

# SERVICE MANUAL

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## Color Inkjet Printer **EPSON Stylus C 60**



# EPSON®

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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 THE POWER SOURCE AND PERIPHERAL DEVICES PERFORMING ANY MAINTENANCE OR REPAIR PROCEDURES.
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.
4. WHEN DISASSEMBLING OR ASSEMBLING A PRODUCT, MAKE SURE TO WEAR GLOVES TO AVOID INJURIER FROM METAL PARTS WITH SHARP EDGES.

## **WARNING**

1. REPAIRS ON EPSON PRODUCT SHOULD BE PERFORMED ONLY BY AN EPSON CERTIFIED REPAIR TECHNICIAN.
2. MAKE CERTAIN THAT THE SOURCE VOLTAGES 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.

# About This Manual

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of the printer. The instructions and procedures included herein are intended for the experienced repair technicians, and attention should be given to the precautions on the preceding page.

## Manual Configuration

This manual consists of six chapters and Appendix.

### **CHAPTER 1.PRODUCT DESCRIPTIONS**

Provides a general overview and specifications of the product.

### **CHAPTER 2.OPERATING PRINCIPLES**

Describes the theory of electrical and mechanical operations of the product.

### **CHAPTER 3.TROUBLESHOOTING**

Describes the step-by-step procedures for the troubleshooting.

### **CHAPTER 4.DISASSEMBLY / ASSEMBLY**

Describes the step-by-step procedures for disassembling and assembling the product.

### **CHAPTER 5.ADJUSTMENT**

Provides Epson-approved methods for adjustment.

### **CHAPTER 6.MAINTENANCE**

Provides preventive maintenance procedures and the lists of Epson-approved lubricants and adhesives required for servicing the product.

### **CHAPTER 7.APPENDIX**

Provides the following additional information for reference:

- Connector pin assignments
- Electric circuit boards components layout
- Electrical circuit boards schematics
- Exploded diagram & Parts List

## Symbols Used in this Manual

Various symbols are used throughout this manual either to provide additional information on a specific topic or to warn of possible danger present during a procedure or an action. Be aware of all symbols when they are used, and always read NOTE, CAUTION, or WARNING messages.



Indicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.



Indicates an operating or maintenance procedure, practice, or condition that, if not strictly observed, could result in damage to, or destruction of, equipment.



May indicate an operating or maintenance procedure, practice or condition that is necessary to accomplish a task efficiently. It may also provide additional information that is related to a specific subject, or comment on the results achieved through a previous action.



Indicates an operating or maintenance procedure, practice or condition that, if not strictly observed, could result in injury or loss of life.



Indicates that a particular task must be carried out according to a certain standard after disassembly and before re-assembly, otherwise the quality of the components in question may be adversely affected.

# Revision Status

Revision	Issued Date	Description
A	2002/8/6	First Release

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**CHAPTER**

**1**

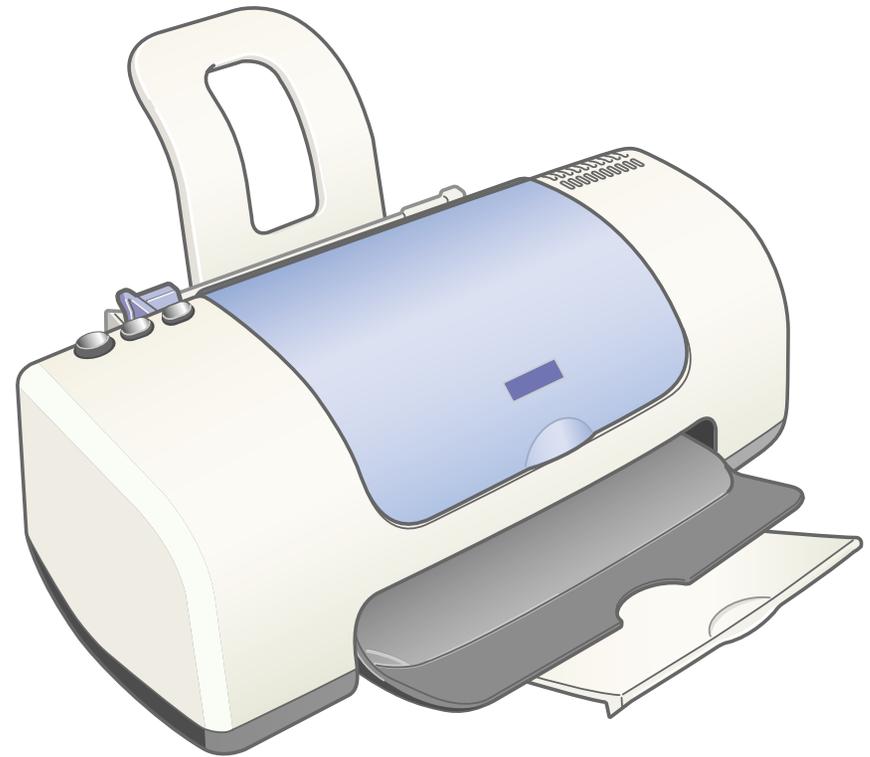
**PRODUCT DESCRIPTION**

## 1.1 FEATURES

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The major features of EPSON color inkjet dot matrix printer EPSON Stylus C60 are:

- High color print quality
  - 2880 (H) X 720 (V) dpi printing
  - Four Color Printing (YMCK)
  - Traditional and New Microweave
- Built-in auto sheet feeder
  - Holds 100 cut-sheets (65g/m<sup>2</sup>)
  - Holds 10 envelopes
  - Holds 10 transparency films
- Two built-in interfaces
  - Bi-directional parallel I/F (IEEE-1284 level 1 device)
  - USB
- Windows/Macintosh exclusive



**Figure 1-1. Product's external view**

## 1.2 SPECIFICATIONS

This section covers specifications of the printer.

### 1.2.1 Physical Specification

- Weight : 3.42 kg (without the ink cartridges)
- Dimension Printing : 479.6 mm (W) x 509 mm (D) x 271.8 mm (H)

### 1.2.2 Printing Specification

- Print method
  - On demand ink jet
- Nozzle configuration
  - Monochrome 144 nozzles (48 x 3 staggered)
  - Color 48 nozzles x 3 (Cyan, Magenta, Yellow)

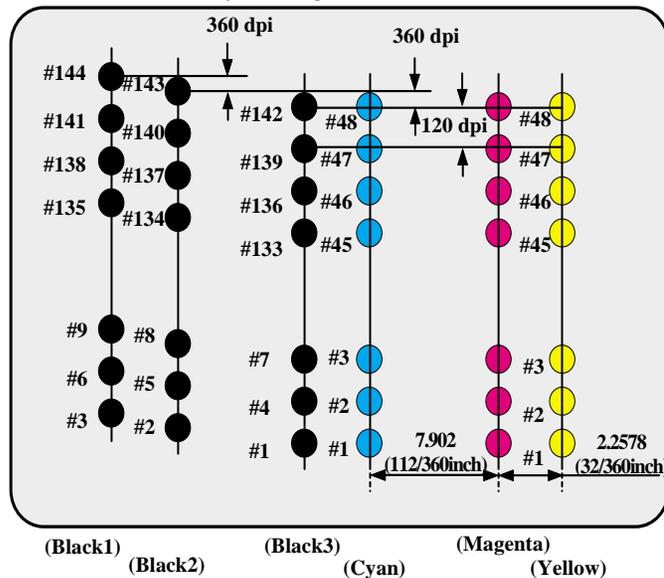


Figure 1-2. Nozzle configuration

- Print direction
  - Bi-direction with logic seeking
- Print speed & printable columns

Table 1-1. Character mode (Black only)

Character pitch	Character quality	Printable columns	CR speed
10 CPI	LQ	80	238 CPS*

\*CPS: Characters/Second

Table 1-2. Raster graphics mode

Horizontal resolution	Printable area	Available dot	CR speed
360 dpi (Normal dot)	209.8 mm (8.26 inch)	2976	86.36 cm/s (34.0 IPS*)
360 dpi (Multi shot 3 dot)	209.8 mm (8.26 inch)	2976	60.452 cm/s (23.8 IPS*)
720 dpi	209.8 mm (8.26 inch)	5952	50.80 cm/s (20 IPS*)
1440 dpi	209.8 mm (8.26 inch)	11904	50.80 cm/s (20 IPS*)

\* IPS: Inch/Second

- Control code
  - ESC/P Raster command
  - EPSON Remote command
- Character tables
  - None
  - ASCII 96 Codes (Code Number 20H-7FH)
- International character sets
  - None

- Typeface
  - Bit map LQ font : EPSON Courier 10 CPI
- Input data buffer
  - 32 KB

### 1.2.3 Paper Feeding

- Feeding method
  - Friction feed with ASF
- Paper path
  - Cut-sheet ASF (Top entry Front out)
- Feed speed

**Table 1-3. Feed speed**

Feed condition	Time	Speed
10.16 mm (0.4 inch) feed	110 msec	92.36 mm (3.64 inch)/sec
Continuous feed	140 msec	139.7 mm (5.5 inch)/sec

## 1.2.4 Paper Specification

### 1.2.4.1 Plain paper

**Table 1-4. Plain paper**

Item	Width (mm)	Length (mm)	Thickness (mm)	Weight (g/m <sup>2</sup> )	Quality
A4	210	297	0.08-0.11	64-90 (17-24(lb))	Plain paper Reclaimed paper
Letter	215.9	279.4			
Legal	215.9	355.6			
Executive	184.2	266.7			
Half Letter	139.7	215.9			
B5	182	257			
A5	148	210			
A6	105	148			
User defined	89-241.3	89-1117.6			



- Poor quality paper may reduce print quality and cause paper jams or other problems. If you encounter problems, switch to a higher grade of paper.
- Do not load curled or folded paper.
- Use paper under normal conditions ;
  - Temperature 15 to 25°C (59 to 77°F)
  - Humidity 40 to 60% RH

1.2.4.2 Envelope

Table 1-5. Envelope

Item	Width (mm)	Length (mm)	Thickness (mm)	Weight (g/m <sup>2</sup> )	Quality *
No.10	241.3	104.8	N/A	45-75 (12-20(lb))	Bond paper Air mail PPC
DL	220	110			
C6	162	114			
Envelope 220*132	220	132			

\* Envelope printing is only available at normal temperature.  
Keep the longer side of the envelope horizontally at setting.



- Poor quality paper may reduce print quality and cause paper jams or other problems. If you encounter problems, switch to a higher grade of paper.
- Do not load curled or folded paper.
- Use paper under normal conditions ;
  - Temperature 15 to 25°C (59 to 77°F)
  - Humidity 40 to 60% RH

1.2.4.3 Exclusive paper

Quality: EPSON Exclusive paper

Transparency printing is only available at normal temperature

Table 1-6. Exclusive paper

Item	Size	Width (mm)	Length (mm)	Thickness (mm)	Weight (g/m <sup>2</sup> )
Photo Quality Ink Jet Paper	A4	210	297	0.13	102 (27lb) *
	Letter	215.9	279.4		102 (27lb)
	Legal	215.9	355.6		
	B5	182	257		
Photo Quality Ink Jet Card	5*8	127	203.2	0.21	180 (48lb)
	8*10	203.2	254		
	A6	105	148		
360dpi Ink Jet Paper	A4	210	297	0.11	89 (24lb)
	Letter	215.9	279.4		
Premium Luster Photo Paper	Letter	215.9	279.4	0.27	250 (66lb)
Ink Jet Transparencies	A4	210	297	0.13	N/A
	Letter	215.9	279.4		
Photo Quality Glossy Film	A4	210	297	0.13	N/A
	Letter	215.9	279.4		
	A6	105	148		
Matte Paper-Heavyweight	A4	210	297	0.23	167(44lb)
	Letter	215.9	279.4		

**Table 1-6. Exclusive paper**

Item	Size	Width (mm)	Length (mm)	Thickness (mm)	Weight (g/m <sup>2</sup> )
Photo Paper	A4	210	297	0.23	194 (52lb)
	Letter	215.9	279.4		
	Card	100	148		
	Photo Paper 4*6	113.6	175.4		
	Panorama	210	594		
Photo Quality Self Adhesive Sheets	A4	210	297	0.19	167 (44lb)
Photo Stickers 16	A6	105	148	0.19	167 (44lb)
Photo Stickers 4	A6	105	148	0.19	167 (44lb)
Iron-On Cool Peel Transfer Paper	A4	210	297	0.18	124 (33lb)
	Letter	215.9	279.4		
Premium Glossy Photo Paper	A4	210	297	0.27	255 (68lb)
	Letter	215.9	279.4		
Premium Semigloss Photo Paper	A4	210	297	0.27	250 (66lb)
	Letter	215.9	279.4		
Premium Ink Jet Plain Paper	A4	210	297	0.11	80 (21lb)
Bright White Ink Jet Paper	A4	210	297	0.13	92.5 (25lb)

\* 98 (26lb) for EU



- Poor quality paper may reduce print quality and cause paper jams or other problems. If you encounter problems, switch to a higher grade of paper.
- Do not load curled or folded paper.
- Use paper under normal conditions ;
  - Temperature 15 to 25°C (59 to 77°F)
  - Humidity 40 to 60% RH
- EPSON Photo Quality Glossy Film and Self Adhesive Sheets should be stored under the following conditions ;
  - Temperature 15 to 30°C (59 to 86°F)
  - Humidity 20 to 60% RH

## 1.2.5 Printing Area

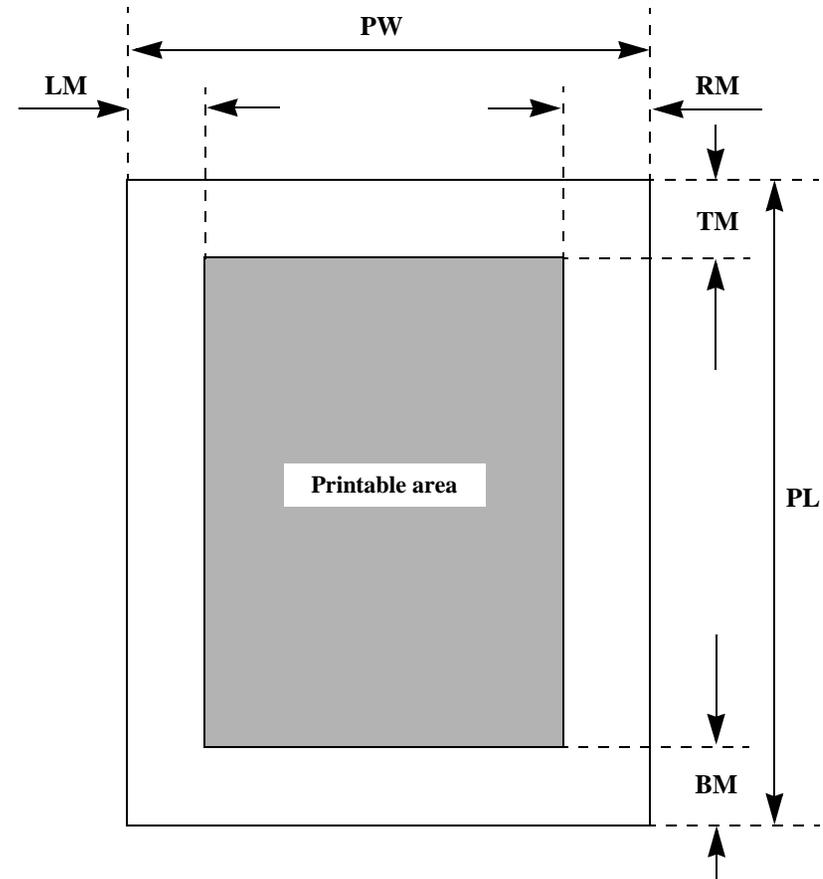
### 1.2.5.1 Cut sheet

Refer to the following table. As for each margin area, refer to Figure 1-3.

**Table 1-7. Printing area**

Paper size	Left margin (min.)	Right margin (min.)	Top margin (min.)	Bottom margin (min.)
A4	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *
Letter	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *
B5	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *
Legal	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *
Statement	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *
Executive	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") / 3mm (0.12") *

\* Bottom margin can be set to 3 mm at minimum when the paper length is designated with "ESC (S" command). However, the printing quality is not guaranteed in the area, ranging from 3 mm to 14 mm, from the form lower end. When the paper length is not designated, the bottom margin must be wider than 14 mm.



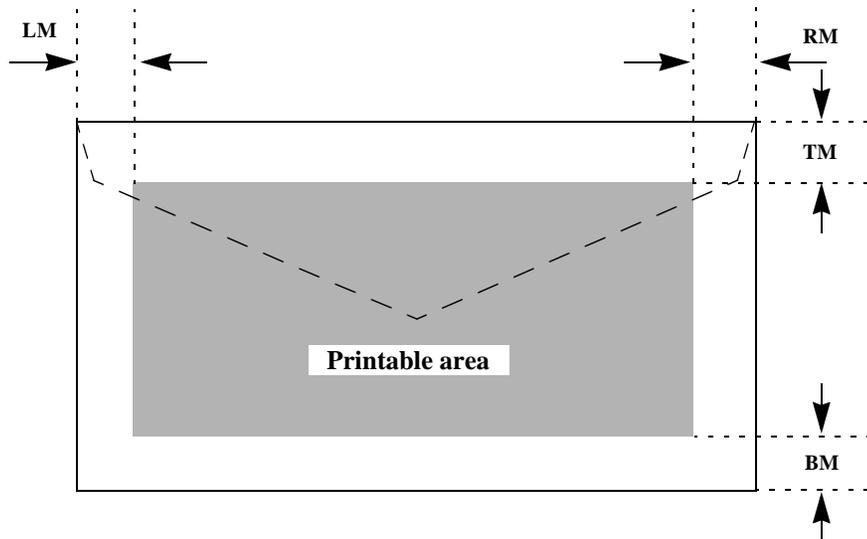
**Figure 1-3. Printable area for cut sheet**

### 1.2.5.2 Envelopes

Refer to the following table. As for each margin area, refer to Figure 1-4.

**Table 1-8. Envelope margin**

Paper size	Left margin (min.)	Right margin (min.)	Top margin (min.)	Bottom margin (min.)
#10	3 mm (0.12")	28 mm (1.10")	3 mm (0.12")	14 mm (0.55")
DL	3 mm (0.12")	7 mm (0.28")	3 mm (0.12")	14 mm (0.55")
C6	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.55")

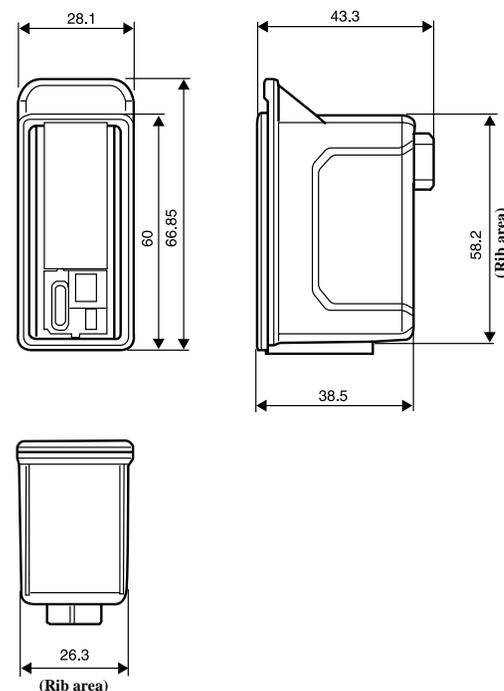


**Figure 1-4. Printable area for envelopes**

### 1.2.6 Ink Cartridge Specification

#### 1.2.6.1 Black ink cartridge

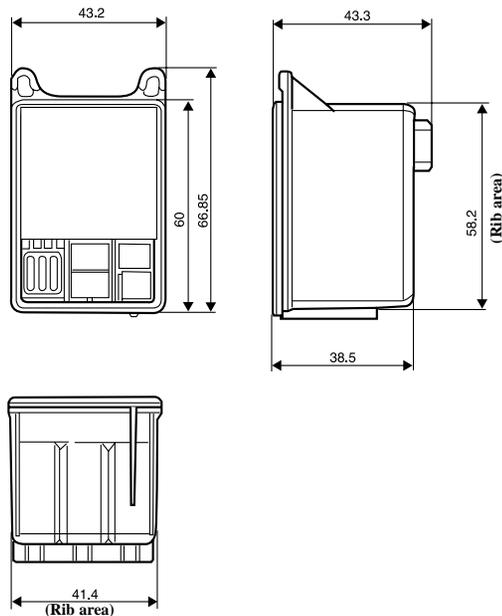
- Type : Exclusive cartridge
- Color : Black
- Print capacity : 600 pages/A4  
(ISO/IEC 10561 Letter Pattern at 360 dpi)
- Ink life : 2 years from production date
- Storage temperature:
  - Storage -20 °C to 40 °C (within a month at 40 °C)
  - Packing -30 °C to 40 °C (within a month at 40 °C)
  - Transit -30 °C to 60 °C (within 120 hours at 60 °C and within a month at 40 °C)
- Dimension : 28.1 mm (W) x 66.85 mm (D) x 43.3 mm (H)



**Figure 1-5. Black ink cartridge**

### 1.2.6.2 Color ink cartridge

- Type : Exclusive cartridge
- Color : Magenta, Cyan, Yellow
- Print capacity : 300 pages / A4 (360 dpi, 5% duty each color)
- Ink life : 2 years from production date
- Storage temperature:
  - Storage -20 °C to 40 °C (within a month at 40 °C)
  - Packing -30 °C to 40 °C (within a month at 40 °C)
  - Transit -30 °C to 60 °C (within 120 hours at 60 °C and within a month at 40 °C)
- Dimension : 43.2 mm (W) x 66.85 mm (D) x 43.3 mm (H)



**Figure 1-6. Color ink cartridge**

*Note 1: Ink cartridge can not re-fill, only ink cartridge is prepared for article of consumption.*

*Note 2: Do not use the ink cartridge which was passed away the ink life.*

*Note 3: Ink will be frozen under -18 ~ -21 °C environment, however it will be usable after placing it more than 3 hours at room temperature.*

### 1.2.7 Electric Specification

#### [120V Version]

- Rated voltage : AC120V
- Input voltage range : AC99~132V
- Rated frequency range : 50~ 60Hz
- Input frequency range : 49.5~ 60.5Hz
- Rated current : 0.4A
- Power consumption : Approx. 17W (ISO10561 Letter Pattern)  
Approx. 4W in standby mode  
Energy Star compliant
- Insulation resistance : 100M ohms min.  
(between AC line and chassis, DC 500V)
- Dielectric strength : AC 1000V rms. 1 minute or  
AC 1200V rms. 1 second  
(between AC line and chassis)

#### [220 ~ 240V Version]

- Rated voltage : AC220V~240V
- Input voltage range : AC198~264V
- Rated frequency range : 50~60Hz
- Input frequency range : 49.5~60.5Hz
- Rated current : 0.2 A
- Power consumption : Approx. 17W (ISO10561 Letter Pattern)  
Approx. 4.5W in standby mode  
Energy Star compliant
- Insulation resistance : 100M ohms min.  
(between AC line and chassis, DC 500V)
- Dielectric strength : AC 1500V rms. 1 minute  
(between AC line and chassis)

### 1.2.8 Environmental Condition

- Temperature
  - Operating : 10 to 35°C (Refer to Figure 1-7)
  - Non-operating : -20 to 60°C (with shipment container)  
1 month at 40°C and 120 hours at 60°C
- Humidity
  - Operating : 20 to 80% RH  
(without condensation / Refer to Figure 1-7)
  - Non-operating : 5 to 85% RH  
(without condensation / with shipment container)
- Resistance to shock
  - Operating : 1G, within 1 ms
  - Non-operating : 2G, within 2 ms (with shipment container)
- Resistance to vibration
  - Operating : 0.15G
  - Non-operating : 0.50G (with shipment container)

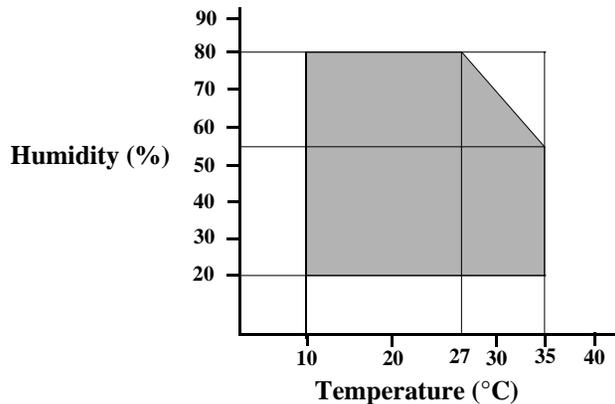


Figure 1-7. Temperature/Humidity range

### 1.2.9 Reliability

- Total print volume : 50,000 pages (A4, Letter)  
or 5 years although less than 50,000 pages printing
- Print head life : 3 billion dots/nozzle

### 1.2.10 Safety Approvals

[120V Version]

- Safety standards : UL1950  
CSA22.2 No.950
- EMI : FCC part15 subpart B Class B  
CSA C108.8 Class B

[220~240V Version]

- Safety standards: : EN60950 (VDE)
- EMI : EN55022 (CISPR Pub.22) Class B  
AS/NZS 3548 Class B

### 1.2.11 Acoustic Noise

- Level : Approx. 45dB(A) (According to ISO 7779)

### 1.2.12 CE Marking

[220~240V Version]

- Low voltage directive 73/23/EEC : EN60950
- EMC directive 89/336/EEC : EN55022 Class B  
EN61000-3-2  
EN61000-3-3  
EN50082-1  
IEC801-2  
IEC801-3  
EC801-4

## 1.3 INTERFACE

The EPSON Stylus C60 provides USB and parallel interface as standard.

### 1.3.1 Parallel Interface (Forward Channel)

- Transmission mode : 8 bit parallel, IEEE-1284 compatibility mode
- Synchronization : By STROBE pulse
- Handshaking : BY BUSY and ACKNLG signal
- Signal level : TTL compatible level
- Adaptable connector : 57-30360 (amphenol) or equivalent

BUSY signal is set high before setting either -ERROR low or PE high, and held high until all these signals return to their inactive state.

BUSY signal is at high level in the following cases.

- During data entry (see data transmission timing)
- When input data buffer is full
- During -INIT signal is at low level or during hardware initialization
- During printer error (see -ERROR signal)
- When the parallel interface is not selected

ERROR signal is at low level when the printer is in one of the following states.

- Printer hardware error (fatal error)
- Paper-out error
- Paper-jam error
- Ink-out error
- No ink cartridge
- Maintenance request

PE signal is at high level during paper-out error.

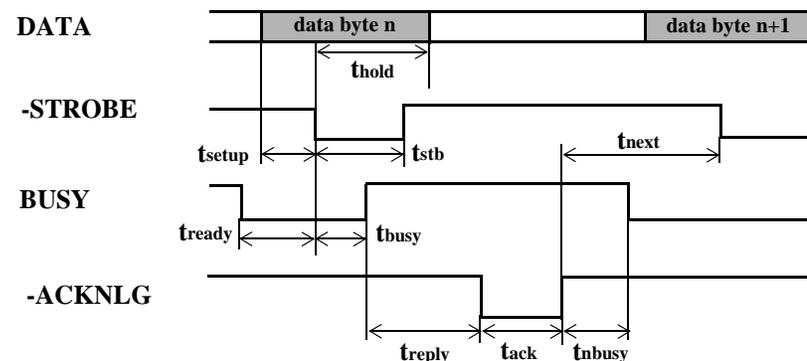


Figure 1-8. Data transmission timing

Table 1-9. Data transmission timing

Parameter	Minimum	Maximum
tsetup	500ns	-
thold	500ns	-
tstb	500ns	-
tready	0	-
tbusy	-	500ns
tt-out*	-	120ns
tt-in**	-	200ns
treply	0	-
tack	500ns	10us
tdbusy	0	-
tnext	0	-

\* Rise and fall time of every output signals

\*\* Rise and fall time of every input signals

\*\*\* Typical timing of tack is shown on the following page.

Table 1-10. Typical time of tack

Parallel I/F mode	Typical time of tack
High Speed	0.5us
Normal Speed	2us

Table 1-11. Signal level: TTL compatible (IEEE-1284 level 1 device)

Parameter	Minimum	Maximum	Condition
VOH*	-	5.5V	
VOL*	-0.5V	-	
IOH*	-	0.32mA	VOH = 2.4V
IOL*	-	12mA	VOL = 0.4V
CO	-	50pF	
VIH	-	2.0V	
VIL	0.8V	-	
IIH	-	0.32mA	VIH = 2.0V
IIL	-	12mA	VIL = 0.8V
CI	-	50pF	

\* A low logic level on the Logic H signal is 2.0V or less when the printer is powered off and this signal is equal or exceeding 3.0V when the printer is powered on. The receiver shall provide an impedance equivalent to 7.5K ohm to ground.

Table 1-12. Connector pin assignment and signals

Pin No.	Signal name	Return GND pin	In/Out	Functional description
1	-STROBE	19	In	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2	DATA0	20	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at high level when data is logical 1 and low level when data is logical 0.
3	DATA1	21	In	
4	DATA2	22	In	
5	DATA3	23	In	
6	DATA4	24	In	
7	DATA5	25	In	
8	DATA6	26	In	
9	DATA7	27	In	
10	-ACKNLG	28	Out	This signal is a negative pulse indicating that the printer can accept data again.
11	BUSY	29	Out	A high signal indicates that the printer cannot receive data.
12	PE	28	Out	A high signal indicates paper-out error.
13	SLCT	28	Out	Always at high level when the printer is powered on.
14	-AFXT	30	In	Not used.
31	-INIT	30	In	The falling edge of a negative pulse or a low signal on this line causes the printer to initialize. Minimum 50us pulse is necessary.
32	-ERROR	29	Out	A low signal indicates printer error condition.
36	-SLIN	30	In	Not used.
18	Logic H	-	Out	Pulled up to +5V via 3.9 K ohm resistor.

Table 1-12. Connector pin assignment and signals (continued)

Pin No.	Signal name	Return GND pin	In/Out	Functional description
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND.
16,33, 19-30	GND	-	-	Signal GND.
15,34	NC	-	-	Not connected.

**NOTE:** In/Out refers to the direction of signal flow from the printer's point of view.

### 1.3.2 Parallel Interface (Reserve Channel)

- Transmission mode : IEEE-1284 nibble mode
- Adaptable connector : See forward channel
- Synchronization : Refer to the IEEE-1284 specification
- Handshaking : Refer to the IEEE-1284 specification
- Data trans. timing : Refer to the IEEE-1284 specification
- Signal level : IEEE-1284 level 1 device  
See forward channel.

**Table 1-13. Connector pin assignment and signals**

Pin No.	Signal name	Return GND pin	In/Out	Functional description
1	HostClk	19	In	Host clock signal.
2	DATA0	20	In	The DATA0 through DATA7 signals represent data bits 0 to 7, respectively. Each signal is at 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.
3	DATA1	21	In	
4	DATA2	22	In	
5	DATA3	23	In	
6	DATA4	24	In	
7	DATA5	25	In	
8	DATA6	26	In	
9	DATA7	27	In	
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy / DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckDataReq / DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag / DataBit-1,5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	In	Host busy signal.
31	-INIT	30	In	Not used.

**Table 1-13. Connector pin assignment and signals (continued)**

Pin No.	Signal name	Return GND pin	In/Out	Functional description
32	-DataAvail / DataBit-0,4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	In	1284 active signal.
18	Logic-H	-	Out	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	-	Out	Pulled up to +5V via 3.3K ohm resistor.
17	Chassis GND	-	-	Chassis GND.
16,33, 19-30	GND	-	-	Signal GND.
15,34	NC	-	-	Not connected.

**NOTE:** *In/Out* refers to the direction of signal flow from the printer's point of view.

- Extensibility request

The printer responds affirmatively when the extensibility request values are 00H or 04H, that means,

00H : Request nibble mode reverse channel transfer.

04H : Request Device ID;  
Return data using nibble mode reverse channel transfer.

❑ Device ID:

The printer sends the following device ID string when it is requested.

When IEEE1284.4 is enabled,

```
[00H] [4EH]
MFG   : EPSON;
CMD   : ESCPL2, BDC, D4;
MDL   : Stylus[SP]C60;
CLS   : PRINTER;
DES   : EPSON[SP]Stylus[SP]C60;
```

When IEEE1284.4 is disabled,

```
[00H] [4BH]
MFG   : EPSON;
CMD   : ESCPL2, BDC;
MDL   : Stylus[SP]C60;
CLS   : PRINTER;
DES   : EPSON[SP]Stylus[SP]C60;
```

Note 1: [00H] denotes a hexadecimal value of zero.

Note2: MDL value depends on the EEPROM setting.

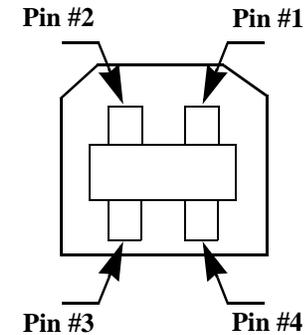
Note3: CMD value depends on the IEEE1284.4 setting.

### 1.3.3 USB Interface

- ❑ Standard : Based on “Universal Serial Bus Specifications Rev. 1.1”  
“Universal Serial Bus Device Class Definition for Printing Devices Version 1.1”
- ❑ Bit rate : 12Mbps (Full Speed Device)
- ❑ Data encoding : NRZI
- ❑ Adaptable connector : USB Series B
- ❑ Recommended cable length : 2 meters

**Table 1-14. Connector pin assignment and signals**

Pin No.	Signal name	I/O	Function description
1	VCC	-	Cable power. Max. power consumption is 2mA.
2	-Data	Bi-D	Data
3	+Data	Bi-D	Data, pull up to +3.3V via 1.5K ohm resistor.
4	Ground	-	Cable ground



**Figure 1-9. USB pin assignment**

### 1.3.4 Prevention Hosts of Data Transfer Time-out

Generally, hosts abandon data transfer to peripherals when a peripheral is in the busy state for dozens of seconds continuously. To prevent hosts of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slowdown is started when the remaining input buffer becomes several hundreds of bytes, and the printer is finally in the busy state continuously when the input buffer is full.

USB and IEEE1284.4 on the parallel interface do not require this function.

### 1.3.5 Interface Selection

The printer has two built-in interfaces: the USB and parallel interface.

These interfaces are selected automatically.

Automatic selection

In this automatic interface selection mode, the printer is initialized to the idle state scanning which interface receives data when it is powered on. Then the interface which receives data first is selected. When the host stops data transfer and the printer is in the stand-by state for seconds, the printer is returned to the idle state. As long as the host sends data or the printer interface is in busy state, the selected interface is let as it is.

Interface state and interface selection

When the parallel interface is not selected, the interface gets into the busy state. When the printer is initialized or returned to the idle state, the parallel interface gets into the ready state. Caution that the interrupt signal such as the -INIT signal on the parallel interface is not effective while that interface is not selected.

### 1.3.6 IEEE1284.4 Protocol

The packet protocol described by IEEE1284.4 standard allows a device to carry on multiple exchanges or conversations which contain data and/or control information with another device at the same time across a single point-to-point link. The protocol is not, however, a device control language. It provides basic transport-level flow control and multiplexing services. The multiplexed logical channels are independent of each other and blocking of one has no effect on the others. The protocol operates over IEEE1284.

Automatic selection

An initial state is compatible interface and starts IEEE1284.4 communication when magic strings (1284.4 synchronous commands) are received.

On

An initial state is IEEE1284.4 communication and data that received it by the time it is able to take synchronization by magic string (1284.4 synchronous commands) is discarded.

Off

An initial state is compatible interface and never starts IEEE1284.4 communication even if magic strings (1284.4 synchronous commands) are received.

## 1.4 PANEL CONTROL

The control panel of the EPSON Stylus C60 is composed of the 2 non-lock type push-buttons, 1 lock-type push-button, and 2 LEDs, as shown figure below.

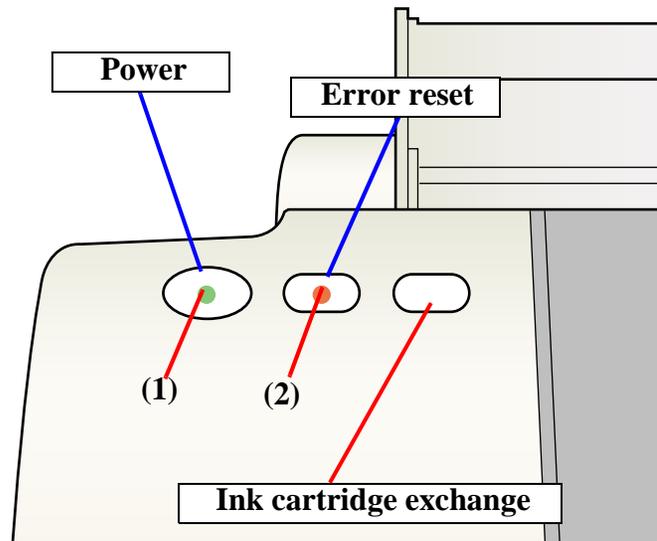


Figure 1-10. Control panel

### 1.4.1 Indicators (LEDs)

- (1) **Power**  
Lights when the operating switch is “ON” and AC power is supplied.
- (2) **Error**  
Lights or blinks when some error has occurred on the printer.

### 1.4.2 Panel Functions

**Table 1-15. Panel functions**

Switch	Function
Error reset SW	<ul style="list-style-type: none"> <li>• Loads or Ejects the paper (Pushing within 3seconds).</li> <li>• Starts the cleaning of head (Pushing for 3seconds).</li> <li>• When carriage is on the ink cartridge change position, return carriage from ink cartridge change position.</li> </ul>
Ink cartridge exchange SW	<ul style="list-style-type: none"> <li>• Starts the ink cartridge change sequence. *</li> </ul>

\* This function is not available in printing status.

**Table 1-16. Panel functions with power on**

Switch	Function
Error reset SW	<ul style="list-style-type: none"> <li>• Start status printings.</li> </ul>
Ink cartridge exchange SW	<ul style="list-style-type: none"> <li>• Selects IEEE 1284.4 mode for parallel I/F. *1</li> </ul>

\*1 Not described in the user's manual.

### 1.4.3 Printer Condition and Panel Status

**Table 1-17. Printer condition and LED status**

Printer status	Indicators		Priority
	Power	Error	
Power ON condition	On	-	10
Ink sequence	Blink	-	6
Ink Cartridge change mode	Blink	-	5
Data processing	Blink	-	9
Paper Out *1	-	On	4
Paper jam condition *1	-	On	3
Ink end (Black) *1	-	On -> Blink	8
Ink level low (Black)	-	Blink-> Blink	8
Ink end (Color) *1	-	On -> Blink2	8
Ink level low (Color)	-	Blink-> Blink2	8
Ink end (Black and Color)	-	On -> On	8
No Ink Cartridge (Black and Color) *1	-	On	7
Maintenance request (Ink Overflow Counter error) *1	Alt Blink	Alt Blink	2
Fatal error *1	Off	On	1
Special setting	Blink2	Blink2	-

" - " : Indicator status don't change.

" A -> B " : A is a indicator condition when carriage is in Home Position.

B is a indicator condition in Ink exchange sequence.

\*1: See 1.4.4 "Error Status" for detailed information.

Blink : On 0.5sec + Off 0.5sec

Blink2 : On 0.2sec + Off 0.2sec + On 0.2sec + Off 0.4sec

## 1.4.4 Error Status

- ❑ **Ink end**  
When the printer runs out the most amount of the ink of any one color, it indicates ink-low and keeps printing. When the printer runs out the whole ink of any color, it stops printing and indicates ink end error. User is then requested to install a new ink-cartridge in this state.
- ❑ **Paper out error**  
When the printer fails to load a sheet, it goes into a paper out error.
- ❑ **Paper jam error**  
When the printer fails to eject a sheet, it goes into a paper jam error.
- ❑ **No ink cartridge**  
When the printer detects that ink cartridge comes off, or failed to read or write CSIC data, it goes into this error mode.
- ❑ **Maintenance request**  
When the total amount of ink wasted through cleanings and flushing reaches to the limit, printer indicates this error and stops. In such a case, the absorber in the printer enclosure needs to be replaced with new one by a service person.
- ❑ **Fatal errors**  
Carriage control error.

## 1.4.5 Printer Initialization

There are four kinds of initialization method, and the following explains each initialization.

1. **Power-on initialization**  
This printer is initialized when turning the printer power on, or printer recognized the cold-reset command (remote RS command).  
When printer is initialized, the following actions are performed.
  - (a) Initializes printer mechanism
  - (b) Clears input data buffer
  - (c) Clears print buffer
  - (d) Sets default values
2. **Operator initialization**  
This printer is initialized when turning the printer power on again within 10 seconds from last power off, or printer recognized the -INIT signal (negative pulse) of parallel interface.  
When printer is initialized, the following actions are performed.
  - (a) Cap the printer head
  - (b) Eject a paper
  - (c) Clears input data buffer
  - (d) Clears print buffer
  - (e) Sets default values
3. **Software initialization**  
The ESC@ command also initialize the printer.  
When printer is initialized, the following actions are performed.
  - (a) Clears print buffer
  - (b) Sets default values
4. **Power-on initialization except I/F**  
The printer recognized the IEEE 1284.4 "rs" command.  
When printer is initialized, following action is performed.
  - (a) Initializes printer mechanism
  - (b) Clears input data buffer
  - (c) Clears print buffer
  - (d) Sets default values except I/F

CHAPTER

2

**OPERATING PRINCIPLES**

## 2.1 Overview

This section describes the operating principles of the Printer mechanism and electrical circuit boards. Like the previous printers (Stylus COLOR 480/580), the Stylus C60 has only the following two circuit boards and does not have the control panel board.\*<sup>1</sup>

- Main board : C418 MAIN
- Power supply board : C417 PSB/PSE

\*<sup>1</sup> : Due to this, the Stylus COLOR 480/580 does not have switches (Power, Error reset, Ink cartridge replacement) and LEDs. However, the Stylus C60 has them on C418 Main board instead of the control panel board.

### 2.1.1 Printer Mechanism

The Printer mechanism for the Stylus C60 is newly designed. But, the basic component of the Printer mechanism is almost the same as the previous printer (Stylus COLOR 480/580).

This printer consists of Printhead, Carriage mechanism, Paper loading mechanism, Paper feeding mechanism, Ink system (Pump mechanism including newly designed Carriage lock mechanism, Capping mechanism including newly designed Wiper mechanism).

Like the previous printers (Stylus COLOR 480/580), the Stylus C60 is equipped with two stepping motors; one for the Paper loading/feeding mechanism and the Pump mechanism with the CR lock mechanism, and one for the CR mechanism. The ASF unit for the Paper loading mechanism uses rear entry front eject system. And, single LD roller in Holder shaft unit loads a paper to the Printer mechanism.

The Cap unit which adopts the valveless mechanism is newly designed on this printer as follows.

- No porous pad in cap
- Cap unit with wiper

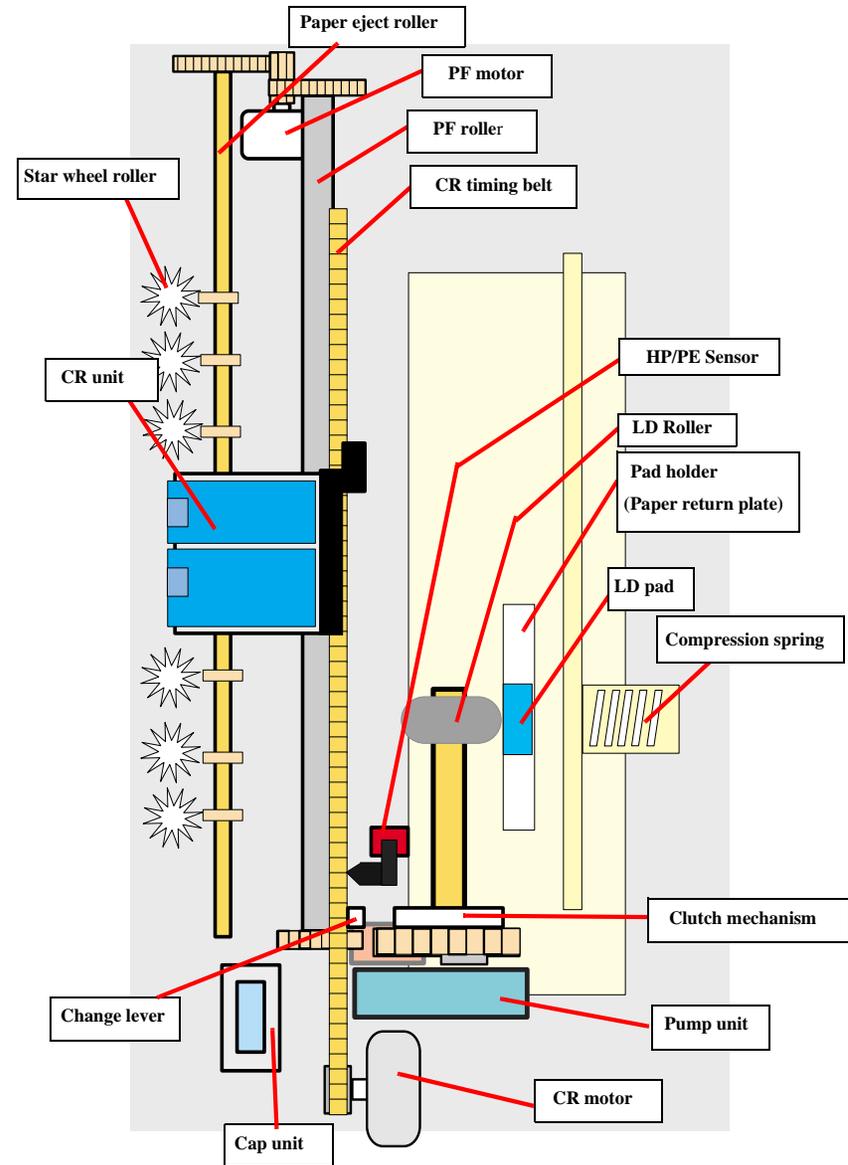


Figure 2-1. Printer mechanism block diagram

### 2.1.2 Printhead

The Printhead uses the same U-CHIPS type as the previous printer (Stylus COLOR 680), and makes it possible to perform multiple shot printing and variable dot printing.

The Printhead nozzle configuration is as follows.

- Nozzle layout
  - Black: 48 nozzles x 3 staggered (nozzle pitch of row: 1/360 inch)
  - Color: 48 nozzles x 1 row/co<sub>l</sub> (nozzle pitch of row: 1/120 inch)

The nozzle layout when viewed from the back surface of the Printhead is shown below.

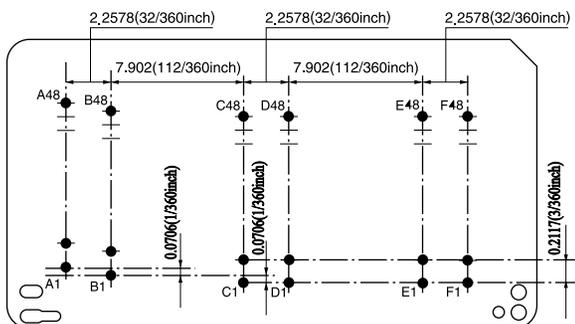


Figure 2-2. Nozzle layout

The Printhead has the electric poles to store the ink consumption amount data into the CSIC chip mounted on the ink cartridge. By storing the ink consumption amount data, this printer can detect the ink consumption status, such as ink low/end condition.

The basic operating principles of the Printhead, which plays a major role in printing, are the same as the previous printer (Stylus COLOR 680); on-demand method which uses PZT (Piezo Electric Element). In order to uniform the ejected ink amount, the Printhead has its own Head ID (11 digits code for this Printhead) which adjusts PZT voltage drive features.

So, you are required to store the Head ID pasted on the Printhead into the EEPROM by using the Adjustment program when replacing the Printhead, the Main board, the Printer mechanism with new one. (Note : there are no resistor arrays to determine the Head ID on the Main board.) And then, based on the stored Head ID into the EEPROM, the Main board generates appropriate PZT drive voltage.

Following explains the basic components for the Printhead.

- PZT
  - PZT is an abbreviation of Piezo Electric Element. Based on the drive waveform generated on the Main board, the PZT selected by the nozzle selector IC on the Printhead pushes the top of the ink cavity, which has ink stored, to eject the ink from each nozzle on the nozzle plate.
- Electric poles for CSIC
  - This electric poles connects the CSIC chip mounted on the ink cartridge. By using this poles, current ink consumption amount data is read out from the CSIC chip. And, the latest ink consumption amount data is written into the CSIC chip.
- Nozzle Plate
  - The plate with nozzle holes on the Printhead surface is called Nozzle Plate.
- Filter
  - When the ink cartridge is installed, if any dirt or dust around the cartridge needle is absorbed into the Printhead, there is a great possibility of causing nozzle clog and disturbance of ink flow, and alignment failure and dot missing finally. To prevent this problem, a filter is set under the cartridge needle.
- Ink Cavity
  - The ink absorbed from the ink cartridge goes through the filter and then is stored temporarily in this tank called “ink cavity” until PZT is driven.

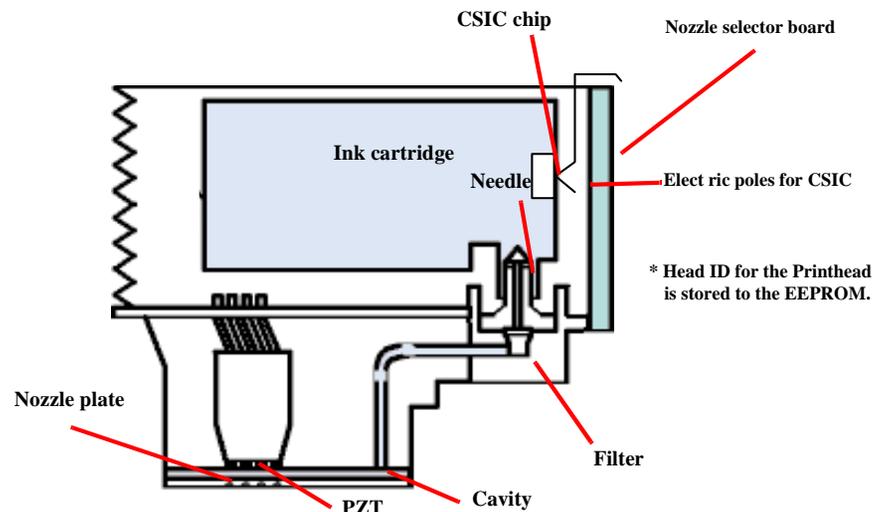


Figure 2-3. Printhead sectional drawing

### 2.1.2.1 Printing Process

This section explains the process which the Printhead of On-Demand inkjet printers eject ink from each nozzle.

1. **Normal state :**

When the printing signal is not output from C418 Main board, or the PZT drive voltage is not applied, the PZT does not change the shape. Therefore, the PZT does not push the ink cavity. The ink pressure inside the ink cavity is kept normal. (Refer to Figure 2-4 : Normal state)

2. **Ejecting state :**

When the print signal is output from the C418 Main board, the nozzle selector IC located on the Printhead latches the data once by 1-byte unit. Based on the drive waveform (common voltage) generated on the Main board, the PZT selected by the nozzle selector IC pushes the top of the ink cavity. By this operation, the ink stored in the ink cavity is ejected from nozzles. (Refer to Figure 2-4 : Ejecting state)

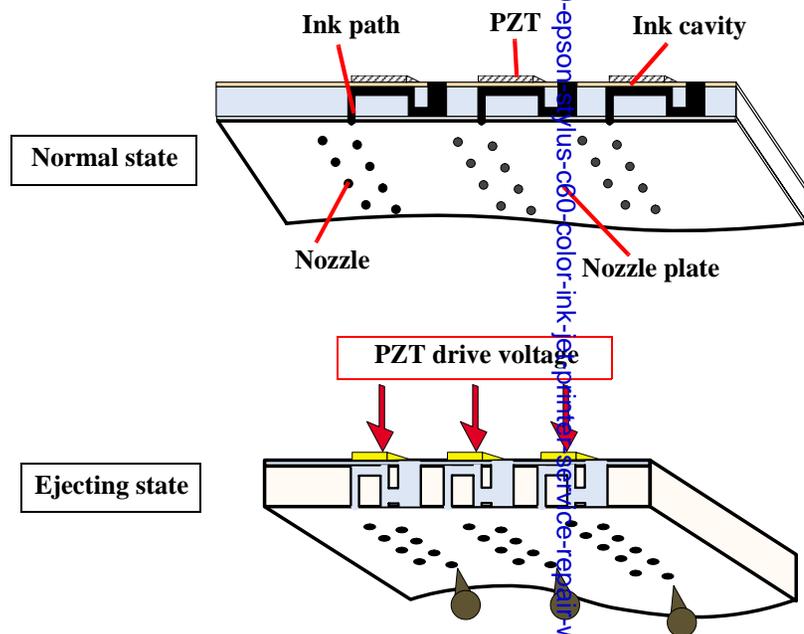


Figure 2-4. Printhead printing process

### 2.1.2.2 Printing Method

For printing dot system, the Stylus C60 has the following two kinds of printing mode.

- Multiple shot printing
- Variable dot printing

The above two printing modes are automatically selected depending on the media and the resolution setting of the printer driver. The following explains each printing mode.

- Multiple shot printing  
This printing mode is developed to improve the print quality on plain paper or transparencies in low resolution. The multiple shot printing mode uses normal dot and the number of dot shot varies from 1 shot to maximum 3 shots depending on the print data to enable to output sharp image even in a low resolution.
- Variable dot printing  
This printing mode is developed to improve the print quality on exclusive paper. This mode is basically the same as variable dot printing mode used on other products; micro dot, middle dot and large dot compose this mode. The printing dot size varies according to the print data and this mode enables to output even sharp image on exclusive paper.

Product: 2000 EPSON Stylus C60 Color Ink Jet Printer Service Repair Workshop Manual  
 Full Download: <https://www.arenamainual.com/downloads/2000-epson-stylus-c60-color-ink-jet-printer-service-repair-workshop-manual/>