

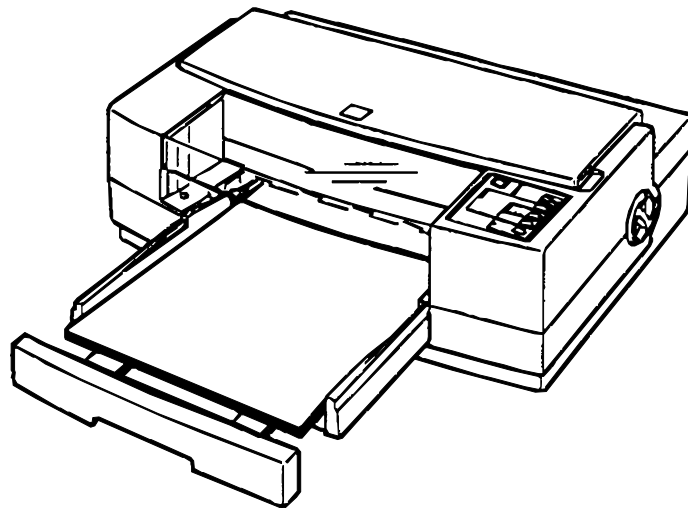
EPSON COLOR INKJET PRINTER

**Stylus Pro**

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**SERVICE MANUAL**

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**EPSON**

4004825

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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 OTHER NONAPPROVED COMPONENTS MAY DAMAGE THE PRODUCT AND VOID ANY APPLICABLE EPSON WARRANTY.

# PREFACE

This manual describes functions, theory of electrical and mechanical operations, maintenance, and repair of STYLUS-PRO.

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	May 30, 1995	-	1st issue
Rev. B	June 5, 1995	1 - 2, 4-7 & 4 - 10	Change Fig.1-2 and WARNINGS

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# Chapter 1 Product Description

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## 1.1 FEATURE

The Stylus Pro is a high-performance color ink jet printer with a small footprint and low cost. The main components of this printer are similar to the Stylus Color. The main features are:

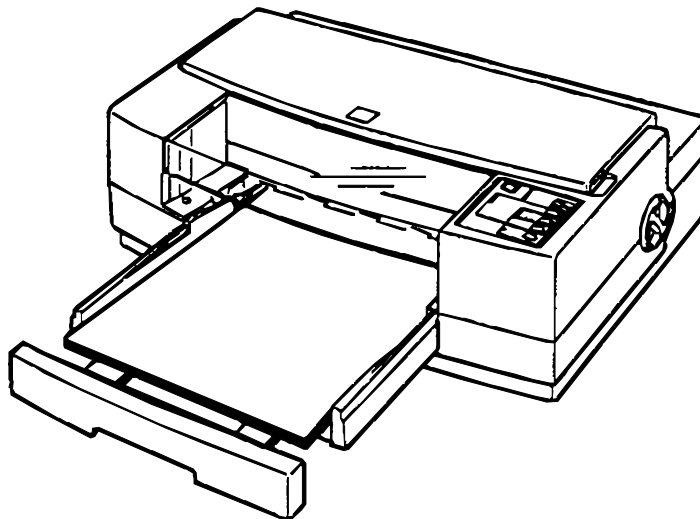
- r High quality color print
  - Super dot 720 dpi printing
  - Plain paper 720 dpi printing
  - Special coated paper for 720 dpi printing
- r High print speed
  - LQ printing at 200 cps
- r Built-in auto sheet feeder
  - Holds 100 cut sheets (55 g/m<sup>2</sup>)
  - Holds 10 envelopes
  - Holds 50 transparency film sheets
  - Holds 70 sheets of special paper
- r Three built-in I/F types
  - Macintosh Serial interface
  - Parallel interface (I-EEE 1284-compatible)
  - Type-B interface (optional)

*Note :* Type-B interfaces are available, except C82324\*(ETHERNET I/F CARD for NETWARE).

\* The asterisk represents the last digit, which varies by country.

- r Easy to set up
  - No DIP switches
  - Multilingual setting messages (5 languages)
- r 4 scalable fonts,  
5 LQ fonts
  - Roman T, Sans Serif H, Roman, Sans Serif (scalable), Roman, Sans Serif, Courier, Prestige, Script (LQ)
- r Character Tables
  - Italic, PC437, PC850, PC860, PC863, PC865, PC437 Greek, PC852, PC853, PC855, PC857, PC866, PC869, PC861, BRASCII, Abicomp, MAZOWIA, Code MJK, ISO 8859-7, ISO Latin 1T, Bulgaria

The figure below shows the Stylus Pro.



**Figure 1-1. Exterior View of Stylus Pro**

## 1.2 SPECIFICATIONS

This section provides statistical facts and other detailed information for the printer.

### 1.2.1 Printing Specifications

Print system: On demand ink jet system  
 Nozzle configuration: 64 nozzles (16 × 4 staggered): monochrome  
 48 nozzles (16 × 3 staggered): color

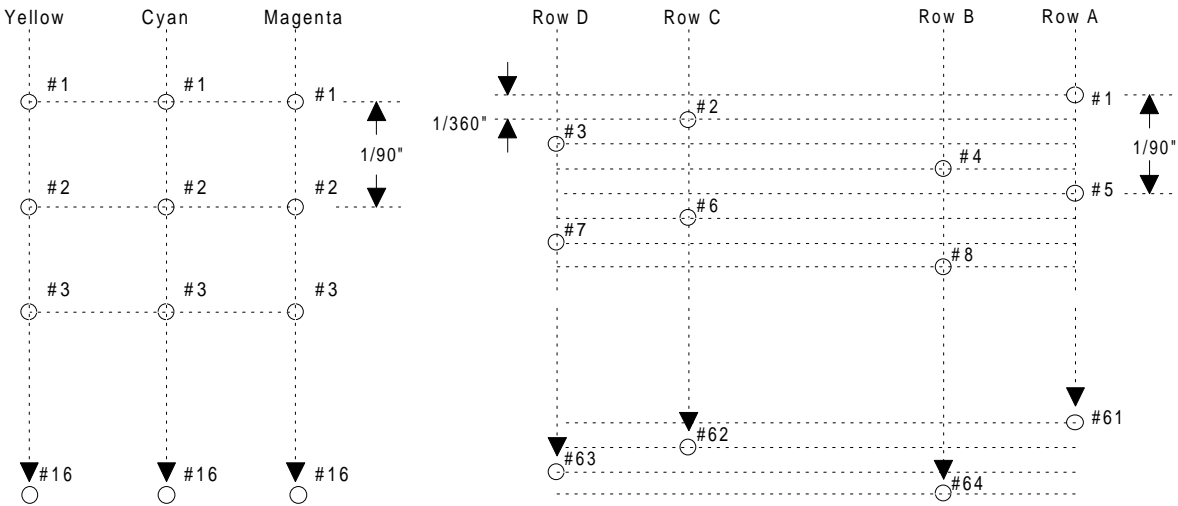


Figure 1-2. Nozzle Configuration

Printing direction: Bidirectional with logic-seeking

The table below shows print speed and printable columns.

Table 1-1. Print Speed and Printable Columns

Character Pitch	Printable Columns	Print Speed (LQ)
10 cpi (pica)	80	200 cps
12 cpi (elite)	96	240 cps
15 cpi	120	300 cps
17 cpi (pica condensed)	137	340 cps
20 cpi (elite condensed)	160	400 cps

Character sets: Legal and 21 international character sets.

Character tables: See Table 1-2.

**Table 1-2. Character Tables**

Character Tables	Bitmap Fonts	Scalable Fonts	
	EPSON Roman EPSON Sans Serif EPSON Courier EPSON Prestige EPSON Script	EPSON Roman EPSON Sans Serif	EPSON Roman T EPSON Sans Serif H
Italic table	m	m	m
PC437 (U.S./Standard Europe)	m	m	m
PC850 (Multilingual)	m	m	m
PC860 (Portuguese)	m	m	m
PC861 (Iceland)	m	m	m
PC863 (Canadian-French)	m	m	m
PC865 (Nordic)	m	m	m
Abicomp	m	m	m
BRASCII	m	m	m
PC437 (Greek)	m	m	×
PC852 (East Europe)	m	m	×
PC853 (Turkish)	m	m	×
PC855 (Cyrillic)	m	m	×
PC857 (Turkish)	m	m	×
PC866 (Russian)	m	m	×
PC869 (Greek)	m	m	×
MAZOWIA (Poland)	m	m	×
Code MJK (Czecho/Slovakia)	m	m	×
ISO 8859-7 (Greek)	m	m	×
ISO Latin 1T (Turkish)	m	m	×
Bulgaria (Bulgaria)	m	m	×

m Supported      × *Not supported*

*Note:* These character tables are not supported for EPSON Roman T and EPSON Sans Serif H scalable fonts.

Fonts:

*Bitmap LQ fonts*

r EPSON Roman (10 cpi/12 cpi/15 cpi/Proportional)  
 r EPSON Sans Serif (10/12/15/Proportional)  
 r EPSON Courier (10/12/15)  
 r EPSON Prestige (10/12/15)  
 r EPSON Script (10/12/15)

*Scalable fonts*

r EPSON Roman 10.5 points, 8 ~ 32 points (in units of 2 points)  
 r EPSON Sans Serif 10.5 points, 8 ~ 32 points (in units of 2 points)  
 r EPSON Roman T 10.5 points, 8 ~ 32 points (in units of 2 points)  
 r EPSON Sans Serif H 10.5 points, 8 ~ 32 points (in units of 2 points)

Control codes: ESC/P 2 and expanded raster graphics codes

Input data buffer: 64K bytes

### 1.2.2 Paper Handling Specifications

Feeding method: Friction feed paper is fed from the built-in auto sheet feeder (ASF).

Notes: The following operations are not allowed:

1. Reverse feeding within 3 mm (0.12 in.) from the top edge of the paper or 16 mm (0.63 in.) from the bottom edge of the paper.
2. Reverse feeding beyond 7.9 mm (0.3 in.).

Line spacing: 1/6-inch feed, 1/8-inch feed, or programmable in 1/360-inch minimum increments.

Paper path: Cut sheets: Built-in auto sheet feeder (ASF). Front entry.

Feeding speed: 89 msec. (at 1/6-inch feed pitch).

### 1.2.3 Paper Specifications

**Table 1-3. Cut Sheet Paper Specifications**

Size (W × L)	Legal: 216 mm (8.5 in.) × 356 mm (14.0 in.)
	Letter: 216 mm (8.5 in.) × 279 mm (11.0 in.)
	A4: 210 mm (8.3 in.) × 297 mm (11.7 in.)
	Executive: 184 mm (7.25 in.) × 267 mm (10.5 in.)
	Statement : 140 mm (5.5 in.) × 216 mm (8.5 in.)
Thickness	0.08 mm (0.003 in.) ~ 0.11 mm (0.004 in.)
Weight	55 g/m <sup>2</sup> (17 lb) ~ 90 g/m <sup>2</sup> (24 lb)
Quality	Plain paper, special coated paper for 720 dpi, special coated paper for 360 dpi, transparency film, high-quality glossy paper

Note : Printing on special coated paper for 720 dpi, special coated paper for 360 dpi, transparency film, and high-quality glossy paper is only available at normal temperatures.

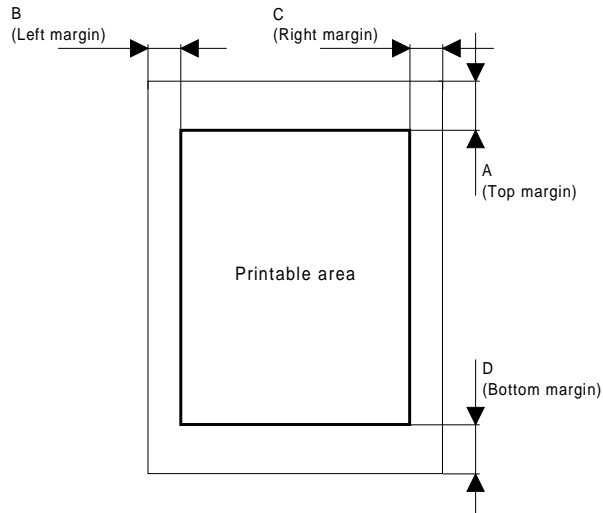
**Table 1-4. Envelope Specifications**

Size (W × L)	C5: 229 mm (9 in.) × 162 mm (6.4 in.)
	No. 10: 240 mm (9 1/2 in.) × 104 mm (4 1/8 in.)
	DL: 220 mm (8.7 in.) × 110 mm (4.3 in.)
Thickness	Less than 0.52 mm (0.020 in.)
Weight	75 g/m <sup>2</sup> (20 lb) ~ 90 g/m <sup>2</sup> (24 lb)
Quality	Plain paper

Note: Printing of envelopes is supported only at room temperature. When inserting envelopes, keep the longer side horizontal.

**Printable area:**

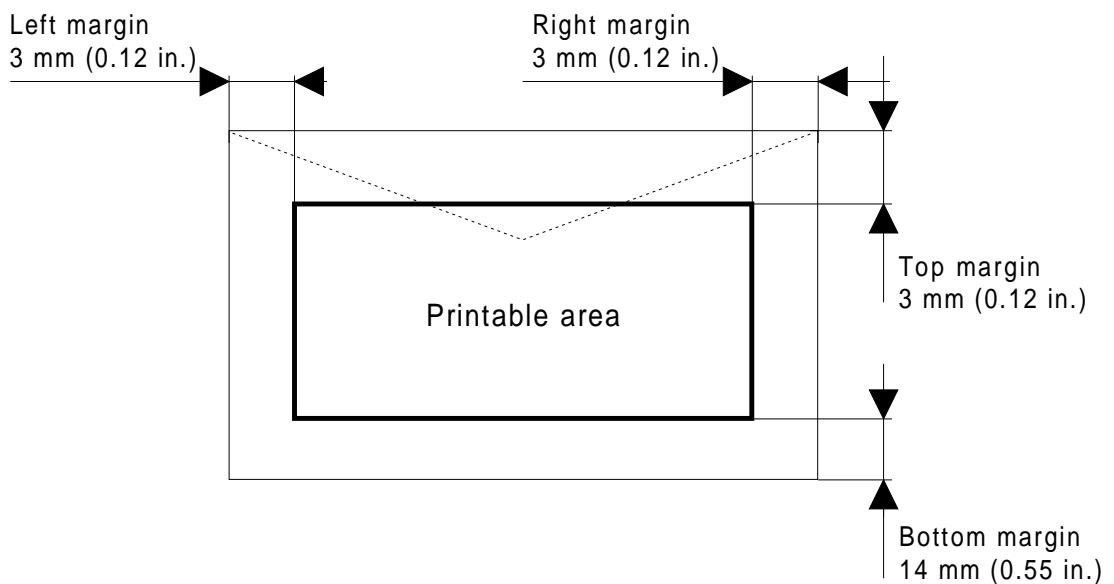
**Cut sheets**



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

- Note:**
- A: Minimum top margin = 3 mm (0.12 in.)
  - B: Minimum left margin = 3 mm (0.12 in.)
  - C: Minimum right margin is:
    - A4 size: 3 mm (0.12 in.)
    - Letter size: 9 mm (0.35 in.)
    - Legal size: 9 mm (0.35 in.)
    - Envelopes: 3 mm (0.12 in.)
  - D: Minimum bottom margin = 14 mm (0.55 in.)

**Envelopes**



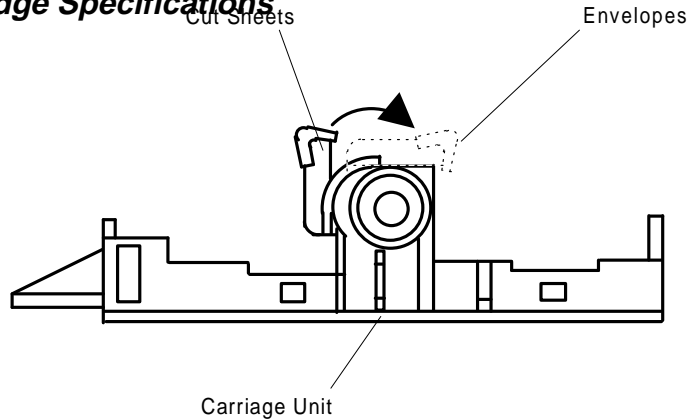
**Figure 1-4. Printable Area for Envelopes**

Adjust lever settings: *The adjust lever on the carriage unit must be set to the proper position for the paper thickness, as shown in Table 1-5.*

**Table 1-5. Adjust Lever Setting**

Lever Position	Paper	Paper Thickness
<b>LEFT</b> (Vertical)	Cut Sheets	0.08 ~ <b>0.11 mm</b> ( <b>0.003 ~ 0.004 in.</b> )
<b>RIGHT</b> (Horizontal)	Envelopes	Less than 0.5 mm (0.020 in.)

**1.2.4 Ink Cartridge Specifications**



**Figure 1-5. Adjustment Lever Settings**

**Black**

- Type: *Exclusive cartridge*
- Color: *Black*
- Print capacity: *1.2 million characters (315 dots/character, Roman 10 cpi)*
- Life: *The effective life from the indicated production date is 2 years.*
- Storage temperature: *-30 ~ 40° C (-22 ~ 104° F) Storage under a month at 40° C (104° F)  
-30 ~ 60° C (-22 ~ 140° F) Transit under a month at 40° C (104° F)  
-30 ~ 60° C (-22 ~ 140° F) Transit under 120 hours at 60° C (140° F)*
- Dimension (W × D × H): *26.9 × 67.4 × 41.8 mm (1.06 × 2.65 × 1.65 in.)*

**Color**

- Type: *Exclusive cartridge*
- Color: *Cyan, magenta, yellow*
- Print capacity: *28 sheets/color (A4, full image printing at 360 dpi)*
- Life: *The effective life from the indicated production date is 2 years.*
- Storage Temperature: *-30 ~ 40° C (-22 ~ 104° F) Storage under a month at 40° C (104° F)  
-30 ~ 60° C (-22 ~ 140° F) Transit under a month at 40° C (104° F)  
-30 ~ 60° C (-22 ~ 140° F) Transit under 120 hours at 60° C (140° F)*
- Dimension (W × D × H): *54.0 × 67.4 × 41.8 mm (2.13 × 2.65 × 1.65 in.)*

- Notes: *r Ink cartridge cannot be refilled; it is the only consumable article.*
- r Do not use an ink cartridge that has exceeded the ink life.*
- r Ink freezes below -3° C; however, it can be used after it returns to room temperature.*

**1.2.5 Electrical Specifications**

**Table 1-6. Rated Electrical Ranges**

Item	120 V Version	220 - 240 V Version
Rated voltage	120 VAC	220 - 240 VAC
Input voltage range	103.5 ~ 132 V	198 ~ 264 V
Rated frequency range	50 ~ 60 Hz	50 ~ 60 Hz
Input frequency range	49.5 ~ 60.5 Hz	49.5 ~ 60.5 Hz
Rated current	0.6 A	0.4 A
Power consumption	Approx. 20 W (self-test with 10-cpi LQ characters)	Approx. 20 W (self-test with 10-cpi LQ characters)
Insulation resistance	10 MΩ, <i>minimum</i> <b>(applying 500 VDC between AC line and chassis)</b>	10 MΩ, <i>minimum</i> <b>(applying 500 VDC between AC line and chassis)</b>
Dielectric strength	1000 VAC rms - 1 minute or 1200 VAC rms - 1 second (between AC line and chassis)	1500 VAC rms - 1 minute (between AC line and chassis)

1.2.6 Environmental Conditions

Table 1-7. Acceptable Environmental Conditions

Description	Operating	Non Operating
Temperature	10 ~ 35° C (50 ~ 95° F) <sup>*1</sup>	-20 ~ 60° C (-4 ~ 122° F) <sup>*2</sup>
Humidity	20 ~ 80% RH <sup>*1,3</sup>	5 ~ 85% RH <sup>*2,3</sup>
Shock resistance	1G (within 1 msec.)	2G (within 2 msec.) <sup>*2</sup>
Vibration resistance	0.15 G	0.50 G <sup>2</sup>

- <sup>\*1</sup> : For operating the printer, conditions must be in the range shown in the figure below.
- <sup>\*2</sup> : These conditions are acceptable when the printer is in its shipping container.
- <sup>\*3</sup> : Without condensation.

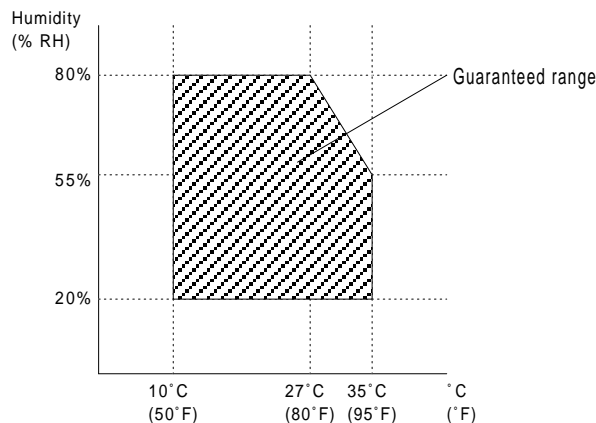


Figure 1-6. Temperature/Humidity Range

### 1.2.7 Reliability

Total print volume:	75,000 pages (A4, letter)
Printhead life:	1,000 million dots/nozzle

### 1.2.8 Safety Approvals

Safety standards:	120 V version:	UL1950 with D3, CSA22.2 # 950 with D3
	220-240 V version:	EN 60950 (TÜV, SEMKO, DEMKO, NEMKO, SETI)
Radio frequency interference (RFI):	120 V version:	FCC part 15 subpart B class B
	220-240 V version:	Vfg.243 (VDE0878 part 3, part 30) EN55022 (CISPR PUB. 22) class B

### 1.2.9 Physical Specifications

Dimension (W × D × H):	482 × 530 × 192 mm (18.5 × 20.7 × 7.56 in.)
Weight:	Approximately 7.5 kg (16.5 lb)



## 1.3 INTERFACE SPECIFICATIONS

The Stylus Pro is standard-equipped with an 8-bit parallel and serial interface.

### 1.3.1 Parallel Interface Specifications

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

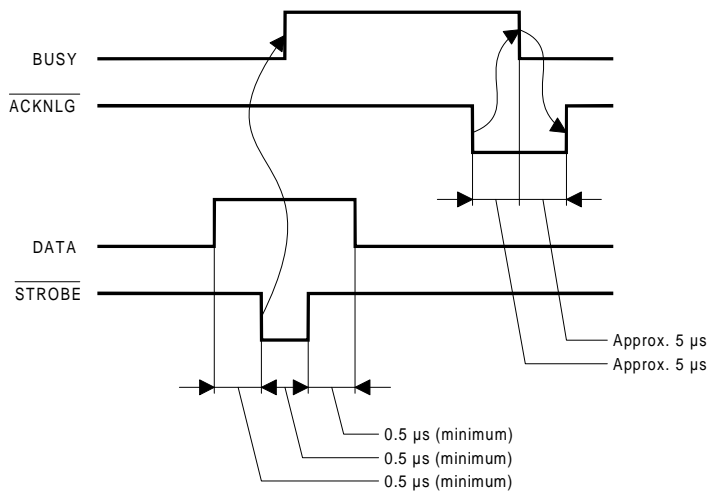


Figure 1-7. Data Transmission Timing

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

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

- r During data reception (See Figure 1-7.)
- r When the input buffer is full
- r When the INIT input signal is active
- r During initialization
- r When the ERROR or PE signal is active
- r During the self-test mode
- r During the demonstration mode
- r During the default setting mode
- r When a fatal error occurs

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

- r When a paper-out error occurs
- r When a no ink cartridge error occurs
- r When a fatal error occurs

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

- r When a paper-out error occurs
- r When a fatal error occurs

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

**Table 1-8. Signal and Connector Pin Assignments for Parallel Interface**

Pin No.	Signal Name	I/O*	Description
1	$\overline{\text{STROBE}}$	I	The $\overline{\text{STROBE}}$ pulse is used to read data from the host computer. Pulse width must be 0.5 $\mu\text{s}$ or more. Normally, it is HIGH, and data is latched with the 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 0. The most significant bit (MSB) is DATA 8. The signal state must be maintained for 0.5 $\mu\text{s}$ on either side of the $\overline{\text{STROBE}}$ signal's active edge.
10	$\overline{\text{ACKNLG}}$	O	$\overline{\text{ACKNLG}}$ is an acknowledge pulse with a width of approximately 10 $\mu\text{s}$ . This signal goes LOW upon completion of data reception to indicate 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 any more data.
12	PE	O	This signal indicates whether paper is available in the printer or not. A HIGH level indicates no paper.
13	SLCT	O	Pulled up to +5 V through a 1.0 K $\Omega$ 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.
31	$\overline{\text{INIT}}$	I	If this signal goes LOW, the printer is initialized. The pulse width of this signal must be 50 $\mu\text{s}$ or more.
32	$\overline{\text{ERROR}}$	O	This signal goes LOW if the printer has a fatal error or runs out of paper.
35	+5 V	—	Pulled up to +5 V through 1.0 K $\Omega$ resistor in the printer.
17	CHASSIS	—	Chassis ground.
16	GND	—	Signal ground.
19-30	—	—	—
33,36	—	—	Not used.
15,18,34	—	—	—

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

### 1.3.2 Serial Interface Specifications

**Data format:** RS-422 serial  
**Synchronization:** Asynchronous  
**Handshaking:** By DTR signal and X-ON/X-OFF protocol

**Table 1-9. DTR and X-ON/X-OFF Protocol**

State	Buffer Space	DTR	X-ON/X-OFF
Busy	Less than 512 bytes	Off	X-OFF
Ready	More than 1,024 bytes	On	X-ON

**Word length**

**Start bits:** 1 bit  
**Data bits:** 8 bit  
**Parity bits:** none  
**Stop bits:** 1 bit

**Bit rate:** 57.6K / 230.4K bps

**Adaptable connector:** 8-pin mini-circular connector

**Recommended I/F cable:** Apple<sup>®</sup> System peripheral-8 cable

**Table 1-10. Signal and Connector Pin Assignments for Serial Interface**

Pin No.	Signal Name	I/O*	Description
1	DTR	Out	Data terminal ready
2	NC	—	No connection
3	$\overline{\text{TXD}}$	Out	Transmit data
4	SG	In	Signal ground
5	$\overline{\text{RXD}}$	In	Receive data
6	TXD	Out	Balanced transmit
7	NC	—	No connection
8	RXD	In	Balanced receive

\* The I/O column indicates the data flow as viewed from the printer.

## 1.4 OPERATIONS

This section describes the basic operations of the printer.

### 1.4.1 Control Panel

The control panel for this printer has 1 lock-type and 5 non lock-type pushbuttons, and 15 LED indicators for easy operation of the various printer functions.

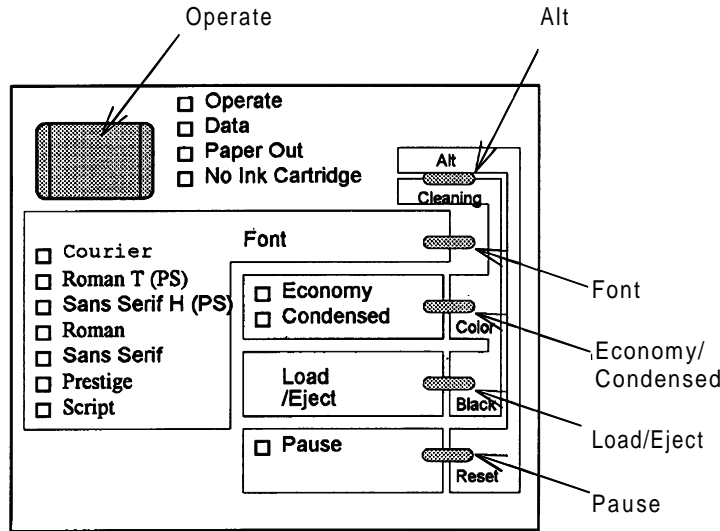


Figure 1-8. Control Panel Appearance

#### Buttons

- Operate** Turns the printer on or off.
- Alt** Modifies the function of other buttons. Holding down this button for 3 seconds turns the Pause light to come on, and causes the printer to move the carriage to the ink cartridge installation position. Pressing Alt again causes the carriage to return to the home position.
- Font** Cycles through the font choices. Pressing the Font button, while holding down the Alt button in pause mode causes the carriage to move to the gap adjustment position. Pressing the Alt button again causes the carriage to return to the home position.
- Economy/Condensed** Selects either economy printing or condensed printing mode. Pressing the Economy/Condensed button while holding down the Alt button turns the Pause light on and starts the color printhead cleaning cycle.
- Load/Eject** Either loads a new sheet into the printer or ejects paper currently in the paper path. Pressing the Load/Eject button while holding down the Alt button starts the black printhead cleaning cycle.
- Pause** Stops printing temporarily or resumes printing if it has been stopped temporarily. Pressing Pause while holding down the Alt button for about three seconds, or until all LEDs light, resets the printer.

### Indicators

Operate	On when the printer is on. Blinks during power on and off.
Data	On when print data is in the input buffer. Data and Pause lights blink if an error occurs.
Paper Out	On when the printer is out of paper. Blinks when a paper jam occurs.
No Ink Cartridge	On when the ink is out.
Economy	On when economy printing mode is selected.
Condensed	On when condensed printing mode is selected.
Font	These LEDs indicate the selected font.
Pause	On when printing is paused.

### 1.4.2 Panel Operation at Power On

You can activate the modes below by doing the following:

Self-test mode	Turn on the printer while holding down the Load/Eject button.
Hex dump mode	Turn on the printer while holding down the Font and Load/Eject buttons. Once this mode is selected, the printer prints all received data in hexadecimal format.
Default setting mode	Turn on the printer while holding down the Economy/ Condensed button. For more information about the mode, see Section 1.4.3.
Initialize EEPROM	Turn on the printer while holding the Alt, Font, Load/Eject, and Pause buttons.

### 1.4.3 Default Settings

The printer can save some printer setting parameters that define its functions at initialization. You can change these parameters using the printer's default-setting mode.

#### 1.4.3.1 Default Setting Items

In default-setting mode, you can change settings listed in the table below. Activate default-setting mode by holding down the Economy/Condensed button while turning on the printer.

**Table 1-11. Default Setting Items**

Menu Contents	Description	Factory Setting
Character table	Selects the character table	—
Print direction	Controls the print direction. (See Tables 1-12 and 1-13) Auto Bi-D Uni-D	—
Network I/F mode	Off: For normal environments. On: For network environments.	Off
Auto line feed	On: Valid Off: Invalid	—
Loading position	3.0/8.5 mm (0.12/0.33 in.)	3.0 mm
Interface mode	Auto I/F mode Parallel I/F mode Serial I/F mode Optional I/F mode	—
Auto I/F wait mode	10/30 seconds	10 sec.

**Table 1-12. Characteristics of Print Direction Mode**

Item	Black and White Printing	Color (CMYK) Printing
Auto	Throughput and quality is better.	Throughput is better. Color quality with special paper is worse. (Color correction depends on the printing direction.)
Bi-D	Throughput is best. Print quality may be down.	Throughput is better. Color quality with special paper is worse. (Color correction depends on the printing direction.)
Uni-D	Throughput is worse. Print quality is better.	Throughput is worse. Color quality is best.

**Table 1-13. Printing Direction and ESC U Command**

Default Setting Mode	Auto			Bi-D			Uni-D			+
	ESC U0	ESC U1	None	ESC U0	ESC U1	None	ESC U0	ESC U1	None	
^										
Character mode (for MS-DOS <sup>®</sup> )	Auto	Auto	Auto	Bi-D	Uni-D	Bi-D	Uni-D	Uni-D	Uni-D	Uni-D
Raster graphics mode (for Windows <sup>™</sup> )	Bi-D	Uni-D	Auto	Bi-D	Uni-D	Bi-D	Bi-D	Uni-D	Uni-D	Uni-D

**Note:** Printing direction is controlled by driver in Windows environment.

#### 1.4.3.2 Changing the Default Settings

To change the printer's default settings:

- a. Hold down the Economy/Condensed button and turn on the printer. The printer prints a sheet that shows the firmware version and describes how to select the language used to print messages.
- b. Press the Font button until the appropriate font LED is selected. The following table shows which language corresponds to which font LED.

**Table 1-14. Language Selection**

Language	Font LED
English	Courier
Français	Roman T (PS)
Deutsch	Sans Serif H (PS)
Italiana	Roman
Español	Sans Serif

- c. Press the Alt button. The printer prints the current settings using the selected language. It also prints a table showing how to change the printer settings.
- d. Press the Font button to advance through the setting menu. The current printer settings are indicated by the Courier, Roman T (PS), and San Serif H (PS) LEDs. Each time you press the Font button, you advance to the next setting, and the three font LEDs change according to the selection.

**Table 1-15. Feature Selection**

Menu				Setting Value			
Feature/Menu	Courier LED	Roman T (PS) LED	Sans Serif H (PS) LED	Setting	Operate LED	Data LED	Paper Out LED
Character table	On	On	On	See Table 1-16			+
Print direction	On	Off	Off	Auto	On	Off	Off
				Bi-D	Off	On	Off
				Uni-D	On	On	Off
Network I/F mode	Off	On	Off	Off	Off	Off	Off
				On	On	Off	Off
Auto line feed	On	On	Off	Off	Off	Off	Off
				On	On	Off	Off
Loading position	Off	Off	On	3 mm	Off	Off	Off
				8.5 mm	On	Off	Off
Interface mode	On	Off	On	Auto	On	Off	Off
				Parallel	Off	On	Off
				Serial	On	On	Off
				Option	Off	Off	On
Auto I/F wait time	Off	On	On	10 sec.	Off	Off	Off
				30 sec.	On	Off	Off

- e. Change the setting value by pressing Alt button. Pressing the Alt button changes the setting for the current menu. The status of the LEDs will be changed as the button is pressed.

Table 1-16. Character Table Selection

Version	Settings	Operate LED	Data LED	Paper Out LED
Common	Italic U.S.A.	Off	Off	Off
	Italic France	On	Off	Off
	Italic Germany	Blinks	Off	Off
	Italic U.K.	Off	On	Off
	Italic Denmark 1	On	On	Off
	Italic Sweden	Blinks	On	Off
	Italic Italy	Off	Blinks	Off
	Italic Spain 1	On	Blinks	Off
	PC437	Blinks	Blinks	Off
	PC850	Off	Off	On
Standard	PC860	On	Off	On
	PC863	Blinks	Off	On
	PC865	Off	On	On
	PC861	On	On	On
	BRASCI	Blinks	On	On
	Abicomp	Off	Blinks	On
NLSP	PC437 Greek	Off	Off	On
	PC853	Blinks	Off	On
	PC855	Off	On	On
	PC852	On	On	On
	PC857	Blinks	On	On
	PC866	Off	Blinks	On
	PC869	On	Blinks	On
	MAZOWIA	Blinks	Blinks	On
	Code MJK	Off	Off	Blinks
	ISO 8859-7	On	Off	Blinks
	ISO Latin 1T	Blinks	Off	Blinks
Bulgaria	Off	On	Blinks	

- f. Repeat d and e to change other printer settings. The setting menu selection will return to the first menu after the last menu selection is over.
- g. Turn off the printer. The setting is stored into non-volatile memory.



## 1.4.4 Error Conditions

The printer can detect the various errors and indicate them with LEDs.

**Table 1-17. Error Indications**

Error	Data LED	Paper Out LED	No Ink Cartridge LED	Economy LED	Condensed LED	Pause LED
Paper out	Off	On	Off	Off	Off	Off
No ink cartridge	Off	Off	On	Off	Off	Off
Paper jam	Off	Blinks	Off	Off	Off	Off
Maintenance request	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks
Carriage error	Blinks	Off	Off	Off	Off	Blinks

## 1.4.5 Printer Initialization

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

### 1.4.5.1 Hardware Initialization

Hardware initialization is performed by:

- r Turning on the printer.
- r Sending the parallel interface  $\overline{\text{INIT}}$  signal.  
(If the  $\overline{\text{INIT}}$  signal is active when the printer is turned on, hardware initialization is started when the  $\overline{\text{INIT}}$  signal becomes inactive.)

When the hardware initialization is performed:

- r The printer mechanism is initialized.
- r Input data buffer is cleared.
- r Downloaded character definitions are cleared.
- r Print buffer is cleared.
- r Default values are set.

### 1.4.5.2 Software Initialization

Software initialization is performed upon receipt of the control code ESC @.

When the software initialization is performed:

- r Print buffer is cleared.
- r Default values are set.

The last panel settings are kept.

### 1.4.5.3 Panel Initialization

This printer is initialized by pressing the Load/Eject button while pressing the Alt button.

When the panel initialization is performed:

- r Input data buffer is cleared.
- r Print buffer is cleared.
- r Default values are set.

The last panel settings are kept.

## 1.5 MAIN COMPONENTS

The main components of the Stylus Pro are:

- o Main control board (C164 MAIN Board)
- o Power supply unit (C137 PSB/PSE Board)
- o Control panel board (C137 PNL Board)
- o Printer mechanism (M-4A10)
- o Housing

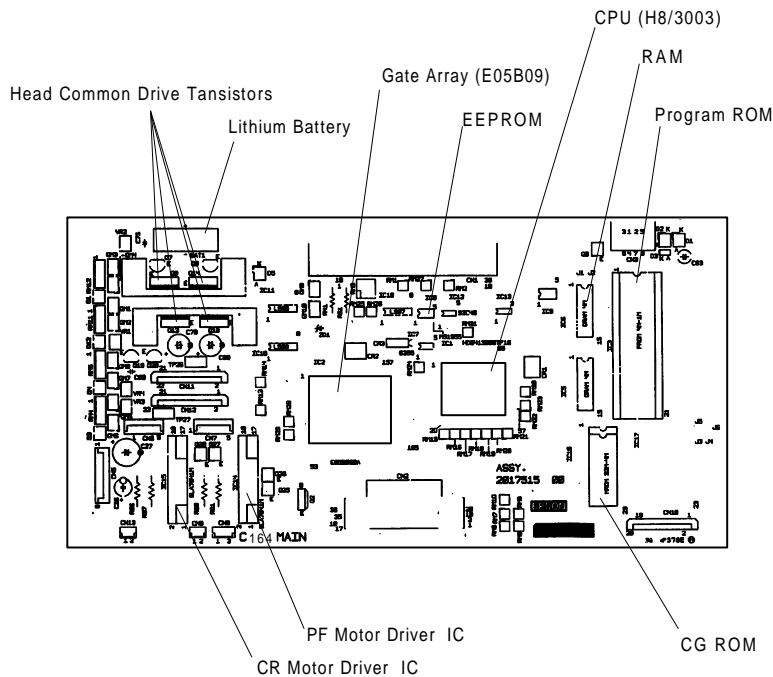
### 1.5.1 Main Control Board (C164 MAIN Board)

The main control board (C164 MAIN Board) consists of an H8/3003 16-bit CPU, E05A09 gate array, a program ROM (1/2/4Mb), a program/CG ROM (1/2/4/8Mb), 1 DRAM (4Mb), a mask ROM (4/8Mb), an EEPROM (1Kb), and a lithium battery for powering the protect counters. The reset IC (M51955 and PST 592) is equipped with both a logic system and a power system. The C164 MAIN Board is almost the same as the C162 MAIN Board, except that the C164 board has no solenoid driving circuit for the ADF. (The C162 MAIN Board has a solenoid driver to operate the document feeder.)

**Table 1-18. Comparison between C164 MAIN and C162 MAIN**

Main Board	C164 MAIN Board	C162 MAIN Board
DRAMs	1	2
ADF Plunger Driving Circuit *	None	Equipped

\* The ADF plunger switches the PF motor operation from paper feed to paper pickup.



**Figure 1-9. C164 MAIN Board Component Layout**

### 1.5.2 Power Supply Board (C137 PSB/PSE Board)

The power supply board (C137 PSB/PSE Board) consists of an RCC switching regulator circuit. This board is equipped with a power switch, connected to the secondary circuit. Thus, if the printer is turned off, it can continue to operate to eject the paper and perform the head-capping operation. The power on/off signal is always monitored by the E05A09 gate array on the C164 MAIN Board, and the logic system recognizes the power switch status.

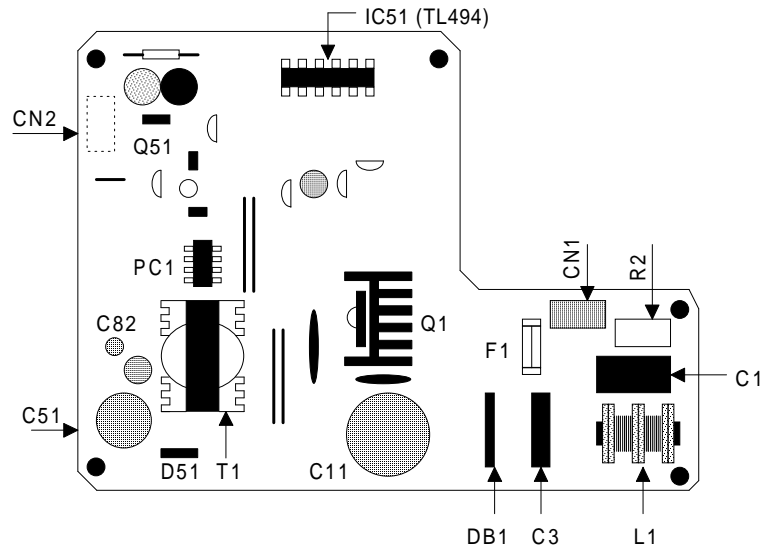


Figure 1-10. C137 PSB/PSE Component Layout

### 1.5.3 Control Panel (C137 PNL Board)

The 15 LEDs on this board indicate error status (there is no buzzer system). By using the 6 buttons in combination with one another, you can operate the printer in each protected mode (cleaning color or black ink systems, exchanging ink cartridges, running a self-test, setting default values, resetting the printer, and EEPROM clearing).

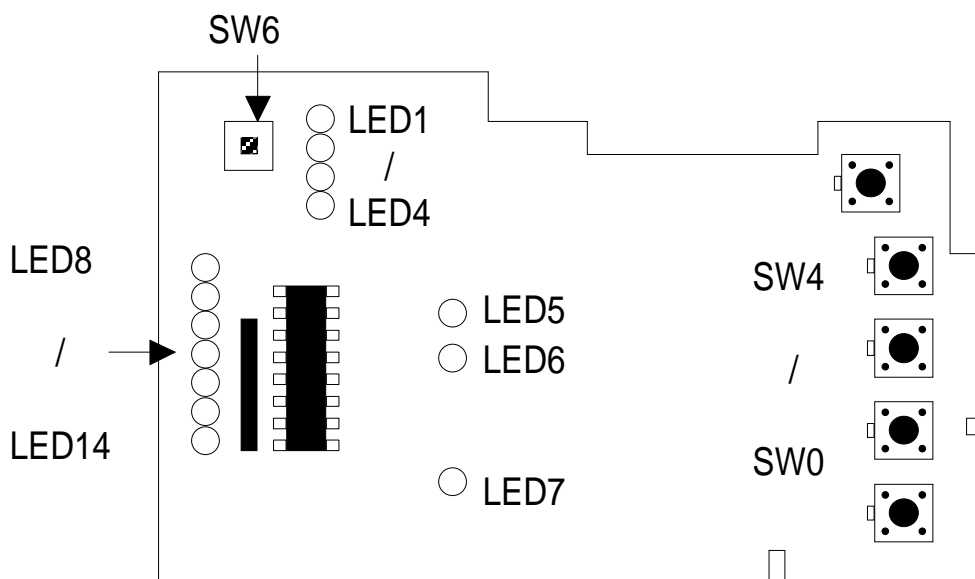


Figure 1-11. C137 PNL Board Component Layout

### **1.5.4 Printer Mechanism (M-4A11)**

The M-4A11 printer mechanism is equipped with a 64-nozzle black printhead and 48-nozzle color (CMY) printhead on the carriage unit. A resolution of 720 dpi is possible with special (non-absorbent) paper.

The ink system has both a black pump unit and a color pump unit. Waste ink from each printhead flows into individual caps. Power for the pump system and paper feed system is supplied by the paper feed motor. This printer mechanism is based on Stylus Color's (M-4A10).

### **1.5.5 Housing**

The Stylus Pro's housing consists of the printer cover, upper case, and the lower case. Attached to the housing is the front paper tray, with paper separator.

# 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 Pro.

## 2.2 OPERATING PRINCIPLES OF THE PRINTER MECHANISM

### 2.2.1 Printer Mechanism

The Stylus Pro is based on the Stylus Color printer. The Stylus Pro printer mechanism is composed of the printhead unit, paper feed mechanism, carriage drive mechanism, pump mechanism, and various sensors such as the Stylus Color's. The figure below shows a functional block diagram of the printer mechanism.

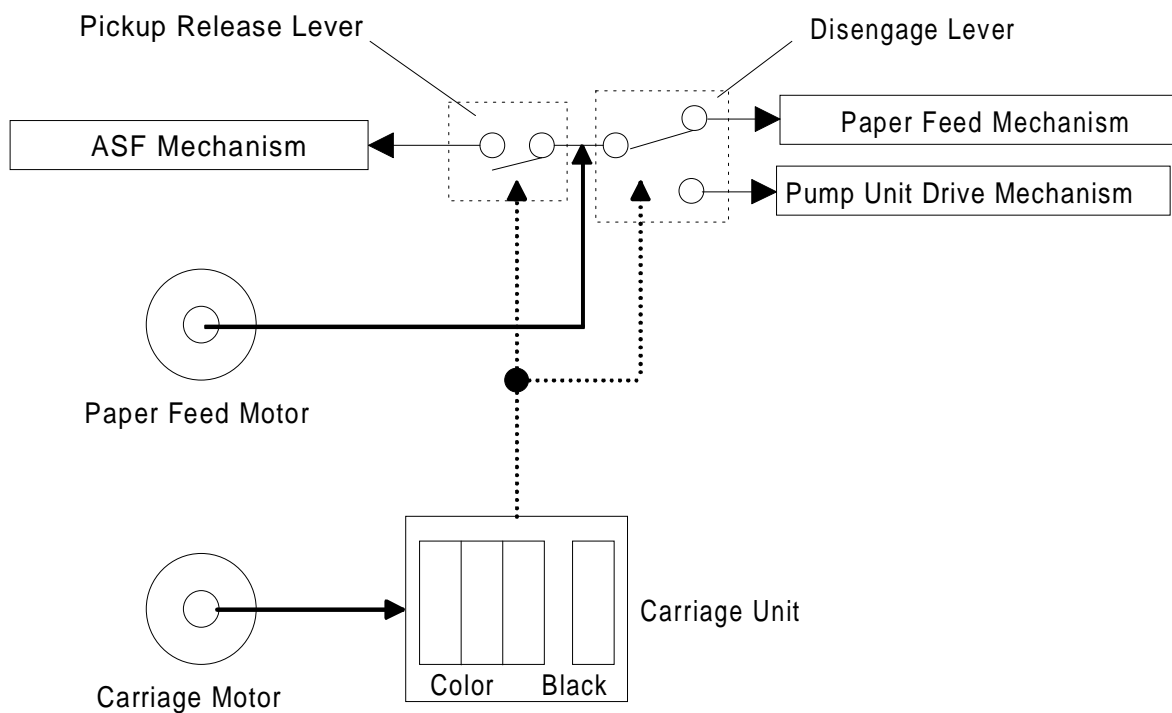


Figure 2-1. Printer Mechanism Block

### 2.2.2 Principles of the Printing Operation

The printing 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 more compact and ensure a high level of reliability, just as with the Stylus Color. The figure below shows the structure of the printhead and ink supply system.

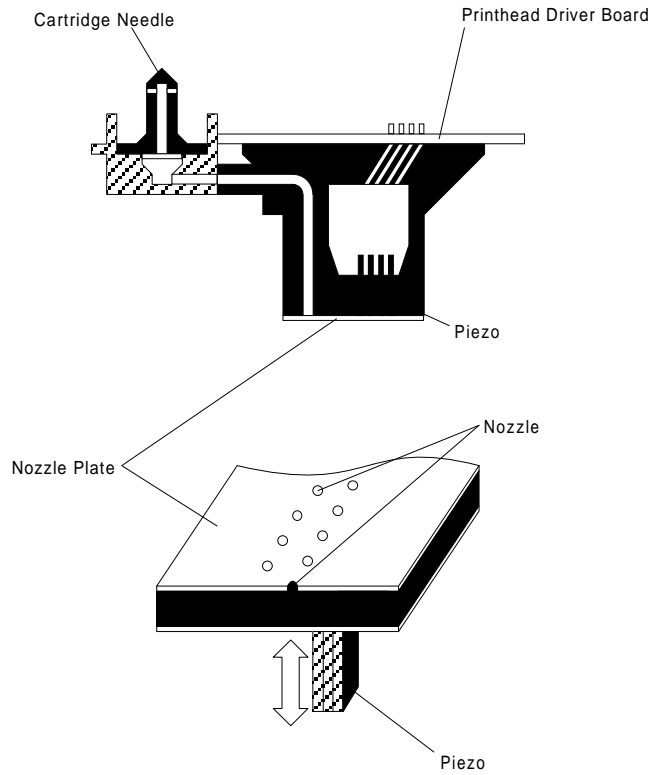


Figure 2-2. Structure of Printhead



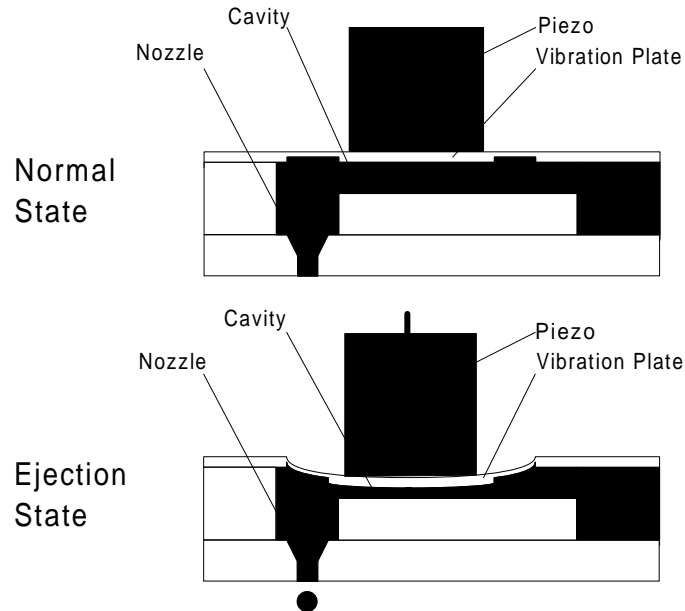
The printhead operates in one of two modes to eject ink from each nozzle:

r Normal state

No electrical charge is applied to the piezoelectric element attached to the back of the cavity, and pressure inside the cavity is kept at a constant level.

r Ejecting state

The head data signal is applied to the specific nozzle control line to select the active nozzle for printing, and the piezoelectric element is gradually charged by the drive voltage. By charging the piezoelectric element, the vibration plate is bent to compress the cavity. Then, ink is ejected 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 ejected from the nozzle, according to the changes in the volume of the cavity.

A thermistor is attached to the side of the color 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 change the time of the Tc pulse. (The Tc pulse is shown in Section 2.3.2.5.)

### **EPSON Micro Dot Printing Mode (Super 720 dpi Printing Mode)**

The Stylus Pro printer has a special printing mode, called the EPSON Micro Dot Printing mode. This printing mode can be selected on command from the host computer. Using this printing mode can improve the quality of output because it eliminates the banding that can sometimes occur in normal mode. In EPSON Micro Dot Printing mode, the ink dot size becomes smaller than the normal dot size.

### 2.2.3 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 from 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. This carriage motor is driven by motor driver IC SLA7041 (see Section 2.3.2.3 for more information).

**Table 2-1. Carriage Drive Motor Specifications**

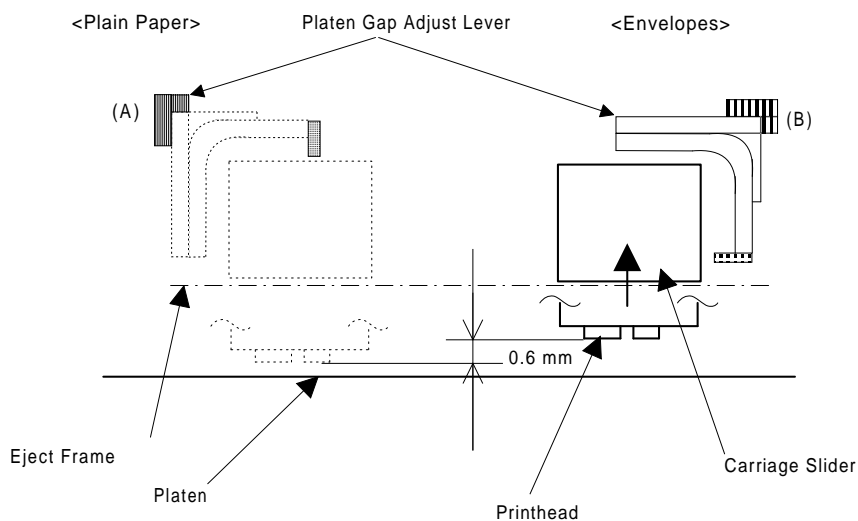
Item	Description
Motor Type	4-phase / 200-pole hybrid-type stepping motor
Drive Voltage	+35 VDC ± 5%
Coil Resistance	10.0 Ω ± 7%
Drive Frequency	960 ~ 4800 PPS
Excitation Mode	Constant current unipolar drive, micro step driving

**Table 2-2. Drive Terms**

CR Speed	Frequency	Phase Drive Method	Acceleration/Deceleration Steps
Mode 1 (200 CPS)	4800 (2400)	r Acceleration/Deceleration Area: 2W1-2 phase + 1-2 phase r Constant Area: 1-2 phase	Acceleration 40 (5)+110 (55) Deceleration 32( 4)+112 (56)
Mode 2 (100 CPS)	2400 (1200)	r Acceleration/Deceleration Area: 2W1-2 phase + 1-2 phase r Constant Area: 1-2 phase	40 (5)+40 (20)
Mode 3 (40 CPS)	960 (480)	r Acceleration/Deceleration Area: 2W1-2 phase r Constant Area: 2W1-2 phase	16 (2)

Notes: 2W1-2 phase means the 1/8 2-2 phase drive control.  
Values in parentheses ( ) are values of the 2-2 phase.

#### 2.2.3.1 Platen Gap Adjust Lever

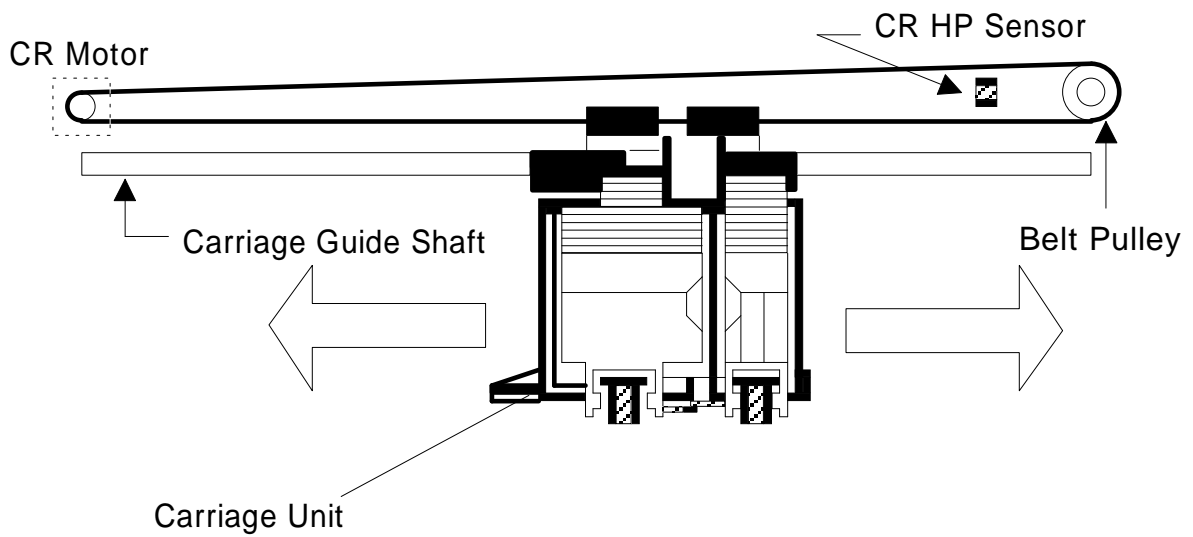


**Figure 2-4. Carriage Drive Mechanism**

The platen gap adjust lever, which is attached to the carriage unit, needs to be set to the appropriate position for the paper thickness. To change the platen gap, put the printer in the PAUSE state, then press the Font button while holding down the Alt button. The carriage unit moves the platen gap adjustment position automatically. The carriage unit moves the platen gap adjustment position automatically. The platen gap adjustment mechanism consists of platen gap lever, carriage slider, and eject frame. When you set the lever for vertical or horizontal position, the carriage slider either pushes against the eject frame or does not push it. Then the platen gap is changed because of the up and down motion of carriage.

**Table 2-3. Platen Gap Adjust Lever Position**

Paper Type	Lever Position
Cut sheets	Horizontal (A) ( $\pm 0$ mm)
Envelopes	Vertical (B) (+0.6 mm)



**Figure 2-5. Platen Gap Lever Operation**

### 2.2.4 Paper Feed Mechanism

This printer's paper feed mechanism can feed paper only from the built-in ASF (auto sheet feeder). The paper feed drive motor is a 4-phase, 96-pole, hybrid-type stepping motor that directly drives the paper feed mechanism (paper advancing operation, paper pickup operation). This motor also drives the pump mechanism, but only when the printer is in the cleaning state. The paper feed motor uses 2-2 phase excitation, except for the paper feed drive sequence (which is 2W1-2 phase).

**Table 2-4. Paper Feed Drive Motor Specification**

Item	Description
Motor Type	4-phase, 96-pole, hybrid-type
Drive Voltage	+35 VDC $\pm$ 5%
Coil Resistance	11.5 $\Omega$ $\pm$ 1.1 $\Omega$
Drive Frequency	300 ~ 1800 PPS
Excitation Mode	Paper feed / pump drive: 2-2 phase, 2W1-2 phase

Table 2-5. Drive Terms

Mode	Frequency (pps)	Current Value (mA)			
		Acceleration/Deceleration	Constant	Rush	Hold
Paper loading	1600	970/750	750	750	240
ASF feed	1600	970/750	750	750	240
Paper feed	391	— / —	970	—	240
Pump Drive 1	1800	1380/1380	1380	750	240
Pump Drive 2	300	— / —	1380	—	240

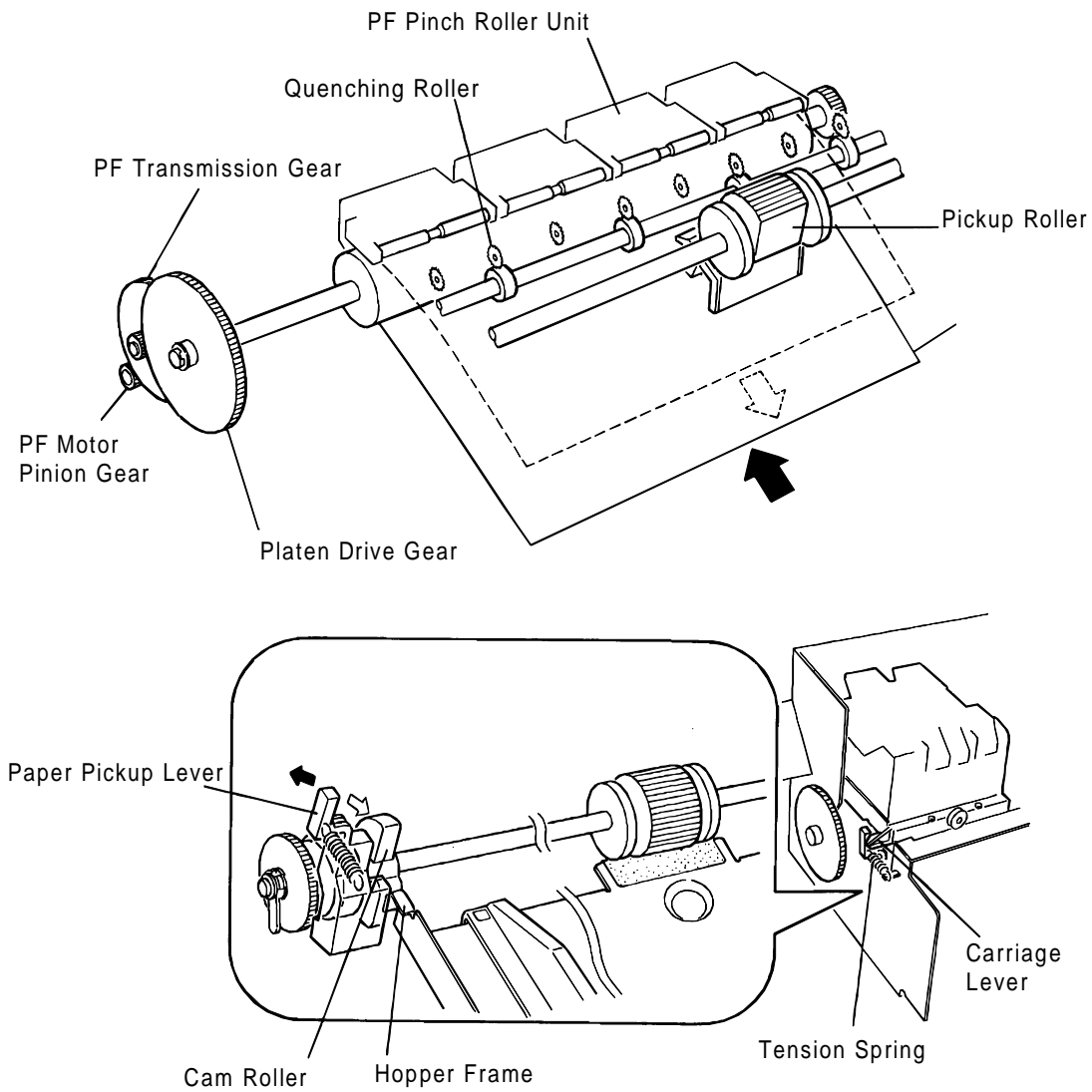


Figure 2-6. Paper Feed Mechanism

### 2.2.5 Ink System

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

- r Ink cartridge
- r Pump mechanism
- r Cap mechanism
- r Waste ink drain tank
- r Wiping mechanism

The figure below shows a diagram of the ink system.

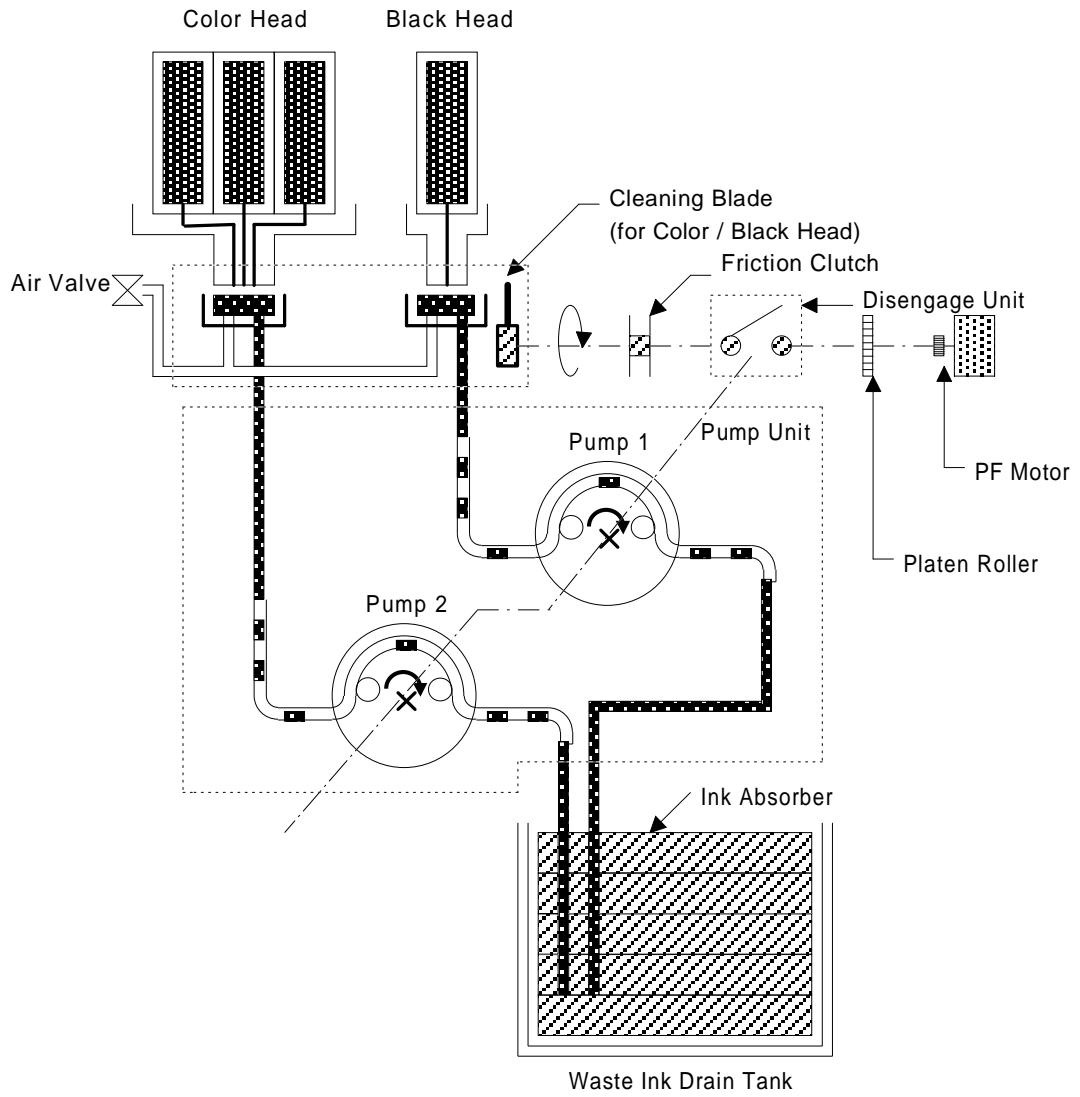


Figure 2-7. Ink System Block Diagram

### 2.2.6 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 diagram of the pump mechanism. Pump system operation depends on the rotational direction of the paper feed drive motor, as shown in Table 2-6.

#### Drive: Pump Mechanism

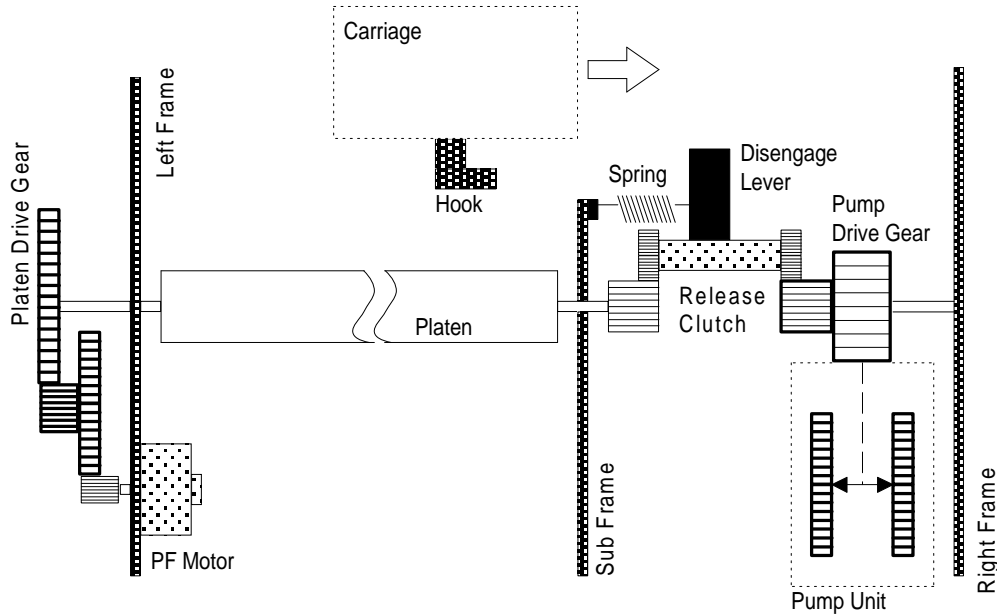


Figure 2-8. Pump Mechanism Block Diagram

#### Drive: Switch Lever Set

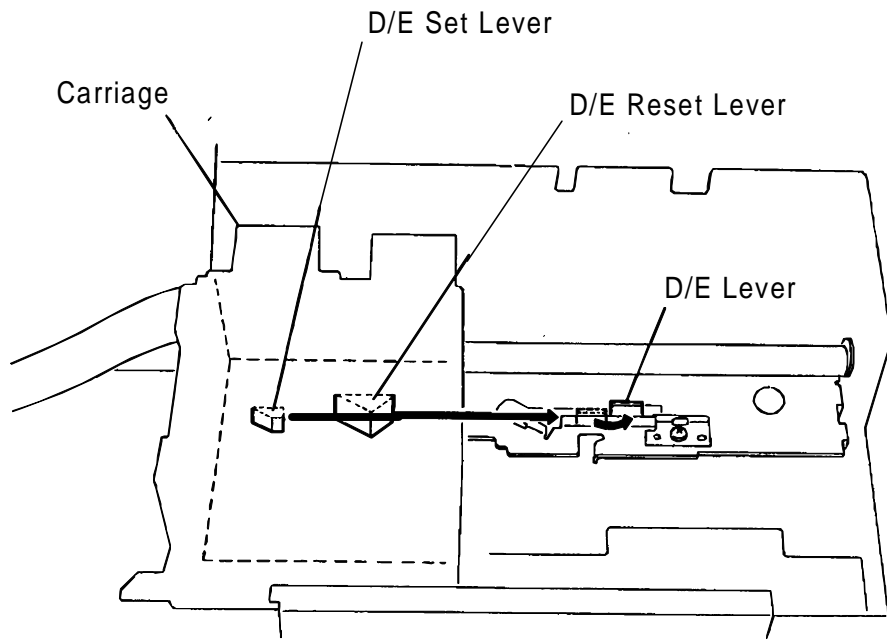


Figure 2-9. Switch Lever Set

Drive: Pump Mechanism

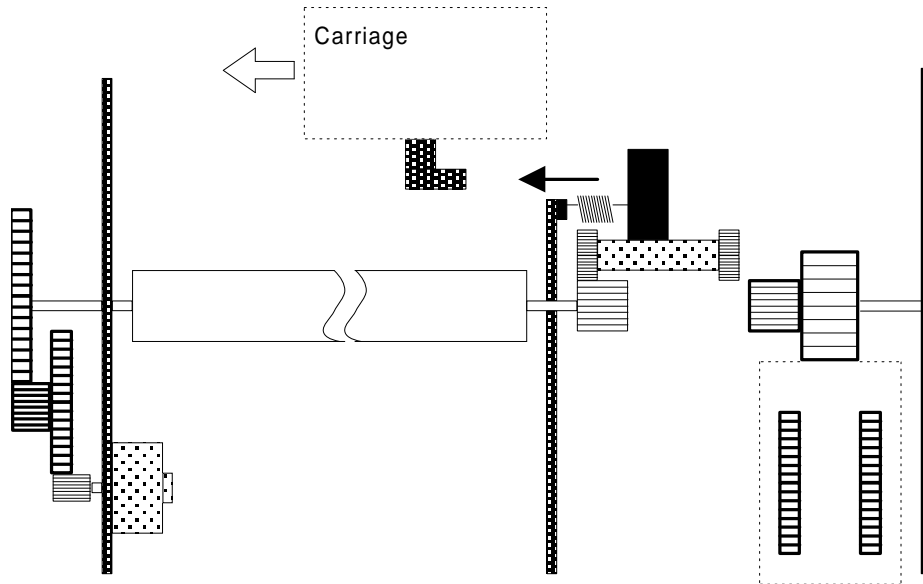


Figure 2-10. Paper Feed Mechanism

Drive: Switch Lever Set

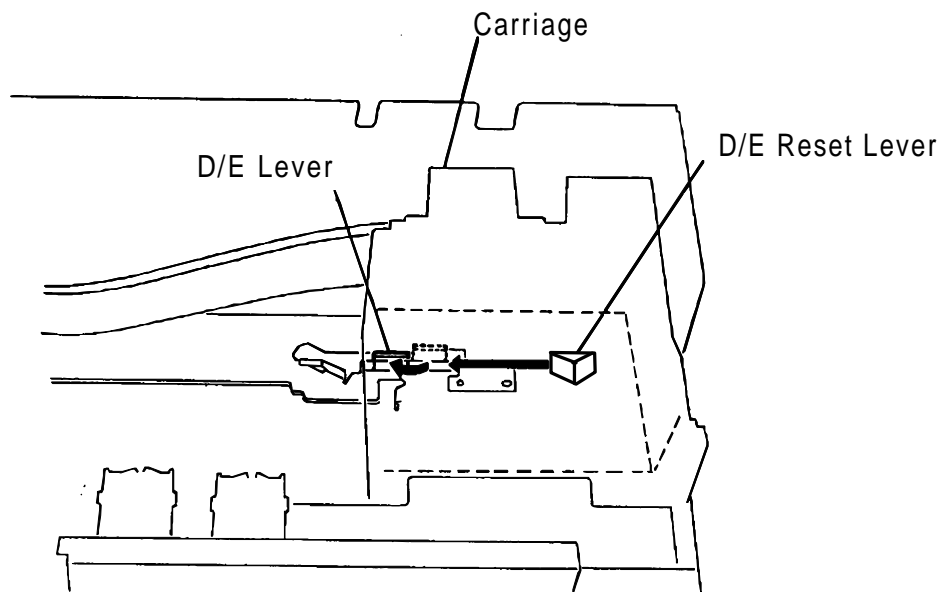
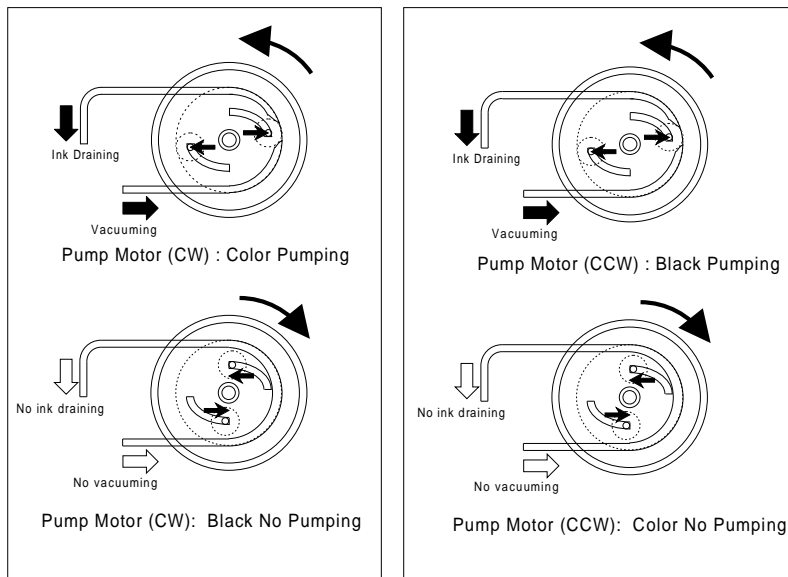


Figure2-11. Switch Lever Reset

**Table 2-6. Pump Mechanism Operation**

PF Motor Rotational Direction	Operation
Clockwise (CW) forward rotation	<ul style="list-style-type: none"> <li>r Color absorption</li> <li>r Wiper reset</li> <li>r Carriage lock reset</li> </ul>
Counterclockwise (CCW) backward rotation	<ul style="list-style-type: none"> <li>r Monochrome absorption</li> <li>r Wiper set</li> <li>r Carriage lock set</li> </ul>

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. The figure below illustrates pump operation. When the paper feed drive motor rotates CW (forward), the color 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. When the motor rotates CCW (backward), the black 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. There are 2 pump rollers in the pump unit, and the drive power is supplied from the paper feed motor via the pump drive gear (D/E gear), which is moved by carriage operation. In the pump unit, the transmission gear supplies both the black and color pulley, which are rotated by the rotation of each other.



**Figure 2-12. Pump Operation**



### 2.2.7 Cap Mechanism

The cap mechanism prevents printhead nozzles from drying and keeps bubbles from forming inside the nozzle while the printer is not in use. The printer performs this operation automatically when print data is not received, when printer power is turned off, and during printing or ink system operations. (The power switch uses a secondary circuit that allows this operation to be performed.) Also this printer has 2 caps, 1 for the black head and 1 for the color head.

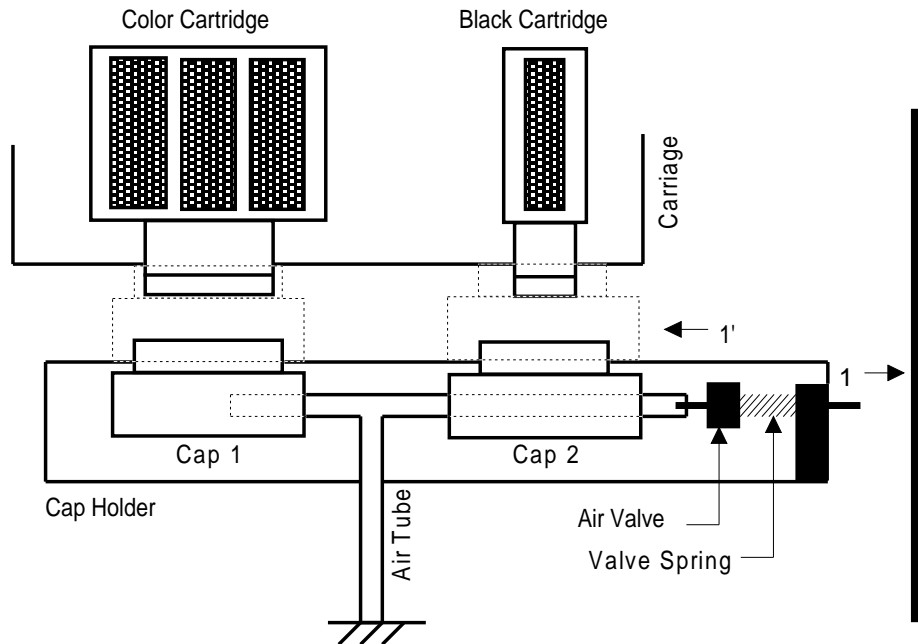


Figure 2-13. Cap Mechanism

### 2.2.8 Wiping Mechanism

The wiping mechanism cleans the surface of the printhead nose when the printer is in the ink system sequence. The wiper drive gear transmits power from the paper feed motor via the clutch gear. When the wiper is raised up against the printhead surface, the hook for securing the carriage to the home position is raised, too. When the wiper goes down toward the bottom frame, the hook goes down, too. Both the black head and the color head are cleaned by this wiper.

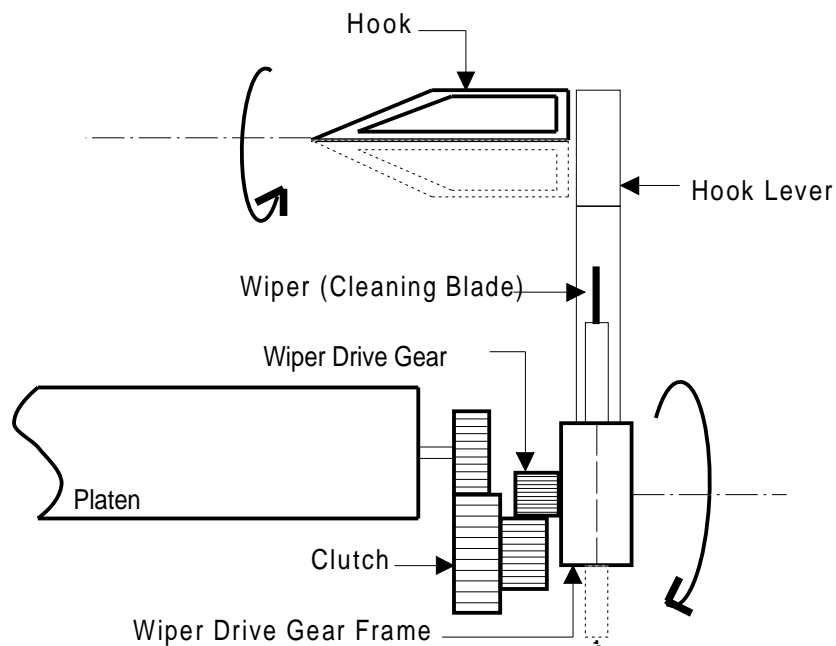


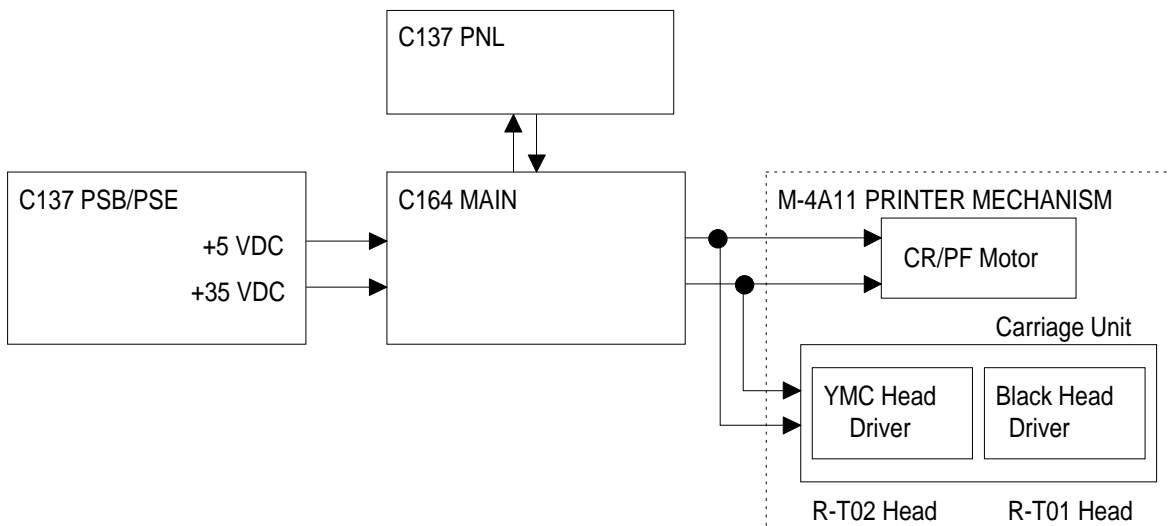
Figure 2-14. Wiping Mechanism

## 2.3 OPERATING PRINCIPLES OF THE ELECTRICAL CIRCUITS

The Stylus Color Pro contains the following circuit board units:

- r C164 MAIN Board (main control circuit board).
- r C137 PSB/PSE Board (power supply circuit board). This board is the same as Stylus Color's
- r C137 PNL (control panel board). This board is the same as Stylus Color's.

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; the printhead is attached directly to this board. The figure below shows a block diagram of the electrical circuits.



**Figure 2-15. Block Diagram of the Electrical Circuits**

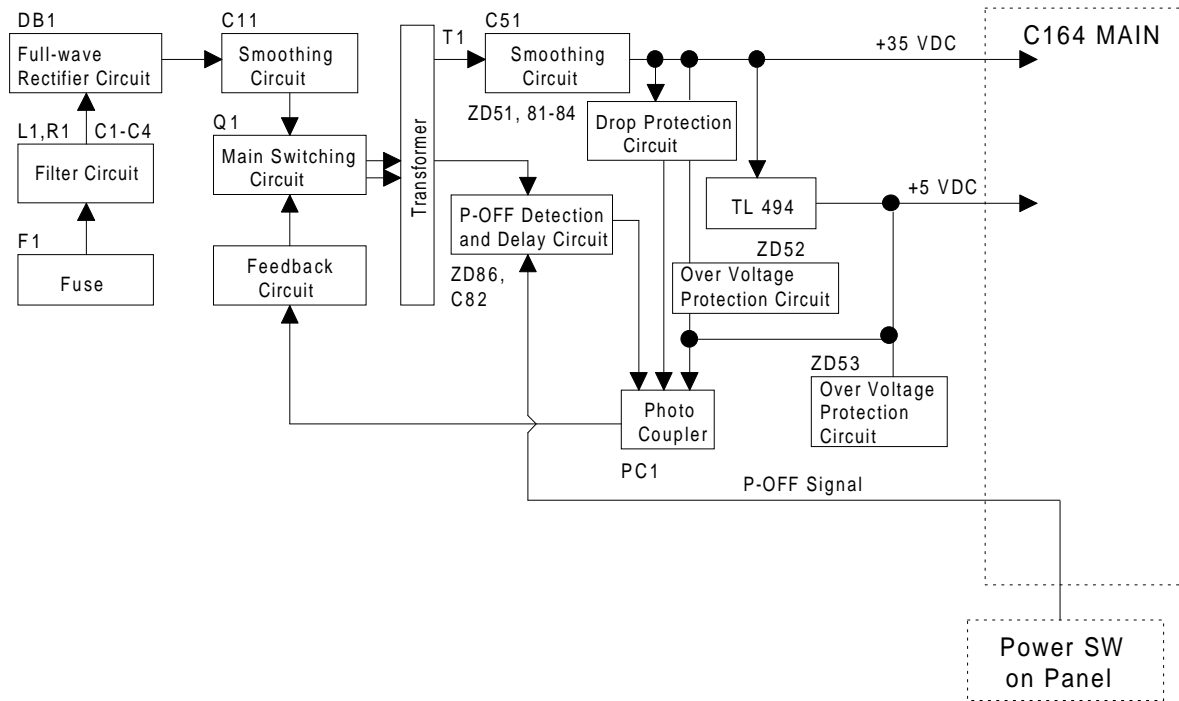
### 2.3.1 Operating Principles of the Power Supply Circuit

The power supply circuitry for this printer is provided either by the C137 PSB board (120 VAC) or the C137 PSE board (220-240 VAC). Both boards are identical in design and functionality, except for the components in the primary circuit that accommodate the specified input voltage. The input voltage and the application of output voltages are summarized in the table below.

**Table 2-7. DC Voltage Distribution**

Voltage	Application
+35 VDC	Motor drive (carriage and paper feed) Printhead (through the drive voltage generation circuit)
+5 VDC	C164 MAIN Board Sensors (home position, paper end, no ink cartridge, head thermistor) Control panel, head nozzle selector

The figure below shows a block diagram of the power supply circuit (C137 PSB/PSE). The power switch is equipped with a secondary circuit that allows the CPU to remain active for a while after the printer is turned off. This allows the printhead to return to the capping position after power has been turned off. The CPU, which is mounted on the C164 MAIN Board, always monitors the PSC (Power On/Off) signal. If this signal goes LOW, the CPU resets each device after performing the head-capping sequence. Also, this board employs the RCC (Ringing Choke Converter) switching system. The AC voltage is first input to the filter circuit for higher harmonics absorption, and then input to the rectification and smoothing circuit, converting it into DC voltage. This DC voltage is then input to the switching circuit for the switching operation. Along with the switching operation on the primary side, +35 VDC is generated after passing through the +35 V line voltage detection circuit. This +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 2-16. Cap Mechanism**

1. +5 VDC line over voltage protection circuit

The output voltage level of +5 V line is monitored by Zener diode ZD53. If the voltage level exceeds +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 / over voltage control circuit

The output current is monitored by detection resistor R53 and fed back to +5 VDC generation switching control IC51, which monitors the output voltage. This information is input to the internal comparator, which outputs a HIGH signal to turn off transistor Q51 when the voltage or current becomes abnormal.

3. +35 VDC line over voltage protection circuit

The output level is monitored by Zener diode ZD36. If the voltage level exceeds +36 V, photocoupler PC1 is activated. This stops primary switching circuit operation.

4. +35 VDC line drop protection circuit

The output level of +35 VDC line is monitored by a detection circuit that consists of Zener diodes ZD51 and ZD81 to 84. 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.

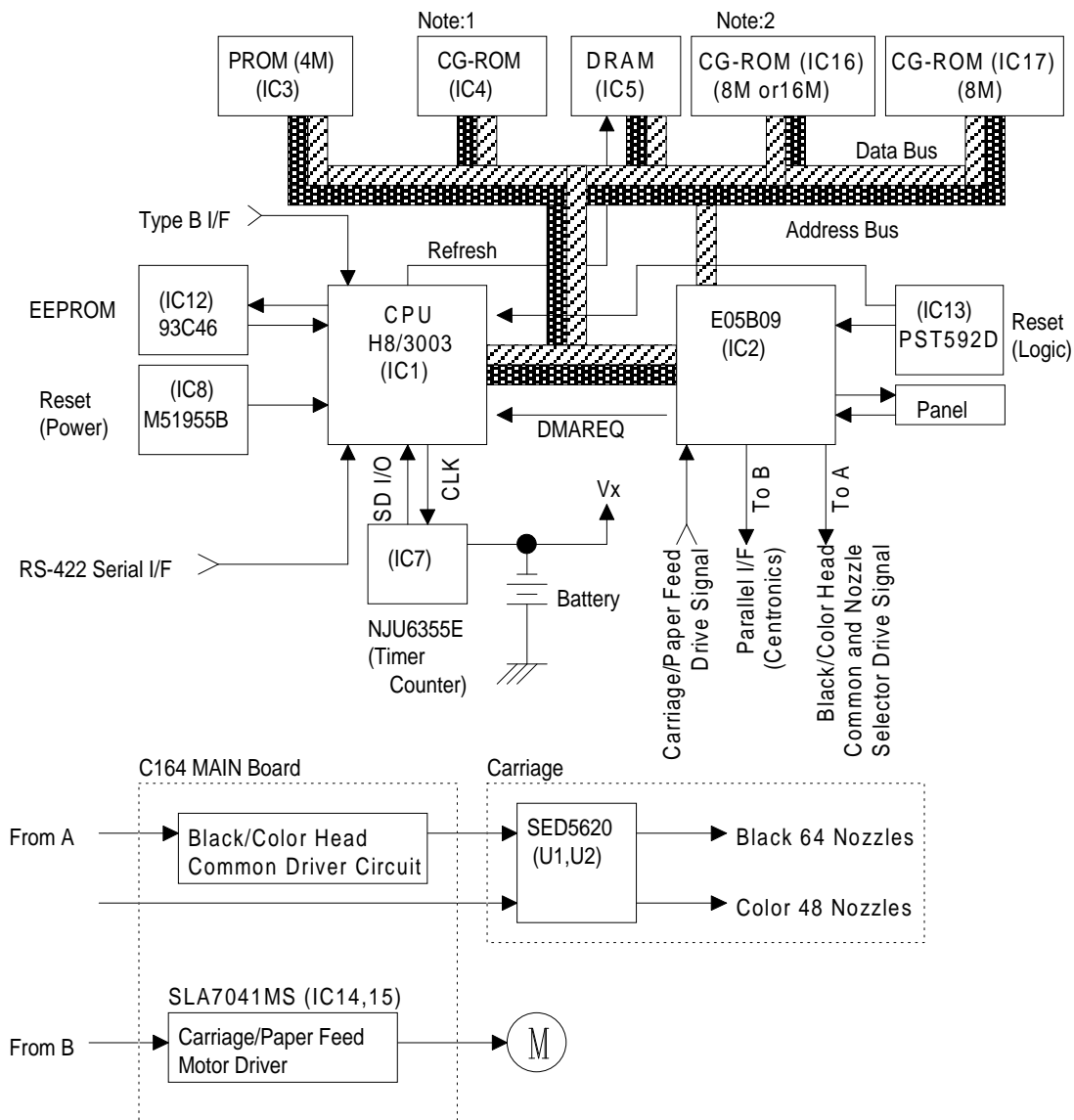
### 2.3.2 Operating Principles of the Main Control Circuit

The main control circuit for this printer is the C164 MAIN Board. This circuit is controlled by a 16-bit H8/3003 CPU (IC1), running at 14.7456 MHz. The CPU has a unique architecture, capable of handling data on the data bus at either an 8-bit or 16-bit bus width. Because of this, a 16-bit or 8-bit data bus width-type ROM is used on this board, increasing the internal processing speed. Also, the CPU's unique architecture is capable of the refresh control function. A 4M DRAM (2 CAS method) on the main board is controlled by the CPU itself. In addition, the CPU controls the serial interface control (RS-422 for Mac).

Gate array E05B06 (IC2) manages printhead drive control, the external Centronics® parallel I/F, extension CG board and the control panel, and the controls that create the 4-bit signal for the carriage or the paper feed motor. (The carriage and paper feed motor are controlled by the current duty data.)

This board also is equipped with EEPROM 93C46 (IC12) to store certain parameters, such as the printer mechanism control parameter, default setting parameters, as well as a special counter value used for printhead (ink management) protection.

The timer IC NJU6355E (IC7) counts each time the printer is cleaned and keeps track of how long the printer is not used, thereby allowing the printer to be cleared only when necessary.



- Notes 1: 32-pin IC socket only
- 2: IC 17 is socket only.
- 16M (IC16), IC17 are only installed in JAPAN version.

Figure 2-17. Main Control Circuit Block Diagram

2.3.2.1 Reset Circuits

The C164 MAIN Board contains 2 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 (logic line), using reset IC PST592D (IC13), and outputs a reset signal to the CPU (IC1) and the E05E09 gate array (IC2) when the voltage level drops below +4.2 V. The +35 V monitor reset circuit monitors the voltage level of the +35 V line, using reset IC M51955B (IC8), and outputs a reset signal to the CPU (IC1) and the E05E09 gate array (IC2) when the voltage level drops below +28 V, and this causes a non-maskable interrupt (NMI).

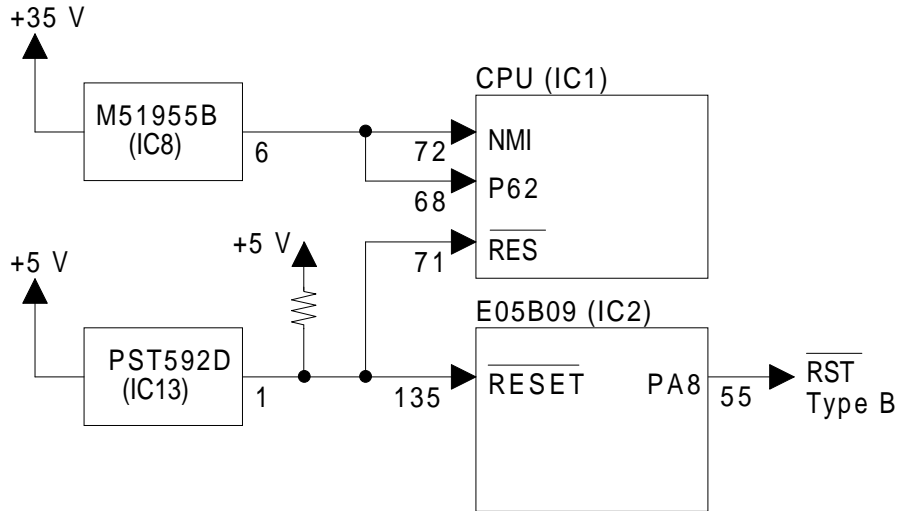


Figure 2-18. Reset Circuit Block Diagram

2.3.2.2 Sensor Circuits

The following sensor circuits enable the C164 MAIN Board to monitor printer mechanism status:

- HP sensor      A photocoupler-type HP (home position) sensor is attached to the surface of the printer mechanism to detect the carriage home position. A HIGH level from the signal indicates that the carriage is in home position.
- 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. A LOW level from the signal indicates that no paper is loaded.
- BCO sensor,      Micro switches (BCO sensor for the monochrome ink cartridge, CCO sensor for the color  
CCO sensor      ink cartridge) are attached to the bottom of monochrome ink cartridge holder in the carriage unit. When the ink cartridge is installed, these switches are pressed and a LOW level from the signal indicates that the ink cartridge is installed into the ink cartridge holder.
- Thermistor      A thermistor is attached to the color printhead driver board to monitor its temperature by thermistor's resistance value (at 25° C (77° F), approximately 10 KΩ ). The CPU changes the printhead drive signal's pulse width (charge pulse width) based on the temperature level.

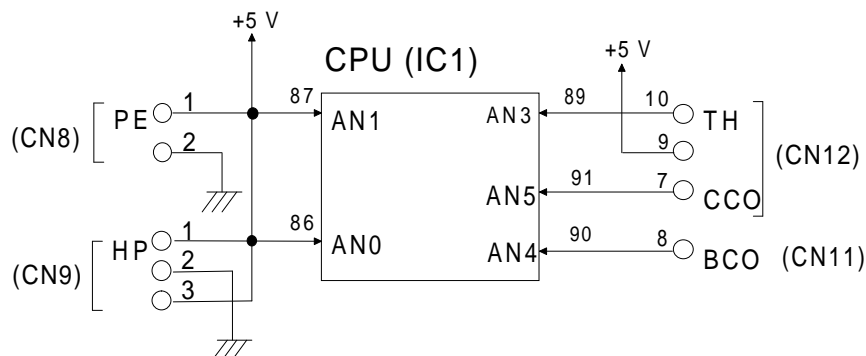


Figure 2-19. Sensor Circuit Block Diagram

### 2.3.2.3 Carriage Motor Drive Circuit

The carriage motor drive IC SLA7041MS (IC15) outputs a constant current to drive the carriage motor for the printer mechanism. Gate array E05B09 (IC2) decides the motor phase and speed and then sends a signal to the carriage motor driver IC (SLA7041MS) using the 4-bit serial transmission line.

The first bit indicates the direction of motor rotation. The other three bits are current duty data for the motor speed of each printing sequence. SLA7041MS can select the reference voltage itself based on these three current duty data bits. Also, it receives these signals by two serial transmission lines for the two motor phases (phase A and phase B). Due to this, the carriage motor can drive micro step sequence (1/720 inches, minimum).

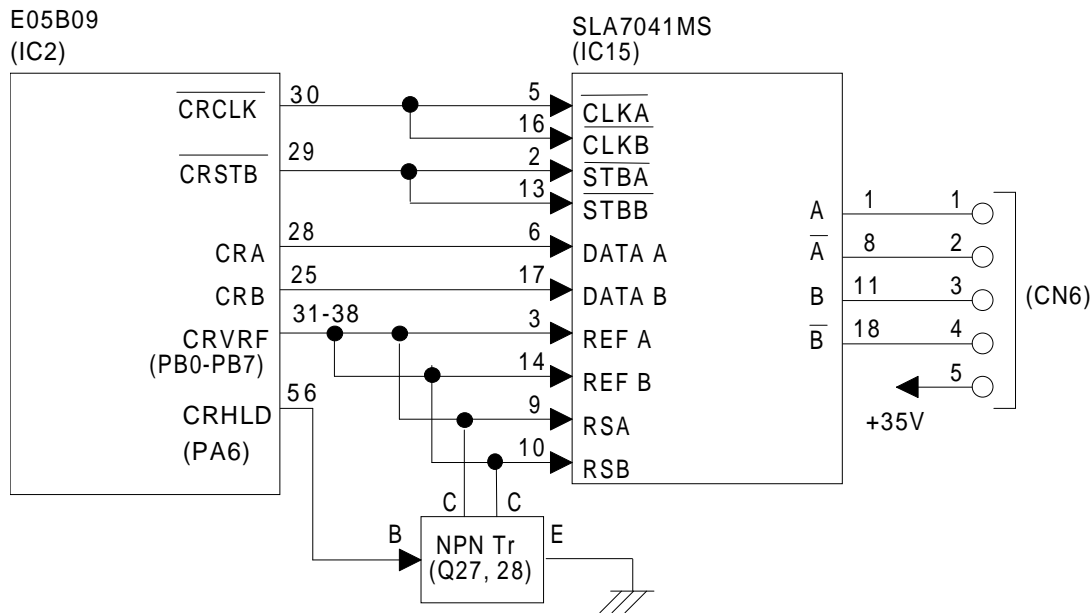


Figure 2-20. Carriage Motor Circuit Block Diagram

The SLA7041MS motor driver reads four-bit serial data using four clock counts from the E05B06 (IC2) clock. Each bit is read at the falling edges of these clock pulses. As a result of this, received serial data is sent into the shift register and then shifts the latch register. When the strobe pulse becomes active from the E05B06 (IC2), serial data is moved into the reference voltage selection circuit and the voltage is changed. Therefore, when the printer is in the constant speed mode, this strobe pulse becomes inactive. The following table indicates the current duty of each carriage motor speed mode.

Table 2-8. Serial Data Contents

Mode	c b a	Vref (typical)	
0	0 0 0	Vref × 1/3 (Vref = +5V)	× 0%
1	0 0 1		× 20%
2	0 1 0		× 40 %
3	0 1 1		× 55.5%
4	1 0 0		× 71.4%
5	1 0 1		× 83%
6	1 1 0		× 91%
7	1 1 1		× 100%

The following figure shows 4-bit serial data and how this data is transferred by the SLA7041MS driver. The step time of the reference voltage is determined by the interval time of the strobe pulse.

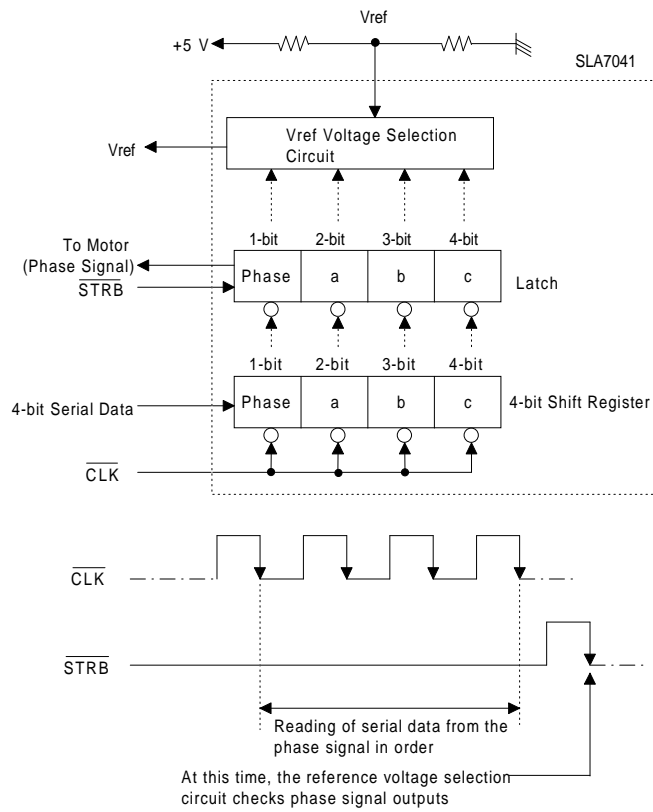


Figure 2-21. Serial Data Transfer Procedure

2.3.2.4 Paper Feed Motor Drive Circuit

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

- r Paper feed mechanism
- r Paper pickup mechanism
- r Pump mechanism

Driver IC SLA7041MS (IC14) drives the paper feed motor by a constant current. The operation principle is same as for the carriage motor drive circuit. But the paper feed motor drives not only the paper feed mechanism but also the pump unit. (Refer to Section 2.2.4.)

Table 2-9. Paper Feed Motor Drive Modes

Mode	Phase Excitation	Drive Frequency
Paper feed	2-2 phase or 2W1-2 phase	391 or 1600 pps
Pump drive	2-2 phase	300 or 1800 pps

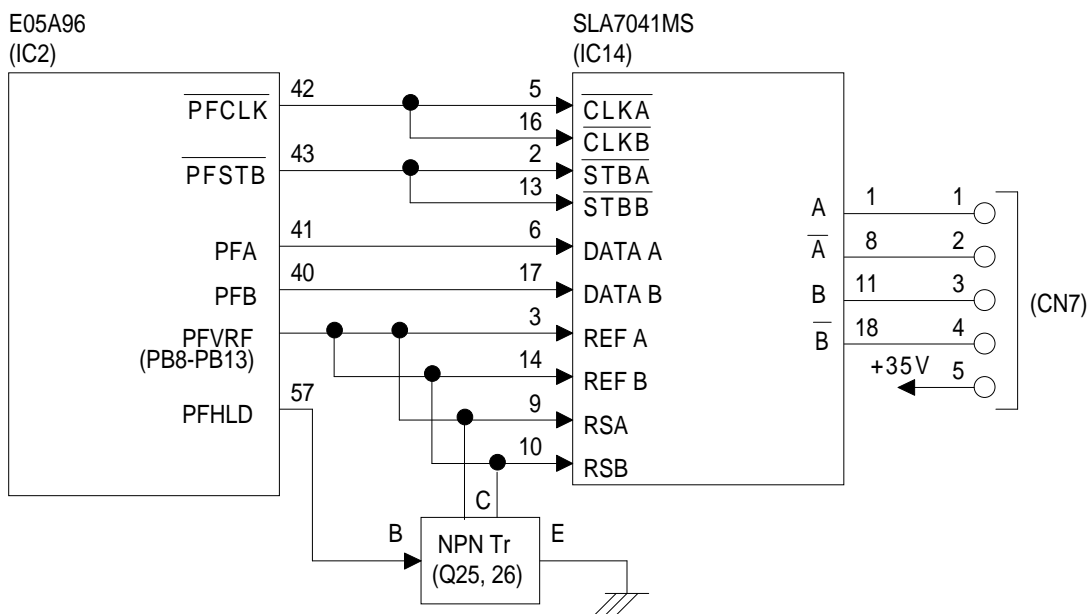


Figure 2-22. Paper Feed Motor Drive Circuit Diagram



### 2.3.2.5 Printhead Drive Circuit

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

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

The 64-bit thermal head driver SED5620D in the head drive circuit on the carriage is used as a nozzle selector to selectively drive the printhead nozzles. Print data is converted into serial data by gate array E05B09 (IC2) and is output from port BSO (pin 20) to the black head drive circuit or output from port CSO (pin 24) to the color head drive circuit. Then, head driver SED5620D latches the head data when gate array E05B09 outputs the BLAT or CLAT signal, and the latched data becomes 64-bit parallel data for the black head, or 48-bit parallel data for the color head. One bit corresponds to each nozzle.

When data transfer and nozzle selection are complete, gate array E05B09 outputs the common drive pulse BPWC or CPWC (charge pulse) and BPWD or CPWD (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 eject ink.

### Normal Dot / EPSON Micro Dot Printing Mode

The Stylus Color Pro produces two types of ink ejection (normal print mode and EPSON Micro Dot Mode). The signals for switching ink ejection modes are “SELM” (for normal dot printing) and “SELN” (for EPSON Micro Dot printing). These signals are output from pin 49 and pin 50 of gate array E05B09 to IC11 and IC18.

In normal dot print mode, the common drive signals (BPWC, CPWC and BPWD, CPWD) are output to the register arrays (RM12 for black, RM5 for color). In the Micro Dot Mode, the signals (BPWC, CPWC and BPWD, CPWD) are output to the register arrays (RM11 for black, RM4 for color). The signals through the resistor array are output to the charge / discharge circuit that consists of Darlington connected transistors. Then the circuit generates printhead drive pulses.

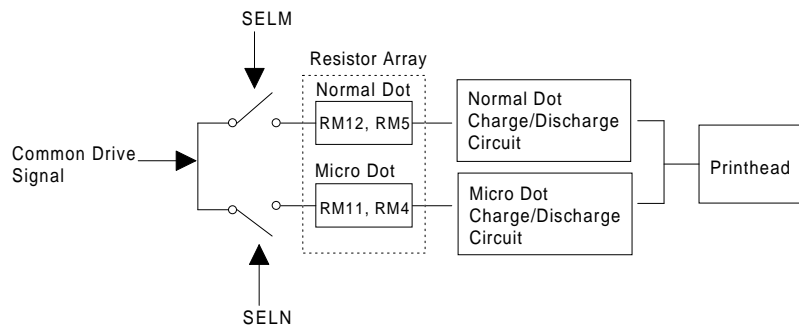


Figure 2-23. Normal / EPSON Micro Dot Switching

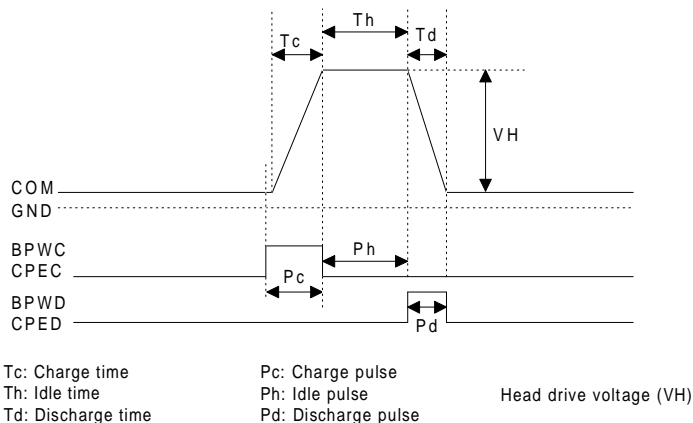


Figure 2-24. Trapezoidal Drive Waveform

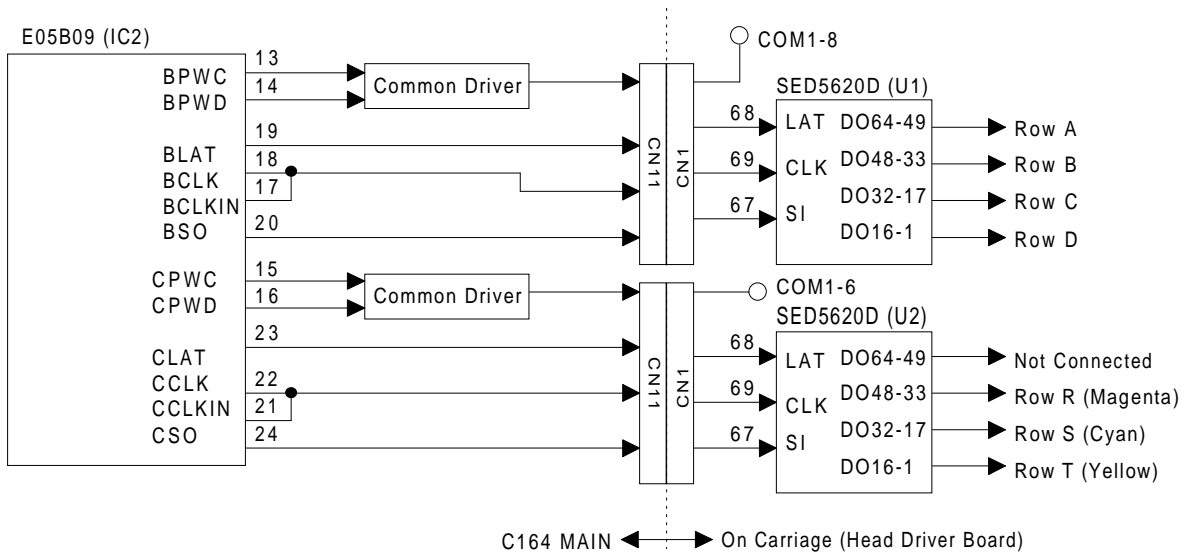


Figure 2-25. Printhead Drive Circuit Block Diagram

2.3.2.6 DMA Controller

Data from the host computer is received automatically by the  $\overline{\text{STB}}$  signal via the external Centronics interface. The data is input to the input buffer on the DRAM (IC5). At this time, E05B09 detects the rising edge of the external STB signal and outputs the STBDMA (strobe DMA request) signal to the CPU. When the CPU detects this signal, the DMA controller in the CPU sends a bus request to the bus controller in the CPU, and then the CPU releases the bus line. Because of this, the external data is transported into the memory, bypassing the CPU.

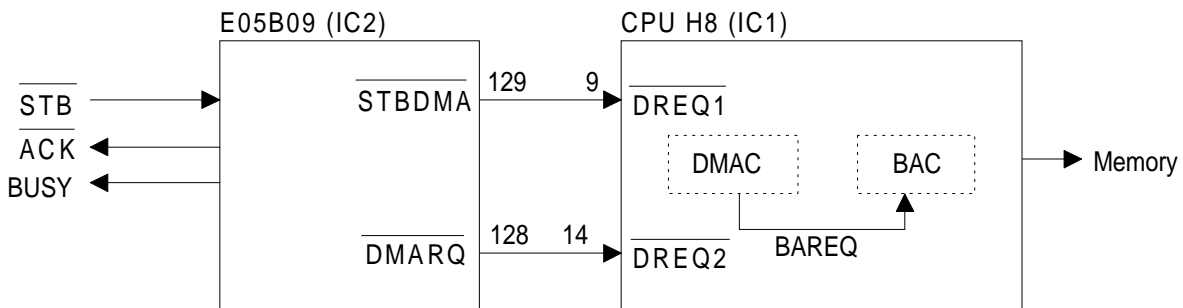


Figure 2-26. DMA Controller Operation

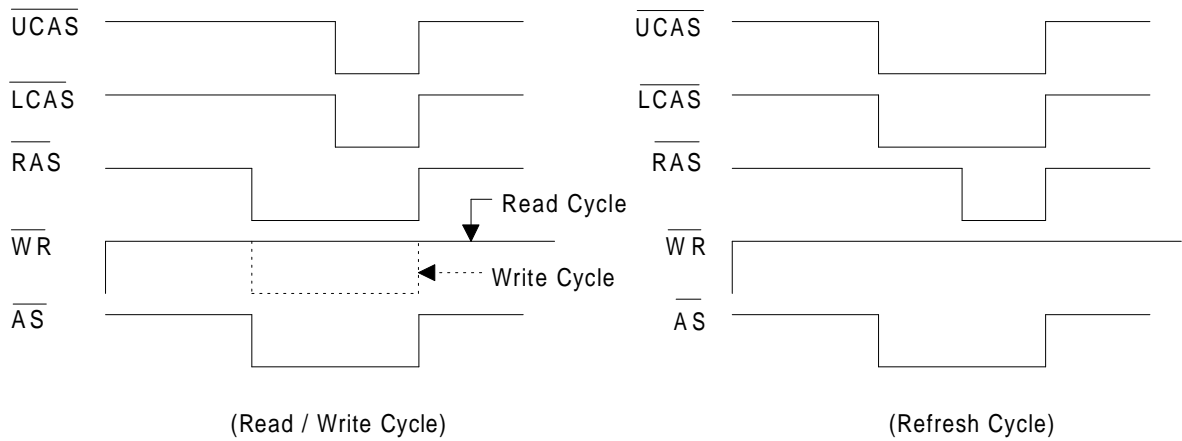
**2.3.2.7 DRAM Refresh Controller**

The CPU is equipped with a refresh controller in its internal controller. This CPU controller can contact the 16-bit length IC5 DRAM, which is a 2 CAS type. The following table lists the junction method between the H8 CPU and the 2 CAS DRAM.

**Table 2-10. Junction Method (CPU - 2 CAS DRAM)**

CPU	2 CAS DRAM
HWR	$\overline{\text{UCAS}}$
LWR	$\overline{\text{LCAS}}$
CS3	$\overline{\text{RAS}}$
RD	$\overline{\text{WR}}$

This method of the DRAM refresh is only used for the CAS-before-RAS cycle method. The following figure shows the timing of each cycle.



**Figure 2-27. Junction Method (CPU - DRAM)**

## 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. Ink system control is composed of the following operations:

- |   |  |
|---|--|
| r Power On  | r Wiping Operation 1                       |
| r Cleaning Selection                              | r Wiping Operation 2                       |
| r Micro Absorbing Cleaning                        | r Rubbing Operation                        |
| r Power Off                                       | r Disengage On                             |
| r Print Start                                     | r Disengage Off                            |
| r Refresh   | r Micro Absorbing                          |
| r Standby   | r Carriage Lock Set                        |
| r False Absorbing                                 | r Carriage Lock Reset                      |
| r Ink Cartridge Replacement                       | r Refresh (When loading or ejecting paper) |
| r Adjust Lever Operation Position Moving Sequence |  |
| r Transportation Sequence                         |  |

These ink system operations are controlled by the following counter:

- r Protect counter

### 2.4.1 Ink Operations

The various ink operations that can be performed selectively by the printer are described below:

#### 1. Power On Operation

This operation is performed when power is turned on.

#### 2. Cleaning Selection Mode

This operation cleans each nozzle to ensure that the nozzle fires and that no dots are skipped during printing. This operation is performed by pressing the cleaning switch (Alt + Load/Eject or Economy/Condensed) while the printer is in PAUSE status.

#### 3. Micro Absorbing Cleaning Operation

This operation prevents an increase in the viscosity of ink in the printhead using ink absorbing discharge.

#### 4. Power Off Operation

This operation ensures that the carriage is in the home position when the printer turns off, and prevents the disengage gear from turning continuously when the printer turns off. This operation is performed when the switch on the secondary side is turned off.

#### 5. Print Start Operation

This operation eliminates ink from the nozzle surface, and is performed when the printer receives print data while in the standby state.

#### 6. Refresh Operation

This operation prevents an increase in the viscosity of the head ink.

#### 7. Standby Operation

This operation also prevents an increase in the viscosity of the head ink.

#### 8. False Absorbing Operation

This operation absorbs ink inside the cap, and eliminates ink from the nozzle plate.

#### 9. Ink Cartridge Replacement Operation

This operation is performed when the Alt button is held down for more than 3 seconds (the Pause LED lights); the carriage then moves to the ink cartridge replacement position.

### **10. Wiping Operation 1**

This operation eliminates dust from the nozzle plate before performing ink absorption.

### **11. Wiping Operation 2**

This operation eliminates dust or ink from the nozzle plate after performing ink absorption.

### **12. Rubbing Operation**

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

### **13. Disengage ON Operation**

This operation sets the switch lever to the position where it transmits the PF motor drive to the pump mechanism. It also moves the carriage to the home position, where the lever is set to the specified position.

### **14. Disengage OFF Operation**

This operation resets the switch lever to the position where it transmits the PF motor drive to the pump mechanism. It also moves the carriage to the flushing position, where the lever is reset to the specified position.

### **15. Micro Absorbing Operation**

When the cartridge is removed, it is possible for a small amount of air to form small air bubbles that can block the ink from the nozzle. This operation eliminates small air bubbles from the cavity of the printhead.

### **16. Carriage Lock Set**

This operation prevents the carriage from moving out of the home position if the printer is turned off or is paused. This operation is performed when the carriage is in the ink system home position and no paper is loaded.

### **17. Carriage Lock Reset**

This operation resets the carriage lock lever.

### **18. Refresh Operation (Performed when Loading or Ejecting Paper)**

This operation prevents an increase in the viscosity of ink inside the black head surface when paper is being loaded or ejected. When just the black head is on, the color head is capped as paper is loaded or ejected. The printer performs the flushing operation for the black head only.

### **19. Adjust Lever Operate Position Moving Sequence**

This operation is performed when the Alt and Font buttons are pressed simultaneously while the printer is paused.

### **20. Transportation Sequence**

This sequence is performed to clean the printhead when the printer is transported to the market.

## 2.4.2 Counter

EEPROM LE93C46 (IC12) on the main board stores certain counter and timer values that are used for controlling the ink system operation.

### 2.4.2.1 Protect Counter

The value of protect counter A is stored into the EEPROM on the main board, and while the printer is on, this data is stored in the RAM on the main board.

n Protect counter A                      This counter is used to manage the total amount of drained ink. If the counter value is equal to or exceeds 40000, the printer indicates an error on the control panel that maintenance is required.

### **Notes for Service**

*Protect counter A is reset:*

- 1. Upon shipment from the factory.*
- 2. After maintenance is performed (when the ink drain tank is replaced).*

# 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 by reversing the disassembly procedure. Therefore no assembly procedures are included. Precautions for any disassembly or assembly procedure are described under the heading “Disassembly/Assembly Points.” Adjustments required after assembling the unit are described under the heading “Required Adjustments.”

### 3.1.1 Precautions for Disassembling the Printer

See the precautions below when disassembling the printer.

#### **WARNING**

- r *Disconnect the power cable before disassembling or assembling the printer.*
- r *Wear protective goggles to protect your eyes from ink. If ink gets in your eye, flush it with fresh water and see a doctor immediately. If ink comes into contact with your skin, wash it off with soap and water. If irritation occurs, contact a physician.*
- r *A lithium battery is installed on the C164 MAIN Board of this printer. Be sure to observe the following instructions when servicing the battery:*
  1. *Keep the battery away from any metal or other batteries so that electrodes of opposite polarity do not come in contact with each other.*
  2. *Do not heat the battery or put it near fire.*
  3. *Do not solder on any part of the battery. (Doing so may result in leakage of electrolyte from the battery, burning, or explosion. The leakage may affect other devices close to the battery.)*
  4. *Do not charge the battery. (An explosive gas may be generated inside the battery, and cause burning or explosion.)*
  5. *Do not dismantle the battery. (The gas inside the battery may hurt your throat. Leakage, burning, or explosion may also result.)*
  6. *Do not install the battery in the wrong direction. (This may cause burning or explosion.)*

#### **CAUTION**

*There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to government's laws and regulations.*

#### **ATTENTION**

*Risque d'explosion si la pile est remplacée incorrectement. Ne remplacer que par une pile du même type ou d'un type équivalent recommandé par le fabricant. Éliminer les piles déchargées selon les lois et les règles de sécurité en vigueur.*

#### **CAUTION**

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

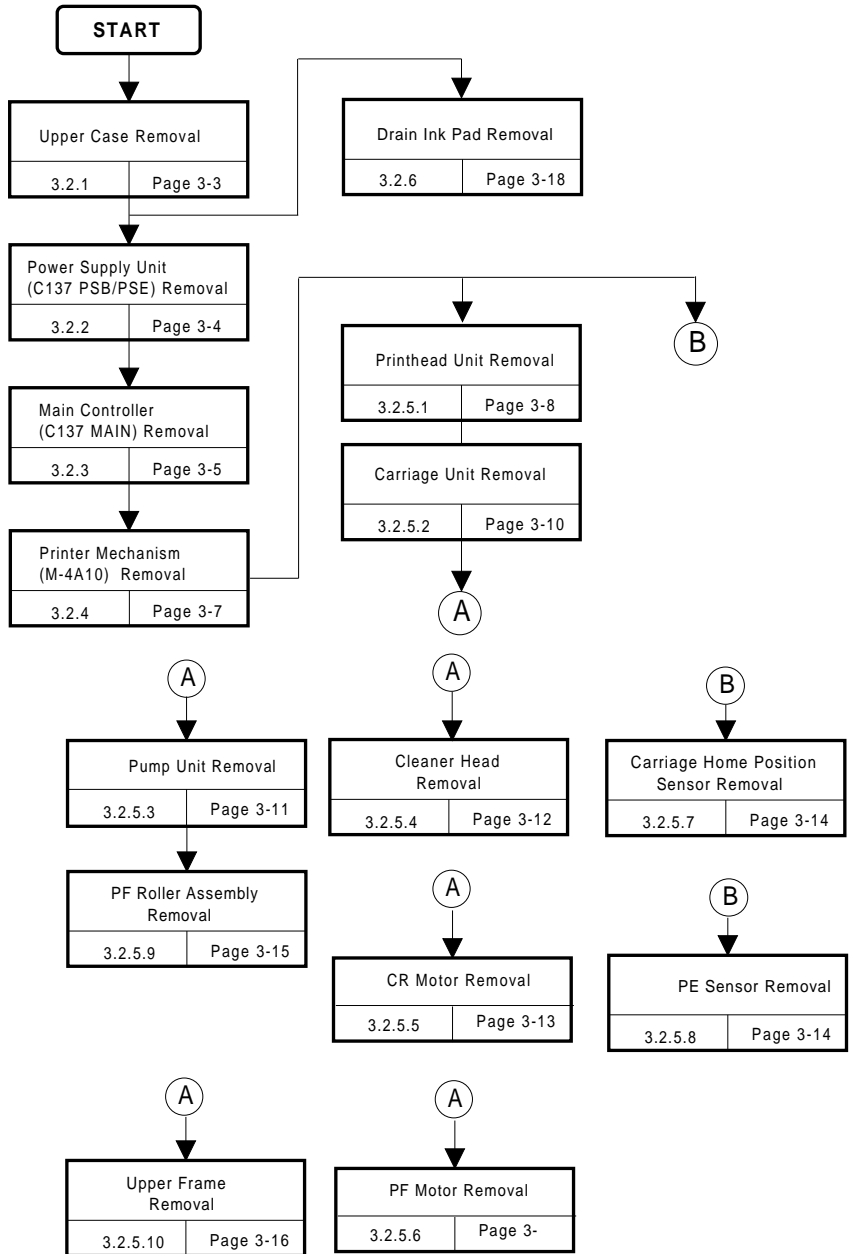


### 3.2 DISASSEMBLY AND ASSEMBLY

#### WARNING

*Follow the precautions in Section 3.1.1 when disassembling the printer.*

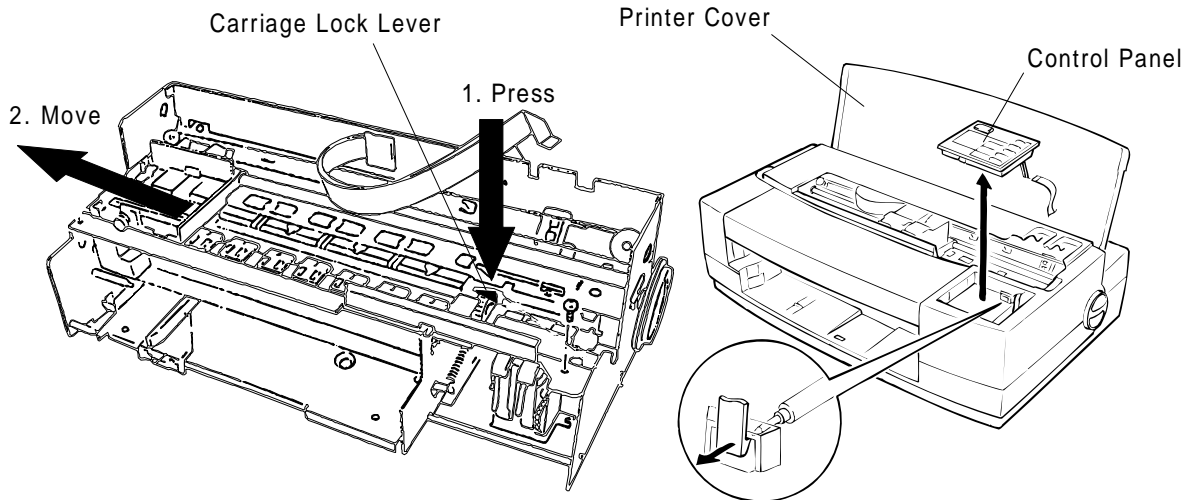
This section consists of the subheads shown in the diagram below. See the exploded view of the printer in the Appendix, if necessary.



**Figure 3-1. Disassembly Flowchart**

### 3.2.1 Upper Case Removal

1. Remove the printer cover by releasing the 2 tabs holding it to the upper case.
2. Remove the paper support by releasing the 2 tabs holding it to the lower case.
3. Move the carriage to the center while pressing the carriage lock lever.
4. Remove the control panel. (Release the tab by inserting a screwdriver into the hole in the upper case, as shown in the figure below.) At this time, disconnect the connector on the C137 PNL Board.

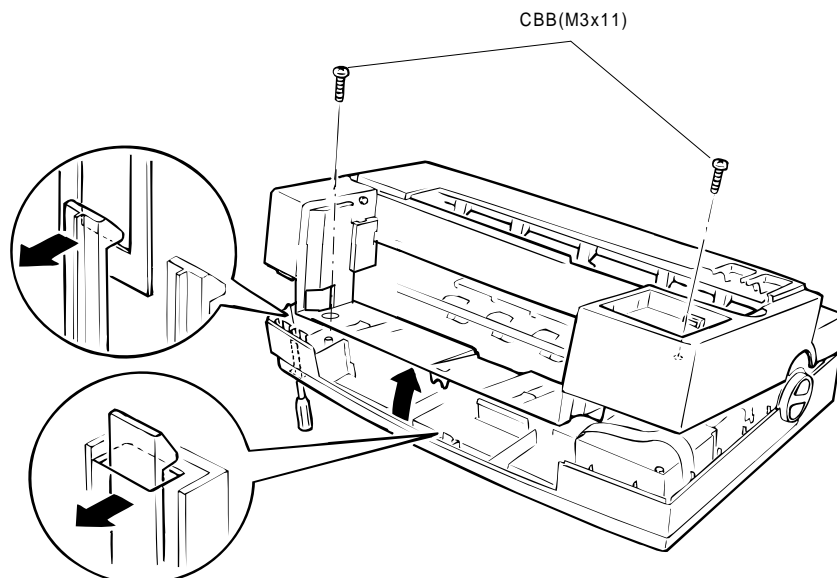


**Figure 3-2. C137 Control Panel Removal**

5. Remove 2 CBB (M3×11) screws securing the upper case to the lower case.
6. Release 2 tabs by inserting a flathead screwdriver into the holes at the bottom of the lower case, as shown in the figure below.
7. Remove the upper case by lifting the front side.

### **DISASSEMBLY/ASSEMBLY POINT**

*Hold the upper case firmly and pull it to remove it, while you release the tabs.*



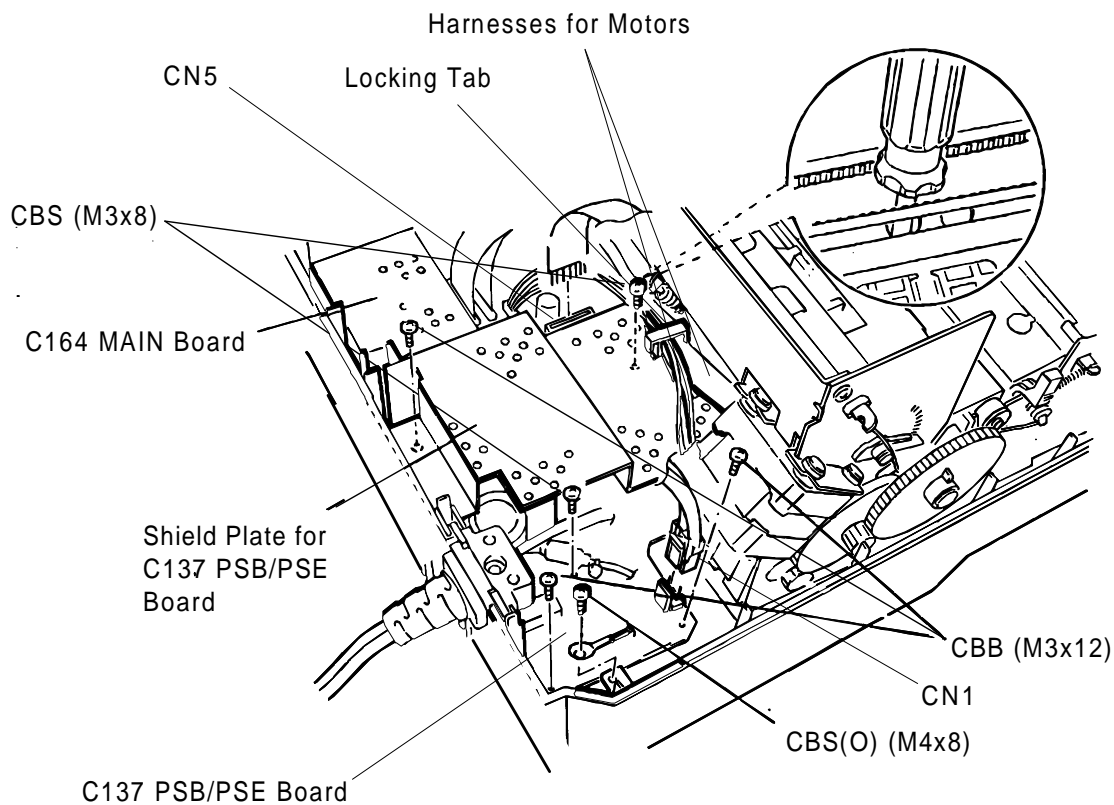
**Figure 3-3. Upper Case Removal**

### 3.2.2 Power Supply Unit (C137 PSB/PSE Board) Removal

1. Remove the upper case. (See Section 3.2.1.)
2. Disconnect the cables from connector CN1 on the C137 PSB/PSE Board and from CN5 on the C164 MAIN Board.
3. Remove 1 CBS (M3×8) screw and remove 4 CBB (M3×12) screws securing the shield plate to the lower case via the C137 PSB/PSE Board.
4. Remove 2 CBB (M3×12) screws and 1 CBS (M3×8) screw securing the C137 PSB/PSE Board to the lower case. Then remove 1 CBS (O) (M4×8) screw fixing the earth line from the AC cable to the earth plate.
5. Remove the wire harness for the motors in the locking tab on the shield plate and take the shield plate out by pulling upward toward the back of the printer.
6. Remove the power supply unit by pulling it upward toward the back of the printer.

#### **CAUTION**

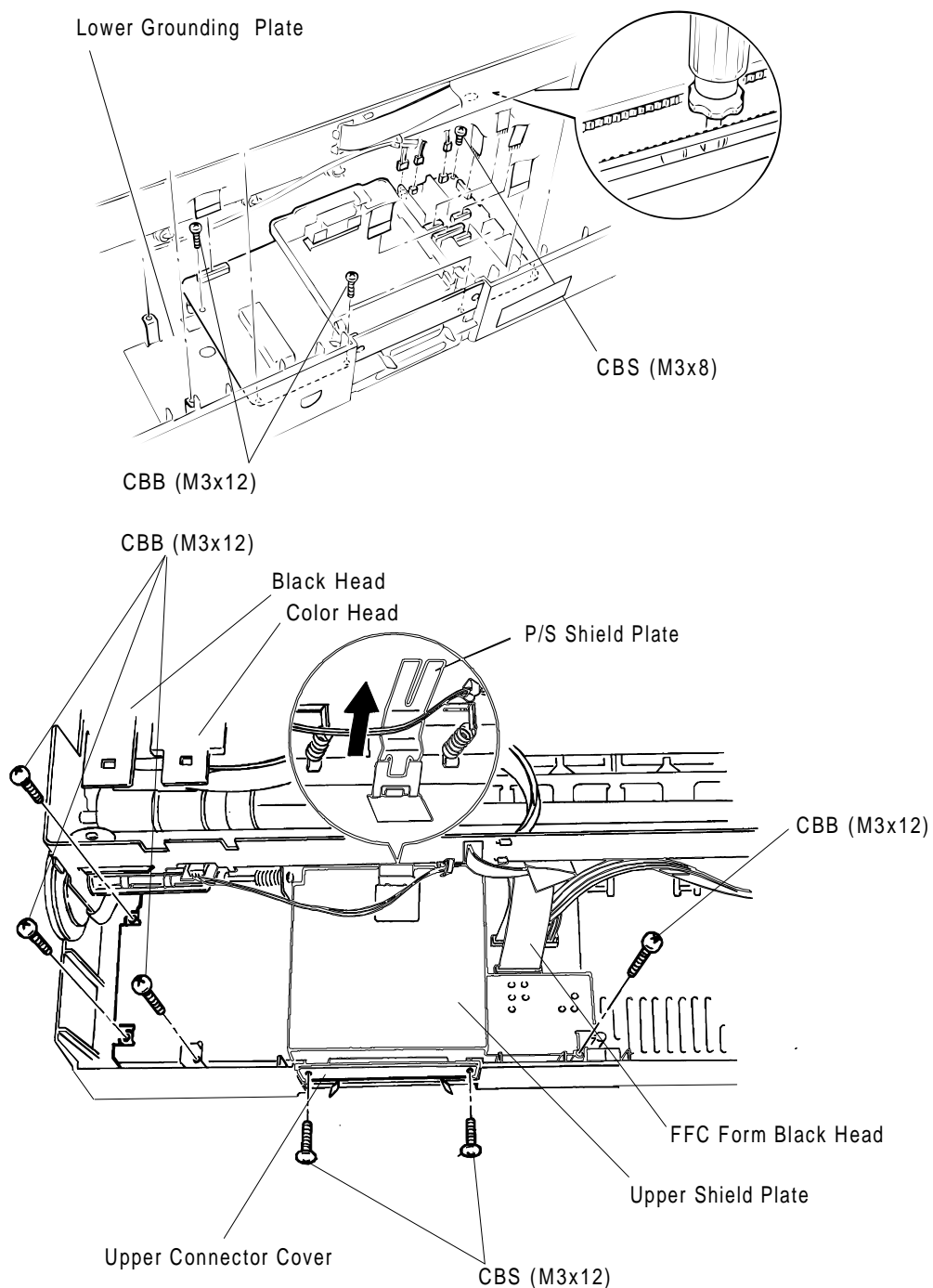
*As the shield plates of C164 MAIN and C137 PSB/PSE have sharp edges, so take care in handling them.*



**Figure 3-4. Power Supply Unit Removal**

### 3.2.3 Main Controller (C164 MAIN Board) Removal

1. Remove the upper case. (See Section 3.2.1.)
2. Remove the P/S shield plate from the upper shield plate.
3. Remove 2 CBS (M3×8) screws securing the upper cover connector to the I/F grounding plate and remove the upper cover connector (Type-B interface cover).
4. Insert a screwdriver into the printer mechanism to remove the CBS (M3×8) screw securing the C164 MAIN Board and the printer mechanism to the lower shield plate.
5. Remove 4 CBB (M3×12) screws securing the upper shield plate to the lower case.
6. Remove 2 CBS (M3×12) screws securing the main controller (C164 MAIN Board) to the lower case and remove it by pulling it upward, toward the back of the printer.
7. Disconnect the cables from the connectors CN5, CN6, CN7, CN8, CN9, CN10, CN11, and CN12 of the C164 MAIN board.



**Figure 3-5. Main Controller Removal**

**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], [Font], [Load/Eject] and [Pause] buttons on the control panel.*
- ⌈ *It is possible to misconnect the cables. When reconnecting the cables from the connectors CN6, CN7 and connectors CN11, CN12 of the C164 MAIN board, see the following instructions.*
  1. *CN11 : Printhead FFC cable (white color mark)*  
*CN12 : Printhead FFC cable (blue color mark)*
  2. *CN6 : Carriage motor cable (red color mark : Also the red color indicates the 1-pin of the CN6.)*  
*CN7 : Paper feed motor cable (black color mark : Also the black color indicates the 1-pin of the CN7.)*
- ⌈ *When you replace the main board, block resistances RM4, RM5, RM11 and RM12 must be re-installed at same position on new board.*

**REQUIRED ADJUSTMENT**

- ⌈ *When replacing the main controller board, adjust both the head gap and the Bi-D adjustment alignment, and input the destination parameter into the EEPROM on the C164 MAIN Board. (See Chapter 4.)*
- ⌈ *When you replace the main board, the parameters in the internal timer are all reset. Therefore, it is possible that printing becomes abnormally. At this time, perform the cleaning operation by the control panel on command (Refer to Chapter 4) until the printing becomes normally.*

**CAUTION**

*As the shield plates of C164 MAIN and C137 PSB/PSE have sharp edge, take care of handling them.*

### 3.2.4 Printer Mechanism (M-4A11) Removal

1. Remove the upper case. (See Section 3.2.1.)
2. Remove the power supply unit. (See Section 3.2.2.)
3. Remove the main controller. (See Section 3.2.3.)
4. Remove the 4 CBS (M4x14) screws and take out the printer mechanism.

#### **DISASSEMBLY/ASSEMBLY POINT**

- r Wipe off any ink around the end of the ink drain tube when you remove the printer mechanism.
- r When reinstalling the printer mechanism, check that the waste ink drain tube is properly inserted between the lower case and the waste ink absorbing material.

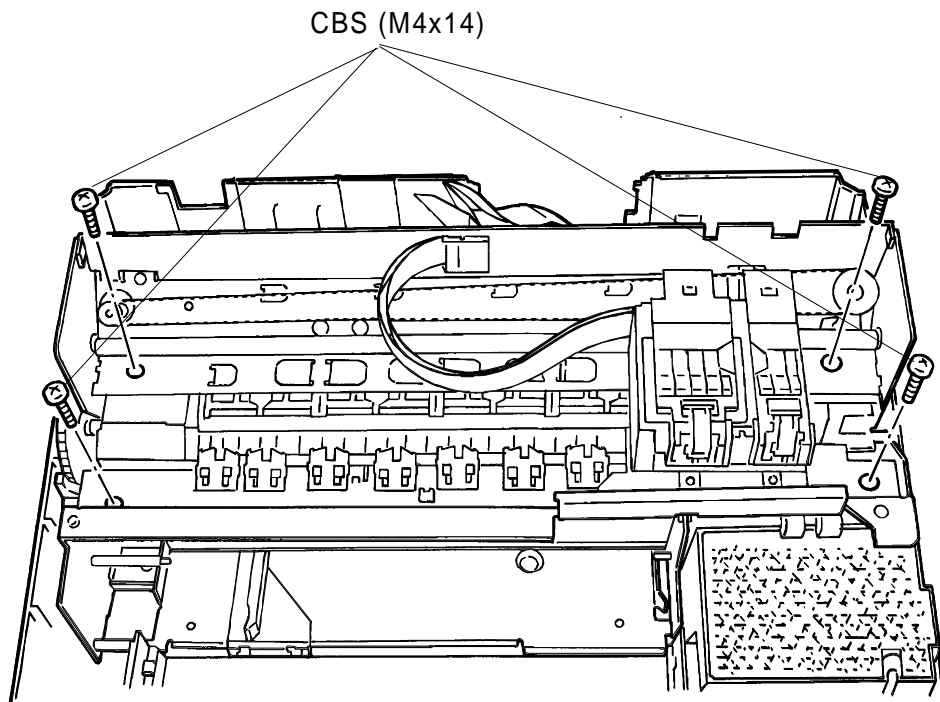


Figure 3-6. Printer Mechanism (M-4A11) Removal

#### **CAUTION**

- r When the printhead or the printer mechanism is replaced, the block resistor must be replaced at locations RM4, RM5, RM11 and RM12 on the C164 MAIN Board. (Every spare printhead or spare printer mechanism comes with a block resistor that is specifically selected for each printhead.)
- r Adjust both the head gap and the Bi-D alignment when replacing the printer mechanism.

### 3.2.5 Printer Mechanism Disassembly

The procedures described in this section explain how to remove the components within the printer mechanism.

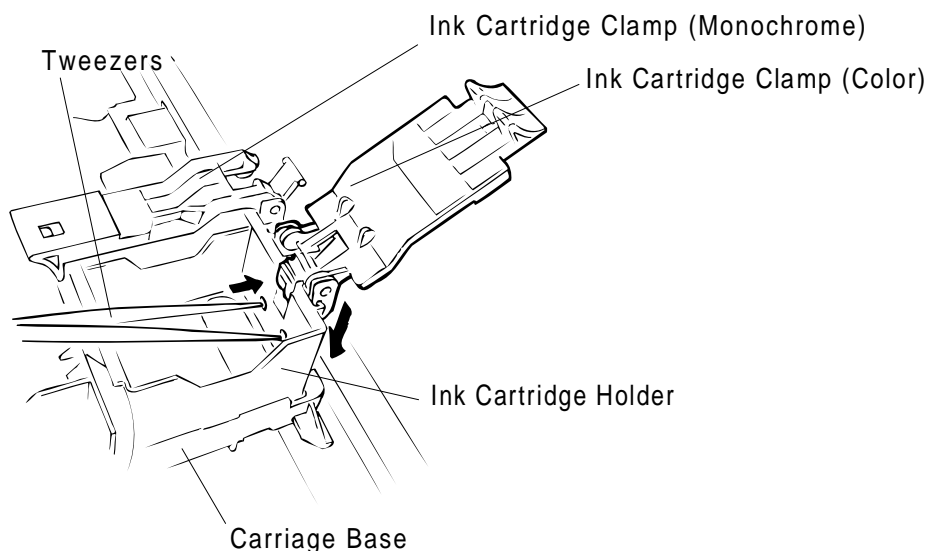
#### 3.2.5.1 Printhead Unit Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Move the carriage to the middle of the printer while pressing the hook that fixes the carriage unit to the home position.
3. Pull the ink cartridge clamp toward you and remove the ink cartridge.

#### **CAUTION**

- r *When removing the ink cartridge, always install a new cartridge immediately after removing the old one.*
- r *When the ink cartridge is replaced, the printer performs the ink cartridge replacement operation automatically.*  
*Exclusive cartridge is as follows; Monochrome : 1020626*  
*YMC: 1020627*
- r *Ink cartridges should never be kept longer than 6 months.*

4.



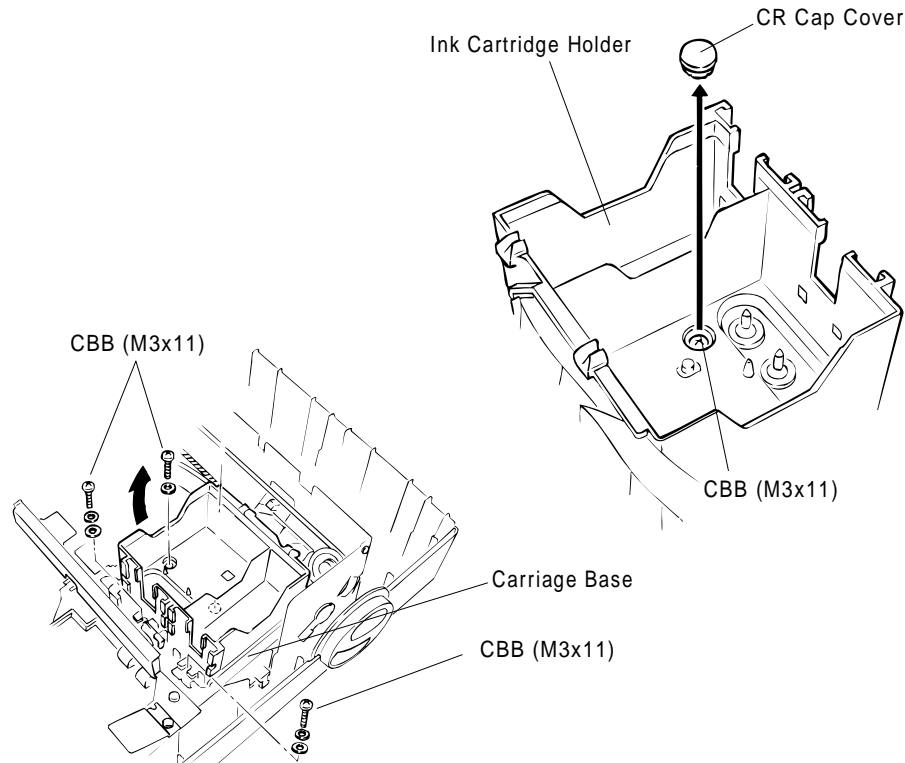
**Figure 3-7. Ink Cartridge Clamp Removal**

Push the 2 hooks from the inside of ink carriage holder with tweezers, push the ink cartridge clamp (monochrome/color) to remove the clamps from ink carriage holder.

5. Remove the 3 CBB (M3×11) screws and 3 plain washers securing the ink cartridge holder to the carriage base, and then lift the ink cartridge holder out of the carriage base sliding a little toward left.

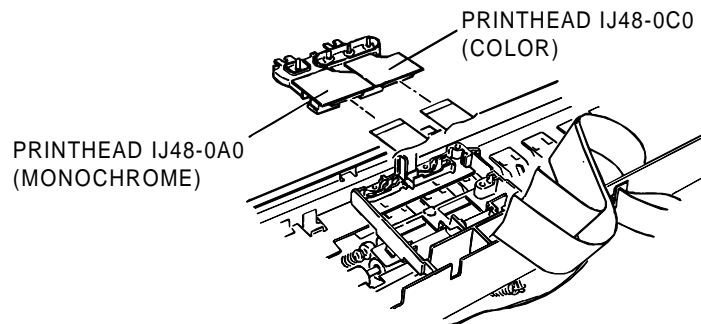
*Note :* As the head FFC cables are secured to the ink cartridge holder with the adhesive tape, tear off the cables from the ink cartridge holder before removing the ink cartridge holder from the carriage base.

6. Remove the CBB (M3×11) screw (under CR cap cover) and a plain washer securing the monochrome and color printheads to the carriage base.



**Figure 3-8. Ink Carriage Holder Removal**

7. Pull the black or color head toward you and disconnect the head flexible flat cable (FFC) on the head driver board (nozzle selector). Then remove the black or color head.

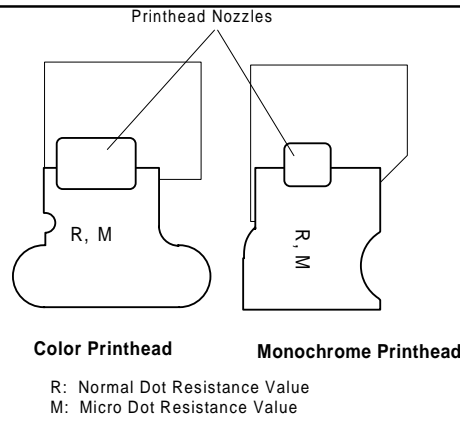


**Figure 3-9. Printhead Removal**

### **CAUTION**

- ⌈ Take proper measures to protect the printhead unit from static electricity, because the driver IC is directly attached to the printhead unit.
- ⌈ Never touch the metallic nozzle surface cover of the printhead. Handle it only by holding the edges of the printhead.
- ⌈ When the printhead or the printer mechanism is replaced, the block resistor must be replaced at location RM4 (for Normal Dot R), RM5 (for Micro Dot M), RM11 (for Normal Dot R), and RM12 (for Micro Dot M) on the C164 MAIN Board. (Every spare printhead or spare printer mechanism comes with a block resistor that is specifically selected for each printhead. And the resistance value of block resistor are written on the nozzle face of printhead. (Refer to Figure 3-10.)





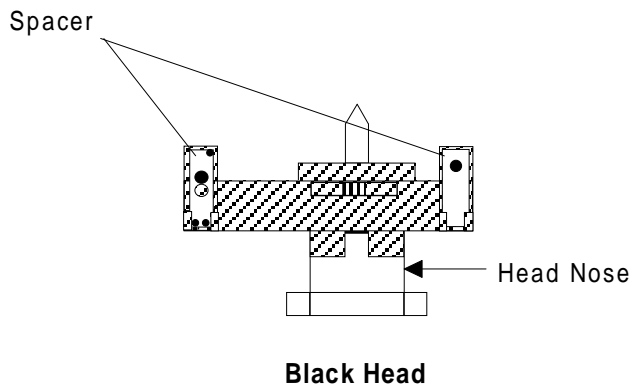
**Figure 3-10. Printhead Resistance Value**

**REQUIRED ADJUSTMENT**

- r *When removing or changing the black head, you need to make the following adjustments:*
  1. *Black head angle adjustment (See Section 4.1.4)*
  2. *Black - Color head vertical adjustment (See Section 4.1.5)*
  3. *Head gap adjustment (See Section 4.1.3)*
  4. *Bi-D alignment adjustment (See Section 4.1.2)*
- r *When removing or changing the color head, you need to make the following adjustments:*
  1. *Color head angle adjustment (See Section 4.1.6)*
  2. *Black - Color head vertical adjustment (See Section 4.1.5)*
  3. *Head gap adjustment (See Section 4.1.3)*
  4. *Bi-D alignment adjustment (See Section 4.1.2)*
- r *When removing or changing both heads, the following adjustments are needed.*
  1. *Color head angle adjustment (See Section 4.1.6)*
  2. *Black head angle adjustment (See Section 4.1.4)*
  3. *Black - Color head vertical adjustment (See Section 4.1.5)*
  4. *Head gap adjustment (See Section 4.1.3)*
  5. *Bi-D alignment adjustment (See Section 4.1.2)*

**WARNING**

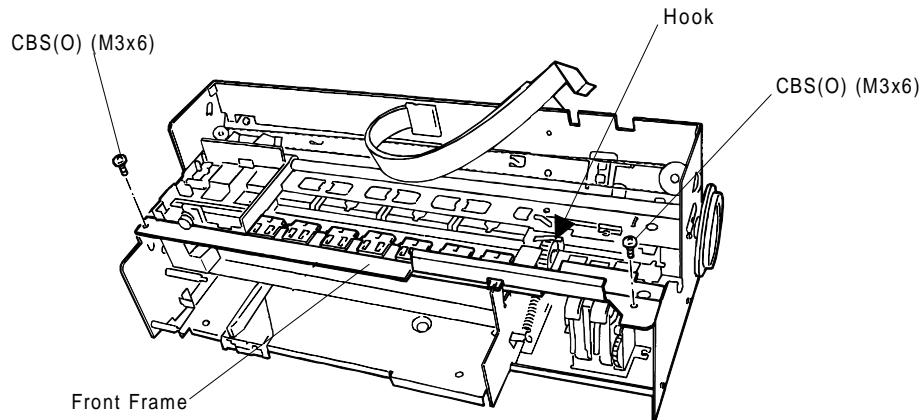
r *When removing the color or black head, do not lose the spacer that is fixed to each head. This spacer modifies the angle error that occurs during manufacturing. Also, this spacer is different from the linear spacer or angular spacer. (See Chapter 4.)*



**Figure 3-11. Head Spacer Position**

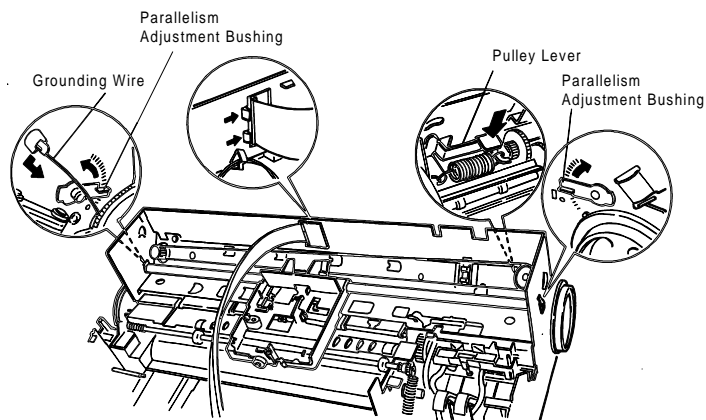
### 3.2.5.2 Carriage Unit Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Move the carriage to the left side of the printer while pressing the hook that fixes the carriage to the home position.
3. Remove the 2 CBS (O) (M3×6) screws securing the front frame to both side frames.



**Figure 3-12. Front Frame Removal**

4. Remove the cartridge holder with from the carriage unit. (See Section 3.2.5.1.)
5. Release the carriage timing belt from the belt pulley while pressing the pulley lever.
6. Remove the grounding wire from the left side frame.
7. Remove 2 parallelism adjustment bushings from both side frames.
8. Lift the carriage unit with the carriage guide shaft out of the printer mechanism.



**Figure 3-13. Carriage Unit Removal**

### **CAUTION**

- r Take proper measures to protect the printhead unit from static electricity, because the driver IC is directly attached to the printhead unit.
- r Never touch the metallic nozzle surface cover of the printhead. Handle it only by holding the edges of the printhead.
- r When the printhead or the printer mechanism is replaced, the block resistor must be replaced at locations RM4, RM5, RM11 and RM12 on the C164 MAIN Board.

### **ADJUSTMENT REQUIRED**

- r Platen gap adjustment (See Chapter 4.)

### 3.2.5.3 Pump Unit Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Remove the carriage unit. (See Section 3.2.5.2.)
3. Remove the CBS (M3×6) screw securing the pump unit to the bottom frame.
4. Push the pump unit outward while releasing the tab at the bottom side of the pump unit, and then lift up the pump unit.

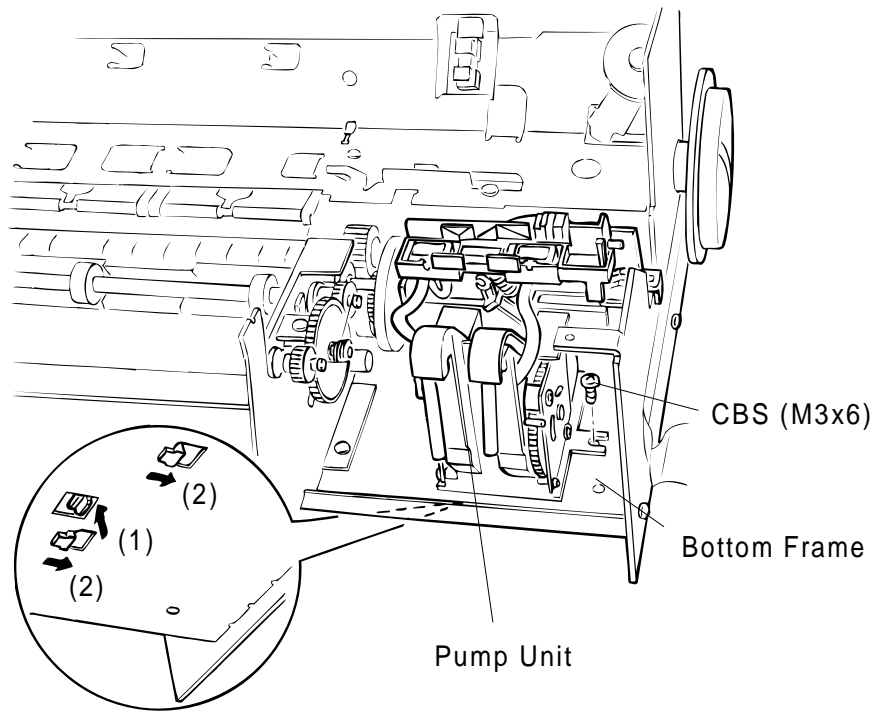


Figure 3-14. Pump Unit Removal

### 3.2.5.4 Cleaner Head Replacement

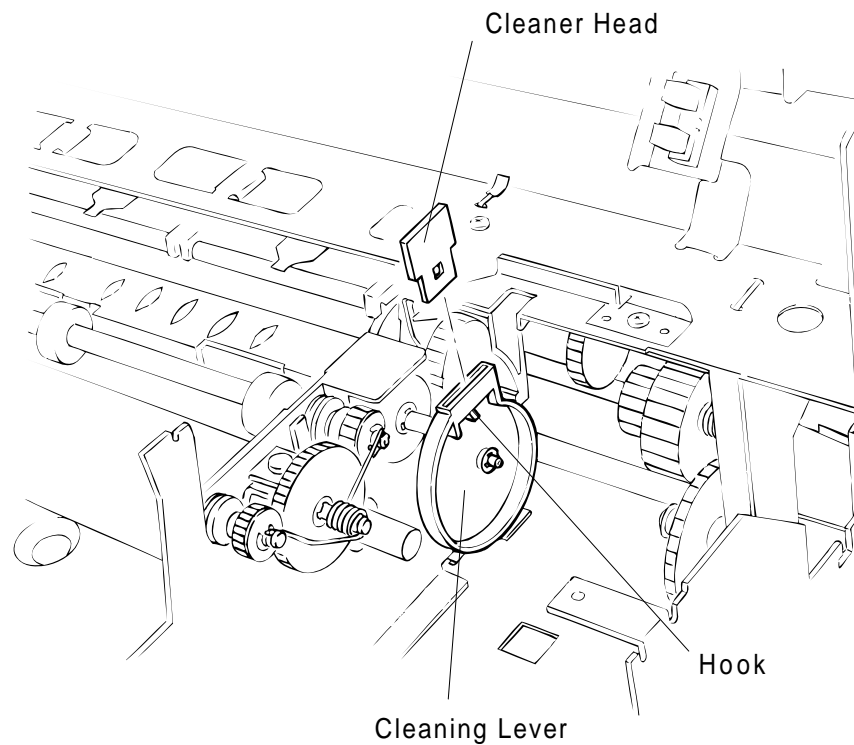
1. Remove the printer mechanism. (See Section 3.2.4.)
2. Use tweezers to unhook the cleaner head from the hook on the cleaning lever.

#### **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 precautions.

- r Never touch the cleaner head with your bare hands.
- r When attaching the cleaner head to the pump unit, wear gloves and use clean tweezers to handle it.

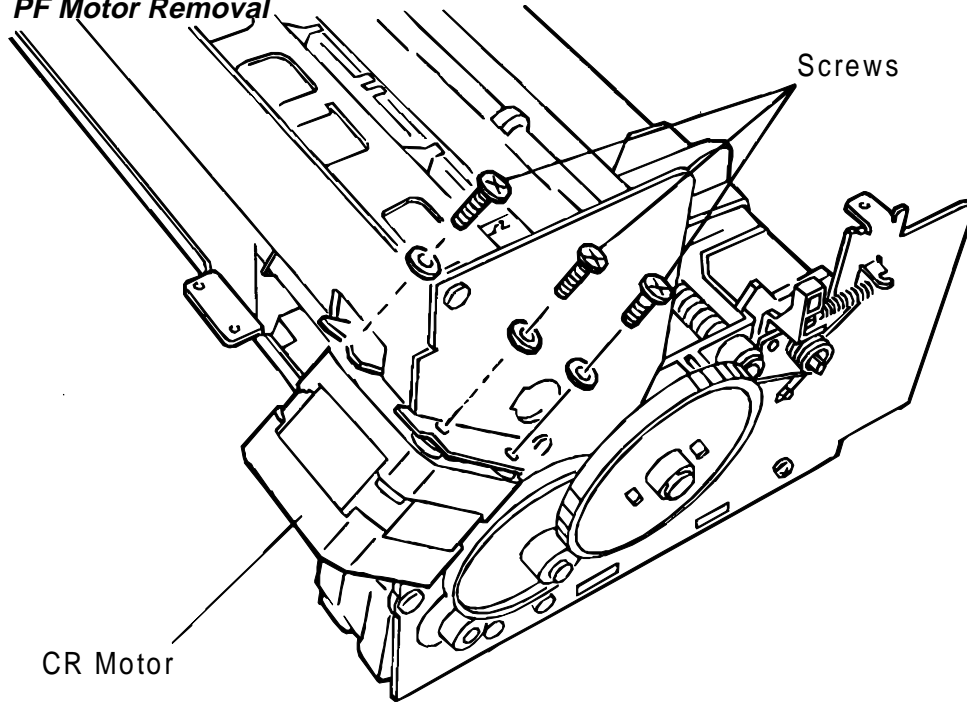


**Figure 3-15. Cleaner Head Replacement**

### 3.2.5.5 CR Motor Removal

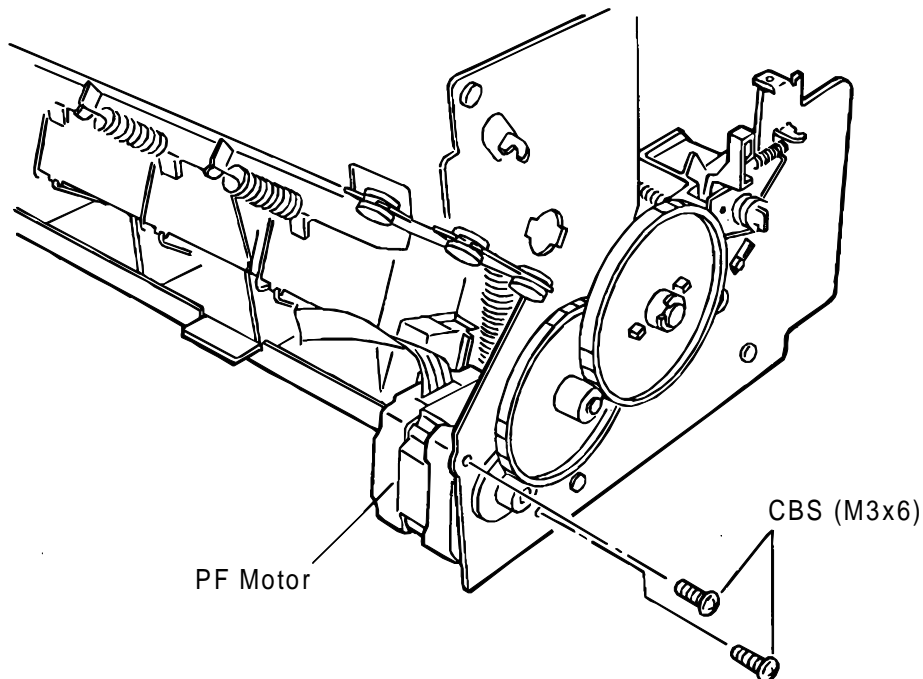
1. Remove the printer mechanism. (See Section 3.2.4.)
2. Release the timing belt. (See Section 3.2.5.2.)
3. Remove the 3 screws securing the CR motor to the upper frame, and then remove the CR motor.

### 3.2.5.6 PF Motor Removal



**Figure 3-16. CR Motor Removal**

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Remove the 2 CBS (M3x6) screws and then remove the PF motor.



**Figure 3-17. PF Motor Removal**

### 3.2.5.7 Carriage Home Position Sensor Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Disconnect the sensor cable from the carriage home position sensor.
3. Unhook the 3 notches securing the carriage home position sensor to the upper frame. Then remove the carriage home position sensor.

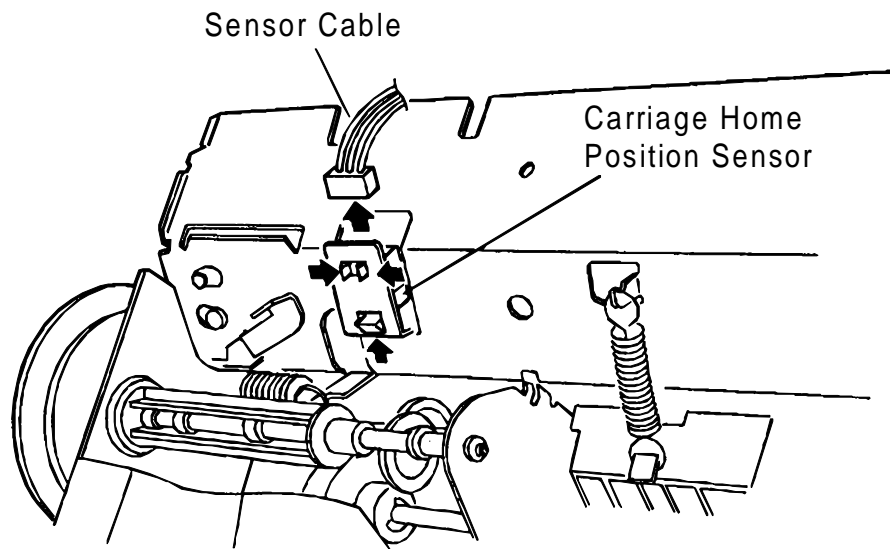


Figure 3-18. Carriage Home Position Sensor Removal

### 3.2.5.8 PE Sensor Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Disconnect the connector for the PE sensor.
3. Rotate the printer mechanism upside down; use tweezers to release the 2 hooks securing the PE sensor to the paper feed roller assembly. Then remove the PE sensor.

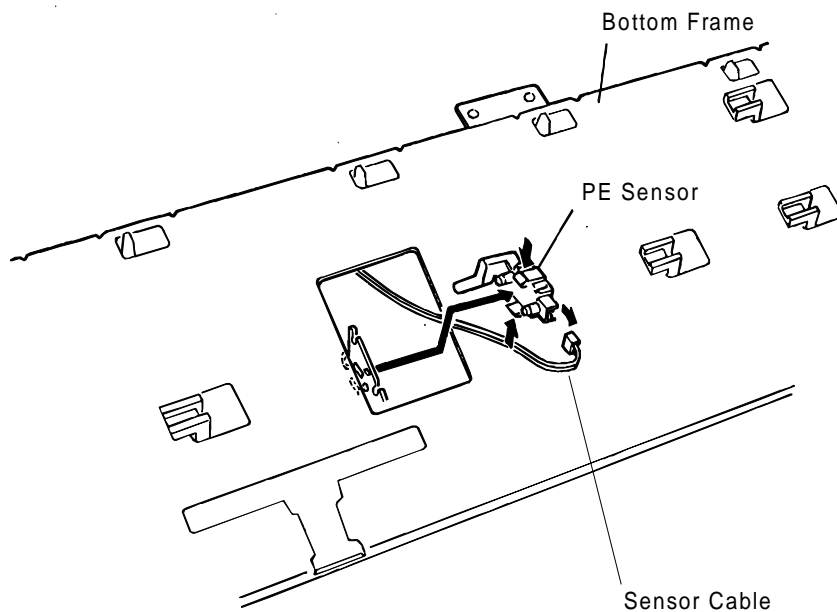
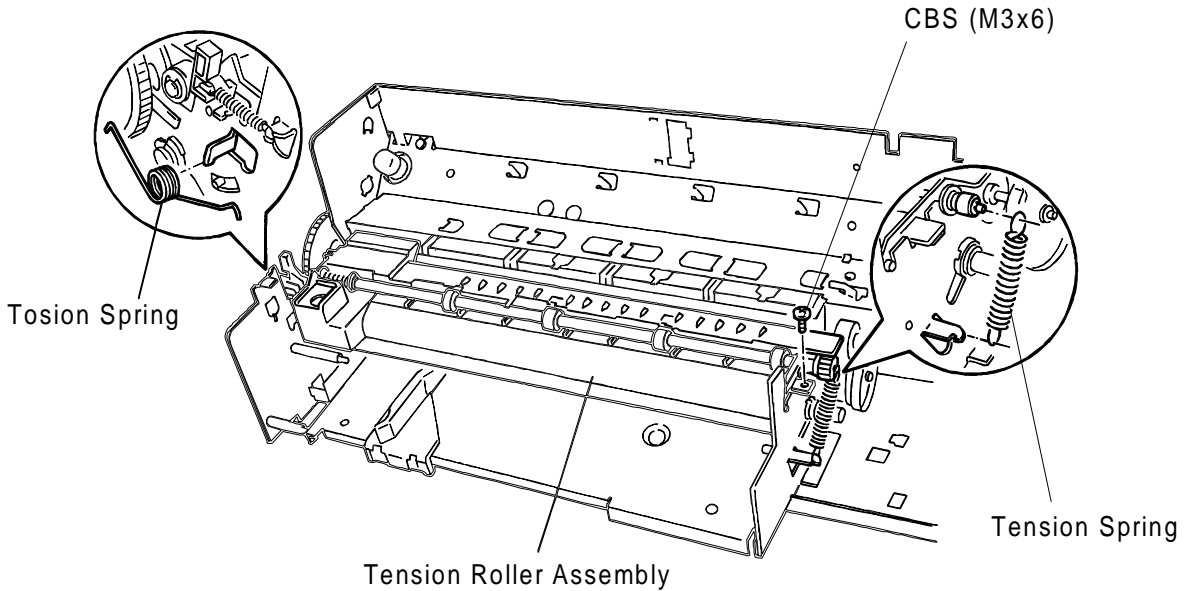


Figure 3-19. PE Sensor Removal

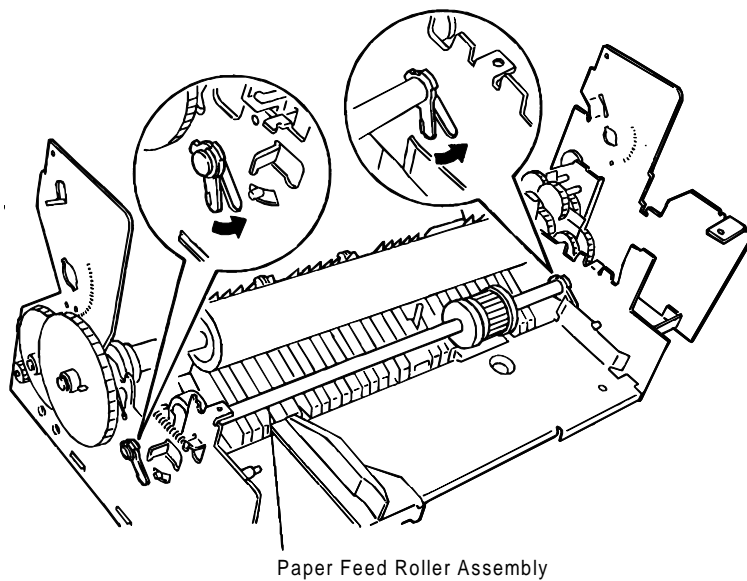
### 3.2.5.9 Paper Feed Roller Assembly Removal

1. Remove the printer mechanism. (See Section 3.2.4.)
2. Remove the carriage unit. (See Section 3.2.5.2.)
3. Remove the tension spring holding the tension roller assembly to the sub frame.
4. Remove the torsion spring on the side frame (L) holding the tension roller assembly to the left side frame.
5. Remove 1 CBS (M3x6) screw securing the tension roller assembly to the sub frame and remove the tension roller assembly.



**Figure 3-20. Tension Roller Assembly Removal**

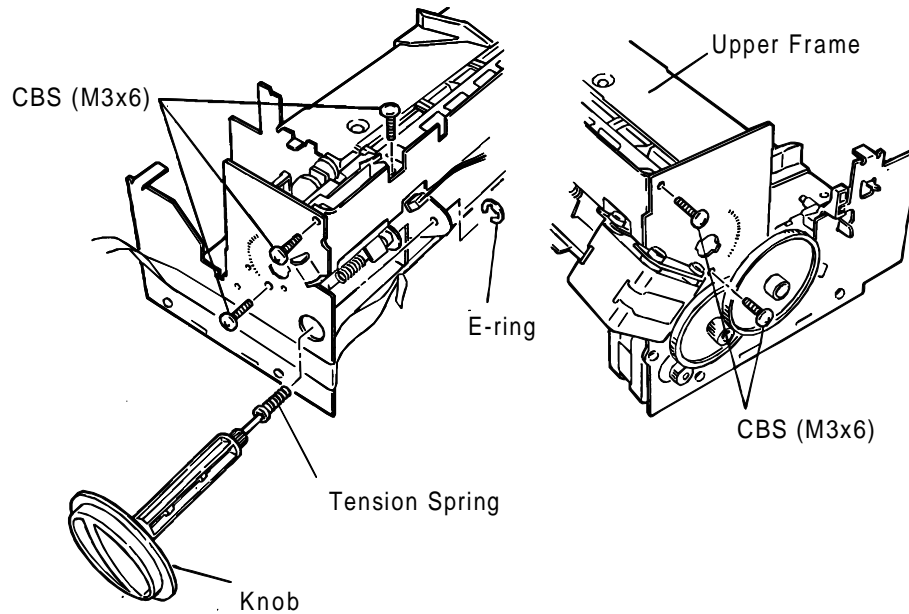
6. Release the 2 bushings securing the paper feed roller assembly to both the left side frame and the sub frame. Then remove the paper feed roller assembly.



**Figure 3-21. Paper Feed Roller Assembly Removal**

### 3.2.5.10 Upper Frame Removal

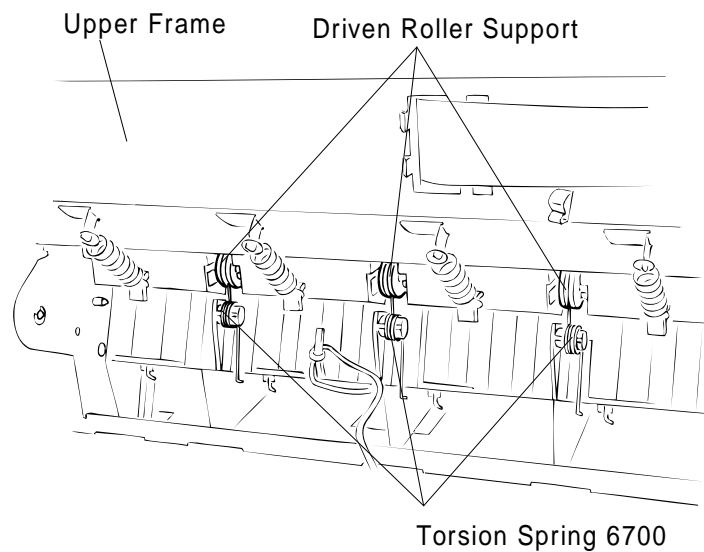
1. Remove the printer mechanism. (See Section 3.2.4.)
2. Remove the carriage unit. (See Section 3.2.5.2.)
3. Remove the E-ring securing the knob shaft to the sub frame; then remove the knob with the knob shaft from the right side frame.
4. Remove the 5 CBS (M3x6) screws securing the upper frame to both side frames and the sub frame.
5. Remove the upper frame with 4 PF support rollers.



**Figure 3-22. Upper Frame Removal**

### **ASSEMBLY POINT**

*Assemble each straight end of the torsion spring 6700s to attach them to the center of the driven roller support.*



**Figure 3-23. Attaching the Torsion Spring**



### 3.2.6 Drain Ink Pad Removal

*The procedures described in this section explain how to remove the drain ink pad when the protect counter value reaches its maximum, and the printer displays a maintenance request error. (Refer to Section 2.4.2.)*

1. *Remove the upper case. (See Section 3.2.1.)*
2. *Remove the drain ink pad.*

#### **ASSEMBLY POINTS**

- r After reassembling the printer, power it on while holding down the ALT, Font, Load/Eject and Pause buttons to reset the protect counter. (Refer to Section 2.4.2.)*
- o *The protect counter value is shown in the first line of printing in the default setting mode. The first line consists of the ROM version number, the protect counter value, and nozzle check patterns.*
  - o *At any time, if the protect counter value is more than 32000, replace the drain ink pad.*

#### **CAUTION**

*After resetting the protect counter, perform the destination data writing operation (Refer to Section 4.1.1.), the Bi-D alignment adjustment (Refer to Section 4.1.2.) and the Head Gap Adjustment. (Refer to Section 4.1.3.)*

# Chapter 4 Adjustment

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## 4.1 OVERVIEW

This section describes adjustments required when the printer is disassembled and assembled after repair. Since this printer has both black and color heads, it needs new adjustments not required for previous printers. Refer to the following table to perform the appropriate adjustments.

### **WARNING**

r Always perform adjustments in the order indicated.  
 r After performing destination setting, head angle adjustment, head vertical position adjustment, head gap adjustment, or bidirectional adjustment, perform the cleaning operation for the black and color printheads. The cleaning operation is necessary because printing sample patterns for these adjustments increases the viscosity of the ink and the printer will not print the correct value. For instance if you replace the black head, you must perform the following adjustments in the order shown:  
 (1) black head angle, (2) black-color head vertical, (3) head gap, (4) Bi-D alignment.  
 r After removing an ink cartridge, always install a new cartridge immediately. During adjustments and testing, use the cartridges designed exclusively for service:  
 Monochrome: 1020626, CMY: 1020627.

**Table 4-1. Required Adjustments**

Work Contents	Adjustment Contents
When replacing the M-4A11 printer mechanism	1. Bi-D alignment adjustment (See Section 4.1.2) 2. Head gap adjustment (See Section 4.1.3) 3. Internal timer reset operation (See Section 4.1.8)
When replacing or disassembling the C164 MAIN board or printer mechanism	1. Destination data writing operation (See Section 4.1.1) 2. Bi-D alignment adjustment (See Section 4.1.2) 3. Head gap adjustment (See Section 4.1.3)
When replacing or disassembling the black head (board)	1. Black head angle adjustment (See Section 4.1.4) 2. Black - Color head vertical adjustment (See Section 4.1.5) 3. Head gap adjustment (See Section 4.1.3) 4. Bi-D alignment adjustment (See Section 4.1.2)
When replacing or disassembling the color head (board)	1. Color head angle adjustment (See Section 4.1.6) 2. Black - Color head vertical adjustment (See Section 4.1.5) 3. Head gap adjustment (See Section 4.1.3) 4. Bi-D alignment adjustment (See Section 4.1.2)
When replacing or disassembling both the color and black head	1. Color head angle adjustment (See Section 4.1.6) 2. Black head angle adjustment (See Section 4.1.4) 3. Black - Color head vertical adjustment (See Section 4.1.5) 4. Head gap adjustment (See Section 4.1.3) 5. Bi-D alignment adjustment (See Section 4.1.2)
When replacing or disassembling the carriage unit	1. Platen gap adjustment (See Section 4.1.7)

### 4.1.1 Destination Data Writing Operation

The setup value that specifies the destination setting is stored in the EEPROM on the C164 MAIN board. This setup value must be rewritten to the EEPROM when the main board or the EEPROM chip is replaced.

#### **CAUTION**

*Before writing destination data, set the interface setting to the parallel interface or the auto select setting.*

1. Connect the PC to the target printer with a parallel interface cable, and turn the printer on.
2. Execute BASIC on the PC and run the program "VERPxxx.BAS."

1. Destination Setting  
2. Head Angle Confirmation Pattern Printing  
(Black Head Spacer Selection)  
3. Head Vertical Position Confirmation  
4. Head Gap Adjustment  
5. Bi-D Adjustment  
6. Internal Timer Reset  
7. END

3. When the main menu appears, choose "Destination Setting" by typing 1 and Enter.
4. The main menu immediately disappears briefly and then reappears. (At this time, specific destination parameters, including the destination, interface mode, TOF value, economy/condensed, are automatically written to the EEPROM.)
5. Choose "END" by typing 7 and Enter. The following message appears on the display.

All parameters that you have specified so far  
are written to EEPROM upon power off.

Turn the printer OFF, Now!

6. Turn off the printer.

### 4.1.2 Bi-D (Bidirectional Printing) Alignment Adjustment

The bidirectional alignment is required when the printer mechanism, main board, or the printhead (board) is replaced. Performing this adjustment determines a compensation value to rectify any deviation in the print position. This deviation could be caused by the different print speeds, which are due to tolerances in the mechanical components, or to the differences in print timing between odd-numbered lines and even-numbered lines in bidirectional printing. The printer stores the compensation data in the EEPROM on the C164 MAIN Board and refers to this data when performing bidirectional printing.

1. Connect the PC to the target printer and turn the printer on.
2. Execute BASIC on the PC and run the program "VERPxxx.BAS."

1. Destination Setting
2. Head Angle Confirmation Pattern Printing  
(Black Head Spacer Selection)
3. Head Vertical Position Confirmation
4. Head Gap Adjustment
5. Bi-D Adjustment
6. Internal Timer Reset
7. END

3. When the main menu appears, choose "Bi-D Adjustment" by typing 5 and Enter. (The printer prints the check pattern with a sample compensation value.)
4. The following menu appears on the display.

Input Bi-D value No. (If OK, input [Y] key.)? \_

5. If the sample printing is not vertically aligned for both the odd-numbered lines and even-numbered lines, enter a compensation value in the range from -30 to +30.
  - r Positive compensation value: Shifts the 2nd line to the left
  - r Negative compensation value: Shifts the 2nd line to the right

When the sample printing becomes vertically aligned in both lines, press Y and Enter; this returns you to the main menu.

6. Choose "END" by typing 7 and Enter. The following message appears on the display.

All parameters that you have specified so far  
are written to EEPROM upon power off.

Turn the printer OFF, Now!

7. Turn off the printer.

### 4.1.3 Head Gap Adjustment (Black and Color Head)

The head gap adjustment is required when the printer mechanism, main board, or printhead (board) is replaced or disassembled. This adjustment calibrates the head drive timing between the black and color head. If this adjustment is not made, the vertical alignment will not be completed.

1. Connect the PC to the target printer, and turn the printer on.
2. Execute BASIC on the PC and run the program "VERxxx.BAS."

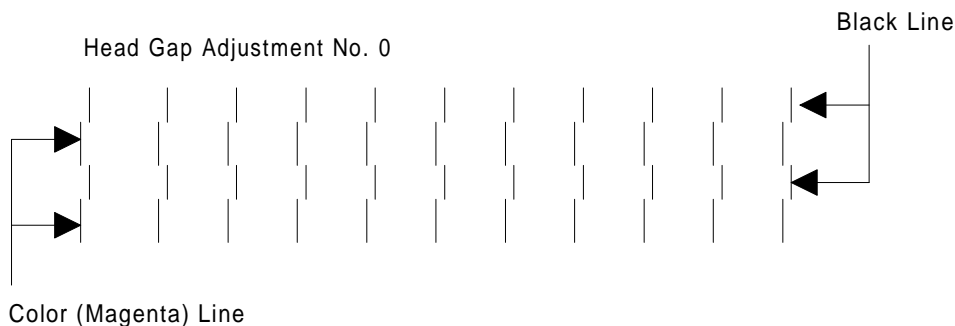
1. Destination Setting
2. Head Angle Confirmation Pattern Printing  
(Black Head Spacer Selection)
3. Head Vertical Position Confirmation
4. Head Gap Adjustment
5. Bi-D Adjustment
6. Internal Timer Reset
7. END

3. When the main menu appears, choose "Head Gap Adjustment" by typing **4** and **ENTER**. (The printer prints a check pattern with a sample compensation value.)
4. The printer prints a sample like the one shown in Figure 4-1.
5. If the sample print is not vertically aligned for both odd-numbered lines (black lines) and even-numbered lines (magenta lines), enter a compensation value in the range from -16 to +16.
  - Positive compensation value: Shifts the 2nd line to the left
  - Negative compensation value: Shifts the 2nd line to the right
 When both the black and magenta lines are vertically aligned, press **Y** and **ENTER**; this returns you to the main menu.
6. Choose "END" by typing **7** and **ENTER**. The next message appears on the display.

All parameters that you have specified so far are written to EEPROM upon power off.

Turn the printer OFF, Now!

7. Turn off the printer.

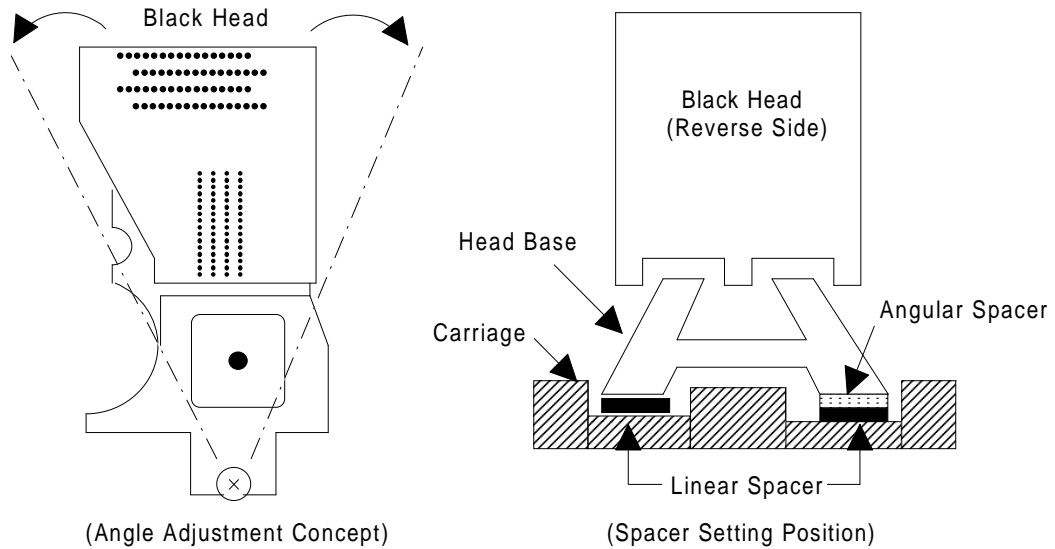


**Figure 4-1. Head Gap Adjustment Sample**

### 4.1.4 Black Head Angle Adjustment

The black head angle adjustment is required when the black head is replaced or disassembled. If this adjustment is not correct, a white banding problem may occur, or the color head timing may not match the black head timing. The following figure illustrates the black head angle adjustment.

The black head angle is adjusted with linear and angular spacers. A linear spacer is attached to both sides of the head base, and an angular spacer is attached only to the right side of the head base. Spacers for the black head come in different shapes for the thickness needed. The following figure shows the relationship between the shape and thickness.



**Figure 4-2. Black Head Angular and Linear Spacers**

Angular Spacers (For Black Head)

Spacer Name	Thickness	Shape
angular spacer BK	0.05	
angular spacer BK:B	0.10	
angular spacer BK:C	0.15	
angular spacer BK:D	0.20	
angular spacer BK:E	0.25	

Linear Spacers (Only Use for Black Head)

Spacer Name	Thickness	Shape
linear spacer K	0.05	
linear spacer J	0.12	
linear spacer I	0.19	
linear spacer	0.26	
linear spacer B	0.33	
linear spacer C	0.40	
linear spacer D	0.47	
linear spacer E	0.54	
linear spacer F	0.61	
linear spacer G	0.68	
linear spacer H	0.75	

**Figure 4-3. Types of Spacers and Relationship between Shape and Thickness**

1. Connect the PC to the target printer, and turn the printer on.
2. Execute BASIC on the PC and run the program "VERxxx.BAS."

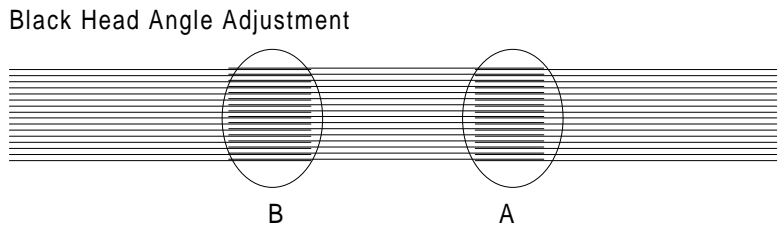
- |  |
|--|
| <ol style="list-style-type: none"> <li>1. Destination Setting</li> <li>2. Head Angle Confirmation Pattern Printing<br/>(Black Head Spacer Selection)</li> <li>3. Head Vertical Position Confirmation</li> <li>4. Head Gap Adjustment</li> <li>5. Bi-D Adjustment</li> <li>6. Internal Timer Reset</li> <li>7. END</li> </ol> |
|--|

3. When the main menu appears, choose "Head Angle Confirmation Pattern Printing" by typing 2 and **ENTER**. (The printer prints the check pattern, along with the sample name.)

**WARNING**

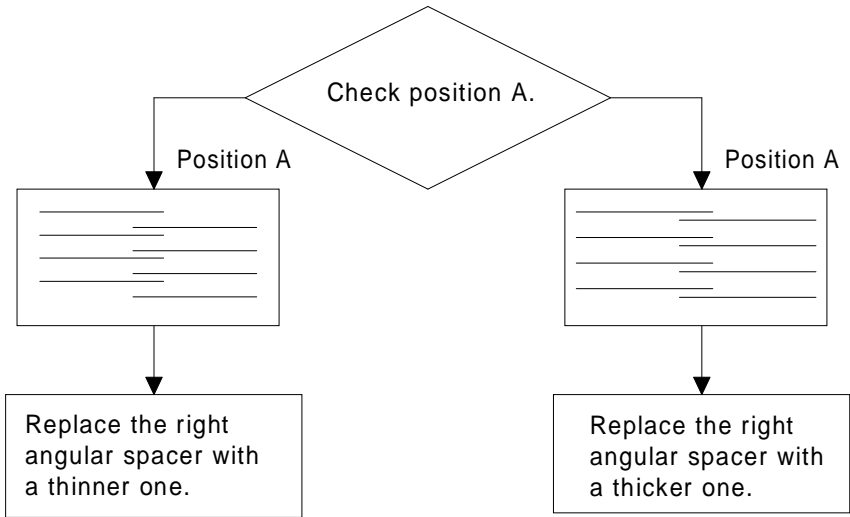
- |  |
|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> When replacing both the black and color heads, always adjust the color head angle first. The black head angle is based on the color head angle.</li> <li><input type="checkbox"/> After you replace the black head and print the black head angle pattern, you only have to insert an angular spacer if the pattern is incorrect.</li> </ul> |
|--|

4. The printer prints a pattern like one in the following sample. Only the nozzles in rows A and D are fired (making it is easy to see the angle of the black head).



**Figure 4-4. Black Head Angle Adjustment Sample**

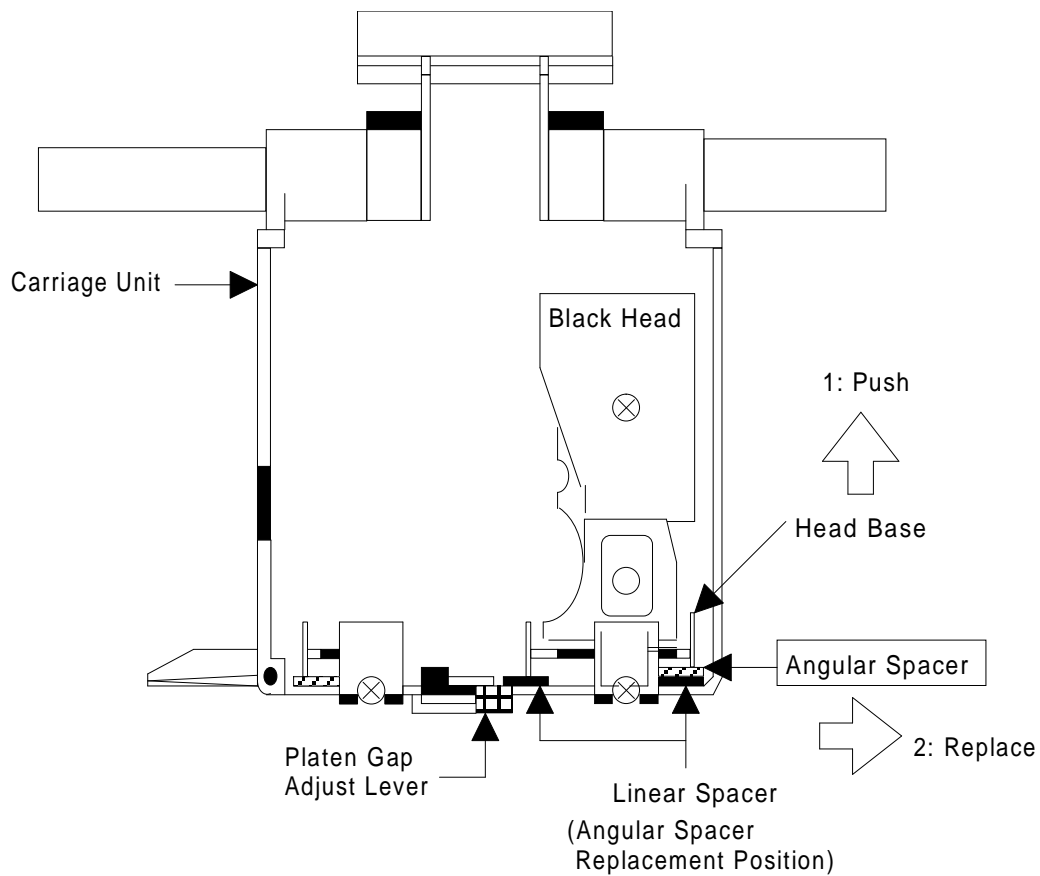
5. In the figure above, pay attention to position A. (Do not look at position B.)
6. Using the following flowchart, replace the angular spacer for the black head, which is under the right linear spacer. The procedure for this replacement is explained beginning with step 7.



**Figure 4-5. Spacer Selection**



7. Turn the printer power off now.
8. Manually move the carriage to the center while pressing the carriage lock lever, and remove the two ink cartridges.
9. Remove the rubber cap covering the head screw at the side of color ink cartridge. Then loosen (but do not remove) 3 screws. (Refer to Figure 4-6.)



**Figure 4-6. Removing the Rubber Cap**

**WARNING**

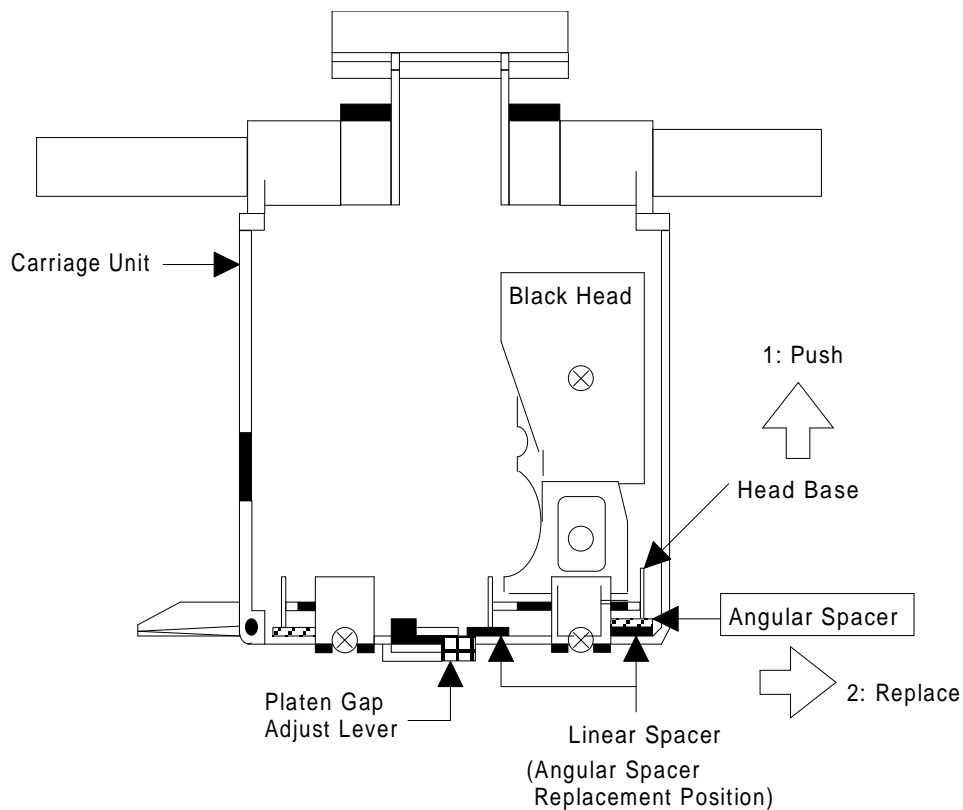
*After replacing the spacer, always install new ink cartridges before returning the printer to the user. During this adjustment, use ink cartridges exclusively for service (Monochrome: 1020626, CMY: 1020627). You can reuse old ink cartridges for other purposes.*

10. Replace the angular spacer for the black head with a new one, referring Figure 4-7. (Replace the angular spacer by using tweezers to push the head base toward the rear.)

11. After replacing the angular spacer, reassemble the ink cartridge holder and reinstall the ink cartridges. Use the BASIC program to verify the angle of the black head. Confirm the angle by performing the steps 1 to 6 again, and if the angle is wrong, perform the adjustment again until the head angle is correct.

### WARNING

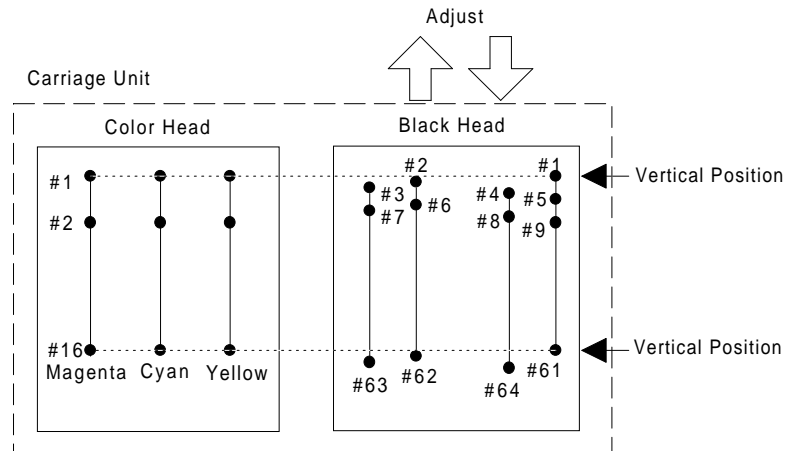
- ❑ *The angular spacer comes in five thicknesses. Continue performing this adjustment, by changing the black head angle is correct.*
- ❑ *When inserting an angular spacer, always place the angular spacer on the linear spacer.*



**Figure 4-7. Angular Spacer Replacement Method**

### 4.1.5 Black - Color Head Vertical Adjustment

This adjustment calibrates the vertical position between the black head and the color head. Align the top nozzles (both nozzle #1 on the black head and nozzle #1 on the color head). You can make this adjustment by using only the linear spacers for the black head. This adjustment is required when the black head or the color head is replaced or disassembled. The following figure illustrates this adjustment.



**Figure 4-8. Black-Color Head Vertical Adjustment Concept**

1. Connect the PC to the target printer, and turn the printer on.
2. Execute BASIC on the PC and run the program "VERxxx.BAS".

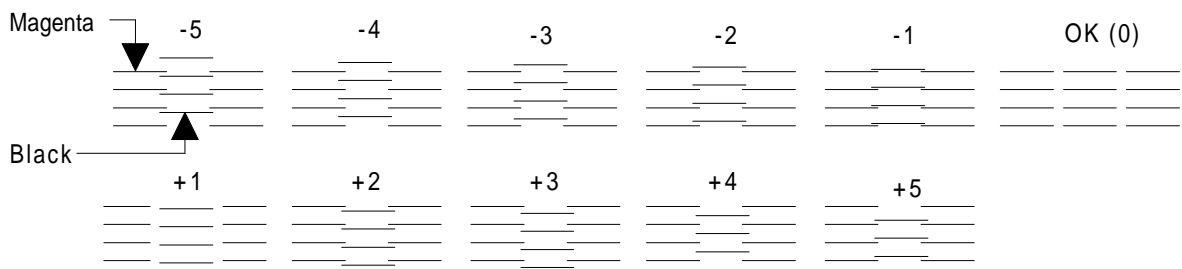
1. Destination Setting
2. Head Angle Confirmation Pattern Printing (Black Head Spacer Selection)
3. Head Vertical Position Confirmation
4. Head Gap Adjustment
5. Bi-D Adjustment
6. Internal Timer Reset
7. END

3. When the main menu appears, choose "Head Vertical Position Confirmation" by typing 3 and **ENTER**. (The printer prints the check pattern, along with the sample name.)

**WARNING**

*When replacing the black head, always adjust the black head angle first, because the black-color head vertical adjustment is based upon the black head angle.*

2-3 BLACK HEAD SPACER SELECTION



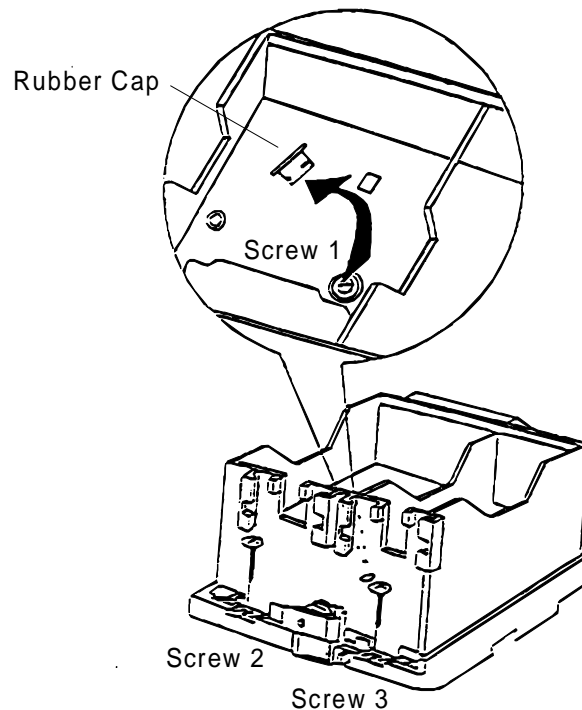
**Figure 4-9. Linear Spacer Selection Sample**

4. In Figure 4-10, the vertical position is correct when both the magenta line and the black line are aligned (as shown in position OK (0)). If the vertical position is correct, turn off the printer. If the black and magenta lines are not aligned, perform the vertical adjustment as described in steps 5-10.

### **WARNING**

- ❑ *The number shown in the sample indicates the thickness level compared to the current linear spacer. (See \*.) There are 11 linear spacers with 11 different thicknesses.*
- ❑ *The linear spacer is attached by two pieces, one on each side of the head base. Therefore, when you need to replace one linear spacer, always replace both linear spacers at the same time.*
- ❑ *When replacing the linear spacer, place it under the angular spacer.*

- \* If necessary, replace the linear spacer. For instance, if your pattern is similar to the pattern shown under -2, replace the linear spacer with a thinner linear spacer. If your pattern is similar to the pattern shown under 2, replace the linear spacer with a thicker spacer.
5. Turn the printer off.
  6. Move the carriage to the center while pressing the carriage lock lever, and remove the two ink cartridges.



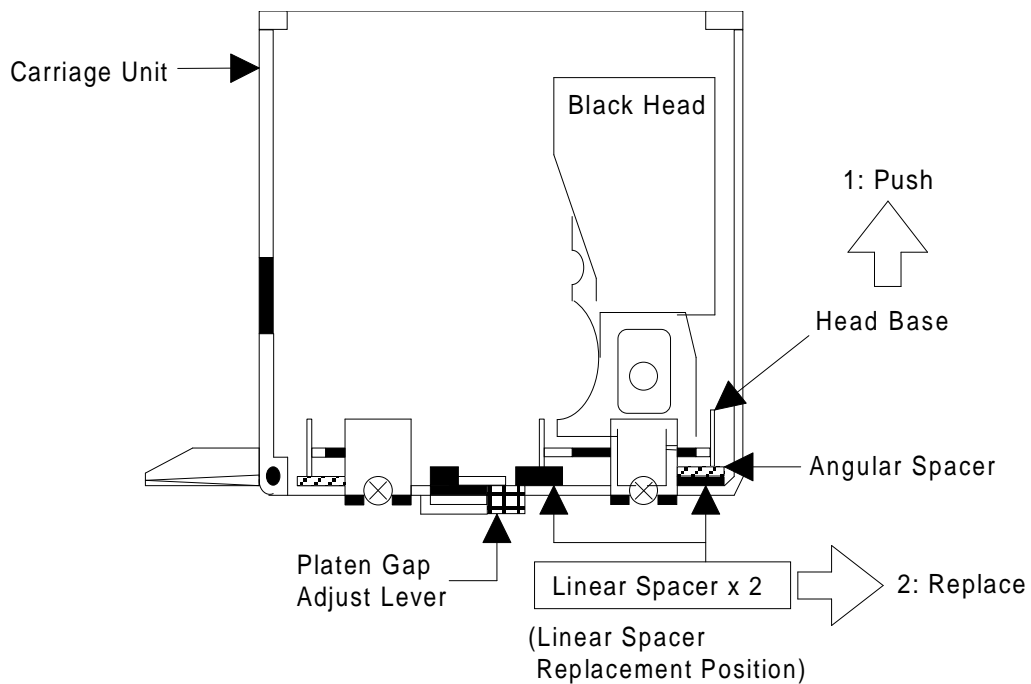
**Figure 4-10. Removing the Rubber Cap**

7. Remove the rubber cap that covering a head screw at the side of color ink cartridge and then loosen (but do not remove) 3 screws. (Refer to the figure below.)

### **WARNING**

*After replacing the spacer, always install new ink cartridges before returning the printer to the user. During adjustment, use the ink cartridges exclusively for service (Monochrome: 1020626, CMY: 1020627). You can reuse the old ink cartridges for other purposes.*

8. Change the linear spacers (2 spacers for the monochrome head only) with new ones, referring the figure below. (Replace linear spacers using tweezers to push the head base toward the rear.)



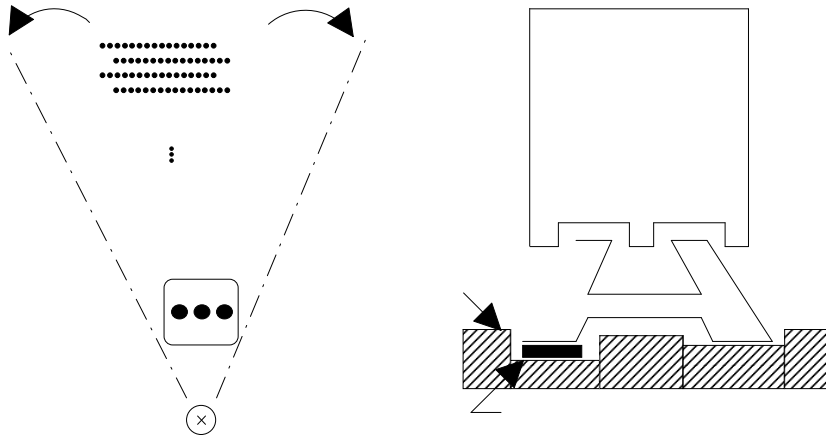
**Figure 4-11. Linear Spacer Replacement Method**

9. Rerun the BASIC program, and choose the "Head Vertical Position Confirmation" by typing **3** and **ENTER**; then confirm that the sample print is correct. If the sample is incorrect, change the thickness of the linear spacer and perform this adjustment again until the two black and magenta lines are aligned at the position "OK (0)."
10. When you complete this adjustment, exit the BASIC program and turn off the printer.

## 4.1.6 Color Head Angle Adjustment

The color head angle adjustment is required when the color head is replaced or disassembled. If this adjustment is not correct, a white banding problem may occur, or the black head timing may not match the color head timing. The following figure illustrates the color head angle adjustment.

The color head angle is adjusted by the angular spacer. The angular spacer is attached only to the left side of the head base.



1. Connect the PC to the target printer, and turn the printer on.
2. Execute BASIC on the PC and run the program "VERxxx.BAS".

<ol style="list-style-type: none"><li>1. Destination Setting</li><li>2. Head Angle Confirmation Pattern Printing (Black Head Spacer Selection)</li><li>3. Head Vertical Position Confirmation</li><li>4. Head Gap Adjustment</li><li>5. Bi-D Adjustment</li><li>6. Internal Timer Reset</li><li>7. END</li></ol>
--

3. When the main menu appears, choose "Head Angle Confirmation Pattern Printing" by typing 2 and **ENTER**. (The printer prints the check pattern with the sample name.)

### **WARNING**

*When replacing both the black head and color head, always adjust the color head angle first. The black head angle and the black-color head vertical position adjustments are based on the color head angle adjustment.*

Angular spacers for the color head come in five thicknesses, each having its own shape. The following figure shows the relationship between the shape and thickness. Since the color head is not equipped with a linear spacer, the angle adjustment is decided only by the angular spacer (specifically designed for the color head), which is placed under the left side of the head base.

Angular Spacer (for Color Head)






Spacer Name	Thickness	Shape
angular spacer YMC	0.30	
angular spacer YMC-B	0.35	
angular spacer YMC-C	0.40	
angular spacer YMC-D	0.45	
angular spacer YMC-E	0.50	

Figure 4-14. Relationship between the Shape and Thickness

- In Figure 4-13, pay attention to the position of A and B while you reset the left angular spacer. The replacement procedure is explained beginning in step 5.

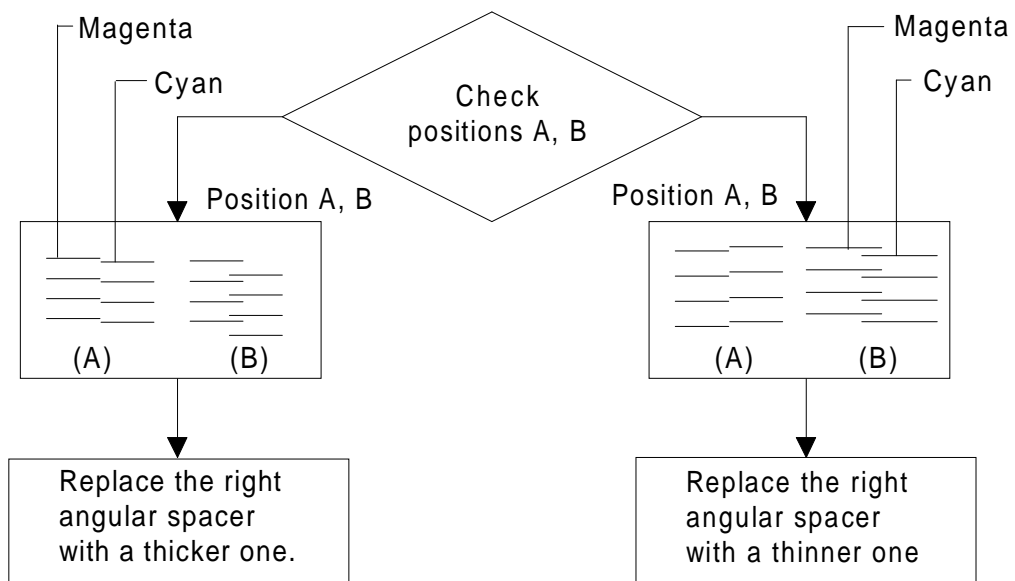
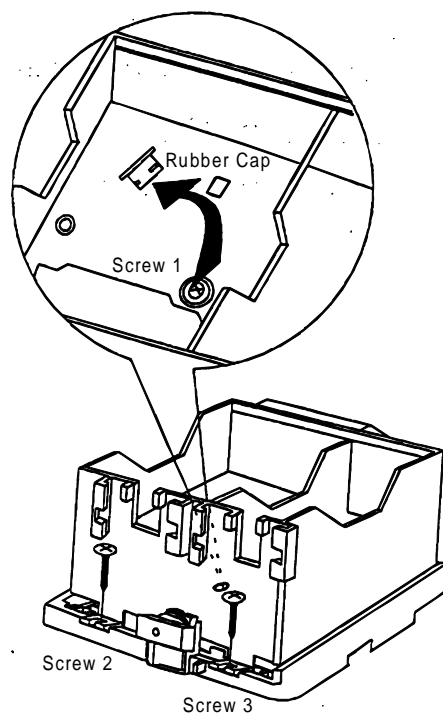


Figure 4-15. Spacer Selection

- Turn off the printer now.
- Move the carriage to the center manually, and loosen (but do not remove) the screw securing the color head to the carriage.

7.



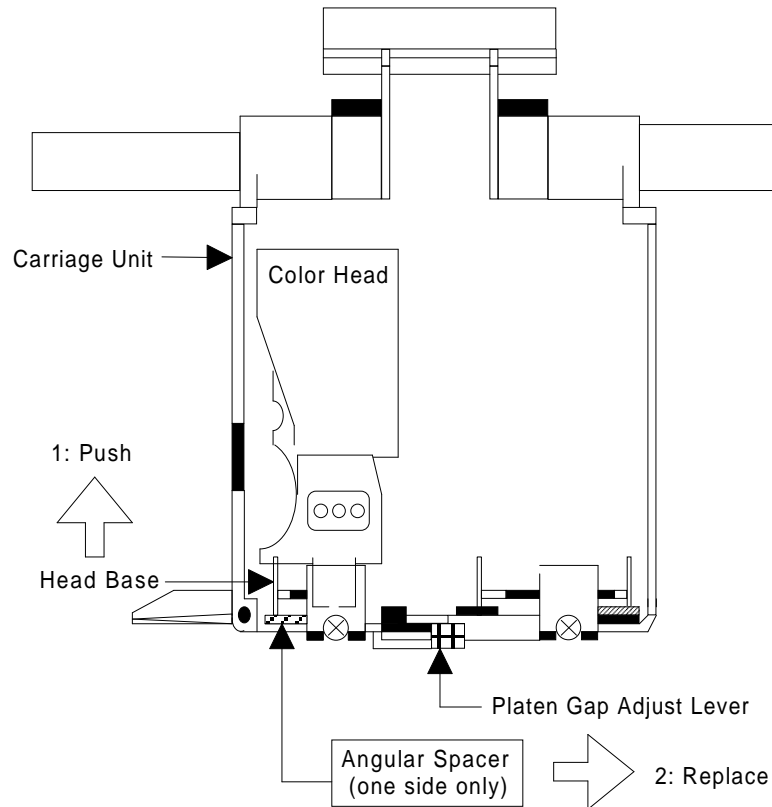
**Figure 4-16. Removing the Rubber Cap**

Remove the rubber cap covering the head screw at one side of color ink cartridge. Then loosen (but do not remove) 3 screws. (Refer to the figure below.)

8. Replace the angular spacer on the left side with a new one, referring the figure below. (Replace the angular spacer using tweezers to push the head base toward the rear.)



9. Rerun the BASIC program and choose "Head Angle Confirmation Pattern" again by typing 2 and **ENTER**. Then verify that the confirmation sample is correct.



**Figure 4-17. YMC Angular Spacer Replacement**

10. If the sample is incorrect, repeat steps 5-9 until the upper lines in the sample are aligned with one another and the lower lines in the sample are exactly equidistant to one another (as shown at B in Figure 4-15).
11. When you complete this adjustment, turn off the printer.

### 4.1.7 Platen Gap Adjustment

This adjustment is required when the carriage unit is replaced or removed from the printer mechanism. Adjust the distance between the printhead nose and the paper surface to 1.1 mm.

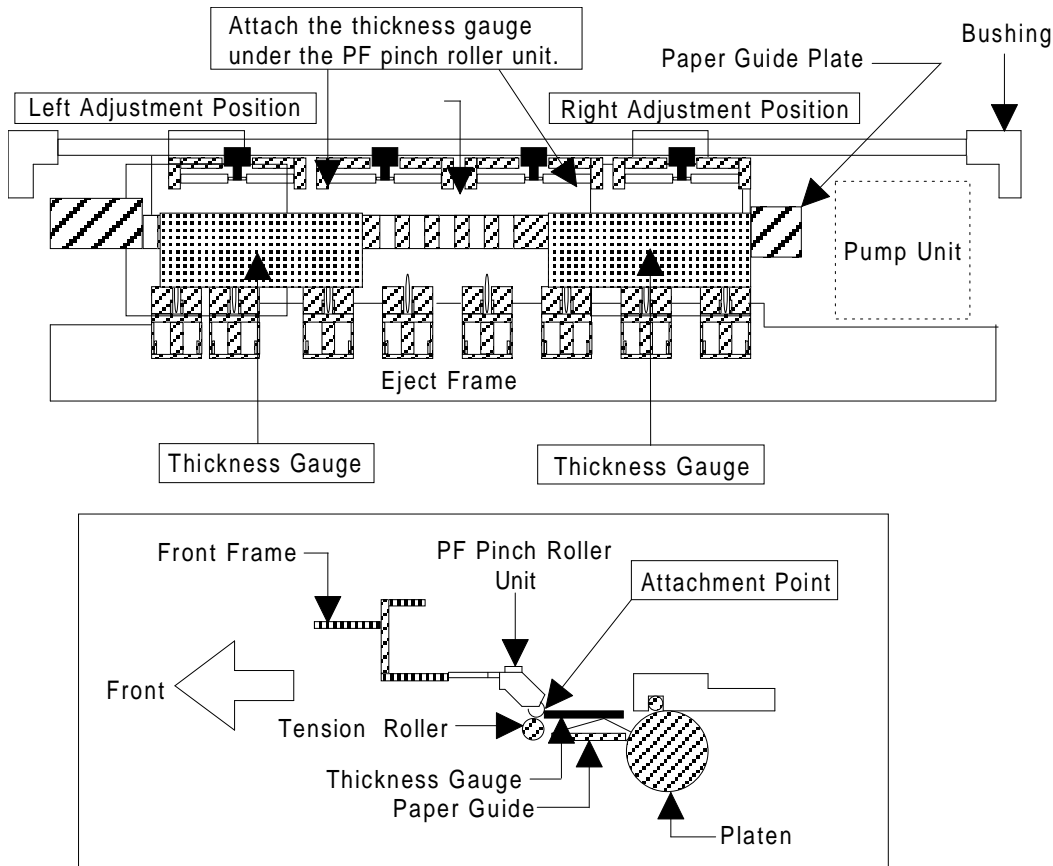
1. Attach a thickness gauge (commercially available) to the left side adjustment position on the paper guide plate, as shown in the figure below, so that one side hooks the paper feed pinch roller unit.
2. Move the carriage unit manually onto the thickness gauge.

**Table 4-2. Gap and Adjustment Direction**

Gap between Head Nose and Gauge Surface	Left Bushing	Right Bushing
Narrow	CW	CCW
Spread	CCW	CW

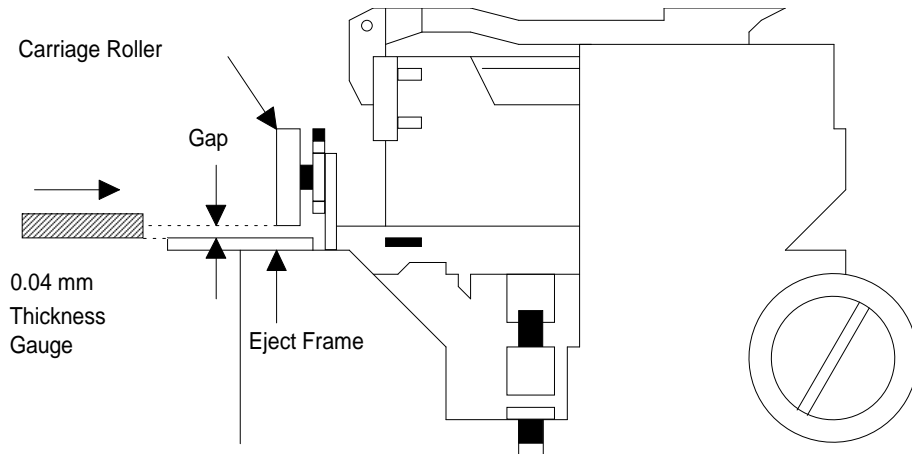
3. Rotate the parallelism adjustment bushing, attached to the left and right ends of the carriage guide shaft, when the black and color printheads contact the thickness gauge.
4. After attaching the printheads to the gauge surface, verify that the gap between the carriage roller and the front frame is less than 0.04 mm. (See Figure 4-16.)
5. Attach the 1.1 mm thickness gauge to the right side adjustment position on the paper guide plate, as shown below, so that one side hooks the paper feed pinch roller unit.

**Note:** When checking the gap between the carriage roller and the front frame, use the thickness gauge or the paper guide plate. If the gap is correct the gauge cannot be installed into the gap. If the gap is incorrect, the gauge can be inserted in the gap.



**Figure 4-18. Adjusting the Platen Gap**

6. Move the carriage manually to the right adjustment position and repeat steps 3 and 4, referring to Figures 4-18 and 4-19.



**Figure 4-19. Confirming the Gap**

#### 4.1.8 Internal Timer Reset Operation

This operation is required when the M-4A60 printer mechanism is replaced. There are 6 timers in this printer:

1. Refresh timer
2. Timer (monochrome and CMY)
3. Flushing level decision timer
4. False absorbing timer
5. Total print timer
6. PAUSE timer

When the printer mechanism is replaced, reset the timers as described here:

1. Connect the PC to the target printer, and turn on the printer.
2. Execute BASIC on the PC and run the VERxxx.BAS program.

<ol style="list-style-type: none"> <li>1. Destination Setting</li> <li>2. Head Angle Confirmation Pattern Printing (Black Head Spacer Selection)</li> <li>3. Head Vertical Position Confirmation</li> <li>4. Head Gap Adjustment</li> <li>5. Bi-D Adjustment</li> <li>6. Internal Timer Reset</li> <li>7. END</li> </ol>
--

3. When the main menu appears, choose "Internal timer reset" by typing **6** and **ENTER**. This resets the internal timer. The following message then appears.

<p>All parameters of the internal timer are now reset. Press Y and ENTER to return to the main menu.</p>
--

4. Press **Y** and **ENTER**.
5. Press **7** and **ENTER**.
6. Turn off the printer.

# Chapter 5 Troubleshooting

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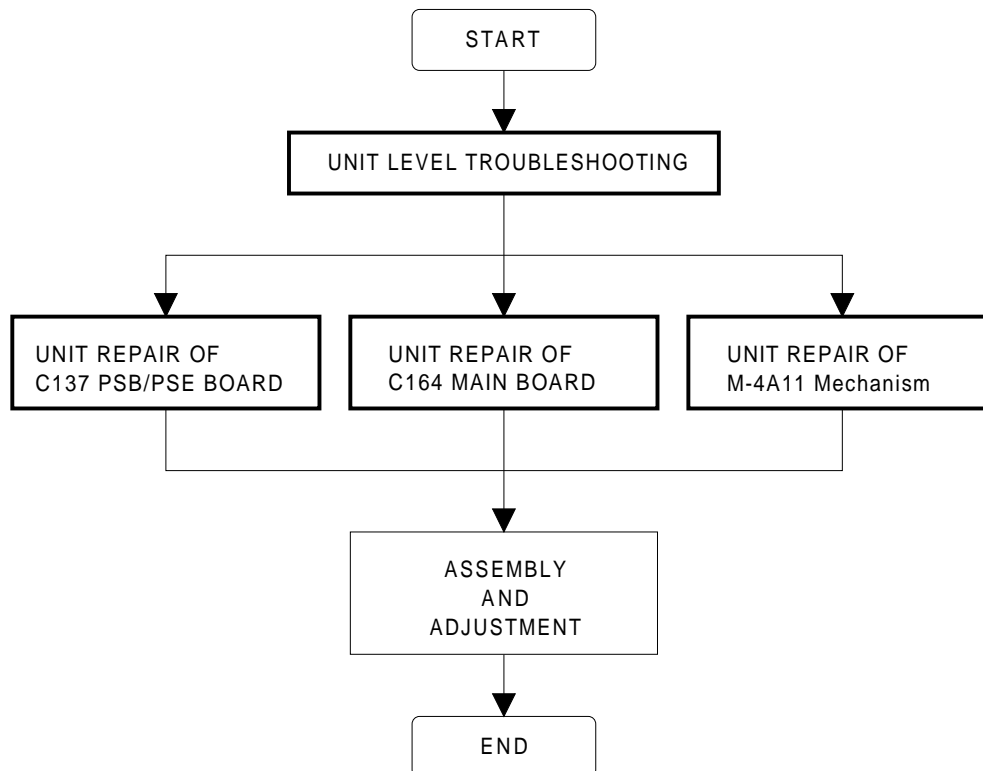
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## 5.1 OVERVIEW

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 in the troubleshooting process.



**Figure 5-1. Troubleshooting Process Flowchart**

**Table 5-1. Motor Coil Resistance Test Points**

Motor Connector Number	Common Pin Number	Test Pin Number	Test Method (Set Meter to Ohms. Disconnect Motor from Main Board and Check it with Printer Power Off.)	Meter Reading
CR Motor (CN6)	5	1, 2, 3, 4	Place one lead on pin 5 and the other lead on each of the 4 test pins to check the two motor phases.	10.0Ω ± 10%(At 25 °C, 77 °F)
PF Motor (CN7)	5	1, 2, 3, 4	Place one lead on pin 5 and the other lead on each of the 4 test pins to check the two motor phases.	11.5 Ω ± 10%(At 25 °C, 77 °F)

**Table 5-2. Sensor Status**

Sensor	Point	Signal Level	Status
PE Sensor	CN8 / Pin 1 to Pin 2	H (5 V)	Paper exists
		L (GND)	No paper (paper end)
BCO Sensor	CN11 / Pin 8 to Pin 7	L (GND)	Black cartridge exists
		H (5 V)	No black cartridge
CCO Sensor	CN12 / Pin 8 to Pin 7	L (GND)	Color cartridge exists
		H (5 V)	No color cartridge
HP Sensor	CN9 / Pin 3 to Pin 2	L	At home position (HP)
		H	Away from HP
TH Sensor	CN12/ Pin 10 to Pin 11	Analog data	Change the pulse width of the charge pulse for the common driver circuit

**Table 5-3. Sensor Test Points**

Sensor connector Number	Test Method (Set Meter to Ohms. Check Printer with Power Off.)	Method Reading
PE Sensor (CN8)	Place one lead on pin 1 and the other lead on pin 2. Toggle the sensor by inserting and removing a sheet of paper.	Meter should toggle between open and short (open = active).
BCO Sensor (CN11)	Place one lead on pin 8 and the other lead on pin 1. Toggle the sensor by inserting and removing a monochrome ink cartridge.	Meter should toggle between open and short.
CCO Sensor (CN12)	Place one lead on pin 8 and the other lead on pin 1. Toggle the sensor by inserting and removing a color ink cartridge.	Meter should toggle between open and short.

**Table 5-4. Error Codes**

Error Status	LED						Recovery
	Data	Paper Out	No Ink Cartridge	Economy	Condensed	Pause	
Paper out	—	On	—	—	—	—	Load paper and press Pause and Load/Eject buttons.
No ink cartridge	—	—	On	—	—	—	Install the new ink cartridge and press the Pause button.
Paper jam	—	Blinks	—	—	—	—	Load paper and press Pause and Load/Eject Buttons.
Maintenance request	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks	Service maintenance request. (Change the waste ink drain tank and reset the counter.)
Carriage error	Blinks	—	—	—	—	Blinks	Turn off the printer and turn it on again.

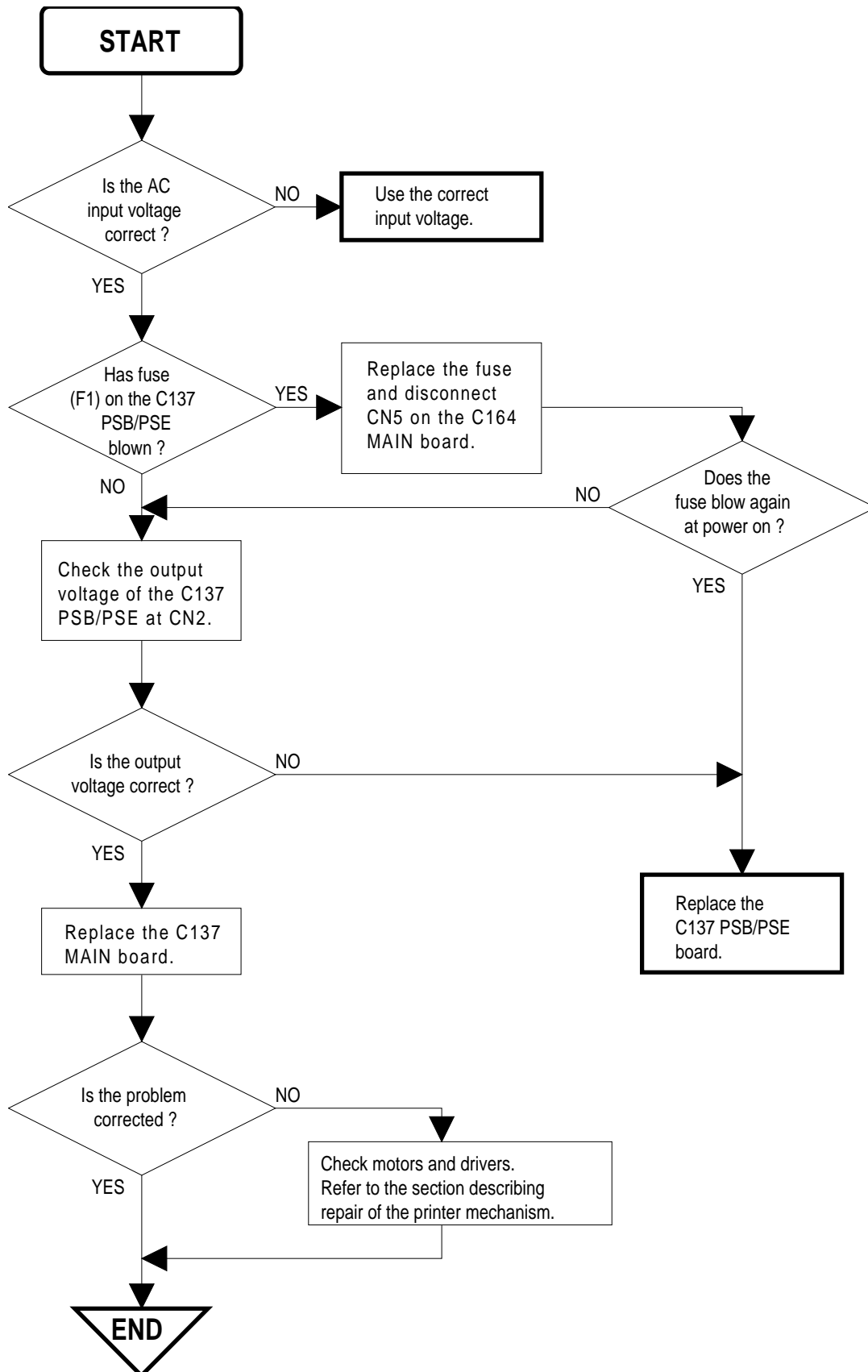
## 5.2 UNIT LEVEL TROUBLESHOOTING

When a problem occurs, you can identify the defective unit by the symptoms exhibited. The table below lists the symptoms of certain problems. Once the problem is identified, refer to the flowchart that corresponds to the problem.

**Table 5-5. Symptom and Problem**

Symptom	Problem	Flowchart No.
Printer does not operate at power on	<input type="checkbox"/> LEDs do not light up. <input type="checkbox"/> Printer mechanism does not operate.	1
Error is detected	<input type="checkbox"/> Error is indicated by LED indication.	2
Failure occurs during printing	<input type="checkbox"/> Printing is not performed. <input type="checkbox"/> Abnormal printing (missing dots, etc.) <input type="checkbox"/> Print quality is poor	3
Printer does not feed the paper correctly	<input type="checkbox"/> No paper is fed. <input type="checkbox"/> Paper feed is irregular. <input type="checkbox"/> Paper jam occurs.	4
Control panel operation is abnormal	<input type="checkbox"/> No response to button access.	5

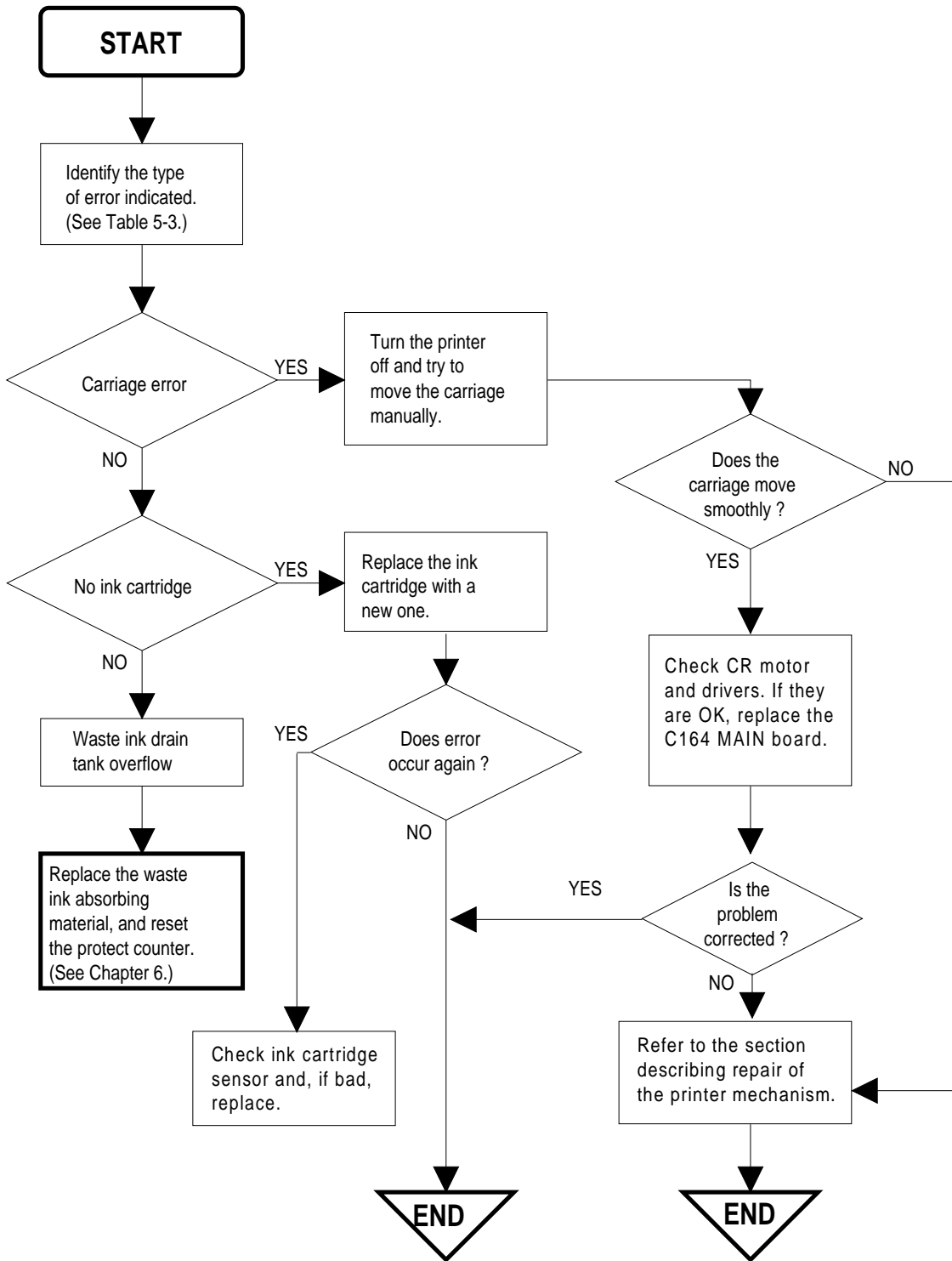
### 5.2.1 Printer Does Not Operate at Power On



Flowchart - 1

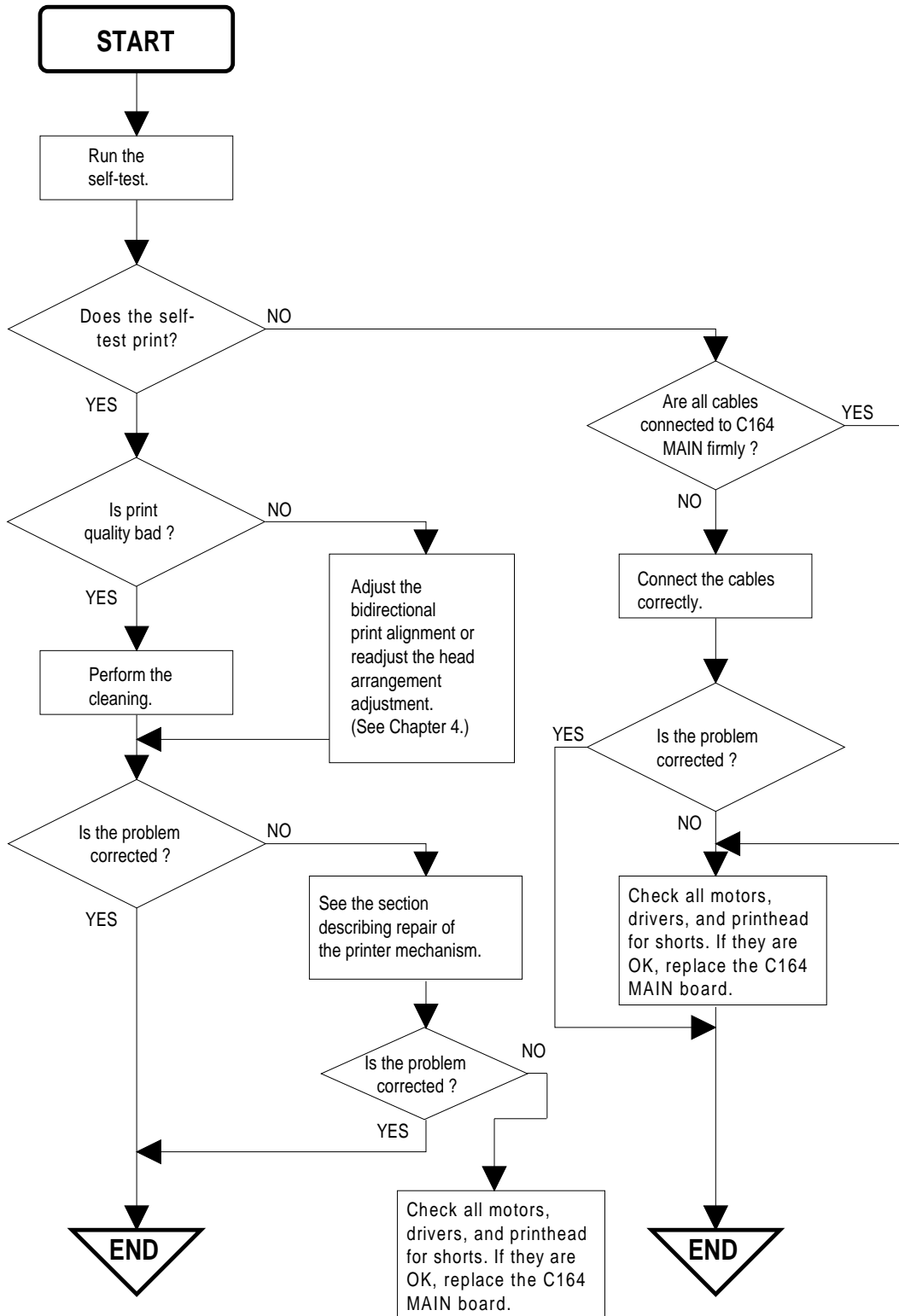


5.2.2 Error is Detected



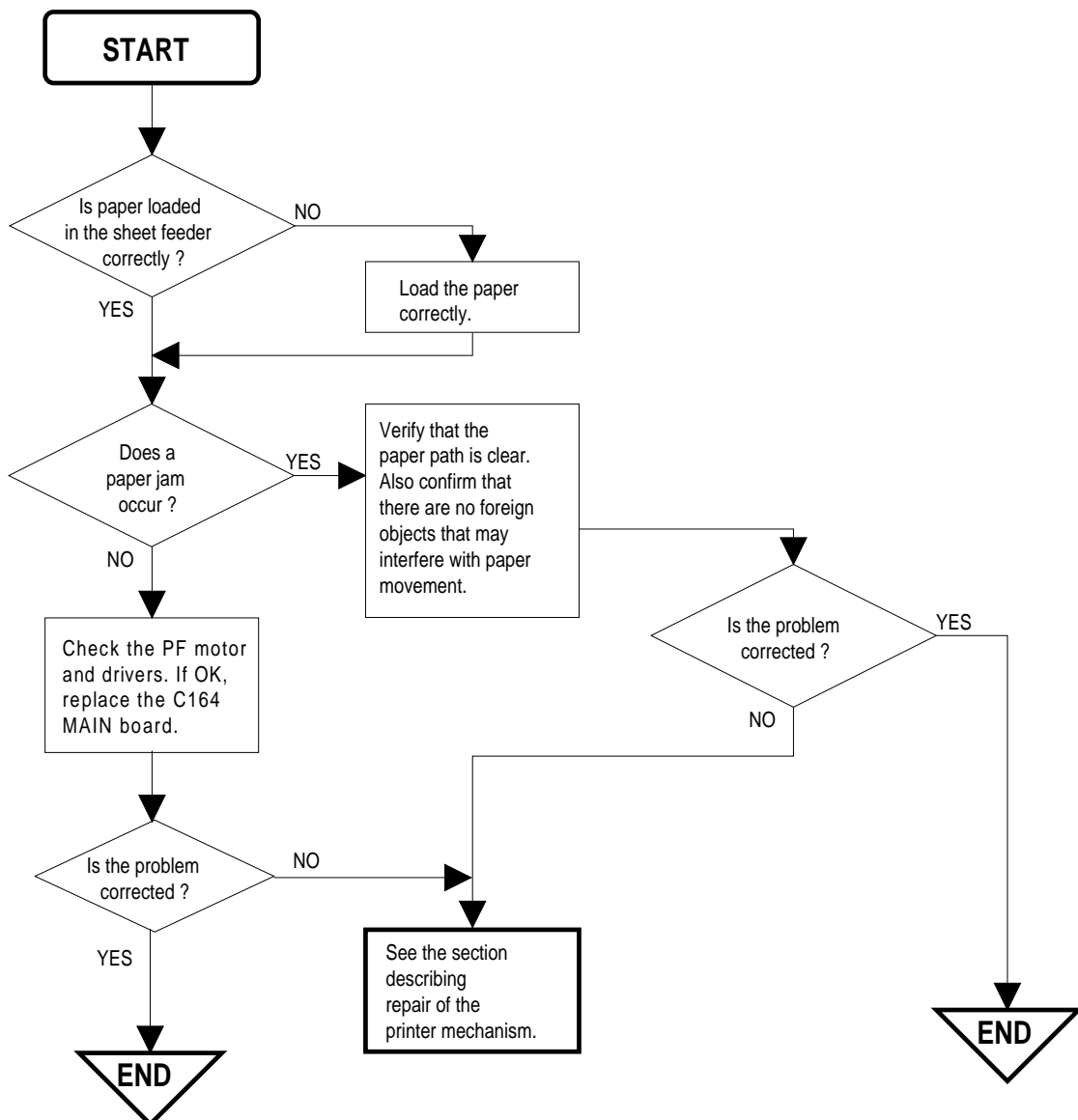
Flowchart - 2

### 5.2.3 Failure Occurs During Printing



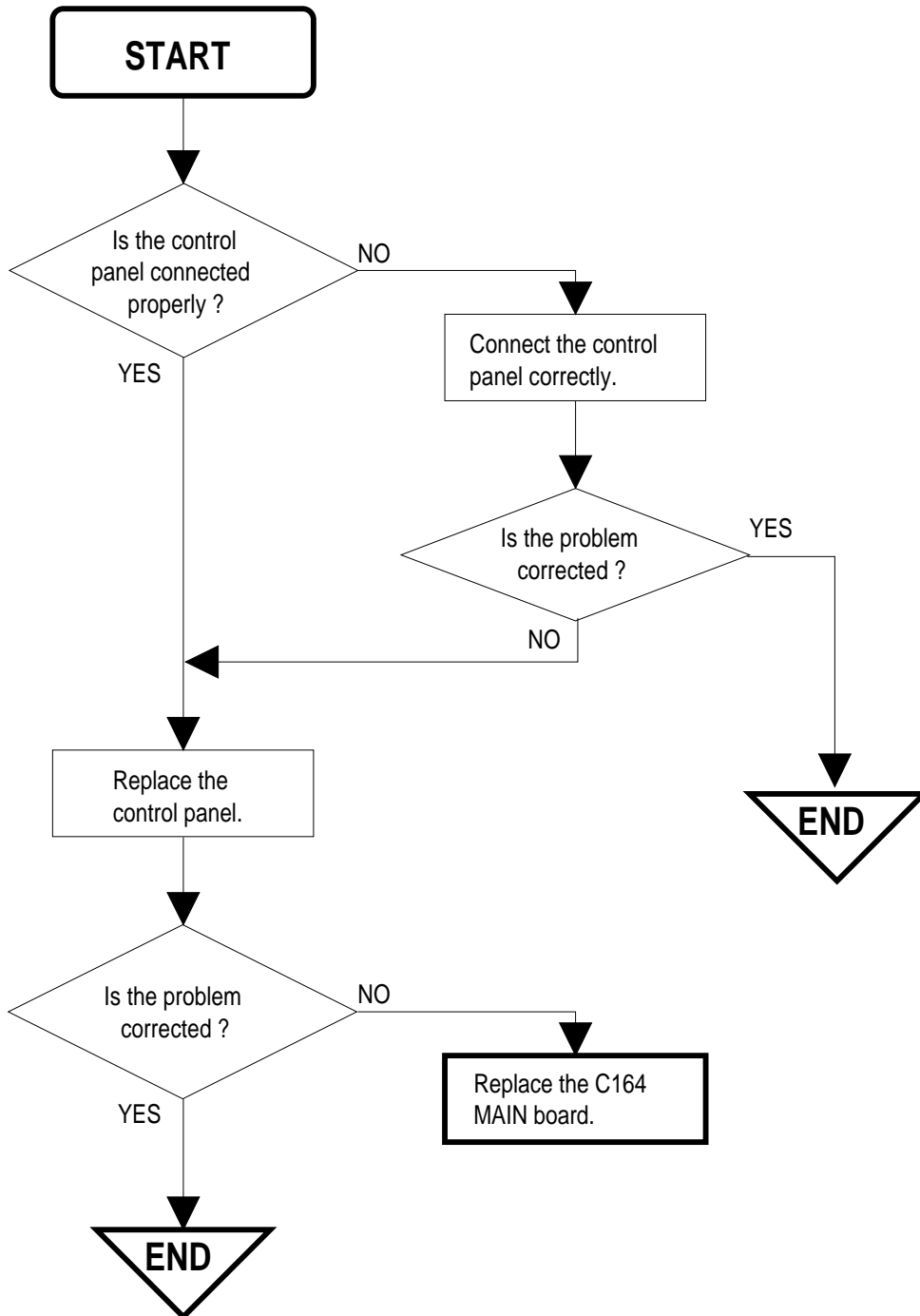
Flowchart - 3

## 5.2.4 Printer Does Not Feed the Paper Correctly



Flowchart - 4

### 5.2.5 Control Panel Operation is Abnormal

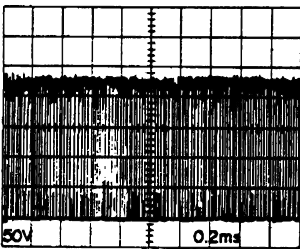
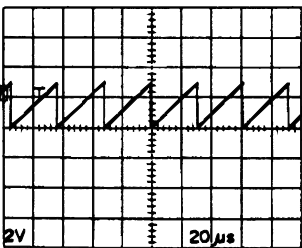
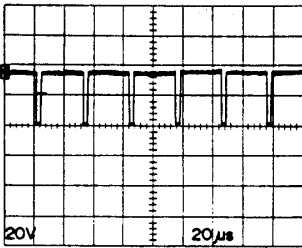


Flowchart - 5

### 5.3 UNIT REPAIR — C137 PSB/PSE BOARD

This section describes problems related to the power supply board (C137 PSB/PSE). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints are waveforms, resistances, and other values to be checked to evaluate the operation of each component.

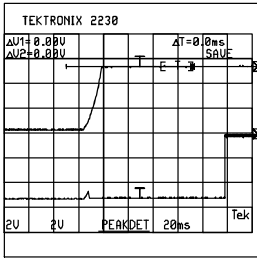
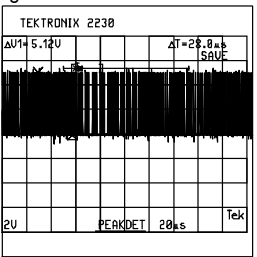
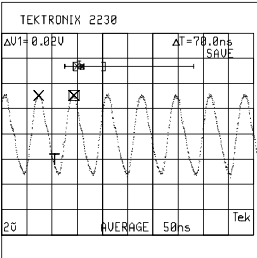
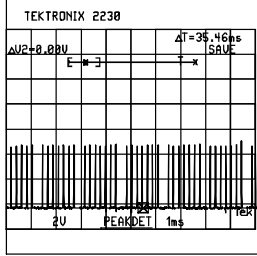
**Table 5-6. Repair of the C137 PSB/PSE**

Symptom	Condition	Cause	Checkpoint	Solution
The printer does not operate at all.	+35 V line is dead.	Transformer (T1) coils are open.	Check the coils for transformer using a multimeter.	Replace T1.
		Switching FET (Q1)	Check the waveform at the drain of Q1. 	Replace Q1.
	+35 V line is abnormal.	ZD52, Q83 or PC1 is dead.	Check the voltage level of the corrector side. Correct voltage is as follows; Power Switch OFF = +1.8 VDC Power Switch On = 0 VDC	Replace ZD52, Q82 or PC1.
	+35 V line is dead.		Check the +35 V line.	Replace IC51.
		IC51 is dead.	Check the oscillation waveform and switching waveform of IC51.  Oscillation waveform (IC51, pin 5)  Switching waveform (IC51, pin 8)	
Auto capping operation is invalid.	+35 V line is invalid when power off.	IC81 is dead.	Turn off the printer and check the voltage at pin 1 of IC81. □ Normal voltage = 0 VDC	Replace IC81
		IC82 is dead or R88 is shorted.	Turn off the printer and check the voltage at plus side of C82. □ Normal voltage = 2.5 VDC □ R88 resistance = 100 Ω	Replace C82 or R88.

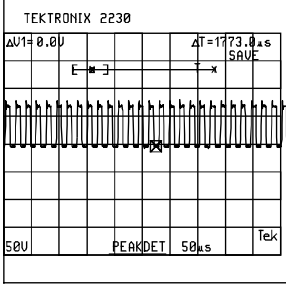
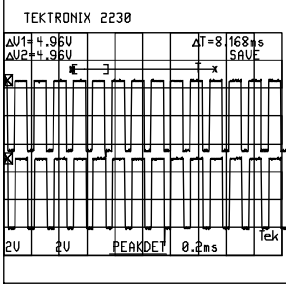
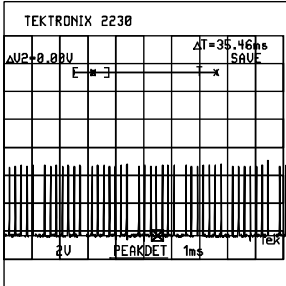
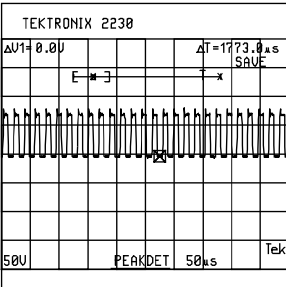
## 5.4 UNIT REPAIR — C164 MAIN BOARD

This section describes the problems related to the main controller board (C164 MAIN). The table below provides various symptoms, likely causes, and checkpoints. The checkpoints are waveforms, resistances, and other values to be checked to evaluate the operation of each component.

**Table 5-7. Repair of the C164 MAIN**

Symptom	Condition	Cause	Checkpoint	Solution
The Printer dose not operate at all.	The CPU dose not operate. (Drive system dose not operate normally when you turn the printer on or off.)	The reset circuit dose not operate.	Check the waveform of the +5V line and that of the RESET signal. 	Replace IC13 or IC8.
		Selection of control ROM is abnormal.	Check pin 2 of IC3 for a change in the signal HIGH/LOW. 	
		Either CG or RAM is defective.		Replace CG or RAM.
		CPU is defective.	Check the osillator signal at either pin 75 or 74 of the CPU. 	If ssignal is detected, replace CPU. Otherwise replace CR1.
The carriage dose not operate normally.	The carriage motor dose not operate normally.	IC2 is defective.	Check the serial signal output from pin 25 or 28 of IC2 to the driver IC15. 	Replace IC2.
		CPU is defective.		Replace the CPU.

**Table 5-7. Repair of the C164 MAIN (Continued)**

Symptom	Condition	Cause	Checkpoint	Solution
Carriage does not operate normally.	The carriage does not operate at all.	IC15 is defective.	Check the output signal at pin 1, 8 or 11, 18 of IC15. 	Replace IC15.
Self-test printing is abnormal.	Self-test is not executed.	IC2 is defective.	Check the output signal at pin 13 or 14 and pin 15 or 16 of IC2. 	Replace IC2.
		Printhead is defective		Replace printhead.
Paper feed does not operate normally.	The paper feed motor does not rotate.	IC2 is defective.	Check the serial signal output from pin 40 or 41 of IC2 to the driver IC14. 	Replace IC2.
		IC14 is defective.	Check the output signal at pin 1, 8 or 11, 18 of IC14. 	Replace IC14.

## 5.5 UNIT REPAIR — PRINTER MECHANISM (M-4A11)

Any problems related to the printer mechanism should be repaired according to the troubleshooting procedures in Table 5-8.

**Table 5-8. Repair of the Printer Mechanism**

Symptom	Condition	Cause	Checkpoint	Solution
The pump mechanism does not operate.	The PF motor fails to rotate at power on.	Foreign substances are lodged in the mechanism gears.	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 is poorly absorbed.	Used ink does not flow 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.	Insert the tube properly.
		The ink tube is damaged.	Check the ink tube visually.	Replace the tube.
		The cap is defective.	Check 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 carriage motor does not rotate.	The carriage motor fails to rotate at power on.	Foreign substances are lodged in the mechanism gears.	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 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.	Check 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.
	The carriage moves slightly and then stops.		Carriage movement is not smooth.	Check whether the carriage moves smoothly when moved manually.
		Check tension of the timing belt.		Adjust tension of the timing belt.



Table 5-8. Repair of the 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 whether the head cable is disconnected.	Reconnect the head cable.
		The head cable is defective.	Replace the head cable to see if operation is normal.	Replace the head 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 disconnected.	Check whether the head cable is disconnected.	Reconnect the head cable.
		The head cable is defective.	Replace the head cable to see if operation is normal.	Replace the head cable.
		The printhead is defective.	Replace the printhead.	Replace the printhead.
	A dot is not printed occasionally.	Printhead surface is not clean.	Check the front of the printhead.	Clean.
		The ink cartridge is used up.	Check whether the ink cartridge is empty.	Replace the ink cartridge.
		Insufficient head cable contact.	Check whether the cable is properly plugged into the connector.	Plug the cable into the connector properly.
			Check whether the printhead is clean.	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 platen gap is not adjusted.	Check the platen gap.
	The intervals between the characters are irregular.	The timing belt is defective.	Check that the timing belt is properly inserted into the bottom of the carriage.	Insert the timing belt properly.
	Vertical line is not aligned.	Bidirectional alignment is not adjusted.	Check it with bidirectional alignment program.	Adjust the bidirectional alignment.
	Paper is not fed normally.	Character or dot pitch is abnormal.	Character or dot pitch is abnormal.	Check for head inclination, distance front/rear position.

**Table 5-8. Repair of the Printer Mechanism (Continued)**

Symptom	Condition	Cause	Checkpoint	Solution
Paper is not fed normally.	Paper is not fed.	Foreign substance is 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

Although this printer is designed so that no specific maintenance is required on a regular basis, it is recommended that you clean the printer thoroughly whenever you get a chance to do so. You can clean:

Outer case

Use a soft, clean cloth, dampened with mild detergent, if necessary.

Auto sheet feeder

If the inside of the auto sheet feeder is dirty (dusty), carefully brush away all dust and dirt using a soft brush. If the pickup 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 that has accumulated inside the printer when you open the outer case for repair, remove all dust and dirt using a small vacuum cleaner designed for such purposes.

### **WARNING**

- Never use paint 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 a vacuum cleaner.*
- A lithium battery is installed on the C164 MAIN board of this printer. Be sure to observe the following instructions when servicing the printer or storing the after-service parts:*
- 1. Keep the battery away from any metal or other batteries so that electrodes of opposite polarity do not come in contact with each other.*
  - 2. Do not heat the battery and place it near fire.*
  - 3. Do not solder on any part of the battery. (Doing so may result in leakage of electrolyte from the battery, burning, or explosion. The leakage may damage devices close to the battery.)*
  - 4. Do not charge the battery. (An explosive gas may be generated inside the battery, and cause burning or explosion.)*
  - 5. Do not dismantle the battery. (The gas inside the battery may hurt your throat. Leakage, burning, or explosion may also result.)*
  - 6. Do not install the battery in the wrong direction. (This may cause burning or explosion.)*

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## 6.2 SERVICE MAINTENANCE

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

### 6.2.1 Printhead Cleaning

If print quality deteriorates, clean the printhead using the built-in printhead cleaning function. The printer also has an 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 to avoid wasting ink.

1. Turn the printer on and press the Pause button to pause the printer. Make sure that the PAUSE LED is on.
2. Hold down the Alt button and press the Load/Eject button for black head cleaning.  
Hold down the Alt button and press the Economy/Condensed button for color head cleaning.

When panel button operation is accepted by the printer, the PAUSE LED flashes during the cleaning cycle. When the cleaning completes, the PAUSE LED stops flashing and the printer returns to standby mode.

### 6.2.2 Waste Ink Drain Tank Replacement

The printer counts the total amount of ink drained to the waste ink drain tank and this information is stored in the EEPROM on the main board (in Protect Counter A). This value is used for ink system operation management. If the counter value reaches the predetermined value, the printer displays an error ("Waste ink tank overflow," see Chapter 1, Section 1.4.4, *Error Conditions*, Table 1-10). When this error is displayed, replace the waste ink absorbing materials and reset the protect counter.

1. Open the upper case and replace the waste ink absorbing materials from the compartment of the lower case. Reassemble the printer.
2. Turn the printer while holding down the Alt, Font, Load/Eject, Pause buttons. This resets the protect counter.

## 6.3 LUBRICATION AND ADHESIVES

The printer must be lubricated properly when it is disassembled for component replacement, or if mechanical noise exceeds a certain level. EPSON recommends only the lubricants listed in the table below for this printer, both of which have been tested extensively and comply with the requirements of this printer mechanism. Figure 6-1 shows the lubrication and adhesive points.

**Table 6-1. Recommended Lubricants**

Type	Name	Quantity	Part No.	Availability
Oil	O-5	40 cc	1010513	E
Grease	G-20	40 gm	B700000001	E
	G-36	40 gm	B703600001	E
Adhesive	Neji Lock #2 (G)	1000 g	B730200200	E

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

**Table 6-2. Lubrication and Adhesive Points**

Ref. No.	Lubrication/Adhesive Point	Lubricant
1	The teeth of gear 60	G-36 (1-3 mg)
2	The teeth of combination gear 10, 50	G-36 (1-3 mg)
3	End point of shaft securing sub frame assembly	G-36 (1-3 mg)
4	Cutout for the CR motor in the base frame assembly (2 points)	G-36 (1-3 mg)
5	Shaft located in the center frame assembly	G-36 (1-3 mg)
6	Shaft located in the center frame assembly	G-36 (1-3 mg)
7	Surface of the eject roller assembly	
8	Contact surface of the right side of the front paper guide and the eject roller assembly	G-36 (1-3 mg)
9	Right end point of the eject roller assembly	G-20 (1-3 mg)
10	Contact surfaces of the shaft and combination gear 13.5, 22 and the combination gear holder on the sub frame assembly	G-36 (1-3 mg)
11	The teeth of gear 22.5	G-36 (1-3 mg)
12	The teeth of combination gear 28, 17.5	
14	End points of the pump speed-up shaft (both sides)	G-36 (1-3 mg)
16	Cut point for knob on the right main frame	G-36 (1-3 mg)
17	Contact points of gear 60, the platen roller shaft, and the PF cap spring.	G-36 (1-3 mg)
18	2 points on the combination gear holder.	G-36 (1-3 mg)
19	Oil pad on the carriage	O5 (1-3 mg)
20	Contact surface of gear 25 and the plain washer	G-36 (1-3 mg)
21	Contact surface of the platen shaft bushing and plain washer	G-36 (1-3 mg)
22	Cutout in the platen roller shaft	G-20 (1-3 mg)
27	Contact point of the pressure spring and washer	G-36 (1-3 mg)
28	Combination gear 13.5, 22	G-36 (1-3 mg)
30	The teeth of gear 24	G-36 (1-3 mg)
(1)	Angular spacer for the black head and the cartridge base	Neji Lock #2 (1-3 mg)
(2)	Angular spacers for the color head and the cartridge base	Neji Lock #2 (1-3 mg)
(3)	The screw and washer attaching the ink cartridge holder to the carriage base.	Neji Lock #2 (1-3 mg)

**CAUTION**

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

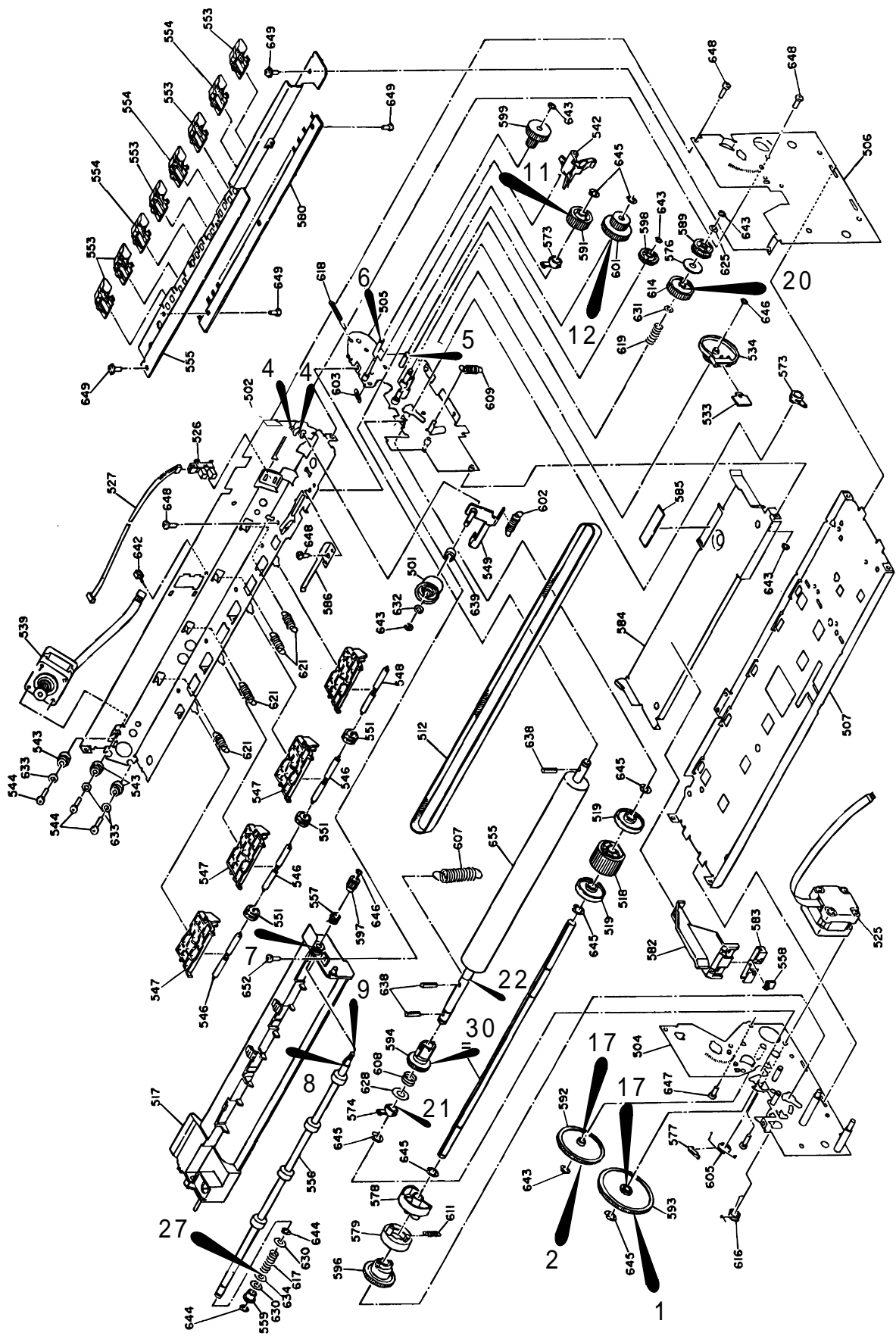


Figure 6-1. Lubrication Points and Adhesive Points (1)



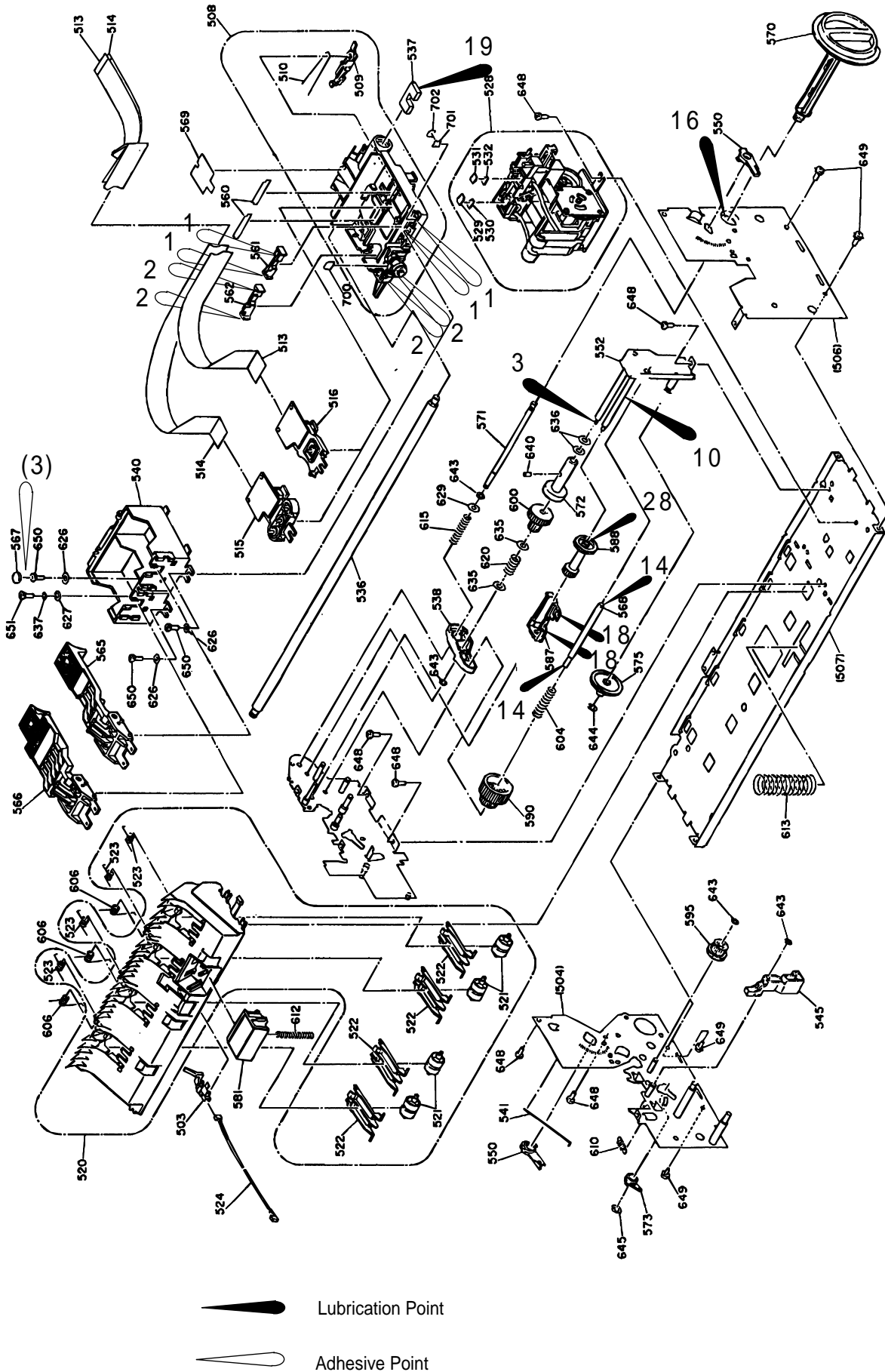


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## A.1 CONNECTOR SUMMARY

The figure below shows the interconnection between the major components of the Stylus Color Pro.

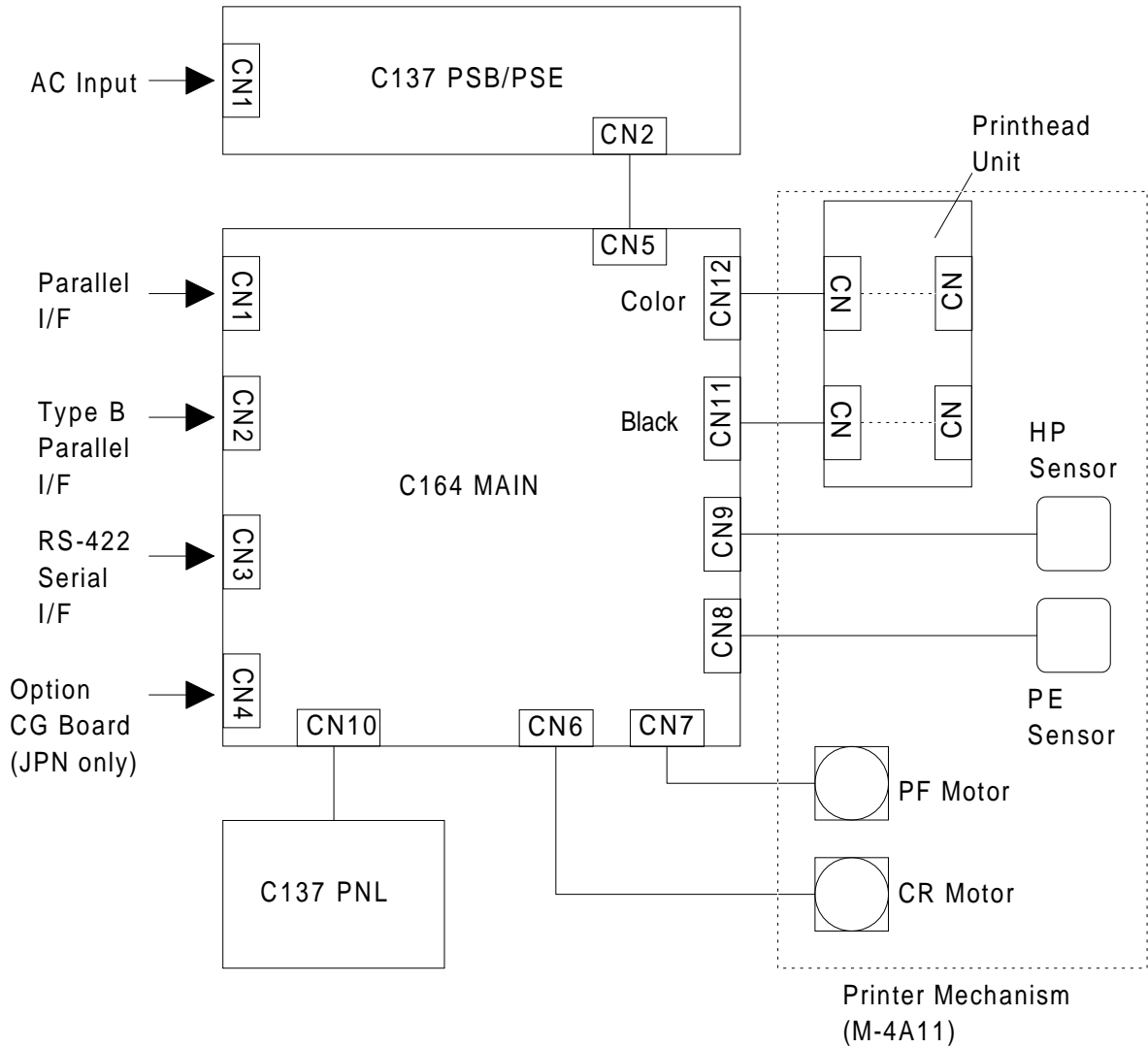


Figure A-1. Interconnection of Major Components

**Table A-1. Connector Summary**

Board	Location	Pins	Description
C164 MAIN	CN1	36	Centronics parallel I/F
	CN2	36	Type B parallel I/F
	CN3	8	RS-422 serial I/F
	CN5	6	Power supply from PS board
	CN6	5	Carriage motor phase output
	CN7	5	PF/PM motor phase output
	CN8	2	Paper end sensor
	CN9	3	Carriage home position sensor
	CN10	20	Control panel (to C137 PNL)
	CN11	22	Black head nozzle selector and common driver
	CN12	22	Color head nozzle selector and common driver
	C137 PSB/PSE	CN1	2
CN2		8	DC output (+5 V / +35 V)
C137 PNL	CN1	20	(to C164 MAIN)

**Table A-2. Connector Pin Assignments – CN1**

Pin	I/O	Name	Description
1	I	STB	Strobe signal
2-9	I	DATA1-8	Data strobe signal
10	O	ACK	ACK signal
11	O	BUSY	Busy signal
12	O	PE	Paper end signal
13	O	SLCT	Printer select signal
14	I	AFXT	Auto line feed signal
15	—	NC	Not connected
16	—	GND	Ground
17	—	FG	Frame ground
18	—	+5 V	+5 VDC
19-30	—	GND	Ground
31	I	INIT	INIT signal
32	O	ERR	Error signal
33	—	GND	Ground
34	—	NC	Not connected
35	—	+5 V	+5 VDC
36	I	SLIN	Select in signal

**Table A-3. Connector Pin Assignments – CN2**

Pin	I/O	Name	Description
1-6	I	+5 V	Power supply for I/F drive
7	O	TXD	Transmit data
8	O	READY	Ready signal
9	I	RXD	Receive data
10	—	NC	Not connected
11	O	RESET	Reset signal
12	O	INH	Inhibit signal
13	O	CMREQ	Command request signal
14	O	WRRDY	Write ready signal
15	O	RDREQ	Read request signal
16	O	HWR	High write signal
17	O	RD	Read signal
18	O	CS	Chip select signal
19-24	—	GND	Ground
25-28	I/O	A3-A0	Address bus signal 3-0
29-36	I/O	D15-D8	Data bus signal 15-8

**Table A-4. Connector Pin Assignments – CN3**

Pin	I/O	Name	Description
1	—	DTR	Data terminal ready
2	—	NC	Not connected
3	O	TXD-	Transmit data-
4	—	GND	Ground
5	I	RXD-	Receive data -
6	O	TXD+	Transmit data+
7	—	NC	Not connected
8	I	RXD+	Receive data +

**Table A-5. Connector Pin Assignments – CN5**

Pin	I/O	Name	Description
1	I	PSC	Power scan signal
2,3	I	+35 V	Head common driver for common drive circuit
4-6	—	GND	Ground
7, 8	I	+5V	Power supply for logic system

**Table A-6. Connector Pin Assignments – CN6**

Pin	I/O	Name	Description
1	O	CRA	Phase A drive signal
2	O	CR/A	Phase /A drive signal
3	O	CRB	Phase B drive signal
4	O	CR/B	Phase /B drive signal
5	O	CRCOM	Carriage drive power (common voltage)

**Table A-7. Connector Pin Assignments – CN7**

Pin	I/O	Name	Description
1	O	PFA	Phase A drive signal
2	O	PF/A	Phase /A drive signal
3	O	PFB	Phase B drive signal
4	O	PF/B	Phase /B drive signal
5	O	PFCOM	Carriage drive power (common voltage)

**Table A-8. Connector Pin Assignments – CN8**

Pin	I/O	Name	Description
1	I	PE	Paper out state detection signal
2	—	GND	Ground

**Table A-9. Connector Pin Assignments – CN9**

Pin	I/O	Name	Description
1	I	HP	Home position detection signal
2	—	GND	Ground
3	O	HPV	Sensor drive power supply

**Table A-10. Connector Pin Assignments – CN10**

Pin	I/O	Name	Description
1,3,5,7	—	GND	Ground
2	O	LDATA	LED data
4	O	LCLK	Clock signal for LED drive
6	O	LLAT	LED data latch signal
8	O	LCLR	LED data reset signal
9,11,19,20	I	+5 V	LED driver and power
10,12-16	I	SW0-5	Switch 0-5 input signal
17	I	PSW	Power switch
18	I	PSC	Power scan

**Table A-11. Connector Pin Assignments – CN11**

Pin	I/O	Name	Description
1	—	GND	Ground
2	O	BCLK	Clock signal for black head
3	—	GND	Ground
4	O	BLAT	Latch signal for black head
5	—	GND	Ground
6	O	BSI	Black head serial data output
7	—	GND	Ground
8	O	BCO	Black cartridge out sensor
9	I	+5 V	Power supply for cartridge out sensor
10	—	NC	Not connected
11-16	O	GP	Ground
17-22	O	COM	Common voltage for printhead drive

**Table A-12. Connector Pin Assignments – CN12**

Pin	I/O	Name	Description
1	—	GND	Ground
2	O	CCLK	Clock signal for color head
3	—	GND	Ground
4	O	CLAT	Latch signal for color head
5	—	GND	Ground
6	O	CSI	Color head serial data output
7	—	GND	Ground
8	O	CCO	Color cartridge out sensor
9	I	+5 V	Power supply for cartridge out sensor
10	I	TH	Thermistor signal
11-16	O	GP	Ground
18-22	O	COM	Common voltage for printhead drive



## **A.2 CIRCUIT DIAGRAMS**

**Figure A-2. C164 MAIN Board Circuit Diagram (1)**

*\*5 IC6, Q2, R135 and CN13 are not mounted on the C164 MAIN Board (Stylus Pro)*

**Figure A-3. C164 MAIN Board Circuit Diagram (2)**

**Figure A-4. C137 PSB Board Circuit Diagram**

Figure A-5. C137 PSE Board Circuit Diagram

**Figure A-6. C137 PNL Board Circuit Diagram**

### A.3 CIRCUIT BOARD COMPONENT LAYOUTS

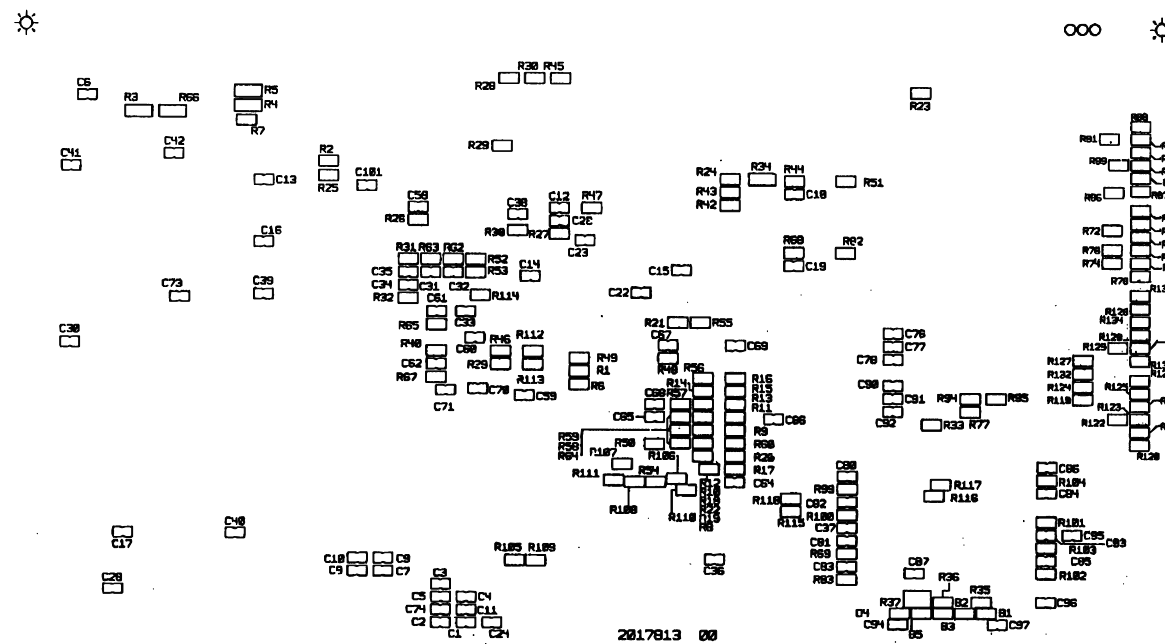
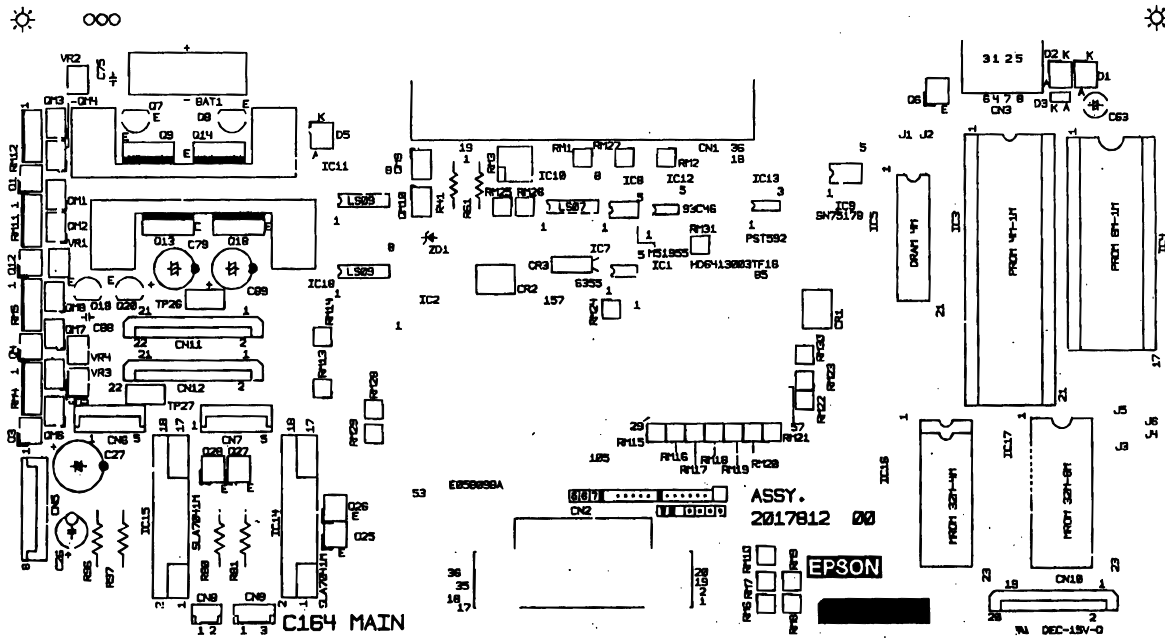


Figure A-7. C164 MAIN Board Component Layout

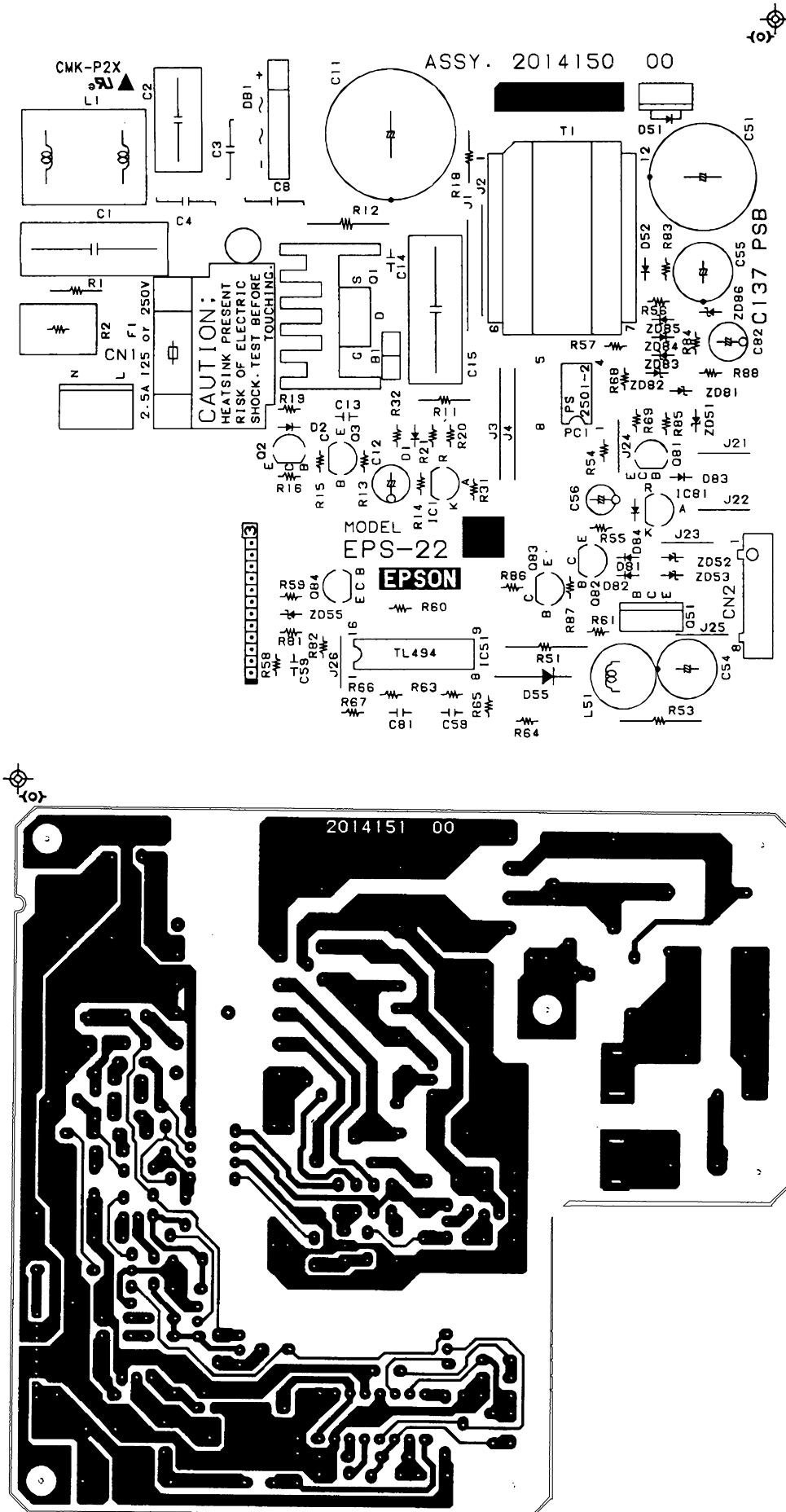


Figure A-8. C137 PSB/PSE Board Component Layout



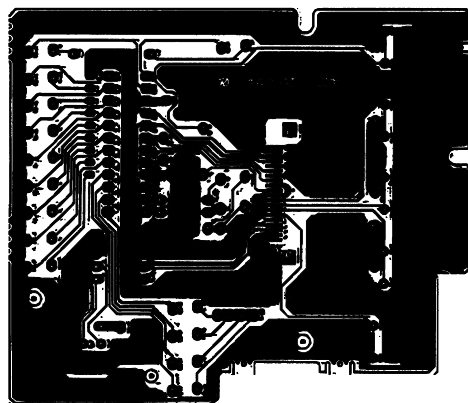
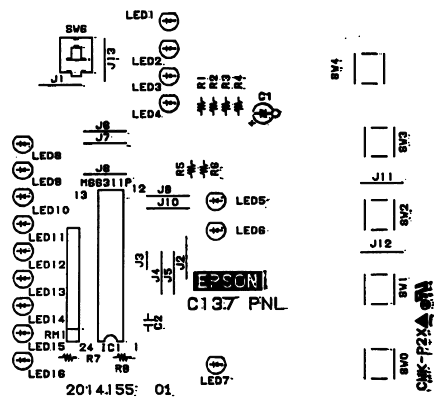


Figure A-9. C137 PNL Board Component Layout

### A.4 EXPLODED DIAGRAMS

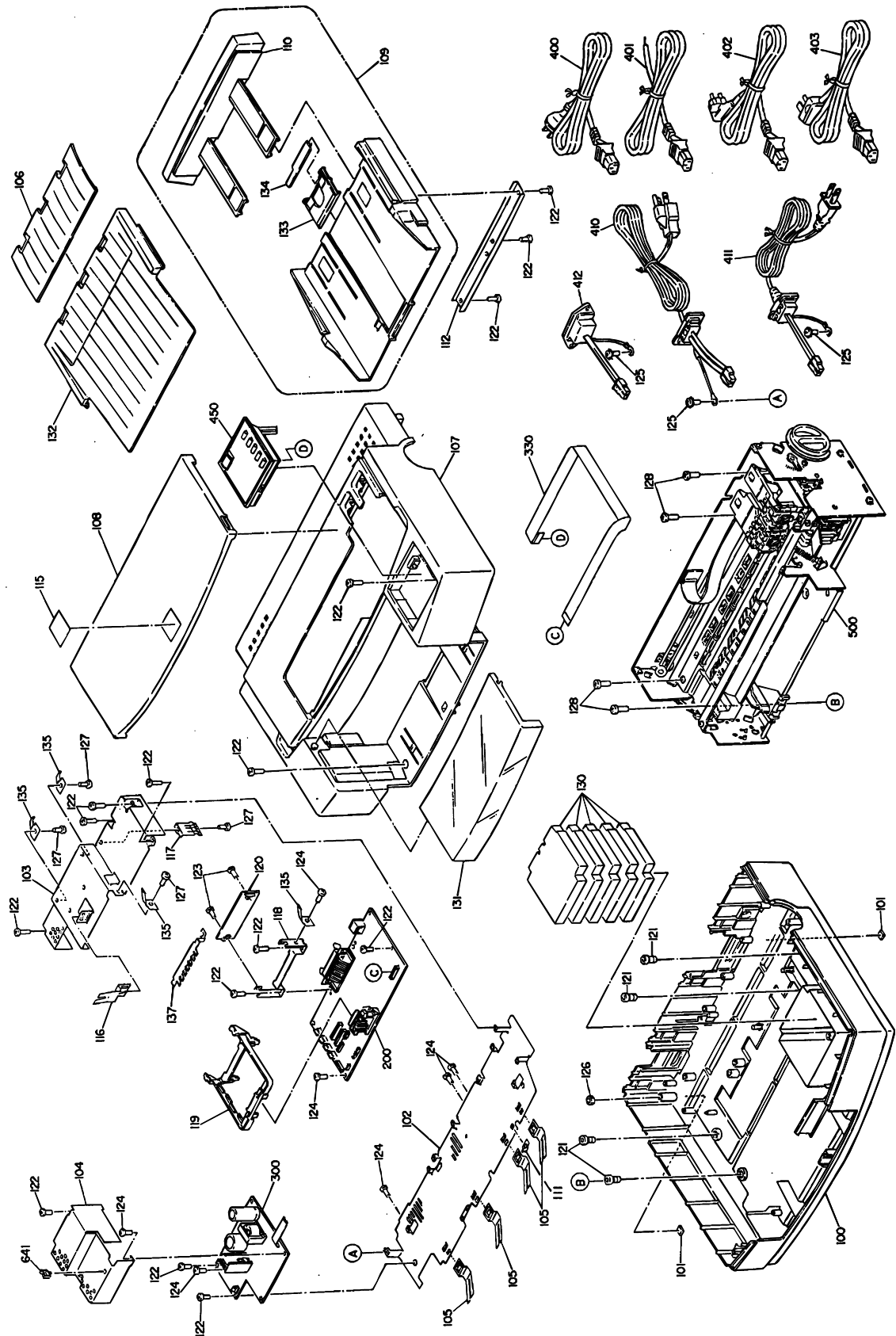


Figure A-10. Stylus Color Pro Exploded Diagram (1)

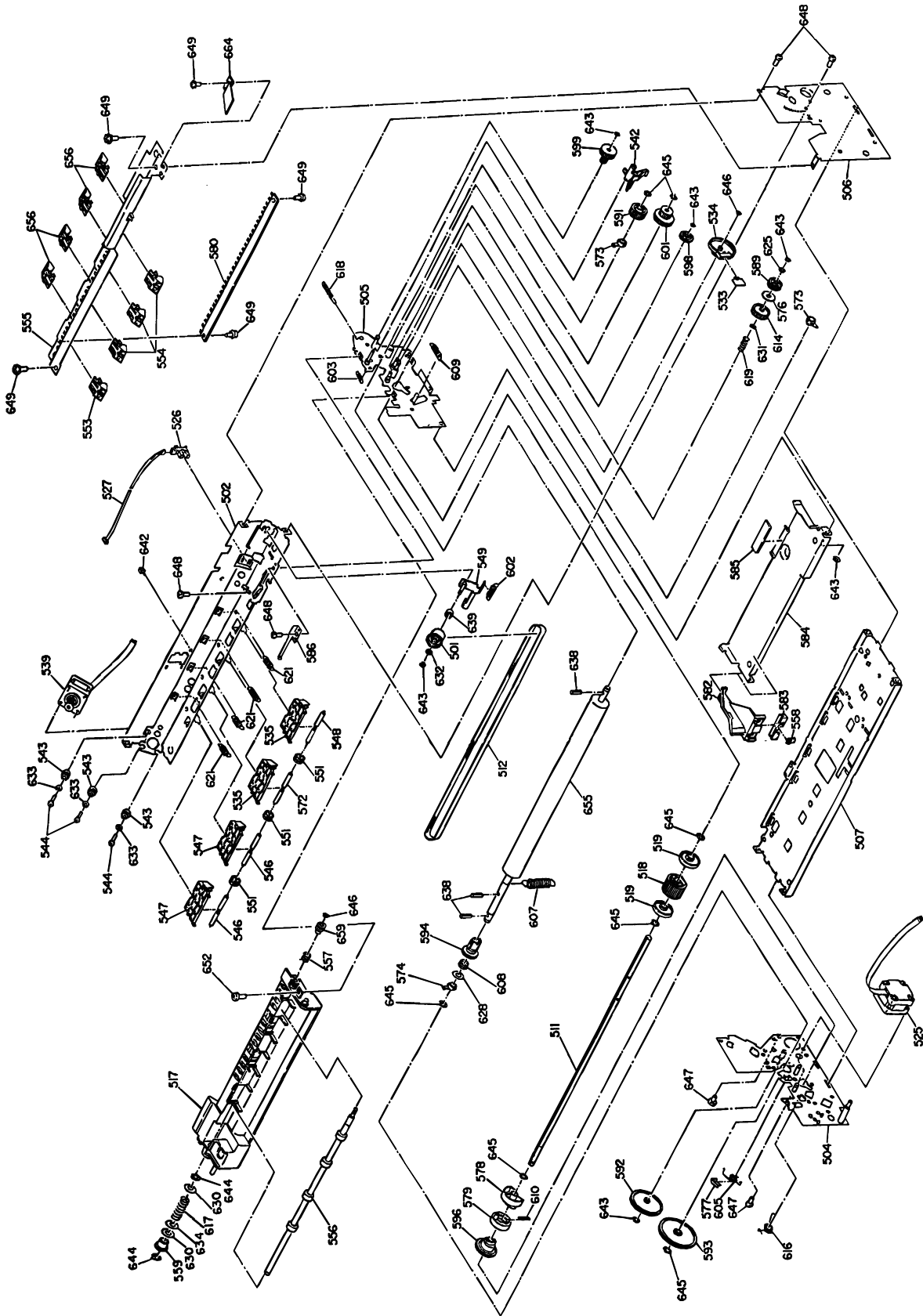


Figure A-11. Stylus Color Pro Exploded Diagram (2)

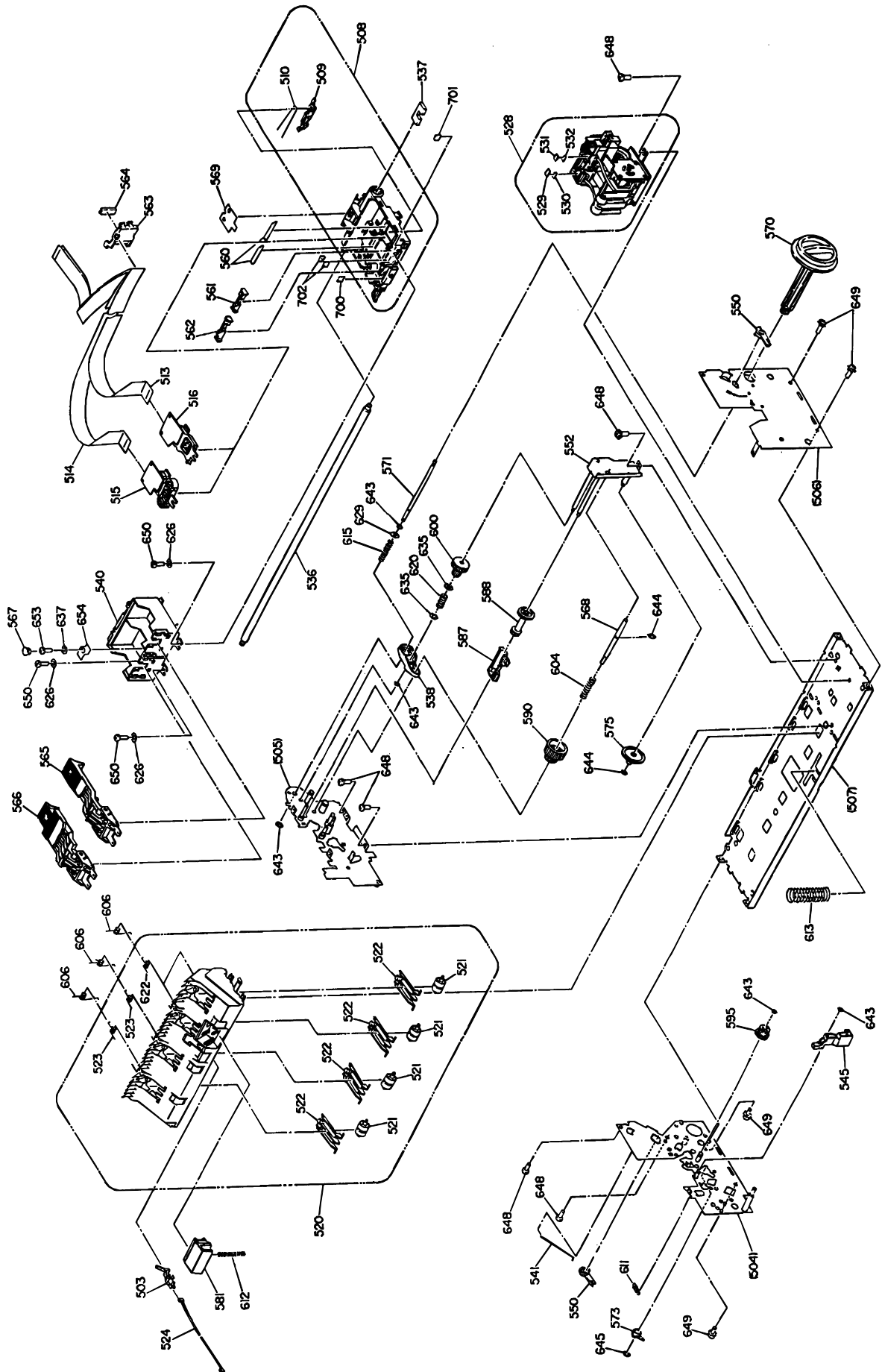


Figure A-12. Stylus Color Pro Exploded Diagram (3)

**Table A-13. Part No. Reference Table**

<b>Ref. No.</b>	<b>Description</b>	<b>PPL Name</b>
100	Lower Housing	HOUSING,LOWER
101	Foot	FOOT
102	Lower Shield Plate	SHIELD PLATE,LOWER
103	Upper Shield Plate	SHIELD PLATE,UPPER
104	Power Supply Shield Plate	SHIELD PLATE,P/S
105	Grounding Plate	GROUNDING PLATE
106	Paper Support Cover	COVER,PAPER SUPPORT
107	Upper Housing	HOUSING UPPER
108	Rear Printer Cover	COVER,PRINTER,REAR
109	Paper Support Assembly	PAPER SUPPORT ASSY.
110	Edge Guide	EDGE GUIDE
111	D Grounding Plate	GROUNDING PLATE;D
112	Paper Support Plate	SUPPORT PLATE,PAPER SUPPORT
115	Logo Plate	LOGO PLATE
116	G Grounding Plate	GROUNDING PLATE;G
117	PS Earth Plate	EARTH PLATE,PS
118	I/F Grounding Plate	GROUNDING PLATE,I/F
119	I/F Board Guide	GUIDE,I/F BOARD
120	Upper Connector Cover	COVER,CONNECTOR,UPPER
121	Clamp	CLAMP
122	Bind Head Screw M3x12	C.B.B. SCREW M3x12
123	Bind Head Screw M3x12	C.B.S. SCREW M3x12
124	Bind Head Screw M3x8	C.B.S. SCREW M3x8
125	Bind Head Screw M4x8 with Plane Washer	C.B.(O) SCREW M4x8
126	Hexagon Nut M4	HEXAGON NUT M4
127	Bind Head USCA Screw 3x6	C.B.USCA 3x6
128	Bind Head Screw 4x14	C.B. SCREW 4x14
130	Ink Pad	POROUS PAD,INK EJECT
131	Front Printer Cover	COVER,PRINTER,FRONT
132	B Paper Support Cover	COVER,PAPER SUPPORT;B
133	Edge Guide Slider	SLIDER,EDGE GUIDE
134	Sub-Edge Guide	EDGE GUIDE,SUB
135	B Grounding Plate	GROUNDING PLATE;B
137	Upper I/F Grounding Plate	GROUNDING PLATE,I/F, UPPER
300	Power Supply Board Assembly	BOARD ASSY.,POWER SUPPLY
330	Harness	HARNESS
400	Power Cable	POWER CABLE (VD31303SA-10A)
401	Power Cable	POWER CABLE (VD31303SA-SR-10A)
402	AC Cable	AC CABLE
403	Power Cable	POWER CABLE (VD00303SA-10A)
410	Power Cable Assembly	POWER CABLE ASSY.

**Table A-13. Part No. Reference Table (Continued)**

<b>Ref. No.</b>	<b>Description</b>	<b>PPL Name</b>
411	Power Cable Assembly	POWER CABLE ASSY. (100V)

412	Harness	HARNESS
450	Panel Board Assembly	BOARD ASSY.,PANEL
500	Printer Mechanism	PRINTER MECHANISM
501	Driven Pulley	PULLEY,DRIVEN
502	Base Frame Assembly	FRAME ASSY.,BASE
503	PE Detector	DETECTOR,PE
504	Left Frame Assembly	FRAME ASSY.,LEFT
505	Middle Frame Assembly	FRAME ASSY.,MIDDLE
506	Right Main Frame	FRAME,MAIN,RIGHT
507	Bottom Main Frame	FRAME,MAIN,BOTTOM
508	Carriage Assembly	CARRIAGE ASSY.,B
509	Gear Change Lever	LEVER,CHANGE,GEAR
510	Change Support Lever	LEVER,CHANGE,SUPPORT
511	Paper Load Shaft	SHAFT,PAPER LOAD
512	Timing Belt	TIMING BELT
513	Black Head Cable	CABLE,HEAD,BK
514	Color Head Cable	CABLE,HEAD ,YMC
515	Color Print Head	PRINT HEAD,IJ48-0CS
516	Black Print Head	PRINT HEAD,IJ64-0AA
517	Front Paper Guide	PAPER GUIDE,FRONT
518	Paper Load Roller Assembly	ROLLER ASSY.,PAPER LOAD
519	Paper Load Support Roller	ROLLER,PAPER LOAD,SUPPORT
520	B Rear Paper Guide Assembly	PAPER GUIDE ASSY.,REAR;B
521	PF Support Roller	ROLLER,PF,SUPPORT
522	PF Support Holder	HOLDER,PF,SUPPORT
523	Torsion Spring	TORSION SPRING,5800
524	PE Harness	HARNESS,PE
525	PF Stepping Motor	STEPPING MOTOR,PF
526	HP Detector	DETECTOR,HP
527	HP Harness	HARNESS,HP
528	Pump Assembly	PUMP ASSY.;B
529	Upper Color Cap Porous Pad	POROUS PAD,CAP,YMC,UPPER
530	Lower Color Cap Porous Pad	POROUS PAD,CAP,YMC,LOWER
531	Upper Black Cap Porous Pad	POROUS PAD,CAP,BK,UPPER
532	Lower Black Cap Porous Pad	POROUS PAD,CAP,BK,LOWER
533	ASP Head Cleaner	CLEANER,HEAD,ASP
534	Cleaner Lever	LEVER,CLEANER
535	C Driven Roller Holder	HOLDER,ROLLER,DRIVEN;C
536	CR Guide Shaft	SHAFT,CR,GUIDE

**Table A-13. Part No. Reference Table (Continued)**

<b>Ref. No.</b>	<b>Description</b>	<b>PPL Name</b>
537	Oil Pad	OIL PAD
538	Knob Lever	LEVER,KNOB
539	CR Stepping Motor	STEPPING MOTOR,CR
540	B CR Cover Assembly	COVER ASSY.,CR;B
541	CR Guide Ground Spring	GROUND SPRING,CR,GUIDE
542	CR Stopper Lever	LEVER,CR,STOPPER
543	CR Damper	DAMPER,CR
544	CR Damper Shaft	SHAFT,DAMPER,CR;B
545	Paper Load Lever	LEVER,PAPER LOAD
546	Driven Roller	ROLLER,DRIVEN
547	Driven Roller Holder	HOLDER,ROLLER, DRIVEN
548	Driven Roller	ROLLER,DRIVEN;C
549	Driven Pulley Lever Assembly	LEVER ASSY.,PULLEY DRIVEN
550	Parallel Adjustment Bushing	BUSHING, PARALLEL,ADJUST
551	Driven Support Roller	ROLLER,DRIVEN.SUPPORT
552	Sub-Frame Assembly	FRAME ASSY.,SUB
553	Paper Eject Holder Assembly	HOLDER ASSY.,PAPER EJECT
554	Paper Eject Holder Assembly	HOLDER ASSY.,PAPER EJECT;B
555	Eject Frame	FRAME,EJ;B
556	Paper Eject Roller Assembly	ROLLER ASSY.,PAPER EJECT
557	Paper Eject Clutch	CLUTCH PAPER EJECT
558	Edge Guide Slider	SLIDER,EDGE GUIDE
559	Bushing	BUSHING,6
560	Head Fastening Pressure Plate	PRESSING PLATE,FASTEN,HEAD
561	Black Head Base	BASE,HEAD,BK
562	Color Head Base	BASE,HEAD,YMC
563	Upper Head Cable Holder	HOLDER,HEAD CABLE,UPPER
564	Lower Head Cable Holder	HOLDER,HEAD CABLE,LOWER
565	Black Cartridge Lever Assembly	LEVER ASSY.,CARTRIDGE,BK
566	Color Cartridge Lever Assembly	LEVER ASSY.,CARTRIDGE,YMC
567	CR Cover Cap	CAP,COVER,CR
568	Pump Speed-up Shaft	SHAFT,UP SPEED,PUMP
569	Oil Pad Pressing Plate	PRESSING PLATE,OIL PAD
570	Knob	KNOB
571	Knob Shaft	SHAFT,KNOB
572	Driven Roller Assembly	ROLLER ASSY.,DRIVEN;E
573	Platen Shaft Holder	PLATEN SHAFT HOLDER
574	Platen Shaft Holder	PLATEN SHAFT HOLDER
575	Tractor Reduction Gear	TRACTOR REDUCTION GEAR
576	Clutch Pad	PAD,CLUTCH

**Table A-13. Part No. Reference Table (Continued)**

<b>Ref. No.</b>	<b>Description</b>	<b>PPL Name</b>
577	PF Spring Cap	CAP,SPRING,PF
578	Hopper Cam	CAM,HOPPER
579	Clutch Cam	CAM,CLUTCH
580	Anti-static Brush	ANTI-STATIC BRUSH
581	Pad Holder Assembly	HOLDER ASSY.,PAD;C
582	Edge Guide	EDGE GUIDE
583	Edge Guide Pressing Plate	PRESSING PLATE,EDGE GUIDE
584	Hopper Assembly	HOPPER ASSY.
585	Paper Load Cork	CORK,PAPER LOAD
586	Change Gear Guide	GUIDE,CHANGE,GEAR
587	Combination Gear Holder	HOLDER,COMBINATION GEAR
588	Combination Gear	COMBINATION GEAR,13.5,22
589	Spur Gear	SPUR GEAR,20
590	Combination Gear	COMBINATION GEAR,16,28
591	Spur Gear	SPUR GEAR,22.5
592	Combination Gear	COMBINATION GEAR,10,50
593	Spur Gear	SPUR GEAR,60
594	Spur Gear	SPUR GEAR,24
595	Combination Gear	COMBINATION GEAR,17.5,14
596	Spur Gear	SPUR GEAR,27.5
597	Spur Gear	SPUR GEAR,9
598	Spur Gear	SPUR GEAR,19
599	Combination Gear	COMBINATION GEAR,21.5,9
600	Combination Gear	COMBINATION GEAR,21.5,9
601	Combination Gear	COMBINATION GEAR,28,17.5
602	Extension Spring	EXTENSION SPRING,1937
603	Extension Spring	EXTENSION SPRING,1.6
604	Compression Spring	COMPRESSION SPRING,90
605	Torsion Spring	TORSION SPRING,90
606	Torsion Spring	TORSION SPRING,15000
607	Extension Spring	EXTENSION SPRING,102
608	Compression Spring	COMPRESSION SPRING,1500
609	Extension Spring	EXTENSION SPRING,104
610	Extension Spring	EXTENSION SPRING,10
611	Extension Spring	EXTENSION SPRING,10;B
612	Compression Spring	COMPRESSION SPRING,10
613	Compression Spring	COMPRESSION SPRING,485
614	Spur Gear	SPUR GEAR,25
615	Compression Spring	COMPRESSION SPRING,100;C
616	Torsion Spring	TORSION SPRING,6120
617	Compression Spring	COMPRESSION SPRING,450

**Table A-13. Part No. Reference Table (Continued)**

<b>Ref. No.</b>	<b>Description</b>	<b>PPL Name</b>
618	Extension Spring	EXTENSION SPRING,200



619	Compression Spring	COMPRESSION SPRING,900
620	Compression Spring	COMPRESSION SPRING,180
621	Extension Spring	EXTENSION SPRING,200
622	Torsion Spring	TORSION SPRING,10400
625	Plain Washer	PLAIN WASHER 4x0.5x8
626	Plain Washer	PLAIN WASHER 3x0.5x7
628	Plain Washer	PLAIN WASHER 8x0.5x15
629	Plain Washer	PLAIN WASHER 4.2x1x11
630	Plain Washer	PLAIN WASHER 6x0.7x12
631	Plain Washer	PLAIN WASHER 6.5x1x18
632	Plain Washer	PLAIN WASHER 4.2x0.3x8
633	Plain Washer	PLAIN WASHER 3x0.5x8
634	Plain Washer	PLAIN WASHER 6.1x0.3x12
635	Plain Washer	PLAIN WASHER 5.07x0.3x10
637	Spring Washer	SPRING WASHER 3x0.7x5.9
638	Spring Pin	SPRING PIN
639	Ball Bearing	BALL BEARING
641	Wire Saddle	WIRE SADDLE
642	Clamp	CLAMP
643	Retaining Ring #3	RETAINING RING TYPE-E(3)
644	Retaining Ring #4	RETAINING RING TYPE-E(4)
645	Retaining Ring #5	RETAINING RING TYPE-E(5)
646	Retaining Ring #2.3	RETAINING RING TYPE-E(2.3)
647	Bind Head Screw M3x6	C.B. SCREW M3x6
648	Bind Head Screw M3X6	C.B.S SCREW M3X6
649	Bind Head Screw M3x6 with Plain Washer	C.B.S.(O) SCREW M3x6
650	Bind Head Screw M3x12	C.B.B. SCREW M3x12
652	Bind Head Screw M3x8	C.B.S. SCREW M3x8
653	Pan Head Screw M3x15	C.P.B. SCREW M3x15
654	Head Mount Pressing Plate	PRESSING PLATE,MOUNTING,HEAD
655	PF Roller	ROLLER,PF
656	Paper Eject Holder Assembly	HOLDER ASSY.,PAPER EJECT
664	Support Grounding Plate	GROUNDING PLATE,SUPPORT
700	Color Angular Spacer	SPACER ANGULAR,YMC
701	Black Angular Spacer	SPACER ANGULAR,BK

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