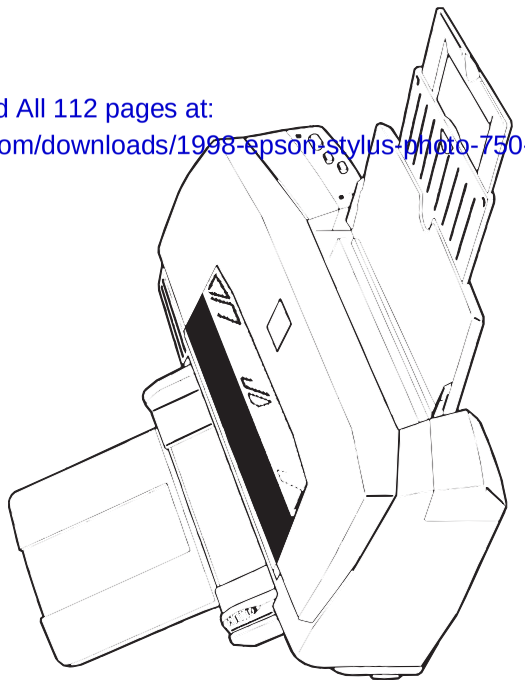
SEIJ98005

SERVICE MANUAL

Color Inkjet Printer

EPSON Stylus Photo 750



COLOR IMAGING 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.

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 EPSON Stylus Photo 750. 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.

Contents

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

CHAPTER 4. DISASSEMBLY AND ASSEMBLY
Describes the step-by-step procedures for disassembling and assembling the product.

CHAPTER 5. ADJUSTMENTS
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.

APPENDIX Provides the following additional information for reference:

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

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 WARNING, CAUTION or NOTE 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.

Revision Status

Revision	Issued Date	Description
Rev. A	December 14, 1998	First Release

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Product Description

Operating Principles

Troubleshooting

Disassembly and Assembly

Adjustment

Maintenance

Appendix

CHAPTER

1

PRODUCT DESCRIPTION

1.1 Overview

This printer has better mechanism for the print quality and paper feeding than that of Stylus Photo and Stylus Photo 700. It also uses new print head and improved printing speed and through put.

1.1.1 General Characteristics

Major features of this printer are as follows;

- High quality color printing
  - Bi-directional printing at the resolution of 720 dpi.
  - 1440 (H) x 720 (V) dpi printing
  - Photo-MACH technology (6 color printing. CMYKcm)
  - Super micro dot, Super micro weave printing
- Built-in auto sheet feeder
  - Holds 100 cut-sheet (55g/m^2)
  - Holds 10 envelopes
  - Holds 10 transparency films
  - Holds 65 sheets of special paper
- Built-in 3 I/Fs
  - Bi-directional parallel I/F (IEEE-1284 level 1 device)
  - Mac serial I/F(up to approx.1.8Mbps)
  - USB I/F
- Windows/Macintosh exclusive

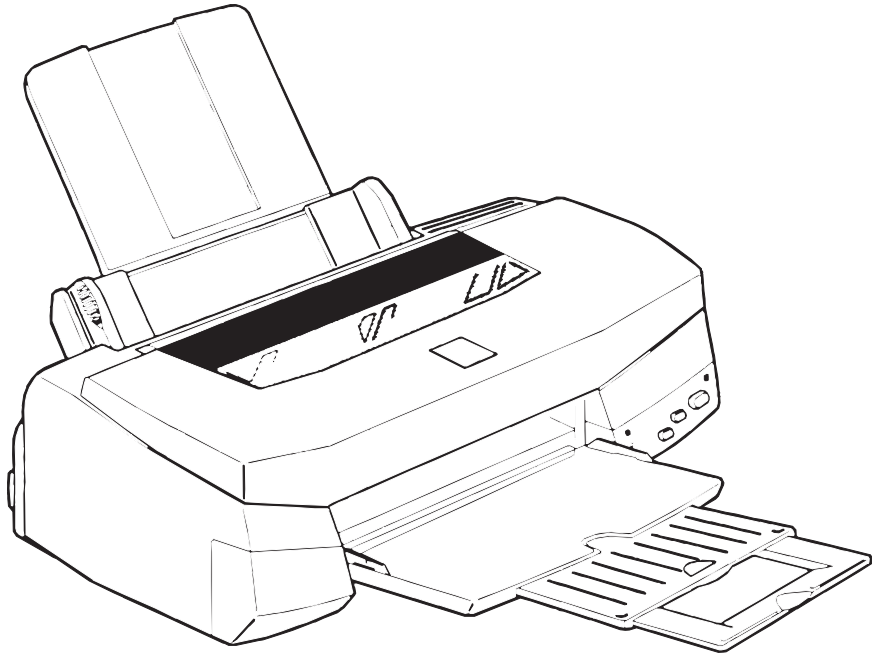


Figure 1-1. Exterior View of Stylus Photo 750

1.2 General Description

1.2.1 Printing

PRINTING METHOD

- ☐ On demand ink jet

NOZZLE CONFIGURATION

- ☐ 48 nozzles x 6 (Black, Cyan, Magenta, Yellow, Light Cyan, Light Magenta)

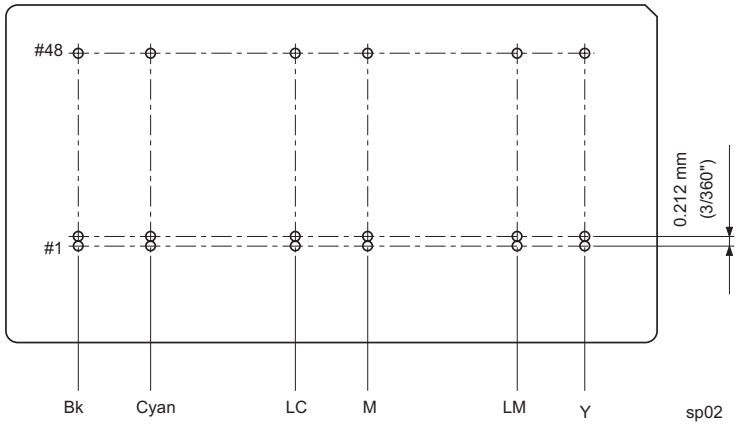


Figure 1-2. Nozzle Configuration

PRINTING DIRECTION

- ☐ Bi-direction with logic seeking

PRINTING SPEED AND PRINTABLE COLUMNS

- ☐ Character mode

Table 1-1. Printing Speed

Character Pitch	Printable columns	LQ speed
10 CPI (Pica)	80	200CPS**

** This value is the speed of one print-pass in which the 1/3 of character matrix is printed.

- ☐ Raster graphics mode

Table 1-2. Raster Graphics Mode

Horizontal resolution	Printable area	Available dot	CR Speed
180 dpi	8.26 inch	1488	20 IPS
360 dpi	8.26 inch	2976	20 IPS
720 dpi	8.26 inch	5952	20 IPS

CONTROL CODE

- ☐ ESC/P Raster
- ☐ EPSON Remote command

CHARACTER TABLES

- ☐ 2 international character sets
  - ■ PC437 (US, Standard Europe)
  - ■ PC850 (Multilingual)

TYPEFACE

- ☐ Bin map LQ font: EPSON Courier, 10 CPI

1.2.2 Paper Feeding

- ☐ Feeding Method: Friction feed with ASF
- ☐ Paper Path: Cut-sheet ASF(Top entry)
- ☐ Feeding Speed: 2.36 inches/sec (normal speed mode/continuous feeding)
  4.5 inches/sec (high-speed mode/continuous feeding)

1.2.3 Paper Specification

This section describes the printable area and types of paper which can be used in this printer.

CAUTION

- ■ **No curled, wrinkled, scuffing or torn paper be used.**
- ■ **Printing should be performed at room temperature for transparency and envelope.**

- ☐ Cut Sheet
  - ■ Size: A4(Width 210mm(8.3”) x Length 297mm(11.7”))
    Letter(Width 216mm(8.5”) x Length 279mm(11.0”))
    Legal(Width 216mm(8.5”) x Length 356 mm(14.0”))
    Statement (Width 139.7mm(5.5”) x Length 215.9mm (8.5”))
    B5(Width 182mm(7.2”) x Length 257 mm(10.1”))
    Executive(Width 184.2 mm(7.25”) x Length 266.7mm (10.5”))
    Photo Paper (Width 101.6mm(4”) x Length 152.4mm(6”))
  - ■ Thickness: 0.08mm(0.003”)-0.11mm(0.004”)
  - ■ Weight: 64g/m^2(17lb.) - 90g/m^2(24lb)
  - ■ Quality: Exclusive paper, Bond paper, PPC
- ☐ Transparency and Glossy Paper
  - ■ Size: A4(Width 210mm(8.3”) x Length 297mm(11.7”)
    Letter(Width 216 mm(8.5”) x Length 279mm(11.0”)
  - ■ Thickness: 0.075mm(0.003”) - 0.085mm(0.0033”)

  Note) Transparency printing is only available at normal temperature.
- ☐ Envelope
  - ■ Size: No.10 Width 241mm(9 1/2”) x Length 104.8mm(4 1/8”)
    DL Width 220mm(8.7”) x Length 110mm(4.3”)
    C6 Width 162mm(6.4”) x Length 114mm(4.5”)
  - ■ Thickness: 0.16mm(0.006”) - 0.52 mm(0.02”)
  - ■ Weight: 45g/m^2(12lb) - 75g/m^2(20lb.)
  - ■ Quality: Bond paper, Plain paper, Air mail

  Note) Envelope printing is only available at normal temperature.
  Keep the longer side of the envelope horizontally at setting.
- ☐ Index Card
  - ■ Size: A6 Index Card: Width 105mm(4.1”) x Length 148mm(5.8”)
    A5 Index Card: Width 148mm(5.8”) x Length 210mm (8.3”)
    5x8” Index Card: Width 127mm(5.0”) x Length 203mm (8.0”)
    10x8” Index Card: Width 127mm(5.0”) x Length 203 mm (8.0”)
  - ■ Thickness: Less than 0.23mm(0.0091”)

1.2.4 Printable Area

☐ Cut Sheet

The figure below shows printable area.

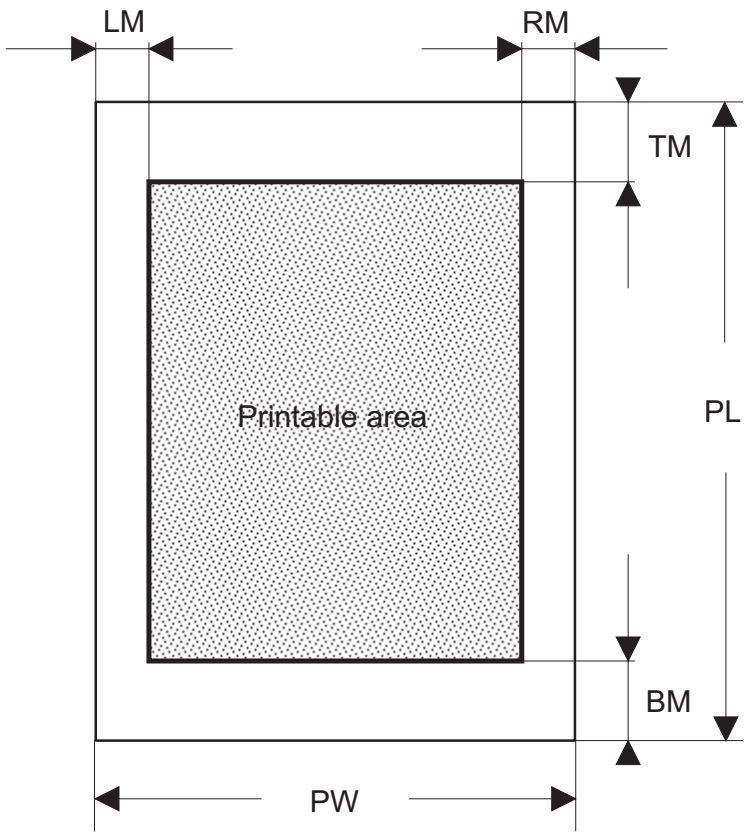


Figure 1-3. Printable Area

Table 1-3. Printable Area

Paper Size	Paper Width (typ)	Paper Length (typ.)	Left Margin (min.)	Right Margin (min.)	Top Margin (min.)	Bottom Margin (min.)
A4	210mm (8.3”)	297mm (11.7”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
Letter	216mm (8.5”)	279mm (11.0”)	3mm (0.12”)	9mm (0.35”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
Legal	216mm (8.5”)	356mm (14.0”)	3mm (0.12”)	9mm (0.35”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
Statement	139.7mm (8.5”)	215.9mm (8.5”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
B5	182mm (7.2”)	275mm (10.1”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
Executive	184.2mm (7.25””)	266.7mm (10.5”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*
Photo Paper	101.6mm (4”)	152.4mm (6”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm(0.54”) /3mm (0.12”)*

Note) Bottom margin can be set up to 3mm at minimum when the paper length is designated with “ESC(S” command.)However, there is the possibility that a printing scrambles in the area ranging from 3mm to 14mm, from the form lower end. When the paper length is not designated, the bottom margin must be wider than 14 mm.

☐ Envelope

Table 1-4. Envelope

Paper Size	LM(Left margin) (min.)	RM(RIght margin) (min.)	TM(Top margin) (min.)	BM(Bottom margin) (min.)
#10	28mm(1.10”)	3mm(0.12”)	3mm(0.12”)	14mm(0.55”)
DL	7mm(0.28”)	3mm(0.12”)	3mm(0.12”)	14mm(0.55”)
C6	3mm(0.12”)	3mm(0.12”)	3mm(0.12”)	14mm(0.55”)

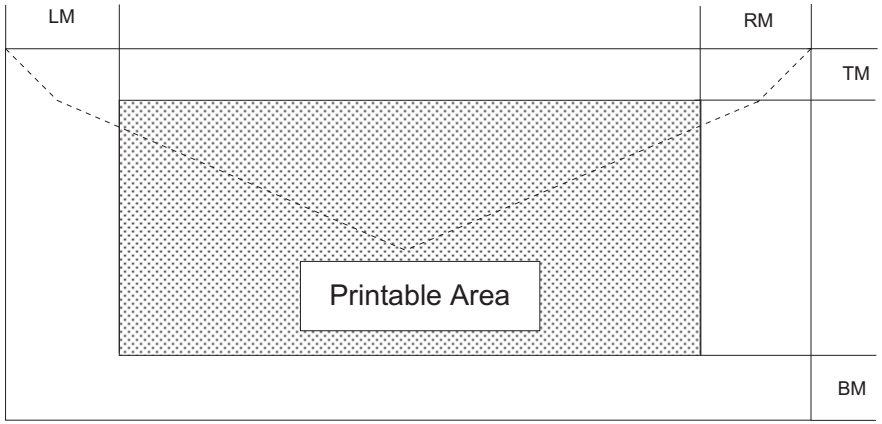


Figure 1-4. Printable Area

1.2.5 Adjust Lever Settings

The adjust lever located under the printer cover(right side) needs to be set for the proper paper setting according to the paper type.

Table 1-5. Setting Position of Adjust Lever

Paper	Lever position	Adjustment Value
Normal paper, Transparency sheet, Label	+	+0.9mm
Envelope	0	0mm

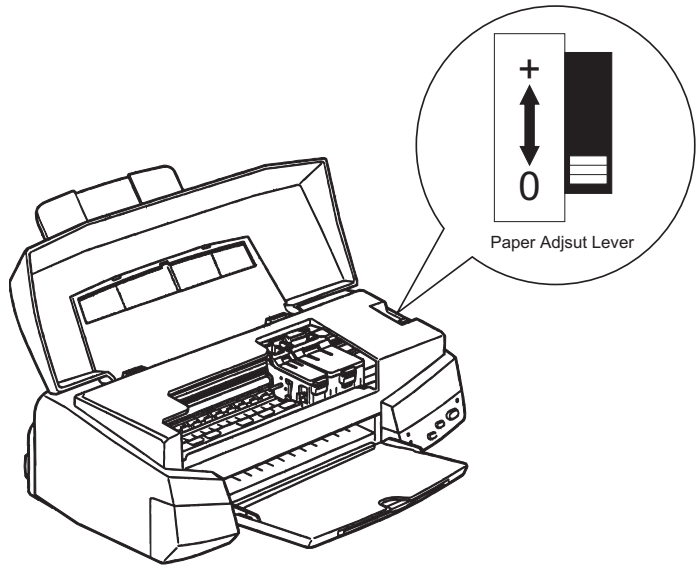


Figure 1-5. Adjust Lever

1.2.6 Environmental Conditions

- Temperature:
  - Operating: 10 to 35◦C(*3)
  - Non-operating: -20 to 60◦C(*1)

NOTE: *1 month at 40◦C and 120 hours at 60◦C*

- Humidity:
  - Operating: 20 to 80% RH(*2,*3)
  - Non-operating: 5 to 85% RH(*1,*2)

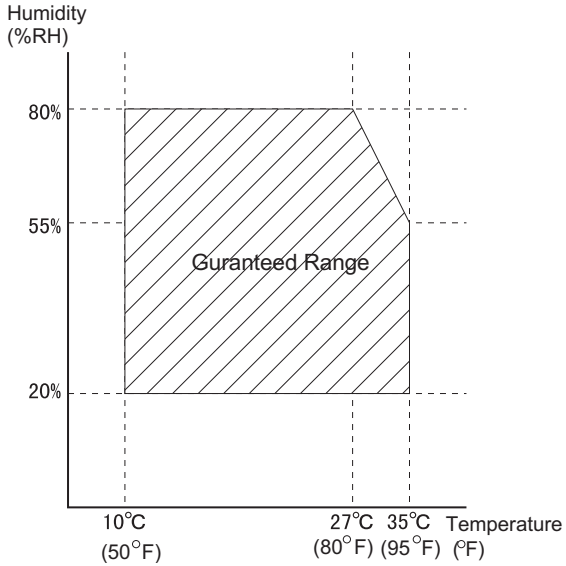


Figure 1-6. Environmental Condition

- Resistance to shock:
  - Operating: 1G, within 1ms
  - Non-operating: 2G, within 2ms(*1)
- Resistance to vibration:
  - Operating: 0.15G
  - Non-operating: 0.50G (*1)

NOTE: **1:with shipment container*
**2:without condensation*
**3:Refer to Figure1-6 for Environmental Condition.*

1.2.7 Ink Cartridge

1.2.7.1 Black Ink Cartridge

- Type: Exclusive cartridge
- Color: Black
- Print capacity: 540 pages/A4 (ISO/IEC1056 1 Letter Pattern at 360 dpi)
- Ink life: 2 years from production date
- Storage temperature: -20◦C to 40◦C(Storage within a month at 40◦C)
  -30◦C to 40◦C(Packing storage, within a month at 40◦C)
  -30◦C to 60◦C(Transit, within 120 hours at 60◦C and within a month at 40◦C)
- Dimension: 19.8mm(W) x 52.7 mm (D)x 38.5mm(H)

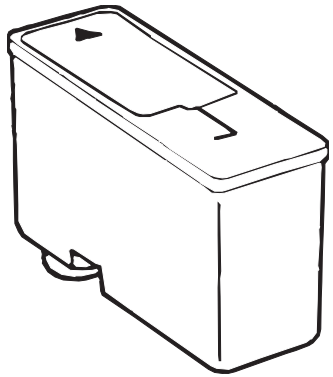


Figure 1-7. Black Ink Cartridge

1.2.7.2 Color Ink Cartridge

- Type: Exclusive cartridge
- Color: Magenta, Cyan, Yellow, Light Magenta, Light Cyan
- Print capacity: 220 pages/A4 (360 dpi, 5% duty each color)
- Ink life: 2 years from production date
- Storage temperature: -20◦C to 40◦C(Storage within a month at 40◦C)
  -30◦C to 40◦C(Packing storage, within a month at 40◦C)
  -30◦C to 60◦C(Transit, within 120 hours at 60◦C and within a month at 40◦C
- Dimension: 51.4mm(W) x 52.7 mm (D)x 38.5mm(H)

NOTE: *Ink cartridge can not be re-filled, only ink cartridge is prepared for article of consumption.Do not use the ink cartridge which was passed away the ink life.*
Ink will be frozen under - 4◦C environment. However, it will be usable again being placed at room temperature for 3 hours.

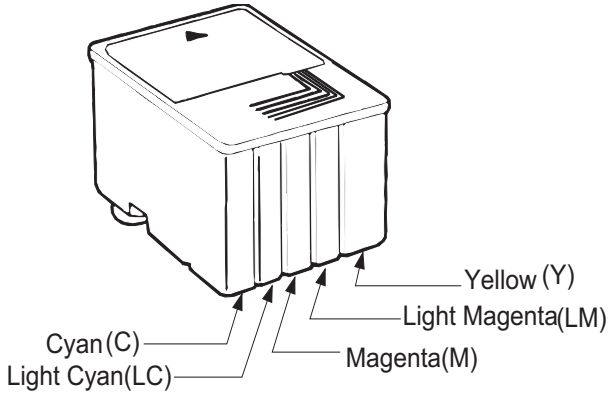


Figure 1-8. Color Ink Cartridge

1.2.8 Input Data Buffer

- Buffer: 256 Kbytes

1.2.9 Electric Specification

- 120V version
  - Rated voltage: AC 120V
  - Input voltage range: AC 99 -132V
  - Rated frequency range:50 - 60Hz
  - Input frequency range:49.5-60.5 Hz
  - Rated current: 0.4A(Max.0.5A)
  - Power consumption: Approx.18W(ISO/IEC 10561 Letter pattern) Energy Star compliant
  - Insulation Resistance:10 M ohms min. (between AC line and chassis, DC 500V)
  - Dielectric: AC 1000 V rms. 1 minute or AC 1200 V rms 1 second(between AC line and chassis)
- 220-240V version
  - Rated voltage: AC220-240V
  - Input voltage range: AC 198 -264V
  - Rated frequency range: 50 - 60Hz
  - Input frequency range:49.5-60.5 Hz
  - Rated current: 0.2A(Max.0.3A)
  - Power consumption: Approx.18W(ISO/IEC 10561 Letter pattern) Energy Star compliat
  - Insulation Resistance:10 M ohms min. (between AC line and chassis, DC 500V)
  - Dielectric: AC 1500 V rms. 1 minute (between AC line and chassis)

1.2.10 Reliability

- Total print volume: 10,000 pages(A4, Letter)
- Print Head Life: 2000 million dots/nozzle

1.2.11 Safety Approvals

- 120V version
  - Safety standard: UL1950 with D3
CSA22.2 No.950 with D3
  - EMI: FCC part 15 subpart B classB
CSA C108.8 class B
- 220-240V version
  - Safety standard: EN60950(VDE, NEMKO)
EN55022(CISPR Pub.22) class B
AS/NZS 3548 class B

1.2.12 Acoustic noise

- Level: Approx. 47 dB(A) (According to ISO 7779)

1.2.13 CE Marking

- 220-240 V 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
    IEC801-4

1.2.14 Printer Language and Emulation

- Printer Language: ESC/P Raster
  EPSON Remote

1.2.14.1 ESC/P Control Codes

< Character mode >

- General operation:
  - Initialize printer: ESC@
- Paper feeding:
  - Form Feed FF
  - Line Feed LF
  - Carriage Return CR

< Graphic Mode >

- General operation:
  - Initialize Printer: ESC @
  - Unidentical Printing: ESC U
  - Print a Image: ESC ACK
  - CSF Mode Control: ESC EM
- Paper Feeding:
  - Form Feed: FF
  - Line Feed: LF
  - Line Spacing: ESC+
  - Carriage Return: CR
- Page format
  - Page Length: ESC (C
  - Top/Bottom Margin: ESC (c
  - Paper Size: ESC (S
- Print position motion
  - Horizontal Print Position: ESC $, ESC\, ESC($, ESC(\
  - Vertical Print Position:ESC(V, ESC(v
- Spacing:
  - Graphics Mode: ESC (G
- Graphics:
  - Raster Graphics: ESC.
  - Microweave control: ESC (i

- Dot size control: ESC (e
- Raster header: ESC (D
- Raster body: ESC i

- Color:
  - Printing Color: ESC r, ESC (r
- EEPROM control:
  - EEPROM control: ESC |

1.3 Parallel Interface

This printer has IEEE-1284 parallel interface, RS-423 serial interface and USB interface as standard.

1.3.1 Parallel Interface(Forward channel)

Forward channel is the mode to transfer the ordinary printing order to the printer side from the PC side.

Table 1-6. Parallel I/F

Item	Specification
Transmission mode	8bit 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 is held high until all these signals return to their inactive state.

BUSY signal is set 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

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

Table 1-7. Connector pin assignment and signals

Pin. No	Signal Name	Return GND pin	In/Out	Function Description
1	-STROBE	19	In	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	Data0-7	20-27	In	The DATA 0 through DATA7 signals represent data bits 0-7, respectively.Eacj signal is at high when data is logical 1 and low level when data is logical 0.
10	-ACKNLG	28	Out	This signal is a negative pulse including that the printer can gain accept data.
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	This falling edge of a negative pulse or a low signal on this line causes the printer to initialize Minimum 50 us pulse is necessary.
32	-ERROR	29	Out	A low signal indicates printer error condition.
36	-SLIN	30	In	Not used.

Pin. No	Signal Name	Return GND pin	In/Out	Function Description
18	Logic H	---	Out	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	---	Out	Pulled up to +5V via 3.3 K 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(Reverse channel)

Reverse channel is used to transfer the information data from the printer side to the PC side.

Table 1-8. Connector pin assignment and signals

Item	Specification
Transmission mode	IEEE-1284 nibble mode
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	TTL compatible level
Adaptable connector	57-30360(amphenol) or equivalent

- Extensibility request: The printer responds affirmatively when the extensibility request values are 00H or 04H, that mean,
  00H: Request Nibble Mode Reverse Channel Transfer.
  04H: Request Device ID;
  Return Data Using Nibble Mode Rev Channel Transfer

- Device ID: The printer sends following device ID string when it is requested.

  - When IEEE1284.4 protocol is effective:
    [00H] [57H]
    MFG:EPSON;
    CMD:ESCPL2,BDC,D4;
    MDL:Stylus[SP]Photo[SP]750;
    CLS:PRINTER;
    DES:EPSON[SP]Stylus[SP]Photo[SP]750;

- When IEEE1284.4 protocol is NOT effective:
  [00H] [57H]
  MFG:EPSON;
  CMD:ESCPL2,BDC;
  MDL:Stylus[SP]Photo[SP]750;
  CLS:PRINTER;
  DES:EPSON[SP]Stylus[SP]Photo[SP]750;

NOTE: *[00H] denotes a hexadecimal value of zero.*
[SP] denotes a space character(20H).
MDL and DES values depend on the EEPROM setting.

Table 1-9. Connect pin assignment and signals

Pin. No	Signal Name	Return GND pin	In/Out	Function Description
1	HostClk	19	In	Host clock signal.
2-9	Data0-7	20-27	In	The DATA 0 through DATA7 signals represent data bits 0-7, respectively.Eacj 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.
10	PtrClk	28	Out	Printer clock signal.
11	PtrBusy/ DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit3 or 7.
12	AckDataReq/ DataBit-2,6	28	Out	Acknowledge data request signal and reverse channel transfer data bit2 or 6.
13	Xflag/ DataBit-0,4	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.
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 3.3 K ohm resistor.
17	Chassis GND	--	--	Chassis GND.
16,33 19-30	GND	---	---	Signal GND.
15,34	NC	---	---	Not connected.

NOTE: *Following lists "Notes" when using the parallel interface.*

1. "Return GND pin" in the table means twist pair return and is connected to the signal GND level.
Also, these cables are shielded wires and it is effective means to connect to each chassis GND in the PC and printer for electrostatic noise.

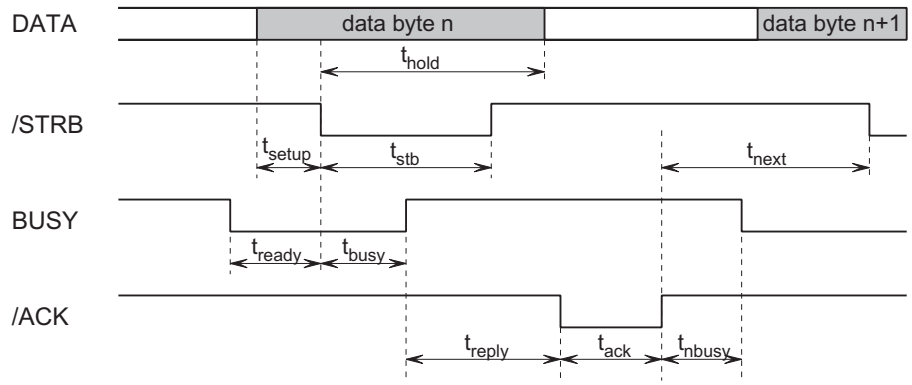
2.Conditions for interface are based on TTL level. Rise and fall time should be within 0.2μs.

3.Refer to figure1-9 for transmission of timing of each signals.

4.Do not perform data transmission ignoring -ACK or BUSY signals. (Perform the data transmission after confirming that -ACK and BUSY signals are Low)

5.It is possible to perform the printing test including interface circuit without using equipment from outside when 8-bit data signal(20-27 pin) is set to appropriate word code and connect then forcefully to -ACK and -STRB. However, to perform this, it is necessary to set "Parallel I/F mode" of EEPROM as normal. Also, set the IEEE-1284.4 packet mode Off.

The figure below shows the timing chart of the parallel interface.



tt-out Max. 120 ns : Rise and fall time of every output signals
tt-in Max. 200 ns : Rise and fall time of everu input signals

Figure 1-9. Timing Chart

Typical time of tack is shown below.

Table 1-10. Typical Time of Tack

Parallel I/F Mode	Typical time of tack
High speed	0.5 μS
Normal speed	2 μS

1.3.3 Serial Interface

This section shows specification for serial interface I/F.

Table 1-11. Serial interface

Item	Specification
Standard	Based on RS-423
Synchronization	Synchronous
Bit rate	Approx. 1.8Mbps
Word format	• Start bit 1bit • Data bit 8bit • Parity bit none • stop bit 1bit
Handshaking	X-ON/X-OFF, DTR protocol
Adaptable connector	8-pin mini circular connector
Recommended interface cable	Apple System Peripheral-8 cable

Table 1-12. Connector pin assignment and signals

Pin No.	Signal Name	In/Out	Function Description
1	SCLK	Out	Synchronous clock
2	CTS	In	Clear to send
3	TxD-	Out	Transmitt data-
4	S.G.	In	Signal ground
5	RxD-	In	Receive data-
6	TxD+	Out	Balanced Transmit+
7	DTR	Out	Data terminal ready
8	RxD+	In	Balanced Receive+

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

Following figure shows port arrangement of serial I/F connector.

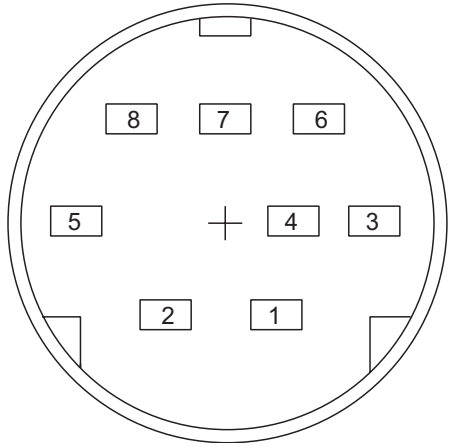


Figure 1-10. Serial I/F Connector Port

Following table shows timing relation of DTR, X-ON/X-OFF handshaking.

Table 1-13. X-ON/X-OFF, DTR protocol

State	Buffer space	X-on/X-off	DTR
Busy	Less than 3072 bytes	Send X-OFF code	Off
Ready	More than 5120 bytes	Send X-ON code	On

1.3.4 USB(Universal Serial Bus) Interface

Following shows specification.

- Standard: Based on
  - Universal Serial Bus Specifications Revision 1.0
  - Universal Serial Bus Device Class Definition for Printing Devices version 1.0
- Bit rate: 12Mbyte(Full Speed Device)
- Data encording: NRZI
- Adaptable connector: USB Series B
- Recommended cable length: 2 meters

Table 1-14. Connector pin assignment and signals

Pin. No	Signal Name	I/Out	Function Description
1	VCC	--	Cable power. Maximum power consumption is 100mA.
2	-Data	Bi-directional	Data
3	+Data	Bi-directional	Data. Pull up to +3.3V via 1.5K ohm resistor.
4	Ground	--	Cable ground.

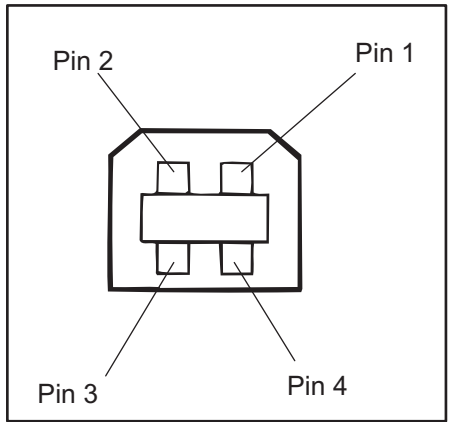


Figure 1-11. USB Interface Port

1.3.5 Prevention of data transfer time-out on the host

Generally, hosts abandon data transfer to peripherals when a peripheral is in busy state for dozens of seconds continuously. To prevent hosts from acting this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This slowdown starts when the remaining input buffer is less than several hundreds of bytes. Finally, the printer is in busy state continuously when the input buffer is full.

1.3.6 Interface selection

The printer has 3 built-in interfaces; Parallel I/F, Mac serial I/F and USB I/F. 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 that receives data first is selected. When the host stops data transfer and the printer is in the stand-by state for the seconds, the printer is returned to the idle state. As long as the host sends data or the printer interface is busy state, the selected interface is let as it is.
- Interface state and interface selection
  When the parallel interface is not selected, the interface got into the busy state. When the serial interface is not selected, the interface sets the DTR signal MARK. When the printer is initialized or returned to the idle state, the parallel interface got into the ready state, the serial interface sets the DTR signal SPACE. Caution that the interrupt signal such as the -INIT signal on the parallel interface is not effective while that interface is not selected.

1.3.7 IEEE 1284.4 protocol

The packet protocol described by IEEE1284. 4 is supported on the parallel I/F and USB I/F. Three function modes of IEEE1284.4 protocol, “On”, “Off” and “Auto” are available for each I/F, and one of them is selected according to the value in EEPROM address 0Ah and 0Ch.

On: Communication in IEEE1284.4 packet mode is started by receiving a magic string(1284.4 synchronous commands). Until a magic string is received, other commdands are discarded.
Off: Communication is carried out in the conventional mode. A magnetic string(1284.4 synchronous commands) is discarded.
Auto: Communication is carried out in the conventional mode until a magic string(1284.4 synchronous commands) is received. By receiving a magic string, communication in IEEE1284.4 packet mode is started.

NOTE: *The packet protocol of IEEE1284.4 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 does provide 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 operate over IEEE1284.*

1.4 Function

1.4.1 Control Code

This printer is operated with the raster graphics control code based on the ESC/P2 control line. Refer to “ESC/PV2 Reference Manual” and “ESC/P2 specification” for each command and ESC sequence.

1.4.2 Bi-directional Command

- Remote Setting Command
  Refer to “Remote Command Specification” for details.

1.4.3 Control Panel

There are 2 non-lock type push switches, 1 lock type push switch and 4 LEDs. The figure below shows the exterior view of the control panel.

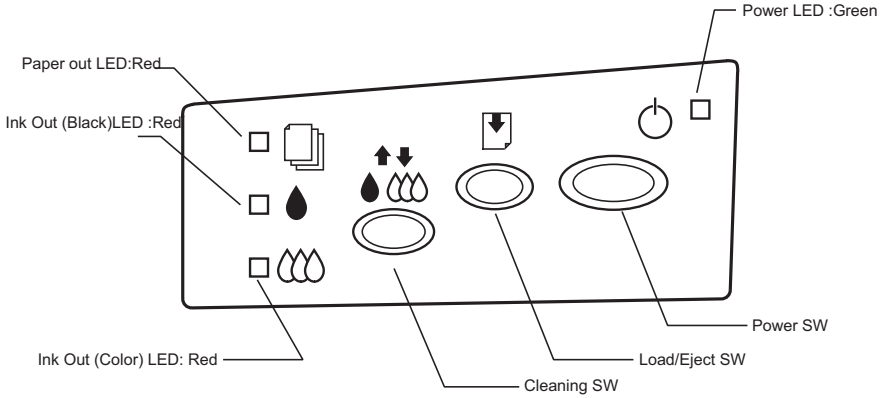


Figure 1-12. Control Panel

1.4.3.1 Switches

Since this printer does not have so many switches, each button has several functions. The tables below show their functions and how to enter those functions for each switch.

Table 1-15. Panel functions in normal state

Switch	Function
Load/Eject (Less than 2 seconds)	• Load or eject paper • When the carriage is on the position for exchanging ink cartridge, return it to the home position.
Load/Eject (for 2 seconds)	• Start the ink cartridge exchange sequence; i.e. move the carriage to carriage exchange position.
Cleaning (for 2 seconds)	• Start cleaning the print head. • In the condition of “Ink Low” or “No Ink Cartridge”, start the ink cartridge exchange sequence.
Cleaning (Less than 2 seconds)	• When the carriage is on the position for exchanging ink cartridge, return it to the home position.

Table 1-16. Panel function with turning on

Switch to press when turning on	Function
Load/Eject	• Start status-printing.*1
Cleaning	• Change code pages/Select IEEE1284.4 mode for parallel I/F*2.
Load/Eject + Cleaning	• Start special setting mode.*3

NOTE: **1: Refer to Table 1-17, “Status printing,” on page 22.*
**2:Not described in the User’s manual. (not open to the users)*
**3:See the Table in the section “Special Setting Mode”.*

*1(from the previous page): According to the content of 35H of EEPROM, one of the following actions is carried out.

Table 1-17. Status printing

Content of 35H of EEPROM, [bit7] [bit6]	Action
00	• Print firmware version, ink counter, selected code page and nozzle check pattern
11	
01	• Start hex-dump printing.
10	• Start self test printing.

1.4.4 Special Setting Mode

CAUTION

- **Unlike the previous models, since this printer does not have EEPROM All Clear function, do not perform this operation except for the purpose of canceling the maintenance errors.**
- **Be sure to replace the waste ink pad located in the lower case, when canceling the maintenance error.**
- **If you replace the waste ink pad regardless of the maintenance error, be sure to perform this operation.**

After turning the power on while pressing Load/Eject and “Cleaning” switches, “Paper Out” indicator blinks for 3 seconds. By pressing the following switches during this period, following action is carried out.

Table 1-18. Special setting mode

Switch	Function
Load/Eject	• Initialize EEPROM* and reset time IC.
Cleaning (for 10 seconds)	• Reset the ink overflow counter in EEPROM.

NOTE: **Waste ink counter value and Timer IC counter value are initialized.*

1.4.5 LED Indications

There are 4 LEDs in this printer.

1. Power
   Lights when the operate switch is “ON”, and AC power is supplied.

2. Paper Out
   Lights during the paper-out condition, and blinks during the paper-jam condition.

3. Ink Out(Black)
   Lights during no Black ink condition, and blinks during the Black ink low condition.

4. Ink Out (Color)
   Lights during no Color ink condition, and blinks during the Color ink low condition.

See the table on the next page for more detailed LED indications. Since LED indicates the various errors and current printer operations, LED indications enable to find out the proper repair operation.

Table 1-19. Printer Status displayed on the control panel

Printer Status	Indicators				Priority
	Power	Ink Out (Black)	Ink Out (Color)	Paper Out	
Power on condition	On	--	--	--	9
Ink sequence	Blink	--	--	--	6
Ink cartridge exchange mode	Blink	--	--	--	5
Data processing	Blink	--	--	--	8
Paper out*1	--	--	--	On	4
Paper jam*1	--	Off	Off	Blink	3
No ink cartridge or Ink out (black)	--	On	--	--	7
Ink level low (black)	--	Blink	--	--	7
No ink cartridge or Ink out (color)	--	--	On	--	7
Ink level low (color)	--	--	Blink	--	7
EEPROM and Timer IC reset*2	--	On (for 1 second)	On (for 1 second)	On (for 1 second)	--
Maintenance Request	Blink	Blink	Blink	Blink	2
Fatal Error*1	Blink	On	On	Blink	1

NOTE: **1 Refer to "Fatal Error" under the "Errors" on page -23.*
**2 EEPROM reset does not mean to erase all address in EEPROM. (See "Special Setting Mode" on page -22)*
**3 -- in the table above means no change.*

1.4.6 Errors

In this printer, when the following conditions are detected. the printer goes to the error condition, sets ERROR signal Low and BUSY signal High and stops receiving the data. The printer becomes unable to print at this time. However, if the printer communicated by IEEE1284.4 protocol, the printer does not become unprintable state.

- Ink Out
  When the printer runs out most of the ink of any one color, it indicates ink-low warning and keeps printing. When the print runs out the whole ink of any one color, it indicates ink-error and stops printing. Exchanging ink cartridges is required on this state. An ink cartridge taken out once should not be used again. Re-installation of the cartridge upsets the ink level detection and may cause a serious problem to the print head as a result.

Never use or re-install the cartridge, which is taken out once. Re-installation of the used cartridge disturbs the normal ink out detection.

- Paper out
  When the printer fails to load a sheet, it becomes "paper out error" condition.
- Paper Jam
  When the printer fails to eject a sheet, it becomes "paper jam error" condition.

☐ No Ink Cartridge
When the printer detects that ink-cartridge comes off, it becomes “No ink cartridge error” condition.

CAUTION

- **When you need to perform test print after the repair service, performing the status-printing(see “Control Panel” on page -21) provides the discharged ink condition from the all ink nozzles and the current value of the waste ink counter. Be sure to check that the counter value still has enough capacity.(if the value is closer to 2700 or not)**
- **If there is no enough capacity, exchange the waste ink absorber and find out if it is necessary to reset EEPROM or not. If you need to reset EEPROM, refer to “Special Setting Mode” on page -22.**

☐ Maintenance request
When the total quantity of ink wasted with cleaning and flushing reaches the limit, the printer indicates this error and stops printing. The absorber in the printer enclosure should be replaced with a new one by a service person. The counter is added by points and its limit is as follows.

- 37000 point = Approx. 418ml

☐ Fatal Errors
When the printer detects a problem with controlling the mechanical components or assessing the CG, it becomes “fatal error” condition.

- Control Error
  Defective parallel adjustment, defective HP detection, scarcity of lubrication on the carriage shaft etc.
- Logic operation error
  Shorted circuit, etc.

1.4.7 Initialization

There are 3 types of initialization.

☐ Power-on Initialization
This printer initializes itself when it is turned on, or when it recognizes the cold-reset command (remote RS command). On this initialization, following actions are performed.

- Initialize mechanical components
- Clear the input buffer
- Clear the print buffer
- Set default values

☐ Operator initialization
This printer initializes itself when it is turned off and is turned on again within 10 seconds, or when it recognizes the -INIT signal(negative pulse) on parallel interface. On this initialization, following actions are performed.

- Cap the print head
- Eject paper
- Clear the input buffer
- Clear the print buffer
- Set default values

☐ Software initialization
“ESC@” command also initializes the printer. On this initialization, following actions are performed.

- Clear the print buffer
- Set default values

1.4.8 Initialization Setting

This printer initializes following settings as initialization setting when the initialization is performed. Also, among the items of panel setting, default setting and remote command settings, the items which can be stored are also initialized as initialization setting.

- Page position: Page heading location as present paper location
- Line spacing: 1/6 inch
- Right margin position: 80 lines
- Left margin position: first line
- Character pitch: 10 CPI
- Printing mode:Text mode (Not raster graphics mode)

1.4.9 Physical Specification

- Weight: 5.2Kg
- Dimensions: 429 mm(W) x 260.9 mm(D) x 167.1 mm (H) (without sheet support)

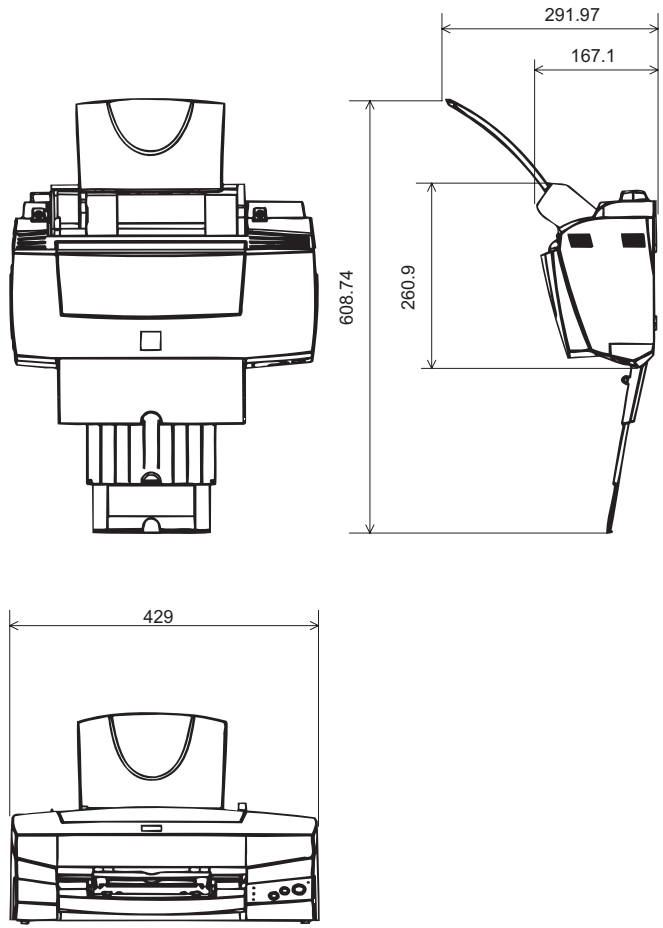


Figure 1-13. Dimension of Stylus Photo 750