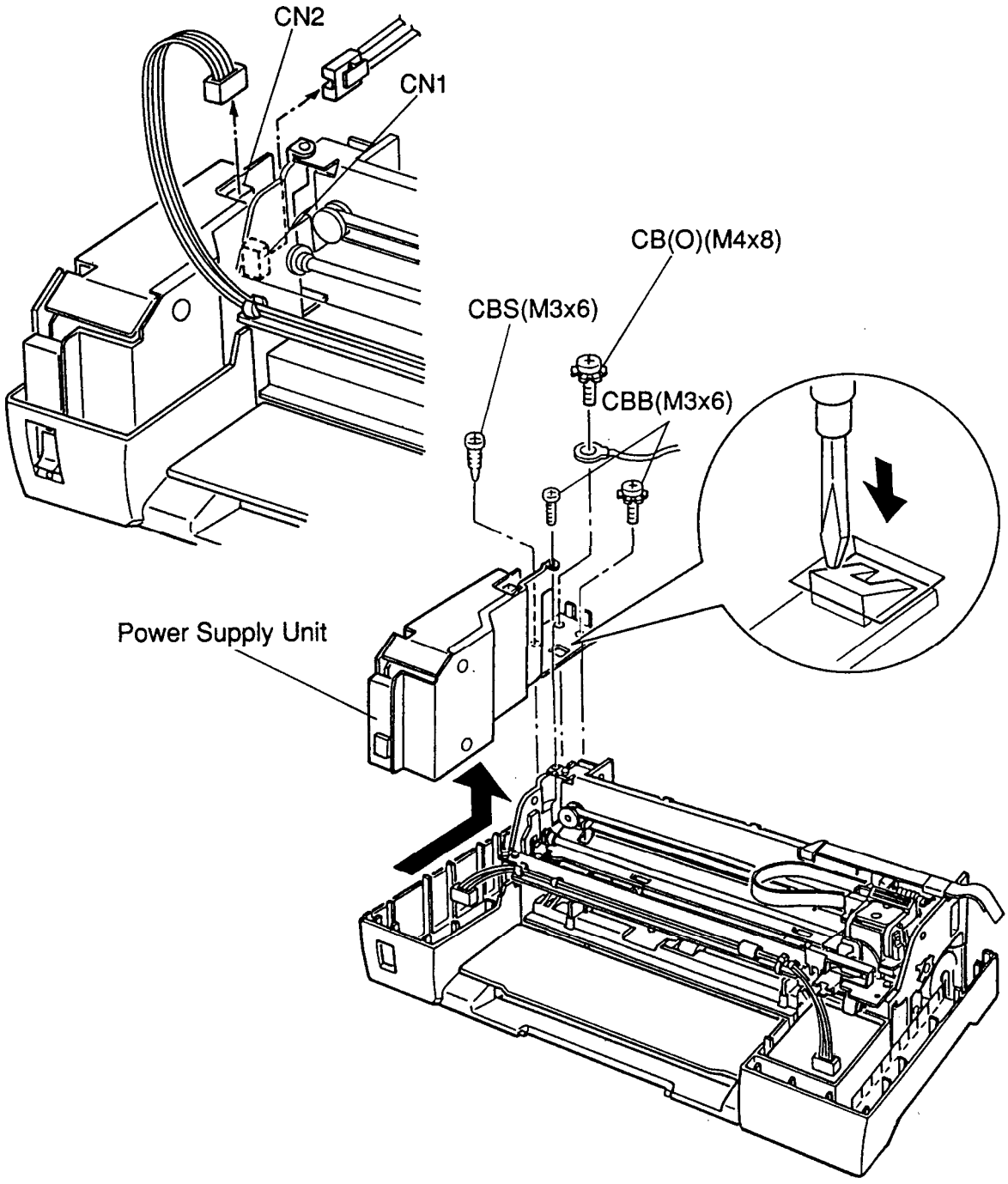

Figure 3-3. POWER SUPPLY UNIT Removal

3.2.3 Main Controller (CI06 MAIN BOARD) Removal

[Step 1] Remove the CASE, UPPER. (Refer to Section 3.2.1.)
[Step 2] Disconnect the cables from the connectors CN2/CN3/CN4/CN5 /CN6/CN7 of the C106 MAIN BOARD.
[Step 3]. Remove 4 screws (CBB screw (M3x1O)X2,CBS screw (M3x6)x2) and take out the main controller.

DISASSEMBLY/ASSEMBLY POINT

- *When you replace the main board, initialize the EEPROM contents as follows:*
  1) Reassemble the printer.
  2) Turn the printer ON while hold down ***[ALT], [ECONOMY/CONDENSED], [LOAD/EJECT]*** *and [PAUSEI buttons on the control panel.*
- *When you replace the main* ***board*** *to new one, you must take out the block resistor attached at the location RM22 of old main board, and this* ***block resistor*** *should be* ***attached*** *to the new board* ***in order*** *to maintain proper printhead drive voltage control.*
- *When you replace the main board to* ***new*** *one,* ***the*** *waste ink absorbing materials must be replaced at the same time.*

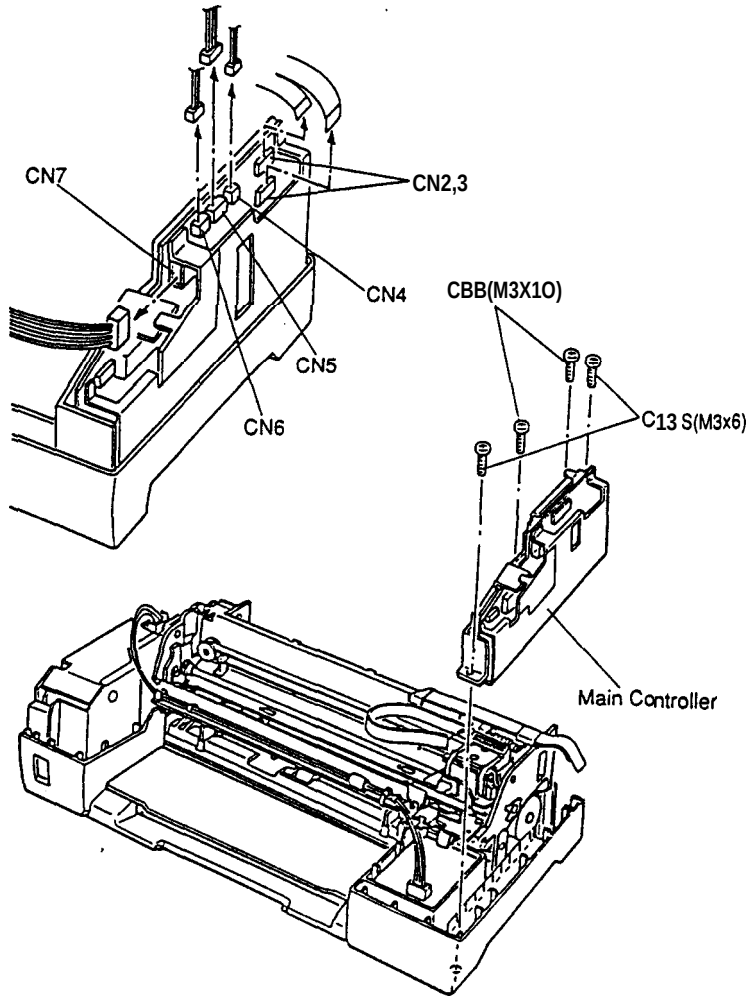

Figure 3-4. MAIN CONTROLLER Removal

REQUIRED ADJUSTMENT

Bi-Directional *Printing Alignment Adjustment (Chapter* ***4,*** *Section* ***4.2)***
Default Setting Parameter ***Registration*** *(Chapter* 4, *Section* 4.3)

3.2.4 PRINTER MECHANISM (M-4810) Removal

[Step 1] Remove the CASE, UPPER. (Refer to Section 3.2.1.)
[Step 2] Remove the power supply unit. (Refer to Section 3.2.2.)
[Step 3] Remove the main controller. (Refer to Section 3.23.)
[Step 4] . Move the carriage to the center of the ptiner.
[Step 5] Remove 4 screws (CB screw (M4×16)×4) and take out the printer mechanism.

DISASSEMBLY/ASSEMBLY POINT

- *Wipe off any. ink attached around the end of the ink drain tube, when you removed the machanism.*
- *When reinstall the printer* mechanism, check that the *waste* ink *drain tube is properly inserted* into *a space between the lower case and the waste ink absorbing material.*

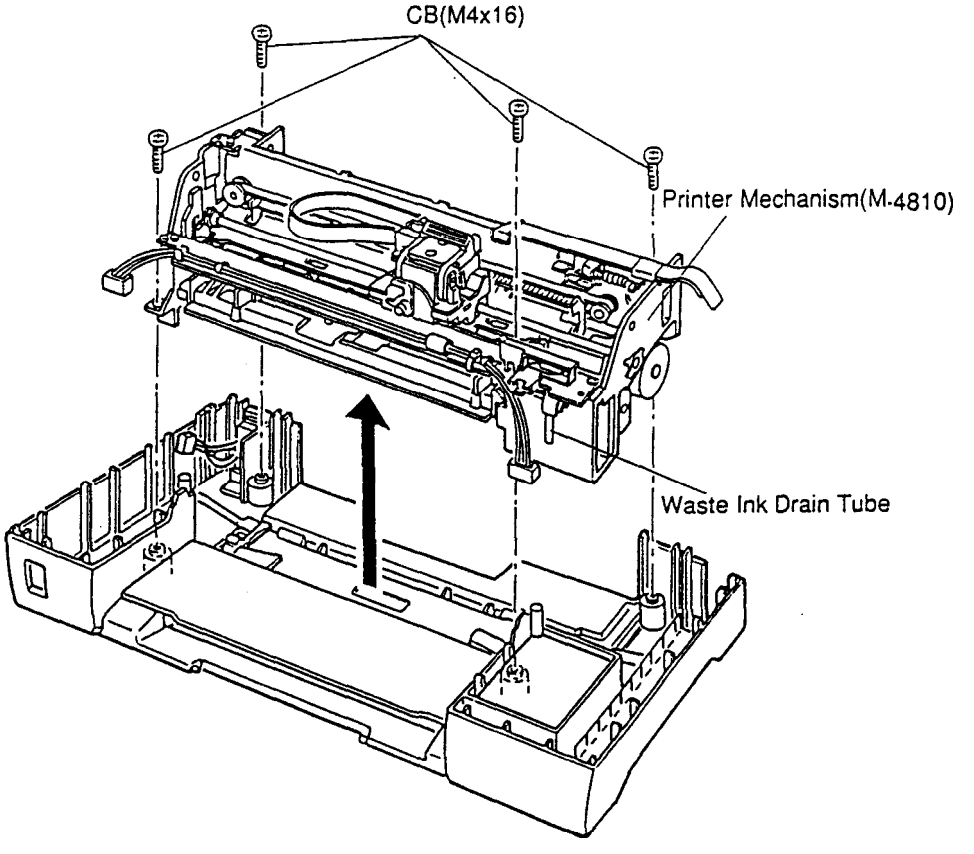

Figure 3-5. PRINTER MECHANISM (M-4810) Removal

CAUTION

When the printhead or the printer mechanism is replaced, the block resistor must be replaced at location RM22 on the main controller board. (Every spare printhead or spare printer mechanism is come with a block resistor that specifically selected to each printhead, to ensure optimal control of the driver circuit.)

REQUIRED ADJUSTMENT

Bi-Directional Printing Alignment Adjustment (Chapter 4, Section 4.2)

3.2.5 PRINTER MECHANISM Disassembly

The procedures described in this section explain removal of components within the printer mechanism.

3.2.5.1 PRINTHEAD UNIT Removal

[Step 1] Remove the printer mechanism. (Refer to section 3.2.4.)

[Step 2] Move the carriage to the middle of the printer. The carriage is located between first and second paper guide roller, as illustrated in figure below. Pull the ink cartridge clamp towards you and remove the ink cartridge.

[Step 3] Release the tabs holding the carriage cover (4 tabs), and take the cover off.

[Step 4] Remove the tension bar that holds the printhead unit in place.

[Step 5] Discomect the cables from the printhead unit (the FPC cables from connectors CN2 and CN3, and the cable from connector CN1), and remove it.

CAUTION

- Take *a proper measurement* to protect a *printhead unit from static-electricity,* since the *driver IC is directly attached on the printhead unit.*
- *Never touch the nozzle surface and a metallic cover of the printhead. Handle it by only holding the edges of the printhead.*
- *When* the *printhead or the printer mechanism is replaced,* the *block resistor must* be *replaced at location RM22 on the C106 MAIN BOARD. (Every spare printhead or spare printer mechanism is come with a block resistor that specifically selected to each printhead, to ensure optimal control of the driver circuit.*

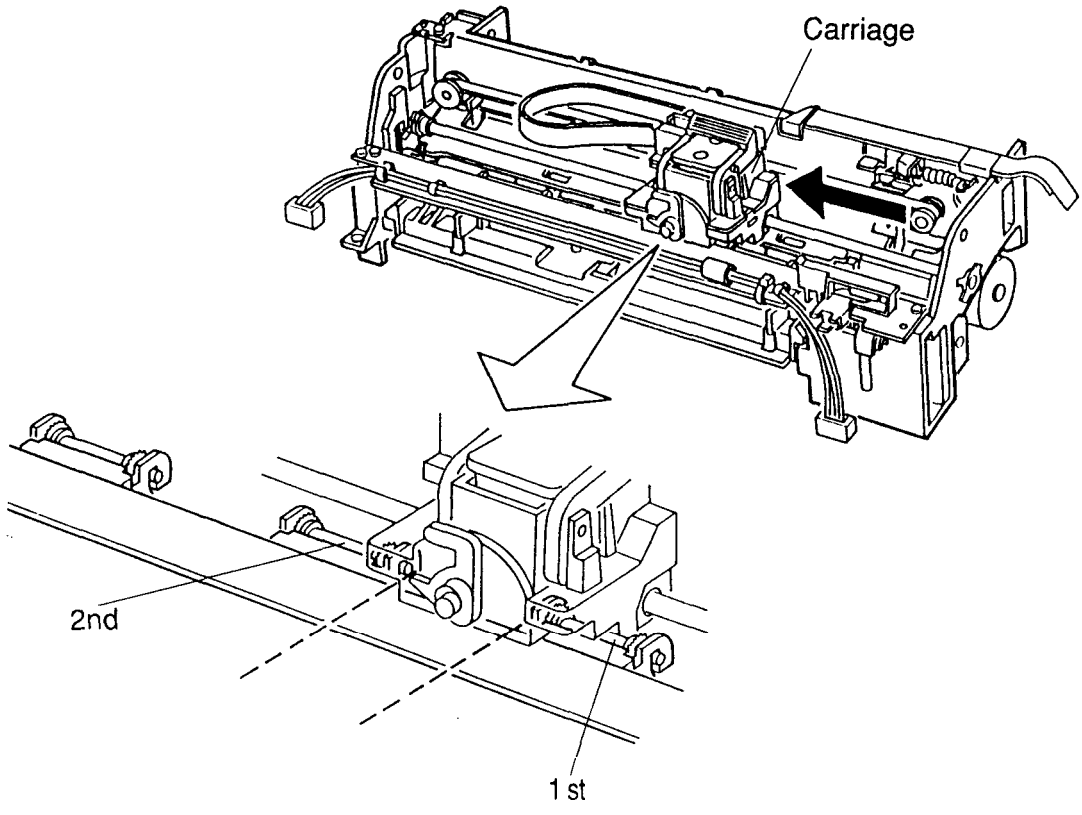

Figure 3-6. PRINTHEAD UNIT Removal "

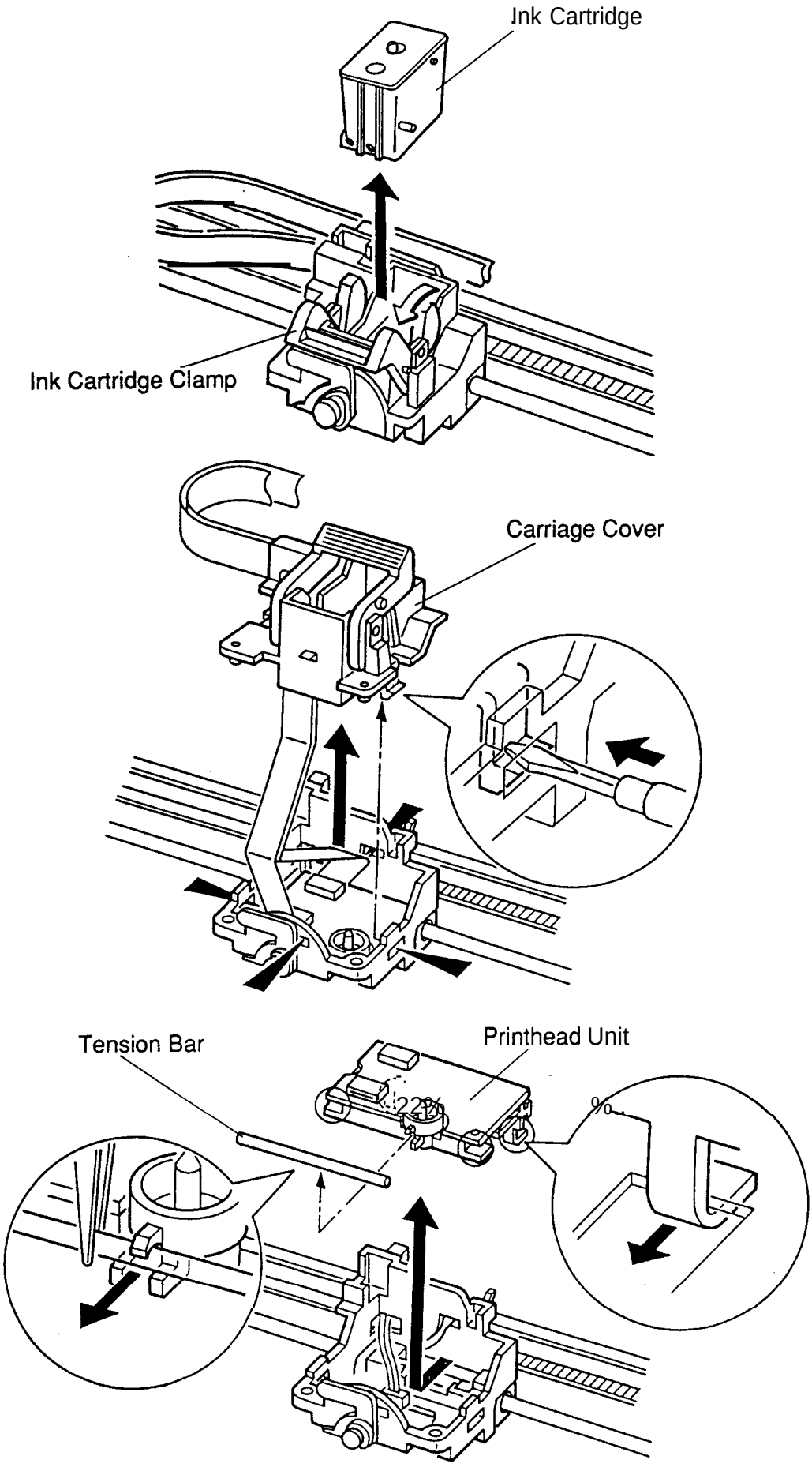

Figure 3-7. PRINTHEAD UNIT Removal (Continued)

3.2.5.2 PUMP UNIT Removal

[Step 1] Remove the PRINTER MECHANISM. (Refer to section 3.2.4.)

[Step 2] Move the carriage to the middle of the printer. The carriage is located between first and second paper guide roller, as illustrated in figure below.

[Step 3] Remove 2 screws (CBB screw (M3 x 10) x 2) fixing the front paper guide assembly to the mechanism.

[Step 4] Lift the front side of the carriage and hold it. Then, lift the left end of the front paper guide assembly slightly, and then lift the right end. Take out the front paper guide assembly by pulling it toward you.

[Step 5] Insert a piece of paper between the printhead and the printer mechanism to protect the surface of the printhead from being damaged.

[Step 6] Push the pump unit inward by releasing the tab securing the pump unit to the holder plate while releasing the tab at the bottom of the pump unit. Then, take the pump unit out of the printer mechanism.

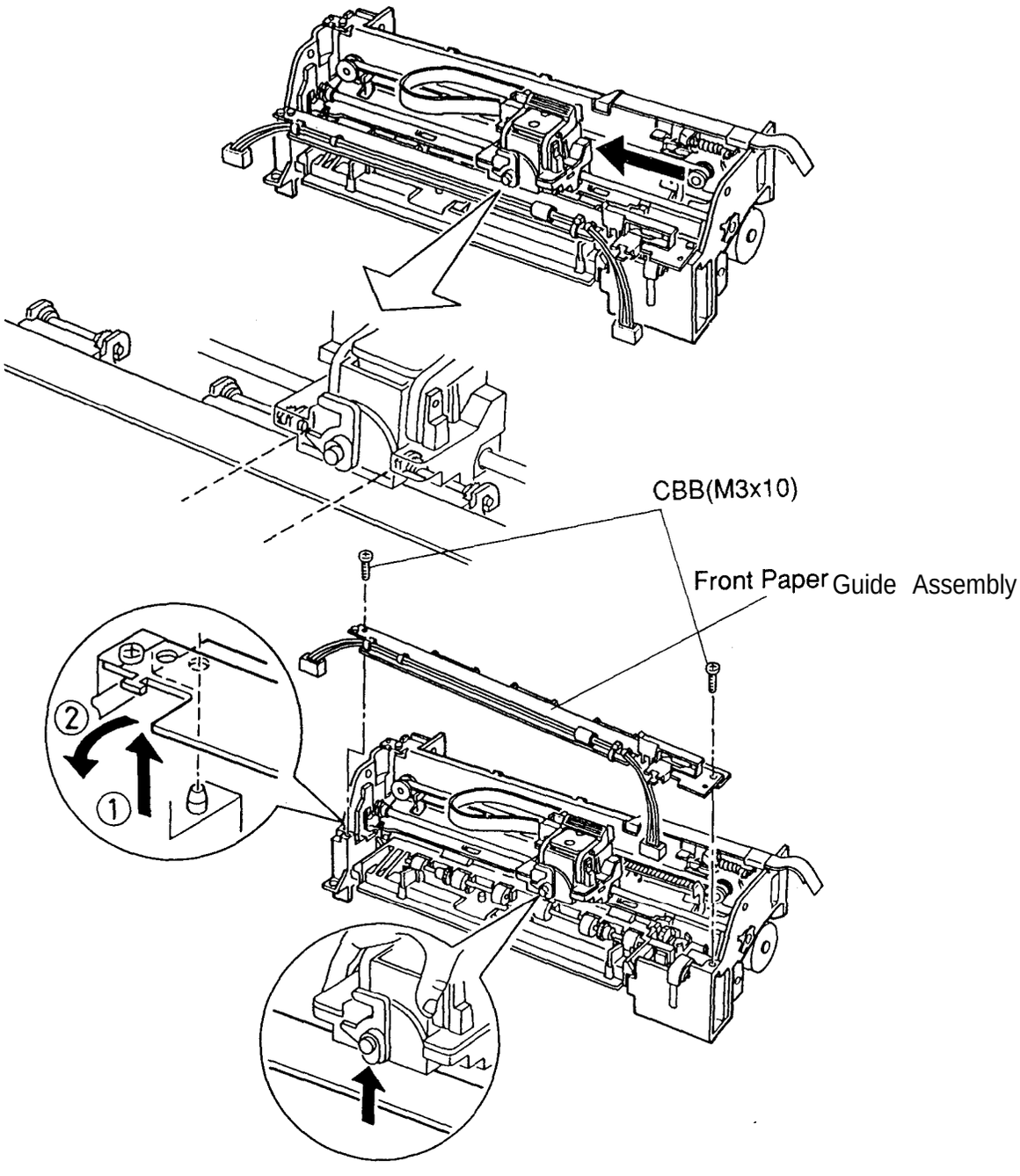

Figure 3-8. PUMP UNIT Removal

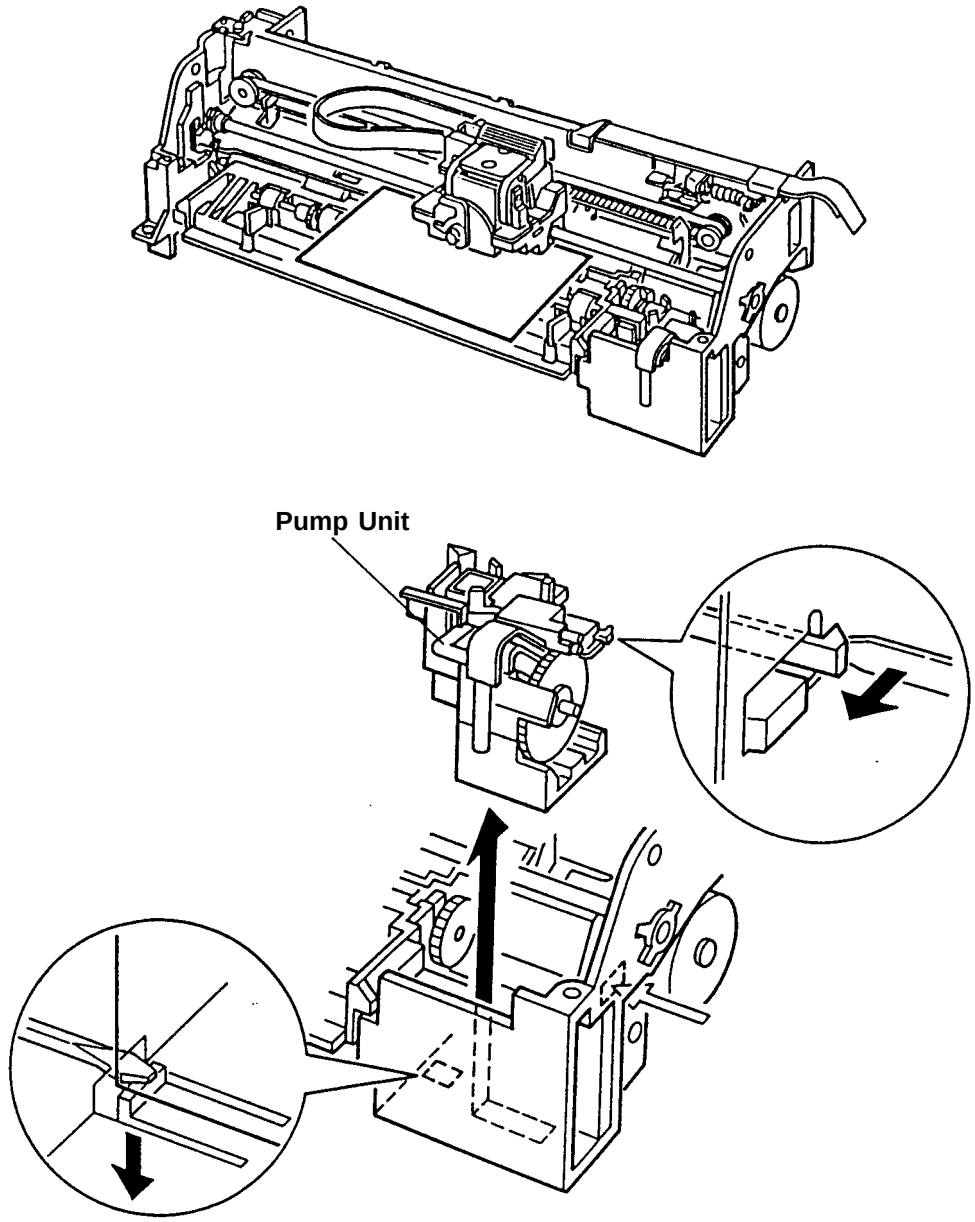

Figure 3-9. PUMP Unit Removal (Continued)

3.2.5.3 CLEANER, HEAD Replacement

[Step 1] Remove the PUMP UNIT. (Refer tosection3.2.5.2.)

[Step 2] Remove the CLEANER, HEAD from the pump unit.

CAUTION

Keeping the ***CLEANER,*** *HEAD clean is extremely important to keep the ink injection system working properly in the printhead, and it directly* ***affects*** *printing quality. Therefore, handle the CLEANER, HEAD* ***very carefully,*** *and observe the following instructions.*

- *Never touch the CLEANER, HEAD with your bare hands.*
- *When attaching the* ***CLEANER,*** *HEAD to the pump unit,* ***wear gloves*** *and use clean tweezers to handle it.*

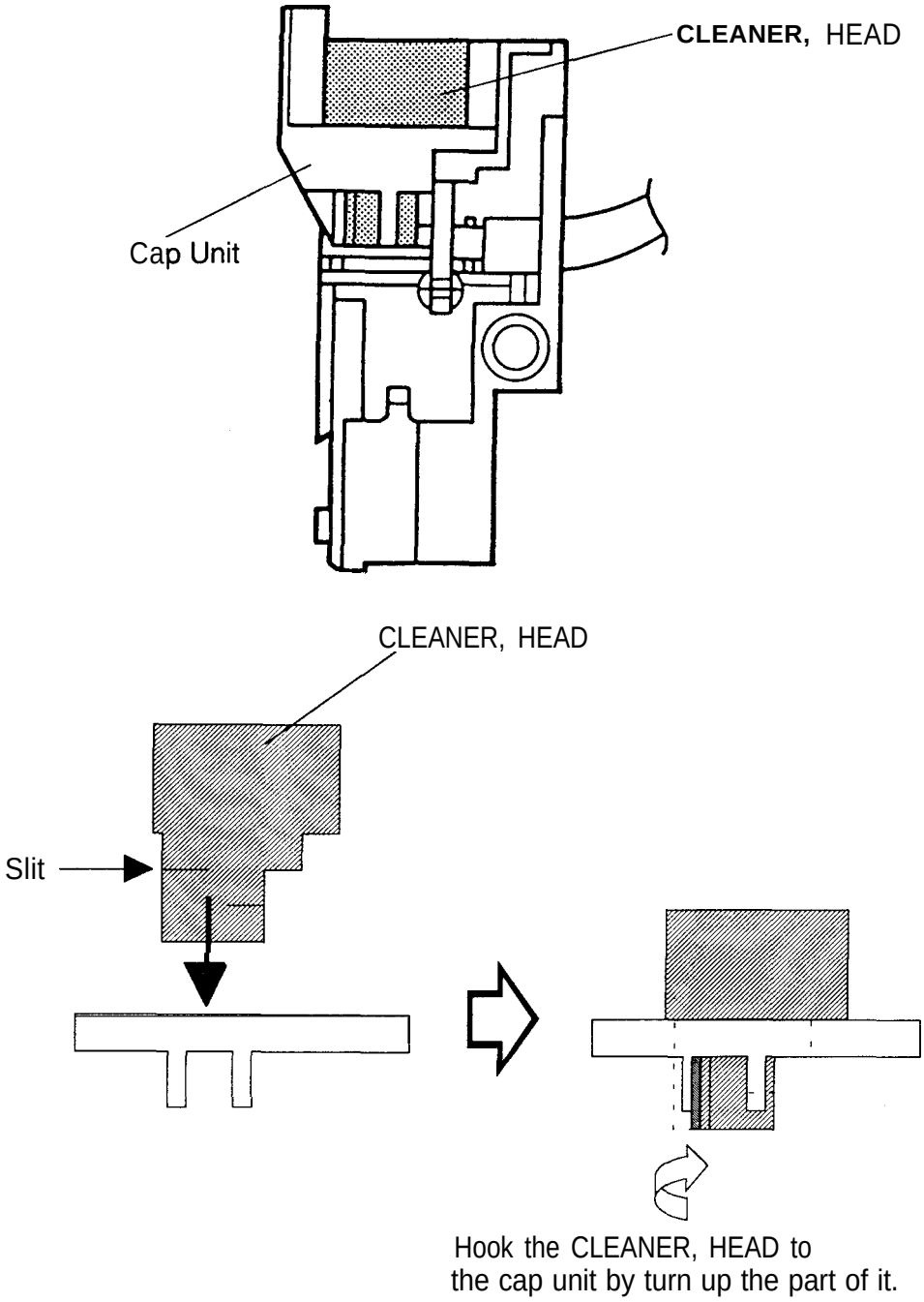

Figure 3-10. CLEANER, HEAD Replacement

3.2.5.4 CARRIAGE UNIT Removal

[Step 1] Remove the printer mechanism. (Refer to section 3.2.4.)

[Step 2] Remove the tension spring that holds the CR motor in place. Then, take the timing belt out of the CR motor drive pulley and the driven pulley.

[Step 3] Remove the ground spring plate on the left side.

[Step 4] Rotate the HOLDER, SHAFT that holds both ends of the carriage guide shaft, and push the ends inward to disengage them from the left and the right frame of the printer mechanism.

[Step 5] Remove the FPC cables that go through the base frame assembly.

[Step 6] Remove the carriage unit along with the carriage guide shaft.

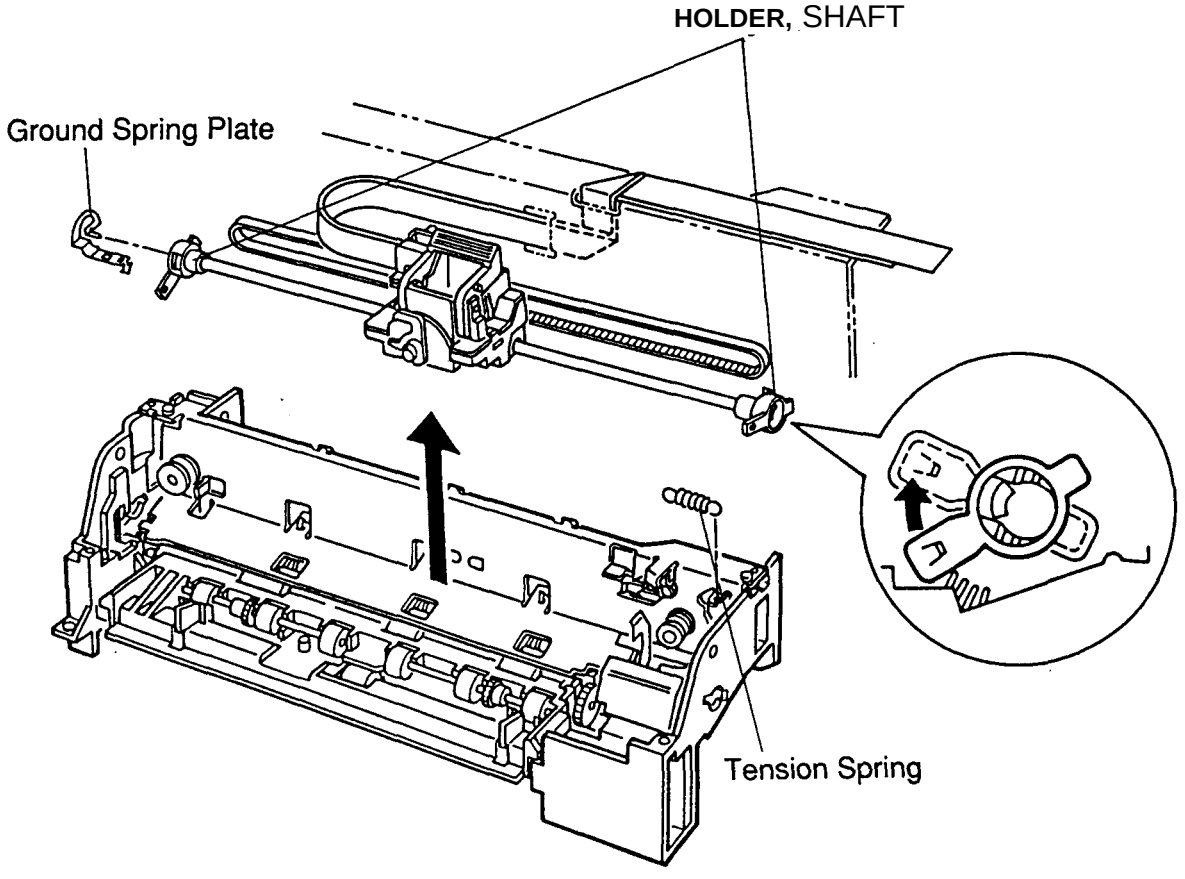

Figure 3-11. CARRIAGE UNIT Removal

REQUIRED ADJUSTMENT

Paper Gap Adjustment (Chapter 4, Section 4.4)

3.2.5.5 CR MOTOR Removal

[Step 1] Remove the printer mechanism. (Refer to section 3.2.4.)

[Step 2] Remove the tension spring and take the timing belt out of the CR motor drive pulley.

[Step3] Remove 3 screws (CP(P2) screw (M3 x 10) x 3) that fixing the CR motor to the CR motor holder plate, and remove the CR motor.

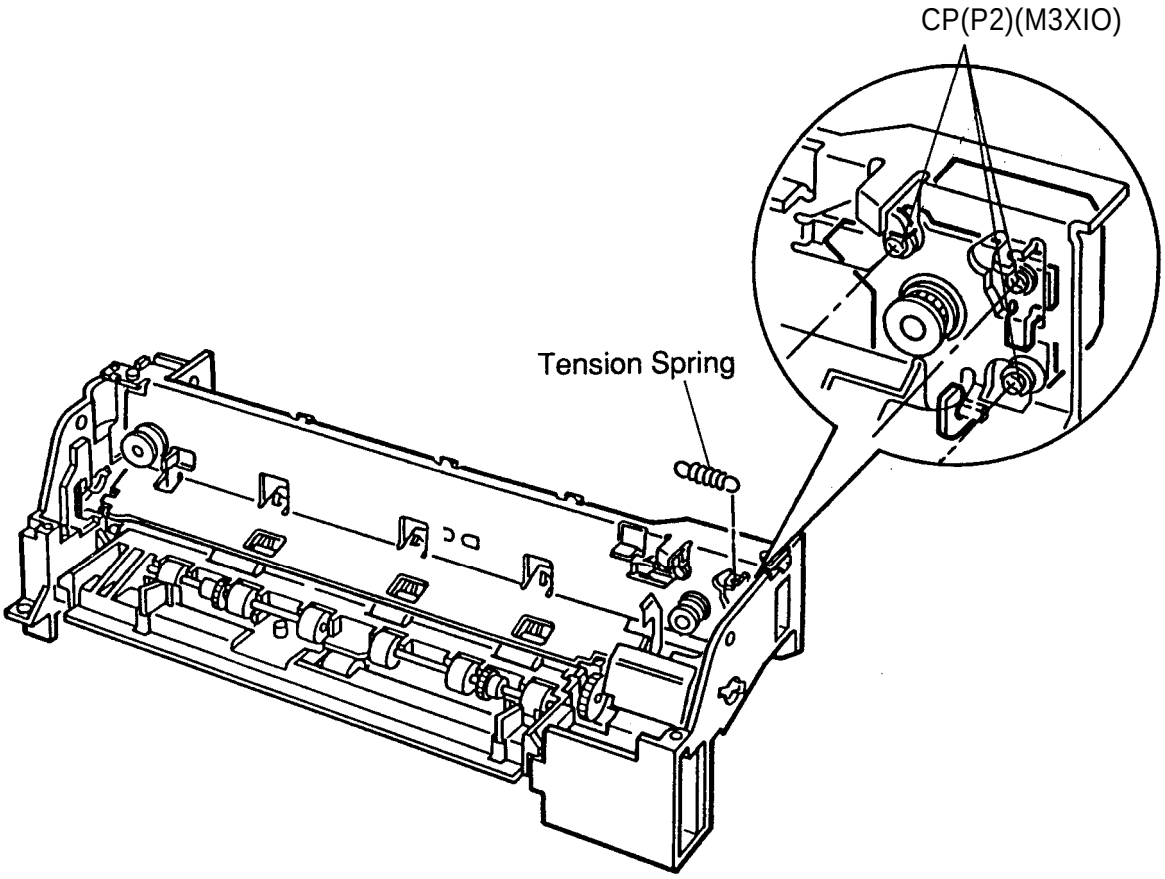

Figure 3-12. CR MOTOR Removal

3.2.5.6 PF MOTOR Removal

[Step 1] Remove the printer mechanism. (Refer tosection3.2.4.)

[Step 2] Remove 3 screws (CBB screw (M3 × 10) x3), and remove theholdingplate.

DISASSEMBLY/ASSEMBLY POINT

Since the holding plate retains the pressure springs under it, be sure not to loose them when removing the holding plate.

[Step 3] Remove a screw (CBB screw (M3 × IO)), and remove the PFMOTOR.

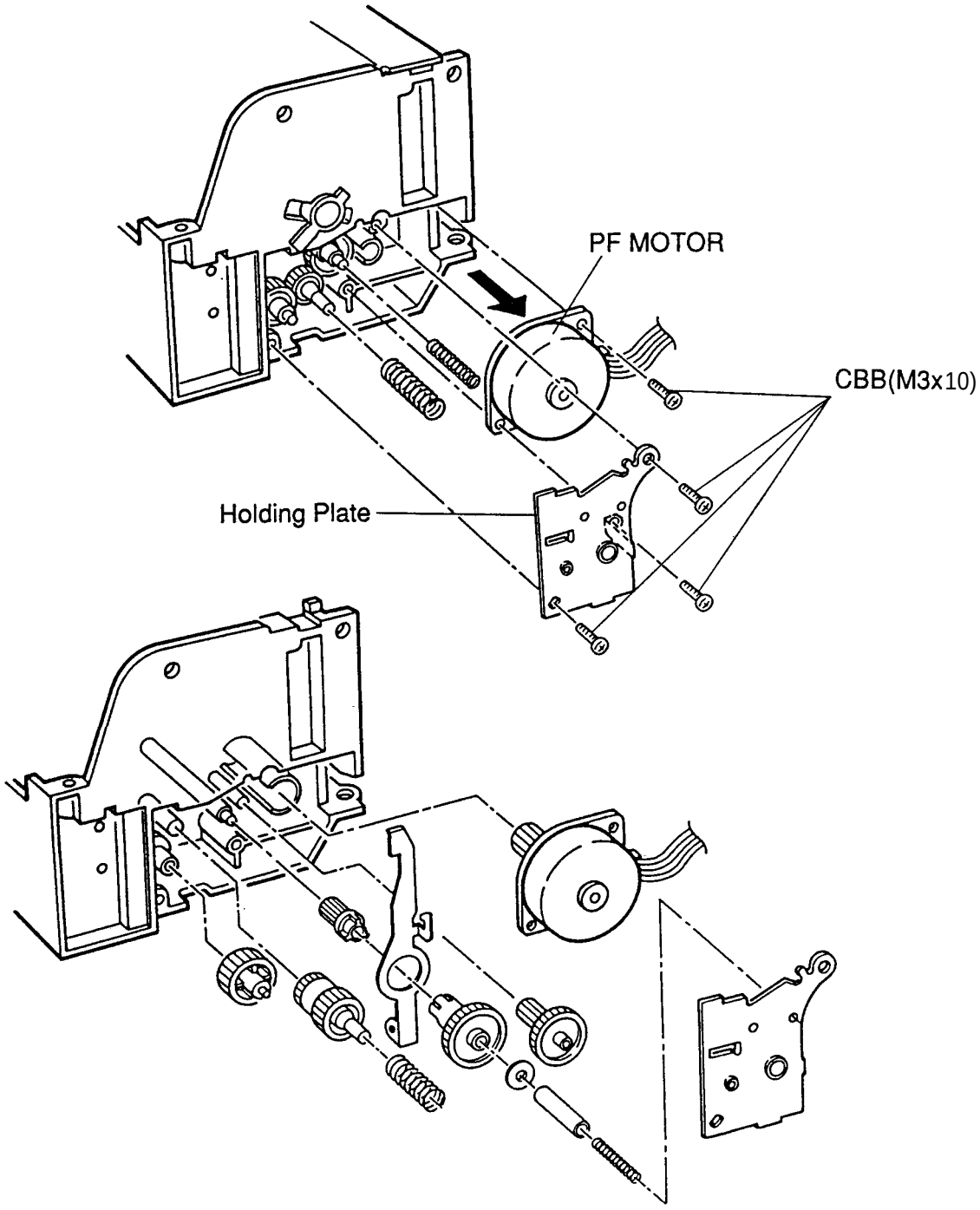

Figure 3-13. PF MOTOR Removal

3.2.5.7 PAPER FEED ROLLER ASSEMBLY Removal

[Step 1] Remove the printer mechanism. (Refer to section 3.2.4.)

[Step *2]* Remove the carriage unit. (Refer to section 3.2.5.4.)

[Step *3]* Remove 2 screws (CBB screw (M3 X 10) x 2), and remove the frame assembly.

[Step 4] Remove the PAPER FEED ROLLER ASSEMBLY.

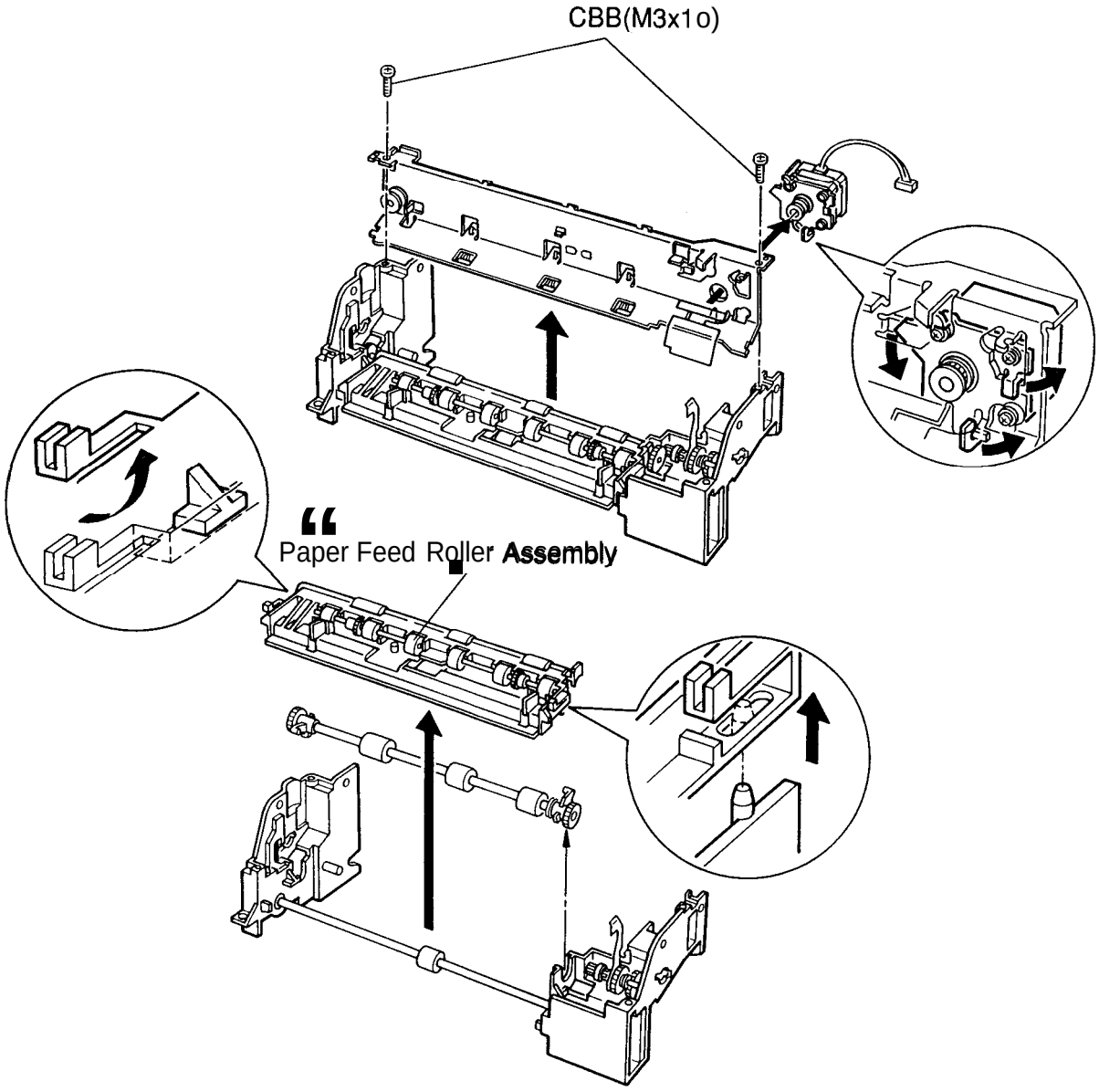

Figure 3-14. PAPER FEED ROLLER ASSEMBLY Removal

REQUIRED ADJUSTMENT

Paper Gap Adjustment (Chapter 4, Section 4.4)

Chapter 4 Adjustments

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4.1 OVERVIEW

This section describes procedures of the adjustment required when the printer is disassembled and assembled after repair.

4.1.1 Precautions for Adjustment

You should refer to the precautions below when adjusting the printer.

WARNING

Disconnect the power cable before when you attempt the adjustment. (Unless otherwise specified.)

4.2 BI-DIRECTIONAL PRINTING ALIGNMENT ADJUSTMENT

The bidirectional printing alignment adjustment is required when the printer mechanism or the main board is replaced. By performing this adjustment, a compensation value is determined for the mechanical control as to compensate the deviation of print position, which may be caused by the different print speeds due to the tolerance of the mechanical components, and the deviation of print timing between odd-numbered lines and even-numbered lines in bidirectional printing. The printer stores the compensation data in the EEPROM on the main board (C106 MAIN), and referring to this data when the bi-directional printing is performed.

[Step 1] Set a stack of paper into the auto sheet feeder of the printer.

[Step 2] Connect the PC to the printer and turn the both units on.

[Step 3] Execute BASIC on the PC and start the adjustment program "DNxxx.BAS".

[Step 4] When the main menu of the program is appeared on the monitor, select "Bi-D Printing Alignment" by entering "1".

[Step 5] Follow the instruction displayed on the monitor, and press ENTER key to start the adjustment.

[Step 6] The printer prints the check pattern with a sample compensation value.

[Step 7] Check the printed sample pattern, and if the character "H" is not vertically aligned in both odd-numbered lines and even-numbered line, enter the compensation value in the range from -30 to +30, from the keyboard.

- Positive compensation value: Shift 2nd line to LEFT
- Negative compensation value: Shift 2nd line to RIGHT

[Step 9] The printer print the sample pattern with the selected compensation value for confirmation. If the alignment is good, press "Y' to finish the adjustment.

[Step 10] Terminate theprogramby selecting "3" at the main menu, and turn theprinteroff.

Because the compensation value specified within this program is not valid until the printer is turned off, turn the printer off immediately after you have finish the adjustment.

4.3 DEFAULT SETTING PARAMETER REGISTRATION

The set up value that specifies the destination of the product distribution, is stored in the EEPROM on the main board (C106 MAIN). Therefore, this set up value must be written in EEPROM when the main board or the EEPROM chip is replaced.

[Step 1] Connect the PC to the target printer and turn the printer on.

[Step 2] Execute BASIC on the PC and run the program "DNxxx.BAS".

[Step 3] When the main menu appeared, choose "Default Setting Parameter Registration" by entering "2" from the keyboard.

[Step 4] When the next menu appeared, press 'Y" and enter key and the program transfer the default setting parameters to the printer.

[Step 5] Press 'Y" and enter key to return to main menu. Transferred setting parameters are stored in EEPROM when the printer is turned off.

4.4 PAPER GAP ADJUSTMENT

When the printer mechanism is disassembled to remove and/or replace the carnage unit, the distance between the printhead and a paper surface (Paper gap) should be adjusted to 1.0 mm, to ensure the print quality.

[Step 1] Attach the paper gap (PG) gauge at the left side adjust position shown in figure below, as the top edge of gauge contacts a support plate of FRAME ASSEMBLY, BASE.

[Step 2] Move the carriage to the position where the PG gauge is attached, while lifting up the front edge of the carriage as to widen the gap between the printhead and the mechanism.

[Step 3] Carefully put the carriage on the PG gauge and verify that there is a gap between the front edge of the carriage unit and the front frame.

Table 4-1. Gap and Adjustment Direction

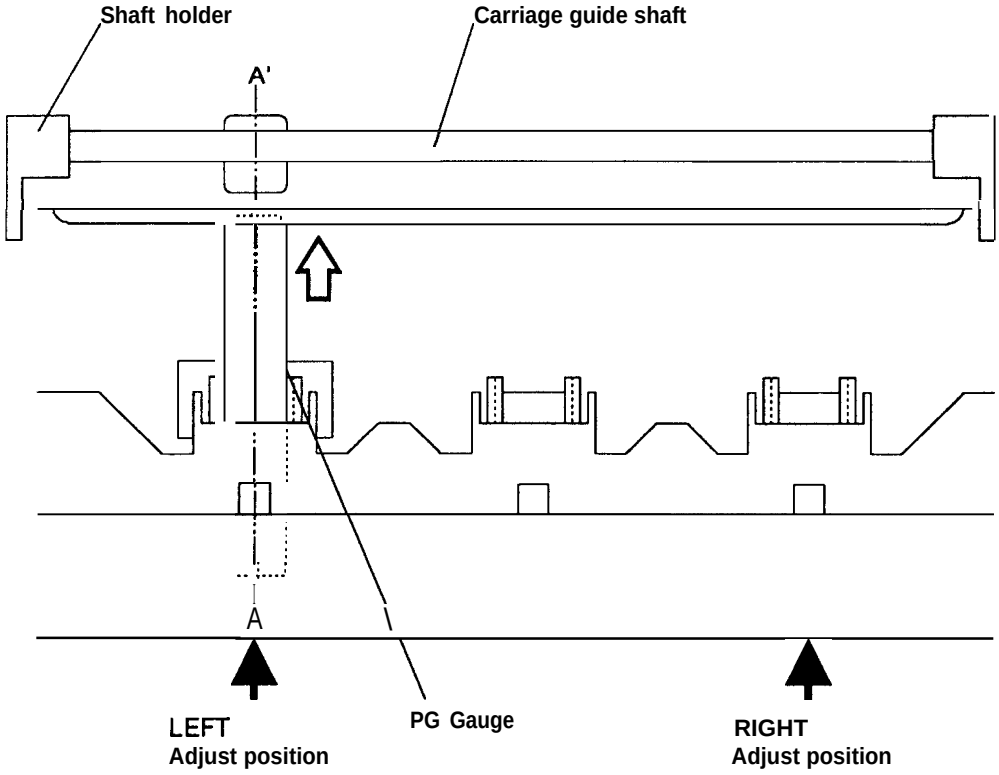
Gap between Carriage and Front Frame	LEFT Bush	RIGHT Bush
Yes	CW	CCW
No (Gap exist between printhead and PG gauge)	CCW	CW

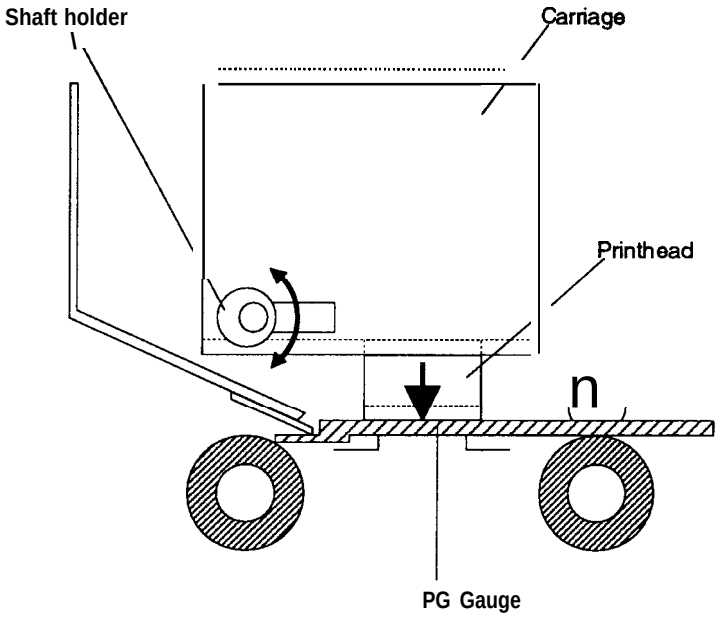
[Step 4] Rotates BUSH, PARALLEL, ADJUST that attached at the left end of the carnage guide shaft as the printhead contact the PG gauge. When you narrow the gap and the printhead contacts the PG gauge, the front edge of the carriage unit pop up and if so, moves the bush 1 step in reverse direction.

[Step 5] Remove the PG gauge and attach it at the right side adjust position.

[Step 6] Repeat the step from [Step 2] to [Step 4], and adjust the gap with BUSH, PARALLEL, ADJUST at the right end of the carriage guide shaft.

[Step 7] Verify the gap at the left adjust position, as if the front edge of the carriage unit pop up when you move the left end bush 1 step in counter-clockwise (CCW).





Cut section (A-A')

Figure 4-1. PG Adjustment

Chapter 5 Troubleshooting

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5.1 OVERVIEW

The printer may exhibit different symptoms for the same problem, which makes troubleshooting more difficult. This **section,** however, provides simple and effective ways to facilitate troubleshooting. The following flowchart illustrates the main steps of the troubleshooting process.

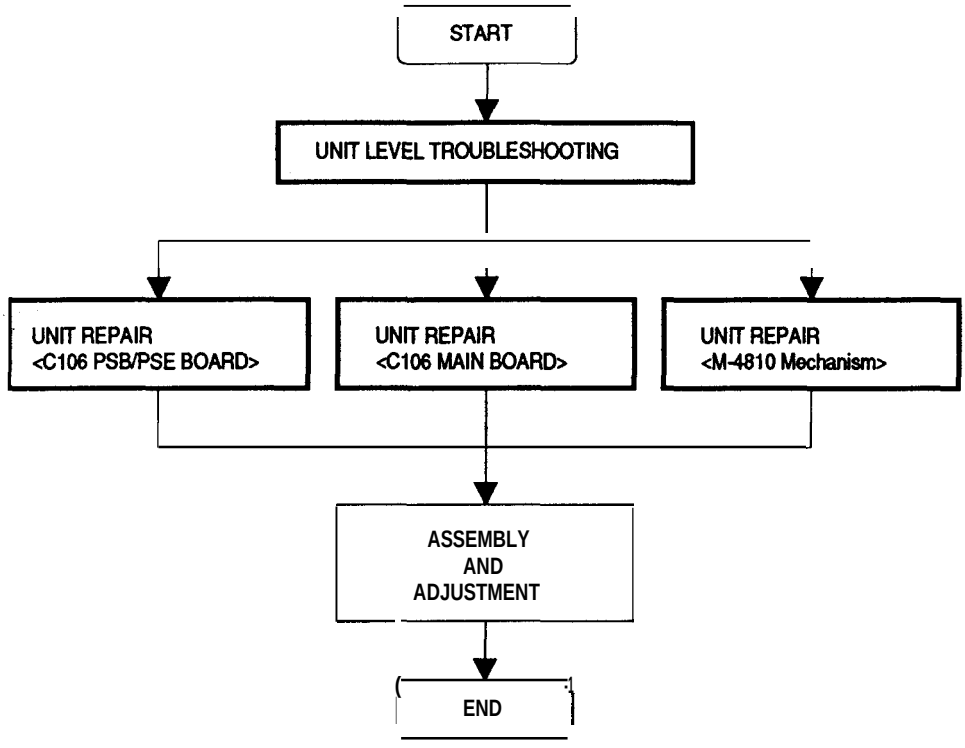


Figure 5-1. Troubleshooting Process Flowchart

Table 5-1. Motor Resistance

Motor	Resistance	Remark
CR Motor	10.0 Ω± 7% / Phase	At25'C
PF Motor	54.0 Ω± 3 Ω/ Phase	At 25 "C

Table 5-2. Sensor Status

Sensor	Point	Signal Level	status
PE Sensor	CN4 / Pin 1	H (5V)	Paper exist
		L (GND)	No paper (Paper end)
HP Sensor	CN3 / Pin 10	H	At home position (HP)
		L	Out of HP

Table 5-3. Error Codes

Error	PAPER LED	INK END LED	PAUSE LED	Buzzer	Recovery
Paper out	ON	OFF	OFF	♥♣ × 3 times	Load the paper and press the buttons as follows: 1. PAUSE 2. LOAD/EJECT
Paper jam	BLINKS	OFF	OFF	V* x 3 times	Same as above.
Ink low *1	OFF	BLINKS	-	No beeps	Press PAUSE button and replace the ink cartridge with a new one. Then, press PAUSE button again to resume printing. ● 2
Ink end	OFF	ON	OFF	♥♣ × 3 times	Replace the ink cartridge and press PAUSE button.
No ink cartridge	OFF	ON	OFF	♥♣ × 3 times	Install the ink cartridge and press PAUSE button.
Carriage Error	OFF	OFF	OFF	♠♦ × 5 times	Turn off the printer, and turn it on again.
Waste ink tank over-flow	OFF	ON	BLINKS	♥♣ x 3 times	Service maintenance required. (Replace the waste ink absorbing material and reset the protect counters.)

Notes: V : 0.1 second beep 4 : 0.5 second beep
4 : 0.1 second interval ♦ : 0.2 second interval

**1: This is not treated as an error.*
**2: It is not necessary to replace the ink cartridge until the printer detects the 'Ink End' error.*

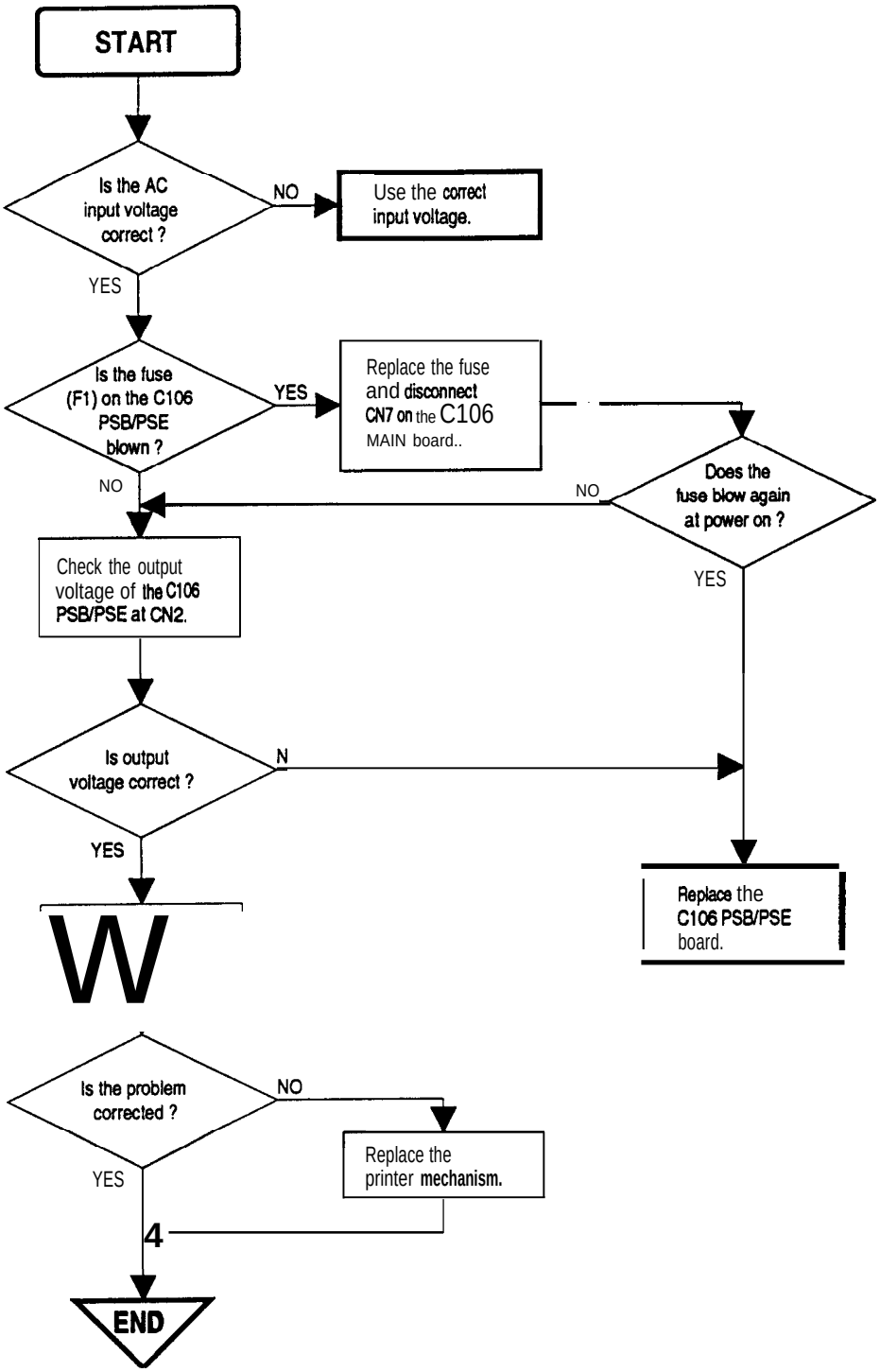
5.2 UNIT LEVEL TROUBLESHOOTING

When a problem occurs, you can distinguish the defective unit by referring the symptoms of the defect. The table below lists the symptom of certain defects, and you can easily identify what the problem. Once the problem is identified, refer to the flowchart corresponding to each problem.

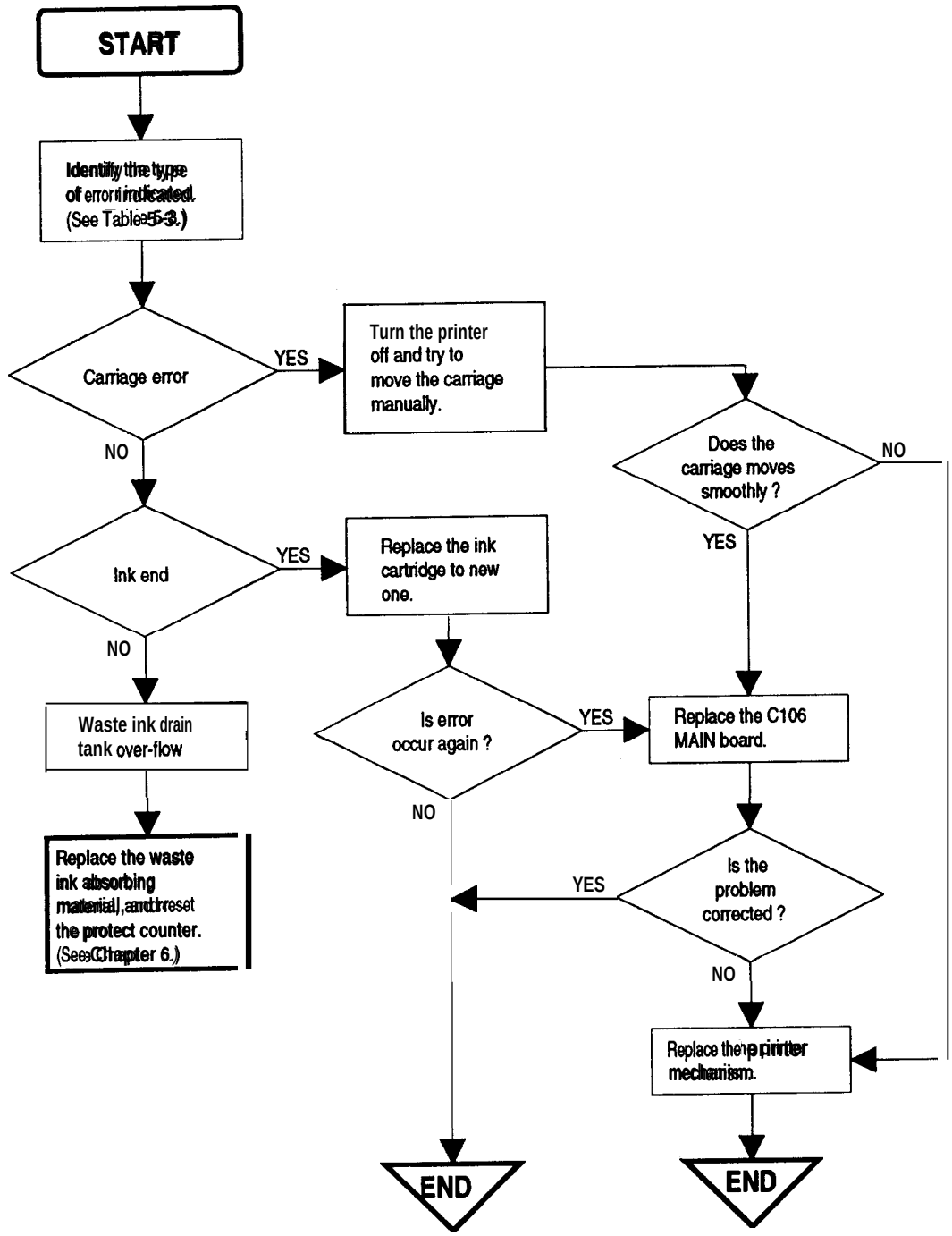
Table 5-4. Symptom and Problem

Symptom	Problem	Flowchart No.
Printer does not operate at power on	■ LED do not light up. ■ Printer mechanism do not operate.	5.2.1
Error is detected	■ Error is indicated by LED or buzzer	5.2.2
Failure occurs during printing	■ Printing is not performed. ■ Abnormal printing (missing dots, etc.) ■ Print quality is poor	5.2.3
Printer does not feed the paper correctly	■ No paper is fed. ■ Paper feed is irregular. ■ Paper jam occurs.	5.2.4
Control panel operation is abnormal	■ No response to button access.	5.2.5

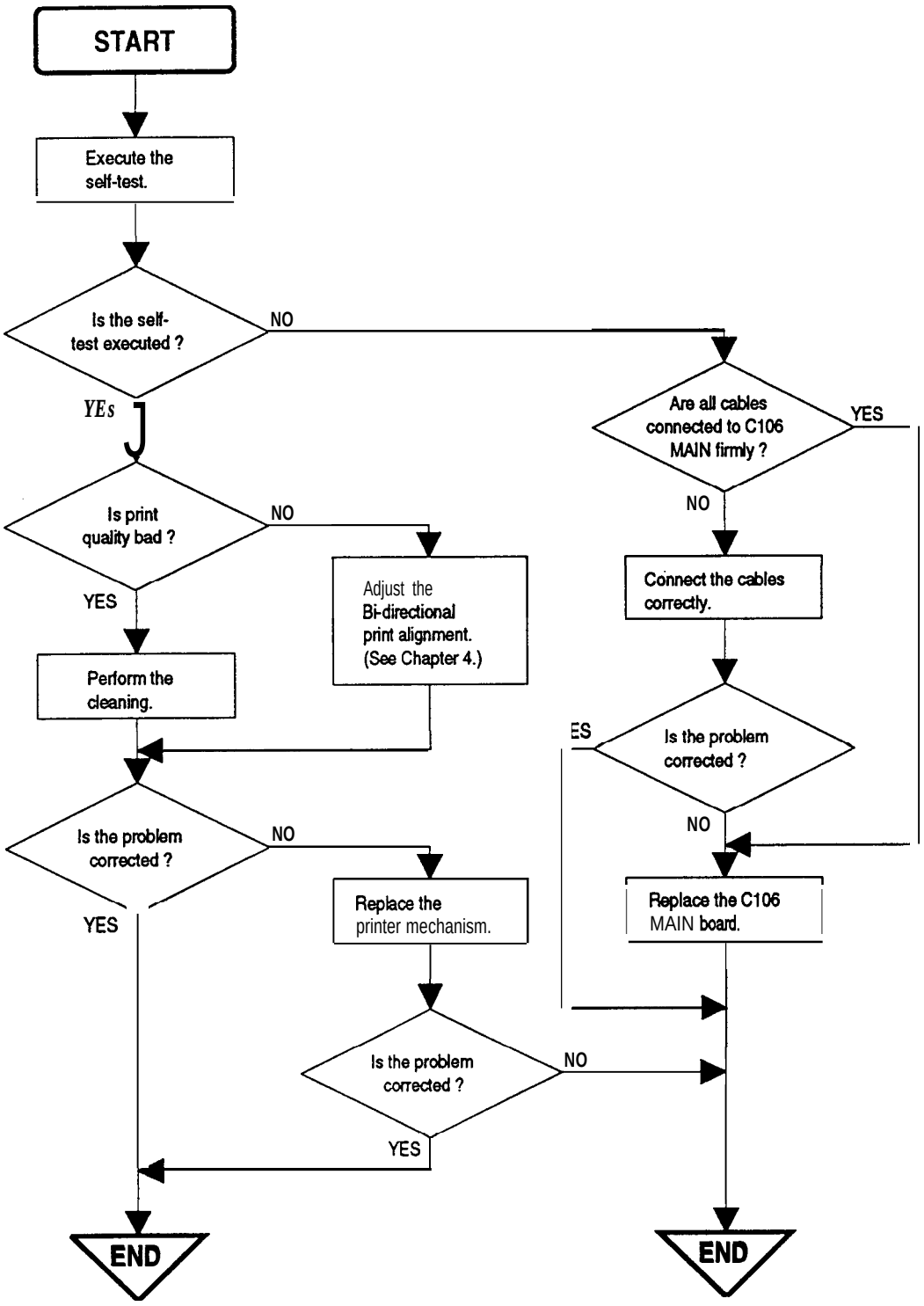
5.2.1 Printer does not operate at power on



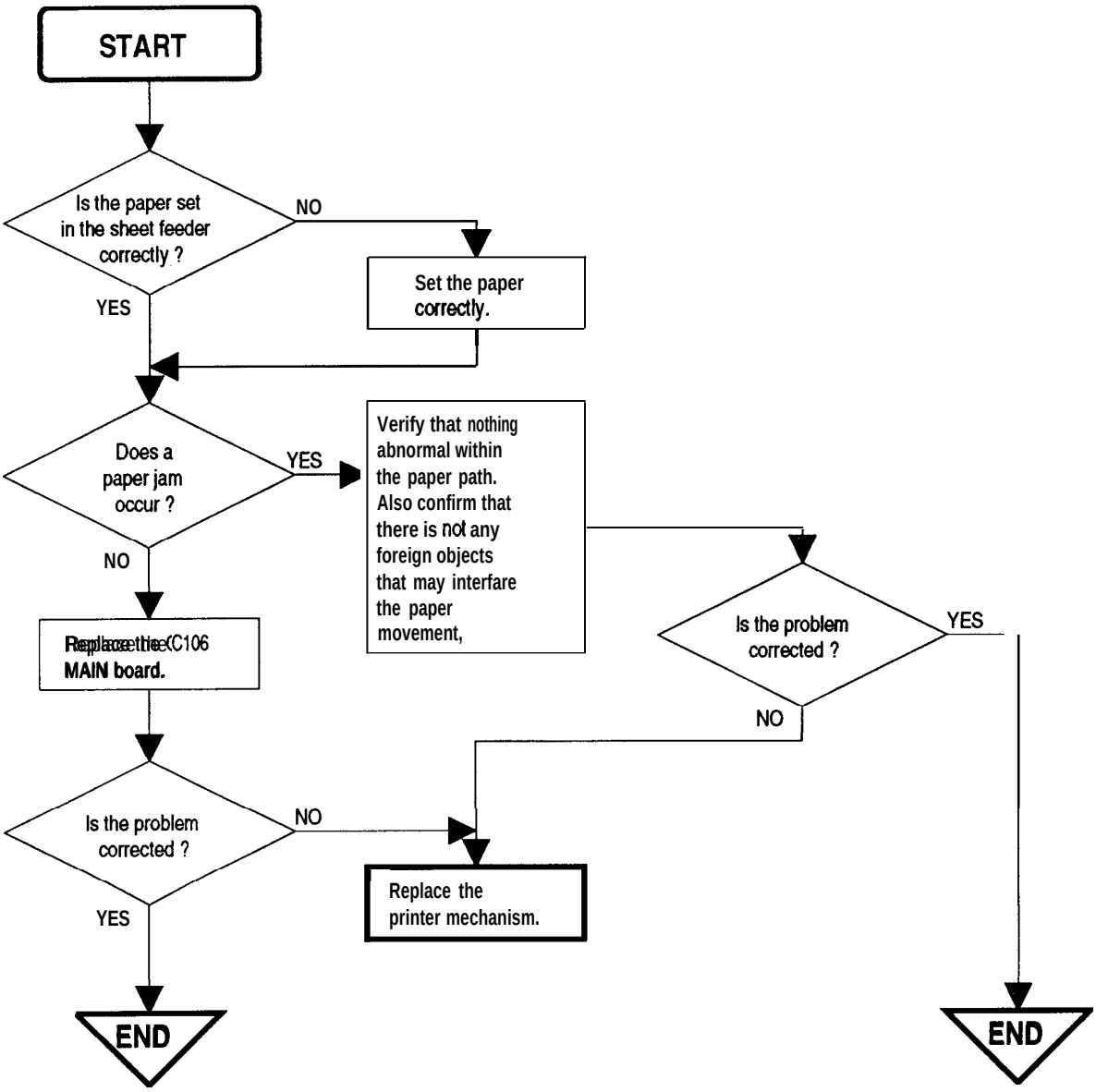
5.2.2 Error is detected



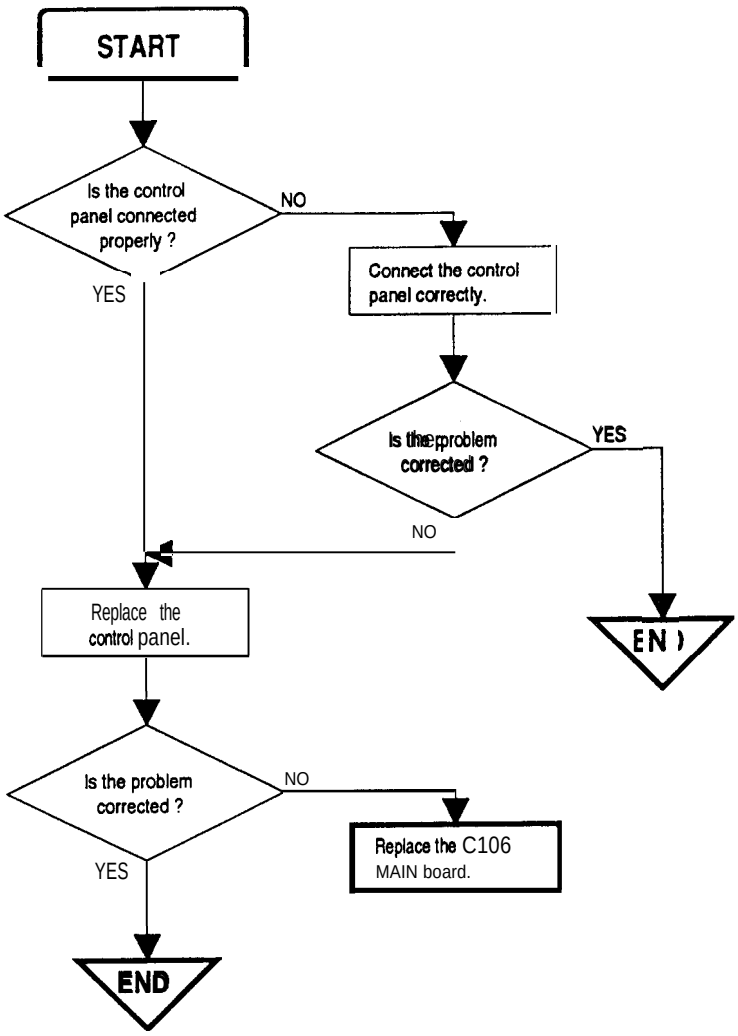
5.2.3 Failure occurs during printing



5.2.4 Printer does not feed the paper correctly



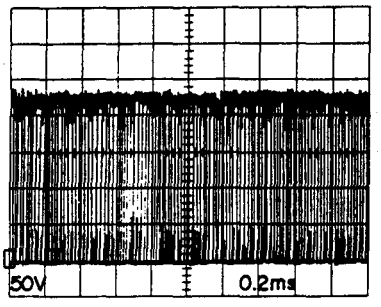
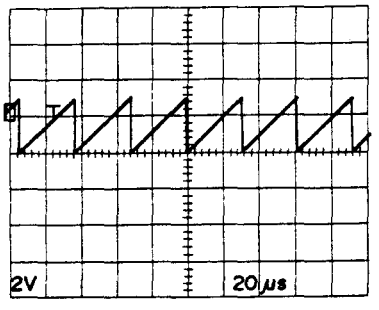
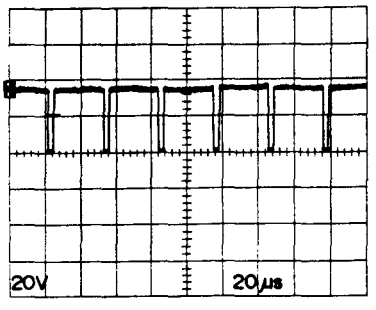
5.2.5 Control panel operation is abnormal



5.3 UNIT REPAIR - CI06 PSB/PSE BOARD

This section describes the problems related to the power supply board (C106 PSB/PSE). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints refer to waveforms, resistance, and *other* values to be checked to evaluate the operation of each component.

Table 5-5. Repair of C106 PSB/PSE Board

Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	+35V line is dead.	Transformer coils are open.	Check the transformer coils by using a multimeter.	Replace T1.
		Switching transistor Q1.	Check the waveform at the drain of Q1. 	Replace Q1.
	+35V line is abnormal.	ZD51, Q52 or PC1 is dead.		Replace ZD51, Q52 or PC1.
	+5V line is dead.	+35V line is dead.	Check the +35V line.	
		IC51 is dead.	Check the oscillation waveform and switching waveform of IC51.  Oscillation waveform (IC51, pin 5)  Switching waveform (IC51, pin 8)	Replace IC51.
		Q51 is dead.		Replace Q51.

5.4 UNIT REPAIR - CI06 MAIN BOARD

This section describes the problems related to the main controller board (C106 MAIN). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints refer to waveforms, resistance, and other values to be checked to evaluate the operation of each component.

Table 5-6. Repair of the C106 MAIN

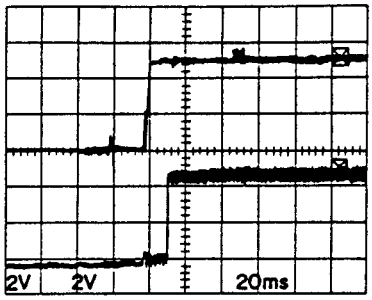
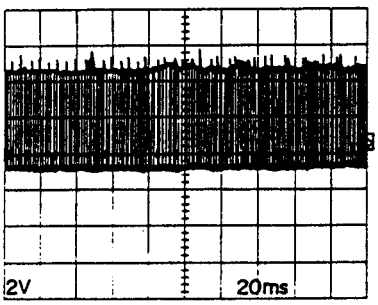
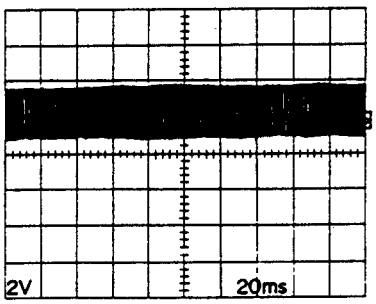
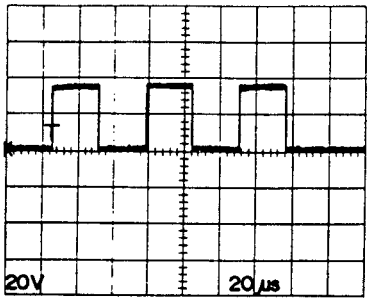
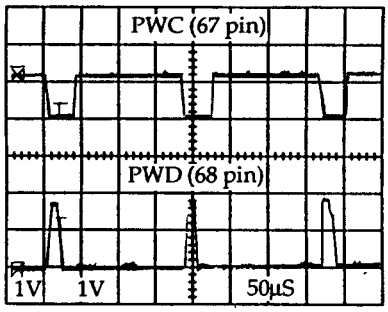
Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operation at all.	The CPU does not operate.	The reset circuit does not operate.	Check the waveform of the +5V line and that of the RESET signal. 	Replace IC12.
		Selection of control ROM is abnormal.	Check pin 111 of IC3 for a change in the signal HIGH/LOW. 	Replace IC3.
		Either CG or RAM is defective.		Replace CG or RAM.
The printer does not operate at all.	The CPU does not operate.	CPU is defective.	Check the oscillator signal at either pin 26 or 27 of the CPU. 	If signal is detected, replace CPU. Otherwise replace CR2.

Table 5-6. Repair of the C106 MAIN (Continued)

Symptom	Condition	Cause	Checkpoint	Solution
The carriage does not operate normally.	The carriage does not operate at all.	IC13 is defective.	Check the signal at pins 6, 5, 17 and 16 of IC13. 	Replace IC13.
		CPU is defective.		Replace the CPU.
Self-test printing is abnormal.	Self-test is not executed.	IC3 is defective.	Check the output signal at pin 67 and pin 68 of IC12.  UPPER: Pin 67(PWC), LOWER: Pin 68 (PWP)	Replace IC3.
		Printhead unit is defective.		Replace printhead unit.
Paper is not fed normally.	The paper feed motor does not rotate.	QM1 id defective.	Check the signal at pin 1, 3, 6, and 8 of QM1.	Replace QM1.
		CPU is defective.		Replace CPU.
	Feed pitch is abnormal. (Lack of torque)	QM1 is defective.	Check the output signal at pin 2, 4, 7 and 9 of QM1.	Replace QM1.
Abnormal print in online mode.	Data is not received normally.	IC3 is defective.	Check the input/output signal of IC3.	Replace IC3.

5.5 UNIT REPAIR - PRINTER MECHANISM (M-4810)

Troubles related to the printer mechanism should be repaired according to the troubleshooting procedures in Table 5-7.

Table 5-7. Repair of Printer Mechanism

Symptom	Condition	Cause	Checkpoint	Solution
The pump mechanism does not operate.	The PF motor fails to rotate at time of power on.	Foreign substances are lodged in the gear in the mechanism.	Manually drive the gear train connected to the pump mechanism to check if the motor rotates.	Remove any foreign substance
		The PF motor is defective.	Check the coil resistance of the motor.	Replace the PF motor.
Ink is not absorbed or poorly absorbed.	Used ink does not go through the used ink tube during the cleaning operation.	The tube is not properly connected to the cap.	Check that the tube is properly connected to the cap.	Set the tube properly.
		The ink tube is damaged.	Cheek the ink tube visually.	Replace the tube
		The cap is defective.	Cheek for any defective part.	Replace the head cap.
		The pump is defective.	Replace the pump to see if this causes the ink to be absorbed normally.	Replace the pump unit.
		The printhead is defective.	Replace the printhead to see if this causes the ink to be absorbed normally.	Replace the printhead.
The carriage motor does not rotate.	The carriage motor fails to rotate at time of power on.	Foreign substances are lodged in the gear in the mechanism.	Manually drive the timing belt to see if the carriage motor rotates	Remove any foreign substance.
		The carriage motor is defective.	Measure the coil resistance of the CR motor.	Replace the carriage motor.
The carriage does not operate normally at time of power on. (after the carriage has been manually centered prior to power on).	The carriage motor rotates, but the carriage does not move.	The pulley is defective.	Cheek for broken or worn pulley.	Replace the driven pulley.
		The timing belt is defective.	Check that the timing belt is properly inserted into the bottom of the carriage.	Reinsert the timing belt.
			Check the timing belt for any darnage.	Replace the timing belt.
	The carriage moves slightly and then stops.	Carriage movement is not smooth.	Check whether the carriage moves smoothly when moved manually.	Clean and lubricate.
			Check tension of the timing belt.	Adjust tension of the timing belt.

Table 5-7. Repair of Printer Mechanism (Continued)

Symptom	Condition	Cause	Checkpoint	Solution
Printing is not performed.	The carriage moves, but no printing is performed.	The head cable is disconnected.	Check the head cable for disconnection.	Replace the cable.,
		The printhead is defective.	Replace the printhead to see if the printhead operates normally.	Replace the printhead.
		Ink absorption is poor.	See "Ink is not absorbed" on the previous page.	
Abnormal printing.	A particular dot is not printed.	Printhead surface is not clean.	Perform the cleaning operation.	Clean.
		The head cable is disconnection.	Check the head cable for disconnected.	Replace the cable.
		The printhead is defective.	Replace the printhead.	Replace the printhead.
	A dot is not printed occasionally.	Printhead surface is not clean.	Check front of the printhead.	Clean.
		The expiration of the ink cartridge.	Check the ink cartridge for expiration.	Replace the ink cartridge.
		Insufficient contact of the head cable.	Cheek whether the cable is properly plugged into the connector.	Plug the cable into the connector properly.
			Cheek the cleanliness.	Clean.
		The printhead is defective.	Replace the printhead to see if this causes printing to be performed normally.	Replace.
		Ink is poorly absorbed.	Check whether the used ink goes through the used ink tube.	See "Ink is not absorbed".
	Printhead characters are not aligned.	The paper gap is not adjusted.	Check the paper gap.	Adjust the gap.
	The intervals between the characters are irregular.	The timing bett is defective.	Cheek that the timing belt is properly inserted into the bottom of carriage.	Set the timing belt properly.
	Vertical line is not aligned.	Bidirectional alignment is not adjusted.	Adjust the check it with bi-directional alignment program.	Adjust the bi-directional alignment.
Paper is not fed normally.	Paper is not fed.	Foreign substance are lodged in the paper path.	Visually check the paper path.	Remove any foreign substance.
		Paper feeding gears are defective.	Visually check the gears.	Replace defective gears.
		The paper feed motor is defective.	Measure the coil resistance of the PF motor.	Replace the PF motor.

Chapter 6 Maintenance

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6.1 PREVENTIVE MAINTENANCE

Altough this printer is designed that no specific maintenance is required in regular basis, it is good idea to clean the printer throughly whenever you get a chance to do so. You can clean :

- Outer case
  If it is dirty, clean it with a soft, clean cloth, dampened with mild detergent if necessary.
- Auto sheet feeder
  If the inside of the auto sheet feeder is dirty (dust), carefully brush away all dust and dirt using a soft brush. If the pick up roller of the sheet feeder is dirty, clean its surface with a soft, clean cloth.
- Inside the printer
  If you notice any dust or dirt accumulated inside the printer when you open the outer case for repair, remove all dust and dirt using a vacuum cleaner.

WARNING

- *Never use thinner, trichloroethylene, or ketone-based solvents for cleaning. These chemicals can damage the components of the printer.*

CAUTION

- *Do not use a hard or abrasive brush for cleaning.*
- *Be careful not to damage the components of the printer when using the vacuum cleaner.*

6.2 SERVICE MAINTENANCE

Certain maintenance is required when the printer detects an error or decline in print quality is observed.

6.1.1 Printhead Cleaning

If print quality deteriorates, clean the printhead using the built-in printhead cleaning function. The printer also has automatic printhead cleaning cycle to ensure the proper nozzle operation for ink injection as well as to preserve its best condition. Therefore, perform this printhead cleaning operation only if print quality declines, in order to avoid wasting ink.

[Step 1] Turn the printer on and press the PAUSE button to pause the printer. Make sure that the PAUSE LED is on.

[Step 2] Hold down the ALT button and press PAUSE button for two *senconds.*

When the panel switch operation is accepted by the printer, buzzer beeps and the cleaning cycle starts. It takes approx. 30 seconds to complete, and the PAUSE LED flashes during the cleaning cycle. When the cleaning completes, the PAUSE LED stop flashing.

6.3 LUBRICATION

The printer must be lubricated properly when the printer is disassembled for component replacement, or if the mechanical noise exceeds a certain level. EPSON only recommends the lubricants listed in table below for this printer, both of which have been tested extensively and found to comply with the requirements of this printer mechanism. The figure on next page shows the lubrication points.

Table 6-1. Recommended Lubricants

Type	Name	QTY	Part No.	Availability
Oil	o-5	40 cc	1010513	E
Grease	G-26	40 g	B702600001	E

Note) E= EPSON Exclusive product (Not commercially available)

Table 6-2. Lubrication Points

Ref. No.	Lubrication Point	Lubricant
(1)	Frame Assembly, R (Gear shaft A,B and C)	G-26 (1 -3 mg)
(2)	Flat gear, 8	G-26 (1 -3 mg)
(3)	Shaft, Reduction	G-26 (1 -3 mg)
(4)	Oil Pad (Carriage)	O-5 (3 drops)
(5)	Shaft, CR, Guide	O-5 (Paint on the shaft)
(6)	Roller, PF	G-26 (1 -3 mg)

CAUTION

■ *Do not **apply** too much lubricant, as it may cause a stain on the mechanism as well as a **malfunction** of the mechanism.*

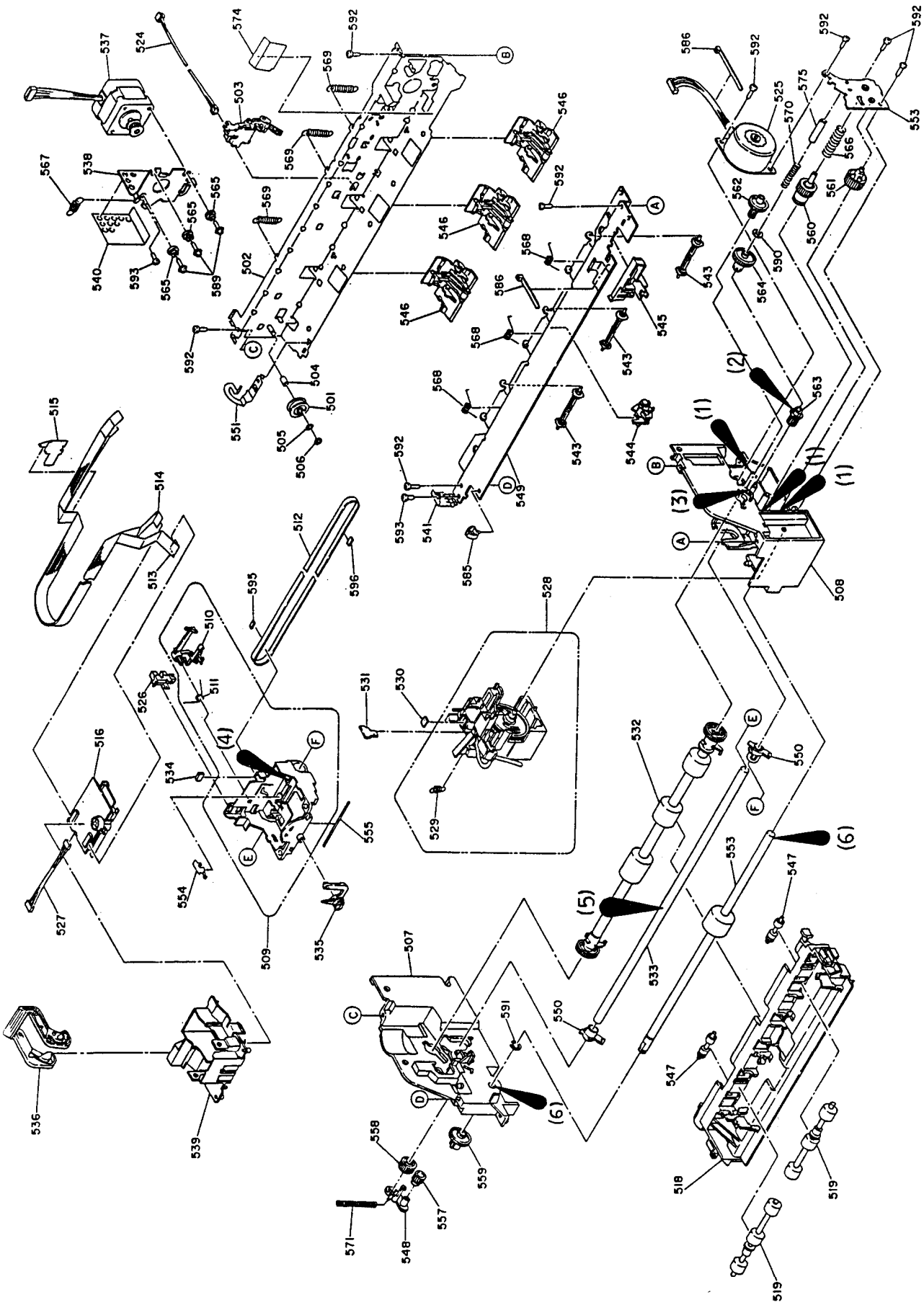

Figure 6-1. Lubrication Points

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A.1 CONNECTOR SUMMARY

Figure below shows the interconnection between the major components of the Stylus 800.

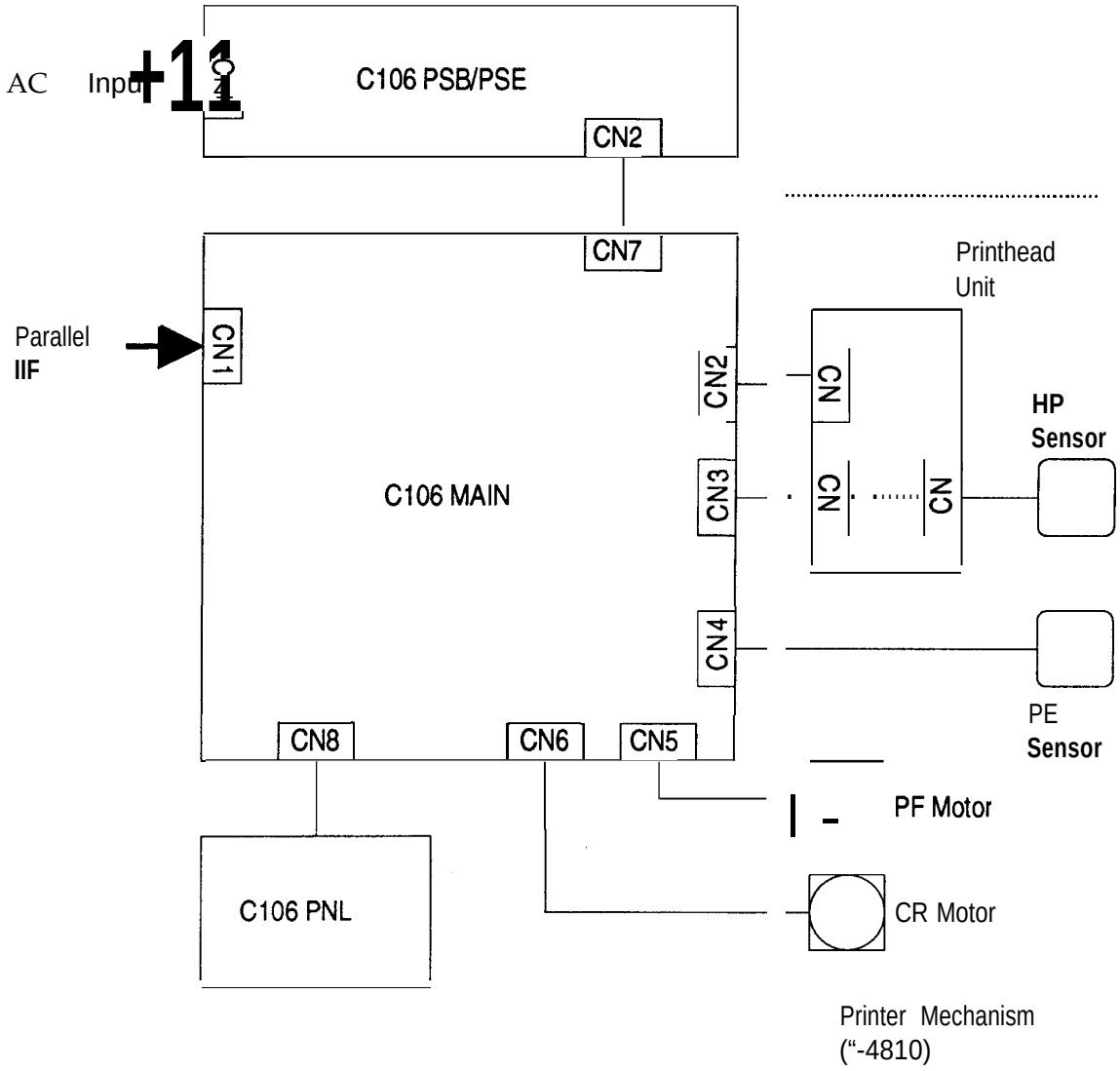


Figure A-1. Interconnection of Major Components

Table A-1. Connector Summary

Board	Location	Pin	Description
CI 06 MAIN	CN1	36 pins	Centronics parallel I/F
	CN2	12	HEAD-1 (to printhead unit)
	CN3	12	HEAD-2 (to printhead unit)
	CN4	2	PE sensor
	CN5	6	PF motor
	CN6	5	CR motor
	CN7	4	PS line (to C106 PSB/PSE)
	CN8	18	Panel control (to CI 06 PNL)
CI 06 PSB/PSE	CN1	2	AC Input (L/N)
	CN2	4	DC output (to CI 06 MAIN/Printer mechanism)
C106 PNL	CN1	18	(to CI 06 MAIN)

Table A-2. Connector Pin Assignment - CN1

Pin	I/O	Name	Description
1	I	STB	STROBE signal
2 - 9	I	D0-D7	Parallel data (DATA1 - DATA8)
10	0	ACK	ACK signal
11	0	BUSY	BUSY signal
12	0	PE	PAPER-END signal
13	0	SLCT	Printer SELECT signal
14	I	AFXT	AUTO LINE-FEED signal
15	-	NC	No connection
16		GND	Ground
17	-	GND	Ground
18		NC	No connection
19	-	GND	Ground
20-30	-	GND	Ground
31	I	INIT	Printer INITIALIZE signal
32	0	ERR	ERROR signal
33	-	-	Not used
34	-	-	Not used
35		-	Not used
36	I	SLIN	Printer SELECT signal

Table A-3. Connector Pin Assignment - CN2

Pin	I/O	Name	Description
1 - 6	-	VH	Printhead drive voltage (VH)
7 - 12	-	GND	Ground

Table A-4. Connector Pin Assignment - CN3

Pin	I/O	Name	Description
1		GND	Ground
2	O	HCLK	Synchronizing clock signal (to SI)
3		GND	Ground
4	0	LAT	Latch signal (to SI)
5		GND	Ground
6	0	SI	Head serial data signal
7		GND	Ground
8	0	I/E	Ink-end (IE) signal
9	0	HPV	Power supply to the photodiode of HP sensor
10	I	HP	HP sensor (output)
11		+5V	+5V DC
12	I	TH	Thermistor signal

Table A-5. Connector Pin Assignment - CN4

Pin	I/o	Name	Description
1	I	PE	Paper-end (PE) signal
2		GND	Ground

Table A-6. Connector Pin Assignment - CN5

Pin	I/o	Name	Description
1	0	PFA	Phase A drive signal
2	0	PFB	Phase B drive signal
3		PFCOM	PF power supply line (+35/+5V DC)
4		PFCOM	PF power supply line (+35/+5V DC)
5	0	PF-A	Phase -A drive signal
6	0	PF-B	Phase -B drive signal

Table A-7. Connector Pin Assignment - CN6

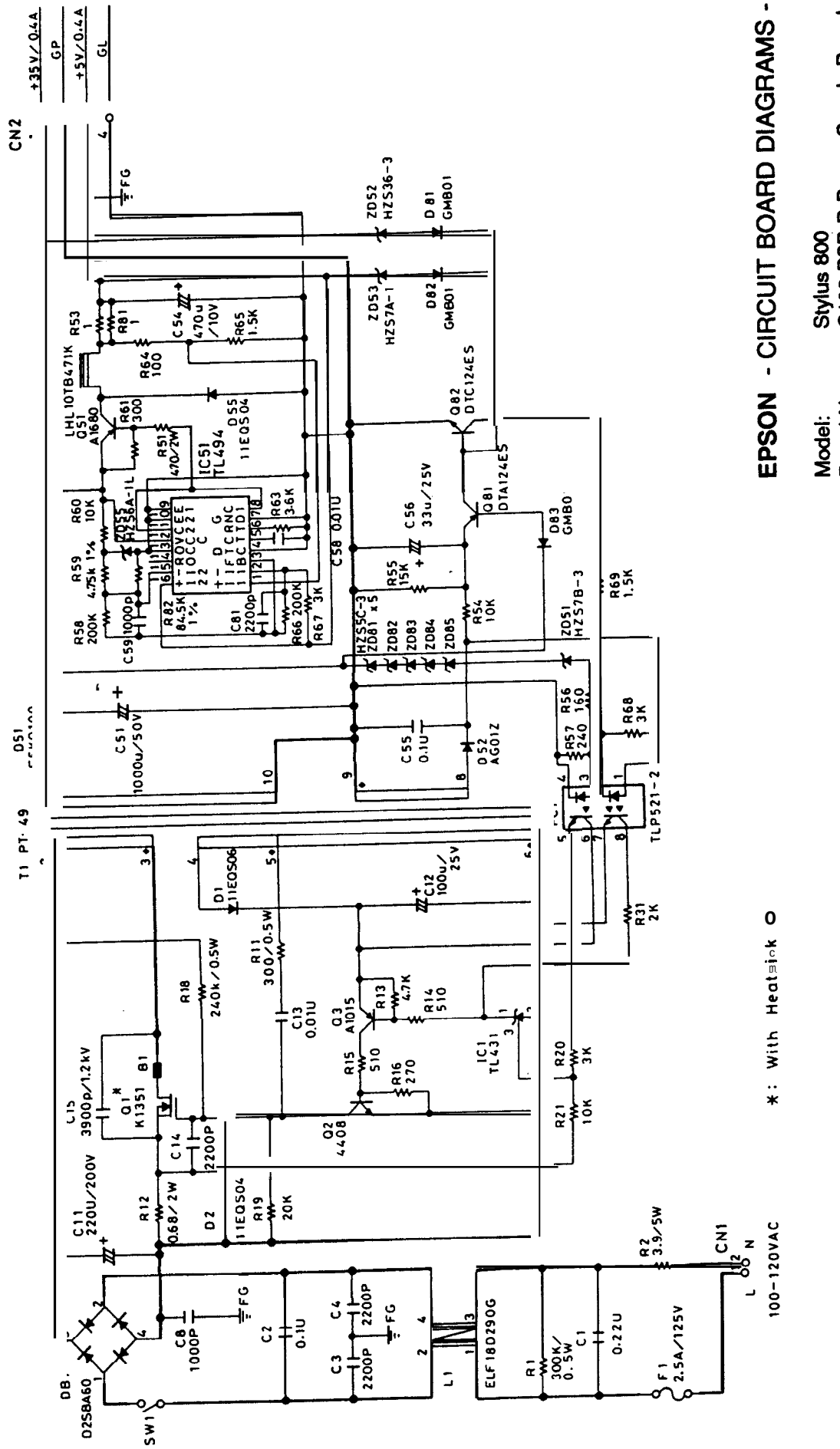
Pin	I/O	Name	Description
1	0	CRA	Phase A drive signal
2	0	CR-A	Phase -A drive signal
3	0	CRB	Phase B drive signal
4	0	CR-B	Phase -B drive signal
5		CRCOM	CR power supply line (+35V DC)

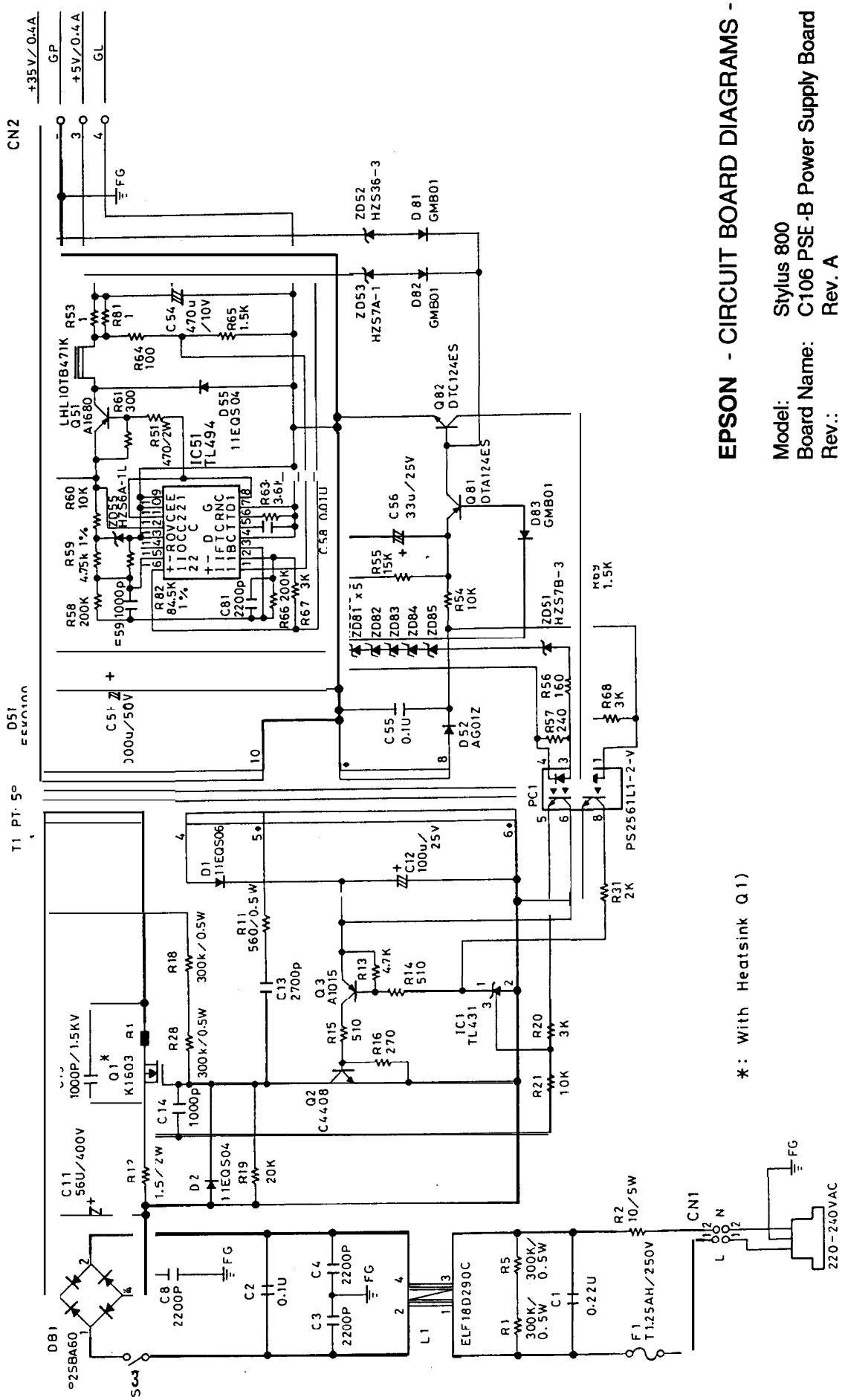
Table A-8. Connector Pin Assignment - CN7

Pin	I/o	Name	Description
1		+35V	+35V DC
2		GP	GND (for +35V)
3		+5V	+5V DC
4		GND	GND (for +5V)

Table A-9. Connector Pin Assignment - CN8

Pin	I/O	Name	Description
1		+5V	+5V DC
2	0	$\overline{\text{LED0}}$	LED0 drive signal ("L"=LED on)
3	I	SW1	SW1 input signal ("L"=Button pressed)
4	I	$\overline{\text{SW2}}$	SW2 input signal
5	I	$\overline{\text{SW3}}$	SW3 input signal
6	I	$\overline{\text{SW4}}$	SW4 input signal
7	I	$\overline{\text{PAUSE}}$	PAUSE input signal
8	0	$\overline{\text{LED1}}$	LED1 drive signal
9	0	$\overline{\text{LED2}}$	LED2 drive signal
10	0	$\overline{\text{LED3}}$	LED3 drive signal
11	0	$\overline{\text{LED4}}$	LED4 drive signal
12	0	$\overline{\text{LED5}}$	LED5 drive signal
13	0	$\overline{\text{LED6}}$	LED6 drive signal
14	0	$\overline{\text{LED7}}$	LED7 drive signal
15	0	$\overline{\text{LED8}}$	LED8 drive signal
16	I	$\overline{\text{SW5}}$	SW5 input signal
17	·	GND	Ground
18		FG	Frame ground


EPSON - CIRCUIT BOARD DIAGRAMS -
Model: Stylus 800
Board Name: C106 PSB-B Power Supply Board
Rev.: Rev. A
*: With Heatsink
CN2
+35V/0.4A
GP
+5V/0.4A
GL
FG
CN1
100-120VAC
F1 2.5A/125V
SW1
DB1 D2SBA60
T1 PT-49
D1 11EQS06
D2 11EQS04
Q1* K1351
Q2 4408
Q3 A1015
Q51 A1680
Q81 DTA124ES
Q82 DTC124ES
IC1 TL431
IC51 TL494
D52 AG01Z
D81 GMB01
D82 GMB01
D83 GMB0
ZD51 HZS7B-3
ZD52 HZS36-3
ZD53 HZS7A-1
ZD55 HZS6A-1L
ZD81 HZS5C-3
ZD82
ZD83
ZD84
ZD85
TLP521-2
R1 300K/0.5W
R2 3.9/5W
R11 300/0.5W
R12 0.68/2W
R18 240k/0.5W
R19 20K
R20 3K
R21 10K
R31 2K
R51 470/2W
R53 1
R54 10K
R55 15K
R56 160
R57 240
R58 200K
R59 4.75k 1%
R60 10K
R61 300
R63 3.6K
R64 100
R65 1.5K
R66 200K
R67 3K
R68 3K
R69 1.5K
R81 1
R82 84.5K 1%
C1 0.22U
C2 0.1U
C3 2200P
C4 2200P
C8 1000P
C11 220U/200V
C12 100u/25V
C13 0.01U
C14 2200P
C15 3900P/1.2kV
C51 1000u/50V
C54 470u/10V
C55 0.1U
C56 33u/25V
C58 0.01U
C59 1000p
C81 2200p
L1 ELF18D290G


EPSON - CIRCUIT BOARD DIAGRAMS -
Model: Stylus 800
Board Name: C106 PSE-B Power Supply Board
Rev.: Rev. A
*: With Heatsink Q1)
CN2
+35V/0.4A
GP
+5V/0.4A
GL
FG
CN1
220-240VAC
F1
T1.25AH/250V
DB1
S25BA60
L1
ELF18D290C
IC1
TL431
IC51
TL494
PC1
PS2561L1-2-V
Q1
K1603
Q2
C4408
Q3
A1015
Q51
A1680
Q81
DTA124ES
Q82
DTC124ES
D1
11EQS06
D2
11EQS04
D51
HZS7B-3
D52
AG01Z
D55
11EQS04
D81
GMB01
D82
GMB01
D83
GMB01
ZD52
HZS36-3
ZD53
HZS7A-1
T1 PT 5P

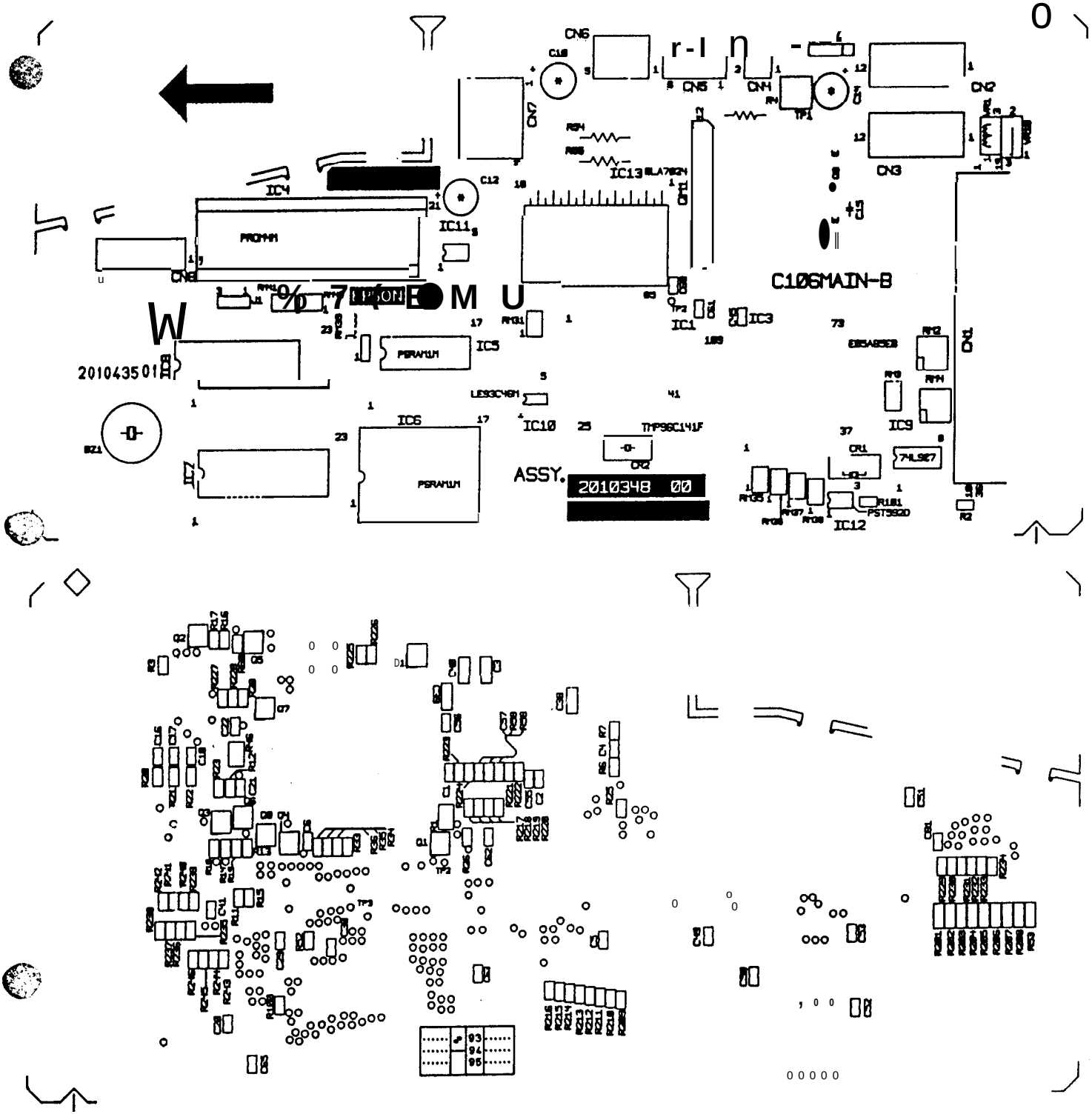


Figure A-2'. C106 MAIN-B Control Board Component Layout

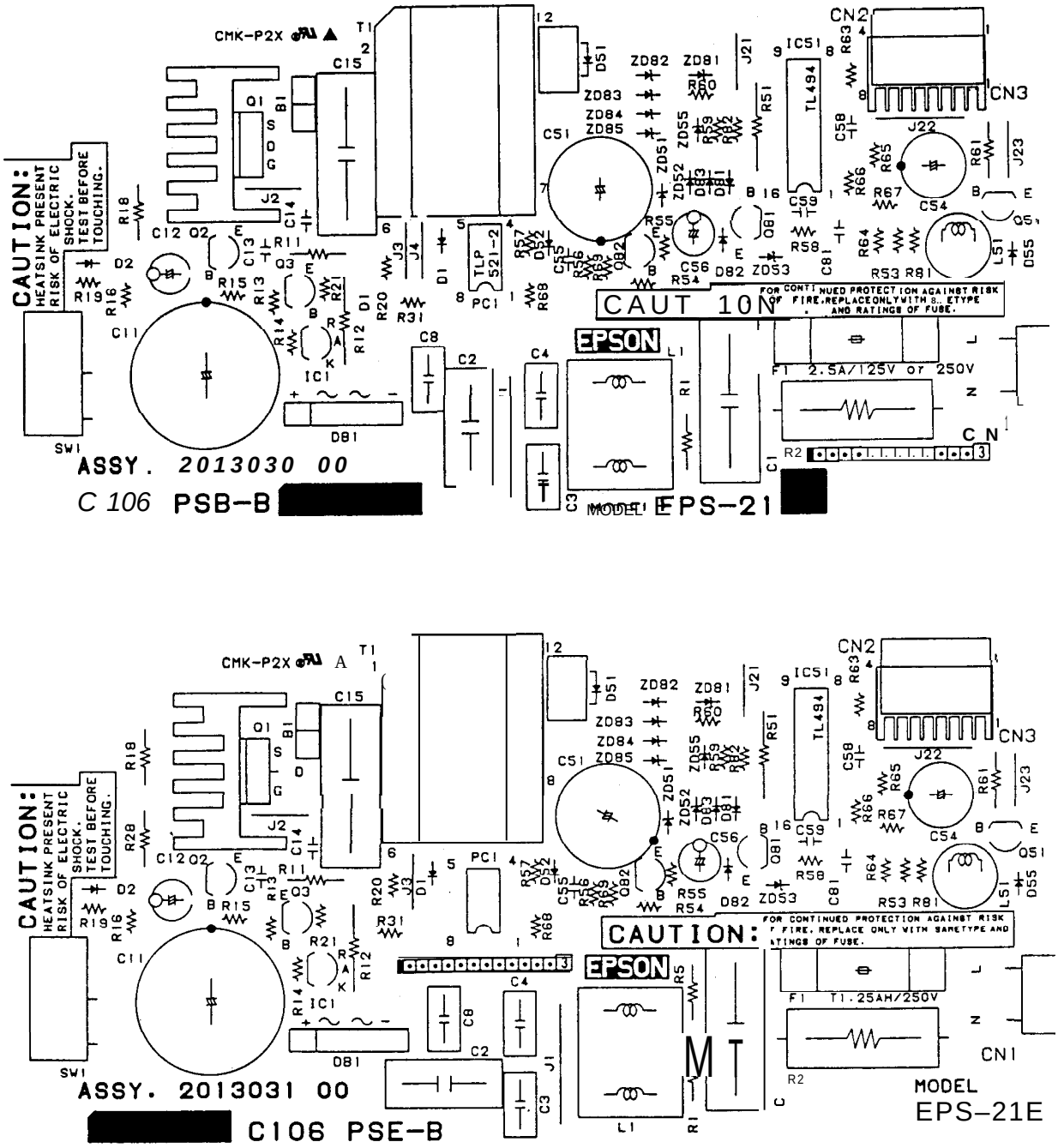


Figure A-3'. CI06 PSB-B/PSE-B Power Supply Board Component Layout

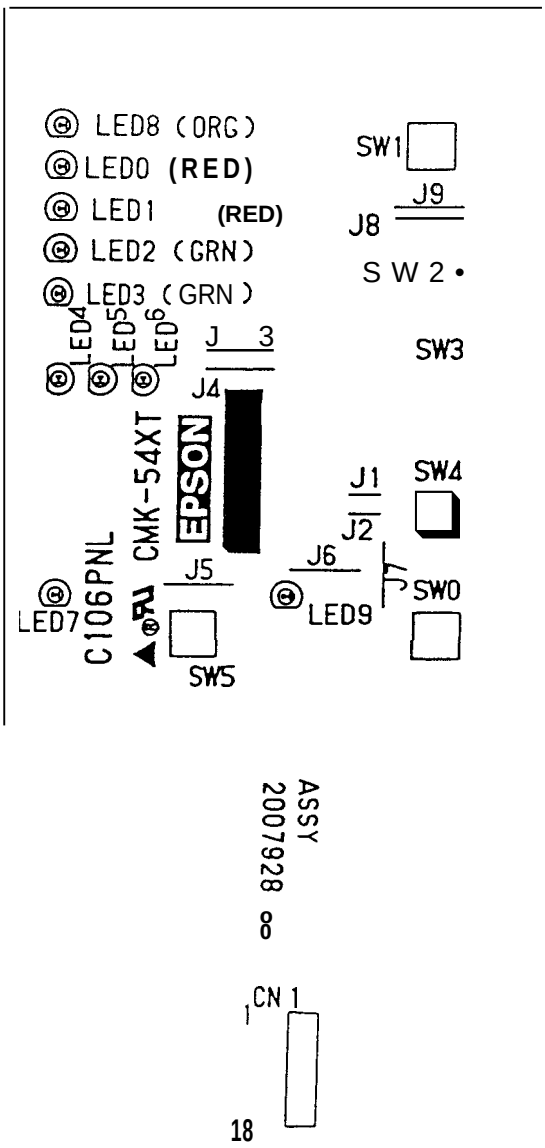


Figure A-4. CI06 PNL Control Panel Component Layout