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TM-C7500 Series / TM-C7500G Series Extended I/F Technical Reference Guide

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Rev.C

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About this Manual

Aim of the Manual

This manual was created to provide information on development, design, and installation of systems and development and design of printer applications for developers.

Manual Content

The manual is made up of the following sections:

Chapter 1 Overview

Chapter 2 Extended I/F Specification

Key to Symbols

The symbols in this manual are identified by their level of importance, as defined below. Read the following carefully before handling the product.

NOTE	Provides important information and useful tips.

Contents

Overview

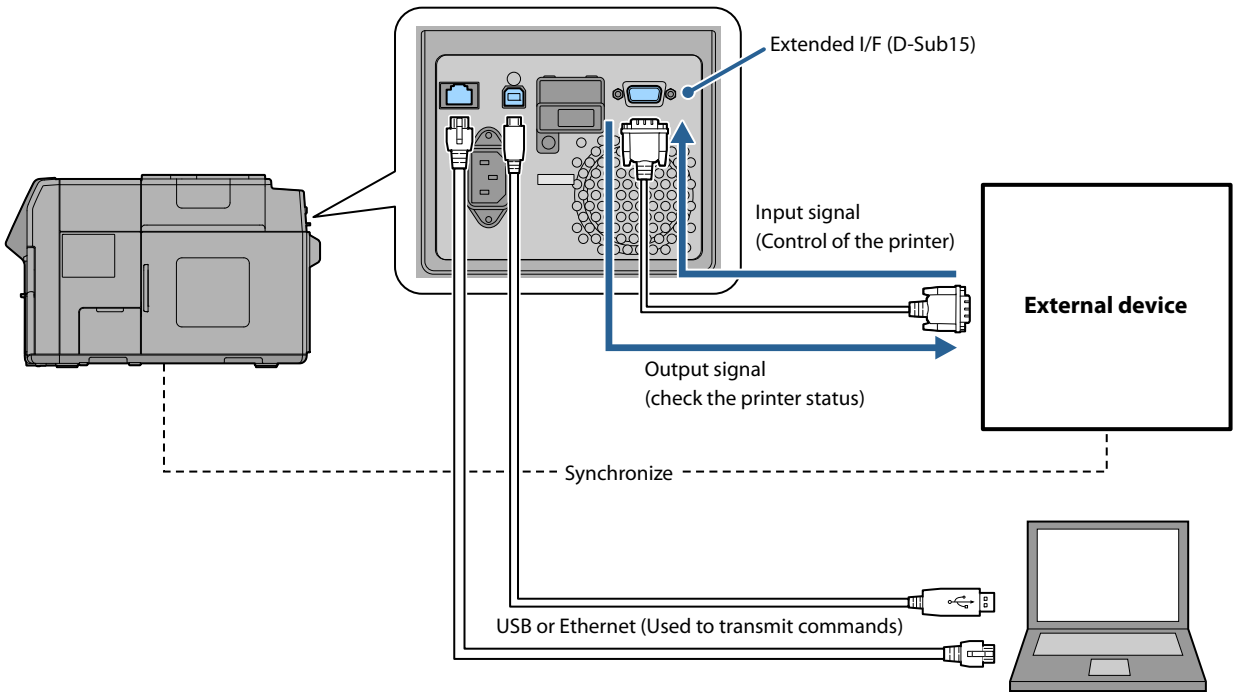
This specification describes the extended I/F specifications for the TM-C7500 series / C7500G series. Please develop your device to match these specifications.

Functionality

Using the extended I/F signal allows the user to perform synchronous control of the printer and external devices and to check the printer status.

Signal transmission between the printer and external device uses a D-Sub15 cable.

Also, use a USB cable or Ethernet cable to send ESC/Label commands, which set the operation for the extended I/F, from the host PC.



Target options

The following external devices can be connected.

- Rewinder (including large diameter roll)
- Unwinder (including large diameter roll)
- Other than above listed options needed to work with Color inkjet printer.

Extended I/F Specification

I/F Signal

The following lists the signal specifications for the extended I/F.

Signal	Explanation	Input-Output (From printer)	Signal Wave	Electrical Condition	Input-output Connector
					D-Sub 15
Paper out	Output paper out.	OUT	Level	Open Drain	Available
Ink cartridge	Output replace ink cartridge, or ink low, for each ink cartridge.	OUT	Level	Open Drain	Available
Printer error	Output error, such as printer error, cover open, pause.	OUT	Level	Open Drain	Available
Print end	Output upon printer paper feed or completion of continuous printing.	OUT	Level/ Pulse	Open Drain	Available
Paper back feed	Output paper back feed.	OUT	Level	Open Drain	Available
Reserved	-	OUT	Level	Open Drain	Available
Pause	This signal input toggles the pause status.	IN	Level/ Pulse	CMOS input	Available
Reserved	-	IN	Level	CMOS input	Available

Command

The following lists the commands (ESC/Label) which set the operation of the extended I/F.

Signal	Input-Output (From printer)	Commands and Parameters that control the extended I/F	Page
Print end	OUT	^S(CNA, B, b = D/E/N/0/1/2/3/4	page 8
Paper back feed	OUT	^S(CNA, R, b = D/E/0/1/2	page 9
Ink cartridge	OUT	^S(CNA, I, b = D/E/N/0/1/2/3/4	page 10
Paper out	OUT	^S(CNA, P, b = D/E/0/1/2	page 11
Printer error	OUT	^S(CNA, E, b = D/E/0/1/2	page 12
Pause	IN	^S(CNI, P, b = 0/1/2/3/4	page 13
		~H(CNI, P	

Print end

[Input-Output] <OUT>

[Format] ^S(CNA, B, b

[Parameter]

Description	Definition range
b = mode	D/E/N/0/1/2/3/4

[Function]

“Print end” signal is set to the mode that is specified by parameter b.

Parameter b	Mode description
D/0	“Print end” signal is not output.
1	“Print end” signal is high in normal status, low in paper feeding.
E/2	“Print end” signal is low in normal status, high in paper feeding.
3	“Print end” signal is high in normal status, when continuous printing end Low for 20 msec.
N/4	“Print end” signal is low in normal status, when continuous printing end High for 20 msec.

[Initial value] 0

[EX]"Print end" signal is set to the mode that is high in normal status, low in paper feeding.

^XA

^S(CNA,B,1

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal output timing, see "Timing chart" on page 20.

Paper back feed

[Input-Output] <OUT>

[Format] ^S(CNA, R, b

[Parameter]

Description	Definition range
b = mode	D/E/0/1/2

[Function]

“Paper back feed” signal is set to the mode that is specified by parameter b.

Parameter b	Mode description
D/0	“Paper back feed” signal is not output.
1	“Paper back feed” signal is high in normal status and low in back feeding.
E/2	“Paper back feed” signal is low in normal status and high in back feeding.

[Initial value] 0

[EX] "Paper back feed" signal is set to the mode that is high in normal status, low in back feeding.

^XA

^S(CNA,R,1

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal output timing, see "Timing chart" on page 20.

Ink cartridge

[Input-Output] <OUT>

[Format] ^S(CNA, I, b

[Parameter]

Description	Definition range
b = mode	D/E/N/0/1/2/3/4

[Function]

“Ink cartridge” signal is set to the mode that is specified by parameter b.

Parameter b	Mode description
D/0	“Ink cartridge” signal is not output.
1	“Ink cartridge” signal is high in normal status and low in replace ink cartridge *1.
E/2	“Ink cartridge” signal is low in normal status and high in replace ink cartridge *1.
3	“Ink cartridge” signal is high in normal status and low in ink low *2 or replace ink cartridge *1.
N/4	“Ink cartridge” signal is low in normal status and high in ink low *2 or replace ink cartridge *1.

*1 Printer status: “NO INK CARTRIDGE”, “INK CARTRIDGE EMPTY”, “INK CARTRIDGE READ ERROR”
*2 Printer status: “INK CARTRIDGE NEAR EMPTY”

[Initial value] 0

[EX] "Ink cartridge" signal is set to the mode that is low in normal status and high in replace ink cartridge.

^XA

^S(CNA,I,E

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal output timing, see "Timing chart" on page 20.

Paper out

[Input-Output] <OUT>

[Format] ^S(CNA, P, b

[Parameter]

Description	Definition range
b = mode	D/E/0/1/2

[Function]

“Paper out” signal is set to the mode that is specified by parameter b.

Parameter b	Mode description
D/0	“Paper out” signal is not output.
1	“Paper out” signal is high in normal status and low in paper out *.
E/2	“Paper out” signal is low in normal status and high in paper out *.

* Printer status: “NO PAPER”, “NO PAPER ERROR”

[Initial value] 0

[EX] "Paper out" signal is set to the mode that is low in normal status and high in paper out.

^XA

^S(CNA,P,E

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal output timing, see "Timing chart" on page 20.

Printer error

[Input-Output] <OUT>

[Format] ^S(CNA, E, b

[Parameter]

Description	Definition range
b = mode	D/E/0/1/2

[Function]

“Printer error” signal is set to the mode that is specified by parameter b.

“Printer error” signal shows printer's unrecoverable error, recoverable error and pause status.

Parameter b	Mode description
D/0	“Printer error” signal is not output.
1	“Printer error” signal is high in normal status and low in printer error *.
E/2	“Printer error” signal is low in normal status and high in printer error *.

* Printer status: “MEDIA DETECTION ERROR”, “MEDIA SIZE ERROR”, “PAPER JAM ERR”, “NO PAPER”, “NO PAPER ERROR”, “PAPER PATH ERROR”, “PAPER REMOVAL ERROR”, “INK COVER OPEN”, “NO INK CARTRIDGE”, “INK READ ERROR”, “M/B COVER OPEN”, “NO M/B”, “M/B READ ERROR”, “REPLACE INK”, “REPLACE M/B”, “ROLL PAPER COVER OPEN”, “PAPER COVER OPEN”, “FRONT COVER OPEN”, “MEMORY FULL”, “PRINTER ERROR”, “SERVICE REQD.”

[Initial value] 0

[EX] "Printer error" signal is set to the mode that is low in normal status and high in printer error.

^XA

^S(CNA,E,E

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal output timing, see "Timing chart" on page 20.

Pause

[Input-Output] <IN>

[Format] ^S(CNI, P, b

[Parameter]

Description	Definition range
b = mode	0/1/2/3/4

[Function]

When the “Pause” signal is input, the printer is set to the mode specified by parameter b.

Parameter b	Mode description
0	“Pause” signal is ignored.
1	Switches the Pause status *2 when low asserted *1 more than 20 msec or until the “Printer error” signal is not asserted for the “Pause” signal input.
2	Switches the Pause status *2 when high asserted *1 more than 20 msec or until “Printer error” signal is not asserted for the “Pause” signal input.
3	The printer is paused while the “Pause” signal is low asserted.
4	The printer is paused while the “Pause” signal is high asserted.

*1 Assert to the printer input (#1) requires edge input (high to low, or low to high).As the “Printer error” signal changes once the printer enters the pause status, assert the “Pause” signal before then.

*2 When paused, the printer switches to unpaused. When unpaused, the printer switches to paused.

[Initial value] 0

[Limitation]

Printer firmware version WAI31000 or higher is required to use this function.

[EX] The printer is paused while the "Pause" signal is low asserted.

^XA

^S(CNI,P,3

^JUS

^XZ

NOTE

- The ^JUS command is required to save settings to the non-volatile memory of the printer unit.
- Use a USB cable or Ethernet cable to send ESC/Label commands from the host PC.
- For the signal input timing, see "Timing chart" on page 20.

Acquires the "Pause" signal's mode

[Format] ~H(CNI, P

[Parameter]

none

[Function]

The mode of “Pause” signal set to the printer is acquired.

[Response]

<STX> ^S(CNI,P,<mode><ETX>

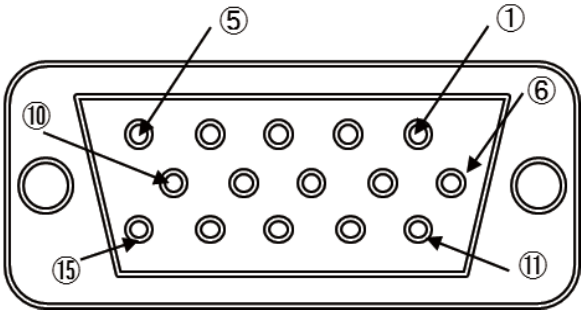
<STX>: Control code that means Start of text (02H by the hexadecimal number expression).

<ETX>: Control code that means End of text (03H by the hexadecimal number expression).

<mode>: Either of 0/1/2/3/4 that shows mode of “Pause” set to printer.

Pin Arrangement of Connector

The following lists the pin arrangement for the D-Sub connector.



Pin No.	Signal	Input-Output (From printer)
1	Pause	IN
2	Reserved	IN
3	Reserved	OUT
4	GND	GND
5	GND	GND
6	GND	GND
7	GND	GND
8	GND	GND
9	OPEN	-
10	GND	GND
11	Paper out	OUT
12	Ink cartridge	OUT
13	Paper back feed	OUT
14	Print end	OUT
15	Printer error	OUT

Electrical characteristic

The followings list the electrical characteristics.

Absolute maximum ratings

Item	Symbol	Min.	Typ.	Max.	Units	Note
Input voltage (H level)	VIH(max)	-	-	30	[V]	
Input voltage (L level)	VIL(min)	-0.5	-	-	[V]	
Output voltage	VO	-	-	30	[V]	*
Output current	IO(max)	-	-	10	[mA]	*

Electrical characteristics

Item	Symbol	Min.	Typ.	Max.	Units	Note
Input voltage (H level)	VIH	2.6	-	-	[V]	
Input voltage (L level)	VIL	-	-	0.45	[V]	
Output voltage (L level)	VOL	-	0.05	0.1	[V]	IO=10 mA
Output leakage current	ILK	-	-	1.0	[uA]	VO=30 V

* Because the output type is open drain, be sure to set the pull-up voltage and pull-up resistor less than the maximum ratings of output voltage and output current.

Signal Logic

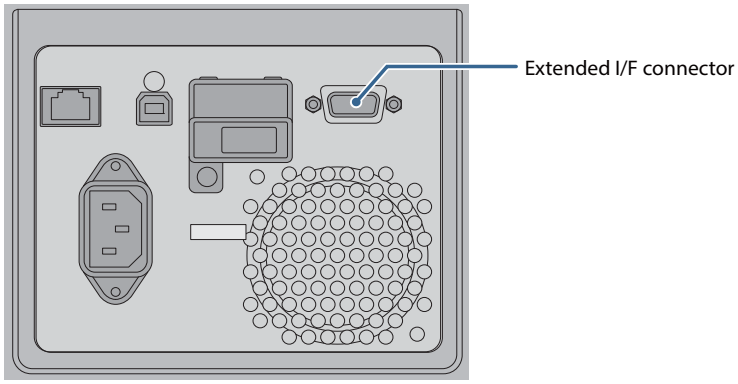
The following lists the signal logic.

Pin No.	Signal	Input-Output (From printer)	Signal Logic	
			Low	High-Z
1	Pause	IN	Assert while 20 msec *1, 2 Signal level: Level/ Pulse	
2	Reserved	IN	-	-
3	Reserved	OUT	-	-
4	GND	GND	-	-
5	GND	GND	-	-
6	GND	GND	-	-
7	GND	GND	-	-
8	GND	GND	-	-
9	OPEN	-	-	-
10	GND	GND	-	-
11	Paper out	OUT	Paper out *2/ Paper remaining *2	
12	Ink cartridge	OUT	Replace ink cartridge or Ink low *2/ With ink left *2	
13	Paper back feed	OUT	Back feeding *2/ No back feeding *2	
14	Print end	OUT	Feeding paper *2 or Continuous printing end *2 / No feeding paper *2 Signal level: Level/ Pulse (20 msec)	
15	Printer error	OUT	Error *2/ No error *2	

∗1 Assert while 20 msec, or until asserted “Printer error” signal (#15).
∗2 Enable to change assert logic by command.

External Device Connection Method

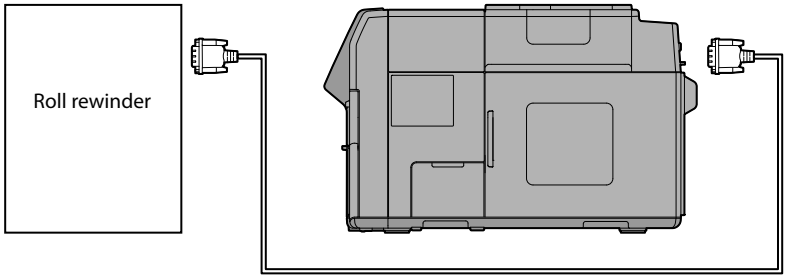
Use a D-Sub15 cable to connect with an external device. Connect the cable to the extended I/F connector on the printer rear.



Roll Rewinder or Roll Unwinder

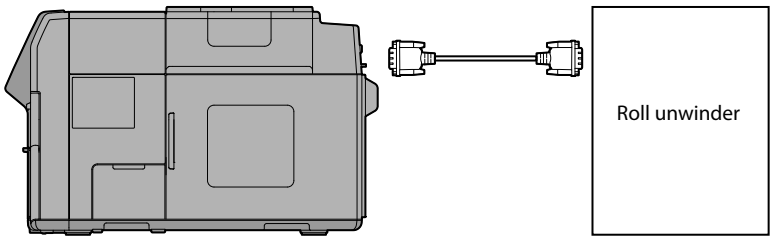
Connect the rewinder's I/F to the Extended I/F connector.

Prepare a power supply for the roll rewinder that is separate from the printer's power supply.



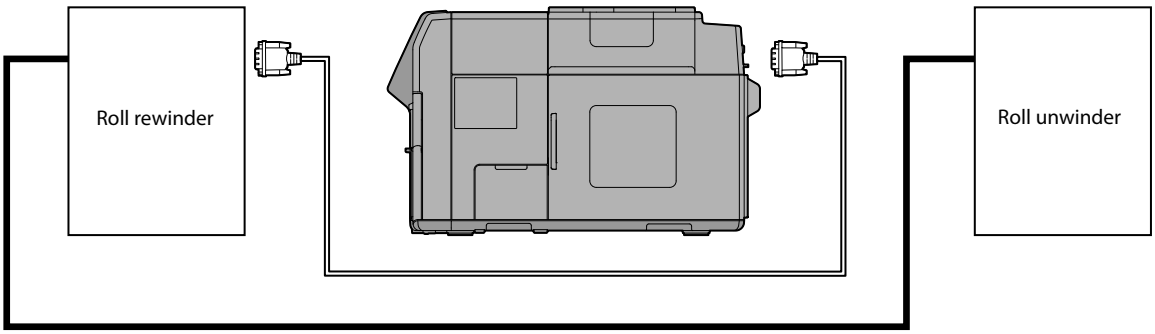
Connect the roll unwinder's I/F to the Extended I/F connector.

Prepare a power supply for the roll unwinder that is separate from the printer's power supply.



Connect the rewinder's I/F to the Extended I/F connector.

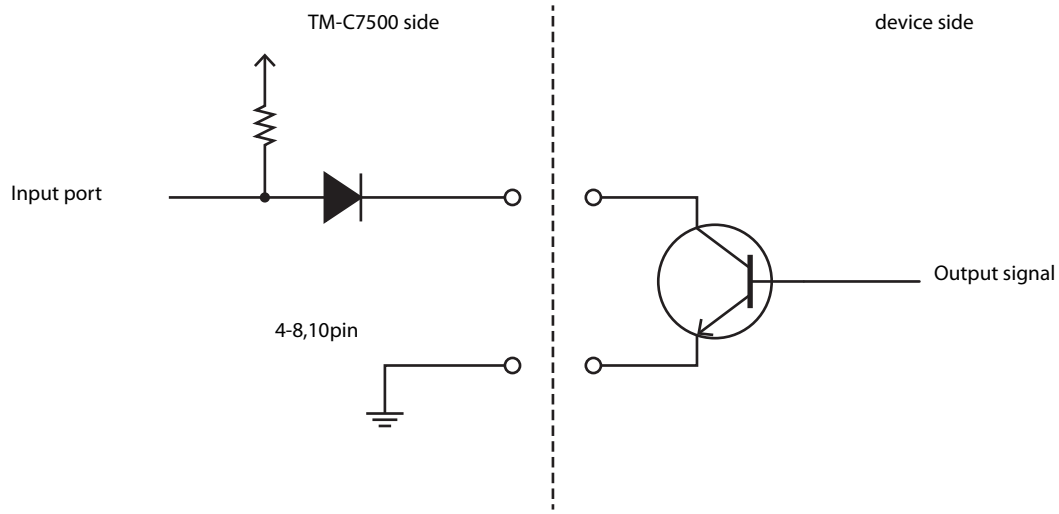
Connect the roll unwinder to the roll rewinder.



Interface circuit

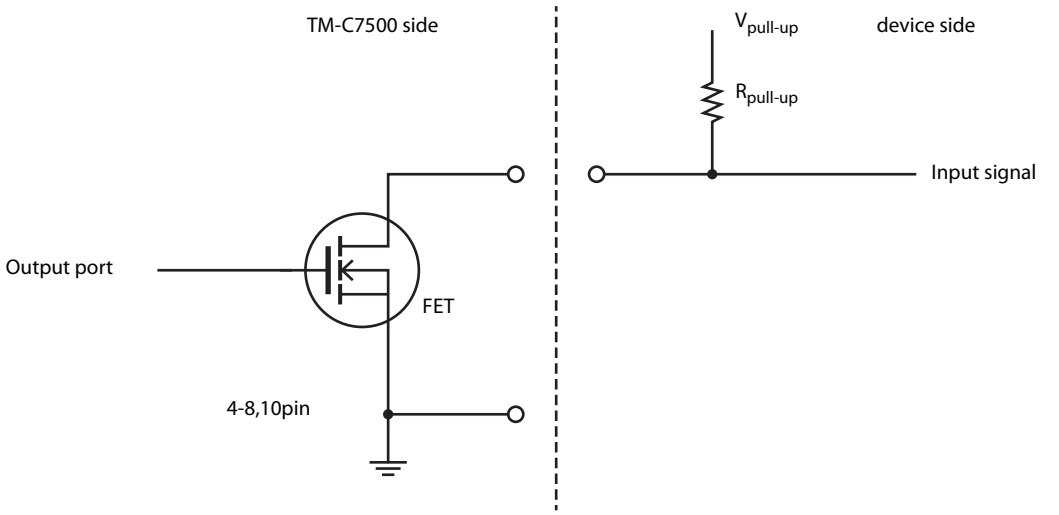
Prepare a circuit like the one below on the device side.

Input Connector



- An open drain signal is input to the TM-C7500.
- When inputting a level signal, set high to 2.6 V or higher and low to 0.45 V or lower.
- Because the TM-C7500 does not have a terminal for providing power to a device, prepare a drive power supply for the circuit on the device side.

Output Connector



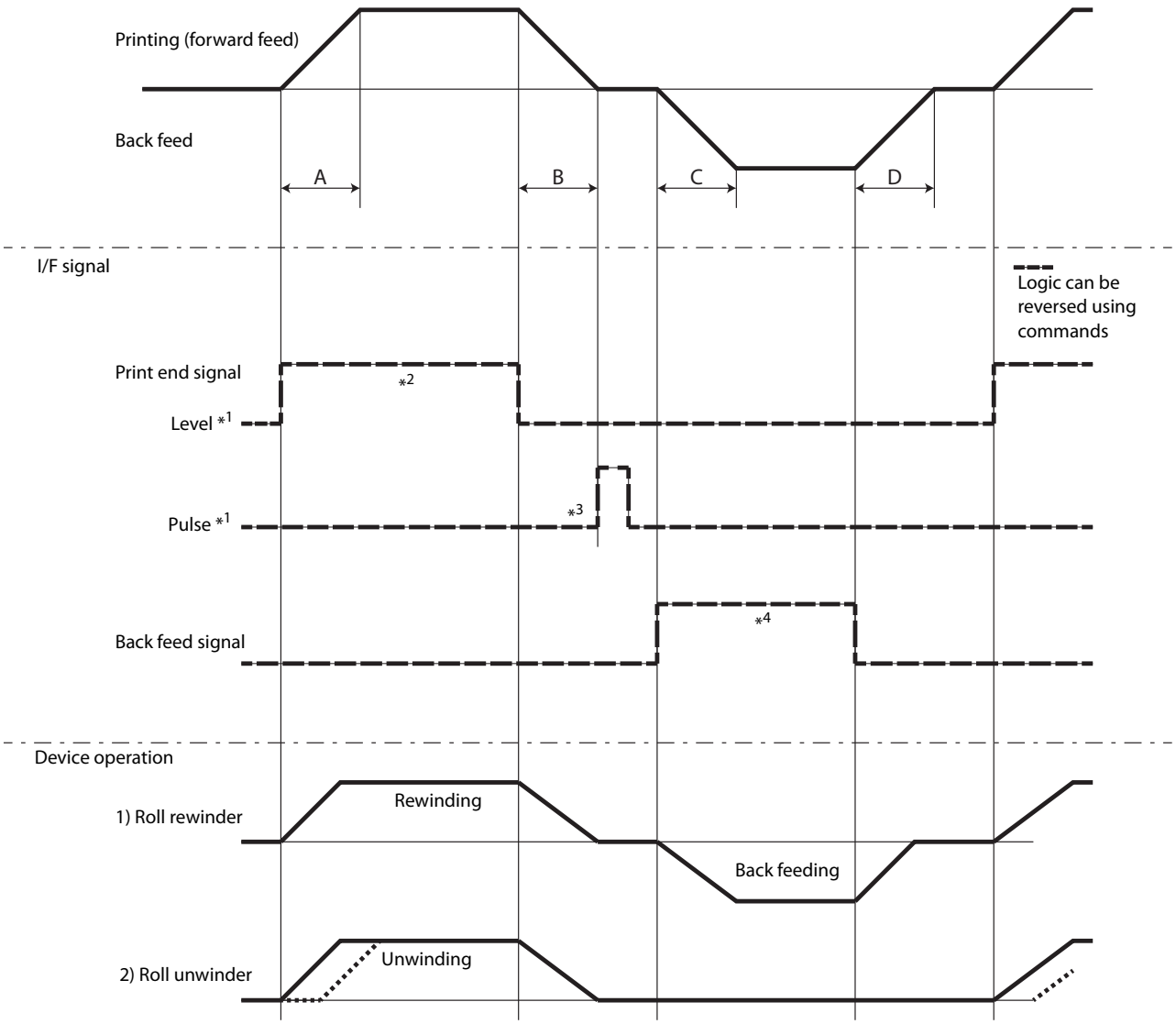
- $V_{pull-up}$: Perform the pull-up using 30 V or lower.
- Because the TM-C7500 does not have a terminal for providing power to a device, prepare a power supply for the $V_{pull-up}$ on the device side.
- $R_{pull-up}$: Set a resistance value to ensure 10 mA or lower.

Timing chart

Set a timing chart for the printer and device like the one below.

Continuous Printing

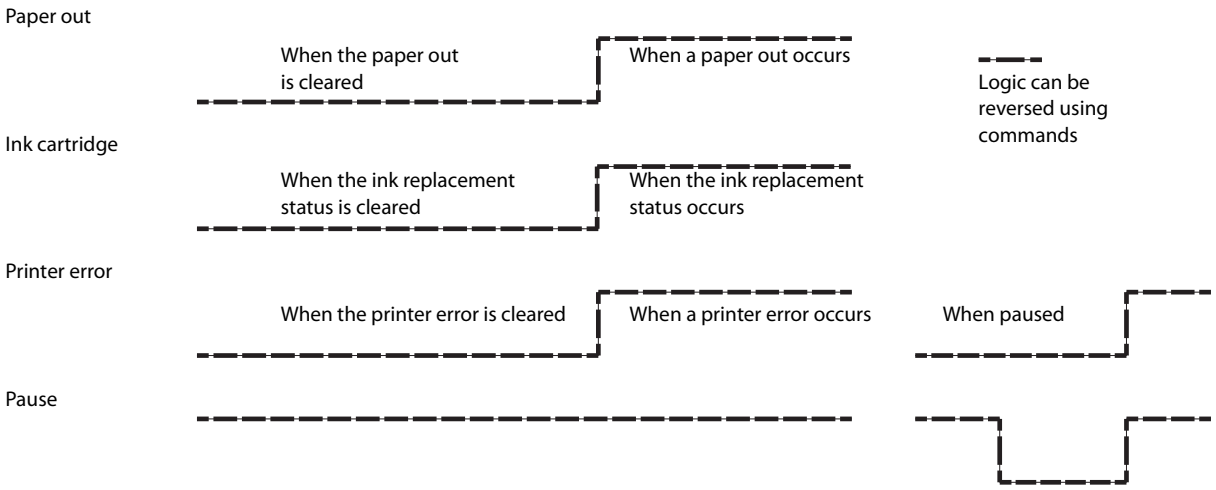
TM-C7500 Paper Feeding Timing Chart



*1 Switch using command. See "Print end" on page 8.
*2 If paper is being fed in the normal feeding direction. / If paper feeding is done by the panel.
*3 If continuous printing ended. (Including stops due to head cleaning or nozzle checks.)
*4 If paper is being fed in the reverse feeding direction.

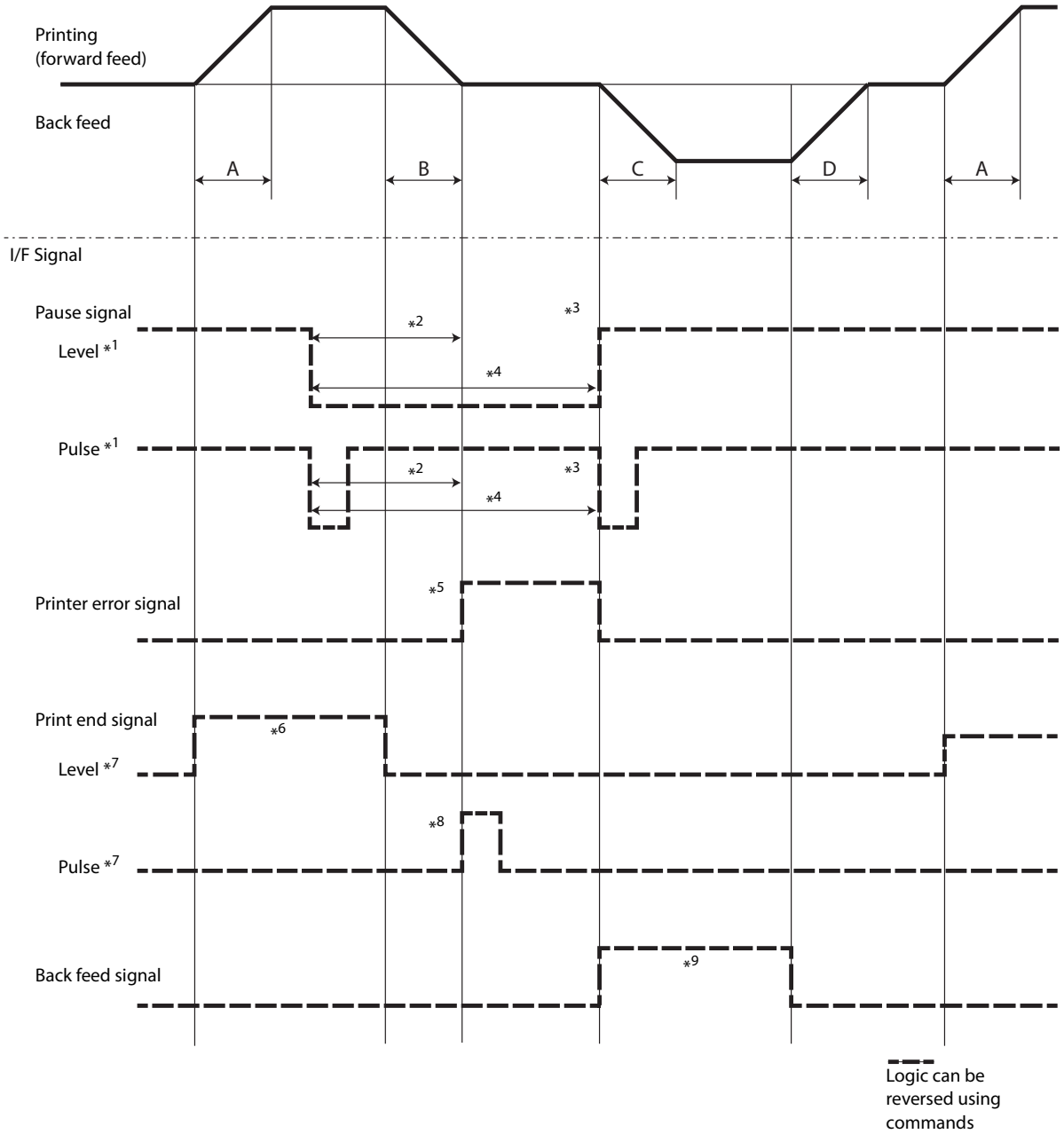
Print speed	A	B	C	D
300 mm/s	224.7 ms ±20%	253.8 ms ±20%	224.7 ms ±20%	253.8 ms ±20%
150 mm/s	160.5 ms ±20%	194.0 ms ±20%	224.7 ms ±20%	253.8 ms ±20%

I/F Signal


Paper out
When the paper out is cleared
When a paper out occurs
Logic can be reversed using commands
Ink cartridge
When the ink replacement status is cleared
When the ink replacement status occurs
Printer error
When the printer error is cleared
When a printer error occurs
When paused
Pause

Pause Command During Printing

TM-C7500 Paper Feeding Timing Chart



*1 Switch using command. See "Pause" on page 13.
*2 After “Pause” signal is input, it enters a pause status after finishing printing of the current page.
*3 Pause cancelled.
*4 Create an interval (more than one second) when toggle the pause status.
*5 Enters into a pause status when the page currently being printed is ended without being completed.
*6 If paper is being fed in the normal feeding direction. / If paper feeding is done by the panel.
*7 Switch using command. See "Print end" on page 8.
*8 If continuous printing ended. (Including stops due to head cleaning or nozzle checks.)
*9 If paper is being fed in the reverse feeding direction.

Print speed	A	B	C	D
300 mm/s	224.7 ms ±20%	253.8 ms ±20%	224.7 ms ±20%	253.8 ms ±20%
150 mm/s	160.5 ms ±20%	194.0 ms ±20%	224.7 ms ±20%	253.8 ms ±20%