

EPSON COLOR INKJET PRINTER

Stylus Pro XL+

SERVICE MANUAL

EPSON

4006101

PREFACE

This document provides supplementary information to describe the Stylus Pro XL+, which is a follow-on version of the Stylus Pro XL. Therefore, you must refer to this information in conjunction with the Stylus Pro XL Service Manual for details on any subjects common to both printers.

REVISION SHEET

Revision	Issue Date	Revision Page	
A	March 15, 1996	-	1st issue

1.1 FEATURES

The Stylus Pro XL+ is a high-quality, high-performance color ink jet printer. This printer is provided with a standard bidirectional parallel interface suitable for the Microsoft® Windows™ 95 environment and a serial interface for the Macintosh. The main components and case of this printer are similar to the Stylus Pro XL. The main features are:

- High-quality color printing 720 dpi printing using EPSON Micro Dot mode
720 dpi printing on:
 - plain paper
 - EPSON premium paper
 - transparencies
- High print speed 720 dpi printing of raster graphics at 200 cps
- Built-in-3 I/F Bidirectional parallel interface (IEEE-1284 nibble mode)
Mac serial interface
Type-B interface (optional)
- Ink out / low indicators Black and color ink out / ink low indicator LEDs

1.2 SPECIFICATIONS

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

1.2.1 Printing Specifications

The table below shows print speeds and printable columns.

Table 1-1. Print Speed and Printable Columns

Character Pitch	Printable Columns	Print Speeds (LQ)
10 cpi (pica)	127	200 cps
12 cpi (elite)	152	240 cps
15 cpi	190	300 cps
17 cpi (pica condensed)	218	343 cps
20 cpi (elite condensed)	254	400 cps
Graphics Density	Printable Dots	Print Speed (10 cpi)
180 dpi × 180 dpi	2289	200 cps
360 dpi × 360 dpi	4578	
H — 720 dpi × V — 360 dpi	9156	
720 dpi × 720 dpi	9156	

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

Input data buffer: 128K bytes

1.2.2 Ink Cartridge Specifications

Black

Type:	Exclusive cartridge
Color:	Black
Print capacity:	1170 pages (ECMA132 letter)
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)
Dimensions (W × D × H):	26.9 × 67.4 × 41.8 mm (1.06 × 2.65 × 1.65 in.)

Color

Type:	Exclusive cartridge
Colors:	Cyan, magenta, yellow
Print capacity:	620 pages (5% duty for each color, A4, 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)
Dimensions (W × D × H):	54.0 × 67.4 × 41.8 mm (2.13 × 2.65 × 1.65 in.)

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

1.3 INTERFACE SPECIFICATIONS

The Stylus Pro XL+ comes standard-equipped with two interfaces: an 8-bit bidirectional parallel and an RS-422 mini-DIN serial interface for the Macintosh. This printer is also equipped with a slot for an optional Type B interface.

1.3.1 Parallel Interface Specifications

1.3.1.1 Forward Channel

Transmission mode:	8-bit parallel, IEEE-1284 compatibility mode
Synchronization:	By $\overline{\text{STROBE}}$ pulse synchronization
Handshaking:	By BUSY and $\overline{\text{ACKNLG}}$ signals
Signal level:	TTL compatible level
Adaptable connector:	36-pin 57-30360 (Amphenol or equivalent)
Data transmission timing:	See Figure 1-7 of the Stylus Pro XL Service Manual.

Note: Transition time (rise time and fall time) of every input signal must be less than 0.2 μs .
Transition time (rise time and fall time) of every output signal must be less than 0.12 μs .

The printer sets the BUSY signal HIGH before setting either the $\overline{\text{ERROR}}$ signal LOW or the PE signal HIGH. BUSY is held HIGH until all these signals return to their inactive state. The BUSY signal is active (HIGH) under the following conditions:

- During data reception (See Figure 1-7 of the Stylus Pro XL Service Manual..)
- When the $\overline{\text{input}}$ buffer is full
- When the $\overline{\text{INIT}}$ input signal is active
- During initialization
- When the $\overline{\text{ERROR}}$ is active
- During self-test
- During default setting
- When the parallel interface is not selected

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

- When a paper-out error occurs
- When a release lever operation error occurs
- When a hardware error (a fatal error) occurs

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

- When a paper-out error occurs

Table 1-2 shows connector pin assignments and signal functions of the 8-bit parallel interface forward channel.

Table 1-2. Signal and Connector Pin Assignments for the Parallel Interface (Forward Channel)

Pin No.	Signal Name	Return GND Pin	I/O*	Description
1	$\overline{\text{STROBE}}$	19	I	The $\overline{\text{STROBE}}$ pulse is used to read data from the host computer. Pulse width must be 0.5 μs or more. Normally, it is HIGH, and data is latched with the rising edge of this signal.
2-9	DATA 0-7	20 - 27	I	DATA 0-7 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 μs on either side of the $\overline{\text{STROBE}}$ signal's active edge.
10	$\overline{\text{ACKNLG}}$	28	O	$\overline{\text{ACKNLG}}$ is a negative pulse indicating that the printer can accept data again.
11	BUSY	29	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	28	O	This signal indicates whether paper is available in the printer or not. A HIGH level indicates no paper.
13	SLCT	28	O	This signal is always at HIGH while printer power is on.
14	$\overline{\text{AFXT}}$	30	I	Not used.
31	$\overline{\text{INIT}}$	30	I	If this signal goes LOW, the printer is initialized. The pulse width of this signal must be 50 μs or more.
32	$\overline{\text{ERROR}}$	29	O	This signal goes LOW if the printer has detected an error.
18	Logic H	—	O	Pulled up to +5 V through 3.9K Ω resistor in the printer.
35	+5 V	—	—	Pulled up to +5 V through 3.3K Ω resistor in the printer.
36	$\overline{\text{SLIN}}$	30	I	Not used.
17	Chassis GND	—	—	Chassis ground.
16, 33, 19-30	GND	—	—	Signal ground.
15, 34	NC	—	—	Not connected

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

1.3.1.2 Reverse Channel

Transmission mode:	8-bit parallel, IEEE-1284 nibble mode.
Synchronization:	Refer to the IEEE-1284 specification.
Handshaking:	Refer to the IEEE-1284 specification.
Signal level:	IEEE-1284 level 1 device (See the forward channel.)
Adaptable connector:	The same as for the forward channel.
Data transmission timing:	Refer to the IEEE-1284 specification.

Table 1-3 shows connector pin assignments and signal functions of the 8-bit parallel interface for reverse channel.

Table 1-3. Signal and Connector Pin Assignments for the Parallel Interface (Reverse Channel)

Pin No.	Signal Name	Return GND Pin	I/O*	Description
1	Host Clk	19	I	Host clock signal.
2 - 9	DATA 0 - 7	20 - 27	I	DATA 0-7 signals represent data bits 0 - 7, respectively. Each signal is at a HIGH level when data is logical 1 and LOW level when data is logical 0. These signals are used to transfer the 1284 extensibility request values to the printer.
10	Ptr Clk	28	O	Printer clock signal.
11	Ptr Busy / Data Bit 3, 7	29	O	Printer busy signal and reverse channel transfer data bits 3, 7.
12	Ack Data Req / Data Bit 2, 6	28	O	Acknowledge data request signal and reverse channel transfer data bits 2, 6.
13	Xflag / Data Bit 1, 5	28	O	X-flag signal and reverse channel transfer data bits 1, 5.
14	Host Busy	30	I	Host busy signal.
31	$\overline{\text{INIT}}$	30	I	Not used.
32	Data Avail / Data Bit 0, 4	29	O	Data available signal and reverse channel transfer data bits 0, 4.
36	1284-Active	30	I	1284 active signal.
18	Logic-H	—	O	A HIGH signal indicates that all other signals sourced by the peripheral are in valid status.
35	+5V	—	O	Pulled up to +5 V via 3.3K Ω resistor.
17	Chassis GND	—	—	Chassis GND.
16, 33, 19 - 30	GND	—	—	Signal GND.
15, 34	NC	—	—	Not connected.

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

Extensibility Request:	The printer responds affirmatively when the extensibility request values are 00H or 04H, values that mean — 00H: Request Nibble Mode Reverse Channel Transfer 04H: Request Device ID Return data using nibble mode reverse channel transfer.
Device ID:	The printer sends following device ID string when it is requested. [00H][39H] MFG:EPSON; CMD:ESCPL2-00; MDL:Stylus Pro XL+; CLS : PRINTER;

Note: [00H] denotes a hexadecimal value of zero.

1.3.2 Optional Interface Specifications

Type-B interface Level-2 (300 mA type) is supported.

Note : With the simplified serial interface card C82305*, "Disregard a parity bit" setup is not supported.

Reply message	ESC/P 2 is selected
Main-Type:	MTP48p,PW127c110cpi,PRG(VCxxxx)rev,AP300ma
Product-Name:	Stylus Pro XL+
Emulation-Type:	ESCP-00
Entity-Type:	EPSONLQ2

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.

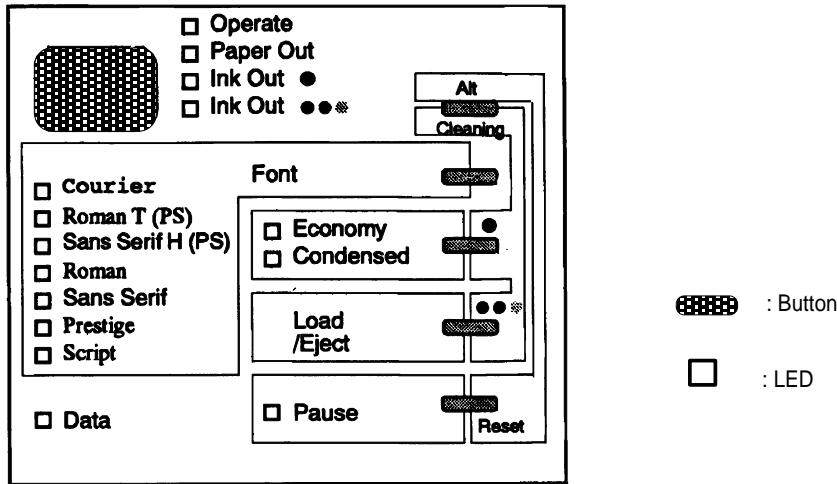


Figure 1-1. Control Panel Appearance

Buttons

Operate	Turns the printer on or off. This button is in the secondary circuit of the power supply. This lets the printer execute the head-capping function after it receives the signal to turn off and before actual printer power down.
Alt	Modifies the functions of other buttons. Holding down this button for 3 seconds 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 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 or condensed printing mode. Pressing the Economy/Condensed button while holding down the Alt button starts the black 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 color printhead cleaning cycle.
Pause	Stops printing temporarily or resumes printing if it has been stopped temporarily. Pressing Pause while holding down the Alt button resets the printer.

Indicators

Operate	On when the printer is on. Blinks while the printer is powered on or off.
Paper Out	On when the printer is out of paper. Blinks when a paper jam occurs.
Ink Out (Black)	On when the black ink cartridge is out of ink or not installed. Blinks when black ink is low.
Ink Out (Color)	On when the color ink cartridge is out of ink or not installed. Blinks when color ink is low.
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.
Data	On when print data is in the input buffer. Data and Pause lights blink if an error occurs.

1.4.2 Panel Operation at Power On

The list below contains printer modes and the procedures you can use to activate them:

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. The printer enters the default setting mode.
Initialize EEPROM	Turn on the printer while holding down the Alt, Font, Load/Eject, and Pause buttons.

Note: You can exit self-test, hex dump, or default setting by turning off the printer.

1.4.3 Error Conditions

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

Table 1-4. Error Indications

Error	Operate	Paper Out	Ink Out (Black)	Ink Out (Color)	Economy	Condensed	Pause	Data
Paper out	—	On	—	—	—	—	—	—
Black ink end	—	—	On	—	—	—	—	—
Black ink low	—	—	Blink	—	—	—	—	—
Color ink end	—	—	—	On	—	—	—	—
Color ink is low	—	—	—	Blink	—	—	—	—
Paper jam	—	Blinks	—	—	—	—	—	—
Maintenance request	—	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks	Blinks
Carriage error	—	—	—	—	—	—	Blinks	Blinks

— Not used to indicate the specified error.

2.1 OPERATING PRINCIPLES - 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 Principles of the Printing Operation

The printing mechanism for the Stylus Pro XL+ has a drop-on-demand ink jet system, similar to the system in all other EPSON ink jet printers. The Stylus Pro XL+ printer uses the Micro Dot printing function both with black ink and super 720 dpi color printing. The type of Micro Dot printing the Stylus Pro XL+ performs is the same as is available in the Stylus COLOR II and Stylus COLOR IIs/820. However, with those printers, Micro Dot printing is available for printing with black ink only. The Micro Dot printing mode can be selected automatically with 720 dpi printing quality using the printer driver settings described in the following table.

Table 2-1. Special Printing Mode

Paper Type	Print Density (DPI)	Print Mode
Normal Paper	360	Normal Dot Printing
	H — 720 × V — 360	EPSON Micro Dot Printing
EPSON Premium Paper for 360 dpi	360	Normal Dot Printing
	H — 720 × V — 360	EPSON Micro Dot Printing
EPSON Premium Paper for 720 dpi	720	EPSON Micro Dot Printing
Labels for 720 dpi	720	EPSON Micro Dot Printing
High Quality Glossy Card Stock	720	EPSON Micro Dot Printing
High Quality Glossy Paper	720	EPSON Micro Dot Printing
Transparency film	360	Normal Dot Printing

Micro Dot printing mode can improve output quality, because it eliminates banding that can sometimes occur in normal mode. The dot size in EPSON Micro Dot Printing mode is smaller than the dot size in normal printing. Normal print mode is mainly used in resolutions of 360 dpi or less.

2.3 OPERATING PRINCIPLES OF THE ELECTRICAL CIRCUITS

The Stylus Color Pro XL+ contains the following circuit board units:

- ❑ C184 MAIN board (main control circuit board).
- ❑ C137 PSB/PSE board (power supply circuit board). This board is the same as Stylus Color's
- ❑ C137 PNL (control panel board). This board is similar to 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.

2.3.1 Operating Principles of the Main Control Circuit

The main control circuit for this printer is the C184 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, both a 16-bit and an 8-bit data bus width-type ROM can be used on the board, increasing the internal processing speed. Also, the CPU's unique architecture is capable of refresh control. In addition, the CPU controls the serial interface (RS-422 for Mac) and optional interface (Type B interface).

Gate array E05B21 (IC2) manages the printhead driver, the external Centronics® parallel interface, the extension CG board, and the control panel. The gate array also oversees the controls that create the 4-bit signals for the carriage or the paper feed motor. (The carriage and paper feed motor are controlled by current duty data.) This board also is equipped with a 93C46 EEPROM (IC11) to store certain parameters, such as the black/color head data, printer mechanism control parameters, default setting parameters, as well as a special counter value used for printhead (ink management) protection.

Timer IC NJU6355E (IC10) counts each time the printer goes through its cleaning cycle and keeps track of how much time has elapsed since the printer has been used, thereby allowing the printer to be cleaned only when necessary. The timer value is backed up by the lithium battery.

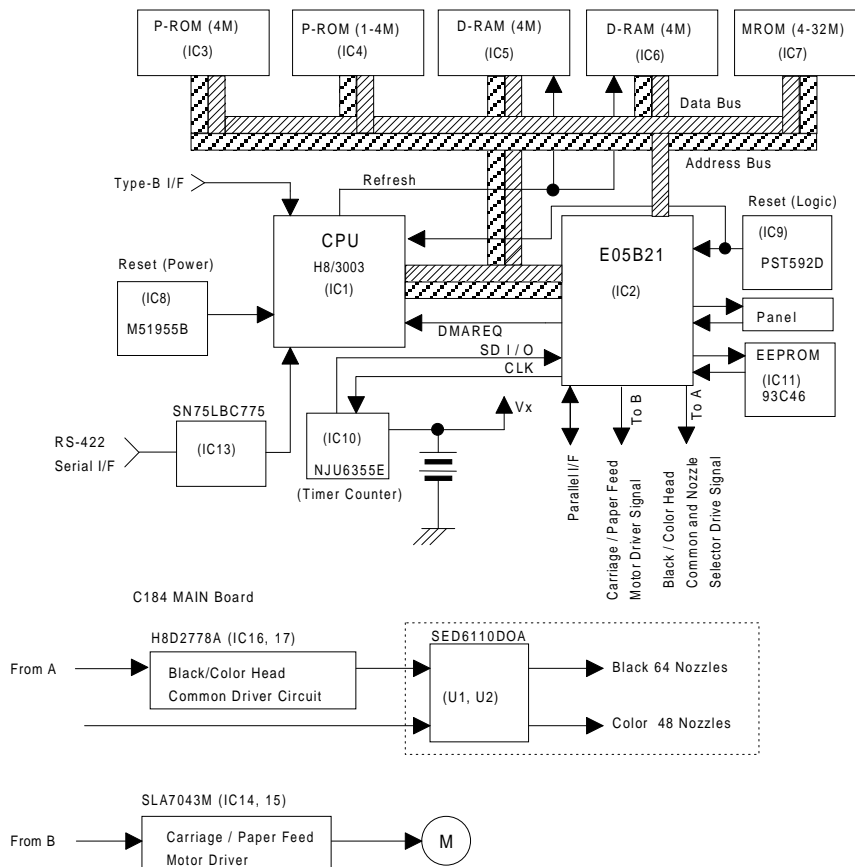


Figure 2-1. Main Control Circuit Block Diagram

2.3.2.1 Reset Circuits

The C184 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 (IC9), and outputs a reset signal to the CPU (IC1) and the E05E21 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 E05E21 gate array (IC2) when the voltage level drops below +28 V, and this causes a non-maskable interrupt (NMI).

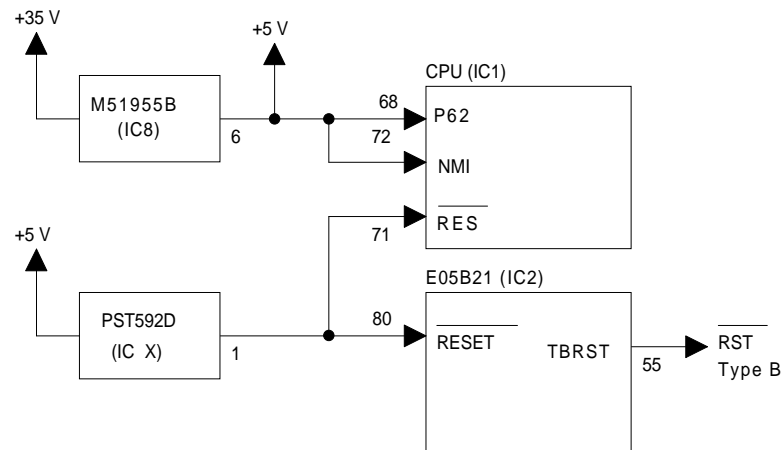


Figure 2-2. Reset Circuit Block Diagram

2.3.2.2 Sensor Circuits

The following sensor circuits enable the C184 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 black ink cartridge, CCO sensor for the color ink cartridge) are attached to the bottom of 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. These sensing timing is only in the cartridge installation mode and one minute after the carriage holed to prevent from miss censoring owing from switch actuators shock in printing condition.
- CCO sensor

- Thermistor A thermistor is attached to the color printhead driver board to monitor its temperature using the thermistor's resistance value (at 25° C (77° F), the normal value is approximately 10K Ω). The CPU changes the printhead drive signal's pulse width (charge pulse width) based on the temperature level.

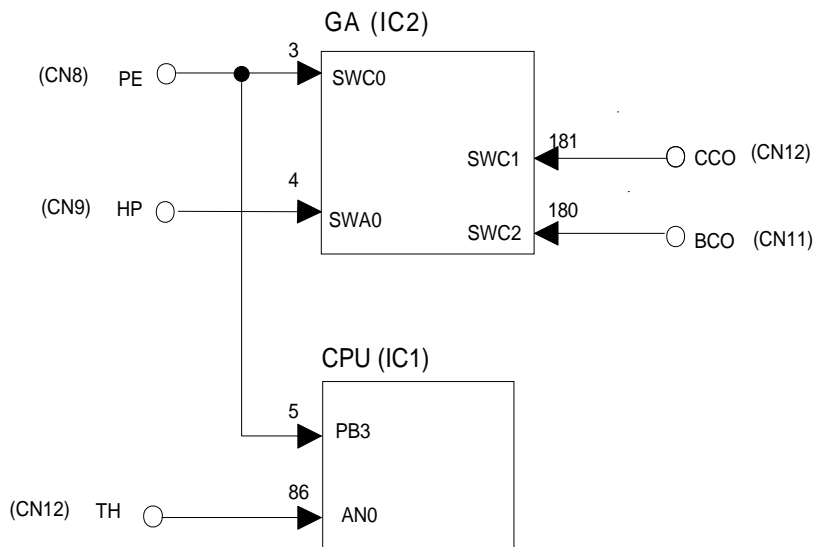


Figure 2-3. Sensor Circuit Block Diagram

2.3.2.3 Carriage Motor Driver Circuit

Carriage motor driver IC SLA7043 (IC15) outputs a constant current to drive the carriage motor in the printer mechanism. Gate array E05B21 (IC2) decides the motor phase and speed, and then it sends a signal to the carriage motor driver IC (SLA7043), using the 4-bit serial transmission line. The first bit indicates the direction of motor rotation. The other three bits (a, b, c) are current duty data for the motor speed for each printing sequence. (Refer to Table 2-2, below.)

SLA7043 can select the reference voltage itself based on these three bits of current duty data. Also, the driver IC receives these signals via two serial transmission lines for the two motor phases (phase A and phase B). As a result, the carriage motor can be driven in micro step sequence ($1/720$ inches, minimum). The SLA7043 motor driver reads four-bit serial data using four clock counts from the E05B21 (IC2) clock.

Each bit is read at the falling edge of the clock pulses. Then, received serial data is written into the shift register and then shifted the latch register. When the strobe pulse becomes active from the E05B21 (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 2-2. Serial Data Contents

Mode	c	b	a*	Vref (Typical)
0	0	0	0	$\bar{\times}$ 0%
1	0	0	1	\times 20%
2	0	1	0	\times 40 %
3	0	1	1	\times 55.5%
4	1	0	0	\times 71.4%
5	1	0	1	\times 83%
6	1	1	0	\times 91%
7	1	1	1	\times 100%

* "a" indicates the 2nd bit, "b" indicates the 3rd bit, and "c" indicates the 4th bit.

The following figure shows 4-bit serial data and how this data is transferred by the SLA7043 driver. The step time for the reference voltage is determined by the interval time of the strobe pulse.

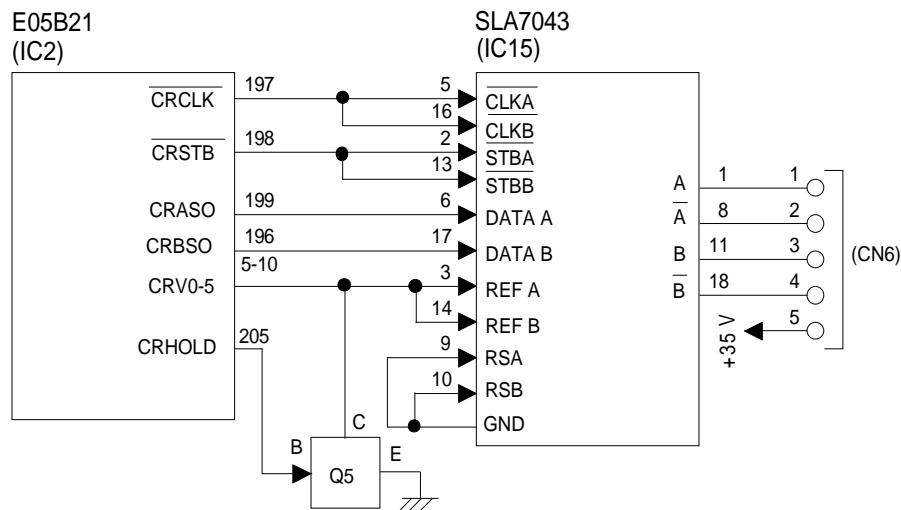


Figure 2-4. Carriage Motor Circuit Block Diagram

2.3.2.4 Paper Feed Motor Driver Circuit

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

- Paper feed mechanism
- Paper pickup mechanism
- Pump mechanism

Driver IC SLA7043 (IC14) drives the paper feed motor by a constant current. The principle of operation is same as for the carriage motor driver circuit. However, the paper feed motor drives not only the paper feed mechanism but also the pump unit. (Refer to Section 2.3.2.4.)

Table 2-3. 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

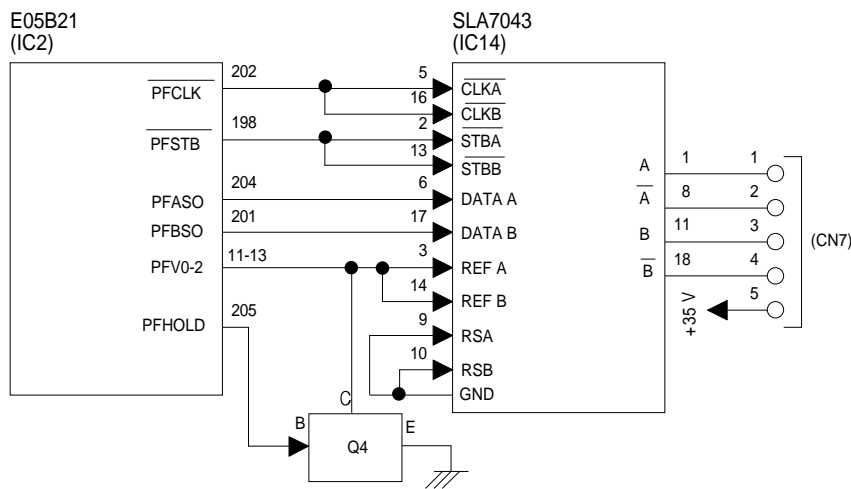


Figure 2-5. Paper Feed Motor Driver Circuit Block Diagram

2.3.2.5 Printhead Driver Circuit

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

- Common driver circuit (common drive pulse generation)
- Head driver circuit (nozzle control built on the printhead)

The common driver circuit is hybrid IC H8D2778A on the C184 MAIN board. The head driver circuit is IC SED61110D0A on the printhead unit itself. The printhead drive signals are output from gate array E05B21. They consist of the common driver control signals (SBDT/SCDAT, SCLK, SSTB, SCLR, BH1C0/CH1C0, BH1C1/CH1C1, BH1D/CH1D, BHDIS/CHDIS) and the nozzle select signals (BHDAT/CHDAT, BHCLK/CHCLK, BHLAT/CHLAT, BHNCHG/CHNCHG).

The common driver control signals from gate array E05B21 are translated to common drive voltage pulses by IC H8D2778A and input to each printhead nozzle PZT. The nozzle select signals are also output from gate array E05B21 to SED6110D0A on the head unit to select the print nozzles. Then the ink dots are ejected from the selected nozzles.

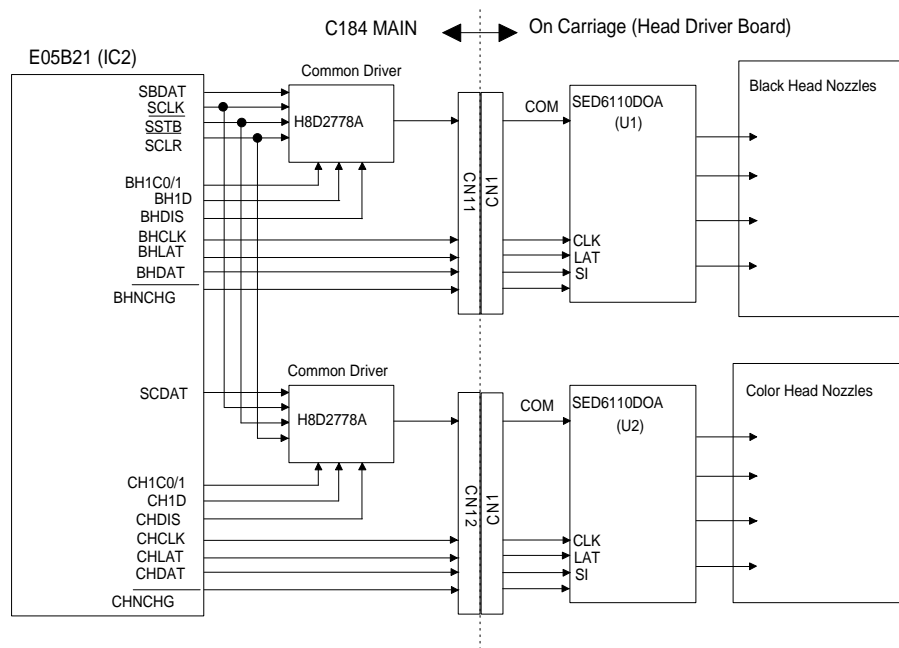


Figure 2-6. Printhead Driver Circuit Block Diagram

Common Driver Signals

The common driver control signals consist of the common voltage control signals (SBDAT/SCDAT, $\overline{\text{SSTB}}$, SCLR, SCLK) and the common drive pulse generation signals (BH1C0/CH1C0, BH1C1/CH1C1, BH1D/CH1D, BHDIS/CHDIS). The common voltages (VH), ranging between the maximum voltage and 0 (V), are split into 256 levels, which are then translated into 8-bit serial data for the common voltage control signal (BHDAT/CHDAT), which is output from gate array E05B21 to the common driver H8D2778A to fit with each printhead specifically. The signals are received by $\overline{\text{SSTB}}$, SCLR and SCLK to the common driver.

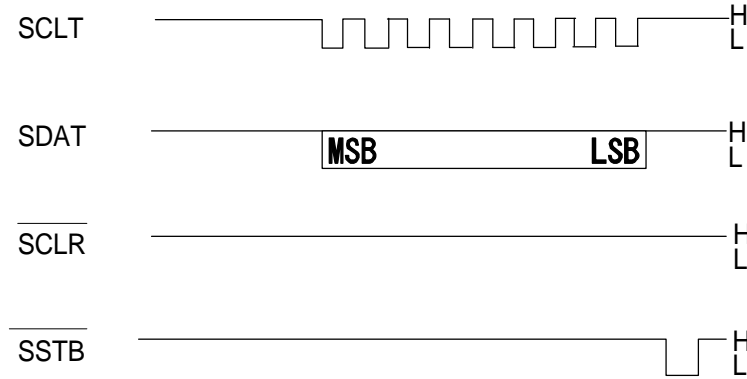


Figure 2-7. Common Driver Signal Timing Chart

After the common voltage (VH) is stabilized, common drive pulse generation signals are translated to generate the common drive pulses from gate array E05B21 to the H8D2778A common driver.

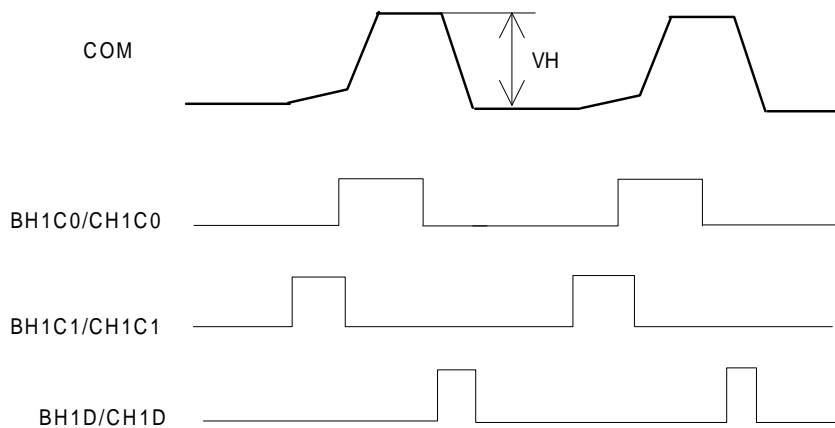


Figure 2-8. Common Drive Pulses

Nozzle Select Signals

The nozzle select signals are output from gate array E05B21 to SED6110D0A on the head unit to select the printhead nozzles. Nozzle select data (BHDAT/CHDAT) is HIGH for selected nozzles and LOW for unselected nozzles. Nozzle select data translation timing is controlled by 64 clock signals (BHCLK/CHCLK), one for each nozzle. After the print nozzles are selected, the common drive pulses are input to each PZT on the selected nozzles via SED6110D0A. Then the ink dots are ejected from each selected nozzle's PZT.

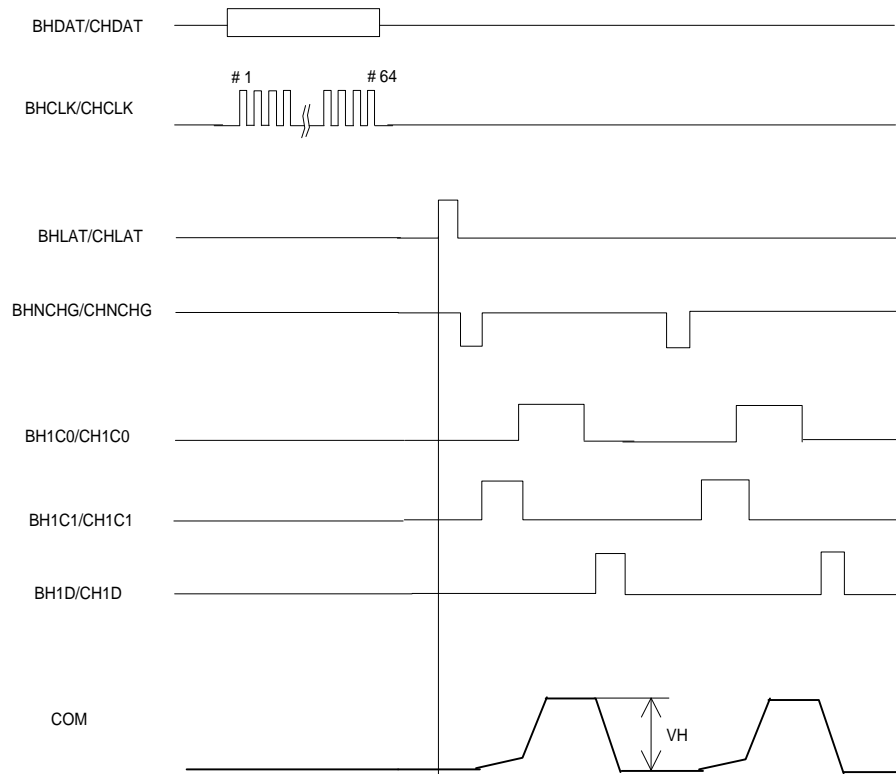


Figure 2-9. Common Drive / Nozzle Select Signal Timing (Normal Dot Printing)

Normal Dot Versus EPSON Micro Dot Printing Mode

The Stylus Color Pro XL+ can eject ink in two different modes (normal print mode and EPSON Micro Dot Mode). These modes are the same as the modes used in the Stylus Color II/Stylus Color IIs. (Refer to Section 2.2.1.) However, EPSON Micro Dot Printing in the Stylus Color II and Stylus Color IIs can be used only for printing with black ink. EPSON Micro Dot Printing in the Stylus Pro XL+ can be used with both black and color printing.

In normal dot printing, a pair of common drive pulses are translated to the printhead to produce one dot. On the other hand, one print dot consists of single dot in the EPSON Micro Dot Printing. A single common drive pulse is translated to the printhead, as shown in the following figure.

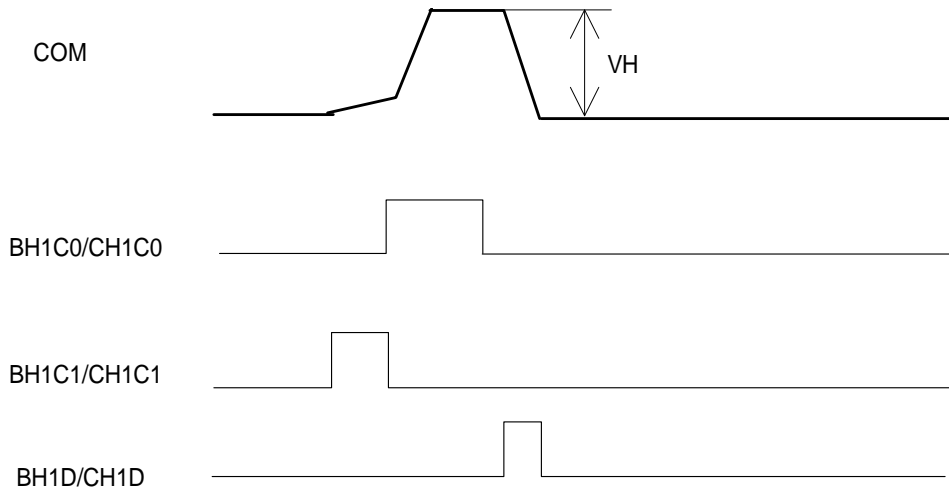


Figure 2-10. Common Drive Pulse for EPSON Micro Dot

2.4 INK SYSTEM MANAGEMENT

This section explains how the ink system is managed to protect the printhead and the ink supply system and to ensure high-quality output. Ink system operations are controlled by the following counters:

- Protect counter
- Ink consumption counter

2.4.1 Counters

EEPROM 93C46 (IC11) on the main board stores the counter values used for controlling ink system operation.

2.4.2.1 Protect Counters

The values of protect counters A and B, C are stored in the EEPROM on the main board, and while the printer is on, this data is also stored in the RAM on the main board.

- Protect counter A This counter manages the total amount of drained ink. If the counter value is equal to or exceeds 51,000, the printer indicates an error on the control panel indicating that maintenance is required.

Notes for Service

Protect counter A is reset:

- 1. Upon shipment from the factory.*
- 2. After maintenance is performed (whenever you replace the ink drain tank).*

- Protect counter B, C These counters set limits to prevent the user from frequent initial ink charging. The counters values are stored in the EEPROM as flags and are reset by the EEPROM reset function.

2.4.2.2 Ink Consumption Counter

This counter manages black and color ink consumption. The counter is counted up during printing, automatically. It also counts compulsory head cleaning and the interval times between usage of the ink cartridge. This counter is only reset by the installation of a new ink cartridge.

3.1 DISASSEMBLY AND ASSEMBLY - OVERVIEW

This section describes procedures for disassembling the main components of the printer. Unless otherwise specified, disassembled units 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

- Disconnect the power cable before disassembling or assembling the printer.*
- 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.*
- A lithium battery is installed on the C184 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

- Never remove the ink cartridge from the carriage unless specified to do so.*
- When transporting the printer after the ink cartridge has been installed, be sure not to remove the ink cartridge when you pack the printer for shipping.*
- Use only recommended tools for disassembling, assembling, or adjusting the printer.*
- Apply lubricants and adhesives as specified. (See Stylus Pro XL Service Manual Chapter 6.)*
- Make specified adjustments when you disassemble the printer. (See Chapter 4.)*

3.2 DISASSEMBLY AND ASSEMBLY

CAUTION

- ❑ When you remove the ink cartridge, always install a new cartridge immediately after taking out the old one.
- ❑ When you replace the ink cartridge, the printer performs the ink cartridge replacement operation automatically.

The exclusive service cartridges have the following part numbers:

Monochrome: 1020626

YMC: 1027990

- ❑ Never keep ink cartridges longer than 6 months.

3.2.1 Printer Mechanism Disassembly

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

3.2.1.1 Carriage Unit Removal

1. Remove the printer mechanism. (See *Stylus Pro XL Service Manual*, 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.
4. Remove the cartridge holder with from the carriage unit. (See the *Stylus Pro XL Service Manual*, Section 3.2.5.1.)
5. Release the carriage timing belt from the belt pulley while pressing the pulley lever.
6. Remove the both sides flange nuts and plain washers.
7. Remove 2 parallelism adjustment bushings and carriage shaft spacers from both side frames.
8. Take off carriage shaft spacer L and carriage shaft spacers B, C, or D (if they have been installed).

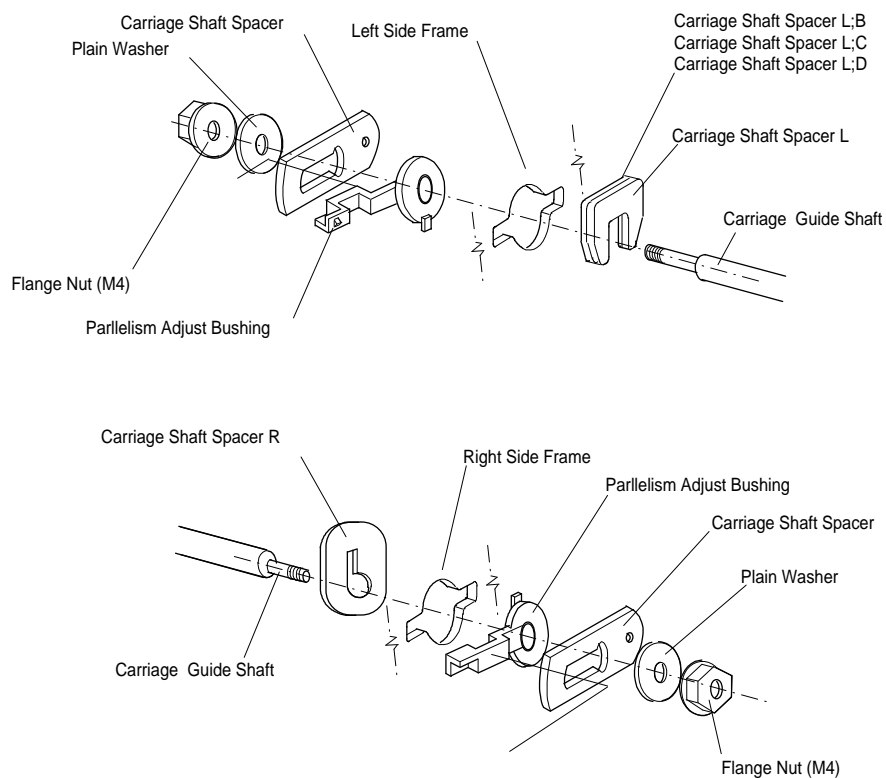


Figure 3-1. Fixing the Carriage Guide Shaft

9. Lift the carriage unit with the carriage guide shaft out of the printer mechanism.

CAUTION

- Take appropriate 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 of the printhead cover. Handle it only by holding the edges of the printhead.*
- After you have replaced the printhead or the printer mechanism, you must perform the head data writing operation before any other adjustments. (See Section 4.1.1.)*
- Put the carriage shaft spacers L, B, C and D between the left frame and the carriage guide shaft to minimize the gap between them. The adjustable range is from 0.8 mm to 1.8 mm. The thickness of carriage shaft spacers are as follows:*

Carriage Shaft Spacer L 0.6 mm

Carriage Shaft Spacer L and B 0.8 mm

Carriage Shaft Spacer L and C 1.0 mm

Carriage Shaft Spacer L and D 1.2 mm

ADJUSTMENT REQUIRED

- Platen gap adjustment (See Chapter 4.)*

4.1 ADJUSTMENT - OVERVIEW

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

CAUTION

- ❑ *Always perform adjustments in the order indicated.*
- ❑ *After performing steps 1-5, do the cleaning operation for the black and color printheads. The cleaning operation is necessary, because printing sample patterns for the head angle, Bi-D alignment, and the head gap 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 do the following adjustments in the order shown:
(1) Black head angle, (2) black-color head vertical, (3) head gap, (4) Bi-D alignment.*
- ❑ *After removing an ink cartridge, always install a new cartridge immediately. During adjustments and testing, use cartridges designed exclusively for service
(Monochrome: 1020626, CMY: 1027990)*

Table 4-1. Required Adjustments

Service Performed	Adjustment Needed
When replacing the printer mechanism	<ol style="list-style-type: none"> 1. Writing head data (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 main board or printer mechanism	<ol style="list-style-type: none"> 1. Writing head data (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)	<ol style="list-style-type: none"> 1. Writing head data (see Section 4.1.1) 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 color head (board)	<ol style="list-style-type: none"> 1. Writing head data (see Section 4.1.1) 2. Color head angle adjustment (see Section 4.1.6). 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 both the color and black head	<ol style="list-style-type: none"> 1. Writing head data (see Section 4.1.1) 2. Color head angle adjustment (see Section 4.1.6). 3. Black head angle adjustment (see Section 4.1.4). 4. Black - color head vertical adjustment (see Section 4.1.5). 5. Head gap adjustment (see Section 4.1.3). 6. Bi-D alignment adjustment (see Section 4.1.2).
When replacing or disassembling the carriage unit	<ol style="list-style-type: none"> 1. Platen gap adjustment (see Section 4.1.7). 2. Writing head data (see Section 4.1.1) 3. Bi-D alignment adjustment (see Section 4.1.2). 4. Head gap adjustment (see Section 4.1.3).

NOTE: *The destination data writing operation (see Section 4.1.2) is performed automatically when you quit the program from the adjustment main menu and turn off the printer.*

When you need to replace the printer mechanism, you will find the head data information written on the outside of carton containing the printer mechanism.

4.1.1 Head Data Writing Operation

Data unique to the specific black and color printhead used in the printer is stored in the EEPROM on the C184 MAIN board. These values must be written to the EEPROM first when the printhead unit, the printer mechanism, main board, or EEPROM chip is replaced. However, it is not necessary to write them to EEPROM again, even if the EEPROM is reset from the control panel.

CAUTION

Before running this program, be sure the interface setting is set to parallel or auto select.

1. Connect the PC to the target printer using a parallel interface cable, and turn the printer on.
2. Load BASIC on the PC, and run the adjustments program. You see the following destination select menu:

```
***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?
```

3. Input the number for the destination. Then the main menu appears, as shown in the menu that follows.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```
STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■
```

4. Select "1, Head VH input" typing **1** and pressing **Enter** to perform the head data writing operation. Then the menu for setting the black head data appears, as shown below:

```
input head VH
BK   VH = ? ■
```

5. Input the black head VH values. Then the menu for setting color head VH values appears.
6. Input the color head VH values. Then the program returns to the main menu.

CAUTION

- ❑ *The head VH data is written on the each head unit as shown in the following figure.*
- ❑ *The setting values are not stored permanently in the EEPROM until you turn the printer off. Turn off the printer immediately after the adjustments.*

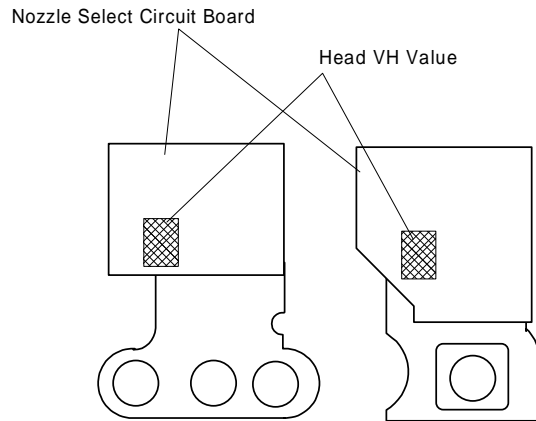


Figure 4-1. Printhead VH Value

7. When the main menu appears, choose “10. Change customer & data / END” by typing **10** and **Enter**.
8. Choose “END” by typing **7** to exit the adjustment program.

CAUTION

Specific destination parameters, including the destination, interface mode, TOF value, and economy/condensed, are not written to the EEPROM yet. Turn off the printer immediately after the adjustments.

9. Turn off the printer.

4.1.1.1 Head VH Indication

This function prints out the VH values for the installed black and color heads stored in the EEPROM. The values are in HEX, so convert them into the head VH values using a conversion table and input in the printer.

1. Select “7, Head VH indication” by typing **7** and pressing **Enter** to print out the head VH settings. The printer prints the head values in four columns, as shown below:

Head VH : X1 X2 X3 X4



CAUTION

X1 and X2 show the VH for the black head; X3 and X4 show the VH for the color head.

4.1.2 Destination Data Writing Operation

The setup value that specifies the printer destination is stored in EEPROM on the C184 MAIN board. Therefore, this setup value must be written to the EEPROM when the main board or EEPROM chip is replaced. This function is always selected to finish the program using END operation.

CAUTION

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

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```
***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?
```

3. Input the number for the destination. Then the main menu appears, as shown shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```
STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check

10. Change customer & data / END
0. Cleaning

Select Menu ? ■
```

4. When the main menu appears, choose “10, Change customer & data / END” by typing **10** and pressing **Enter**.
5. The main menu immediately disappears briefly and then the destination select menu appears.
6. Choose “END” by typing **7** to exit the adjustment program.

CAUTION

Settings have not yet been written to the EEPROM. Turn off the printer immediately after the adjustments.

7. Turn off the printer.

4.1.3 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 color head timing may not match 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.

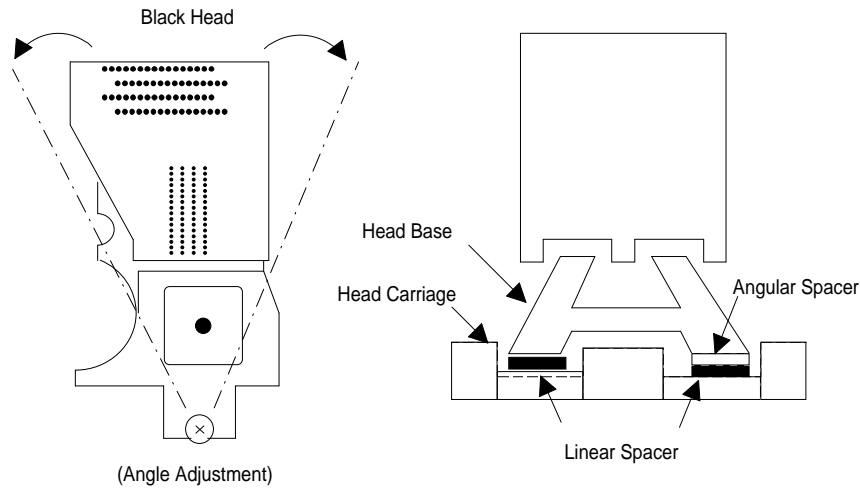


Figure 4-2. Black Head Angle Adjustment

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 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 using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■

```

4. Choose “3, Head angular & linear adjustment” by typing **3** and pressing **ENTER**. (The printer prints the check pattern, along with the sample name.)

CAUTION

- When you replace both the black and color heads, always adjust the color head angle first. The black head angle is based on the color head angle.*
- 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.*

5.

3-2. BLACK HEAD ANGLE ADJUSTMENT

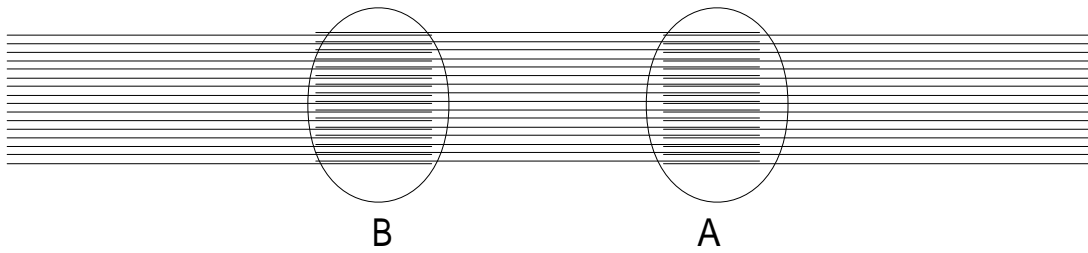


Figure 4-4. Black Head Angle Adjustment Sample

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).

6. In the figure above, pay attention to position A. (Do not look at position B.)

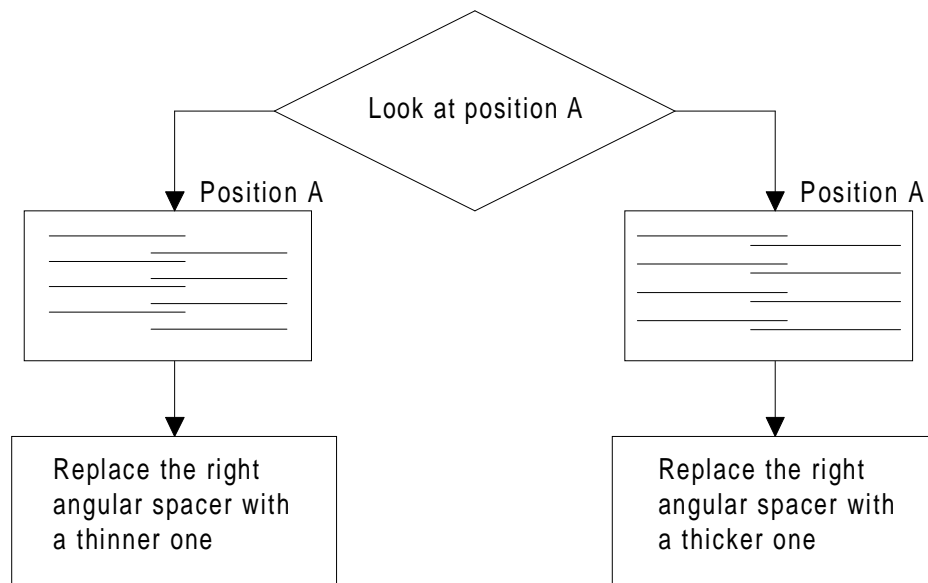


Figure 4-5. Spacer Selection Flowchart

7. 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.
8. Turn the printer power off now.
9. Manually move the carriage to the center while pressing the carriage lock lever, and remove the two ink cartridges.
10. 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.)

CAUTION

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: 1027990).

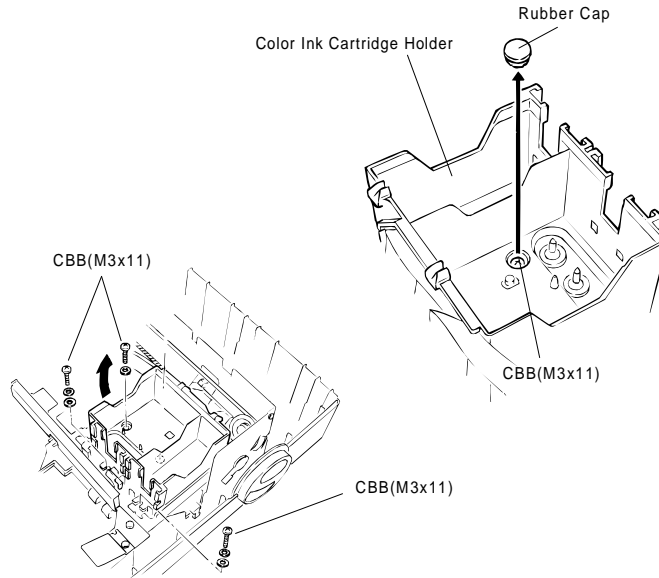


Figure 4-6. Removing the Rubber Cap

- 11. Replace the angular spacer for the black head with a new one. (Refer to Figure 4-7.)
(To replace the angular spacer, use tweezers to push the head base toward the rear.)
- 12. 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.

CAUTION

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

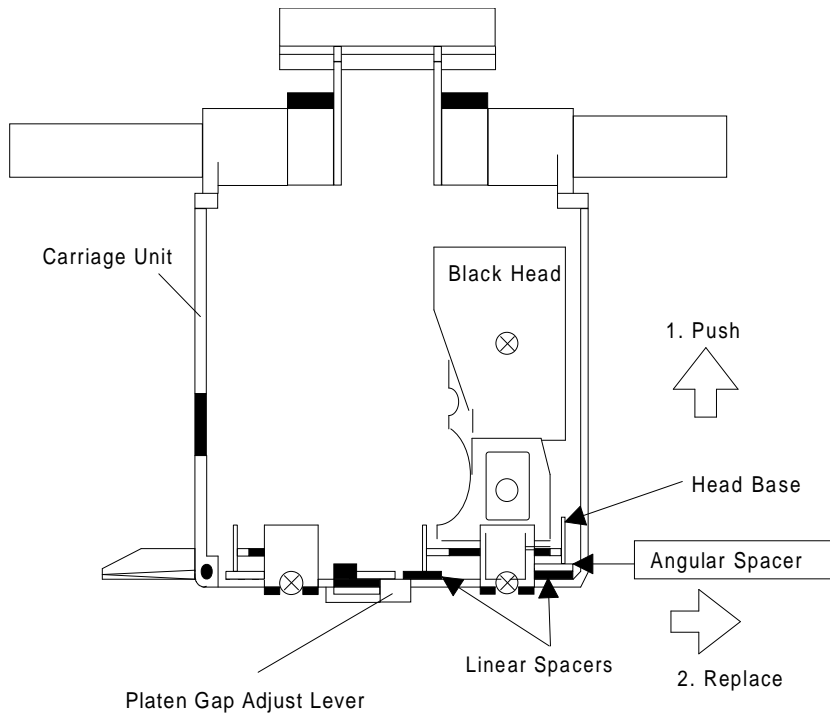


Figure 4-7. Angular Spacer Replacement Method

4.1.4 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 with the angular spacer. The angular spacer is attached only to the left side of the head base.

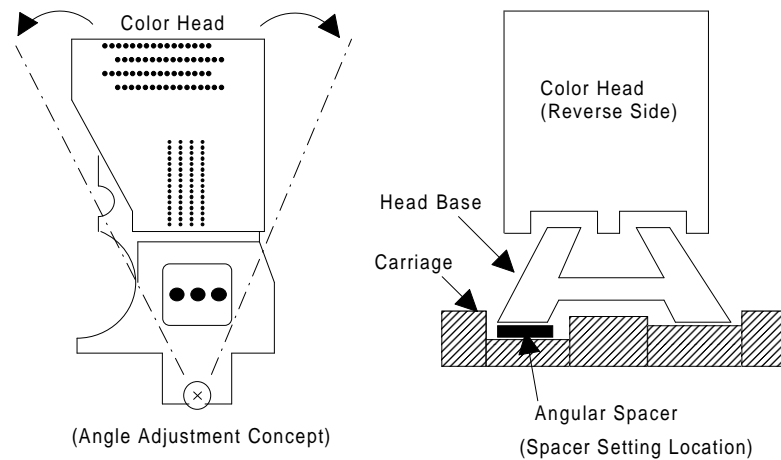


Figure 4-8. Color Head Angle and Angular Spacer Position

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■

```

4.

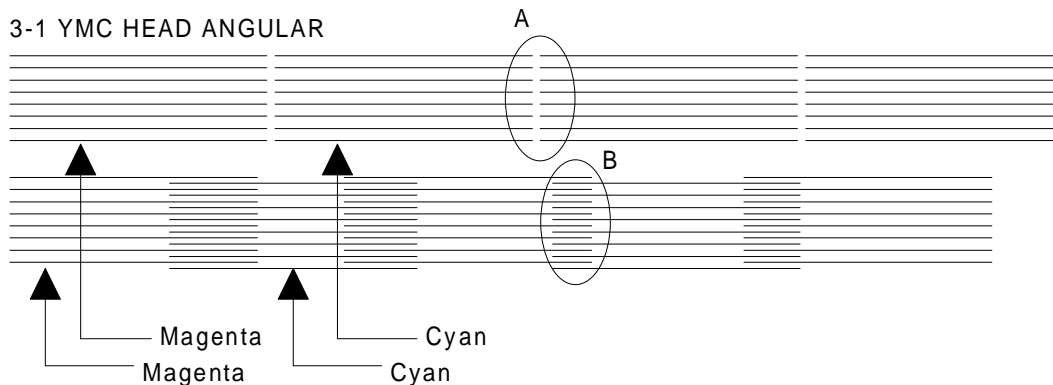


Figure 4-9. Color Head Angle Confirmation Sample

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

CAUTION

When replacing both the black and color heads, 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 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 4-10. Relationship between the Shape and Thickness

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.

5. In Figure 4-9, pay attention to the position of A and B while you reset the left angular spacer. The replacement procedure is explained beginning in step 6.
6. Turn off the printer now.

7. Move the carriage to the center manually, and loosen (but do not remove) the screw securing the color head to the carriage.

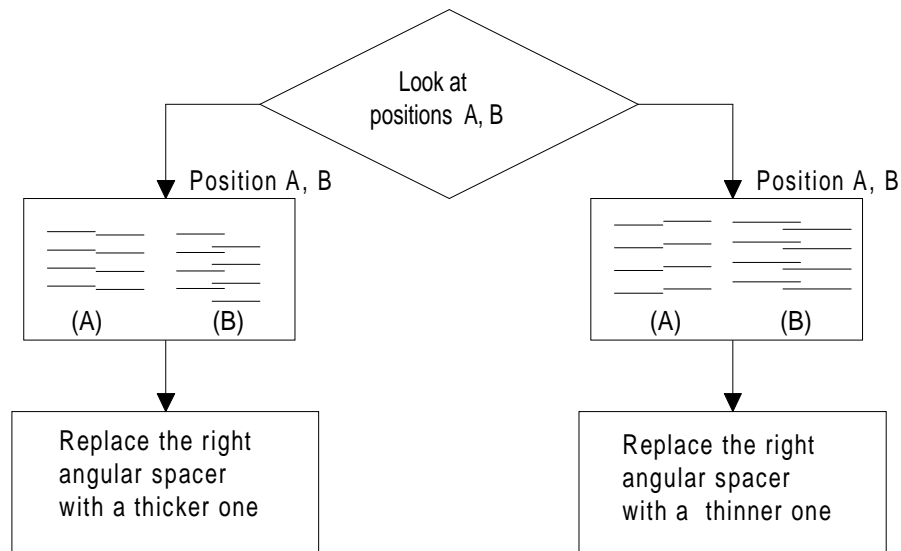


Figure 4-11. Spacer Selection

8. 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 4-9.)
9. Replace the angular spacer on the left side with a new one, referring to the figure below. (Replace the angular spacer using tweezers to push the head base toward the rear.)
10. Rerun the BASIC program and choose “3, Head Angle Confirmation Pattern Printing” again by typing **3** and pressing **ENTER**. Then verify that the confirmation sample is correct.

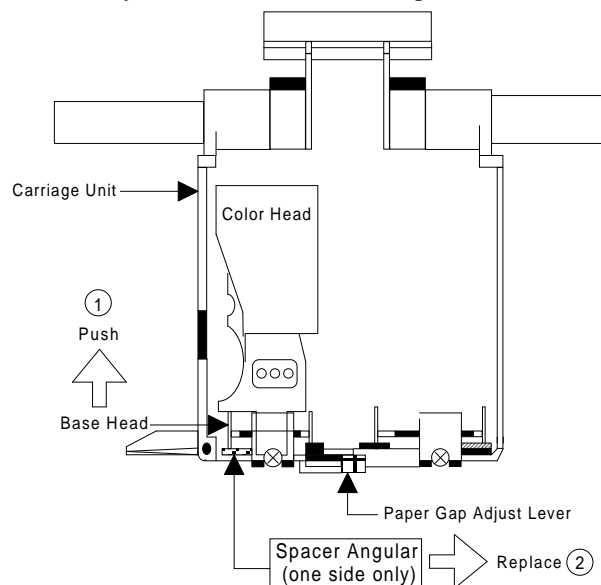


Figure 4-12. YMC Angular Spacer Replacement

11. If the sample is incorrect, repeat steps 6-10 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 4-11).
12. When you complete this adjustment, turn off the printer.

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.

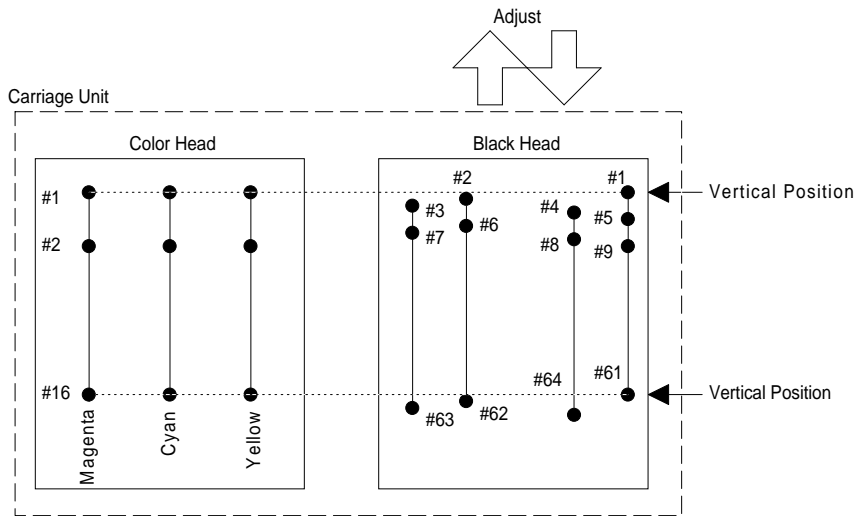


Figure 4-13. Black - Color Head Vertical Adjustment

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication

```

10. Change customer & data / END
 0. Cleaning
 Select Menu ? ■

4. When the main menu appears, choose “3, Head angular & linear adjustment” by typing **3** and pressing **ENTER**. (The printer prints the check pattern, along with the sample name.)

CAUTION

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.

3-3. BLACK HEAD SPACER SELECTION

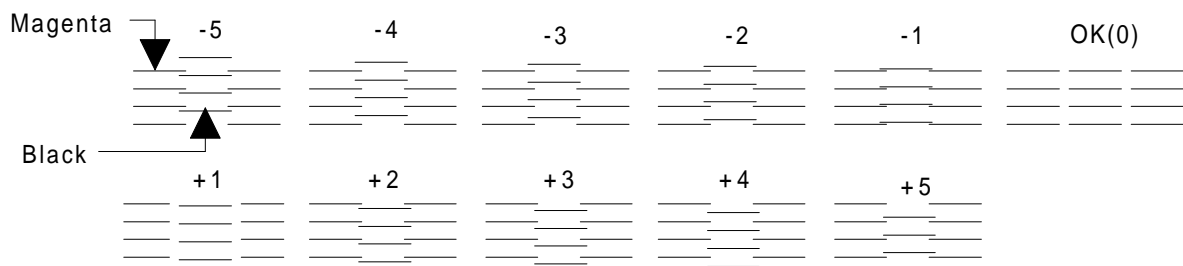


Figure 4-14. Linear Spacer Selection Sample

5. In Figure 4-14, 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 6-10.

CAUTION

- 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.
6. Turn the printer off.
7. Move the carriage to the center while pressing the carriage lock lever, and remove the two ink cartridges.
8. Remove the rubber cap that covers a head screw at the side of color ink cartridge, and then loosen (but do not remove) 3 screws. (Refer to the figure on the next page.)

CAUTION

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: 1027990).

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

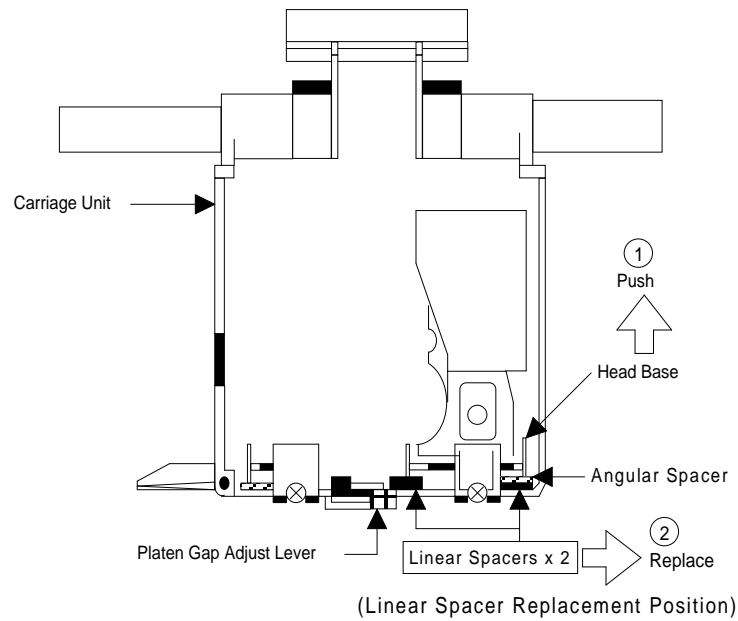


Figure 4-15. Linear Spacer Replacement Method

10. Rerun the BASIC program, and choose the “Head Vertical Position Confirmation” by typing **3** and pressing **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)**.”
11. When you complete this adjustment, exit the BASIC program and turn off the printer.

4.1.6 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 using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■

```

4. When the main menu appears, choose “5, BK. YMC head gap adjustment” by typing 5 and pressing **ENTER**. (The printer prints a check pattern sample with a sample compensation value. The printer prints a sample like the one shown in the following figure.)

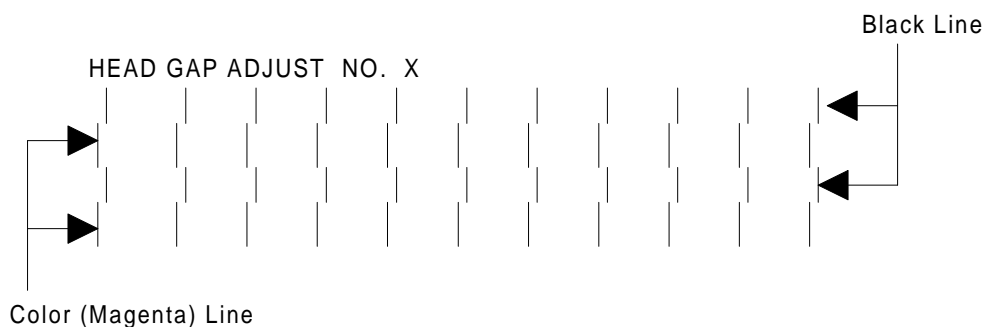


Figure 4-16. Head Gap Adjustment Sample

The adjustment value input menu appears as shown:

INPUT ADJUST No. (IF OK INPUT Y)? ■
adjust range (from -32 to 32)

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 -32 to +32.
 - Positive compensation value: Shifts the 2nd line to the left
 - Negative compensation value: Shifts the 2nd line to the rightWhen both the black and magenta lines are vertically aligned, input **Y** or **y**, and press **ENTER**. This returns you to the main menu.
6. When the main menu appears, choose “10, Change customer & data / END” by typing **10** and **Enter**. (This returns you the destination setting menu.)
7. Choose “7, END” by typing **7** and pressing **ENTER** to quit the adjustment program.

CAUTION

Settings have not yet been written to the EEPROM. Turn off the printer immediately after the adjustments.

8. Turn off the printer.

4.1.7 Bi-D (Bidirectional Printing) Alignment Adjustment

The bidirectional alignment is required when the printer mechanism, main board, or 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 different print speeds, which are due to tolerances in the mechanical components, or to 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 C184 MAIN board and refers to this data when performing bidirectional printing.

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■

```

4. When the main menu appears, choose “6, Bi-D Adjustment” by typing **6** and pressing **ENTER**. (The printer prints a check pattern with a sample compensation value. The next menu appears on the display.)

INPUT ADJUST No. (If OK INPUT Y)? ■

720 DPI adjust range (from -30 to 30)

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

When the sample print becomes vertically aligned for both lines, press **Y** and **ENTER**; then the printer prints out the current Bi- D setting pattern, and this returns you to the 360 DPI Bi-d adjustment mode.

6. Adjust the 360 DPI Bi-d setting mode in the same way as 720 dpi Bi-D adjustment.
7. If you have finished the 360 dpi Bi-d adjustment, choose “10, END” by typing **10** and pressing **ENTER**. (The destination setting menu appears on the display again.)
8. Choose “7, END” by typing **7** and pressing **ENTER** to quit the adjustment program.

CAUTION

Settings have not been written to the EEPROM yet. Turn off the printer immediately after the adjustments.

9. Turn off the printer.

4.1.8 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 4-18.)
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.

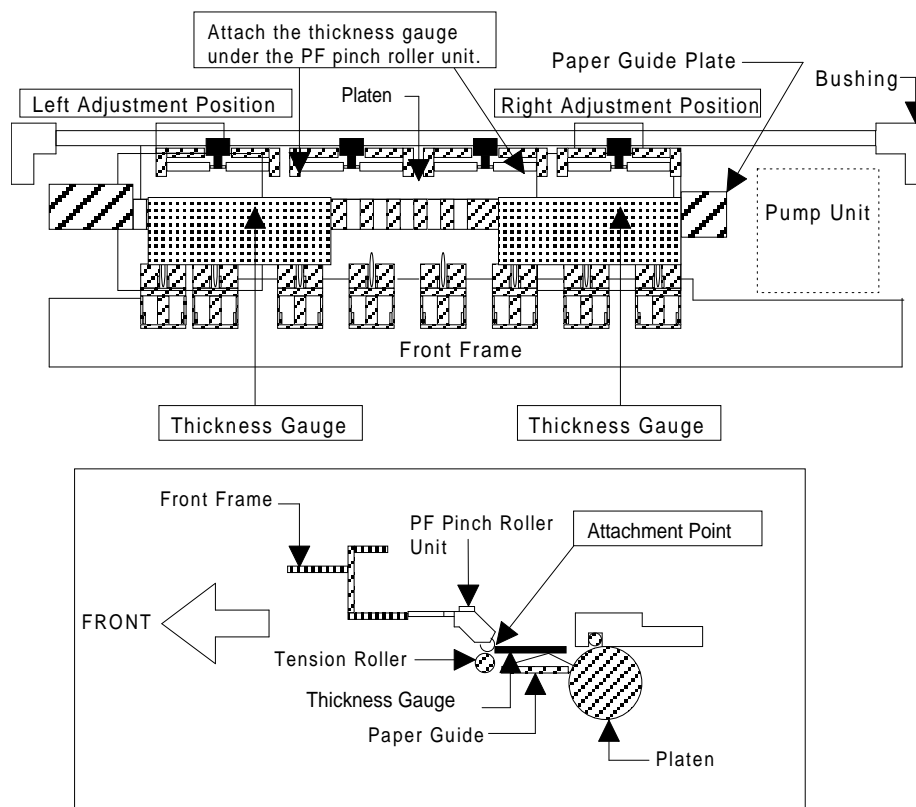


Figure 4-17. Adjusting the Paper Gap

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.

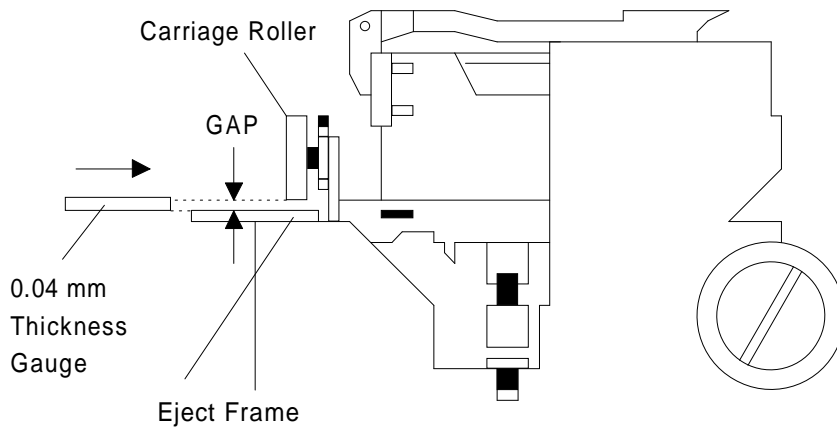


Figure 4-18. Confirming the Gap

6. Move the carriage manually to the right adjustment position and repeat steps 3, 4 and 5 referring to Figures 4-17 and 4-18.

4.1.9 Ink Consumption Counter Reset Operation

This operation is required when the ink cartridge is replaced. Usually, this operation is performed by the panel operation. But if you perform this operation, you can reset the ink consumption counter value at any time.

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```

***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?

```

3. Input the number for the destination. Then the main menu appears, as shown below.

CAUTION

If you enter an incorrect number as the destination selection, printer functions are not guaranteed.

```

STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■

```

4. When the main menu appears, choose “2, Ink consumption counter reset” by typing 2 and pressing **ENTER**. This resets the internal timer. The following message then appears.

```

Ink Counter Reset
Black Ink Counter Reset only —— 1
Color Ink Counter Reset only —— 2
Both Ink Counters Reset —— 3
Quit Ink Counter Reset —— 4

Select No.

```

5. Choose and type the selection number. This returns you to the main menu.

4.1.10 Head Cleaning Function

This function performs the compulsory ink charging to the printer head in order to check using the service tool for ink charging.

1. Connect the PC to the target printer using a parallel interface cable and turn the printer on.
2. Load BASIC on the PC, and run the program. You see the following destination select menu.

```
***** Customer *****
1. EAI, EAI (Latin America), EAL, ESP
2. EDG, EUL, EFS, EIS, EIB, EUL (Northern Europe), EUL (Middle East), EHK
3.
4. JAPAN
5.
6.
7. END

Select Menu ?
```

3. Input the number for the destination. Then the main menu appears, as shown below.

```
STYLUS Pro XL+ Program : Rev. X
customer :
1. Head VH input
2. Ink consumption counter reset
3. Head angular & linear adjustment
4. Head position check
5. BK. YMC head gap adjustment (head gap center )
6. Bi-D adjustment (Bi-d center )
7. Head VH indication
10. Change customer & data / END
0. Cleaning

Select Menu ? ■
```

4. When the main menu appears, choose “0, Cleaning” by typing 0 and pressing **ENTER**. This resets the internal timer. The following message then appears.

```
Ink Counter Reset
Black Ink counter Reset only —— 1
Color Ink Counter Reset only —— 2
Both Ink Counter Reset —— 3
Quit Ink Counter Reset —— 4

Select No.
```

5. Choose and type the selection number. This returns you to main menu.

CAUTION

If you perform this function on the same ink cartridge repeatedly, the ink life of this cartridge becomes shorter than normal.

A.1 CONNECTOR SUMMARY

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

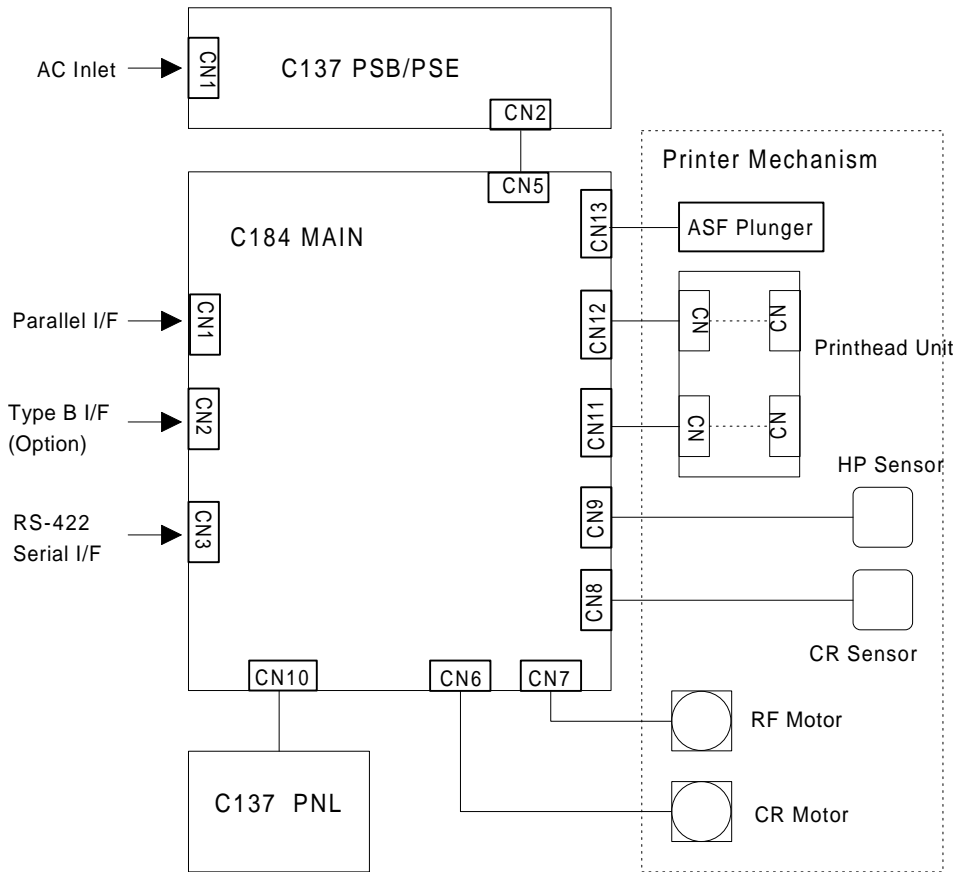


Figure A-1. Interconnection of major components

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	$\overline{\text{STB}}$ / Host Clk	$\overline{\text{STROBE}}$ signal / Clock signal (Host)
2-9	I	DATA1-8	Data strobe signal
10	O	$\overline{\text{ACK}}$ / Ptr Clk	$\overline{\text{ACK}}$ signal / Clock signal (Printer)
11	O	BUSY / Ptr Busy (Data Bit-3, 7)	Busy signal / Printer busy signal and reverse channel transfer data bits 3, 7
12	O	PE / Ack Data Req (Data Bit-2, 6)	Paper end signal / ACK data request signal and reverse channel transfer data bits 2, 6
13	O	SLCT / Xflag (Data Bit-1, 5)	Printer select signal / X-flag signal and reverse channel data bit 1, 5
14	I	AFXT / Host Busy	Auto line feed signal / Host busy signal
15	—	NC	Not connected
16	—	GND	Ground
17	—	FG	Frame ground
18	O	Logic-H	Pulled up to +5 V through 3.9K Ω / A HIGH signal indicates that all other signals sourced by the peripheral are in valid status
19-30	—	GND	Ground
31	I	INIT	INIT signal
32	O	ERR / Data Avail (Data Bit-0, 4)	Error signal / Data available signal and reverse channel transfer data bit 0, 4
33	—	GND	Ground
34	—	NC	Not connected
35	O	+5 V	Pulled up to +5 V through 3.3K Ω
36	I	$\overline{\text{SLIN}}$ / 1284-Active	Not used / 1284 active signal

A.2 CIRCUIT DIAGRAMS

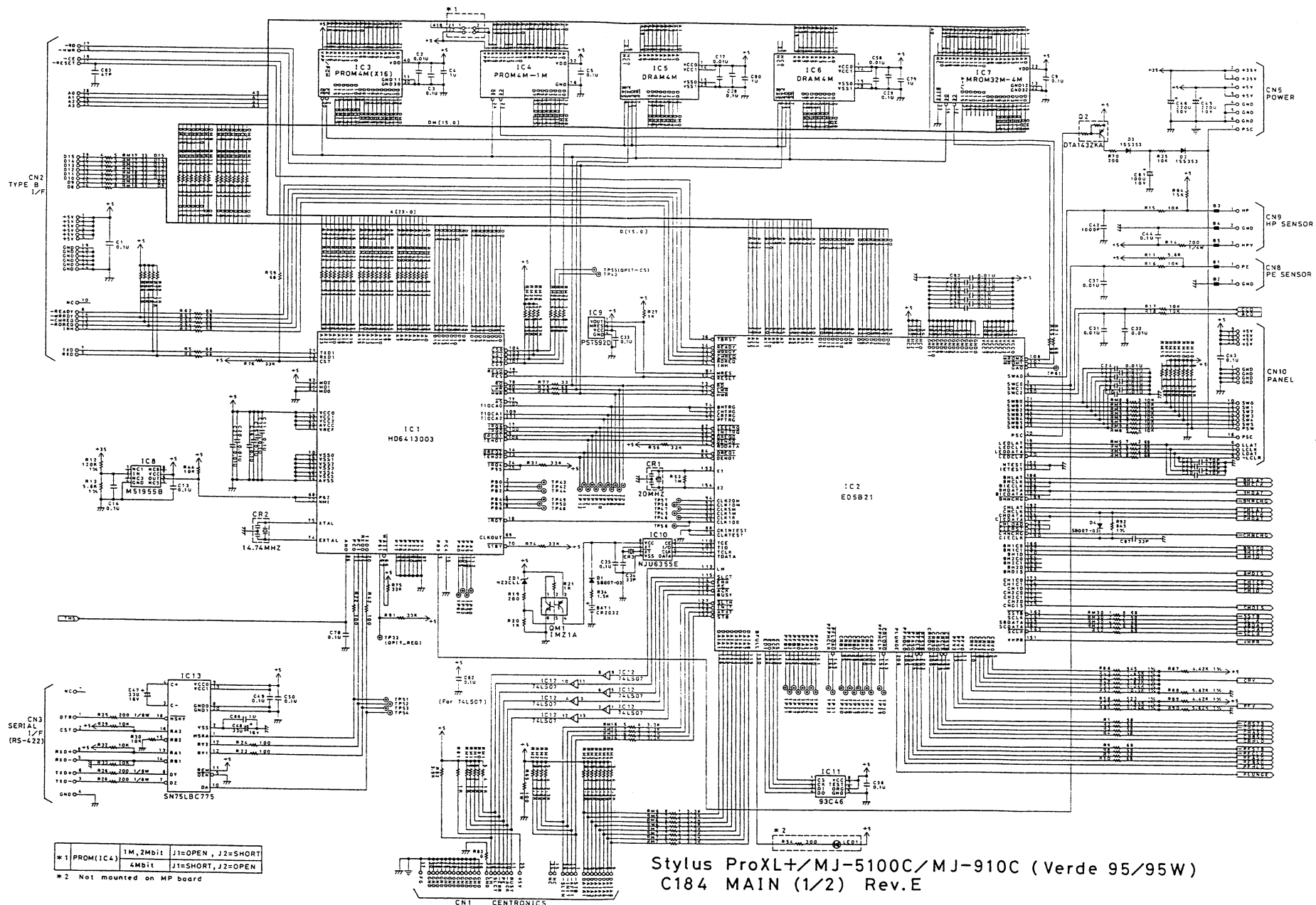
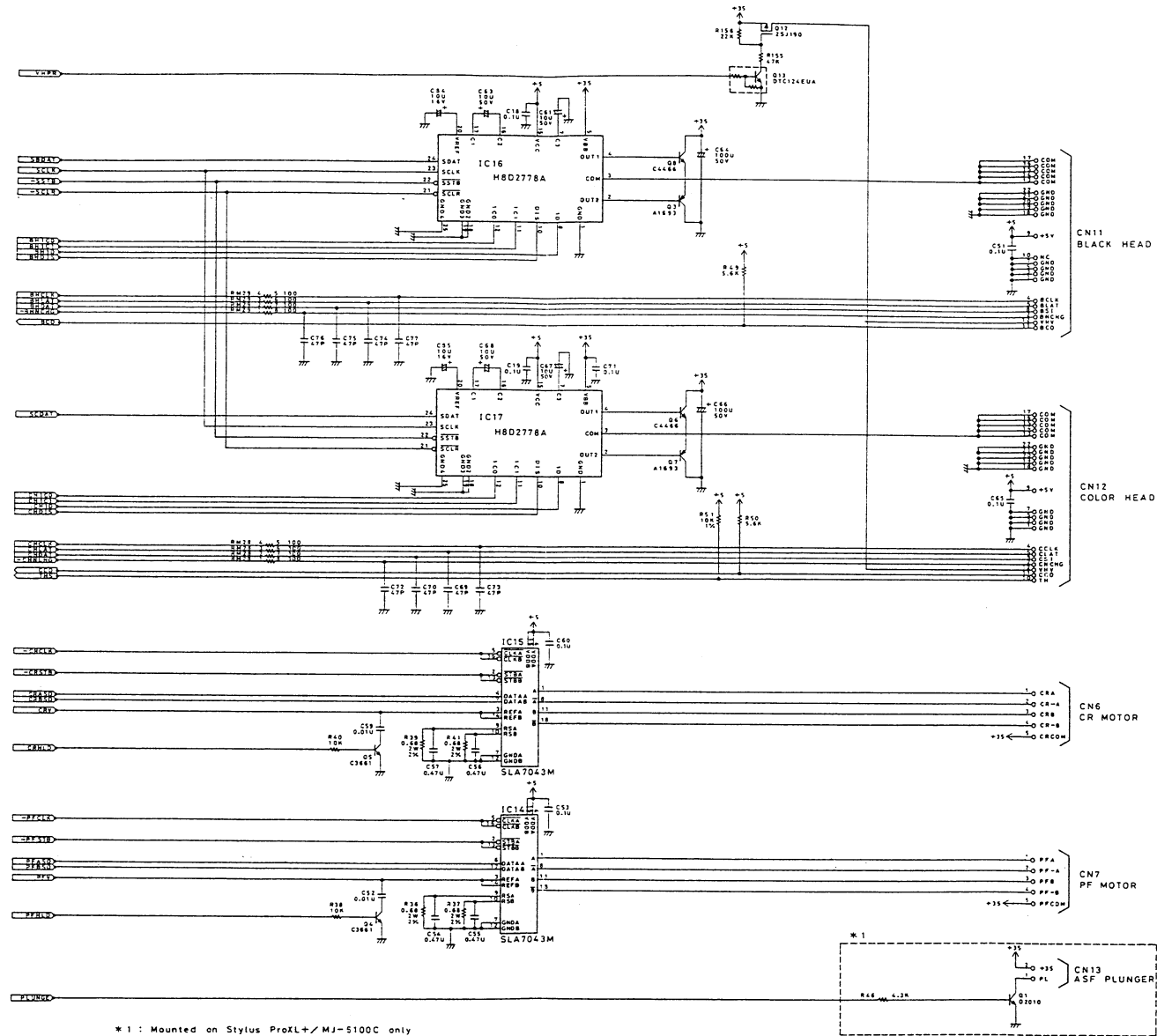


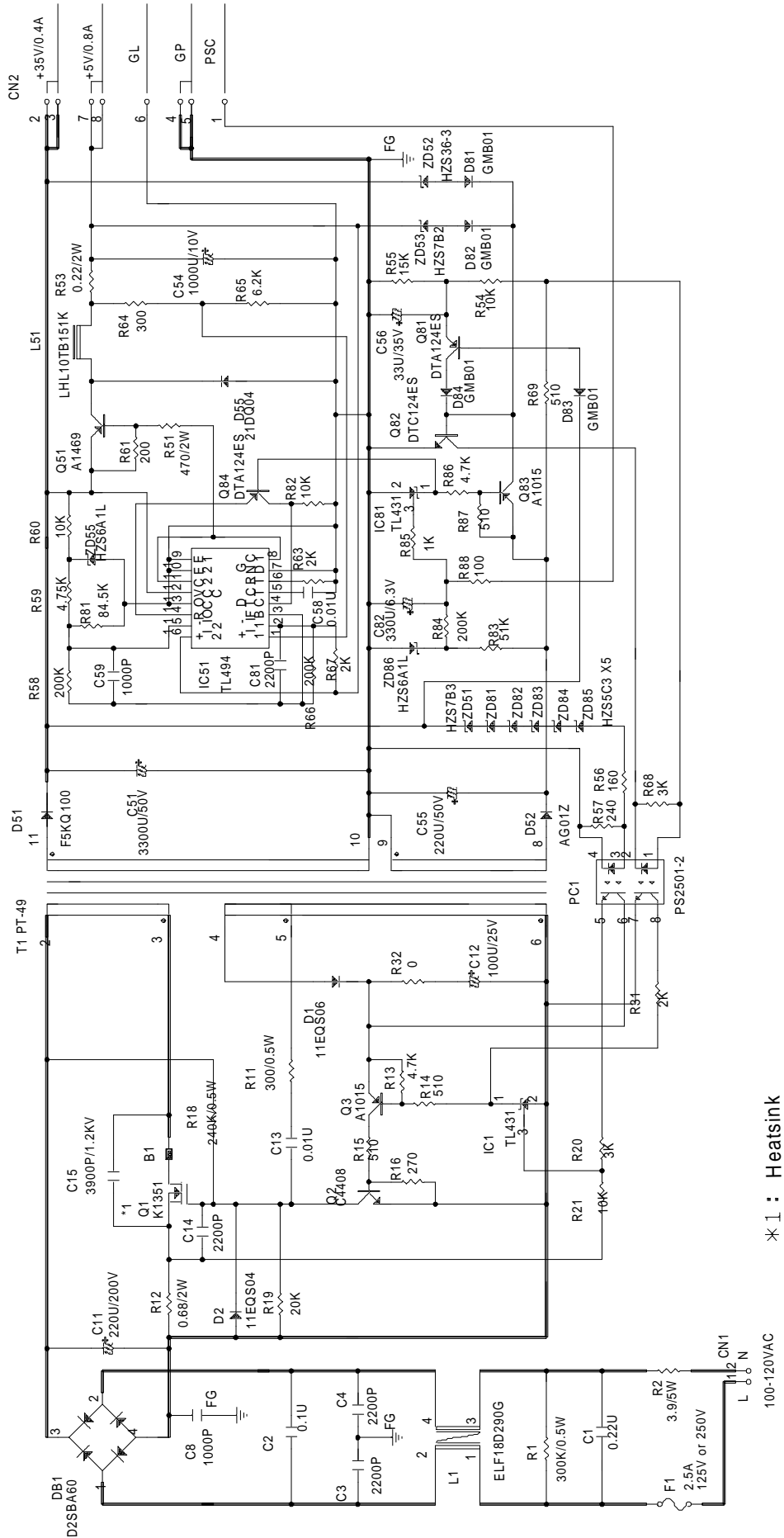
Figure A-2. C184 MAIN Board Circuit Diagram (1)



* 1 : Mounted on Stylus ProXL+/MJ-5100C only

Stylus ProXL+/ MJ-5100C / MJ-910C (Verde 95/95W)
C184 MAIN (2/2) Rev. E

Figure A-3. C184 MAIN Board Circuit Diagram (2)



* 1 : Heatsink

Figure A-4. C137 PSB Board Circuit Diagram

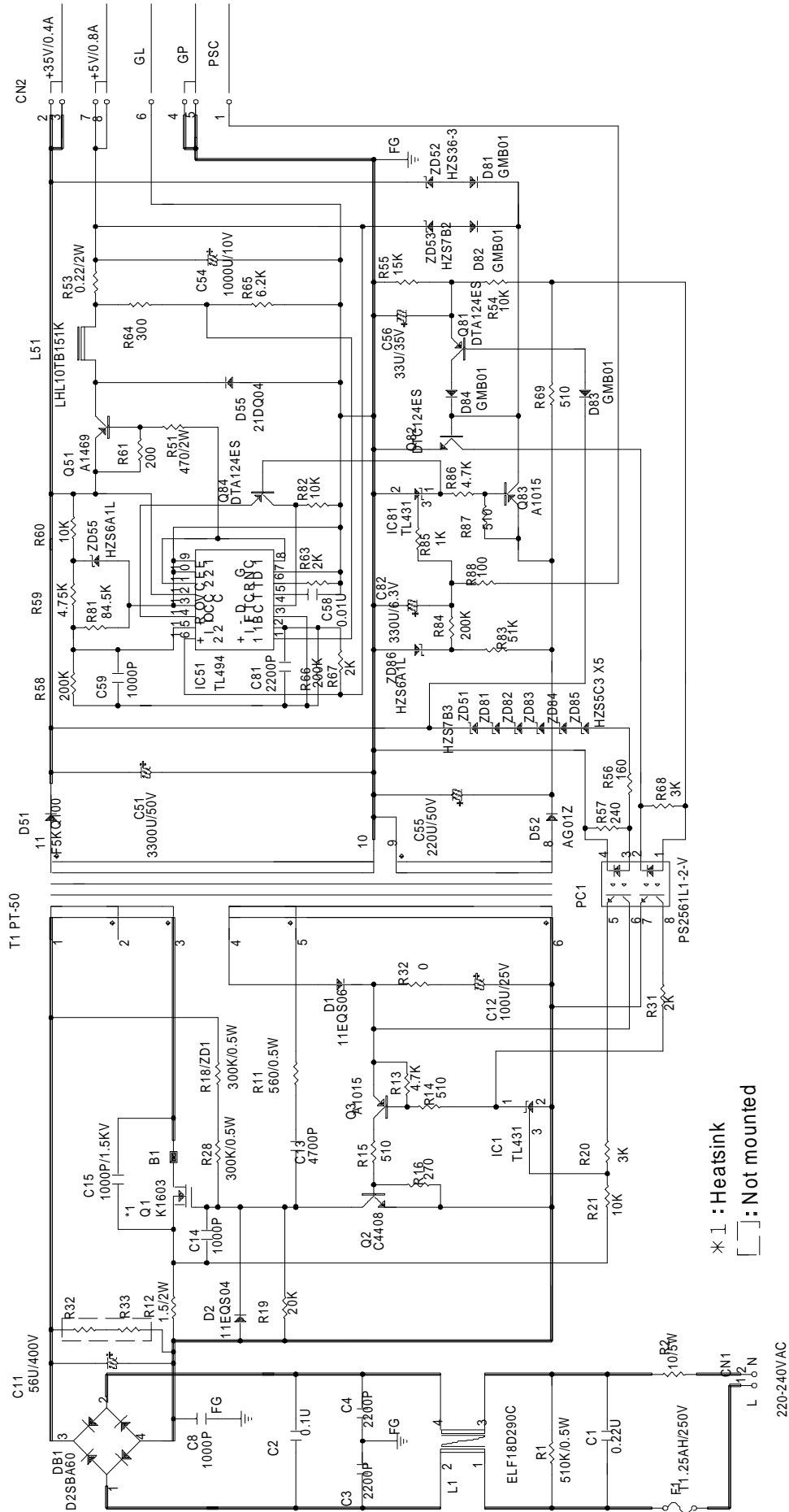


Figure A-5. C137 PSE Board Circuit Diagram

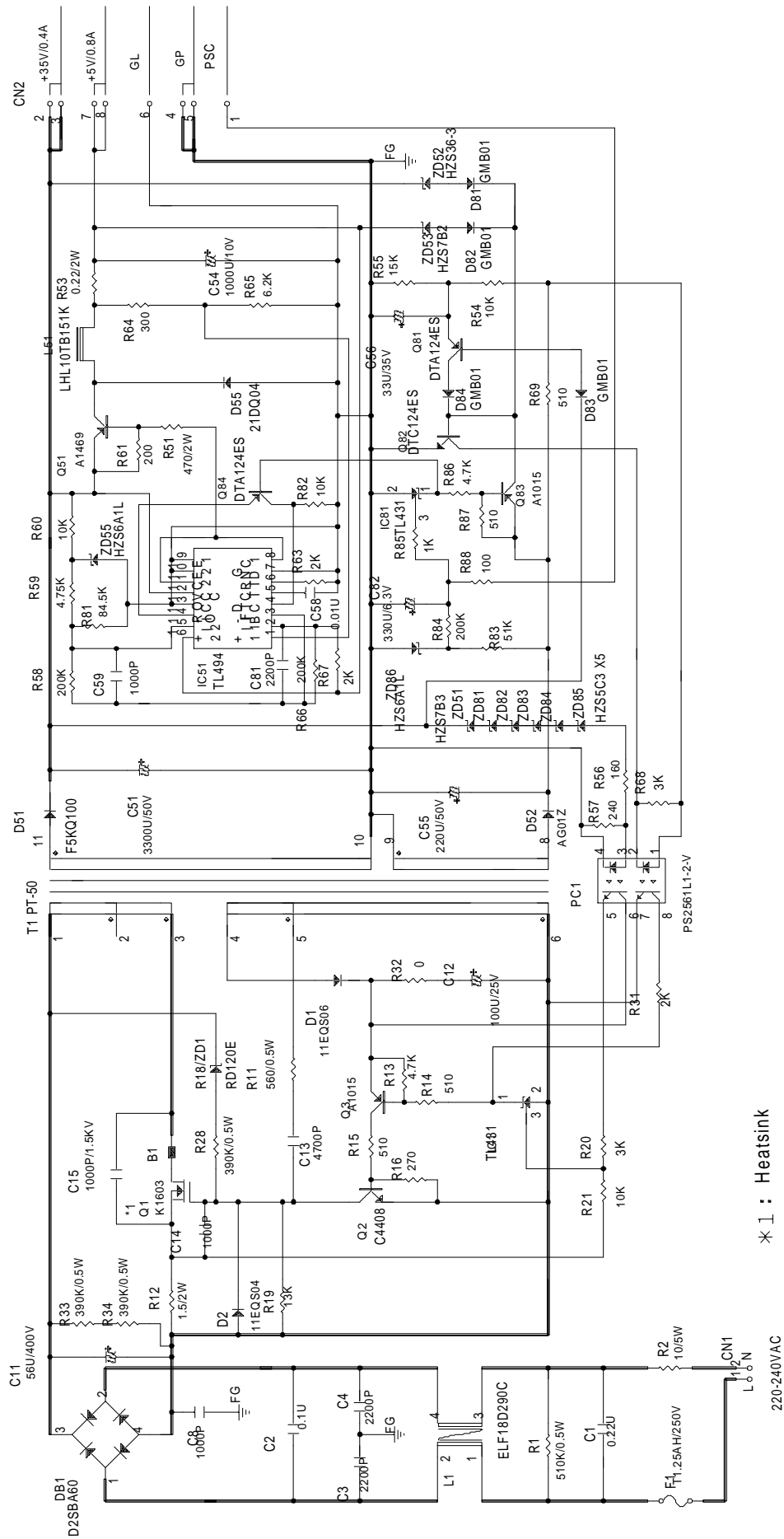
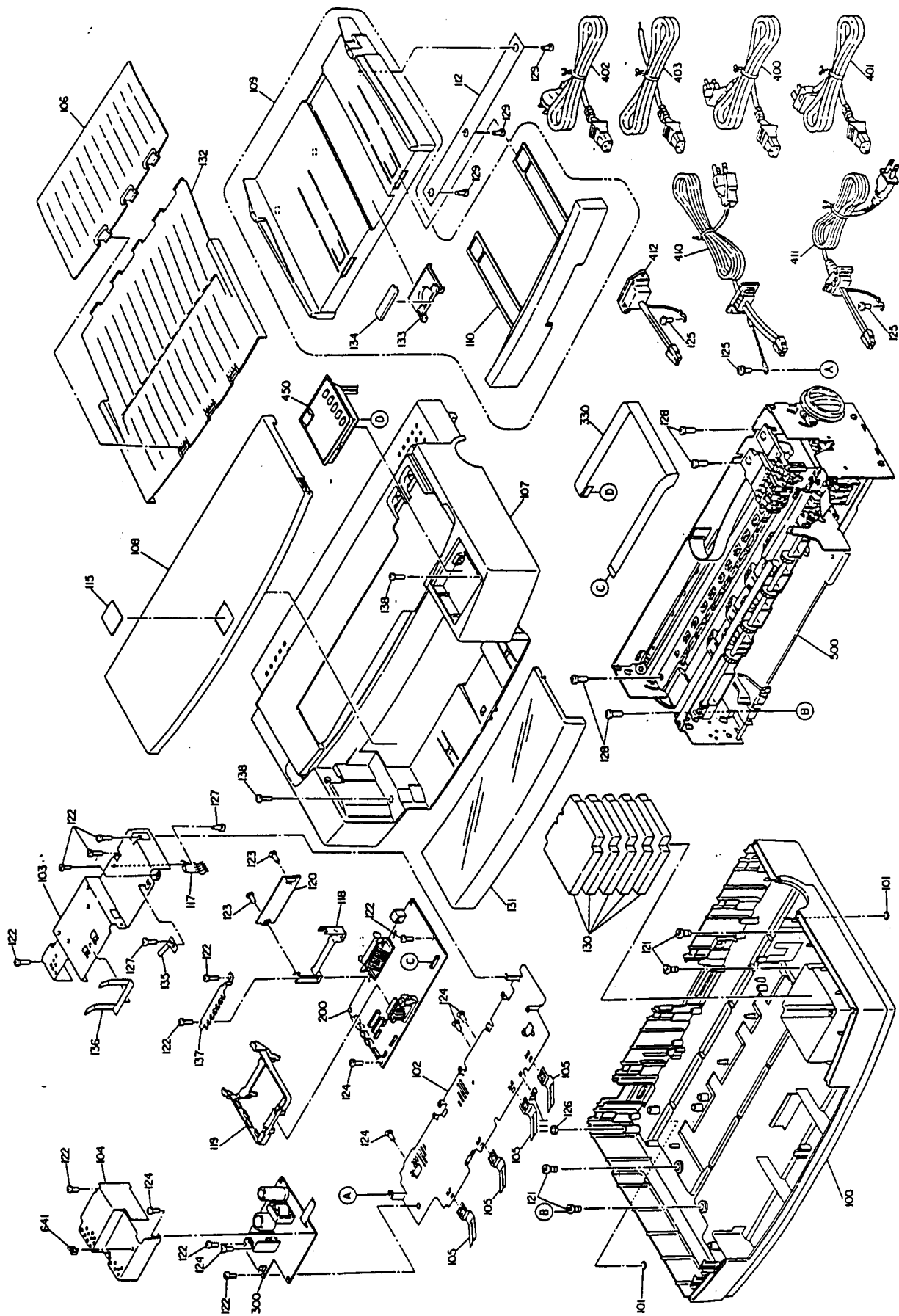


Figure A-6. C137 PSE (Korea) Board Circuit Diagram



EPSON