EPSON

slip printer

TM-U295/U295P

Specification

STANDARD	
REV. NO.	F
Notes	

REVISION SHEET

Be sure to check the contents before utilizing the specification.　This specification has the history shown below.

Rev.	Document	Date	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
Revisions			**Design Section**			**Sheet Rev. No.**					
A	ENACTMENT					I	F	12	F	34	F
B	CHANGE		Y.Itoh	--	K.Itoh	II	F	13-1	F	35	F
C	CHANGE		Y.Itoh	--	K.Itoh	III	F	13-2	F	36	F
D	CHANGE		T. Miyashita	K,Ebina	Y.Inoda	IV	F	14	F	37	F
E	CHANGE		T. Miyashita	K,Ebina		V	F	15	F	38	F
F	CHANGE							16	F	39	F
								17	F	40	F
						1	F	18	F	41	F
						2	F	19	F	42	F
						3	F	20	F	43	F
						4	F	21	F	44	F
						5	F	22	F	45	F
						6	F	23	F	46	F
						7	F	24	F	47	F
						8	F	25	F	48	F
						9	F	26	F	49	F
						10	F	27	F	50	F
						10	F	28	F	51	F
						11-1	F	29	F	52	F
						11-2	F	30	F	53	F
						11-3	F	31-1	F	54-1	F
						11-4	F	31-2	F	54-2	F
						11-5	F	32	F	55	F
						11-6	F	33	F	56	F

TITLE			Front Part						
TM-U295/U295P Specification (STANDARD)		Cover	Rev. Sheet	General Description	Table of Contents	Contents	Appendix	Total	
		1	10	1	6	80	34	132	

Be sure to check the contents before utilizing the specification.   This specification has the history shown below.

Revisions			Design Section			Sheet Rev. No.					
Rev.	Document	Date	WRT	CHK	APL	Sheet	Rev.	Sheet	Rev.	Sheet	Rev.
A	ENACTMENT					58	F	App.9	F	App.33	F
B	CHANGE					59	F	App.10	F	App.34	F
C	CHANGE					60	F	App.11	F		
D	CHANGE					61	F	App.12	F		
E	CHANGE					62	F	App.13	F		
F	CHANGE					63	F	App.14	F		
						64	F	App.15	F		
						65	F	App.16	F		
						66	F	App.17	F		
						67	F	App.18	F		
						68	F	App.19	F		
						69	F	App.20	F		
						70	F	App.21	F		
						71	F	App.22	F		
						72	F	App.23	F		
								App.24	F		
						App.1	F	App.25	F		
						App.2	F	App.26	F		
						App.3	F	App.27	F		
						App.4	F	App.28	F		
						App.5	F	App.29	F		
						App.6	F	App.30	F		
						App.7	F	App.31	F		
						App.8	F	App.32	F		

TITLE	Front Part						
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	1	10	1	6	80	34	132

REVISION SHEET

REV.	SHEET	CHANGED CONTENTS	DATE
B	3	Section 1.4, Paper - 3) Sizes 80 mm (W) x 80 mm (L) → 80 mm (W) x 69 mm (L)　　(Change) 6) Notes on using slip paper ・ When using slip paper of 80 mm (3.15") long or less, load the paper so that it is fed straight.　　(Addition)	
	6	Section 1.10, EMI - 3) CE marking class B, (EMI directive):　level 2　　(Delete)	
	31	Figure 4.4.1, External Appearance　　(Change)	
	38 62 68 70	Tables TOF → BOF/　BOF → TOF　　(Change)	
	54	Figure in [Description] ($x0+dx+1$, $y0+dy+1$) → ($x0+dx$-1, $y0+dy$-1)　　(Change) [Default] $dxL = 209 → 210$, $dyL = 223 → 224$　　(Correction)	
C	1	Section 1.1, Printing Specification - 7) Paper feed speed 25 line (105mm(4.13") → 12.5 line (52.5mm(2.07"))　　(Change)	
	7	1) Specification (RS-232C) → 1) Specification (RS-232)　　(Change)	
	12	Section 2.2.3, Drawer kick-out connector A pulse specified by the **ESC p** command is output to this connector. Status of input signal is informed to the host computer by **ESC u, GS a, GS r**, or **DLE EOT**.　　(Addition)	
	13	Figure 2.2.3, *Drawer Circuitry*　　(Change)	
	15	Table Page mode column for: 　**ESC !**　▲ → ◆ 　**ESC {**　Disable → ■ Standard mode column for: 　**ESC T**　Disable → ■ 　**ESC W**　Disable → ■　　(Change)	
	16	Standard mode ■: Setting is kept but does not have any effect.　　(Addition)	

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C		Page mode ■: Setting is kept but does not have any effect. ◆: For some functions, setting is kept but does not have any effect. (Addition)	
	24	2) Starting the self-test The printer is now in the slip paper standby state. Insert a sheet of slip paper. The printer prints the current settings and ejects the slip paper. (Addition)	
		3) Self-test printing (Addition)	
		4) Ending the self-test ....ejects the slip paper... (Addition)	
	25	Section 3.6.1 - 1) Error detection The TM-295 performs as follows when it detects an error: • Blinks the paper out LED → RELEASE LED (Change)	
	27	Section 3.9.1, General description In the third paragraph: By executing an ESC @ command, printer returns to standard mode without printing the received data. (Addition)	
		Figure 3.9.1 **ESC @** (Addition)	
		Section 3.9.2, Page mode limitations The following command <u>has no effect in page mode, but it becomes effective when printer returns to standard mode:</u> (Change)	
	28	Section 3.9.2 - 2) Reverse feed commands are disabled. **ESC F, ESC K** and **ESC e** (Delete)	
		Section 3.9.2 - 5) ....underline mode selected by **ESC !** is disabled. → ...underline by **ESC !** is not drawn. But it becomes effective when printer returns to standard mode. (Change)	
		Section 3.9.3 - 2) (Delete)	
	46	[Description] • When the printer is not selected.... → • When the printer disabled is selected... (Change)	

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C		[Note] • Even if the printer is disabled,... → • Even if the printer disabled is selected,... (Change)	
	51	[Notes] • The following commands are settable but do not have any effect in page mode. (Addition) • This command is effective only in standard mode. • **ESC @** command returns the printer to standard mode without printing any data. (Addition)	
	54	[Range] Except $dx_L=dx_H=0$, or $dy_L=dy_H=0$ (Addition) [Notes] • This command is available only in page mode. → • When starting point (x0, y0) is out of printable area, this command is not effective. (Change)	
	63	[Notes] • This command is available only in standard mode. → • This command has no effect in page mode. (Change)	
	67	[Notes] • When the printer is disabled using **ESC =**, ... → • When the printer disabled is selected using **ESC =**, ... (Change)	
	69	Table Status for ASB column for Bit 2 and 3: Undefined → Not used (Change) Bit 1 description • When the release button is pressed during slip printing, bit 1 becomes On (slip printing is not possible). (Delete)	
	App.16	8) and 9) (Addition)	
D		Major Change of this revision is the addition of bidirectional parallel interface. See below for detail.	

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REV.	SHEET	CHANGED CONTENTS		DATE
D	all sheets	Sheet title TM-295 → TM-295/295P	(Change)	
	I	Application Apply to TM-295 (Standard Specification). → Apply to TM-295 (Standard Specification) (RS-232 serial interface specification) or to TM-295P (IEEE 1284 bidirectional parallel interface specification).	(Change)	
		Features Either RS-232 Serial Interface or IEEE 1284 bidirectional parallel interface should be selectable when the product is shipped from the factory.	(Addition)	
	II - VI	Table of contents	(Change)	
	6	Applied Standards Applied standards were changed. Also applied safety and EMI standards are described in this section while they were mentioned in the separated sections on last revision.	(Change)	
	11-1 | 11-6	2.1.2 IEEE 1284 bidirectional parallel interface	(Addition)	
		2.1.3 Reception of status from the printer through the bidirectional parallel interface	(Addition)	
	12	2.2 Connectors Figure 2.2.2	(Addition)	
	15	3.1.2 Command list CR command	(Addition)	
		ESC c 3 command	(Addition)	
	22	DIP switch settings for parallel interface	(Addition)	
	25	3.6.1 Mechanical errors Descriptions for parallel interface mode	(Addition)	
	31-2	Figure 4.4.2	(Addition)	
	32	5.2 Option Power supply unit safety standard CSA → C-UL	(Change)	
	35	CR command details	(Addition)	

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REV.	SHEET	CHANGED CONTENTS	DATE
D	36	DLE EOT This command is executed even... → With the serial interface model, ... (Change)	
	38	Table (lower) Bit 6 Off = Slip is not detected.... → Slip is detected... On = Slip is detected.... → Slip is not detected.... (Correction)	
	42	The way to indicate the command was changed as below. ESC & *y c1 c2 [x [d] y × x] c2 - c1 + 1* → ESC & *y c1 c2 [x1 d1...d(y × x1)]...[xk d1...d(y × xk)]* (Change)	
	44	The way to indicate the command was changed as below. ESC ∗ *m nL nH [d]k* → ESC ∗ *m nL nH d1...dk* (Change)	
	48	The way to indicate the command was changed as below. ESC D *[n] k NUL* → ESC D *n1...nk NUL* (Change)	
	50	ESC L Change of expression (Change)	
	54-2	ESC c3 command details (Addition)	
	63	ESC { [Example] When upside-down mode on → When upside-down mode off When upside-down mode off → When upside-down mode on (Correction) (Correction)	

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REV.	SHEET	CHANGED CONTENTS	DATE
D	64	GS I *n* Printer model ID = TM-295 → TM-295/TM-295P (Change)	
	68	Table (lower) Bit 6 On = Slip is detected... → Slip is not detected... (Correction)	
	72	Ignored Command CR command is added as ignored command. Also the sentence was changed as both ESC c3 and CR commands are ignored with a serial interface model. (Addition/Change)	
	App.17 - App.34	APPENDIX H Bidirectional Parallel Interface (Addition)	
E	15	• ESC 2 Selects 1/6-inch line spacing. → Selects the initial line spacing. (Change)	
	22	• 2) For parallel interface model I/F nInit reset signal → Internal use, Fixed to ON (Change) Correction and addition are made to the NOTE. (Addition)	
	23	• DIP switch setting for parallel interface model (Addition) • 1) For serial interface model Correction and addition are made to the NOTE. (Addition) • 3) Paper-out LED → Paper LED (Change) • Figure 3.4.1 Paper-out LED → Paper LED (Change)	
	35	• CR Command description is added. (Addition)	
	38	• Bit 3 The contents of the NOTE are corrected and added. (Addition)	
	40	• ESC ! n [Description] "Selects print modes (s)..." → "Selects and cancels print modes (s)..." (Correction) [Notes] Underline mode specification (both selected and not selected) does not have nay effect in page mode. 7×7 font specification does not have any effect in page mode. → Underline mode on/off and 7×7 font mode on/off are settable but do not have any effect in page mode. (Correction)	
	45	• ESC 2 Selects 1/6-inch line spacing. → Selects the initial line spacing. (Change) • ESC 2 [Description] 1/6 inch → 4.23mm (1/6 inch) (Change)	
TITLE		**TM-U295/U295P** Specification (STANDARD)	

REVISION SHEET

REV.	SHEET	CHANGED CONTENTS	DATE
E	45	• ESC 3 [Description] n/60 inch → n x approx. 0.423mm (1/60 inch) (Change)	
		• ESC 3 [Description] 1/6 inch → 4.23mm (1/6 inch) (Change)	
	49	• ESC J [Description] n/60 inch → n 5 approx. 0.423mm (1/60 inch) (Change)	
	50	• ESC K [Description] n/60 inch → n 5 approx. 0.423mm (1/60 inch) (Change)	
	51	• [Notes] ESC 2 Set 1/6-inch line spacing. → Set the initial line spacing. (Change)	
	54-2	• [Default] n=48 → n=0 (Change)	
	60	• [Notes] Since the status is transmitted when this command is buffered in the receive buffer, → Since this command is stored in the receive buffer and then executed during normal command process, (Change)	
	62	• [Notes] Since the status is transmitted when this command is buffered in the receive buffer, → Since this command is stored in the receive buffer and then executed during normal command process, (Change)	
	64	• [Notes] Since the status is transmitted when this command is buffered in the receive buffer, → Since this command is stored in the receive buffer and then executed during normal command process, (Change)	
	65	• Bit 0 Not used → Not available for 2-byte code (Change)	
		• Bit 1 Not used → No auto cutter (Change)	
	69	• Bit 1 The contents of the NOTE are corrected and added. (Addition)	
	67	• [Notes] Since the status is transmitted when this command is buffered in the receive buffer, → Since this command is stored in the receive buffer and then executed during normal command process, (Change)	
		• First Bit 5 Not used 00 0 → Undefined - - (Change)	
	70	• [Notes] Since the status is transmitted when this command is buffered in the receive buffer, → Since this command is stored in the receive buffer and then executed during normal command process, (Change)	
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REVISION SHEET

REV.	SHEET	CHANGED CONTENTS	DATE
E	45	• "CR (ignored only when the model is serial interface model)" is added. (Addition)	
		• "Ignored only when the model is serial interface model" is also added for ESC c 3 n. (Addition)	
F	All	•Product name TM-295/295P → TM-U295/U295P (Change)	

	1	1.1 Printing Specifications
		    7) Paper feed speed: 52.9mm/second
		    Table 1.1.1 Characters Per Inch (Change)	

	6	1.8 Reliability
		1) MCBF 1) Life ...
		2) Print head life → 2) MCBF ...
		                   3) MTBF ..
		    (Change)	

TITLE

TM-U295/U295P
Specification
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General Description

Application

These specifications apply to TM-U295(Standard Specification)(RS-232 Serial Interface Specification) or to TM-U295P (IEEE 1284 Bidirectional Parallel Interface Specification).

Features

The TM-U295 is terminal slip printer which uses a 7-pin shuttle dot printing method, and provides the different modes, standard and page (∗).

The printer has the following features:

- Programmable page length.
- Programmable print starting position.
- Multiple character sizes (standard, double-width, double-height, and quadruple).
- Character directions: 4
- International character set selection.
- Forward and backward paper feeding.
- Command protocol based on the ESC/POS™ standard.
- Programmable paper feed amount.
- Paper eject function.
- Top Of Form (TOF) and Bottom Of Form (BOF) sensors.
- Data reception during printing (improved throughput and less waiting time for the host computer).
- 512 byte printer buffer memory.
- Compact, space efficient design.
- Drawer kick-out function.
- Automatic Status Back (ASB) function to automatically send printer status changes.
- Either RS-232 serial interface or 1284 bidirectional parallel interface should be selectable when the product is shipped from the factory.

   ∗ In page mode, the print data is buffered within a specified printing area in the memory. After all the data has been buffered in the specified printing area, it is all printed at one time.

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1. GENERAL SPECIFICATIONS

1.1 Printing Specifications

1) Printing method: Impact dot matrix

2) Head wire configuration: 7-pin shuttle type

3) Printing direction: Unidirectional

4) Lines per second: Refer to Table 1.1.1.

5) Characters per line: Refer to Table 1.1.1.

6) Characters per inch: Refer to Table 1.1.1.

7) Paper feed speed: Approximately 12.5 line (52.9 mm (2.08"))/second
(When the **ESC d** and **FF** commands are used.)

Table 1.1.1   Lines Per Inch, Characters Per Second, Character Per Line, Character Size

Character Structure (Horizontal × Vertical)	Character Set	Characters Per Inch (mm)	Lines Per Second (LPS) (Approximately)	Characters Per Line (column)	Character Size (mm) (W × H)
5 × 7	ANK	0.31	1.9 to 2.3	35	1.6 × 2.9 (.063" × .114")
5 × 7	Graphics	0	1.9 to 2.3	35	1.9 × 2.9 (.075" × .114")
7 × 7	ANK	0.31	1.9 to 2.3	42	1.3 × 2.9 (.051" × .114")
7 × 7	Graphics	0	1.9 to 2.3	42	1.6 × 2.9 (.063" × .114")

(All the numeric values are typical.)

1.2 Character Specifications

1) Character set: Alphanumeric: 95
International: 32
Extended graphics: 128 × 3

2) Character structure: 5 × 7 with 1-dot spacing (normal dot)
7 × 7 with 3-dot spacing (half dot)

3) Character size: Refer to Table 1.1.1.

1.3 Ribbon Cassette

1) Inking method: Exclusive ribbon cassette
2) Color: Purple
3) Part number: ERC-27
4) Life expectancy: Approximately 1,500,000 characters (5 × 7 font)
5) Ribbon cassette overall dimensions:
                              Refer to Figure 1.3.1.
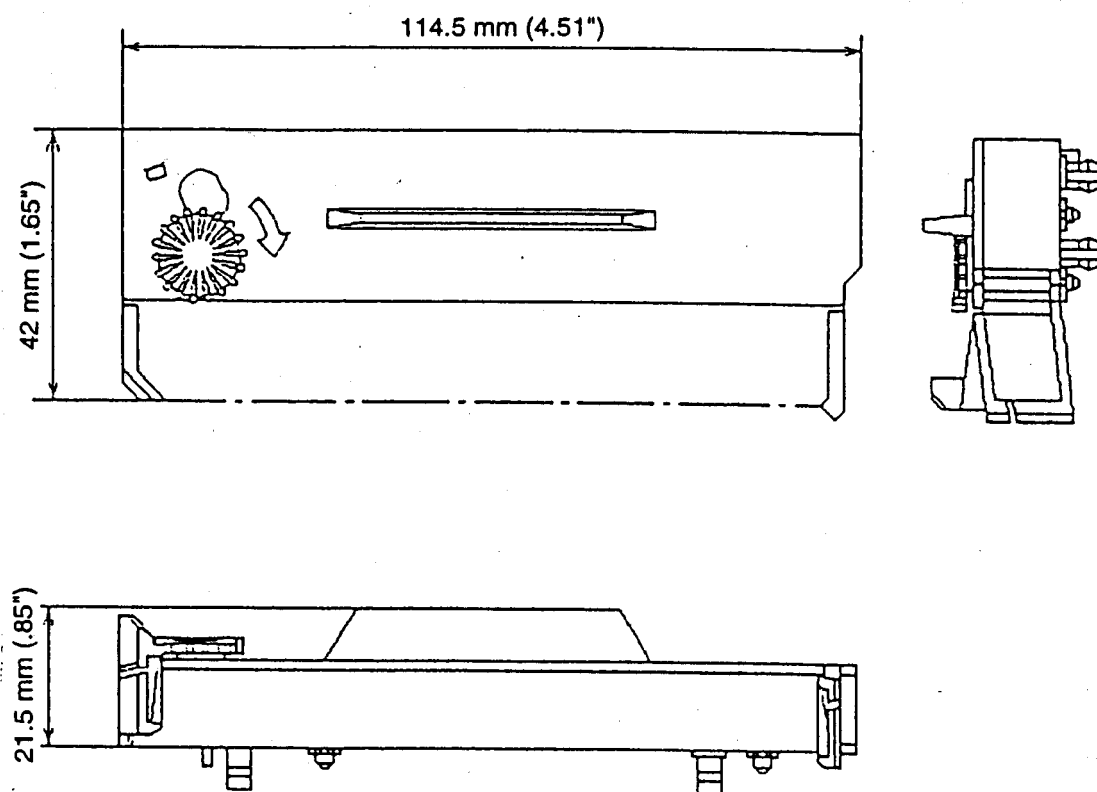
Figure 1.3.1   Ribbon Cassette Overall Dimensions

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1.4 Paper

1) Paper types: Normal (high quality), pressure sensitive, and carbon copy papers

2) Total thickness: Single-play paper: 0.09 to 0.25 mm (.0035 to .0098")
             Copy paper: 0.09 to 0.35 mm (.0035 to .0138")

3) Sizes: 80 mm (W) × 69 mm (L) to 182 mm (W) × 257 mm (L)
             (3.15" × 2.72" to 7.17" × 10.12") Up to the European B5 size.

4) Copy capability and paper thickness:

 a) No copies (single-ply): 0.09 to 0.25 mm (.0035 to .0098") (135 kg paper or equivalent)

 b) Combination of normal paper and pressure sensitive paper:

   3 sheets maximum (1 original and 2 copies) (0.09 to 0.35 mm (.0035 to .0138"))

    Backing paper: 0.07 to 0.20 mm (.0028 to .0079")

    Copy and original paper: 0.04 to 0.07 mm (.0016 to .0028")

    Carbon copy paper: Approximately 0.035 mm (.0014")

   Example: 1 original and 2 copies

    Original: 0.04 mm (.0016") (0.04 mm × 1 sheet)

    Carbon copy paper: 0.035 mm (.0014") (0.035 mm × 2 sheets)

    Copy: 0.04 mm (.0016") (0.04 mm × 1 sheet)

    Backing paper: 0.07 mm (.0028") (0.07 mm × 1 sheet)

    Total thickness: 0.22 mm (.0087")

5) Copy capability and ambient temperature for printing

 Copying capability is influenced by the ambient temperature. Printing must be performed under the conditions, described in Table 1.4.1.

Table 1.4.1 Relation between Ambient Temperature and Number of Copies

Number of Copies	Ambient Temperature
Original + 1 or 2 copies	5° to 40°C (41° to 104°F)

6) Notes on using slip paper

- Slip paper should be flat, without curls, wrinkles, or camber, especially at the paper edges. Otherwise, the paper may become ink stained.
- When using multiply-ply carbon copy paper, it should be flat and the glue area should be as small as possible.
- Glue area should be located at the top or left edge of the slip paper.
- Since TOF and BOF sensors are optical sensors, paper having holes at the sensor positions or translucent paper should not be used normally. When using these papers, be sure to disable the paper sensors by **ESC c 4**.
- When using slip paper of 80 mm (3.15") long or less, load the paper so that it is fed straight.

7) Printing position
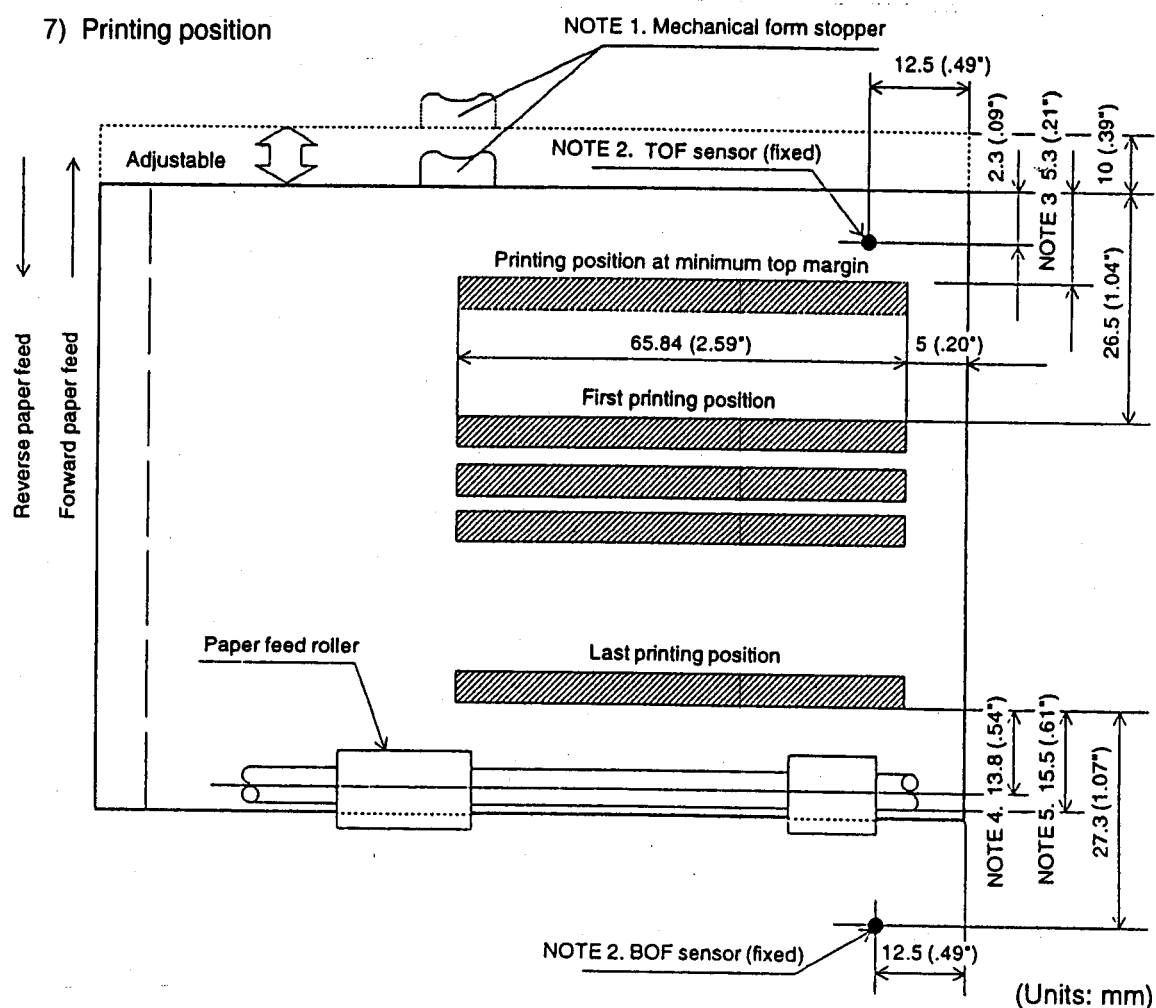
Figure 1.4.1   Printing Position

NOTES: 1. The mechanical form stopper is adjustable in the range 26.5 to 36.5 mm (1.04 to 1.44").

2. The TOF and BOF sensors are fixed and cannot be adjusted.

3. After slip paper is set at the mechanical form stopper, the top margin can be shortened up to 21.2 mm (.83") by feeding the paper backwards (ejection feeding).

4. When ejection feeding is not performed after printing, printing can be performed up to the position at which the paper edge is no longer held by the paper feed roller (13.8 mm (.54") from the paper edge).

5. When ejection feeding is performed after printing, the paper can be fed forward up to 11.8 mm (.46") (28 dots) after the bottom edge is detected.

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1.5   Receive Buffer

Either 512 or 35 bytes is selectable by DIP switches.

1.6   Electrical Specifications

1) Power supply: 24 VDC $\pm$ 10%

2) Power consumption

   Operating (except for drawer kick-out)

      a) Mean: Approximately 600 mA at 24 VDC (full-column printing and data transmission of ANK characters)

      b) Peak: Approximately 5.5 A at 24 VDC   (full-column printing and data transmission of ANK characters)

         Standby: Approximately 100 mA (at 24 VDC, 25°C (77°F))

1.7   Environmental Specifications

1) Temperature

Operating:	5° to 40°C (41° to 104°F)
Storage:	-10° to 50°C (14°F to 86°F) (excluding paper and ribbon)

2) Humidity

Operating:	30 to 85% (no condensation)
Storage:	30 to 90% (no condensation, excluding paper and ribbon)

3) Vibration resistance

When packed:	Frequency:	5 to 55 Hz
	Acceleration:	2 G
	Sweep:	5 minutes (half cycle)
	Duration:	1 hour
	Directions:	x, y, and z

No external or internal damage should be found after the vibration test, and the printer should operate normally.

4) Impact resistance

When packed:	Package:	EPSON standard package
	Height:	60 cm (2.36")
	Directions:	1 corner, 3 edges, 6 surfaces

No external or internal damage should be found after the drop test, and the printer should operate normally.

When unpacked: Height: 5 cm (.197")

                               Direction: Lift one edge and release it (for all 4 edges)

A non-operating printer should not be damaged after it is dropped (for all 4 edges).

5) Acoustic noise: Operating: Approximately 65 dB (Bystander Position)

1.8 Reliability

1) Life

Mechanism: 3,000,000 lines

Print head life: 100 million characters
(when in the average of 2 dots/wire per character.)
End of life is defined as the point at which the printer reaches the
beginning of the Wearout Period.

2) MTBF   180,000 hours
Failure is defined as Random Failure occurring at the time of the
Random Failure Period.

3) MCBF   7,000,000 lines
This is an average failure interval based on failures relating to wearout
and random failures up to the life of 3 million lines.

1.9 Applied Standards

(EMC is experimented by using the Epson PS-150 power supply.)

1) Europe: CE marking: EN55022
                                        EN50082-1
                                        EN45501

                       Safety standard: TÜV

2) North America: FCC Class A

                       Safety standard: UL1950-2TH-D3
                                                  C-UL

3) Japan: VCCI Class1

1.10 Electrostatic Protection (based on the IEC801-2 test conditions)

Air discharge: 8 KV clear level

Contact discharge: 4 KV clear level

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2. CONFIGURATION

2.1 Interface

2.1.1 RS-232 serial interface (For serial interface model)

1) Specifications

Data transmission:	Serial
Synchronization:	Asynchronous
Handshaking:	DTR/DSR or XON/XOFF control (selected by DIP switch)
Signal level:	MARK = -3 to -15 V: Logic "1"
	SPACE = +3 to +15 V: Logic "0"
Baud rates:	1200, 2400, 4800, 9600 bps
Data word length:	7 or 8 bit
Parity:	None, even, odd
Stop bit:	1 or more
Connector 1:	D-SUB25 female connector or equivalent

2) On-line/off-line

The printer goes off-line at the following times:

① The period from power-on (including reset using interface) until data communication becomes possible after initializing the mechanism.

② During the self-test.

③ During paper feed operation using the paper feed button.

④ During an error condition.

3) Interface connector pin assignments and signal functions

Table 2.1.1   TM-U295 Printer Status and Signals

Pin number	Signal name	Input	Output	Function
1	FG			Frame ground
2	TXD		∗	Transmit data
3	RXD	∗		Receive data
4	RTS		∗	Same as the DTR signal
6	DSR	∗		Indicates whether the host can receive data. SPACE indicates that the host can receive data, and MARK indicates that the host cannot receive data. When DTR/DSR control is selected, the printer transmits data after checking this signal. When XON/XOFF control is selected, the printer does not check this signal. Changing DIP switch 1-9 setting enables this signal to be used as a reset signal for the printer (see Section 3.3.1). The printer is reset when the signal remains MARK for 1 ms or more.
7	SG			Signal ground
20	DTR		∗	Indicates whether the printer can receive data. When DTR/DSR control is selected, SPACE indicates that the printer can receive data, and MARK indicates that the printer cannot receive data. The signal goes MARK at the following times: • The period from power-on (including reset using interface) until data communication becomes possible after initializing the mechanism. • During the self-test. • During paper feed operation using the paper feed button. • During an error condition. • When the receive buffer is full. (Note 1) When XON/XOFF control is selected, the signal is always SPACE except at the following times: • The period from power-on (including reset using interface) until data communication becomes possible after initializing the mechanism. • During the self-test. • During an error condition.
25	INIT	∗		Changing the DIP switch 1-10 setting enables this signal to be used as a reset signal for the printer (see Section 3.3.1). The printer is reset when the signal remains MARK for 1 ms or more.

Note 1   When the remaining space in the receive buffer is 10 bytes the printer status becomes buffer-full and this status continues until the space in the receive buffer increases to 20 bytes (because data is processed).

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4) XON/XOFF timing

When XON/XOFF control is selected, the TM-U295 transmits XON/XOFF signals as follows:

[XON transmission]

① When the printer first becomes ready to receive data after turning on the power.

② When the receive buffer is released from the buffer full state.

③ When the printer switches from off-line to on-line.

[XOFF transmission]

④ When the receive buffer becomes full.

⑤ When the printer switches from on-line to off-line.

NOTE: The XON code is 17 (11H) and the XOFF code is 19 (13H).

5) Notes on resetting the printer using the interface

The printer can be reset through the interface (pin 6 or 25) by changing the DIP switch settings accordingly (see Table 2.1.2).

Table 2.1.2   DIP Switch Settings for Resetting the Printer

Pin Number	DIP switch status	Reset Condition
Pin 6 (DSR)	1-9 ON	MARK level voltage input
Pin 25 (INIT)	1-10 ON	SPACE or TTL-HIGH level voltage input

To reset the printer, the conditions given below must be satisfied:

Table 2.1.3 Reset Conditions (DC Characteristics)

Item	Symbol	Pin 6 (DSR)	Pin 25 (INIT)
Reset Active Voltage	V_A	-15 V to -3 V	+2 V to +15 V
Reset Negative Voltage	V_N	+3 V to +15 V	-15 V to +0.8 V
Reset Active Current	I_A	-5.3 mA (maximum)	1 mA (maximum)
Reset Negative Current	I_N	5.0 mA (maximum)	-2 mA (maximum)
Input Impedance	R_{IN}	3 KΩ (minimum)	

AC characteristics

Reset signal minimum pulse width: T_{RS} 1 msec

• When pin 6 (DSR) is used (DIP switch 1-9: ON)

• When pin 25 is used (DIP switch 1-10 ON)
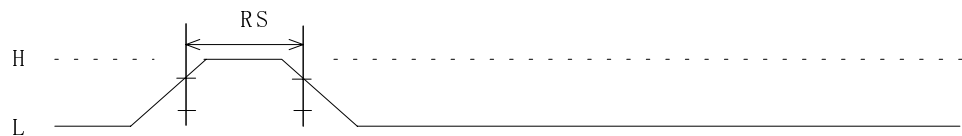
NOTES: 1. Correct printer operation is not guaranteed unless the signals meet the above stated conditions.   The above conditions must also be met when TTL signals are used to drive the INIT reset pin.   If a TTL signal is input to pin 6 (DSR) according to the above conditions, it goes out of the TTL signal operation range. Therefore, pin 6 cannot be controlled.

2. When pin 6 or pin 25 is open, the printer is operating.

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2.1.2 IEEE 1284 bidirectional parallel interface (For parallel interface model)

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1) Specifications

Data transmission:	8-bit Parallel
Synchronization:	Externally supplied nStrobe signals
Handshaking:	nAck and Busy signals
Signal levels:	TTL compatible
Connector:	ADS-B36BLFDR[SERIES or equivalent (1284 Type B) (HONDA TSUSHIN KOGYO Co.Ltd)

Reverse communication (from Printer to Host) from : Nibble or Byte Mode

2) Switching between on-line and off-line

The printer is not equipped with any on-line/off-line switch.   The printer is placed into off-line status in either of the followings:

- When the power is turned on or until the printer becomes ready for data transmission after it is initialized by the reset signal (nInit) from the interface.
- In the process of self-test.
- In the process of paper feeding using the paper feed switch
- When an error has occurred.

3) Reverse Mode (Data Transmission from Printer to Host)

The STATUS data transmission from the printer to the host is proceeded in the Nibble or Byte mode.

- Description

This mode allows data transmission from the asynchronous printer under the control of the host.

Data transmissions in the Nibble Mode are made via the existing control lines in units of four bits (Nibble).   In the Byte Mode, data transmissions are proceeded by making the eight-bits data lines bidirectional.

The both modes fail to be proceeded concurrently with the Compatibility Mode, thereby causing half duplex transmission.

For detail description, refer to APPENDIX H.   The 1284 Nibble/Byte Modes may be modified without any notice.

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4) Interface Pin Assignments for Each Mode

Pin	Source	Compatibility Mode	Nibble Mode	Byte Mode
1	Host	nStrobe	HostClk	HostClk
2	Host/Ptr	Data0(LSB)	Data0(LSB)	Data0(LSB)
3	Host/Ptr	Data1	Data1	Data1
4	Host/Ptr	Data2	Data2	Data2
5	Host/Ptr	Data3	Data3	Data3
6	Host/Ptr	Data4	Data4	Data4
7	Host/Ptr	Data5	Data5	Data5
8	Host/Ptr	Data6	Data6	Data6
9	Host/Ptr	Data7(MSB)	Data7(MSB)	Data7(MSB)
10	Printer	nAck	PtrC1k	PtrClk
11	Printer	Busy	PtrBusy/Data3, 7	PtrBusy
12	Printer	PError	AckDataReq/Data2, 6	AckDataReq
13	Printer	Select	Xflag/Data1, 5	Xflag
14	Host	nAutoFd	HostBusy	HostBusy
15		NC	ND	ND
16		GND	GND	GND
17		FG	FG	FG
18	Printer	Logic-H	Logic-H	Logic-H
19		GND	GND	GND
20		GND	GND	GND
21		GND	GND	GND
22		GND	GND	GND
23		GND	GND	GND
24		GND	GND	GND
25		GND	GND	GND
26		GND	GND	GND
27		GND	GND	GND
28		GND	GND	GND
29		GND	GND	GND
30		GND	GND	GND
31	Host	nInit	nInit	nInit
32	Printer	nFault	nDataAvail/Data0, 4	nDataAvail
33		GND	ND	ND
34	Printer	DK_STATUS	ND	ND
35	Printer	+5V	ND	ND
36	Host	nSelectIn	1284-Active	1284-Active

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				NEXT 11-3	SHEET 11-2

NOTE: 1. A prefix "n" to signal names refers to "L" active signals. To the host provided with none of the signal lines listed above, both-way communication fails.

2. For interfacing, signal lines shall use twisted pair cables with the return sides connected to signal ground level.

3. Interfacing conditions shall be all based on the TTL level to meet the characteristics described below. In addition, both rise time and fall time of each signal shall be 0.5ms or less.

4. Data transmission shall not ignore the signal nAck or Busy. An attempt to transmit data with either signal, nAck or Busy, ignored can cause lost data. (Data transmissions to the printer shall be made after verifying the nAck signal or while the Busy signal is at the "L" level.)

5. Interface cables shall be as minimum required short in length as possible.

    * NC: No Connect
       ND: Not Defined

5) Electrical Characteristics

DC Characteristics (Except Logic-H, + 5 V signals)

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	*2.4 V	5.5 V	*I_{OH}=0.32mA
Output LOW voltage	V_{OL}	-0.5 V	*0.4 V	*I_{OL}=-12mA
Output HIGH current	I_{OH}	0.32 mA	-	V_{OH}=0.32V
Output LOW current	I_{OL}	-12 mA	-	V_{OL}=0.4V
Input HIGH voltage	V_{IH}	2.0 V	-	
Input LOW voltage	V_{IL}	-	0.8 V	
Input HIGH current	V_{IH}	-	-0.32 mA	V_{IH}=2.0V
Input LOW current	V_{IL}	-	12 mA	V_{IL}=0.8V

Logic-H Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	V_{OH}	3.0 V	5.5 V	
Output LOW voltage	V_{OL}	-	2.0 V	While the power is OFF

+5 V Signal Sender Characteristics

Characteristics	Symbol	Specifications		Conditions
		Min	Max	
Output HIGH voltage	VOH	*2.4 V	5.5 V	*IOH=0.32mA
Output LOW voltage	VOL	-	- **	While the power is OFF
Output HIGH current	IOH	-	0.32 mA	VOH=2.4V
Output LOW current	IOL	- **	-	While the power is OFF

** No guarantee is offered to VOL and IOL while the power is OFF.

6) Compatibility Mode
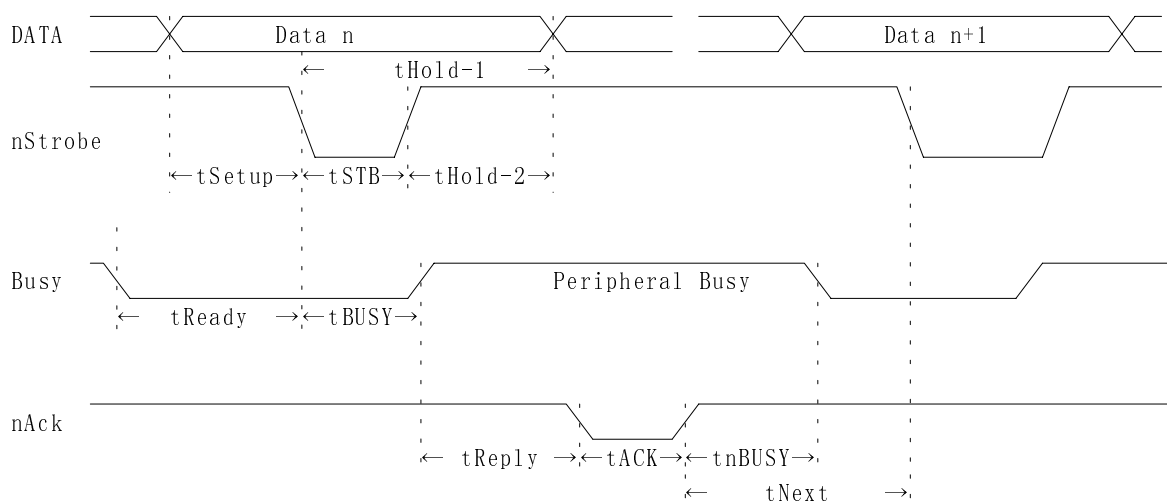
Characteristics	Symbol	Specifications	
		Min [ns]	Max [ns]
Data Hold Time (host)	tHold-1	--	500
Data Hold Time (printer)	tHold-2	--	--
Data Setup Time	tSetup	--	500
STROBE Pulse Width	tSTB	--	500
READY Cycle Idle Time	tReady	--	--
BUSY Output Delay Time	tBUSY	0	500
Data Processing Time	tReply	0	∞
ACKNLG Pulse Width	tACK	500	10μs
BUSY Release Time	tBUSY	0	∞
ACK Cycle Idle Time	tNEXT	--	0

* The printer latches data at a falling edge of nStrobe.

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7) Notes on resetting the printer through the interface

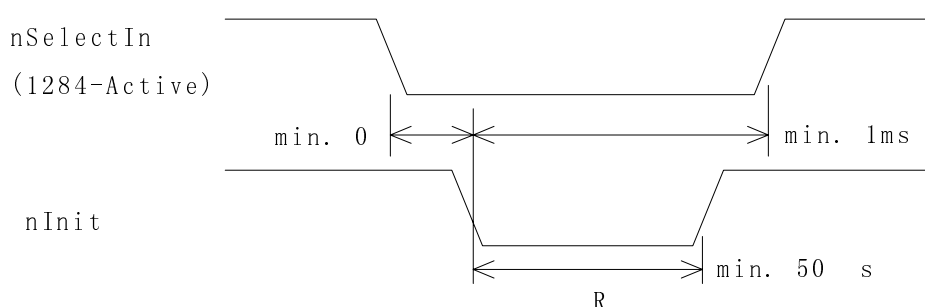The printer reset is available through the interface nInit signal (#31 pin) by changing the DIP switch setting. (Refer to Table 3.3.3 DIP Switch 1.)

Table 2.1.4   DIP Switch Setting for Printer Reset

Signal Line	DIP Switch	Reset Condition
#31 Pin (nInit)	DSW 1-10: ON	TTL-LOW level input

The printer reset through the nInit signal is only available with the SelectIn(1284-Active) signal at LOW.

To enable the printer reset, the following signal timing shall be satisfied.

Minimum reset pulse width TR: 50 μs (min)

```
nSelectIn
(1284-Active)
                      min. 0  |←→|              →|       |← min.  1ms

nInit
                                |←              →| min.  50  s
                                      R
```

2.1.3   Reception of status from the printer through the bidirectional parallel interface

In the bidirectional parallel interface specifications, the printer status transmission is available by using the both-way communication facility in the Nibble/Byte Modes in accordance with the 1284.

In this case, different from in the RS-232 serial interface specifications, the real-time interruptions from the printer to the host are disabled and thus precautions must be taken to the followings.

1) Allowable capacity of the printer internal buffer is 100 bytes (except ASB status). The status signals exceeding this capacity will be discarded. To prevent possible loss of status, the host shall be ready for data acception (Reverse Mode).

2) When ASB is used, the host is preferably in the wait state for data acception (Reverse Idle Mode). When this state is not available, the host shall enter the Reverse Mode to always monitor the presence of data.

3) When ASB is used, preference shall be given to the ASB status for transmission over the other status signals. Any accumulated ASB status signals left for transmission from the last to the newest ASB status transmission shall be transmitted together at a time as one ASB status showing the presence of change, followed by the latest ASB status.

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Example: In the normal (wait) state, the ASB status is configured as follows.

First Status	Second Status	Third Status	Fourth Status
0000 0000	0000 0000	0000 0000	0000 0000

When a sequence of operations such as, BOF paper-out detection → FORWARD button ON → FORWARD button OFF, are proceeded, the following pieces of data are accumulated.

	First Status	Second Status	Third Status	Fourth Status	
①	0000 0000	0000 0000	0010 0000	0000 0000	BOF paper-out detection
②	0100 1000	0000 0000	0010 0000	0000 0000	FORWARD button ON
③	0000 0000	0000 0000	0010 0000	0000 0000	FORWARD button OFF

When the ASB status is received following this, a total of eight (8) bytes of ASB will be transmitted as follows.

	First Status	Second Status	Third Status	Fourth Status
Accumulated ASB (①+②+③)	0100 1000	0000 0000	0010 0000	0000 0000

+

	First Status	Second Status	Third Status	Fourth Status
The latest ASB (③)	0000 0000	0000 0000	0010 0000	0000 0000

2.2 Connectors

Interface connector   F.G   Drawer kick-out connector   DC24V
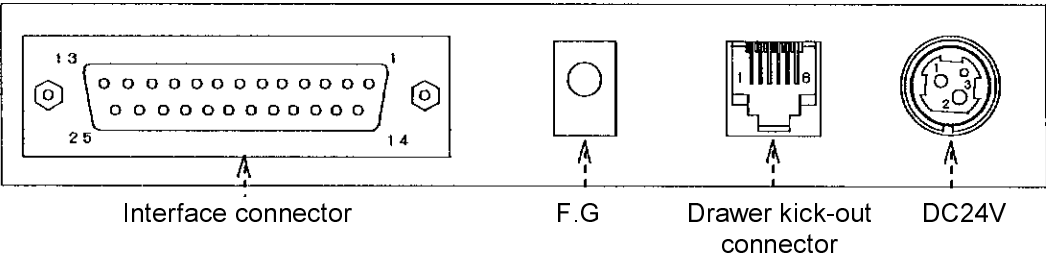
Figure 2.2.1 Serial Interface Connector panel External Appearance

Interface connector   F.G   Drawer kick-out connector   DC24V
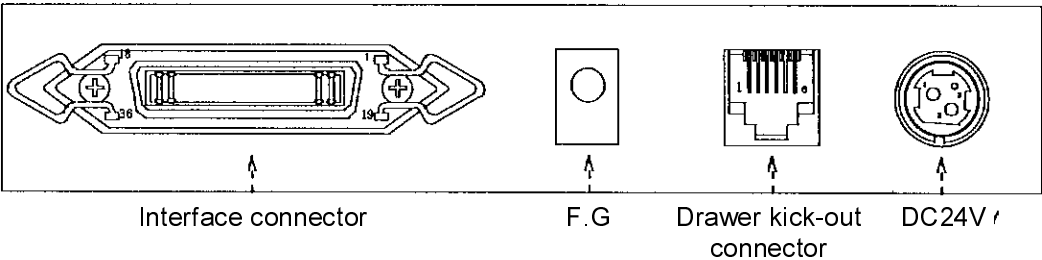
Figure 2.2.2 Parallel Interface Connector Panel External Appearance

2.2.1 Interface connector

Refer to Section 2.1, Interface.

2.2.2 Power supply connector

This connector is used to connect an external power source.

1) Pin assignments: Refer to   Table 2.2.1.
2) Model: Hosiden TCS7960-532010
3) Host side: Hosiden TCP8927-631110

Table 2.2.1 Power Supply Connector Pin Assignments

Pin Number	Signal Name
1	+24 VDC
2	GND
3	NC
Shell	Frame GND

Shell

2.2.3 Drawer kick-out connector

A pulse specified by the **ESC p** command is output to this connector.　The status of input signal is informed to the host computer by **ESC u**, **GS a**, **GS r**, or **DLE EOT**.

1) Pin assignments (modular connector)

Table 2.2.2 Drawer Kick-out Connector Pin Assignments

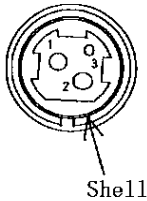| Pin Number	Signal name	Direction
1	Frame GND	--
2	Drawer Kick-out driver signal 1	Output
3	Drawer open/close signal	Input
4	+24V	--
5	Drawer kick-out drive signal 2	Output
6	Signal GND	--
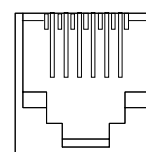
2) Drawer open/close signal

Input signal level:　　　　LOW = 0 V

　　　　　　　　　　　　HIGH = 2 to 5 V (at connector pin 3)

3) Drawer kick-out drive signal

Output signal:　　　　Voltage:　　　Approximately 24 VDC

　　　　　　　　　　Current:　　　1 A or less
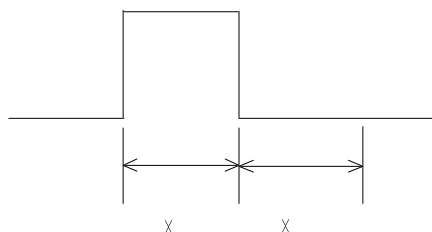
Figure 2.2.3 Drawer Kick-out Drive Signal Waveform

NOTE: The resistance of the drawer kick-out solenoid must not be less than that specified (24 Ω). Otherwise, an overcurrent could damage the solenoid.

Output waveform: Outputs the waveform in Figure 2.2.3 to points A and B in Figure 2.2.4. (The **ESC p** command specifies ON time *t1* and OFF time *t2*.)
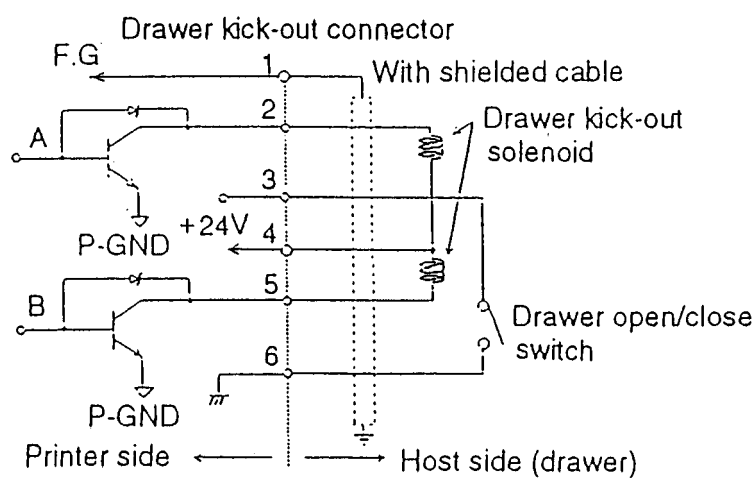
Figure 2.2.4 Drawer Circuitry

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3. FUNCTIONS

3.1 Commands

3.1.1 Command description

The command system of the TM-U295/U295P is based on ESC/POS and has both Standard Mode and Page Mode.

1) Standard Mode

The standard command system uses the printer as a common serial terminal printer.   Printing and control functions are executed immediately after the commands are received.

2) Page Mode

The print command is stored in the specified printable area in memory.   After all the data has been stored, the printer prints it at one time.

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3.1.2 Command list

Command	Name	Classification		Standard Mode	Page Mode	Added Command
		Execution	Setting			
HT	Horizontal tab	∗		∗	∗	
LF	Print and line feed	∗		∗	∗	
FF	Print and eject cut sheet/Print and return to standard mode	∗		∗	∗	
CR	Print and carriage return	∗		∗	∗	
DLE EOT	Real-time status transmission	∗		∗	∗	∗
CAN	Cancel print data in page mode	∗		Disable	∗	
ESC SP	Set right-side character spacing		∗	∗	∗	
ESC !	Select print mode(s)		∗	∗	◆	
ESC %	Select/cancel user-defined character set		∗	∗	∗	
ESC &	Define user-defined characters		∗	∗	∗	
ESC ∗	Select bit-image mode	∗		∗	▲	
ESC 2	Select the inital line spacing		∗	∗	∗	
ESC 3	Set line spacing		∗	∗	∗	
ESC =	Select peripheral device		∗	∗	∗	
ESC @	Initialize printer	∗	∗	∗	∗	∗
ESC C	Set cut sheet eject length		∗	∗	∗	
ESC D	Set horizontal tab positions		∗	∗	∗	
ESC F	Set/cancel cut sheet reverse eject		∗	∗	∗	
ESC J	Print and feed paper	∗		∗	∗	
ESC K	Print and reverse feed	∗		∗	Disable	
ESC L	Select page mode	∗		(Line)	Disable	
ESC R	Select an international character set		∗	∗	∗	
ESC T	Select print direction in page mode		∗	■	∗	
ESC W	Set printing area in page mode		∗	■	∗	
ESC c 3	Select paper sensor(s) to output paper end signals		∗	∗	∗	
ESC c 4	Select paper sensor(s) to stop printing		∗	∗	∗	
ESC c 5	Enable/disable panel button		∗	∗	∗	
ESC d	Print and feed *n* lines	∗		∗	∗	
ESC e	Print and reverse feed *n* lines	∗		∗	Disable	
ESC f	Set cut sheet wait time		∗	∗	∗	
ESC p	Generate pulse	∗		∗	∗	
ESC q	Release	∗		∗	Disable	
ESC t	Select character code table		∗	∗	∗	
ESC u	Transmit peripheral device status	∗		∗	∗	
ESC v	Transmit paper sensor status	∗		∗	∗	
ESC {	Turn upside-down printing mode on/off		∗	(Line)	■	

Command list (continued)

Command	Name	Classification		Standard Mode	Page Mode	Added Command
		Execution	Setting			
GS I	Transmit printer ID	∗		∗	∗	∗
GS a	Enable/disable Automatic Status Back (ASB)	∗	∗	∗	∗	∗
GS r	Transmit status	∗		∗	∗	∗

Command Classification

Execution commands: Printer executes the command function once and does not affect the following data.

Setting commands: The command is retained by a flag and affects the following data.

Standard mode: ∗ : Available
(Line):Effective only at the beginning of the line.

■: Setting is kept but does not have any effect.

Page mode: ∗ : Available

▲: Some data is ignored.

■: Setting is kept but does not have any effect.

◆: For some functions, setting is kept but does not have any effect.

Disabled: Parameters are processed as part of the following data.

3.2 Character Code Tables

3.2.1 Page 0 (PC437: U.S.A., Standard Europe)

HEX	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
BIN	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0 / 0000	NUL	DLE	SP	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1 / 0001		XON	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2 / 0010			"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3 / 0011	EOT	XOFF	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4 / 0100	ENQ		$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5 / 0101			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6 / 0110			&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7 / 0111			'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8 / 1000	HT	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9 / 1001	LF		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
A / 1010			*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B / 1011		ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C / 1100	FF		,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
D / 1101	CR	GS	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
E / 1110			.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
F / 1111			/	?	O	_	o	SP	Å	ƒ	»	┐	╧	▀	∩	SP

NOTE: The actual print patterns differ from those in the above character code.

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3.2.2 Page 1 (Katakana)

HEX	BIN	8 (1000)	9 (1001)	A (1010)	B (1011)	C (1100)	D (1101)	E (1110)	F (1111)
0	0000	─ 128	⊥ 144	SP 160	ー 176	タ 192	ミ 208	═ 224	× 240
1	0001	▬ 129	┬ 145	｡ 161	ア 177	チ 193	ム 209	┠ 225	門 241
2	0010	▬ 130	┤ 146	｢ 162	イ 178	ツ 194	メ 210	╪ 226	年 242
3	0011	▬ 131	├ 147	｣ 163	ウ 179	テ 195	モ 211	┦ 227	川 243
4	0100	▪ 132	148	、 164	エ 180	ト 196	ヤ 212	◢ 228	日 244
5	0101	■ 133	─ 149	・ 165	オ 181	ナ 197	ユ 213	◣ 229	時 245
6	0110	■ 134	│ 150	ヲ 166	カ 182	ニ 198	ヨ 214	◥ 230	分 246
7	0111	■ 135	┃ 151	ァ 167	キ 183	ヌ 199	ラ 215	◤ 231	秒 247
8	1000	┃ 136	┌ 152	ィ 168	ク 184	ネ 200	リ 216	♠ 232	〒 248
9	1001	┃ 137	┐ 153	ゥ 169	ケ 185	ノ 201	ル 217	♥ 233	市 249
A	1010	┃ 138	└ 154	ェ 170	コ 186	ハ 202	レ 218	♦ 234	区 250
B	1011	┃ 139	┘ 155	ォ 171	サ 187	ヒ 203	ロ 219	♣ 235	町 251
C	1100	┃ 140	┍ 156	ャ 172	シ 188	フ 204	ワ 220	● 236	村 252
D	1101	┃ 141	┑ 157	ュ 173	ス 189	ヘ 205	ン 221	○ 237	人 253
E	1110	■ 142	┙ 158	ョ 174	セ 190	ホ 206	゛ 222	／ 238	▨ 254
F	1111	┼ 143	┚ 159	ッ 175	ソ 191	マ 207	゜ 223	＼ 239	SP 255

NOTE: The actual print patterns differ from those in the above character code table.

3.2.3 Page 2 (PC850: Multilingual)

HEX	BIN	8 (1000)	9 (1001)	A (1010)	B (1011)	C (1100)	D (1101)	E (1110)	F (1111)
0	0000	Ç 128	É 144	á 160	▓ 176	└ 192	ð 208	Ó 224	─ 240
1	0001	ü 129	æ 145	í 161	▓ 177	┴ 193	Ð 209	ß 225	± 241
2	0010	é 130	Æ 146	ó 162	▓ 178	┬ 194	Ê 210	Ô 226	‗ 242
3	0011	â 131	ô 147	ú 163	│ 179	├ 195	Ë 211	Ò 227	¾ 243
4	0100	ä 132	ö 148	ñ 164	┤ 180	─ 196	È 212	õ 228	¶ 244
5	0101	à 133	ò 149	Ñ 165	Á 181	┼ 197	ı 213	Õ 229	§ 245
6	0110	å 134	û 150	ª 166	Â 182	ã 198	Í 214	µ 230	÷ 246
7	0111	ç 135	ù 151	º 167	À 183	Ã 199	Î 215	þ 231	¸ 247
8	1000	ê 136	ÿ 152	¿ 168	© 184	╚ 200	Ï 216	Þ 232	° 248
9	1001	ë 137	Ö 153	® 169	╣ 185	╔ 201	┘ 217	Ú 233	¨ 249
A	1010	è 138	Ü 154	¬ 170	║ 186	╩ 202	┌ 218	Û 234	· 250
B	1011	ï 139	ø 155	½ 171	╗ 187	╦ 203	■ 219	Ù 235	¹ 251
C	1100	î 140	£ 156	¼ 172	╝ 188	╠ 204	▄ 220	ý 236	³ 252
D	1101	ì 141	Ø 157	¡ 173	¢ 189	═ 205	¦ 221	Ý 237	² 253
E	1110	Ä 142	× 158	« 174	¥ 190	╬ 206	Ì 222	¯ 238	■ 254
F	1111	Å 143	ƒ 159	» 175	┐ 191	¤ 207	▀ 223	´ 239	SP 255

NOTE: The actual print patterns differ from those in the above character code table.

3.2.4 International character set

Country name	HEX / DEC	23 / 35	24 / 36	40 / 64	5B / 91	5C / 92	5D / 93	5E / 94	60 / 96	7B / 123	7C / 124	7D / 125	7E / 126
						ASCII code							
0 U.S.A.		#	$	@	[	\	]	^	`	{	¦	}	~
1 France		#	$	à	°	ç	§	^	`	é	ù	è	¨
2 Germany		#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
3 England		£	$	@	[	\	]	^	`	{	¦	}	~
4 Denmark I		#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
5 Sweden		#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
6 Italy		#	$	@	°	\	é	^	ù	à	ò	è	ì
7 Spain		Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
8 Japan		#	$	@	[	¥	]	^	`	{	¦	}	~
9 Norway		#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
10 Denmark II		#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü

NOTE: The actual print patterns differ from those in the above character code table.

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3.3   Buttons and Switches

3.3.1   Panel buttons

The **ESC c 5** command enables the panel buttons.   When disabled, none of the buttons will not function.

1) Release button (RELEASE) (Non-locking push button)
   Function: Release the paper.

2) Reverse button (REVERSE) (Non-locking push button)
   Function: Feeds paper backward based on the line feed amount set by **ESC 2** and **ESC 3**.

3) Forward button (FORWARD) (Non-locking push button)
   Function: Feeds paper forward based on the line feed amount set by **ESC 2** and **ESC 3**.

3.3.2 Power switch (located at the left side of the printer)

Function: Turns on or off the printer power.   To start the self-test, hold down the release button and press this switch.

Note: This switch is located at the left side of the printer.   When the printer is turned off using this switch, the RAM is completely initialized.

3.3.3 DIP switches

1) For serial interface model

Table 3.3.1 DIP Switch 1

DIP Switch 1	Function	ON	OFF
1	Data receive error	Ignored	Prints "?".
2	Receive buffer capacity	Data buffer 35 bytes	Data buffer 512 bytes
3	Handshaking	XON/XOFF	DTR/DSR
4	Data word length	7 bits	8 bits
5	Parity check	Yes	No
6	Parity selection	Even	Odd
7 8	Baud rate selection	Transmission speed selection Refer to Table 3.3.2.	
9	Pin 6: Reset signal	Used	Not used
10	Pin 25: Reset signal	Used	Not used

Table 3.3.2   Transmission Speed

DIP Switch 1-8	DIP Switch 1-7	Transmission Speed
ON	ON	1200 bps
ON	OFF	2400 bps
OFF	ON	4800 bps
OFF	OFF	9600 bps

NOTES: 1 The DIP switch settings, except for Pin 6 : Reset Signal (1-9) and Pin 25 : Reset Signal (1-10), are effective only when the power is turned on.   Therefore, once the power is has been turned on, changing the settings is ineffective.

2 If the DIP switches 1-9 or 1-10 are set to ON while the power is supplied, the printer may be reset depending on the state of the signal lines, so do not change the DIP switch settings while power is supplied.

2) For parallel interface model

Table 3.3.3 DIP Switch 1

DIP Switch 1	Function	ON	OFF
1	Automatic line feed	Always enable	Always disable
2	Receive buffer capacity	Data buffer 35 bytes	Data buffer 512 bytes
3	Undefined		
4	Undefined		
5	Undefined		
6	Undefined		
7	Undefined		
8	Undefined		
9	Undefined		
10	Internal use	Fixed to ON	

NOTES: 1 The DIP switch settings are effective only when the power is turned on.   Therefore, once the power has been turned on, changing the settings is ineffective.

2 The DIP switch settings 1-10 must always be set to ON.

3.4 Panel LED Indicators

3.4.1 Panel LED

1) Power LED (POWER):   Green

   On: Power supply of +24 V is stable.

   Off: Power supply of +24 V is not stable.

2) Release LED (RELEASE):   Green

   On: Paper release state (paper can be manually repositioned.)
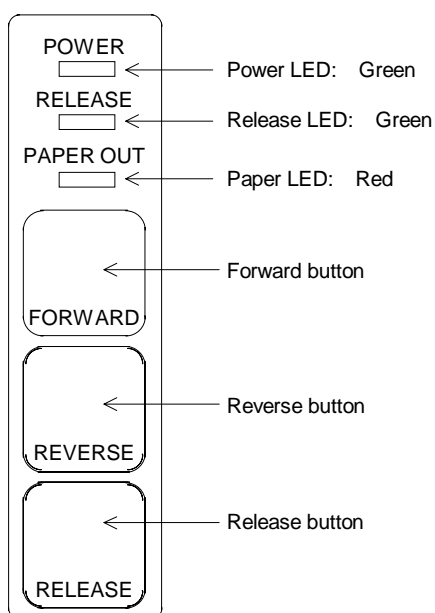
   Off: Paper clamp state (paper is held by the printer.)

   Blinking: Error state.

3) Paper LED (PAPER OUT) :   Red

   On: Either BOF or TOF sensor has detected the paper out state (it lights regardless of whether sensors are enabled/disabled.)

   Off: Both BOF and TOF sensors detect paper.

Figure 3.4.1   Panel Buttons and Indicators

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3.5 Self-test

1) The printer has a self-test that checks the following:
   □ Control circuit functions
   □ Printer mechanisms
   □ Print quality
   □ Control ROM version
   □ RAM
   □ DIP switch settings

2) Starting the self-test

   To start the self-test on slip paper, hold down the RELEASE button while you turn on the printer. Then release the RELEASE button. The printer is now in the slip paper standby state. Insert a sheet of slip paper. The printer prints the current settings and ejects the slip paper.

3) Self-test printing

   Press the RELEASE button. Insert another sheet of slip paper and the printer will print characters from its character sets. During the self test, the printer will stop whenever it is out of paper. When this happens, press the RELEASE button and insert another sheet of slip paper.

4) Ending the self-test

   Continue this process until the printer indicates the end of the self test by printing "∗∗∗ completed ∗∗∗", ejects the slip paper, and goes into the normal mode.

3.6 Error Processing

3.6.1 Mechanical errors

1) Error detection

The TM-U295/U295P detects the following mechanical error states:

- □ Abnormal load due to paper jams.
- □ Abnormal home position error.
- □ Abnormal timing error.
- □ Drive circuit error.
- □ Power supply voltage error (only at power-on)

The TM-U295/U295P performs as follows when it detects an error:

<Serial interface model>

- □ Stops all mechanical operation.
- □ Sets the DTR signal to MARK.
- □ Blinks the RELEASE LED.
- □ Transmits XOFF if XON/XOFF control is selected.

<Parallel interface model>

- □ Stops all mechanical operation.
- □ Sets the Busy signal to HIGH.
- □ Blinks the RELEASE LED.
- □ Sets the nFault signal to LOW.

2) Error recovery

The TM-U295/U295P recovers from an error state by turning off the power, correcting the error, and then turning the power back on.

3.6.2 Data receive error

If a parity, framing, or overrun error occurs, the printer ignores the corresponding data or prints a question mark (?), according to the setting of DIP switch 1-1.

3.7 Paper Sensors

Two types of paper sensors are equipped as follows:

- TOF sensor
- BOF sensor

3.7.1 Sensors and LED indicators

The paper out LED indicator lights when either the BOF or TOF sensor detects a paper-out, regardless of whether the sensor is enabled or disabled.

3.7.2 Sensors and printing operation

When a paper-out is detected, whether printing stops or not is selected by **ESC c 4**.   The related sensors are as follows:

- TOF sensor
- BOF sensor

When printing stops by detecting a paper-out, the printer stops after printing and feeding the current line. If the panel buttons are disabled, the printer automatically releases the paper and waits for another slip to be inserted.

3.8 Buffer-full Printing

When more print data is received after processing one line of data, the printer automatically prints the processed data and feeds the paper one line.

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3.9 Page Mode

3.9.1 General descriptions

The printer operates in two modes: standard mode and page mode.   In standard mode, the printer prints and feeds paper each time it receives print and paper feed commands.   In page mode, all the received print and paper feed commands are processed in the specified memory, and the printer executes no operations.   All the data in the memory is then printed collectively when an **FF** command is received.

For example, when the printer prints the data "ABCDEF" and feeds the line, "ABCDEF" is printed and the paper is fed one line in standard mode.   In page mode, "ABCDEF" is written to the specified printing area in memory, and the position in memory for the next print data is shifted by one line.

The **ESC L** command puts the printer into page mode and commands received thereafter are processed in page mode.   Executing an **FF** command collectively prints the received data and then restores the printer to standard mode. By executing an **ESC @** command, printer returns to standard mode without printing the received data.
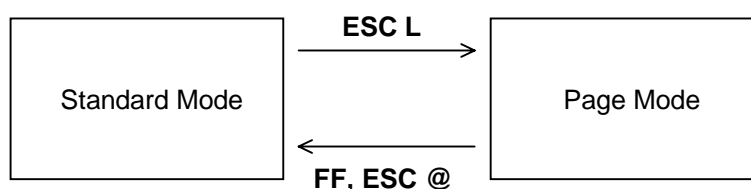

Figure 3.9.1   Print Modes

3.9.2 Page mode limitations

Page mode has the following limitations:

1) Half-dots are not usable

Page mode can handle only normal dots.   Therefore, the 7 × 7 dot font, user-defined characters including half-dots, and bit images cannot be specified. Since setting values with the **ESC SP** and **ESC D** commands use half-dot reference, these values must be converted into values referenced to normal dots.   Under these command conditions, displacement by one half-dot may occur.

The following command has no effect in page mode, but it becomes effective when printer returns to standard mode:

□ 7 × 7 font specification using **ESC !**.

The following specifications are disabled in page mode:

□ Double-density bit image specification using **ESC ∗**.

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2) Reverse feed commands are disabled.

In page mode, data can be written freely in the specified printing area. Therefore, the following commands which feeds paper in reverse direction is disabled:

ESC K, and **ESC e**

3) Up-side down printing mode has no effect in page mode.

In page mode, characters and bit images can be rotated in increments of 90°, and also printing is available any of four directions. Therefore, the **ESC {** command which turns on or off up-side down printing mode has no effect in page mode.

4) Double-strike printing cannot be performed.

In page mode, data written twice to the same area is logically OR'ed before printing. Therefore, double-strike mode cannot be used to emphasize characters.

5) Underline mode has no effect in page mode.

In page mode, because characters and bit images can be overlapped, underline by **ESC !** is not drawn. But it becomes effective when printer returns to standard mode. In this case, bit images can be used, instead of underline mode. (Broken line, wavy line, etc. are also available.)

3.9.3   Setting values in standard and page modes

1) The values set by commands are common to both standard and page modes. However, values are set independently in each mode for **ESC SP**, **ESC 2**, and **ESC 3**.

2) Although the maximum number of printable dots for a bit image is 210 in standard mode, 480 bit-image dots can be printed in the y direction (paper feeding direction) in page mode. This is possible only when 480 printable-area dots in the y direction have been specified using **ESC W**, and the printing direction value n in the **ESC T** command is 1 or 3).

3.9.4   Development of print data in the printing area

Development of print data in the printing area is performed as follows:

① The printing area is set using **ESC W**. When all printing and feeding are complete before the printer receives the **ESC W** command, the left side as you face the printer is taken as the origin (x0, y0) of the printing area. The printing rectangular area is defined by the length (dx dots) extending from and including the origin (x0, y0) in the x direction (perpendicular to the paper feed direction), and by the length (dy dots) in the y direction (paper feed direction).

When the printer receives print data after **ESC W** sets the printing area and **ESC T** sets the printing direction, the print data is developed within the printing area so that the highest dot of the print data is at the beginning of the printing area. (See the **ESC ✶** command description in Section 6.2 and Appendix F)

Since print data containing double-height and quadruple-size characters is developed so that only the lower 7 dots of these characters are included in the printing area, execute a line feed (**LF**) before the print data to allow the remaining higher dots to be printed.

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② If the print data exceeds the printing area (including the space to the right of a character) before a command that is followed by line feeding (**LF**, **ESC J**, etc.) is received, line feeding is executed automatically within the printing area.   The development position therefore moves to the beginning of the next line. The line feed amount depends on the values set by command (**ESC 2**, **ESC 3**, etc.).

If the print data for the next line contains double-height or quadruple-size characters, the amount of line feeding may be insufficient, resulting in overlapping of the characters' higher-order dots with the previous line.   To avoid this, increase the amount of line feeding.

4. CASE SPECIFICATIONS

4.1 Overall Dimensions and Weight

Height: 101.5 mm (4.0")
Width: 180 mm (7.09")
Depth: 190.5 mm (7.50") (except for the interface connector projection)
Weight: Approximately 1.6 kg (3.52 lbs)

4.2 Color

EPSON standard gray

4.3 Notes on Transportation

Before repacking and storing the printer, move the print head to the left and insert the damper.

(Release the printer by pressing the RELEASE button, then press the FORWARD button, and the print head is moved to the left automatically.)
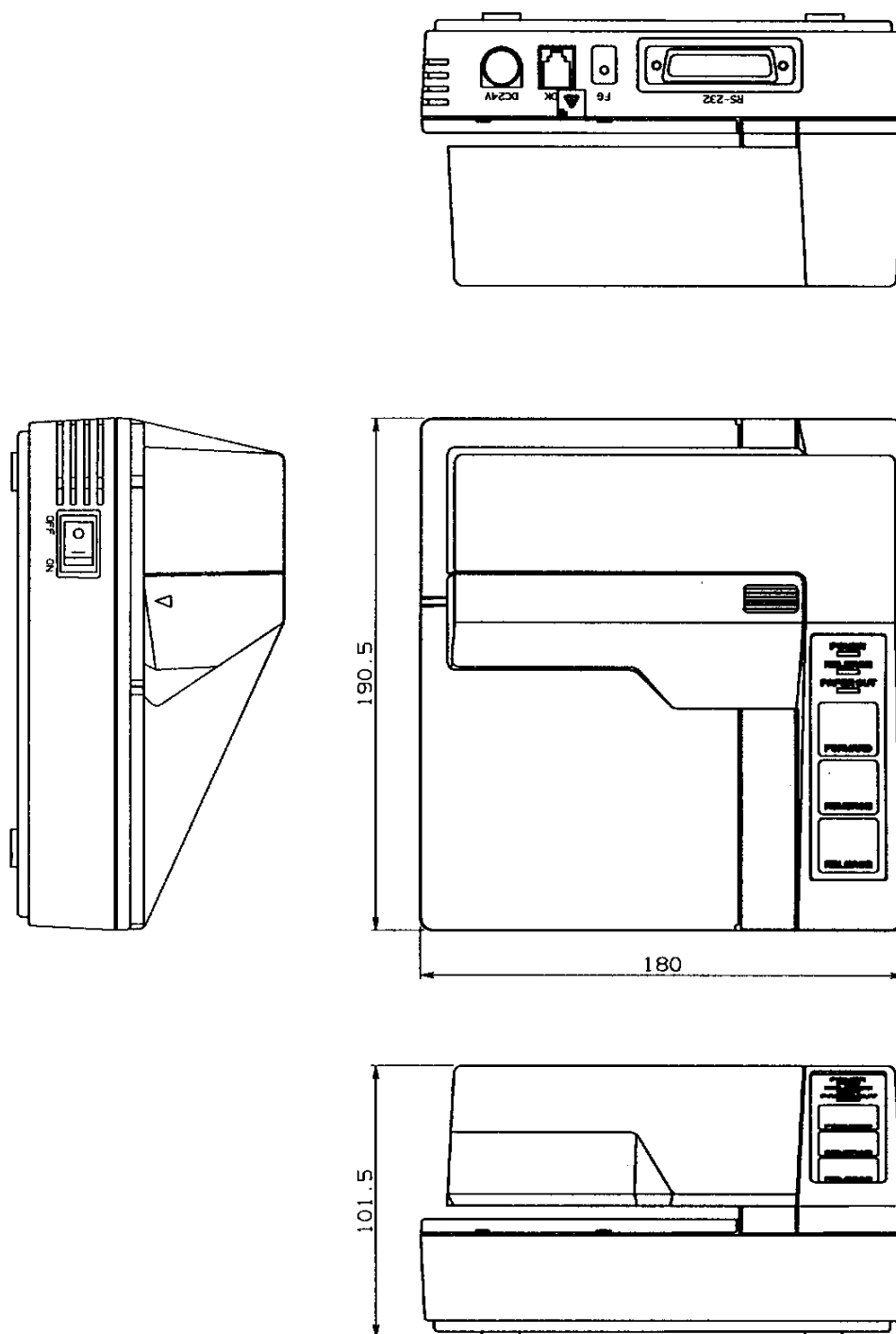
4.4 External Appearance

Figure 4.4.1   External Appearance (Serial interface model)

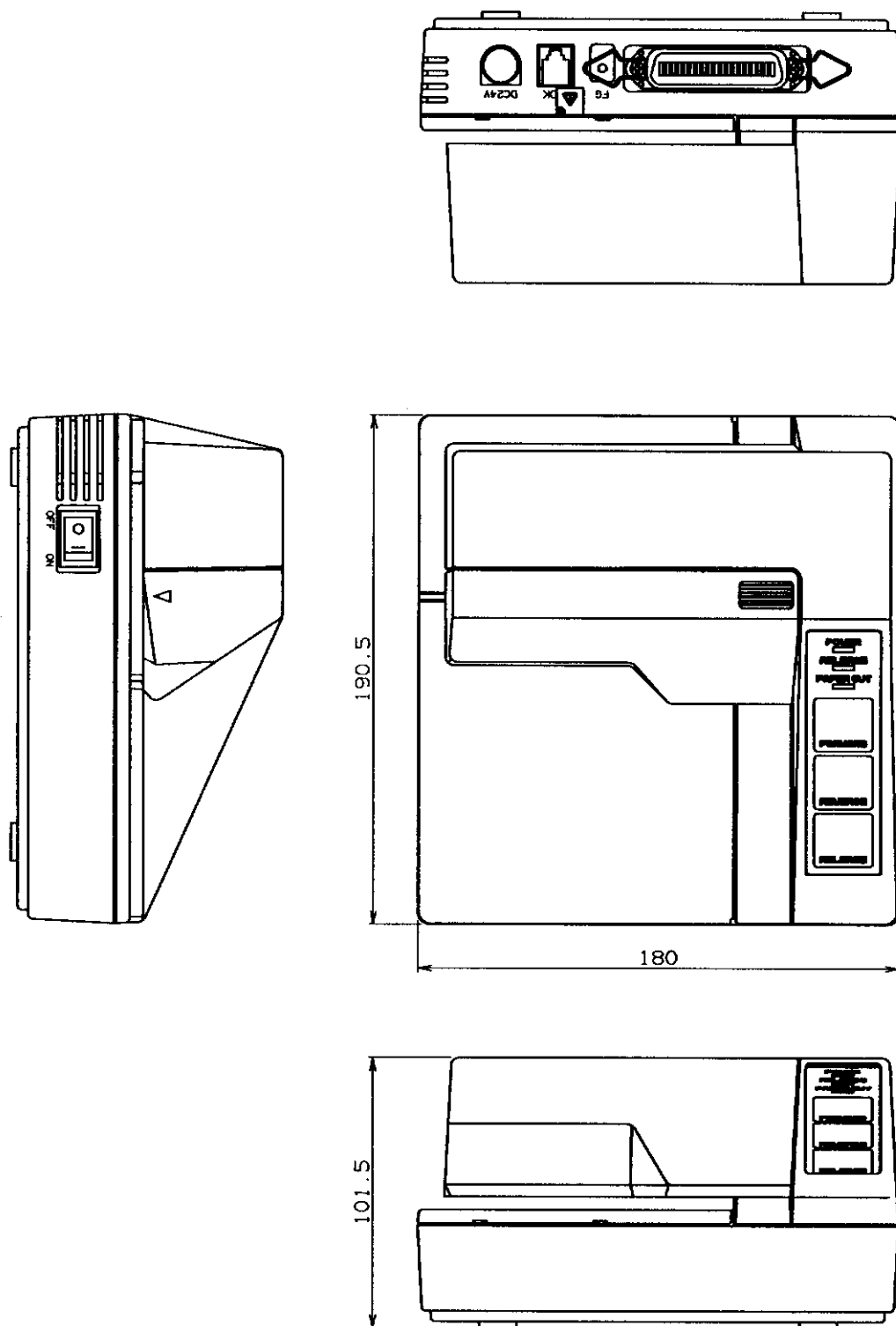| EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION F	NO.	
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Figure 4.4.2　External Appearance (Parallel interface model)

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5. ACCESSORIES AND OPTION

5.1 Standard Accessories

□ Exclusive ribbon cassette

□ Installation manual

□ Hexagon lock screws (mm-size, only for overseas's specifications)

5.2 Option

External power supply PS-150

Exclusive power supply unit: EPSON PS-150

Specifications

Input:	90 to 132 VAC/198 to 264 VAC
	AC inlet type
	Power supply type is selectable depending on country (North America, Europe I, Europe II, and Japan).
Output:	24 VDC with exclusive DC cable
Size:	86 mm (W) × 166 mm (D) × 44 mm (H) (3.39" × 6.54" × 1.73")
Case material:	Plastic (black)
Safety standards:	UL/C-UL/T⚬V (already certified)
CE marking	Already acquired

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6. COMMAND DESCRIPTIONS

6.1 Command Notation

XXXX

[Name]	The name of the command.
[Format]	The code sequence.
	ASCII indicates the ASCII code.
	[ ]*k* indicates that the contents of the [ ] should be repeated *k* times.
[Range]	Gives the allowable ranges for the arguments.
[Description]	Describes the function of the command.
[Notes]	Provides important information on setting and using the printer command, if necessary.
[Default]	Gives the default values if any for the command arguments.
[Reference]	Lists related commands.

< >H indicates the hexadecimal equivalents.

< >B indicates the binary equivalents.

< > indicates the decimal equivalents.

Beginning of the line

The beginning of the line indicates the following condition:

No data (including spaces skipped by **HT**) has been received in the current print buffer.

6.2 Command Descriptions

HT

[Name]	Horizontal tab
[Format]	ASCII HT Hex 09 Decimal 9
[Description]	Moves the print position to the next horizontal tab position.
[Notes]	▫ Horizontal tab positions are set with **ESC D**. ▫ This command is ignored unless the next horizontal tab position has been set. ▫ The default tab positions are at intervals of 8 characters in the 5 × 7 font (9th column, 17th column, 25th column ...).
[Reference]	**ESC D**

LF

[Name]	Print and line feed
[Format]	ASCII LF Hex 0A Decimal 10
[Description]	Prints the data in the print buffer and feeds one line based on the current line spacing.
[Note]	This command sets the print position to the beginning of the line.
[Reference]	**ESC 2**, **ESC 3**

FF

[Name]	① Print and eject cut sheet (in standard mode)
	② Print and return to standard mode (in page mode)
[Format]	ASCII FF
	Hex 0C
	Decimal 12

This command functions differently depending on the printer mode selected.

① When standard mode is selected:

[Description]	Prints the data in the print buffer and ejects the sheet.
[Notes]	▫ When the eject length has been set by **ESC C**, the printer ejects the sheet based on the current eject length. Otherwise, the printer ejects the sheet completely. If a paper out is detected during ejection, the printer stops ejecting the sheet even if the specified amount of paper has not been ejected.
	▫ The ejecting direction is specified by **ESC F**.
[Reference]	**ESC F**, **ESC C**

② When page mode is selected:

[Description]	Prints the data in all the print areas and returns to standard mode. All the data is deleted after printing. The paper is not ejected.
[Notes]	▫ This command sets the print position to the beginning of the line.
[Reference]	**ESC L**

CR

[Name]	Print and carriage return
[Format]	ASCII CR
	Hex 0D
	Decimal 13
[Description]	This command has the same function as **LF** if automatic line feed is enabled, and is ignored if automatic line feed is disabled.
[Notes]	▫ This command sets the print position to the beginning of the line.
	▫ This command is ignored with a serial interface model.

DLE EOT *n*

[Name]	Real-time status transmission
[Format]	ASCII DLE EOT *n*
	Hex 10 04 *n*
	Decimal 16 4 *n*

[Range] $1 \leq n \leq 3$, $n = 5$

[Description]   Transmits the selected printer status specified by *n* in real time, according to the following parameters:

       n = 1:   Transmits printer status.
       n = 2:   Transmits off-line status.
       n = 3:   Transmits error status.
       n = 5:   Transmits slip paper status.

[Notes]   □ Printer status data which can be transmitted are shown on the following pages.

            □ The printer executes this command upon receiving it.

            □ The printer transmits one byte of the status data without confirming the DSR signal status.

            □ With the serial interface model, this command is executed even if the printer is off-line or receive buffer is full. However, with the parallel interface model, this command can not be executed if the printer is off-line or receive buffer is full, since the printer is busy and unable to receive this command.

            □ This command is transmitted anytime the data sequence 16 (10H) 4 (04H) *n* ($1 \leq n \leq 3$, $n = 5$) is received, even if it appears as part of another command.

            Example

            In ESC ∗ *m nL nH [d] nL* + 256 × *nH*, *d1* = 16 (10H), *d2* = 4 (04H), *d3* = 1 (1H)

            □ This command should not be used within the data sequence of another command that consists of two or more bytes.

            Example

            When attempting to transmit **ESC 3 *n*** to the printer and **DLE EOT 3** is transmitted, the code 16 (10H) for **DLE EOT 3** is processed as the code for **ESC 3** 16 (10H).

            □ When Auto Status Back (ASB) is enabled using **GS a**, the status transmitted by **ESC EOT** and the ASB status must be differentiated by using the table in Appendix D.

            □ If *n* is out of the specified range, this command is ignored.

❏ The status data transmitted is shown in the following table:

n = 1:   Printer status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Drawer kick-out signal is LOW (connector pin 3).
	On	04	4	Drawer kick-out signal is HIGH (connector pin 3).
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 2:   Off-line status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	00	0	Paper is not being fed by the paper feed button.
	On	08	8	Paper is being fed by the paper feed button.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No paper-end stop.
	On	20	32	Printing stops due to paper-end.
6	Off	00	0	No error.
	On	40	64	Error occurs.
7	Off	00	0	Not used. Fixed to Off.

Bit 5:   The printer will stop printing and "32" (printing currently stopped) occurs if a paper-end is detected by TOF or BOF sensor when paper-end printing stop is selected by **ESC c 4**.

n = 3:   Error status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

n = 5:   Slip paper status

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Not used. Fixed to Off.
1	On	02	2	Not used. Fixed to On.
2	Off	00	0	Slip paper selected.
3	Off	00	0	Does not wait for slip paper insertion.
	On	08	8	Waits for slip paper insertion.
4	On	10	16	Not used. Fixed to On.
5	Off	00	0	Slip is detected by the BOF sensor.
	On	20	32	Slip is not detected by the BOF sensor.
6	Off	00	0	Slip is detected by the TOF sensor.
	On	40	64	Slip is not detected by the TOF sensor.
7	Off	00	0	Not used. Fixed to Off.

Bit 3:   Switches to "1" (waiting for paper insertion) at the end of current printing operation, if print stop is selected when paper-end is detected by **ESC c 4** as well as subsequent print data being present.

Switches to "0" (not waiting for paper insertion) just before actual slip selection takes place after slip paper is detected.

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Bit 5 and 6:　Transmits the current status of the TOF and BOF sensors.

[Reference]　**ESC u**, **ESC v**, **GS a**, Appendix D: *Transmission Status Identification*

CAN

[Name]	Cancel print data in page mode
[Format]	ASCII　　CAN
	Hex　　　18
	Decimal　24
[Description]	In page mode, deletes all the print data in the current printable area.
[Notes]	□ This command is enabled only in page mode.
	□ If data that existed in the previously specified printable area also exists in the currently specified printable area, it is deleted.
[Reference]	**ESC W**

ESC SP *n*

[Name]	Set right-side character spacing
[Format]	ASCII　　ESC　SP　*n*
	Hex　　　1B　20　*n*
	Decimal　27　32　*n*
[Range]	$0 \leq n \leq 32$
[Description]	Sets the character spacing for the right side of the character.
[Notes]	□ The right-side character spacing for double-width mode is twice the normal value.
	□ The character spacing is set in increment of half dot.
	□ In page mode, the actual dot positions shift by half dot.
	□ This command sets values independently in standard mode and in page mode.
[Default]	*n* = 0
[Reference]	Section 3.9.2, *Page Mode Limitations*

ESC ! *n*

[Name]	Select print mode(s)

[Format]

ASCII	ESC	!	*n*
Hex	1B	21	*n*
Decimal	27	33	*n*

[Range] $0 \leq n \leq 255$

[Description]   Selects and cancels print mode(s) using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	5×7 font selected.
	On	01	1	7×7 font selected.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Double-height mode not selected.
	On	10	16	Double-height mode selected.
5	Off	00	0	Double-width mode not selected.
	On	20	32	Double-width mode selected.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Underline mode not selected.
	On	80	128	Underline mode selected.

[Notes]
- All the printed characters are underlined, except for a space set by an **HT**.
- When both double-height and double-width modes are set, quadruple-size characters are printed.
- Underline mode on/off and 7×7 font mode on/off are settable but do not have any effect in page mode.

[Default]   *n* = 0

[Reference]   Section 3.9.2, *Page Mode Limitations*

ESC % _n_

[Name]	Select/cancel user-defined character set			
[Format]	ASCII	ESC	%	_n_
	Hex	1B	25	_n_
	Decimal	27	37	_n_
[Range]	$0 \leq n \leq 255$			

[Description] Selects or cancels the user-defined character set.

□ Only the LSB of n is effective.

When n = <∗∗∗∗∗∗∗0>B, the user-defined character set is canceled (internal character set is selected).

When n = <∗∗∗∗∗∗∗1>B, the user-defined character set is selected.

[Default] _n_ = 0

[Reference] **ESC &**

ESC & *y c1 c2 [x1 d1... d(y × x1)]...[xk d1... d(y × xk)]*

[Name]	Define user-defined characters	

[Format]

ASCII	ESC	&	*y*	*c1*	*c2*	*[x1 d1...d(y × x1)]...[xk d1...d(y × xk)]*
Hex	1B	26	*y*	*c1*	*c2*	*[x1 d1...d(y × x1)]...[xk d1...d(y × xk)]*
Decimal	27	38	*y*	*c1*	*c2*	*[x1 d1...d(y × x1)]...[xk d1...d(y × xk)]*

[Range]
$y = 1$
$32 \le c1 \le c2 \le 126$
$0 \le x \le 6$ (5 × 7 font)
$0 \le x \le 10$ (7 × 7 font)
$0 \le d1...dy \times xk \le 255$
$k = c2 - c1 + 1$

[Description] Defines user-defined characters for the specified character code.

- □ *y* specifies the number of bytes in the vertical direction.

- □ *c1* specifies the beginning character code for the definition, and *c2* specifies the final code.

- □ The allowable character code range is from decimal code 32 to 126.

- □ *x* specifies the number of dots in the horizontal direction.

- □ *d* is the dot data for the characters. The dot pattern is in the horizontal direction from the left side. Any remaining dots on the right side are blank.

[Notes]
- □ After user-defined characters are defined, they remain effective until: another definition is made, a user-defined bit image is defined, **ESC @** is executed, the printer is reset, or the power is turned off.

- □ When value of *y*, *c1*, *c2*, or *x* is out of the range, this command is ignored, and the following data is processed as normal data.

- □ In 7 × 7 font, horizontally adjacent dots cannot be printed. Define the character so that it does not include horizontally adjacent dots.

[Default] The same pattern as the internal character set.
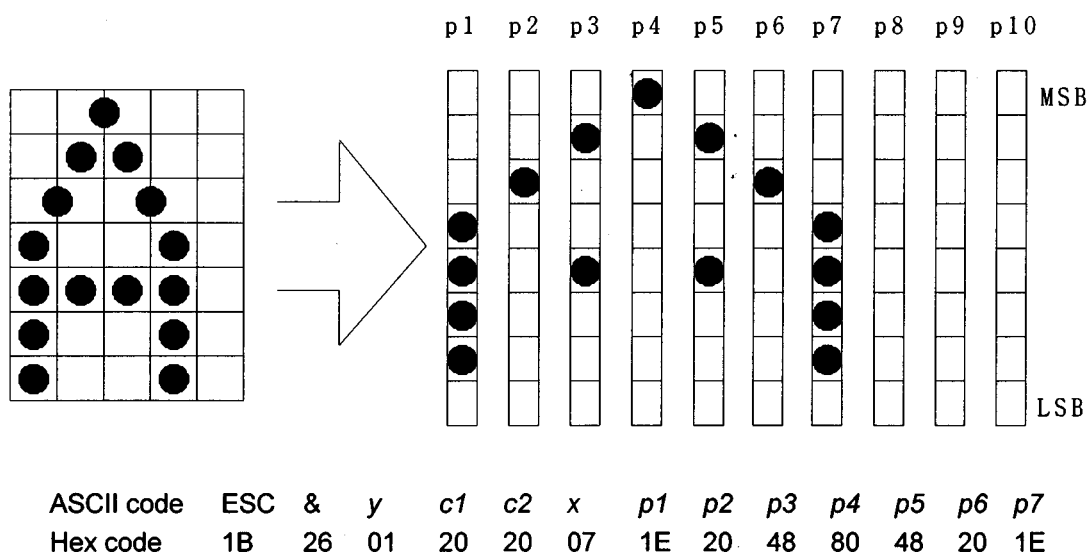
[Reference] **ESC %**

[Example]

• 5 × 7 font when the dot pattern for code 32 (20H) is define as shown below:

ASCII code	ESC	&	y	c1	c2	x	p1	p2	p3	p4	p5
Hex code	1B	26	01	20	20	05	3E	48	88	48	3E
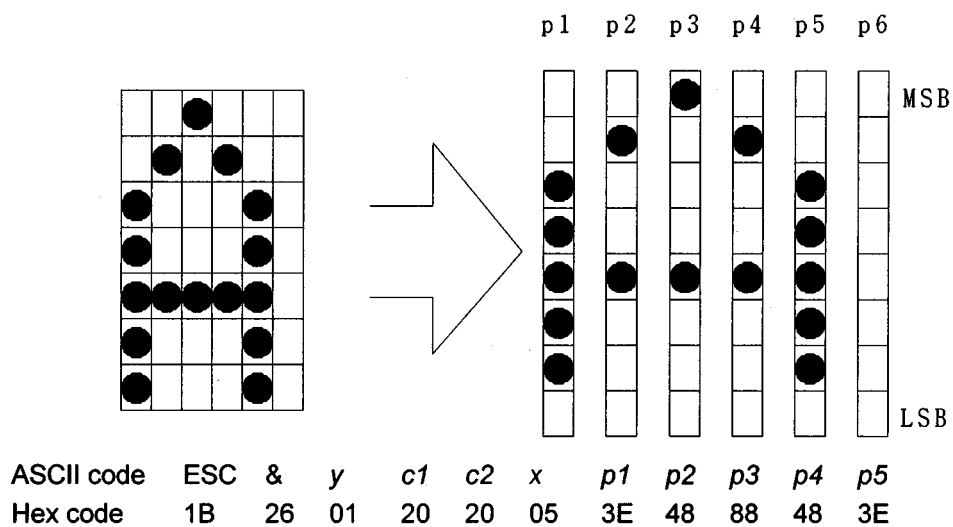
• 7 × 7 font when the dot pattern for code 32 (20H) is defined as shown below:

ASCII code	ESC	&	y	c1	c2	x	p1	p2	p3	p4	p5	p6	p7
Hex code	1B	26	01	20	20	07	1E	20	48	80	48	20	1E

EPSON	TITLE	TM-U295/U295P Specification (STANDARD)	SHEET REVISION	NO.		
			F	NEXT 44	SHEET 43	

ESC * m n_L n_H d1...dk

[Name]	Select bit-image mode					
[Format]	ASCII	ESC	*	nL	nH	d1...dk
	Hex	1B	2A	nL	nH	d1...dk
	Decimal	27	42	nL	nH	d1...dk

[Range] $m = 0, 1$
$0 \leq nL \leq 255$
$0 \leq nH \leq 3$
$0 \leq d \leq 255$
$k = nL + nH \times 255$

[Description]   Selects a bit-image mode m for the number of dots specified by nL and nH, as follows:

  □ The nL and nH indicate the number of dots of the bit image in the horizontal direction. The number of dots is calculated by the formula
  $nL + nH \times 256$.

  □ If the bit-image data input exceeds the number of dots to be printed on a line, the excess data is ignored.

  □ d indicates the bit-image data.   Set a corresponding bit to 1 to print a dot or to 0 to not print a dot.

  □ Bit image modes which can be selected by m are shown in the table below.

m	Mode	Vertical Direction		Horizontal Direction(*1)	
		Number of Dots	Dot Density	Dot Density	Maximum Number of Dots
0	8-dot single-density	8	60 DPI	80 DPI	210
1	8-dot double-density	8	60 DPI	160 DPI	420

*1: The number of dots in the horizontal direction depends on the printing area and the printing direction specified by **ESC W** and **ESC T**.
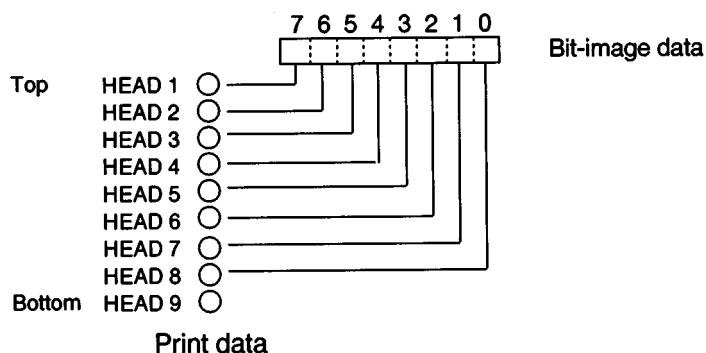
[Notes]   □ If m and nH is out of the specified range, the data following nL is processed as normal data.

  □ After the bit image is printed, the printer returns to the normal data processing routine.

  □ The relationship between bit image data and dots to be printed is given on the next page.

  □ In page mode, double density bit image data is not available.

[Reference]   Section 3.9, *Page Mode*

□ The relationship between the image data and the dots to be printed is as follows:

ESC 2

[Name]	Select the inital line spacing
[Format]	ASCII ESC 2
	Hex 1B 32
	Decimal 27 50
[Description]	Selects 1/6-inch line spacing.
[Notes]	□ This command (Approximately 4.23 mm) sets values independently in standard mode and in page mode.
[Reference]	**ESC 3**

ESC 3 *n*

[Name]	Set line spacing
[Format]	ASCII ESC 3 *n*
	Hex 1B 33 *n*
	Decimal 27 51 *n*
[Range]	$0 \leq n \leq 255$
[Description]	Sets the line spacing to $n/60$ inches ($n \times$ approximately 0.423 mm).
[Note]	□ This command sets values independently in standard mode and in page mode.
[Default]	$n = 10$ (1/6 inch (Approximately 4.23 mm))
[Reference]	**ESC 2**

ESC = *n*

[Name]	Select peripheral device	

[Format]

ASCII	ESC	=	*n*
Hex	1B	3D	*n*
Decimal	27	61	*n*

[Range] $0 \le n \le 3$

[Description]   Selects the device to which the host computer sends data, using *n* as follows:

Selects the peripheral device for which subsequent data is effective, according to the value set for "*n*".

□ Each bit of "*n*" is described in the table below.

□ If "printer disables" is selected, the printer ignores all received data until "printer enabled" is selected by this command.

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Printer disabled.
	On	01	1	Printer enabled.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	--	--	Undefined.
	On	--	--	Undefined.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	--	--	Undefined.
	On	--	--	Undefined.

[Note]   □ Even if the printer disabled is selected, it goes off-line due to printer operation.   (Refer to Section 2.1.1.2).)

[Default]   *n* = 1

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT 47	SHEET 46

ESC @

[Name]	Initialize printer		
[Format]	ASCII	ESC	@
	Hex	1B	40
	Decimal	27	64

[Description] Clears the data in the print buffer and resets the printer mode to the mode that was in effect when the power was turned on.

[Notes] ▫ The DIP switches are not checked again.

▫ The data in the receive buffer is not cleared.

ESC C *n*

[Name]	Set cut sheet eject length			
[Format]	ASCII	ESC	C	*n*
	Hex	1B	43	*n*
	Decimal	27	67	*n*

[Range] $0 \leq n \leq 127$

[Description] Sets the eject length for a cut sheet to *n* lines.

▫ When *n* = 0, no eject length is set.

[Notes] ▫ The previously specified eject length does not change, even if the line spacing changes.

▫ This command is available only when **FF** is executed.

[Default] *n* = 0

[Reference] **FF**

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT 48	SHEET 47

ESC D *n1...nk NUL*

[Name]	Set horizontal tab positions				
[Format]	ASCII	ESC	D	*n1...nk*	*NUL*
	Hex	1B	44	*n1...nk*	*00*
	Decimal	27	68	*n1...nk*	*0*

[Range] $1 \leq n \leq 255$
$0 \leq k \leq 32$

[Description] Sets horizontal tab positions.

- *n* specifies the number of columns present between the beginning of the line and the position at which a horizontal table is to be set.

  n = tab column position - 1.   If you want to set a tab at column 9, set *n* to 8.

- *k* indicates the total number of horizontal tab positions to be set.

- A horizontal tab position is set to a position expressed by "character width × *n*" from the beginning of the line. The character width includes the right-side character spacing. In double-width mode, the character width is twice the width of normal characters. In page mode, the character width is also determined according to the double-width setting.

- [*n*] *k*, which indicates the set position, needs to be set in ascending order and <00>H must be entered at the end.

- **ESC D *NUL*** cancels all horizontal tab positions. An **HT** received after tabs are cleared is ignored.

[Notes]
- When [*n*] *k* is less than or equal to the preceding value [*n*] *k*-1, horizontal tab setting is considered to have been completed. In this case, the subsequent data is processed as normal data.

- Up to 32 tab positions can be set. Data exceeding 32 tab positions is processed as normal data.

- If an **HT** is executed, attempts to move to any tab position outside the printable area will result in movement to a position only 1 dot outside the printable area.

- Once horizontal tab positions are specified, they do not change even if the character width is changed.

- The right-side character spacing is set independently in page mode and in standard mode. Therefore, the right-side character spacing is used to set horizontal tab positions.

[Default] The default tab positions are at intervals of 8 characters
(columns 9, 17, 25, ...) for the 5 × 7 character font.

[Reference]   Section 3.9.2, *Page Mode Limitations*

ESC F *n*

[Name]	Set/cancel cut sheet reverse eject			
[Format]	ASCII	ESC	F	*n*
	Hex	1B	46	*n*
	Decimal	27	70	*n*

[Range] $0 \le n \le 255$

[Description]   Sets or cancels the cut sheet reverse eject specified by **FF**.

When n = <∗∗∗∗∗∗∗1>B, reverse ejection is set.
When n = <∗∗∗∗∗∗∗0>B, reverse ejection is canceled (forward ejection is set automatically).

[Default]   *n* = 0

[Reference]   **FF**

ESC J *n*

[Name]	Print and feed paper			
[Format]	ASCII	ESC	J	*n*
	Hex	1B	4A	*n*
	Decimal	27	74	*n*

[Range] $0 \le n \le 255$

[Description]   Prints the data in the print buffer and feeds the paper by *n*/60 inches (*n* $\times$ approximately 0.423 mm).

[Notes]   Sets the print position to the beginning of the line.

ESC K *n*

[Name]	Print and reverse feed				
[Format]	ASCII	ESC	K	*n*	
	Hex	1B	4B	*n*	
	Decimal	27	75	*n*	
[Range]	0 ≤ *n* ≤ 255				

[Description] Prints the data in the print buffer and feeds the paper by *n*/60 inches (*n* × approximately 0.423 mm) in the reverse direction.

[Notes]
- This command is available only in standard mode.
- The setting values do not remain.
- After printing is completed, this command sets the print position to the beginning of the line.

ESC L

[Name]	Select page mode			
[Format]	ASCII	ESC	L	
	Hex	1B	4C	
	Decimal	27	76	

[Description] Switches from standard mode to page mode.

- Page mode develops the data received in the specified printable area and collectively prints the data when the **FF** command is given. Therefore, print commands (such as **LF**) are developed in printer memory but are not actually executed.
- When an **FF** command is given, the data in the specified printable area is printed and the printer then returns to standard mode.

[Notes]
- This command is enabled only when input at the beginning of a line.
- In page mode, the printer processes data using only normal dot. In another word, the printer does not use half dot in page mode. Therefore, be careful when settings using half dot in standard mode.
- Only character fonts with normal dot configuration are available.

□ The following commands have two type of setting values, one is for standard mode, the other is for page mode.

    ESC SP: Set right-side character spacing
    ESC 2:   Set the inital line spacing
    ESC 3:   Set line spacing

□ The following commands are ignored in page mode.

    ESC K: Print and reverse feed
    ESC e: Print and reverse feed *n* lines
    ESC ∗:   Set double-density bit image.
    ESC q: Paper release

The following commands are settable but do not have any effect in page mode.

□ **ESC {** (Upside-down printing mode on/off)

□ **ESC !** (7×7 font mode on/off and underline mode on/off)

□ The commands are effective only in standard mode.

□ Use of **ESC @** causes the printer to return to standard mode without carrying out printing.

[Default]   Standard mode is selected.

[Reference]   **FF**

    Section 3.9.2, *Page Mode Limitations*

    Appendix D, *Transmission Status Identification*

ESC R *n*

[Name]   Select an international character set

[Format]   ASCII   ESC   R   *n*
                  Hex   1B   52   *n*
                  Decimal 27   82   *n*

[Range] $0 \leq n \leq 10$

[Description] Selects an international character set *n* from the following table:

n	Country
0	U.S.A.
1	France
2	Germany
3	U.K.
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

[Note]   If *n* is outside of the specified range, this command is ignored.

[Default]   *n* = 0

[Reference] Section 3.2.3, *International Character Set*

ESC T *n*

[Name]	Select print direction in page mode		
[Format]	ASCII	ESC T *n*	
	Hex	1B 54 *n*	
	Decimal	27 84 *n*	

[Range] $0 \leq n \leq 3, 48 \leq n \leq 51$

[Description] Selects the print direction and starting position in page mode.

n specifies the print direction and starting position as follows:

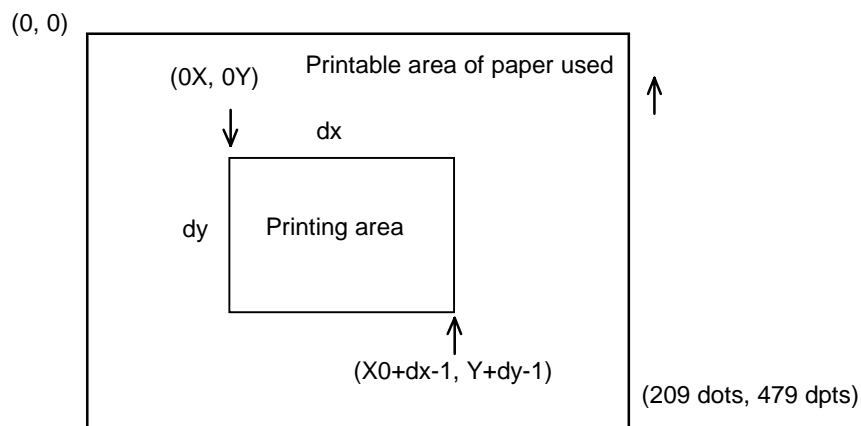| *n*	Print Direction	Starting Position
0, 48	Left to right	Upper left (A in the figure)
1, 49	Bottom to top	Lower left (B in the figure)
2, 50	Right to left	Lower right (C in the figure)
3, 51	Top to bottom	Upper right (D in the figure)
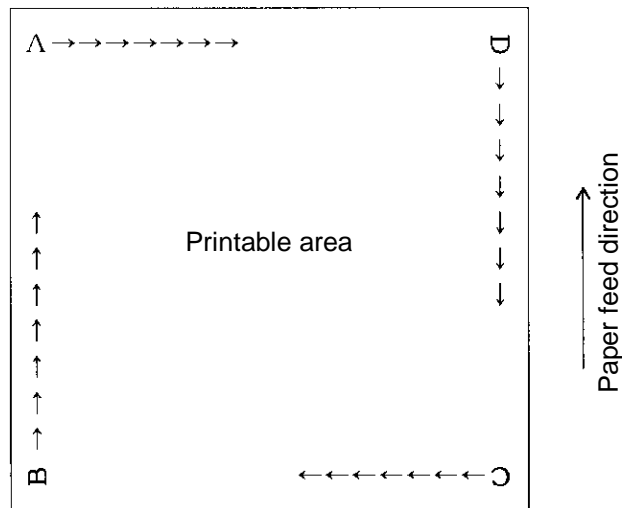
[Notes]
- When the printing direction is changed, the printing direction and print starting position for the data following are those specified by *n*.
- This command is available only in page mode.
- If *n* is out of the specified range, this command is ignored.

[Default] *n* = 0

ESC W *xL xH yL yH dxL dxH dyL dyH*

[Name]	Set printing area in page mode										

[Format]

ASCII	ESC	W	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Hex	1B	57	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*
Decimal	27	87	*xL*	*xH*	*yL*	*yH*	*dxL*	*dxH*	*dyL*	*dyH*

[Range] $0 \le xL \le 255$, $xH = 0$, $0 \le yL \le 255$, $0 \le yH \le 1$, $0 \le dxL \le 255$, $dxH = 0$
$0 \le dyL \le 255$, $0 \le dyH \le 1$ Except $dxL=dxH=0$, or $dyL=dyH=0$

[Description]   Sets the position and the size of the printing area.

□ Starting from the position ($x0, y0$) at the upper right, the length in the y direction is dy dot and that in the x direction is dx dot.

$x0 = [(xL + xH \times 256)]$ $y0 = [(yL + yH \times 256)]$
$dx = [(dxL + dxH \times 256)]$ $dy = [(dyL + dyH \times 256)]$

(0, 0)

(209 dots, 479 dpts)

[Notes]

□ If the setting values exceed the printing area, it set to the maximum printing area automatically, depending on the values from *xL* to *dyH*.

□ The maximum printing area in the x direction is 210 dots.

□ The maximum printing area in the y direction is 480 dots.

□ When the print data is buffered in the specified printing area, the length of the printing area in both the horizontal and vertical direction should be 8 dots or more.

□ The printing area should accommodate to the size of the print sheet.

□ When starting point ($x0, y0$) is out of printable area, this command is not effective.

□ This command is available only in page mode.

□ This command is settable but does not have any effect in standard mode.

[Default] $xL = xH = yL = yH = 0$

$dxL = 210$, $dxH = 0$, $dyL = 224$, $dyH = 1$

[Reference]   **CAN**, **ESC L**, **ESC T**

ESC c 3 *n*

[Name]	Select paper sensor(s) to output paper end signals			
[Format]	ASCII	ESC	c	3	*n*

[Format]	ASCII	ESC	c	3	*n*
	Hex	1B	63	33	*n*
	Decimal	27	99	51	*n*

[Range] $0 \leq n \leq 255$

[Description]   Selects the paper sensor(s) to output paper end signals.

▫ Each bit of *n* is used as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	--	--	Undefined.
	On	--	--	Undefined.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	TOF sensor disabled.
	On	10	16	TOF sensor enabled.
5	Off	00	0	BOF sensor disabled.
	On	20	32	BOF sensor enabled.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	--	--	Undefined.
	On	--	--	Undefined.

[Notes]   ▫ It is possible to select multiple sensors to output signals.   Then, if any of the sensors detects a paper end, the paper end signals is output.

▫ This command is available only with a parallel interface model and is ignored with a serial interface model.

[Default]   *n* = 0

ESC c 4 *n*

[Name]	Select paper sensor(s) to stop printing	
[Format]	ASCII	ESC c 4 *n*
	Hex	1B 63 34 *n*
	Decimal	27 99 52 *n*

[Range] $0 \le n \le 255$

[Description] Selects the paper sensor(s) used to stop printing when a paper-end is detected, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	--	--	Undefined.
	On	--	--	Undefined.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	TOF sensor disabled.
	On	10	16	TOF sensor enabled.
5	Off	00	0	BOF sensor disabled.
	On	20	32	BOF sensor enabled.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	--	--	Undefined.
	On	--	--	Undefined.

[Notes]
□ It is possible to select multiple sensors to stop printing.   Then, if any of the selected sensors detects a paper-end, the printer stops printing.

□ When a paper-end is detected, printing stops after printing and feeding the current line. In this time, if the panel buttons are disabled, the printer release the paper and waits the next paper automatically.

[Default] *n* = 0

[Reference] **ESC c 5**

ESC c 5 *n*

[Name]	Enable/disable panel buttons			
[Format]	ASCII	ESC	c	5	*n*
	Hex	1B	63	35	*n*
	Decimal	27	99	53	*n*

[Range] $0 \le n \le 255$

[Description] Enables or disables the panel buttons.

  □ Only the LSB of *n* is effective.

    When *n* = <*******0>B, the panel switches are enabled.
    When *n* = <*******1>B, the panel switches are disabled.

[Note]   When the panel buttons are disabled, none of them are usable.

[Default]   *n* = 0

ESC d *n*

[Name]	Print and feed n lines			
[Format]	ASCII	ESC	d	*n*
	Hex	1B	64	*n*
	Decimal	27	100	*n*

[Range] $0 \le n \le 255$

[Description] Prints the data in the print buffer and feeds *n* lines.

[Notes]   □ This command sets the print starting position to the beginning of the line.

              □ This command does not affect the line spacing set by **ESC 2** or **ESC 3**.

[Reference]   **ESC 2**, **ESC 3**

ESC e *n*

[Name]	Print and reverse feed n lines
[Format]	ASCII ESC e *n*
	Hex 1B 65 *n*
	Decimal 27 101 *n*

[Range] $0 \leq n \leq 255$

[Description]   Prints the data in the print buffer and feeds *n* lines in the reverse direction.

[Notes]   □ This command is available only in standard mode.

            □ This command sets the print position to the beginning of the line.

            □ The setting values do not remain.

ESC f *t1 t2*

[Name]	Set cut sheet wait time
[Format]	ASCII ESC f *t1* *t2*
	Hex 1B 66 *t1* *t2*
	Decimal 27 102 *t1* *t2*

[Range]   *t1* = 0

           $0 \leq t2 \leq 64$

[Description]   Sets the time during which the printer waits for a cut sheet to be inserted and the time from insertion of the sheet to the start of printing.

            □ The time during which the printer waits for a cut sheet to be inserted is unlimited.

            □ The printer starts operation [*t2* × 0.1] seconds after insertion of the sheet is detected.

[Notes]   □ When either *t1* or *t2* is out of the specified range, this command does not change the previously set wait time.

[Default]   *t1* = 0, *t2* = 10

ESC p m *t1 t2*

[Name]	Generate pulse
[Format]	ASCII	ESC	p	*m*	*t1*	*t2*
	Hex	1B	70	*m*	*t1*	*t2*
	Decimal	27	112	*m*	*t1*	*t2*

[Range]   *m* = 0, 1, 48, 49

$0 \leq t1 \leq 255$

$0 \leq t2 \leq 255$

[Description]   Outputs the pulse specified by *t1* and *t2* to connector pin m.

m	Connector pin
0, 48	Drawer kick-out connector pin 2
0, 49	Drawer kick-out connector pin 5

□ The pulse ON time is [*t1* × 2 ms] and the OFF time is [*t2* × 2 ms].

[Notes]   □ If the *m* is out of the specified range, this command is ignored, and the data following is processed as normal data.

[Reference]   Section 2.2.3, *Drawer kick-out Connector*

Appendix C, *Notes on Drawer Kick-out Connector*

ESC q

[Name]	Paper release		
[Format]	ASCII	ESC	q
	Hex	1B	71
	Decimal	27	113
[Description]	Releases the paper.		

[Notes]   □ When the panel button is disabled and the specified paper sensor detects a paper-end, the printer releases the paper, regardless of this command.

               □ This command is available only in standard mode.

[Reference]   **ESC c 4, ESC c 5**

ESC t *n*

[Name]	Select character code table			
[Format]	ASCII	ESC	t	*n*
	Hex	1B	74	*n*
	Decimal	27	116	*n*
[Range]	$0 \leq n \leq 2$			

[Description]   Selects a page *n* from the character code table.

               The value of *n* represents a page from the character code tables, as follows:

n	Character type
0	PC437 (U.S.A., Standard Europe)
1	Katakana
2	PC850 (Multilingual)

[Note]   If *n* is out of the specified range, this command is ignored.

[Default]   *n* = 0

[Reference]   Section 3.2, *Character Code Tables*

ESC u *n*

[Name]	Transmit peripheral device status

[Format]

	ASCII	ESC	u	*n*
	Hex	1B	75	*n*
	Decimal	27	117	*n*

[Range]   *n* = 0, 48

[Description]   Transmits one status byte for a peripheral device to the connector pin specified by *n*, as follows:

n	Connector pin
0, 48	Drawer kick-out connector pin 3

[Notes]
- Peripheral device status data which can be transmitted are shown in the table below.
- Bit 0 is always set to "1" if no connection is made to the connector.
- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE).   If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the status of the DSR signal.
- Since this command is stored in the receive buffer and then executed during normal command process, there may be a time lag between command reception and status transmission, depending on the receive buffer status.
- When Automatic Status Back (ASB) is enabled using **GS a**, the status transmitted by this command must be differentiated from the ASB status. For a detailed description, refer to Appendix D.
- If *n* is out of the specified range, this command is ignored.

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 signal is LOW
	On	01	1	Drawer kick-out connector pin 3 signal is HIGH
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used.　Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	--	--	Undefined.
	On	00	0	Not used.　Fixed to Off.

[Reference]　**DLE EOT,GS a**
Section 2.2.3, *Drawer kick-out connector*
Appendix D, *Transmission Status Identification*

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.
			F	NEXT 62	SHEET 61

ESC v

[Name]	Transmit paper sensor status		
[Format]	ASCII	ESC	v
	Hex	1B	76
	Decimal	27	118

[Description] Transmits one status byte for a paper sensor, as follows:

[Notes] □ Paper sensor status data which can be transmitted are shown in the table below.

□ When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE).   If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the status of the DSR signal.

□ If this command is received during printing, the status in effect at the end of printing of the current line and completion of paper feed is transmitted then.   (**ESC u** differs from **GS I** in transmission timing.)

□ Since this command is stored in the receive buffer and then executed during normal command process, there may be a time lag between command reception and status transmission, depending on the receive buffer status.

□ When Automatic Status Back (ASB) is enabled using **GS a**, the status transmitted by this command must be differentiated from the ASB status. For a detailed description, refer to Appendix D.

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Slip is detected by BOF sensor.
	On	01	1	Slip is not detected by BOF sensor
1	Off	00	0	Slip is detected by TOF sensor.
	On	02	2	Slip is not detected by TOF sensor.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.

Bit	Off/On	Hex	Decimal	Function
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference] **DLE EOT, GS a**

Section 1.4, *Paper*

Appendix D, *Transmission Status Identification*

ESC { *n*

[Name]	Turn upside-down printing mode on/off			
[Format]	ASCII	ESC	{	*n*
	Hex	1B	7B	*n*
	Decimal	27	123	*n*

[Range] $0 \leq n \leq 255$

[Description] Turns upside-down printing mode on/off.

□ Only the LSB of *n* is effective.

When $n = <\!*\!*\!*\!*\!*\!*\!*0\!>$B, upside-down printing mode is turned off.
When $n = <\!*\!*\!*\!*\!*\!*\!*1\!>$B, upside-down printing mode is turned on.

[Notes]   □ In upside-down printing mode, the printer rotates the line to be printed by 180° and then prints it.

□ This command is enabled only when it is specified at the beginning of a line.

□ This command is settable but does not have any effect in page mode.

[Default] $n = 0$

[Example]   When upside-down mode off When upside-down mode on

Paper feed direction
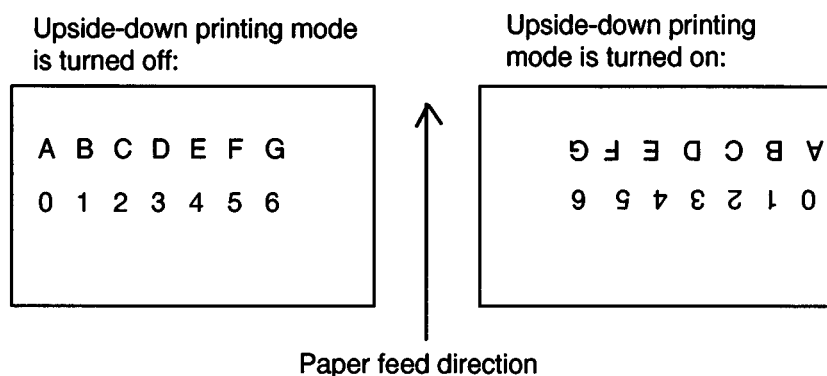
EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT 64	SHEET 63

GS I *n*

[Name]	Transmit printer ID		
[Format]	ASCII	GS	I	*n*
	Hex	1D	49	*n*
	Decimal	29	73	*n*

[Range] $1 \le n \le 3, 49 \le n \le 51$

[Description]   Transmits the printer ID specified by *n* as follows:

n	Print Direction	Specification	ID (Hex)
1, 49	Printer model ID	TM-295/TM-295P	02H
2, 50	Type ID	Refer to table below	
3, 51	ROM version ID	Depends on ROM version	∗∗

[Notes]
- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE).   If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the status of the DSR signal.
- Since this command is stored in the receive buffer and then executed during normal command process, there may be a time lag between command reception and status transmission, depending on the receive buffer status.
- When Automatic Status Back (ASB) is enabled using **GS a**, the status transmitted by this command must be differentiated from the ASB status. For a detailed description, refer to Appendix D.
- The ROM version may change as different versions are released.
- If *n* is out of the specified range, this command is ignored.

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT 65	SHEET 64

n = 2: Type ID

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Two-byte character code not supported.
1	Off	00	0	Auto-cutter not equipped.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference]   Section 3.3.3, *DIP switches*:   Appendix D, *Transmission Status Identification*

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT 66	SHEET 65

GS a *n*

[Name]	Enable/disable Automatic Status Back (ASB)
[Format]	ASCII GS a *n*
	Hex 1D 61 *n*
	Decimal 29 97 *n*
[Range]	0 ≤ *n* ≤ 255

[Description] Enables or disables ASB and specifies the status items to include, using *n* as follows:

Bit	Off/On	Hex	Decimal	Function
0	Off	00	0	Drawer kick-out connector pin 3 status disabled.
	On	01	1	Drawer kick-out connector pin 3 status enabled.
1	Off	00	0	On-line/Off-line status disabled.
	On	02	2	On-line/Off-line status enabled.
2	Off	00	0	Error status disabled.
	On	04	4	Error status enabled.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	--	--	Undefined.
	On	--	--	Undefined.
5	Off	00	0	Slip sensor status disabled.
	On	20	32	Slip sensor status enabled.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	--	--	Undefined.
	On	--	--	Undefined.

[Notes]
- The ASB function is disabled if no status is selected.
- If any of the status items in the table above are enabled, the printer automatically transmits 4 status bytes whenever the enabled status item changes.
- If ASB is enabled while processing this command, the current status is transmitted with no regulations.
- Status data which can be transmitted are shown in the table below.
- The 4 status bytes are transmitted without checking DSR.
- The 4 status bytes must be consecutive, except for XOFF code.

- Since this command is stored in the receive buffer and then executed during normal command process, there may be a time lag between command reception and status transmission, depending on the receive buffer status.
- When the printer disabled is selected using **ESC =**, this command is disabled, but the ASB is always enabled.
- When any of **DLE EOT, ESC u, ESC v,** or **GS I** is used, the status transmitted by these commands and the ASB status must be differentiated by using the table in Appendix D.

① First byte (printer information):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Not used. Fixed to Off.
1	Off	00	0	Not used. Fixed to Off.
2	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	04	4	Drawer kick-out connector pin 3 is HIGH.
3	Off	00	0	On-line.
	On	08	8	Off-line.
4	On	10	16	Not used. Fixed to On.
5	Off	--	--	Undefined.
6	Off	00	0	Paper is not being fed by the paper feed button.
	On	40	64	Paper is being fed by the paper feed button.
7	Off	00	0	Not used. Fixed to Off.

② Second byte (error information):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	--	--	Undefined.
	On	--	--	Undefined.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

③ Third byte (paper sensor information):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	--	--	Undefined.
	On	--	--	Undefined.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	00	0	Slip is detected by BOF sensor.
	On	20	32	Slip is not detected by BOF sensor.
6	Off	00	0	Slip is detected by TOF sensor.
	On	40	64	Slip is not detected by TOF sensor.
7	Off	00	0	Not used. Fixed to Off.

④ Fourth byte (paper sensor information):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Slip paper selected.
1	Off	00	0	Slip printing possible.
	On	02	2	Slip printing not possible.
2	Off	--	--	Not used.
	On	--	--	Not used.
3	Off	--	--	Not used.
	On	--	--	Not used.
4	Off	00	0	Not used. Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Bit 1: ▫ Becomes 1 (printing not possible) when printing is carried out by **FF** or paper is ejected.

▫ If **ESC c 4** (slip paper-end stop) is not selected, bit 1 does not become 1 (printing not possible). If **ESC c 4** is selected, bit 1 becomes 1 (printing not possible) when paper-end is detected by the sensor.

▫ When the printer goes to the slip wait status, bits 5 and 6 of the third byte become 1 (paper-end) and bit 1 of the fourth byte becomes 1 (printing not possible).

[Default] $n = 0$

[Reference]   **DLE DOT, ESC u, ESC v**

Appendix D, *Transmission Status Identification*

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION F	NO.	
				NEXT 70	SHEET 69

GS r *n*

[Name]	Transmit status

[Format]   ASCII   GS   r   *n*
            Hex   1D   72   *n*
            Decimal 29   114   *n*

[Range] $1 \le n \le 2, 49 \le n \le 50$

[Description]   Transmits the status specified by *n* as follows:

    n = 1, 49: Transmits paper sensor status (same as **ESC v**)
    n = 2, 50: Transmits drawer kick-out connector status (same as **ESC u 0**)

[Notes]
- Status data which can be transmitted are shown below and in the table of the next section.
- When DTR/DSR control is selected, the printer transmits only 1 byte after confirming that the host is ready to receive data (DSR signal is SPACE).   If the host computer is not ready to receive data (DSR signal is MARK), the printer waits until the host is ready. When XON/XOFF control is selected, the printer transmits only 1 byte without confirming the status of the DSR signal.
- Since this command is stored in the receive buffer and then executed during normal command process, there may be a time lag between command reception and status transmission, depending on the receive buffer status.
- When Automatic Status Back (ASB) is enabled using **GS a**, the status transmitted by this command must be differentiated from the ASB status. For a detailed description, refer to Appendix D.
- If *n* is out of the specified range, this command is ignored.

Paper sensor status (n = 1, 49):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Slip is detected by BOF sensor.
	On	01	1	Slip is not detected by BOF sensor.
1	Off	00	0	Slip is detected by TOF sensor.
	On	02	2	Slip is not detected by TOF sensor.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

Drawer kick-out connector status (n = 2, 50):

Bit	Off/On	Hex	Decimal	Status for ASB
0	Off	00	0	Drawer kick-out connector pin 3 is LOW.
	On	01	1	Drawer kick-out connector pin 3 is HIGH.
1	Off	--	--	Undefined.
	On	--	--	Undefined.
2	Off	--	--	Undefined.
	On	--	--	Undefined.
3	Off	--	--	Undefined.
	On	--	--	Undefined.
4	Off	00	0	Not used. Fixed to Off.
5	Off	--	--	Undefined.
	On	--	--	Undefined.
6	Off	--	--	Undefined.
	On	--	--	Undefined.
7	Off	00	0	Not used. Fixed to Off.

[Reference]   **DLE EOT, ESC u, ESC v, GS a**
              Appendix D, *Transmission Status Identification*

6.3   Ignored Command

The printer ignores the following command.

CR   (Ignored with the serial interface model only)
ESC c 3   (Ignored with the serial interface model only)

APPENDIX A:　MISCELLANEOUS NOTES

A.1 Printing and Paper Feeding

1) Setting paper feed length

Since this printer employs a shuttle dot printing mechanism, printing always keeps pace with paper feed operations.　This means that paper should be fed longer than the set value in order to implement an actual print job when the set paper feed length is short.

For example, if line feed length is set to 6 dots (6/60 inches), a line of 8 dots (8/60 inches) is fed. In page mode, however, this is not the case because all the print data sets is buffered in memory and printed at one time.　Therefore, it is possible for print data to be shifted and overlapped with other data by increment of one dot .

Character Type	Required Paper Feed Length
Standard	8 dots (8/60 inches)
Double-height	16 dots (16/60 inches)
Double-width	8 dots (8/60 inches)
Quadruple	16 dots (16/60 inches)
Bit image	8 dots (8/60 inches)

2) Printing after reverse paper feed

After paper is fed in the reverse direction, the paper feed pitch may not be correct for subsequent printing.　Be sure to feed the paper one line in the reverse direction and then feed it forward one line, before resuming printing.

A.2　Notes on Manual Operations

1) The ribbon cassette should be mounted with the printer released.　Follow the directions on the caution label.

2) Paper may become ink stained if it remains in the printer for a long period.

3) Printing without paper loaded and/or without a ribbon cassette mounted must not be performed.

A.3　How to Insert Paper

Insert slip paper from the front side or sideways and set properly with the printer released.

A.4　Ribbon Cassette

Use only the exclusive ribbon cassette EPSON ERC-27 (purple only) to maintain good print quality and to assure durability.　The ribbon should never be re-inked.

APPENDIX B: PRINT DUTY

Printing should be executed according to the print duty shown below.

1) Character printing

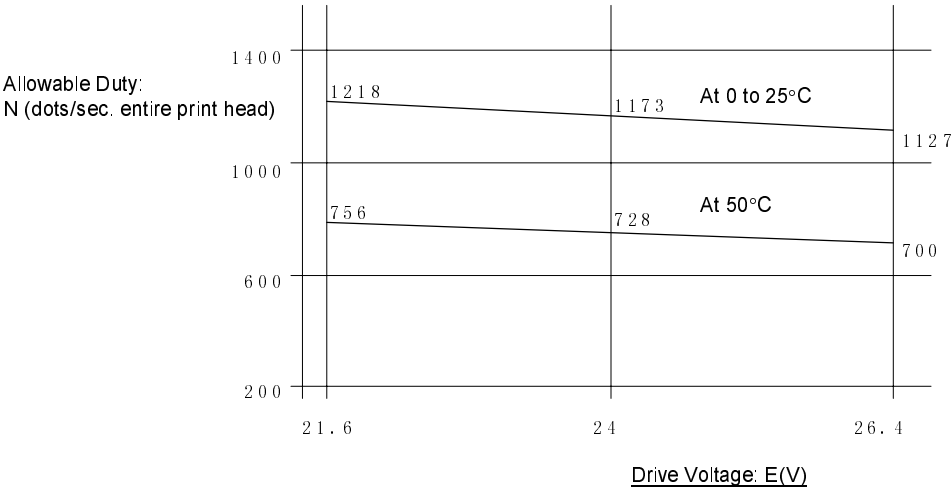The average number of dots printed per second (N) should be within the range shown in the figure below.

Figure B.1   Print Duty

Example: Alphanumeric character full column printing (at 24 VDC)

Average number of dots per character: Approximately 14

Number of printable columns per line: 35

Mean printing speed: Approximately 2.1 lines per second

Print duty = 14 × 35 × 2.1 = 1029 < 1173

Therefore, the alphanumeric character full-column printing is possible under the room temperature.   If specific wires are to be preferentially used, refer to the print duty shown below.
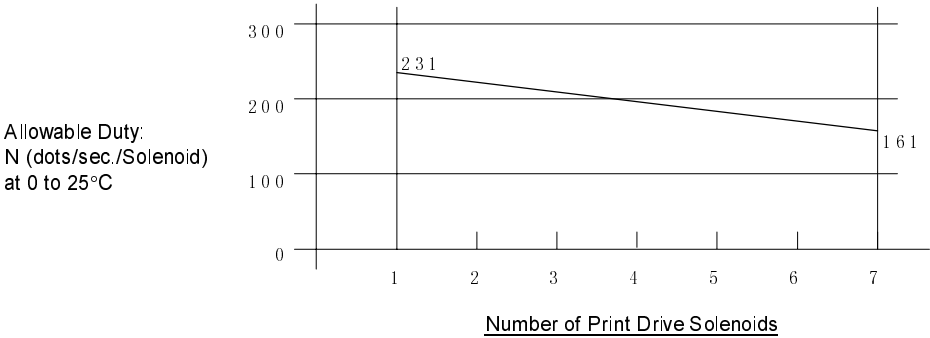
Figure B.2   Print Duty when Specific Wires are Preferentially Used

EPSON	TITLE	TM-U295/U295P Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT App.3	SHEET App.2

2) Continuous printing

Each print solenoid can be used continuously up to 5400 dots.   After energizing, however, the print solenoid must not be used for more than twice the period of energizing time to prepare the next printing.

Example 2:   Continuous solid printing (when the bit image using continuous FFH is printed)

Number of dots in the horizontal direction/solenoid: 30

Number of dots/lines/solenoid: $30 \times 8 = 240$

Maximum number of lines for continuous solid printing = 5400/240 = approximately 22

Therefore, continuous solid printing of 22 lines is possible.   In this case, the print solenoid must not be used for [2×22 lines/2.1 = 21 second] before next printing.

EPSON	TITLE		SHEET REVISION	NO.	
	TM-U295/U295P Specification (STANDARD)		F	NEXT App.4	SHEET App.3

APPENDIX C: NOTES ON USING THE DRAWER KICK-OUT CONNECTOR

1) Drawer specifications (see Section 2.2.3, *Drawer kick-out connector*)

Dwawer specifications differ significantly depending on manufacturer and model number.   Make sure that the specifications of the drawer used meet the following conditions when connected to the drawer kick-out connector.   These conditions also apply to any equipment (other than a drawer) that is connected to the drawer kick-out connector.

Never use a drawer (or other equipment) that does not meet all of the following conditions:

- The load, such as a drawer kick-out solenoid, must be connected between pins 4 and 2 or pins 4 and 5 of the drawer kick-out connector. (*1)

- When the drawer open/close signal (indicating the state of the drawer) is used, a switch must be provided between drawer kick-out connector pins 3 and 6. (*2)

- The resistance of the load, such as a drawer kick-out solenoid, must be 24Ω or more or the input current must be 1A or less. (*3)

- Make sure to use the 24V power output on drawer kick-out connector pin 4 driving the equipment. Never connect any other power supply to the drawer kick-out connector. (*4)
  The peak current is 1 A.   See item 2) below for drive signal duty.

NOTES: (*1): Proper operation is not guaranteed with different connections.

(*2): Proper operation is not guaranteed with different connections or connection to a component other than a switch.

(*3): Connection to equipment whose resistance is 24 Ω or less or whose input current is 1 A or more may damage the connected equipment as well as the printer.

(*4): Operation is not guaranteed with other power supplies.

EPSON	TITLE	TM-U295/U295P Specification (STANDARD)	SHEET REVISION	NO.		
			F	NEXT App.5	SHEET App.4	

APPENDIX D: TRANSMISSION STATUS IDENTIFICATION

The values of specific bits are fixed in the status information transmitted by the printer, so that the status bytes of commands can be identified.   The user can therefore confirm the command to which the status belongs, as shown in the following table.

When using Auto Status Back (ASB), however, process the consecutive three-byte code (except for XOFF) as ASB data after confirming the first byte of the ASB.   Otherwise, the status transmitted by using the command and the status of the second and following bytes of the ASB cannot be differentiated.

Command	Status Reply
ESC u	<0**0****>B
ESC v	<0**0****>B
GS l	<0**0****>B
GS r	<0**0****>B
XON	<00010001>B
XOFF	<00010011>B
DLE EOT	<0**1**10>B
ASB (1st byte)	<0**1**00>B
ASB (2nd byte - 4th byte)	<0**0****>B

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT App.6	SHEET App.5

APPENDIX E: EXAMPLE PRINTING IN PAGE MODE

Example use of page mode is described in this appendix.

A typical procedure for transmitting commands in page mode is as follows:

① Transmit **ESC L** to enter page mode.

② Specify the printable area using **ESC W**.

③ Specify the printing direction using **ESC T**.

④ Transmit the print data.

⑤ Collectively print the data by sending an **FF.**

⑥ After printing, the printer automatically returns to standard mode.

Example 1: Sample program in BASIC (assumes transmission to the printer is already possible with file #1 open)

```
100   PRINT #1,CHR$(&H1B);"L";
110   PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120   PRINT #1,CHR$(100);CHR$(0);CHR$(100);CHR$(0);
130   PRINT #1,CHR$(&H1B);"T";CHR$(0);
140   PRINT #1,"Page mode lesson TEST 1"
150   PRINT #1,CHR$(&HC);
```

In the program for Example 1, a printable area of 100 × 100 dots starting at (0. 0) is set, and characters are printed on the first line of the area as shown in Figure E.1.1 below.
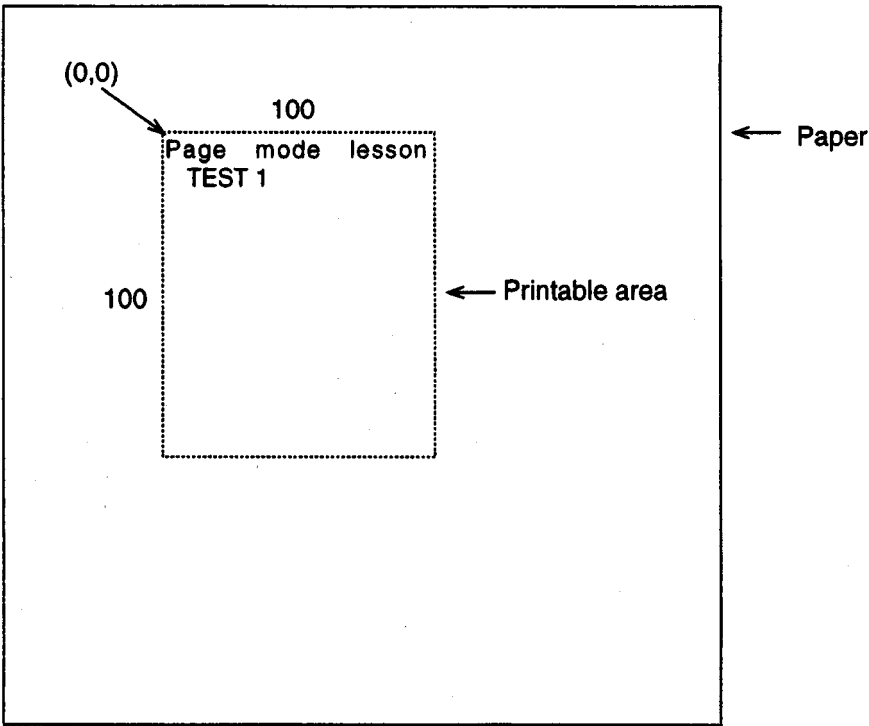
Figure E.1.1   Page Mode Example 1

EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT App.7	SHEET App.6

Note that a line feed was inserted between "lesson" and "TEST 1" in Figure E.1.1. This line feed was inserted automatically because there was no room for the blank "" following the word "lesson" within the horizontal range of the 100 × 100 printing area. The feed amount here is that specified by **ESC 3**. Any number of printing areas can be specified before the **FF** is executed. If any printing areas overlap, however, the logical sum of the logical sum of the data written to the overlapping portions is used for the final printing.

It is possible to erase a portion of the data that is already developed. Using **ESC W**, specify a printing area consisting of only the section to be erased, then use **CAN** to erase the data. Note that all the data existing in the specified printing area is erased, even if it is just a portion of a character.

Example 2:   Sample program in BASIC

```
100   PRINT #1,CHR$(&H1B);"L";
110   PRINT #1,CHR$(&H1B);"W";CHR$(0);CHR$(0);CHR$(0);CHR$(0);
120   PRINT #1,CHR$(100);CHR$(0);CHR$(100);CHR$(0);
130   PRINT #1,CHR$(&H1B);"T";CHR$(0);
140   PRINT #1,"Page mode lesson 2 CAN command"
150   PRINT #1,"ABCDEFGHIJKLMNOPQRST1234567890"
160   PRINT #1,CHR$(&HC);
```

This example works as follows:

First, transmit **ESC L** to switch to page mode (line no.100). Then use **ESC W** to send 8 arguments, from *xL* to *dyH* to specify the printing area. To specify a printing area of 100 dots in the x direction and 100 dots in the y direction, starting from the origin (0, 0), the arguments are transmitted in the order of 0, 0, 0, 0, 100, 0, 100, 0 (line nos. 110 and 120). In addition, the printing direction is specified as 0 by using **ESC T** (line no.130).

After these items are specified, the print data "Page mode lesson 2 CAN command" and "ABCDEFGHIJKLMNOPQRST 1234567890" are transmitted (line no. 150). By sending **FF** (line no.160), the printout shown in Figure E.1.2 is produced.

EPSON	TITLE	TM-U295/U295P Specification (STANDARD)	SHEET REVISION	NO.		
			F	NEXT App.8	SHEET App.7	
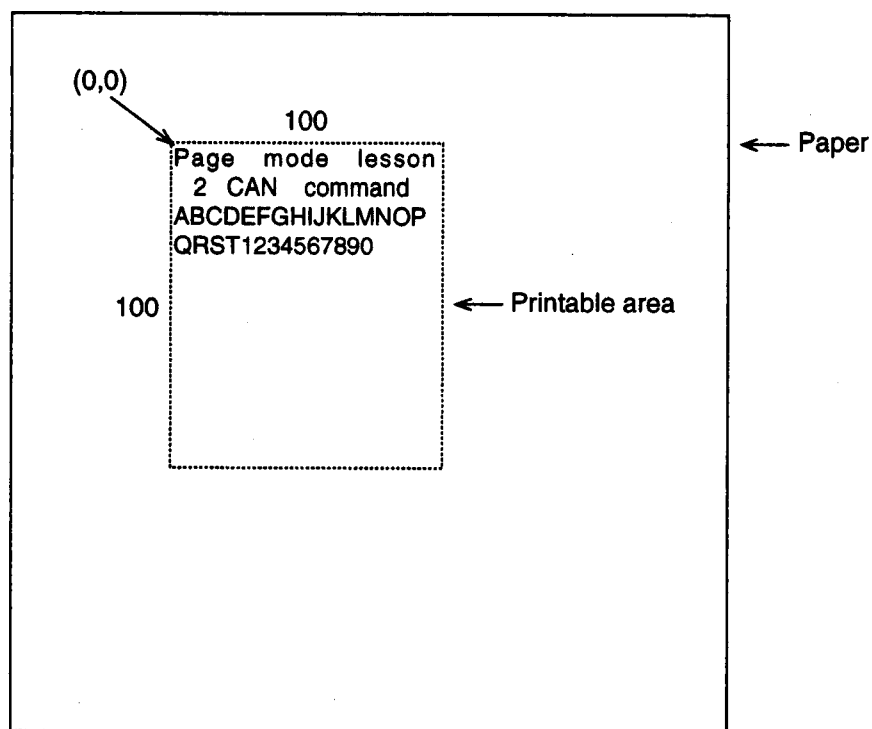
Figure E.1.2   Page Mode Example 2

If the program listed below is included before the **FF** is transmitted, a portion of the data will be deleted:

    160   PRINT #1,CHR$(&H1B);"W";CHR$(36);CHR$(0);CHR$(20);CHR$(0);

    170   PRINT #1,CHR$(18);CHR$(0);CHR$(10);CHR$(0);

    180   PRINT #1,CHR$(&H18);

    190   PRINT #1,CHR$(&HC);

If the above program is included, character string "GHI" is deleted, resulting in the printout shown in Figure E.1.3.   When an area is deleted with **CAN**, the deleted part is left blank.

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			F	NEXT App.9	SHEET App.8	
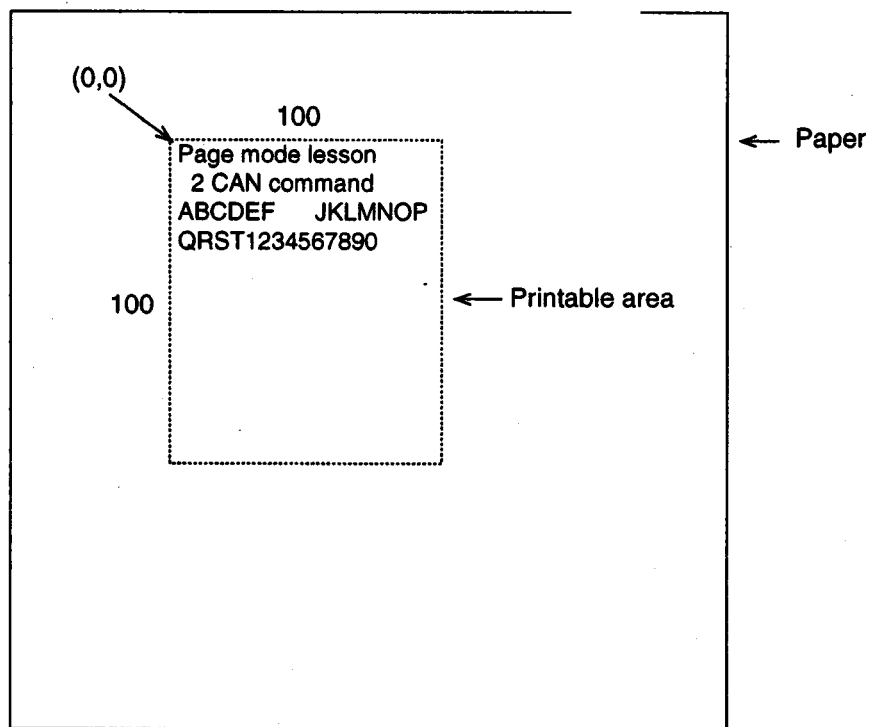
Figure E.1.3   Page Mode Example 3

APPENDIX F: CHARACTER FONT FORMAT

F.1 Character Font Format

A printed character consists of a matrix of dots, and the dot patterns are called font data, which is normally stored in ROM.

The printer has character fonts which are classified roughly into 2 patterns: the normal dot pattern and the half dot pattern.

In the normal dot pattern, dots in the horizontal direction are arranged with 1 dot space as shown in Figure F.1.1.   For the half dot pattern, the space between dot positions is half the width of 1 dot as shown in Figure F.1.2.

Fonts are categorized by (the number of horizontal dots) 5 (the number of vertical dots).   The number of horizontal dots is counted using normal units for normal dot patterns, and using half dot units for half dot patterns.

For example, the font in Figure F.1.1 is 5 × 7 and that in Figure F.1.2 is 7 × 7.
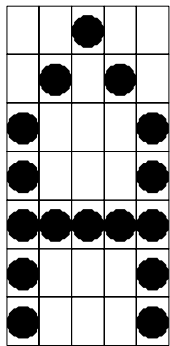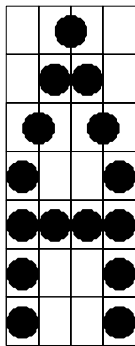
Figure F.1.1   5 × 7 Font   **Figure F.1.2   7 × 7 Font**

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The actual character width is defined by print density in the horizontal direction and the number of horizontal dots per character.   *Standard character width* consists of this character width plus right-side spacing of the character.   *Standard character width* is used as a reference for setting the number of printable characters per line.   The character width for an actual printed character is called *print character width*.   *Print character width* may be larger than *standard character width*, depending on the settings of the right side spacing and the double-width mode.

Actual character width

Space

Standard character width
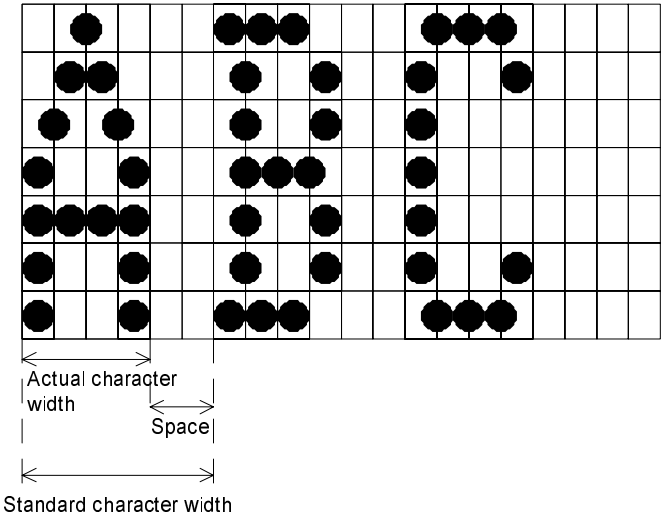
Figure F.1.3   Character Structure

F.2 Character Format for Alphanumeric and International Characters
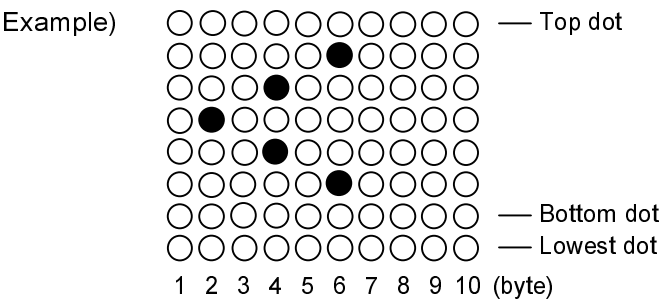
5 × 7 font

One character is composed of 6 bytes of data, with the first byte denoting the left-most column of dots, the second byte the next column of dots and so on, up to the sixth byte.   In this character format, only normal dot positions are printed, and adjacent dots can be printed

The Most Significant Bit (MSB) (or the seventh byte) denotes the top dot of a column, and the Least Significant Bit (LSB) (or the first byte) denotes the bottom of a column.

When a bit is 1, the dot is printed, and when a bit is 0, the dot is not printed. The lowest dot is 0.

Example)

— Top dot

— Bottom dot   ● ="1"
— Lowest dot   ○ ="0"

1 2 3 4 5 6 (byte)
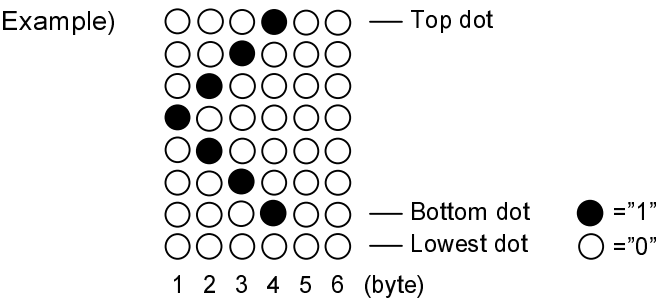
Data for the example: 10H, 28H, 44H, 82H, 00H, 00H

F.2.1   5 × 7 Font Character Format

7 × 7 Font

One character is composed of 10 bytes of data, with the first byte denoting the left most column of dots, the second the next column of dots and so on, up to the tenth byte.   In this character font, the even bytes denote the printing data for half dot (adjacent dot) positions.

The MSB (or the seventh bit) denotes the top of a column, and the LSB (or the first bit) denotes the bottom dot of a column.

When a bit is 1, the dot is printed, and when a bit is 0, the dot is not printed.   The lowest dot is 0.

Example)

— Top dot

— Bottom dot
— Lowest dot

1 2 3 4 5 6 7 8 9 10 (byte)

Data for the example: 00H, 10H, 00H, 28H, 00H, 44H, 00H, 00H, 00H, 00H

F.2.2   5 × 7 Font Character Format

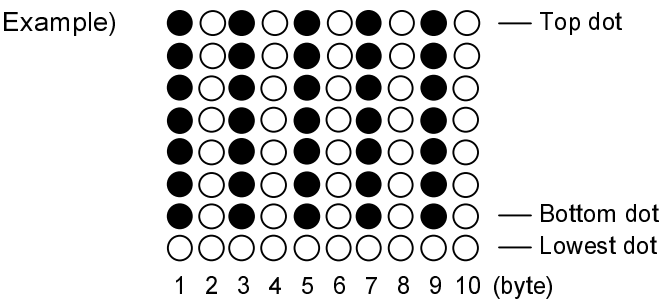| EPSON	TITLE	TM-U295/U295P Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT App.13	SHEET App.12

F.3 Format for Graphic Characters

5 × 7 font

One character is composed of 6 bytes of data, with the first byte denoting the left-most column of dots, the second byte the next column of dots and so on, up to the sixth byte. In this character format, only normal dot positions are printed, and adjacent dots can be printed.

The MSB (or the seventh bit) denotes the top dot of a column, and the LSB (or the first bit) denotes the bottom dot of a column.

When a bit is 1, the dot is printed, and when a bit is 0, the dot is not printed. The lowest dot is 0.

Example)

— Top dot

— Bottom dot   ● ="1"
— Lowest dot   ○ ="0"

1 2 3 4 5 6 (byte)
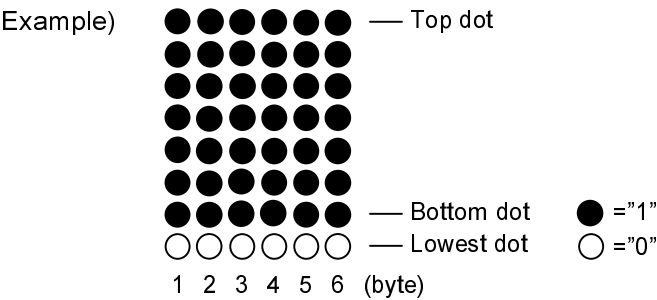
Data for the example: FEH, FEH, FEH, FEH, FEH, FEH

Figure F.3.1   5 × 7 Font Character Format

7 × 7 font

One character is composed of 10 bytes of data, with the first byte denoting the left-most column of dots, the second byte the next column of dots and so on, up to the tenth byte. In this character format, the even bytes denote the printing data for half dot (adjacent dot) positions.

The MSB (or the seventh bit) denotes the top dot of a column, and the LSB (or the first bit) denotes the bottom dot of a column.

When a bit is 1, the dot is printed, and when a bit is 0, the dot is not printed. The lowest dot is 0.

Example)

— Top dot

— Bottom dot
— Lowest dot

1 2 3 4 5 6 7 8 9 10 (byte)

Data for the example: FEH, 00H, FEH, 00H, FEH, 00H, FEH, 00H, FEH, 00H

Figure F.3.2   7 × 7 Font Character Format

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APPENDIX G: COMPARISON TABLE FOR TM-290II AND TM-U295

The TM-290II and the TM-U295 differ in the following points:

1) DIP switches

DIP Switch	TM-290II	TM-U295
SW1-1	Data receive error	Data receive error
SW1-2	Data buffer capacity	Data buffer capacity
SW1-3	Handshaking	Handshaking
SW1-4	Data word length	Data word length
SW1-5	Parity	Parity
SW1-6	Parity selection	Parity selection
SW1-7	Transmission speed selection 110,150, 300, 600, 1200, 2400, 4800, 9600 bps	Transmission speed selection 1200, 2400, 4800, 9600 bps
SW1-8		
SW1-9		Pin 6 Reset signal
SW1-10	Not used	Pin 6 Reset signal

2) Buttons

Button	TM-290II	TM-U295
Power button	Not equipped	Equipped
Reset button	Equipped	Not equipped

3) Drawer kick-out connector signal

Pin Number	TM-290II	TM-U295
1	Frame GND	Frame GND
2	Drawer kick-out drive signal	Drawer kick-out drive signal
3	Drawer open/close signal	Drawer open/close signal
4	+24 V	+24 V
5	N.C	Drawer kick-out drive signal 2
6	Signal GND	Signal GND

4) Interface signal (D-SUB25)

Pin Number	TM-290II	TM-U295
1	FG	FG
2	TXD	TXD
3	RXD	RXD
4	--	RTS (same as DTR)
6	DSR	DSR
7	SG	SG
20	DTR	DTR
25	--	INIT

5) Added Commands

Command	TM-290II	TM-U295
DLE EOT	--	Real-time status transmission
ESC =	--	Select peripheral device
GS I	--	Transmit printer ID
GS a	--	Enable/disable Automatic Status Back (ASB)
GS r	--	Transmit status

6) Commands to which the ranges are added

Command	TM-290II	TM-U295
ESC T	$0 \le n \le 3$	$0 \le n \le 3, 48 \le n \le 51$
ESC p	$n = 3$	$0 \le n \le 1, 48 \le n \le 49$
ESC t	$0 \le n \le 1$	$0 \le n \le 2$
ESC u	$n = 0$	$n = 0, 48$

7) Character code

	TM-290II	TM-U295
Character code table **ESC t**	Page 0, 1 $0 \le n \le 1$	Page 0, 1, 2 $0 \le n \le 2$

8) Command specification differences

Command	TM-290II	TM-U295
ESC T, ESC W	Disabled in standard mode.	Has no effect in standard mode.
ESC {, **ESC !** 7×7 font, **ESC !** underline	Disabled in Page mode.	Has no effect in page mode.
ESC W	Spreads print area to 8 dot when print area is below 8 dot (both of x and y).	Does not spread print area to 8 dot when print area is below 8 dot. When print area is 0, this command is ignored.
HT	When this command is executed at the end of a line in standard mode, a tab is executed at the beginning of the next line. In page mode, only line feed is executed.	When this command is executed at the end of line, a tab is executed at the beginning of the next line in both of standard and page modes.

9) Self-test operation

	TM-290II	TM-U295
Current printer status printing and self test printing	Continuous.	After printing the current printer status, the printer ejects the paper and executes self test printing on the next paper.
Paper-out printing stop	Disabled.	Enabled.

APPENDIX H: Bidirectional Parallel Interface

H.1.   Description

The printer interface configured to the parallel interface specifications conforms to the IEEE 1284 Level-1 Devices and it works with those communication modes described in H.1.1 below.

H.1.1 Parallel Interface Communcation Modes

The parallel interface available with this product offers three communication modes as listed below.

When the power is applied to the printer or the printer is reset, the initialization mode is Compatibility Mode.

• Compatibility Mode

This mode allows byte-by-byte data transmissions from the host to the printer.   The normal data acception is proceeded in this mode.   All the other modes are accessible through the Compatibility Mode.

• Nibble Mode

This mode allows data transmission from the printer to the host in units of four bits.   Data transmissions from the printer are made via the status signal lines.   To transmit one byte data in this mode, four bits data is transmitted twice in succession.

• Byte Mode

This mode allows data transmission from the priter to the host in units of byte.   Data transmissions from the printer are made via the eight bits data signal lines.   To enable the Byte Mode, the host must be capable of switching the direction of signals for the eight bits data signal lines.

The communication direction from the host to the printer is referred to as Forward Channel, while the communication direction from the printer to the host is called Reverse Channel.

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H.1.2 Interface Operation Phases

Interface operation is divided into a number of interface phases. Each communication mode consists of one or more phases. Additional phases are defined to cover initialization and transitions between communication modes. The names and functions of the interface signals may vary between each modes and phases.
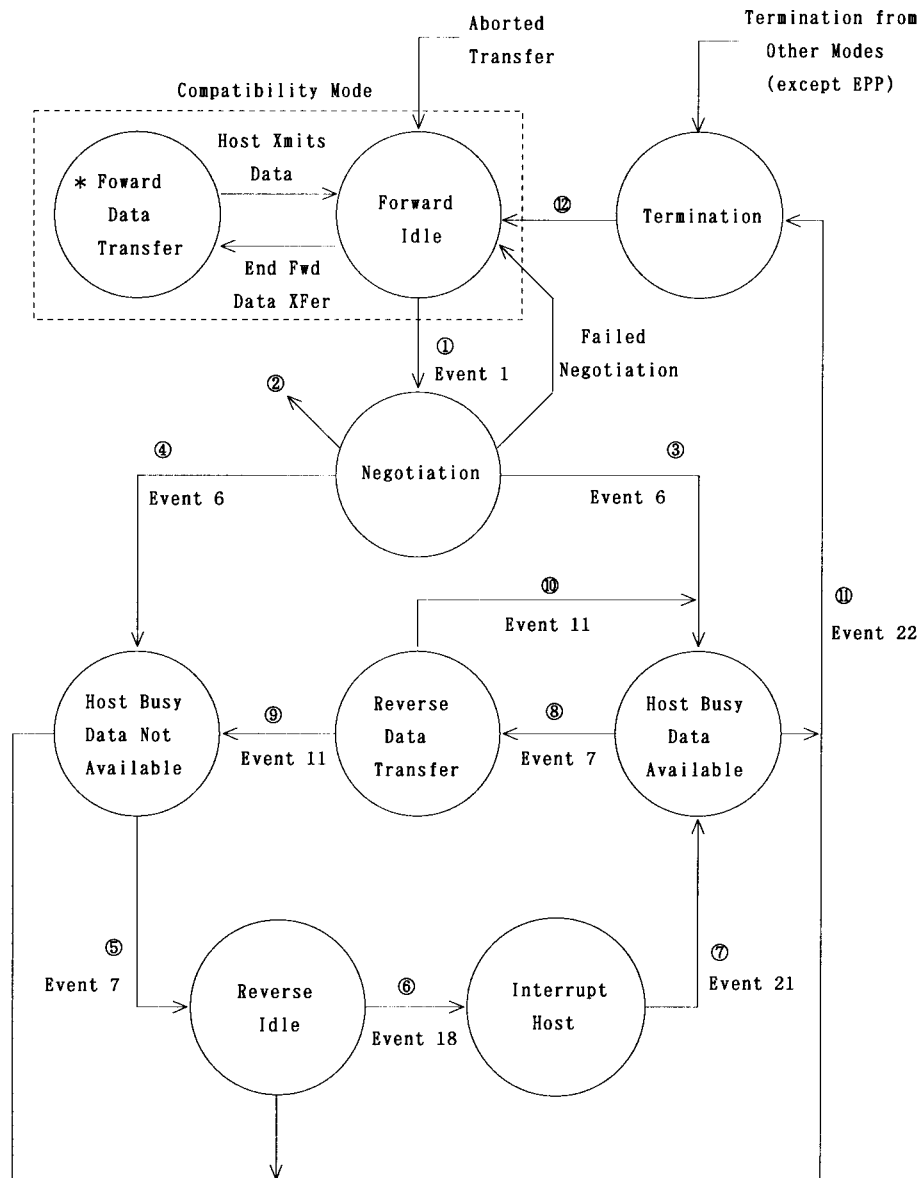

Figure H.1.2.1   Interface phase transitions

1 Host Requests Reverse Transfer.

2 Successful Negotiation to Another mode.

3 Peripheral Has Data To Send.   nDataAvail = Low

4 Peripheral Has No Data To Send.   nDataAvail = High

5 Host Goes To Idle.   HostBusy = Low

6 Peripheral Has New Data.

7 Peripheral Has Data Send.

8 Host Requests Data Byte.

9 Host Receives Data Byte.
   Peripheral Has No More Data To Send. nDataAvail = High

10 Host receives Data Byte.
   Peripheral Has More Data.   nDataAvail = Low

11 Host requests termination.

12 Interface Returns To The Compatible Mode.

   * In states other than in the process of data acception, the interface is set in the Forward Idle phase.

H.1.2.1   Phases in Compatibility Mode

• Compatibility Mode Forward Data Transfer phase:

   This phase allows the printer to accept data from the host.   The host and the printer perform handshaking in response to the signals, nStrobe, nAck and Busy.   The host shall not initiate any negotiation phase to a new operating mode until the interface successfully returns to the Compatibility Mode Forward Idle phase.

• Compatibility Mode Forward Idle phase:

   The interface is in Compatibility Mode, with no data transfer in progress.   The host is allowed to initiate a data transfer in Compatibility Mode, or initiate negotiation phase to a new operating mode.

H.1.2.2   Phases in Nibble Mode and Byte Mode

• Reverse Data Transfer phase:
   Data transfer from the printer to the host.

• Reverse Host Busy Data Available phase:
   The printer has data to transmit to the host.

• Reverse Host Busy Data Not Available phase:
   The printer has no more data to transmit.

• Reverse Idle phase: No data transfer is in progress and the host is waiting for the printer data. When any printer data is available, the printer will cause the interface to go to the Reverse Interrupt phase.

• Reverse Interrupt phase: This phase makes the printer report to the host that it has got data to transfer in the Reverse Idle phase.   While in this phase, the host may cause the interface to go to the Termination phase.

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H.1.2.3 Other phases

• Initialization phase: This phase includes both power-on initialization and host-driven interface reset.

• Negotiation phase: Signal handshaking to change the signaling method from Compatibility Mode to Nibble, Byte or other such modes.

• Power-on phase: This phase includes power-on initialization for both devices.

• Termination phase: A host-initiated transition phase in which the interface is changed from Nibble, Byte or other such Mode to Compatibility Mode.

H.2. Interface Operation

H.2.1 Power-On

In this interface, the printer status after power-on sequence is available by checking Logic-HIGH.

In 500 ms after Logic-HIGH exceeds High level (3.0 V) following the power-on sequence, all signals become active.

H.2.2 Hardware Reset

The printer may be forcedly reset through the nInit signal. However, in either of the following conditions, the forced printer reset becomes inoperative and Low level pulses are ignored.

- When the 1284-Active(nSelectIn) singal is High.
- When the printer is equipped with a Hardware Reset ON/OFF facility available by setting the DIP switch and the DIP switch is set in the OFF position.
  To reset the printer with the nInit signal, the following signal timing shall be satisfied.
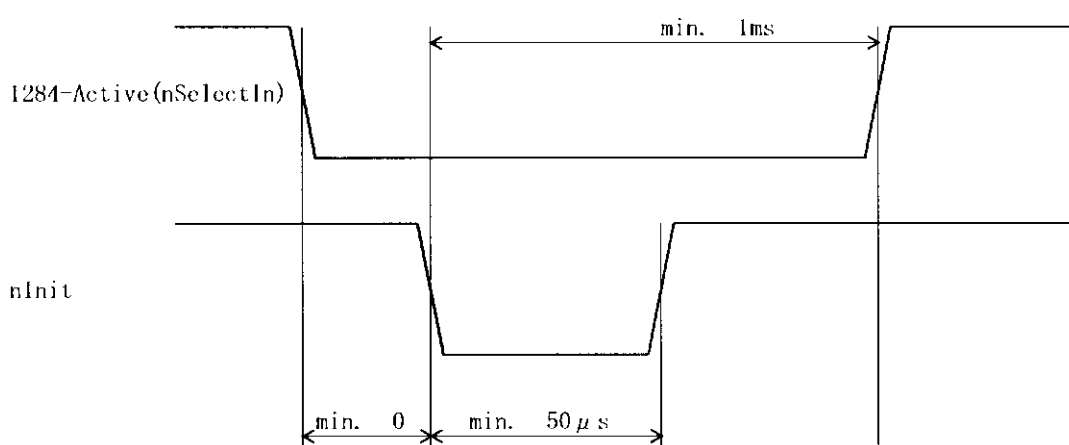

Figure H.2.2.1　nInit signal-driven hardware reset
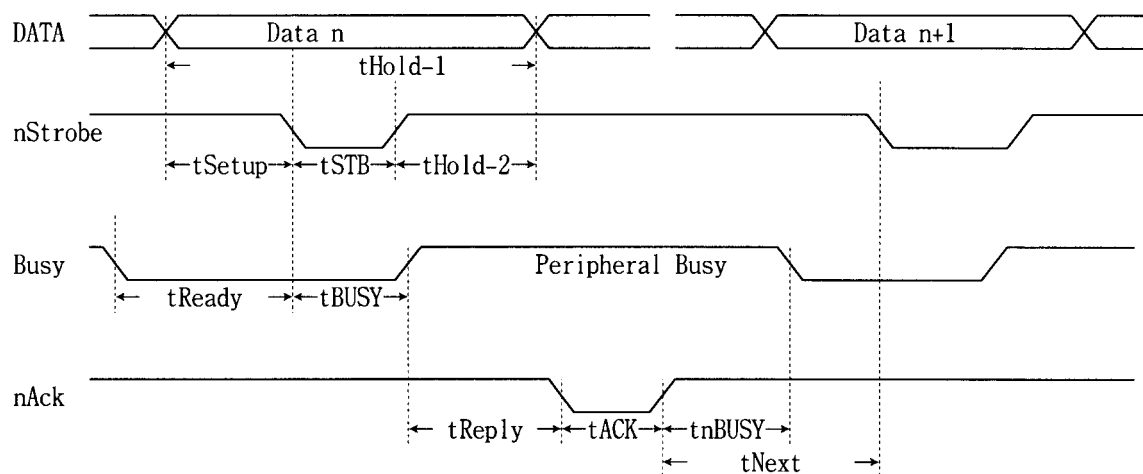
H.2.3 Compatibility Mode

H.2.3.1 Description

The Compatibility Mode features compatibility with the Centronics interface popular among the existing PCs. This is the initialization mode of the interface following the power-on sequence and also the printer reset. Under normal condition, the printer receives data from the host in this mode.

Data transmissions are proceeded as follows.

- The host checks that the printer has been ready for data acception then sends data and the nStrobe signal.
- Upon detection of Strobe signal from the host, the printer responds by setting Busy high to receive transmitted data.
- After completion of data reception, the printer sends the nAck LOW pulse signal and sets the Busy signal low. Then the printer becomes ready to receive next data.

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H.2.3.2 Handshaking

Figure H.2.3.1 Compatibility Mode handshake

Table H.2.3.1 Compatibility Mode handshake timing values

Parameter	Symbol	Request for printer Specifications on the printer		Request for host Specifications on the host	
		Minimum	Maximum	Minimum	Maximum
Data hold time (host)	tHold-1	—	500	—	—
Data hold time (printer)	tHold-2	—	—	750	—
Data setup time	tSetup	—	500	750	—
STROBE pulse width	tSTB	—	500	750	500 μs
READY cycle idle time	tReady	—	—	0	
BUSY output delay time	tBUSY	0	500	—	—
Data processing time	tReply	0		—	—
ACKNLG pulse width	tACK	500	10 μs	—	—
BUSY release time	tnBUSY	0		—	—
ACK cycle idle time	tNext	—	0	0	—

* The printer latches data at falling edge of   nStrobe.

H.2.4 Negotiation

H.2.4.1 Description

Normally the printer starts with Compatibility Mode in which it is Centronics interface compatible.   In an attempt to transit to Nibble/Byte Mode, the printer proceeds with negotiation in response to the host request.   Negotiation is proceeded as follows.

1) The host sets 1284-Active high to allow the interface to go to the Negotiation Phase.

2) The printer reports to the host whether or not it is ready to perform the host-requested mode.

3) The Negotiation Phase is terminated, changing to the communication phase.

H.2.4.2 Negotiation procedures

Negotiation is proceeded as follows.

1) In the 1284 communication mode, the default mode for the host and the printer is Compatibility Mode.   The host can use the negotiation to move from Compatibility Mode to other communication mode.

2) To begin the negotiation, the host places the communication mode request bit on the data bus (event 0).

3) The host sets 1284-Active(nSelectIn) high and HostBusy(nAutoFd) low (event 1).

4) The printer responds by setting PtrClk(nAck) low, nDataAvail(nFault) high, Xflag(Select) high, and AckDataReq(PError) high (event 2).

5) The host sets HostClk(nStrobe) low, allowing the printer to latch the communication request bit data (event 3).

6) The host sets HostClk(nStrobe) and HostBusy(nAutoFd) high (event 4).

7) When the printer has any data to transmit to the host, it sets AckDataReq(PError) low, and nDataAvail(nFault) low then Xflag(Select) to its appropriate value as listed below for the communication mode (event 5).

> Xflag: Low for Nibble Mode
> High for Byte Mode

8) The printer sets PtrClk(nAck) high, indicating that it is ready to accept the other status lines (event 6).

9) When the printer has any data to transmit to host, the host enters the HostBusy Data Available Phase, otherwise it enters the Termination Phase and returns to the Compatibility Mode.

10) When the printer has no data to transmit to the host, the host enters the HostBusy Data Not Available Phase, otherwise it enters the Termination Phase and returns to the Compatibility Mode.

11) If the printer fails to support the communication mode requested by the host, it responds by setting Xflag(Select) as follows.

> For request for Nibble Mode: High
> For request for Byte Mode: Low

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H.2.4.3 Notes

1) The start of negotiation phase shall be defined with rising edge of 1284-Active signal.

2) The timing to start negotiation in the Compatibility Mode shall be in principle after nAck pulse has been developed following nStrobe.

   After the rising edge of nStrobe, by detecting the rising edge of 1284-Active signal before or during the output of nAck, the interface enters the negotiation phase.   In this case, when the termination is followed by the Compatibility Mode, nAck pulse is not developed.

3) Negotiation is available from Busy or Error state in the Compatibility Mode.   In this case, the termination fails to lead to the original Busy or Error state but to the printer status after termination.

4) If the printer fails to support the communication mode requested by the host, the host shall enter the Termination phase then return to the Compatibility Mode.   (Refer to H.2.4.2.)

Table H.2.4.1   1284 Communication Mode Request values-bit assignments

Bit	Definition	Valid Bit values	Valid Hex Code	Xflag Values when supported	Xflag Values on the printer
7	Request Extensibility Link	10000000	80H	High	Low
6	Request EPP Mode	01000000	40H	High	Low
5	Request ECP Mode with RLE	00110000	30H	High	Low
4	Request ECP Mode	00010000	10H	High	Low
3	Reserve	00001000	08H	High	Low
2	Request Device ID; Return Data Using				
	Nibble Mode Rev Channel Transfer	00000100	04H	High	High
	Byte Mode Rev Channel Transfer	00000101	05H	High	High
	ECP Mode Transfer without RLE	00010100	14H	High	Low
	ECP Mode Transfer with RLE	00110100	34H	High	Low
1	Reserve	00000010	High	Low	
0	Byte Mode Reverse Channel Transfer	00000001	01H	High	High
non	Nibble Mode Reverse Channel Transfer	00000000	00H	Low	Low
	Illegal or Contradictory Request	Other than above cases	Other than above cases	—	Low

* The printer is designed to work with only Nibble/Byte and thus it responds with negative Xflag values for request for the other modes.

H.2.5 Printer to Host Transfer Modes

H.2.5.1 Nibble Mode

Data transmissions from the printer to the host is proceeded as follows. The steps beginning with 1) apply to the transition from the Negotiation phase to the Host Busy Data Available phase. To the transition from the Negotiation phase to the Host Busy Data Not Available phase, the steps shall start with 9).

1) After negotiating to the Nibble Mode, the host will set HostBusy(nAutoFd) low to indicate it is ready to accept data from the printer (event 7).

2) The printer responds by placing the lower four bits on the Reverse channel data lines then sets PtrClk(nAck) low (event 8, event 9).

3) The host latches data in the event 9 then sets HostBusy(nAutoFd) high signaling to the printer that it has received the data (event 10).

4) The printer sets PtrClk(nAck) high, then the lower four bits transmission ends. (event 11).

5) The steps 1) through 3) are repeated for the upper four bits transmission, followed by the steps follow.

6) The host sets HostBusy(nAutoFd) high (event 10) to receive data, after which the printer shall set the four status lines as follows (event 13).
   - PtrBusy(Busy):   To its current forward channel value.
   - nDataAvail(nFault):   Low if another byte is ready to be sent.
   - AckDataReq(PError):   To the same value as nDataAvail(nFault).
   - Xflag(Select):   To the current mode status or low.

7) The printer sets PtrClk(nAck) high (event 11).

8) Following the event 11, based on the signals set by the printer in the event 13, the host examines the status lines to determine if;

   Another printer to host byte is available,
   and The host to the printer data transmission is possible.

9) At the end of a byte transfer, two nibbles, the host is allowed three options as listed below when the printer has no more data to transmit to the host.
   1. To proceed with termination and return to Compatibility Mode,
   2. To remain in the Host Busy Data Not Available phase, or
   3. To set HostBusy(nAutoFd) low (event 7) then put the interface into the Rev. Idle phase.

10) When the printer has any additional data to transmit to the host, the host is provided with three options as listed below.
   1. To set HostBusy(nAutoFd) low, indicating that the host is ready to accept additional data,
   2. To remain in the Host Busy Data Available phase, or
   3. To proceed with termination and return to Compatibility Mode.

11) When the host sets HostBusy(nAutoFd) low in the Host Busy Data Available phase, the printer repeats the steps starting with 2).

12) Whenever the printer generates data for the host in the Reverse Idle phase, it sets PtrClk low to request an interrupt from the host (event 18).

13) Then, the printer sets PtrClk high (event 19).

14) The host responds to the interrupt requested by the printer by setting HostBusy(nAutoFd) high (event 20).

15) The printer then sets AckDataReq(PError) low to acknowledge the host s response, followed by the transition of the interface to the Host Busy Data Available phase (event 21).

H.2.5.2　Byte Mode

Data transmissions from the printer to the host are proceeded as described below.　The steps starting with 1) apply to the transition to the Host Busy Data Available phase in the negotiation.　To the transition to the Host Busy Data Not Available phase in the negotiation, the steps shall start from 9).

1) After negotiating to the Byte Mode, the host will place the data line in a high impedance state (event 14) then set HostBusy(nAutoFd) low (event 7) to indicate that it is ready to accept data from the printer.

2) The printer responds by placing the communication data on the data line (event 15).

3) The printer then sets PtrClk(nAck) low (event 9).

4) The host latches data in the event 9 then sets HostBusy(nAutoFd) high, indicating that it is processing the data(event 10).

5) At this point, the printer shall respond by setting the status line as follows (event 13).
   - PtrBusy(Busy):　　　　　　To its current forward channel value
   - nDataAvail(nFault):　　　Low if another byte is ready to be sent
   - AckDataReq(PError):　　　To the same value as nDataAvail(nFault)
   - Xflag(Select):　　　　　　To its value during the last negotiation or low

6) The printer then sets PtrClk(nAck) high, completing the byte handshake (event 11).

7) At this point, the host will pulse HostClk(nStrobe) low (event 16), then high (event 17), signaling that it has received the byte.

8) Note that the events 10 and 16 may occur simultaneously, and the events 7 and 17 may occur simultaneously (in such cases in which HostBusy and HostClk are set equivalent).

9) At the end of a byte transfer, the printer reports to the host whether or not it has additional data to transmit to the host. When the printer has no more data to transmit to the host, the host is allowed three options as listed below.
   1. To proceed with termination and return to Compatibility Mode.
   2. To remain in the Host Busy Data Not Available phase.
   3. To set HostBusy(nAutoFd) low then put the interface into the Reverse Idle phase (event 7).

10) When the printer has data to transmit to the host, the host is provided with three options as listed below.

    1. To set HostBusy(nAutoFd) low, indicating that the host is ready to accept additional data.

    2. To remain in the Host Busy Data Available phase.

    3. To proceed with termination and return to Compatibility Mode.

    The procedures to start data transmissions from the Reverse Idle phase are same as in the Nibble Mode.

H.2.6 Device ID

Device ID is a string of characters to identify a device connected through the interface.

The printer will respond to the request by the host for the Device ID with the following Device ID.

    <00>h<31>h
    MFG: EPSON;
    CMD: ESC/POS;
    MDL: TM-P1.00;
    CLS: PRINTER;

The first two bytes indicate the length of the entire Device ID including those two bytes.

For request of Device ID, refer to the section under 'Negotiation.'

The host is required to accept a complete string of Device ID having a length indicated by the first two bytes and it is not allowed to terminate the Device ID reception in progress until the entire Device ID is received.   If the host terminates the Device ID transfer before all bytes have been transferred, the printer will discard the remainder of the Device ID string.   Then, when the host requests Device ID again, the printer sends the ID from the beginning.

Once the host has received a complete string of Device ID having a length indicated by the first two bytes, it shall proceed with termination even if the printer has more data to transmit to the host (Data Available).   If the host attempts to accept additional data without termination, the printer status will be sent.

H.2.7 Termination

Termination refers to the processing to return to the Compatibility Mode from either Nibble or Byte Mode. To terminate either the Nibble or Byte Mode, the host must take the following actions.

- To set 1284-Active(nSelectIn) low.
- To set HostBusy(nAutoFd) high (event 22).

Termination is available in two types.

① Handshake between the host and the printer

② Immediate termination

In the case of ①, on the condition that, in the process of transition from Reverse Mode to Compatibility Mode, the event 22 has been completed while the interface is active (with 1284-Active set high);

1) The printer responds to the 1284-Active by setting PtrBusy(Busy) and nDataAvail(nFault) high (event 23).

2) The printer will then reverse Xflag(Select) and set PtrClk(nAck) low (event 24).

3) The host then sets HostBusy(nAutoFd) low (event 25).

4) The printer then sets nDataAvail(nFault), Xflag(Select) and AckDataReq(PError) back to the status in the Compatibility Mode (event 26) and sets PtrClk(nAck) high (event 27).

5) The host completes the termination handshake by setting HostBusy(nAutoFd) high, returning the interface to the Compatibility Mode Idle phase (event 28).

6) The printer then changes PtrBusy(Busy) to be ready to accept data from the host.

In the case of ②, the printer proceeds to immediate termination whenever the interface becomes inactive (with 1284-Active set low) by omitting the event 22. In this termination, data integrity is not guaranteed and the printer will switch the data line from output to input in 1 μs.

In the Reverse Idle phase, the printer is allowed to report to the host that it has any data to transmit to the host. This may occur in conjunction with termination because the host changes from the Idle phase to the Compatibility Mode.

The printer will start the Interrupt phase provided in the events 8 and 9 when it has data to transmit to the host. At this point, when 1284-Active(nSelectIn) becomes low before HostBusy(nAutoFd) changes from a high to a low state, the printer will judge that the host has entered the Termination phase and that it proceeds to the normal termination handshake.
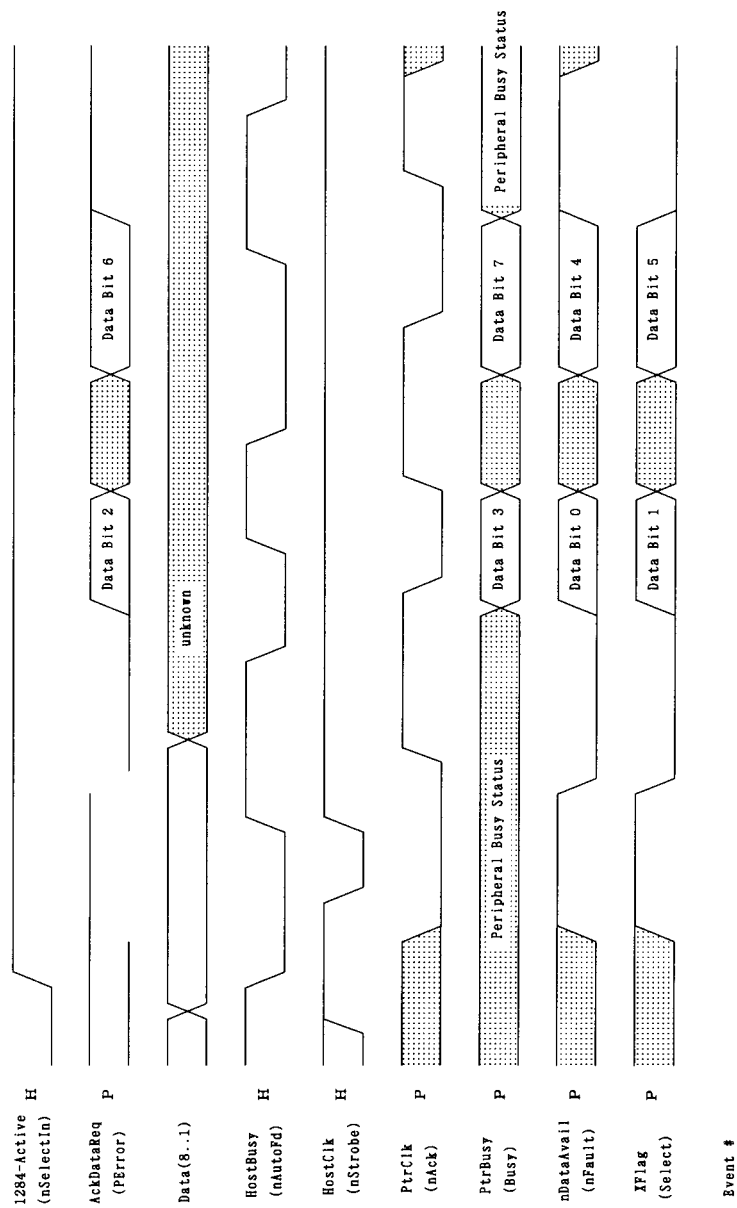
H.2.8 Interface Operation Timing Chart

Figure H.2.8.1 Nibble Mode Negotiation and Transfer

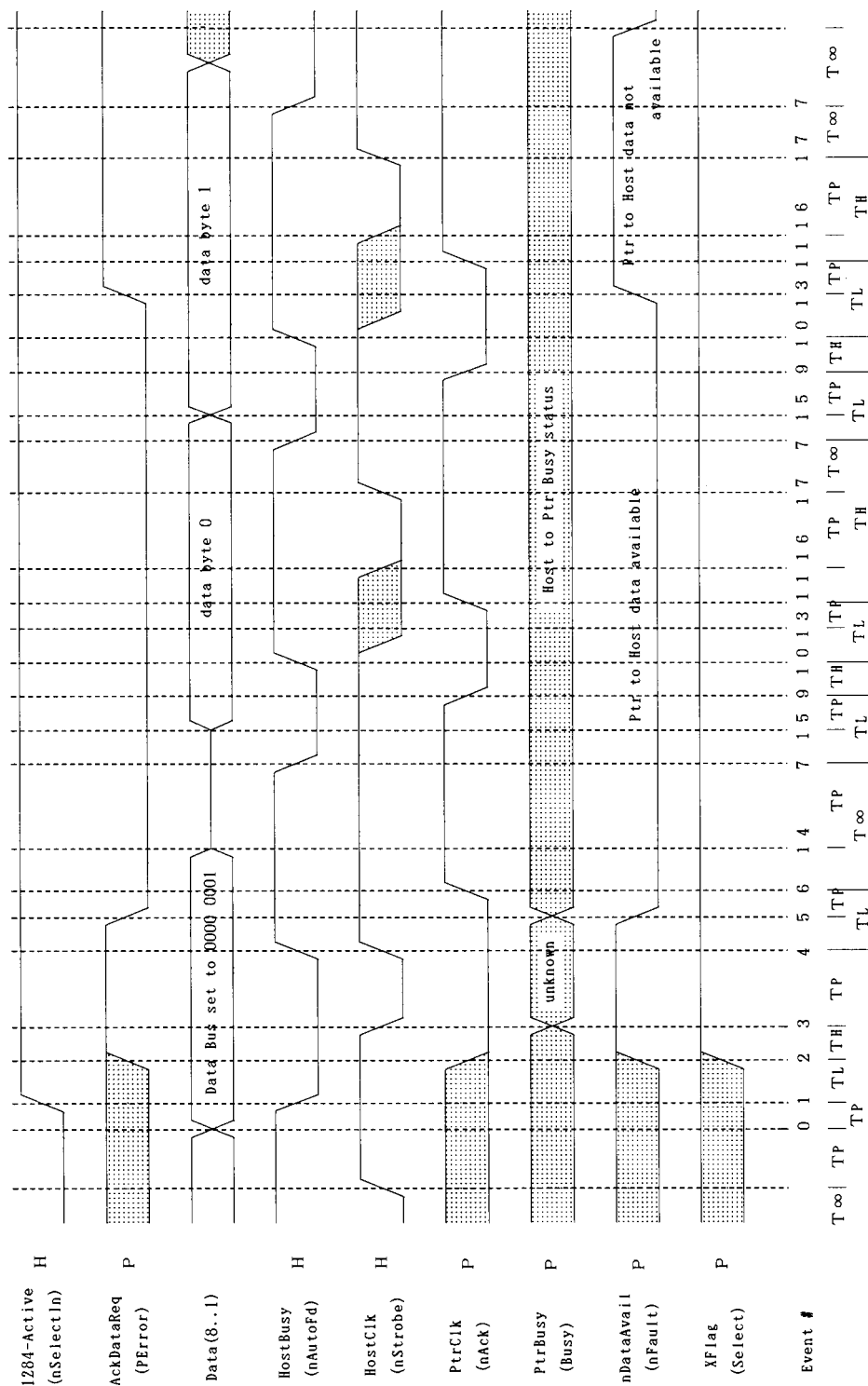| EPSON	TITLE	**TM-U295/U295P** Specification (STANDARD)	SHEET REVISION	NO.	
			F	NEXT App.30	SHEET App.29

Figure H.2.8.2 Byte Mode Negotiation and Termination

	TITLE	SHEET REVISION	NO.	
EPSON	**TM-U295/U295P** Specification (STANDARD)	F	NEXT App.31	SHEET App.30

Figure H.2.8.3 Byte Mode Negotiation and Transfer

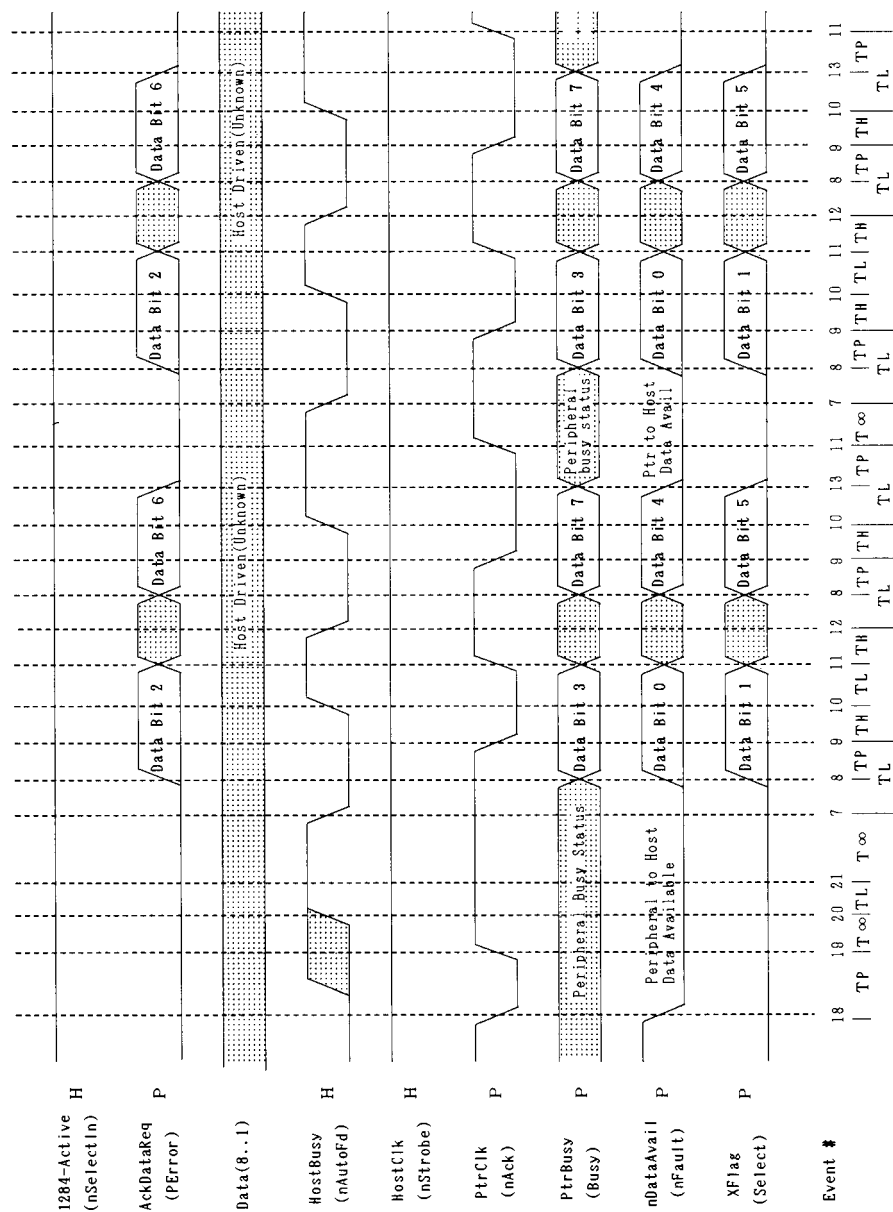|	TITLE	SHEET REVISION	NO.	
EPSON	**TM-U295/U295P** Specification (STANDARD)	F	NEXT App.32	SHEET App.31
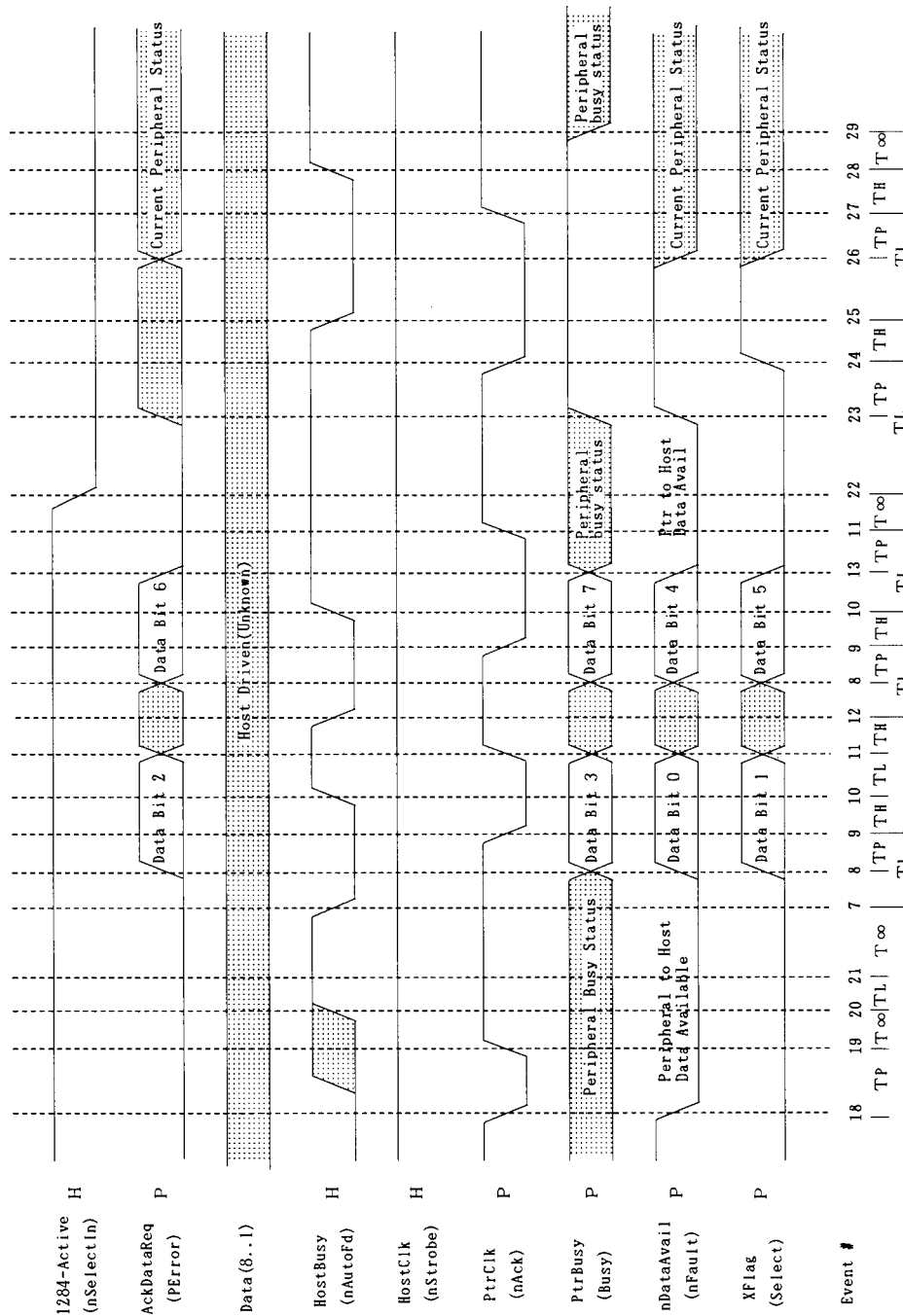
Figure H.2.8.4 Nibble Mode Transfer and Termination

Figure H.2.8.5 Nibble Mode Interrupt and Transfer

Figure H.2.8.6 Failed Negotiation