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SERVICE MANUAL

Color ink jet printer

EPSON Stylus Color 440/640/740

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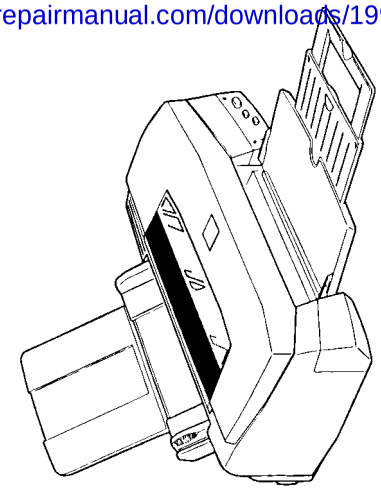

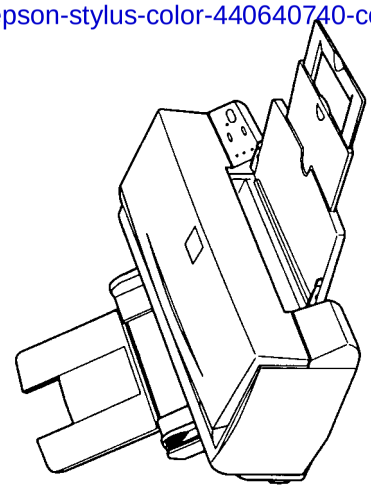

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PRECAUTIONS

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. NOWORK SHOULD BE PERFORMED ON THE UNIT BY PERSONS UNFAMILIER 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

PREFACE

This manual describes basic functions, theory of electrical and mechanical operations, maintenance and repair procedures of Stylus Color 440/640/740. 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. The chapters are organized as follows:

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 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***

REVISION STATUS

Rev.	Date	Page(s)	Contents
A	1998/07/15	All	First Release
B	1998/09/30	Page 188 Pages 195 to 212	The exploded diagrams and part list for the Stylus Color 740 has been added.

Product Description

Features 9
Specifications 11
- Printing Specification 11
- Paper Specification 15
- Printing Area 17
- Ink Cartridge Specifications 20
- Environmental Condition 22
- Electric Specification 23
- Reliability 23
- Safety Approvals 23
- Acoustic Noise 24
- CE Marking 24
- Input Data Buffer 24

Interface 25
- Parallel Interface (Forward Channel) 25
- Parallel Interface (Reverse Channel) 27
- Serial Interface (for Stylus Color 640, 740) 31

Control Panel 32
- Indicators (LEDs) 32
- Panel Functions 33
- Printer Condition and Panel Status 34

Error Status 35
- Ink Out 35
- Paper Out 35
- Paper Jam 35
- No Ink-Cartridge 36
- Maintenance Request 36
- Fatal Errors 36

Printer Initialization 37

Initialization Settings 37

Main Components 38
- Printer Mechanism 38
- C206 Main-B Board (Stylus Color 440) 39
- C256 Main Board (Stylus Color 640) 39
- C257 Main Board (Stylus Color 740) 40
- Power Supply Board
- C206 PSB/PSE (Stylus Color 440, 640)
- C257 PSB/PSE (Stylus Color 740) 40
- C206 PNL Board (Stylus Color 440, 640) 41
- C209 PNL Board (Stylus Color 740) 41

Operating Principles

Overview 43
- Printer Mechanism 44

Electrical Circuit Operating Principles 56
- C206 PSB/PSE and C257 PSB/PSE Power Supply Board (for Stylus Color 440, 640, 740) 57
- C206 Main-B, C255 Main (for Stylus Color 440) 60
- C256 Main (for Stylus Color 640) 62
- C257 Main, (for Stylus Color 740) 64

Troubleshooting

Troubleshooting 82

Unit Level Troubleshooting 85
- Printer does not operate at power on. 85
- Error is detected 86
- Failure occurs during printing 86
- Printer does not feed paper correctly. 87
- Control panel operation is abnormal 87

Unit Repair of Power Supply Board 88

Unit Repair of the Main Board 91

Repair of the Printer Mechanism 96

Disassembly and Assembly

Overview 100
- Precautions for Disassembling the Printer 100
- Tools 101
- Specification for Screws 102
- Service Checks After Repair 103

Disassembly Procedures 104
Removing the Housing 105
Removing the Board Assembly 106
Removing the Operation Panel 108
Disassembling the Printer Mechanism 109

Adjustment

Overview 130
Required Adjustments 130
Adjustment Tools Required 131
Adjustment 132
Parallelism Adjustment 132
Adjustment by Adjustment Program 134

Maintenance

Overview 154
Cleaning 154
Service Maintenance 154
Lubrication 155

Appendix

Connector Summary 161
Connector Summary (Stylus Color 440/640) 162
Connector Summary for Stylus Color 740 166
EEPROM Address Map 169
EEPROM ADDRESS Map (Stylus Color 440/640) 169
EEPROM Address Map (Stylus Color 740) 174
Circuit Board Component Layouts 178
Exploded Diagrams 188
Part List 198
Part List for Stylus Color 440/640 198
Part List for Stylus Color 740 200
Circuit Diagrams 202

CHAPTER

1

PRODUCT DESCRIPTION

1.1 FEATURES

EPSON Stylus Color 440/640/740 are designed for PC users at home and low price for hat high performance. Also, Stylus Color 440 printer has the same high color print quality (720 X 720dpi) as Stylus ProXL, and Stylus Color 640,740 have the same high color print quality (1440 X 720) as Stylus Color 600 and Stylus Pro 5000. The major printer features are;

- High color print quality
  - 720 (H) x 720 (V) dpi printing (for Stylus Color 440)
  - 1440 (H) X 720 (V) dpi printing (for Stylus Color 640,740)
  - 4 color printing (YMCBk)
  - Traditional and New Microwave
  - Black 64 nozzles, CMY 21 nozzles (for Stylus Color 440)
  - Black 64 nozzles, CMY 32/color nozzles (for Stylus Color 640)
  - Black 144 nozzles, CMY 48/color nozzles (for Stylus Color 740)
- Built-in auto sheet feeder
  - Holds 100 cut-sheets (55g/m^2)
  - Holds 10 envelopes
  - Holds 10 transparency films
  - Holds 65 special papers
- High-speed print
  - 200 cps (for Stylus Color 440, 740)
  - Normal 200 cps, Draft 400 cps (only for Stylus Color 640)
  - By using head drive frequency 14.4KHz, printing speed is twice faster
    than Stylus Color.
- Compact size
  - 429mm (W) x 231mm (D) x 155mm (H) (for Stylus Color 440)
  - 429mm (W) x 231mm (D) x 157mm (H) (for Stylus Color 640)
  - 429mm (W) x 261mm (D) x 157mm (H) (for Stylus Color 740)
  - Weight : 5.2Kg (for 3 models)
- Acoustic noise
  - Approximately 45 dB (for Stylus Color 440)
  - Approximately 47 dB (for Stylus Color 640, 740)
- Interface
  - Bi-directional parallel I/F IEEE-1284 level 1 device (for 3 models)
  - Serial I/F up to 1800 bps (only for Stylus Color 640)
  - USB
- One unit combined black and CMY head
- Windows exclusive (for Stylus Color 440, 640)
- Standard, NLSP, 5 Scaleable fonts (only for Stylus Color 740)

See Table 1-1 in the following page for the consumable list.

Table 1-1. Consumables Available for Stylus Color 440/640/740

Items	Codes	Remarks
Black Ink Cartridge	S020189	Stylus Color 740
Black Ink Cartridge	S020187	Stylus Color 440,640
CMY Ink Cartridge	S020191	Stylus Color 440,640,740
CMY Ink Cartridge		
EPSON 360 dpi Ink Jet Paper	S041025	Size: A4 (200 sheets)
EPSON 360 dpi Ink Jet Paper	S041059	Size: A4 (100 sheets)
EPSON 360 dpi Ink Jet Paper	S041060	Size: Letter (100 sheets)
Photo Quality Ink Jet Paper	S041026	Size: A4 (200 sheets)
Photo Quality Ink Jet Paper	S041061	Size: A4 (100 sheets)
Photo Quality Ink Jet Paper	S041062	Size: Letter
Photo Quality Ink Jet Paper	S041067	Size: Legal
Photo Quality Glossy Paper (New Release)	S041126	Size: A4
Photo Quality Glossy Paper (New Release)	S041124	Size: Letter
Photo Quality Glossy Film	S041071	Size: A4
Photo Quality Glossy Film	S041124	Size: Letter
Photo Quality Glossy Film	S041107	Size: A6
Ink Jet Transparencies	S041063	Size: A4
Ink Jet Transparencies	S041064	Size: Letter
Photo Quality Ink Jet Card	S041054	Size: A6
Photo Quality Ink Jet Card	S041121	Size: 5 x 8 inches
Photo Quality Ink Jet Card	S041122	Size: 10 x 8 inches
Photo Quality Self Adhesive Sheet	S041106	Size: A4

1.2 Specifications

This section describes each specification for Stylus Color 440, 640, and 740.

1.2.1 Printing Specification

- Print method
  - On demand ink jet (MACH type. One unit combined with black and CMY head)
- Nozzle configuration
  - Black 64 nozzles, CMY 21 nozzles (for Stylus Color 440)
  - Black 64 nozzles, CMY 32/color nozzles (for Stylus Color 640)
  - Black 144 nozzles, CMY 48/color nozzles (for Stylus Color 740)
- Print direction
  - Bi-direction with logic seeking
- Print speed and Printable columns, character pitch and print quality Refer to Table 1-2 and Table 1-3.

Table 1-2. Character Mode Speed

Model Name	Character Pitch	Printable Column	LQ Speed	Draft Speed
Stylus Color 440	10	80	200 CPS	---
Stylus Color 640	10	80	200 CPS	400 CPS
Stylus Color 740	10	80	200 CPS	---

Table 1-3. Graphic Mode Speed

Horizontal Resolution	Printable Area	Available dot	CR Speed
180 dpi	8.26	1488	20 IPS
360 dpi	8.26	2976	20 IPS
720 dpi	8.26	5952	20 IPS

- Nozzle Configuration:
  - Refer to Figure 1-1 for Stylus Color 440.
  - Refer to Figure 1-2 for Stylus Color 640.
  - Refer to Figure 1-3 for Stylus Color 740.

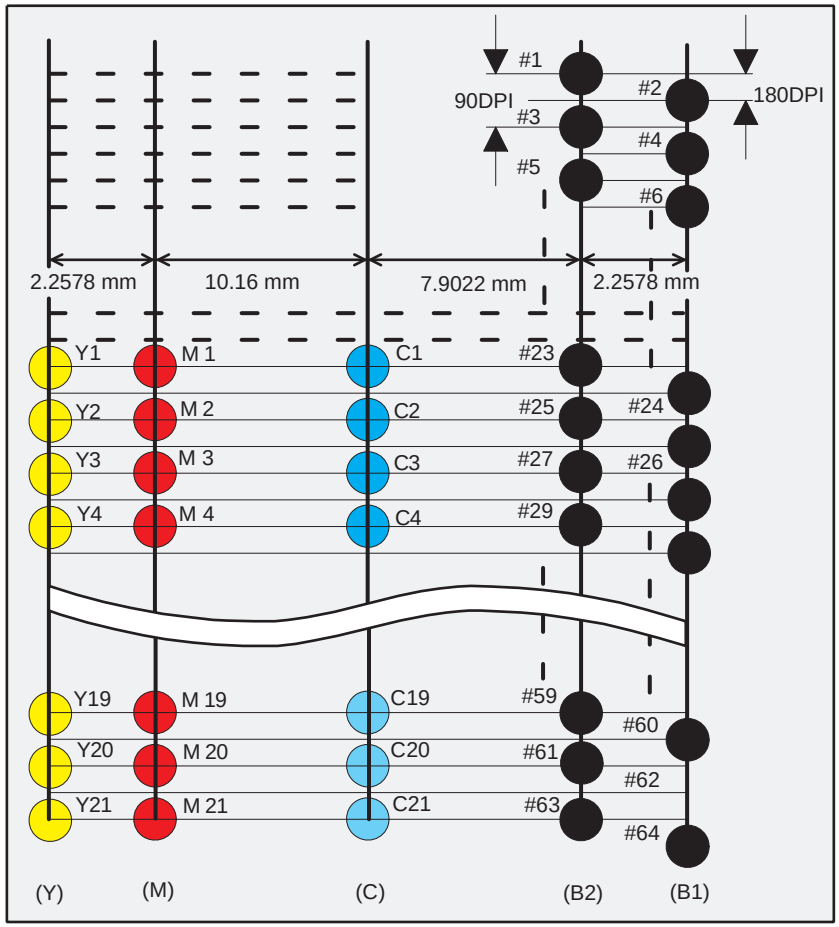

Figure 1-1. Nozzle Configuration for Stylus Color 440

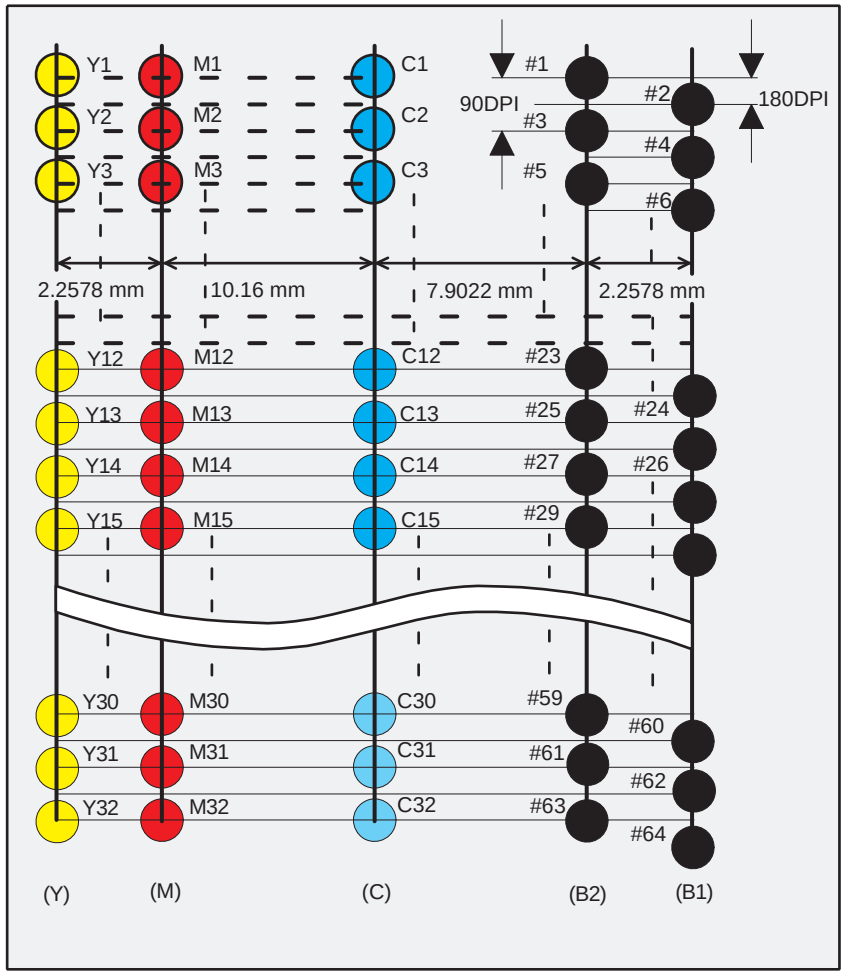

Figure 1-2. Nozzle Configuration for Stylus Color 640

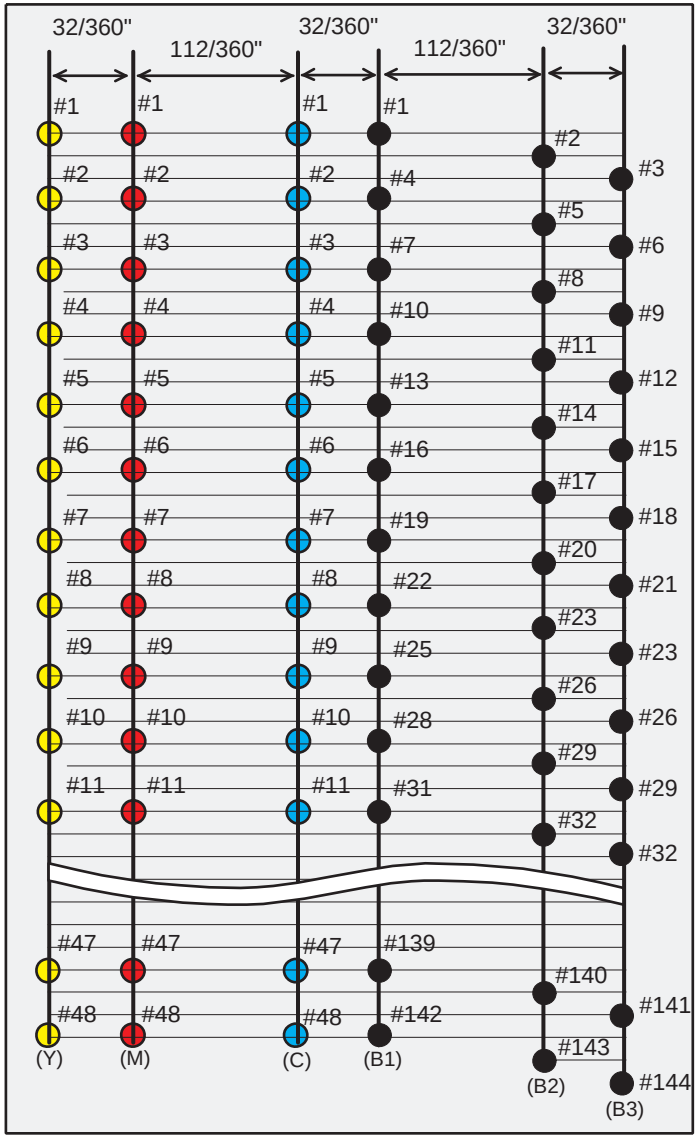

Figure 1-3. Nozzle Configuration for Stylus Color 740

- Feeding method
  - Friction feed with ASF
- Line spacing
  - 1/6 inches or programmable at 1/360 inches (only for Stylus Color 440)
  - 1/6, 1/8 inches or programmable at 1/360 inches (for Stylus Color 640,740)
- Paper path
  - Cut-sheet ASF (Top entry)
- Feeding speed

  <Stylus Color 440, 640>
  - 190 ms (1/3 inch)
  - 2.0 inches/seconds (continuous)

  <Stylus Color 740>
  - 110 ms (10.16 mm)
  - 114.3 mm/second (Continuous)
- Ink supply
  - Exclusive ink cartridge (Black and CMY)

- Paper holding capacity of Hopper
  - Size: Index card ~Legal
  - Thickness: Less than 8mm
  - Paper capacity: 100 Cut sheets
    10 Envelopes
    65 Coated papers (360 dpi)
    65 Coated papers (720 dpi)
    20 Glossy papers, Photo Paper
    10 Transparent sheets
    30 Index cards
    1 Panoramic Photo Paper, Iron-On Cool Peel Transfer Paper, and Photo Sticks,
    Glossy Film, Self Adhesive
- Character tables: 2 international character sets (Not Opened)

  <Stylus Color 440, 640>
  - PC437 (US, Standard Europe)
  - PC850 (Multilingual)
- Typeface
  - Bit map LQ font: EPSON Courier 10CPI

  <Stylus Color 740>
  - Standard version:11 character tables
    Italic table, PC437 (US Standard, Europe), PC 850 (Multilingual), PC860 (Portuguese), PC861 (Icelandic), PC863 (Canadian-French), PC865 (Nordic), Abicomp, BRASCII, Roman 8, ISO Latin 1
  - NLSP Version: 30 character tables
    Italic table, PC437, PC437 Greek, PC 850, PC852, PC853, PC855, PC857, PC860, PC861, PC865, PC866, ISO8859-7, ISO Latin 1T, Bulgaria,ic),PC774,Estonia,ISO8859-2,PC866-LAT,PC866UKR, PC AR864, PC APTEC, PC708, PC720, Hebrew7[*1] Hebrew8[*1], PC862[*1]

NOTE: **1 is not opened. These character tables can not be selected in the default setting mode.*

- Typeface
  - Bit map LQ font:

EPSON Roman	10 CPI, 12 CPI, 15 CPI, Proportional
EPSON Sans Serif	10 CPI, 12 CPI, 15 CPI, Proportional
EPSON Courier	10 CPI, 12 CPI, 15 CPI
EPSON Prestige	10 CPI, 12 CPI, 15 CPI
EPSON Script	10 CPI, 12 CPI, 15 CPI

  - Scaleable font:

EPSON Roman	10.5pt., 8pt. to 32 pt. (every 2 pt. unit)
EPSON Sans Serif	10.5pt., 8pt. to 32 pt. (every 2 pt. unit)
EPSON Roman T	10.5pt., 8pt. to 32 pt. (every 2 pt. unit)
EPSON Sans Serif H	10.5pt., 8pt. to 32 pt. (every 2 pt. unit)

NOTE: *The above typeface has 4 variations individually as follows;*
EPSON Roman, EOSON Roman bold
EPSON Roman Italic, EPSON Roman bold Italic

- Control code

  <Stylus Color 440, 640>
  - ESC/P Raster
  - EPSON Remote command

  <Stylus Color 740>
  - ESC/P2 and ESC/P Raster
  - EPSON Remote command

1.2.2 Paper Specification

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

1.2.2.1 Cut Sheet

[Size]

A4: [Width 210mm (8.3”) x Length 297mm (11.7”)]
Letter: [Width 216mm (8.5”) x Length 279mm (11.0”)]
B5: [Width 182mm (7.2”) x Length 257mm (10.1”)]
Legal: [Width 216mm (8.5”) x Length 356mm (14.0”)]
Statement: [Width]139.7mm (5.5”) x Length 215.9mm (8.5”)]
Exclusive: [Width 190.5mm (7.5”) x Length 254mm (10”)]

[Thickness]

0.08mm (0.003”) - 0.11mm (0.004”)

[Weight]

64g/m^2 (17lb.) - 90g/m^2 (24lb.)

[Quality]

Exclusive paper, Bond paper, PPC

1.2.2.2 Transparency, Glossy Paper

[Size]

A4: [Width 210mm (8.3”) x Length 297mm (11.7”)]
Letter: [Width 216mm (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.*

1.2.2.3 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”) - 0.52mm (0.02”)

[Weight]

45g/m^2 (12lb.) - 75g/m^2 (20lb.)

[Quality]

Bond paper, Plain paper, Air mail

NOTE 1 *Envelope printing is only available at normal temperature.*
NOTE 2 *Keep the longer side of the envelope horizontally at setting.*

1.2.2.4 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 203mm (8.0”)

[Thickness] : Less than 0.23mm (0.0091”)

1.2.3 Printing Area

[Cut Sheet]
See Figure 1-4 in the right column and the tables in the following page for the printable areas for Raster Graphics mode and Character mode.

NOTE: *Character mode is only suitable for Stylus Color 740.*

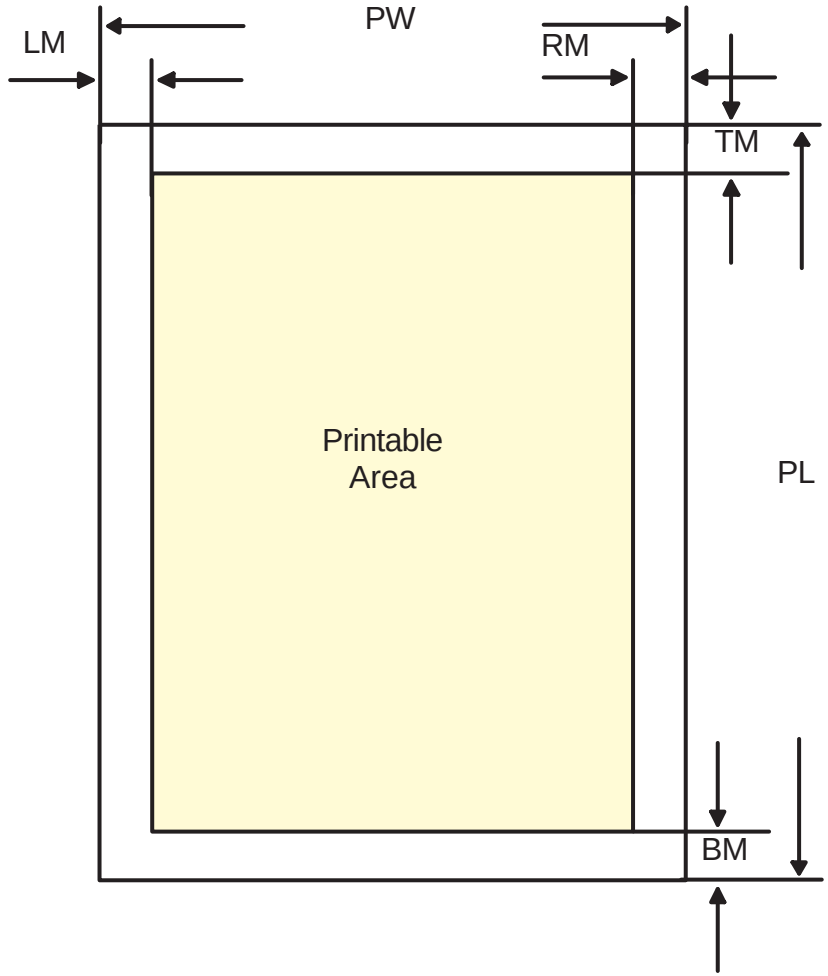

Figure 1-4. Printable Area for Cut sheet

Table 1-4. Raster Graphics Mode (for 3 models)

Paper Size	PW	PL	LM	RM	TM	BM/min.
A4	210 mm (8.3”)	297 mm (11.7”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm(0.54”) 3 mm (0.12”)
Letter	216 mm (8.5”)	279 mm (11.0”)	3 mm (0.12”)	9 mm (0.35”)	3 mm (0.12”)	14 mm (0.54”) 3 mm (0.12”)
B5	182 mm (7.2”)	257 mm (10.1”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”) 3 mm (0.12”)
Legal	216 mm (8.5”)	356 mm (14.0”)	3 mm (0.12”)	9 mm (0.35”)	3 mm (0.12”)	14 mm (0.54”) 3 mm (0.12”)
Statement	139.7 mm (5.5”)	215.9 mm (8.5”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”) 3 mm (0.12”)
Exclusive	190.5 mm (7.5”)	254 mm (10”)	3 mm (0.12”)	3 mm (0.12”)	3 mm (0.12”)	14 mm (0.54”) 3 mm (0.12”)

Table 1-5. Character Mode (only for Stylus Color 740)

Paper Size	PW	PL	LM	RM	TM	BM/min.
A4	210mm (8.3”)	297mm (11.7”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)
Letter	216mm (8.5”)	279mm (11.0”)	3mm (0.12”)	9mm (0.35”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)
B5	182mm (7.2”)	257mm (10.1”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)
Legal	216mm (8.5”)	356mm (14.0”)	3mm (0.12”)	9mm (0.35”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)
Statement	139.7mm (5.5”)	215.9mm (8.5”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)
Exclusive	190.5mm (7.5”)	254mm (10”)	3mm (0.12”)	3mm (0.12”)	3mm (0.12”)	14mm (0.54”) 3 mm (0.12”)

[Envelope]

Table 1-6 and Figure 1-5 show the printable area for envelopes.

Table 1-6. Envelopes Margin

Paper Size	LM	RM	TM	BM/min.
#10	28 mm (1.10")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") 3 mm (0.12")
DL	7 mm (0.28")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") 3 mm (0.12")
C6	3 mm (0.12")	3 mm (0.12")	3 mm (0.12")	14 mm (0.54") 3 mm (0.12")

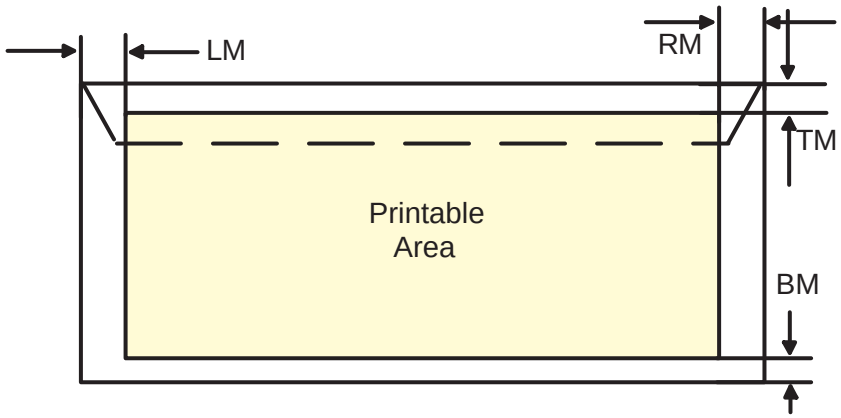

Figure 1-5. Printable Area for Envelopes

1.2.3.1 Adjust Lever Setting

The adjustment lever located on the right side (dark blue) under the printer cover needs to be set to the proper position according to the paper you print. (Refer to the Table 1-7.) Also, if there is any dirt caused by friction on the way or wrinkled paper, this can be prevented by changing the lever position to rear position (marked with "+") in spite of paper types.

Table 1-7. Adjust Lever Setting

Lever Position	Clearance between head and platen
Plus Position	1.04 mm
Zero Position	1.74 mm (+0.7 mm)

NOTE: *Return the adjust lever to the zero position, which is normal position, after you finish printing on all media. Leaving the lever in the plus position may cause the printed image to have gaps on other media.*

1.2.4 Ink Cartridge Specifications

[Black Ink Cartridge]

Table 1-8. Black Cartridge Specifications

Items	Specifications
Type	Exclusive Cartridge for Stylus Color 440, 640 Exclusive Cartridge only for Stylus Color 740
Color	Black
Print Capacity	<Stylus Color 440,640> 540 pages / A4 (ISO/IEC 10561 Letter Pattern at 360 dpi) <Stylus Color 740> 900 pages / A4 (ISO/IEC 10561 Letter Pattern at 360 dpi)
Validity	2 years (sealed in package) / 6 months (out of package)
Environmental conditions	• Temperature - Storage: -20°C~40°C (within a month at 40 °C) - Packing storage: -30°C~40°C (within a month at 40 °C) - Transit: -30°C~60°C (within 120 hours at 60°C and within a month at 40°C) • Humidity 5% to 85% (without condensation) ***Note:*** *Ink freezes below -3°C, but it returns to normal after 3 hours at room temperature. (25 °C)* • Dimension *<Stylus Color 440,640>* 19.8 mm (W) X 52.7 mm (D) X 38.5 mm (H) *<Stylus Color 740>* 27.8 mm (W) X 52.7 mm (D) X 38.5 mm (H)
Weight	Total Ink Cartridge: 30 g Total Ink: 16.4 +/-0.5 g Consumable Ink weight: more than 12.1 g

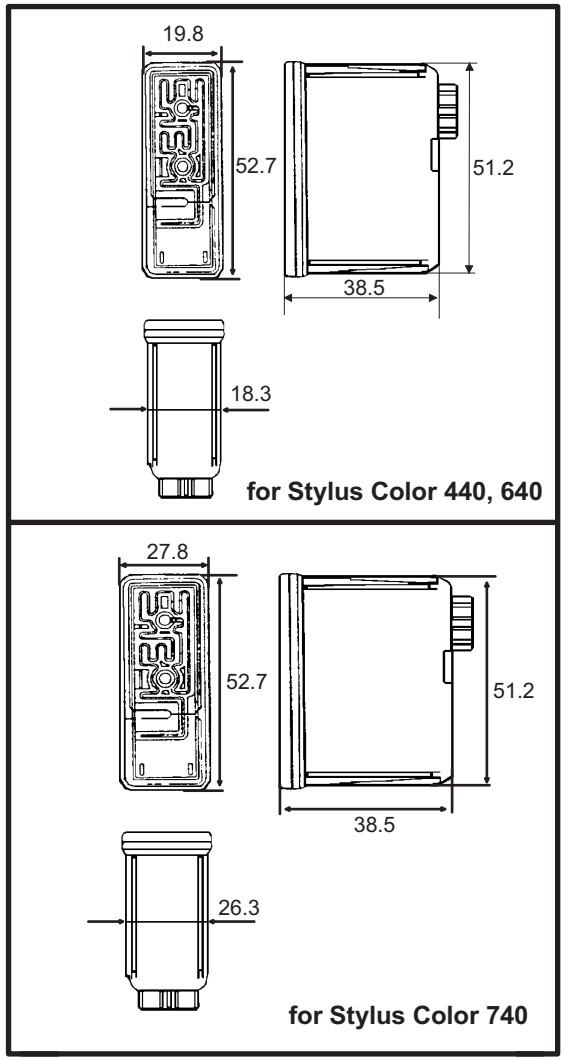

Figure 1-6. Black Ink Cartridge Appearance

[Color Ink Cartridge]

Table 1-9. Color I/C Specifications

Items	Specifications
Type	Exclusive Cartridge for Stylus Color 440, 640, 740
Color	CMY
Print Capacity	300 pages / A4 (360 dpi, 5% duty each colors)
Validity	2 years (sealed in package) / 6 months (out of package)
Environmental conditions	• Temperature - Storage: -20°C~40°C (within a month at 40 °C) - Packing storage: -30°C~40°C (within a month at 40 °C) - Transit: -30°C~60°C (within 120 hours at 60°C and within a month at 40°C) • Humidity 5% to 85% (without condensation) ***Note:*** *Ink freezes below -3°C, but it returns to normal after 3 hours at room temperature. (25 °C)* • Dimension 42.9 mm (W) X 52.7 mm (D) X 38.5 mm (H)
Weight	Total Ink Cartridge: 67 g Total Ink: 12.8 +/-0.5 g/colors Consumable Ink weight: more than 9.6 g/colors

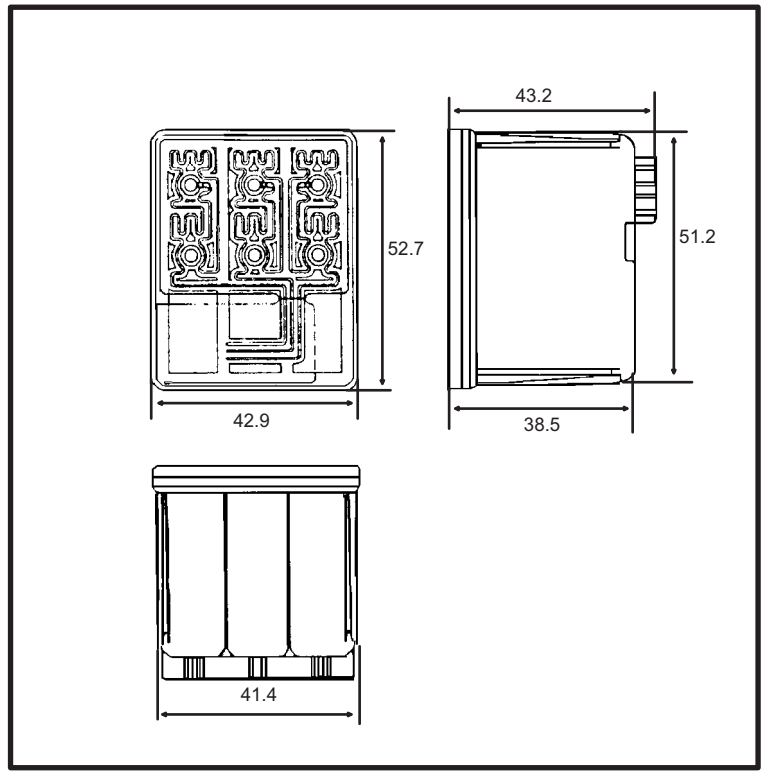

Figure 1-7. Color Ink Cartridge

1.2.5 Environmental Condition

- Temperature
  - Operating :10 to 35 °C (Refer to Figure 1-8 for condition)
  - Non-operating:-20 to 60 °C (with shipment container)

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

- Humidity
  - Operating: 20% ~ 80% RH
    (without condensation Refer to Figure 1-8 for condition)
  - Non-operating: 5% ~ 85% RH
    (without condensation and with shipment container)

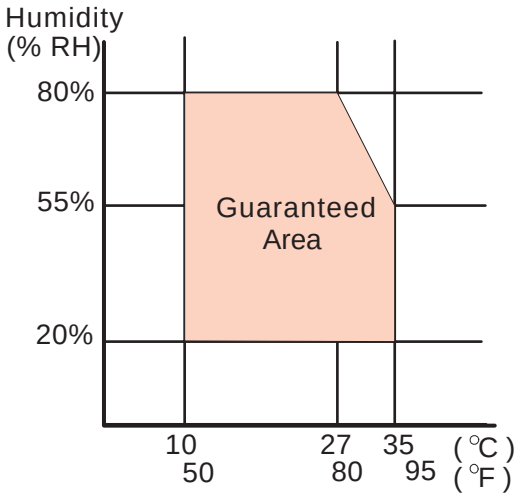

Figure 1-8. Temperature / Humidity of Range

- Resistance to shock
  - Operating: 1G, within 1 ms
    X,Y,Z directions
  - Non-operating:2G, within 2 ms
    X,Y,Z directions (with shipment container)
- Resistance to vibration
  - Operating: 0.15G (Operating)
  - Non-operating:0.50G (Non-Operating)

NOTE 1:*During non-operating, make sure that the head is capped.*

NOTE 2:*During the transport, make sure that the head is capped and ink cartridge is installed to the printer.*

NOTE 3: *If the head is not capped at the power-off state, turn the power on with installed ink cartridge and turn off the power after confirming that Power on operation is completed and the head is capped.*

NOTE 4: *Ink will be frozen less than -3°C environment, however it will be usable after placing it more than 3 hours at 25°C.*

1.2.6 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 (Max. 0.5A)
[Power consumption]	Approx.15W (ISO/IEC 10561 Letter pattern) Energy Star compliant
[Insulation Resistance]	10M ohms min. (between AC line and chassis, DC 500 V)
[Dielectric strength]	AC1000 V rms. 1 minute or AC1200 Vrms. 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 (Max. 0.3A)
[Power consumption]	Approx.15W (ISO/IEC 10561 Letter pattern) Energy Star compliant
[Insulation Resistance]	10M ohms min. (between AC line and chassis, DC500V)
[Dielectric strength]	AC1500 V rms. 1 minute (between AC line and chassis)

1.2.7 Reliability

[Total print volume]

Stylus Color 440:	10,000 pages (A4, Letter)
Stylus Color 640:	25,000 pages (A4, Letter)
Stylus Color 740:	75,000 pages (A4, Letter)

[Print head life]

Stylus Color 440:	2000 million dots/nozzle
Stylus Color 640:	2000 million dots/nozzle
Stylus Color 740:	4000 million dots/nozzle

1.2.8 Safety Approvals

[120V version]

Safety standard	UL1950 with D3 CSA22.2 No.950 with D3
EMI	FCC part 15 subpart B class B CSA C108.8 class B

[220~240V]

Safety standard	EN 60950 (VDE,NEMKO)
EMI	EN55022 (CISPR Pub.22) class B AS/NZS 3548 class B

1.2.9 Acoustic Noise

Stylus Color 440: Approximately 45 dB
Stylus Color 640,740: Approximately 47 dB

1.2.10 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

1.2.11 Input Data Buffer

10 K byte (for Stylus Color 440)
32 K byte (for Stylus Color 640)
64 K byte (for Stylus Color 740)

1.3 Interface

This printer provides parallel interface as standard.

1.3.1 Parallel Interface (Forward Channel)

[Transmission mode] 8 bit parallel, IEEE-1284 compatibility mode
[Synchronization] By /STOPBE pulse
[Handshaking] BY BUSY and /ACKLG 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)

/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.

See Table 1-10 in the following page which shows the signal and connector pin assignments for parallel interface (forward channel *1). In case of these signals, twist pair line is used and returning side is connected to signal GND.

**1: Forward channel is the mode when the ordinary data such as an order to print is sent from the PC to the printer.*

Table 1-10. Parallel I/F Forward Channel

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	/STROBE	19	I	The strobe pulse. Read-in of data is performed at the falling edge of this pulse.
2-9	DATA0-7	20-27	I	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.
10	/ACKNLG	28	O	This signal is a negative pulse indicating that the printer can again accept data.
11	BUSY	29	O	A high signal indicates that the printer cannot receive data.
12	PE	28	O	A high signal indicates paper-out error.
13	SLCT	28	O	Always at high level when the printer is powered on.
14	/AFXT	30	I	Not used.
31	/INIT	30	I	The 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	O	A low signal indicates printer error condition.
36	/SLIN	30	I	Not used.
18	Logic H	----	O	Pulled up to +5V via 3.9K ohm resistor.
35	+5V	----	O	Pulled up to +5V via 3.9K ohm resistor.
17	Chassis GND	----	---	Chassis GND.
16,33, 19-30	GND	----	---	Signal GND.
15,34	NC	----	---	Not connected.

Note) In and Out refer to the direction of signal flow from the printer's point of view.

1.3.2 Parallel Interface (Reverse Channel)

[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] IEEE-1284 level 1 device
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.

NOTE: *The printer sends following device ID string when it is requested.*

Table 1-11. Details of Device ID

00H	3CH	Contents
MGF	EPSON;	Production Maker
CMD	ESCPL2,BDC;	Command system
MDL	Stylus[SP]Color[SP] 440; Stylus[SP]Color[SP] 640; Stylus[SP]Color[SP] 740;	Model name
CLS	PRINTER;	Class

NOTE: *[00H] denotes a hexadecimal value of zero. MDL value depends on the EEPROM setting.*
NOTE: *MDL value depends on the EEPROM setting. Model name can be changed by changing a certain address in the EEPROM.*

Table 1-12 shows pin assignment for reverse channel (*3). In these case of signals, twist pair line is used and returning side is connected to Signal GND.

**3: Reverse channel is the mode that any data is transferred from the printer to the PC.*

Table 1-12. Parallel I/F Reverse Channel

Pin No.	Signal Name	Return GND Pin	In/Out	Functional Description
1	HostClk	19	I	Host clock signal.
2-9	Data0-7	20-27	I	The DATA0 through DATA7 signals represent data bits 0 to7, 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.
10	PrtClk	28	O	Printer clock signal.
11	PtrBusy, Data Bit-3,7	29	O	Printer busy signal and reverse channel transfer data bit 3 or 7.
12	AckData Req, DataBit-2,6	28	O	Acknowledge data request signal and reverse channel transfer data bit 2 or 6.
13	Xflag, DataBit-1,5	28	O	X-flag signal and reverse channel transfer data bit 1 or 5.
14	HostBusy	30	I	Host busy signal.
31	/INIT	30	I	Not used.
32	/DataAvail, DataBit-0,4	29	O	Data available signal and reverse channel transfer data bit 0 or 4.
36	1284-Active	30	I	1284 Active Signal
18	Logic-H	----	O	Pulled up to +5V via 3.9K ohm resister.
35	+5V	----	O	Pulled up to +5V via 3.3K ohm resister.
17	Chassis GND	----	---	Chassis GND.
16,33, 9-30	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.

The following are the points to note when using the parallel Interface.

NOTE 1:*"Return GND pin" in the table means twist pair return and is used for all control signals except for Logic H,+5V, Chassis, GND and NC. In this twist pair return, returning side is connected to GND (16,33, 19-30 pin) for twist pair return. Also, these cables are shielded wires and it is effective to connect to each chassis GND in the PC and printer for electrostatic noise.*

NOTE 2:*Conditions for Interface are based on TTL level. Rise and fall time should be within 0.2µs.*

NOTE 3:*Refer to Figure 1-9 for transmission timing of each signals.*

NOTE 4:*Do not perform data transmission ignoring /ACK or BUSY signal. (Perform the data transmission after confirming that / ACK and BUSY signals are Low.)*

NOTE 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 them forcefully to /ACK and /STRB.*

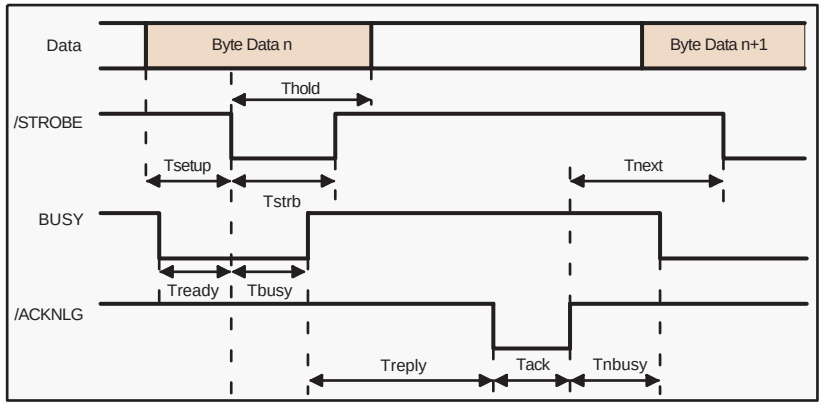

Figure 1-9. Data Transmission Timing for Forward Channel

Table 1-13.
Maximum and Minimum Timing for Data Transmission

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

** Rise and fall time of every output signal.*
*** Rise and fall time of every input signal. Typical timing for the tack parameter is shown below.*

Table 1-14. Typical Tack Timing

Parallel I/F Mode	Typical Tack Timing
High speed	2us (for Stylus Color 440,640) 1us (only for Stylus Color 740)
Normal speed	4us (for Stylus Color 440,640) 3us (only for Stylus Color 740)

Table 1-15. Signal level for TTL (IEEE-1284 level 1 device)

Parameters	Minimum	Maximum	COndition
VOH*	---	5.5V	
VOL*	-0.5V	---	
IOH*	---	0.32mA	VOH = 2.4V
IOL	---	12mA	VOL = 0.4V
CO	---	50pF	
VIH	---	5.0V	
VIL	0.8V	---	
IIH	---	0.32mA	VIH = 2.0V
IIL	---	-12mA	VIL = 0.8V
CI	---	50pF	

NOTE: *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.*

1.3.2.1 Prevention Hosts from 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 this kind of time-out, the printer receives data very slowly, several bytes per minute, even if the printer is in busy state. This showdown is started when the rest of the input buffer becomes several hundreds of bytes. Finally, the printer is in the busy state continuously when the input buffer is full.

1.3.2.2 Auto Interface Selection (for Stylus Color 640, 740)

- ☐ Manual Selection:
  One of two interfaces can be selected by the default setting mode.
- ☐ Automatic Selection:
  The automatic interface selection is enabled by the default setting mode. 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.

Following explains conditions of other interfaces when a particular interface is selected.

- When the parallel interface is not selected, the interface gets into BUSY state. At this time, LH signal is set to “L”. That means blocking power supply and no responds from 1284. Therefore it is necessary for the host, which requires Reverse transfer, to check LH 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, Parallel interface becomes the ready condition and DTR of serial interface becomes SPACE (Low) condition and reset off-line bit of Main Status Register (MNSTS)to, option interface.

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