

Software Developer's Manual

Raster Command Reference

RJ-4030/4040

Version 1.02

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Introduction

This material provides the necessary information for directly controlling the Brother printer RJ-XXXX (where “XXXX” is the model name).

This information is provided assuming that the user has full understanding of the operating system being used and basic mastery of USB and networks in a developer's environment.

Details concerning the USB interface are not described in this material. If a USB interface is being used, refer to “[Appendix A: USB Specifications](#)” to prepare the interface.

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Read the model names that appear in the screens in this manual as the name of your printer.

About Raster Commands

Using raster commands an RJ-XXXX printer (where “XXXX” is the model name) can be used to print without using our printer driver.

This operation is useful in the following situations.

- When printing from an operating system other than Windows
(Example: When printing from a Linux computer or mobile terminal)
- When adding print functions to an existing system

In addition, printing can be performed with advanced settings.

In this material, “raster” refers to binary bitmap data (collection of dots).

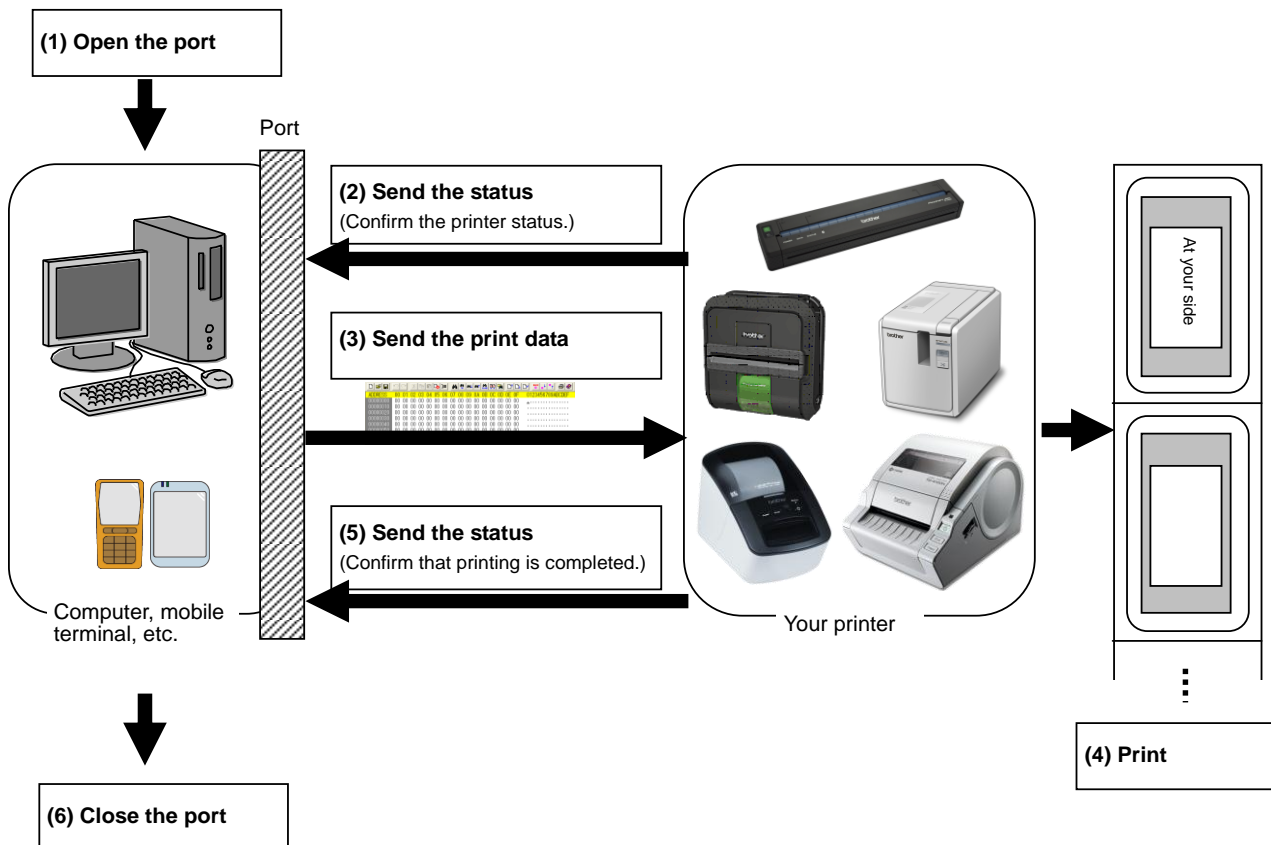
Refer to this material to print by sending initialization commands and control codes together with raster data to the RJ-XXXX printer (hereafter, referred to as “printer”).

This manual describes the procedure for adding these codes and sending the data.

1. Printing Using Raster Commands

The printing procedure is described below. For detailed flow charts, refer to “[6. Flow Charts](#)”. For details on each command, refer to “[4. Printing Command Details](#)”.

In addition, descriptions of the commands for the MCR (magnetic card reader) are provided. For details, refer to “[5. MCR Command Specifications](#)”.



(1) Open the USB/serial/network port

Open the USB/serial/network port in the operating environment. The procedure for opening the USB/serial/network port is not described in this material.

The network port can only be used with the RJ-4040.

(2) Confirm the printer status sent from the printer

The “status information request” command is sent to the printer, the status information received from the printer is analyzed, and then the status of the printer is determined.

For details on the “status information request” command and on the definitions of “status”, refer to “Status information request” in [“4. Printing Command Details”](#).

(3) Send the print data

If the status analysis confirms that media compatible with the print data is loaded into the printer and that no error has occurred, the print data is sent.

The structure of the print data is explained in the next section, [“2. Print Data”](#).

Note:

No command can be sent to the printer after the print data is transmitted and until the completion of printing is confirmed.

Even the “status information request” command cannot be sent during printing.

(4) Print the data

(5) Confirm that printing is completed

When printing is completed, the status is received from the printer.

If this status is analyzed to confirm that printing is completed, printing one page is considered finished.

If the print job has multiple pages, (2) through (4) are repeated.

(6) Close the USB/serial/network port

After all printing is finished, close the USB/serial/network port.

Note:

In order to print at high speed when a USB port is used to send uncompressed raster data, the Brother RJ-XXXX starts printing when it starts to receive print data, instead of waiting for a print command (concurrent printing).

For the processing flow, for example when managing errors, refer to [“6. Flow Charts”](#).

2. Print Data

2.1 Print data overview

The print data is constructed of the following: (1) initialization commands, (2) control codes, (3) raster data, and (4) print commands. If the print job consists of multiple pages, (2) through (4) are repeated.

(1) Initialization commands

Specified only once at the beginning of the job.

Sequence	Command Name	Description/Example
1	Invalidate	Sends a 350-byte invalidate command, and then resets the printer to the receiving state.
2	Initialize	Initializes for printing. 1Bh, 40h (Fixed)

(2) Control codes

Added at the beginning of each page and sent for each page.

Sequence	Command Name	Description/Example
1	Switch dynamic command mode	1Bh, 69h, 61h, 01h
2	Additional media information command	1Bh, 69h, 55h, 77h, 01h, 127 bytes of media information Note If the media information is the same as when printing was last performed, it is unnecessary to send the additional media information command.
3	Print information command	Sets the print information for the printer. For 102-mm-wide continuous length tape: 1Bh, 69h, 7Ah, 86h, 0Ah, 66h, 00h, 09h, 07h, 00h, 00h, 00h, 00h
4	Specify margin amount	Specifies the amount of the margins. For 3 mm margins: 1Bh, 69h, 64h, 23h, 00h
5	Select compression mode	Selects the compression mode for raster graphics. To send the data compressed to TIFF format: 4Dh, 02h

(3) Raster data

Repeated for each page in the print job.

Sequence	Command Name	Description/Example
-	Raster graphics transfer	Sends a raster line that contains data with pixels set to "ON".
-	Zero raster graphics	Sends a raster line with all pixels set to "0". 5Ah (Fixed)

(4) Print commands

Specified at the end of the page.

Sequence	Command Name	Description/Example
-	Print command	Specifies at the end of a page that is not the last page. 0Ch
-	Print command with feeding	Specifies at the end of the last page. 1Ah (Fixed)

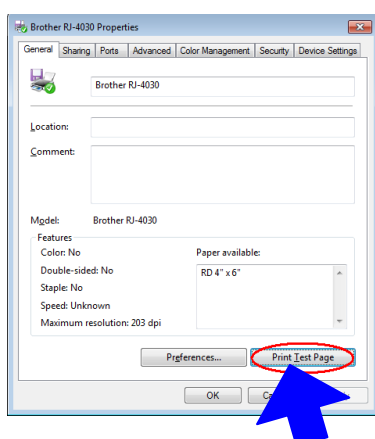
2.2 Sample (analyzing the print data of the test page)

The print data created by the printer driver is described here.

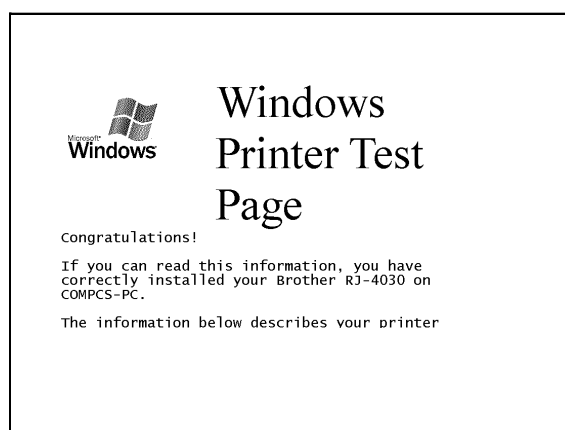
As an example, we will check the print data created when the **[Print Test Page]** button in the printer Properties dialog box is clicked to print the test page.

Since the print data differs depending on the print settings of the printer, refer to this procedure and try creating print data with various print settings.

Furthermore, this procedure is for the Windows® 7 operating environment. A similar procedure can be performed if you are using a different operating system.



Printer Properties



Test page

2.2.1 Preparation

Install the two listed below.

- Printer driver of the Brother RJ-XXXX
- Binary file editor

The data that we will analyze in this sample is a binary file.

Therefore, use a binary file editor to display and check the contents of the binary file.

2.2.2 Checking the print data

The procedure for checking the print data is provided below.

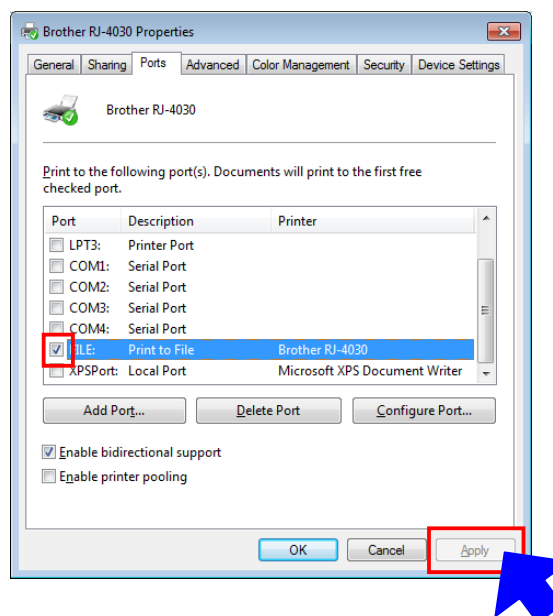
Step 1: Change the port of the printer to "FILE:".

Step 2: Print the desired item (in this case, the test page), and then specify the file name.

Step 3: Open the created file in the binary file editor to check it.

Step 1: Change the port of the printer to “FILE:”.

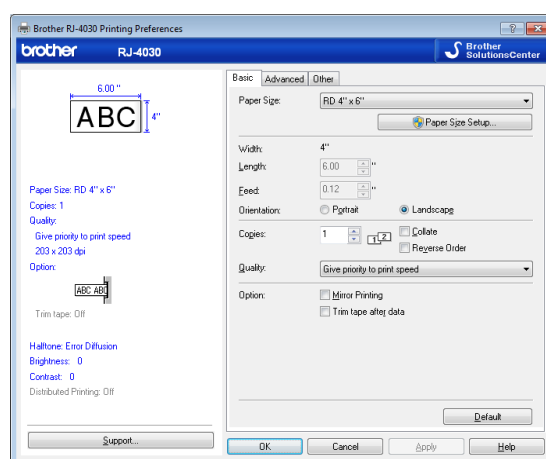
Open the **Printers and Faxes** folder, and then right-click the printer (in this case, RJ-4030) to display the Properties dialog box. In the Properties dialog box, click the **[Ports]** tab, select the **“FILE:”** check box, and then click the **[Apply]** button.



[Ports] tab of the printer Properties dialog box

Step 2: Print the item (in this case, the test page), and then specify the file name.

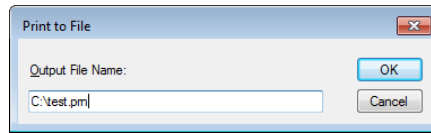
For this sample, print the test page with the default print settings, which were specified immediately after the printer driver was installed.



Default settings immediately after installation of the printer driver

When the test page is printed with the printer, a dialog box appears so that the file name can be specified. (Refer to the illustration below.)

After a file name is typed in and the **[OK]** button is clicked, the printer driver creates the print data and saves it in a file with the specified name.



Dialog box for specifying the file name

Step 3: Open the print data in the binary file editor.

Open the saved file in the binary file editor. The rows of numbers that appear are the print data. (Refer to the illustration below.)

The print data is constructed of the following: (1) initialization commands, (2) control codes, (3) raster data and (4) print commands, which were described in [“2.1 Print data overview”](#). For details on the print data, refer to [“2.2.3 Explanation of print data for the test page”](#).

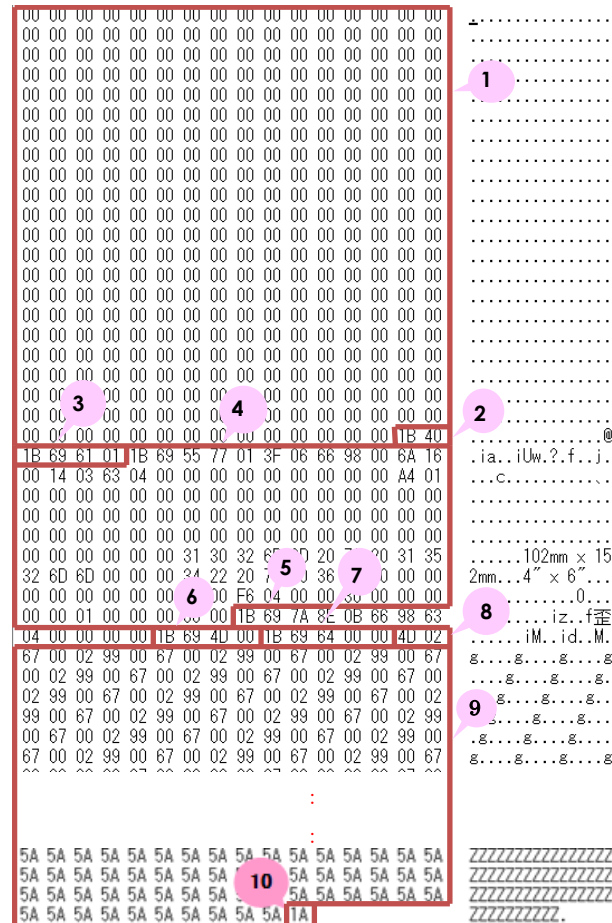
[illegible]

Print data

2.2.3 Explanation of print data for the test page

The print data for the test page outputted in the previous section is described below.

The following illustration shows the print data created in section “[2.2.1 Preparation](#)” opened in the binary file editor.



Print data

Descriptions for the numbers in the print data on the previous page are provided in the following table.

For details on each command, refer to [“4. Printing Command Details”](#).

No.	Command Name	Description
1	Invalidate	A 350-byte invalidate command is sent.
2	Initialize	The “initialize” command is sent.
3	Switch dynamic command mode	The printer is switched to raster mode. Send this command before sending raster data to the printer.
4	Additional media information command	Additional media information on the media size is sent. This is the command for “4” × 6” (102 mm × 152 mm)”.
5	Print information command	Media size information for the print data is sent. This is the command for “4” × 6” (102 mm × 152 mm)” die-cut labels.
6	Various mode settings (1Bh+69h+4Dh+00H)	This is the command for specifying settings such as cut options. Since there are no cut options with this model, it is unnecessary to send this command.
7	Specify margin amount	Since a margin amount cannot be specified with die-cut labels, this command is sent with a margin amount of 0.
8	Select compression mode	TIFF compression mode is selected.
9	Raster data	Raster data continues.
10	Print command with feeding	Since one page will be printed, this is sent at the end of the first page.

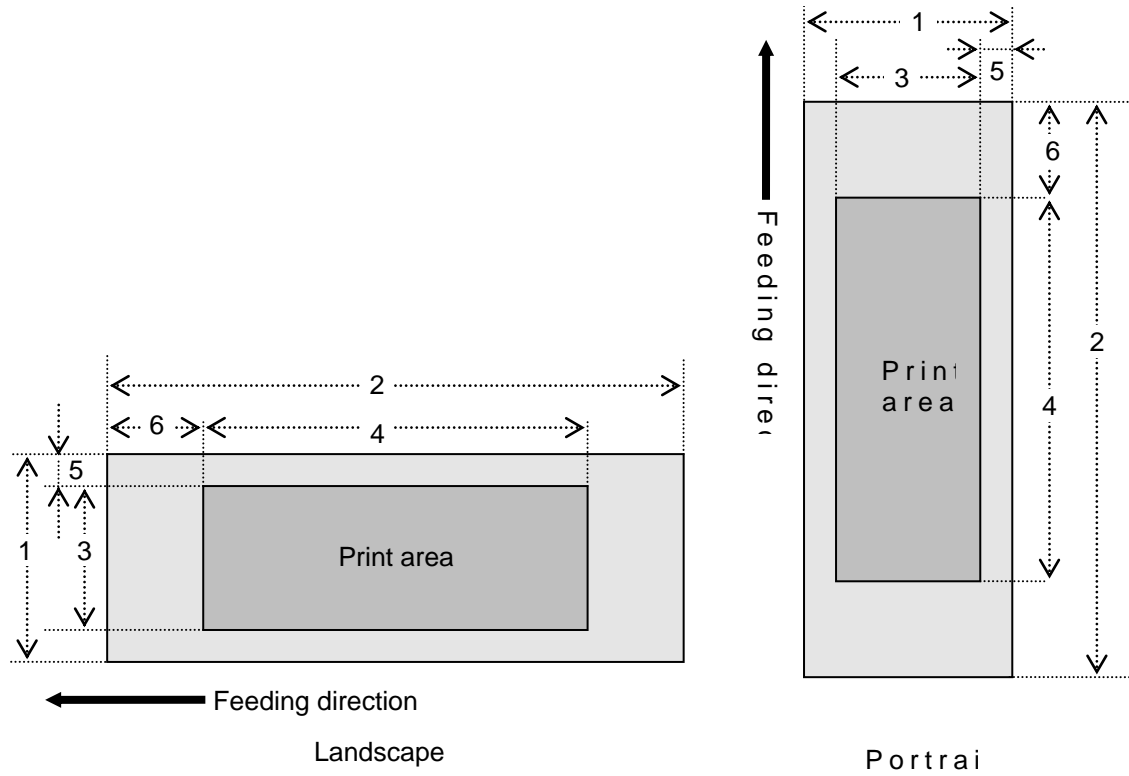
2.3 Page data details

2.3.1 Resolution

Resolution	Height-to-Width Proportion
203 dpi high, 203 dpi wide	1:1

2.3.2 Page size

(a) Continuous length tape



- Number

1 Width

3 Print area width (maximum printing width)

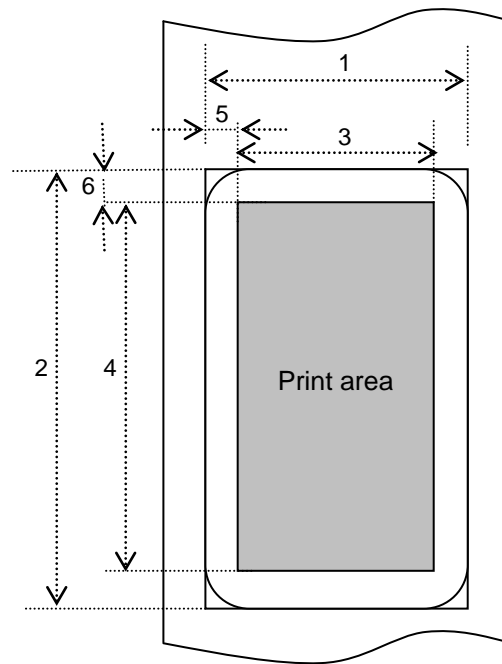
5 Width offset
- 2 Length

4 Print area length

6 Length offset

ID	Tape Size	Designation	1	2	3	4	5	6
415	102 mm	102 mm 4"	101.6 mm 812 dots	--> 2.3.4.	98.6 mm 764 dots	--> 2.3.4.	1.5 mm 12 dots	--> 2.3.3.

(b) Die-cut labels



Number	1 Width	2 Length
	3 Print area width (maximum printing width)	4 Print area length
	5 Width offset	6 Length offset

ID	Label Size	1	2	3	4	5	6
423	RD 102 mm x 26 mm RD 4" x 1"	101.6 mm 812 dots	25.6 mm 195 dots	98.6 mm 788 dots	20.5 mm 156 dots	1.5 mm 12 dots	3.0 mm 24 dots
419	RD 102 mm x 50 mm RD 4" x 2"	101.6 mm 812 dots	49.9 mm 399 dots	98.6 mm 788 dots	43.9 mm 351 dots	1.5 mm 12 dots	3.0 mm 24 dots
424	RD 102 mm x 76 mm RD 4" x 3"	101.6 mm 812 dots	76.2 mm 609 dots	98.6 mm 788 dots	70.2 mm 561 dots	1.5 mm 12 dots	3.0 mm 24 dots
425	RD 102 mm x 102 mm RD 4" x 4"	101.6 mm 812 dots	101.6 mm 812 dots	98.6 mm 788 dots	95.6 mm 764 dots	1.5 mm 12 dots	3.0 mm 24 dots
420	RD 102 mm x 152 mm RD 4" x 6"	101.6 mm 812 dots	152.4 mm 1218dots	98.6 mm 788 dots	140.5 mm 1123 dots	1.5 mm 12 dots	6.0 mm 48 dots

2.3.3 Feed amount

The feed amount (left and right margins) is defined below.

Type	Minimum Margin Setting	Maximum Margin Setting
Continuous length tape	3 mm 0.12" 24 dots	127 mm 5" 1020 dots
Die-cut labels	The length offset indicated in “(b) Die-cut labels” of “2.3.2 Page size” is used. However, set “0” as the value of the “specify margin amount” command.	

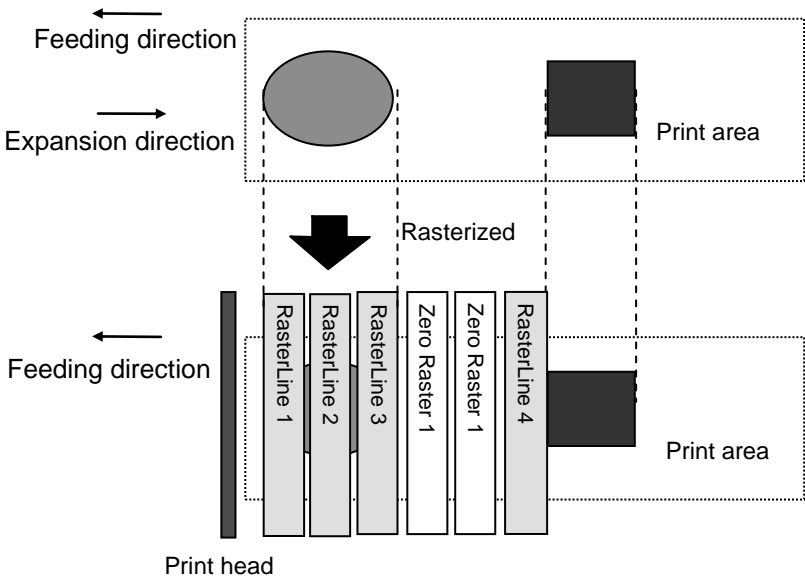
2.3.4 Maximum and minimum lengths

The maximum and minimum lengths are defined below.

Type	Minimum Length	Maximum Length
Device Capabilities Value of DC_MINEXTENT	25.4 mm 204 dots	3000 mm 24094 dots
Continuous length tape	25.4 mm 204 dots	3000 mm 24094 dots
Die-cut labels	Fixed	Fixed

2.3.5 Raster line

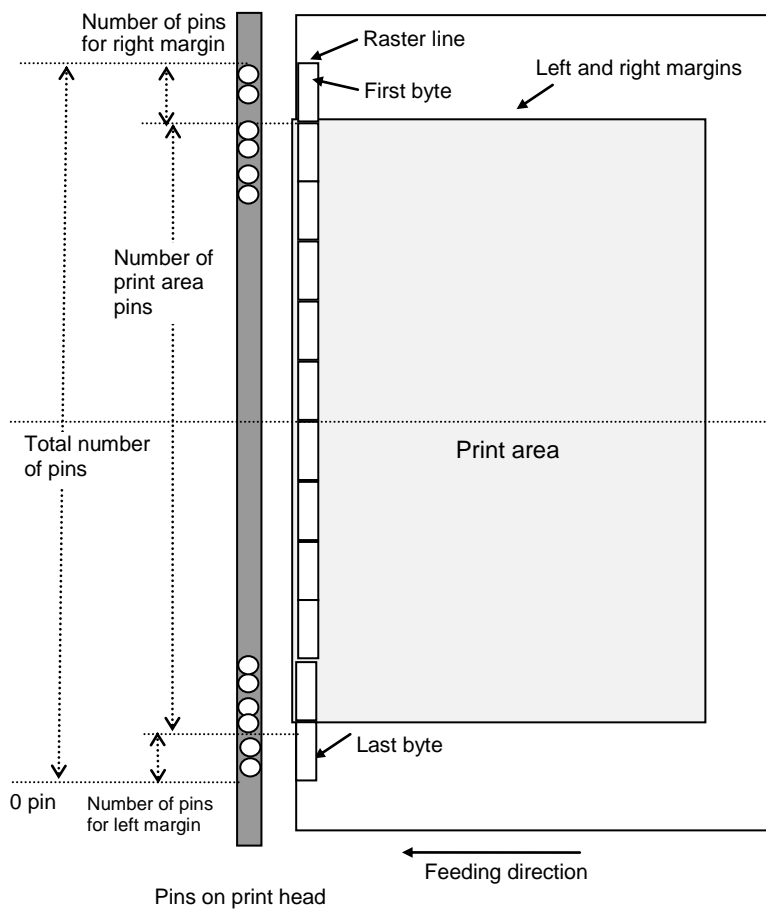
As shown below, the parts with data to be printed are converted with “raster graphics transfer”, and the parts with no data are converted with “zero raster graphics”. On the actual tape, margins (feed) are added specified with “various mode settings” at the beginning and the end.



The following shows the relationship between the raster graphics parameters and the pixels.



Total number of pins: 832 pins



Continuous length tape:

Tape Size	Number of Pins for Left Margin	Number of Print Area Pins	Number of Pins for Right Margin	Number of Bytes for Raster Graphics Transfer
102 mm	22	788	22	104

Die-cut labels:

Label Size	Number of Pins for Left Margin	Number of Print Area Pins	Number of Pins for Right Margin	Number of Bytes for Raster Graphics Transfer
102 mm x 25 mm	22	788	22	104
102 mm x 51 mm	22	788	22	104
102 mm x 76 mm	22	788	22	104
102 mm x 102 mm	22	788	22	104
102 mm x 152 mm	22	788	22	104

3. Print Command List

ASCII Code	Binary Code	Description
NULL	00	Invalidate
ESC i S	1B 69 53	Status information request
ESC @	1B 40	Initialize
ESC i U w 1	1B 69 55 77 01	Additional media information command
ESC i d	1B 69 64	Specify margin amount (feed amount)
ESC i a	1B 69 61	Switch dynamic command mode
g	67	Raster graphics transfer
ESC i B	1B 69 42	Specify baud rate
Z	5A	Zero raster graphics
FF	0C	Print command
Control-Z	1A	Print command with feeding
ESC i z	1B 69 7A	Print information command
M	4D	Select compression mode

4. Printing Command Details

NULL Invalidate

ASCII:	NULL
Hexadecimal:	00

Description

- Skipped
- If data transmission is to be stopped midway, send the “initialize” command after sending the “invalidate” command for the appropriate number of bytes to return to the receiving state, where the print buffer is cleared.

ESC i S Status information request

ASCII:	ESC	i	S
Hexadecimal:	1B	69	53

Description

- Send a request to the printer for status information. For details on the status, refer to the previous section.
- The size is fixed at 32 bytes.

Note

Before sending print data to the printer, this command should be sent once. Since error information is automatically sent by the printer during printing, do not send this command while printing.

Number	Offset	Size	Name	Value/Reference
1	0	1	Print head mark	Fixed at 80h
2	1	1	Size	Fixed at 20h
3	2	1	Reserved	Fixed at "B" (42h)
4	3	1	Series code	Fixed at "7" (37h)
5	4	1	Model code	RJ-4030: Fixed at "1" (31h) RJ-4040: Fixed at "2" (32h)
6	5	1	Reserved	Fixed at "0" (30h)
7	6	1	Battery level	Refer to table (8) below.
8	7	1	Reserved	Fixed at "00h"
9	8	1	Error information 1	Refer to table (1) below.
10	9	1	Error information 2	Refer to table (2) below.
11	10	1	Media width	Refer to table (3) below.
12	11	1	Media type	Refer to table (4) below.
13	12	1	Reserved	Fixed at 00h
14	13	1	Reserved	Fixed at 00h
15	14	1	Reserved	Fixed at 3Fh
16	15	1	Mode	Value specified where the "various mode settings" command 00h if not specified
17	16	1	Reserved	Fixed at 00h
18	17	1	Media length	Refer to table (3) below.
19	18	1	Status type	Refer to table (5) below.
20	19	1	Phase type	Refer to table (6) below.
21	20	1	Phase number (higher order bytes)	
22	21	1	Phase number (lower order bytes)	
23	22	1	Notification number	Refer to table (7) below.
24	23	1	Reserved	Fixed at 00h
25	24	8	Reserved	Fixed at 00h

(1) Error information 1

Flag	Mask	Definition
Bit 0	01h	“No media” error
Bit 1	02h	“End of media” error (only for die-cut labels)
Bit 2	04h	Cutter jam (not used)
Bit 3	08h	(Not used)
Bit 4	10h	Printer in use
Bit 5	20h	Printer turned off
Bit 6	40h	High-voltage adapter (not used)
Bit 7	80h	Fan motor error (not used)

(2) Error information 2

Flag	Mask	Definition
Bit 0	01h	“Replace media” error (with a serial connecting)
Bit 1	02h	“Expansion buffer full” error
Bit 2	04h	Communication error
Bit 3	08h	“Communication buffer full” error (not used)
Bit 4	10h	“Cover open” error
Bit 5	20h	Cancel key (not used)
Bit 6	40h	Media cannot be fed (also when the media end is detected)
Bit 7	80h	System error

(3) Media width and length

The media width and length is described in millimeters. 0~255 (0 to FFh)

(a) Continuous length tape

* Media Width: The tape width is indicated in millimeters.

* Media Length: Fixed at 00h

Media	Media Width	Media Length
102 mm	102	00

(b) Die-cut labels

* Media Width: The width of the die-cut section is indicated.

* Media Length: The length of the die-cut section is indicated.

Media	Media Width	Media Length
102 mm x 26 mm	102	26
102 mm x 50 mm	102	50
102 mm x 76 mm	102	76
102 mm x 102 mm	102	102
102 mm x 152 mm	102	152

(4) Media type

Media Type	Value	Description
No media	00h	Used as print information when the media type is not indicated.
Continuous length tape	4Ah	Used for both paper and film.
Die-cut labels	4Bh	Used for both paper and film.

(5) Status type

Status Type	Value	Description
Reply to status request	00h	
Printing completed	01h	
Error occurred	02h	
Turned off	04h	
Notification	05h	
Phase change	06h	
(Not used)	08h to 20h	
(Reserved)	21h to FFh	

If an error occurred during printing, the printer returns the error status.

(6) Phase type and phase number

If the phase number is not used, both are fixed at 00h.

Phase State	Phase Type
Receiving state	00h
Printing state	01h

Receiving state

Phase	Value (Dec.)	Higher Order Bytes	Lower Order Bytes
Waiting to receive	0	00h	00h

Printing state

Phase	Value (Dec.)	Higher Order Bytes	Lower Order Bytes
Printing	0	00h	00h

- When the printer is turned on, it is in the receiving state. When printing begins, it changes to the “printing” phase (phase type: printing state; phase number: printing), and the printer sends that phase status to the computer. When printing has finished, the printer sends the “receiving state” phase status (phase type: receiving state; phase number: waiting to receive) to the computer. Unless an error occurs during printing, the printer sends the “printing completed” status.
- With concurrent printing, printing starts even if a print command has not been sent from the computer in order to print at high speed. At this time, care should be taken since the “printing” and “waiting to receive” phase statuses will be sent. (Refer to [“6. Flow Charts”](#).)

(7) Notification number

Notification	Value
Not available	00h
Cooling (started)	01h
Cooling (finished)	02h

(8) Battery level

Battery Level	Value
Full	00h
Half	01h
Low	02h
Charging required	03h
AC adaptor in use	04h

ESC @ Initialize

ASCII:	ESC	@
Hexadecimal:	1B	40

Description

- Initializes mode settings.
- Also used to cancel printing.

ESC i U Additional media information command

ASCII:	ESC	i	U	w	1	{d1...d127}
Hexadecimal:	1B	69	55	77	01	{d1...d127}

Description

- Updates the media information for the printer.
- Send to the printer the commands outputted with the “Save Paper Size Commands” function of Paper Size Setup.

Note

If the media information is the same as when printing was last performed, it is unnecessary to send the additional media information command.

“Save Paper Size Commands” function of Paper Size Setup**1. Preparation**

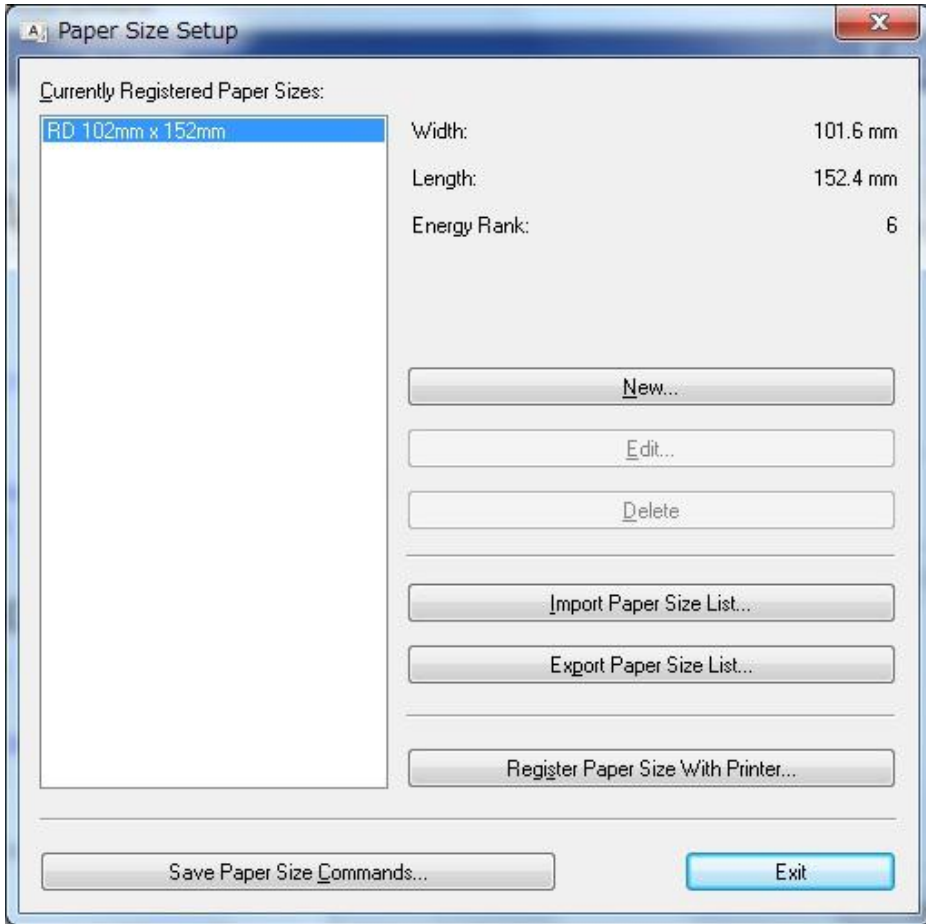
Install the two listed below.

- Printer driver of the Brother RJ-XXXX
- Binary file editor.

The data outputted with the “Save Paper Size Commands” function of Paper Size Setup will be a binary file. Therefore, use a binary file editor to display and check the contents of the binary file.

Open the [Devices and Printers] window, right-click the printer, and then display the Printing Preferences dialog box. Click the [Paper Size Setup] button on the [Basic] tab to display the Paper Size Setup dialog box. (Refer to the illustration below.)

Click [Save Paper Size Commands] button to display a dialog box for creating a file for saving the paper size commands, and then save them in a file with the specified name.



2. Open the saved file in the binary file editor. The rows of numbers that appear are the command data.(Refer to the illustration below.)

In the command data that appeared, the part marked with the red box is the additional media information command.

Of this, the 127 bytes underlined in orange are the media information.

Use this when adding media information.

1B 69 55 4F 10 37 31 00 84 00 00 00 00 00 00 00	..iU0.71.....
1B 69 55 77 01 3F 06 66 98 00 6A 16 00 14 03 63	..iUw.?.f..j....c
04 00 00 00 00 00 00 00 00 00 00 A4 01 00 00 00\.....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 31 30 32 6D 6D 20 78 20 31 35 32 6D 6D 00	..102mm x 152mm.
00 00 34 22 20 78 20 36 22 00 00 00 00 00 00 00	..4" x 6".....
00 00 00 00 F6 04 00 00 30 00 00 00 00 00 01 000.....
00 00 00 00

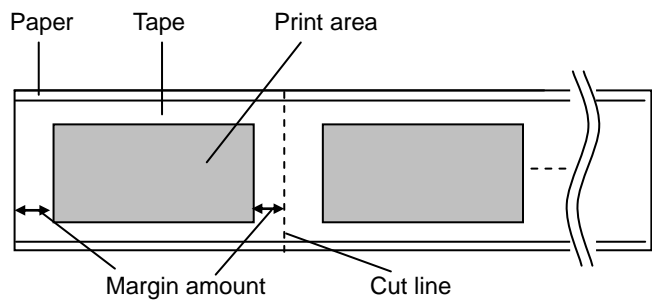
ESC i d Specify margin amount (feed amount)

ASCII:	ESC	i	d	{n1}	{n2}
Hexadecimal:	1B	69	64	{n1}	{n2}

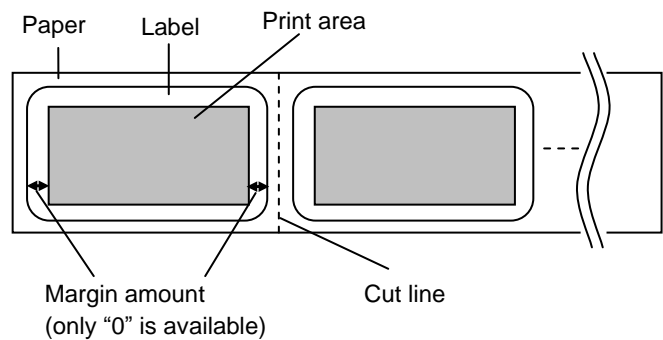
Description

- Specifies the amount of the margins.
- Margin amount (dots)= $n1+n2*256$
- With die-cut labels, the margin amount at the ends of the printed area is 0.

(a) Continuous length tape



(b) Die-cut labels



ESC i a Switch dynamic command mode

ASCII:	ESC	i	a	{n1}
Hexadecimal:	1B	69	61	{n1}

Parameters

Definitions of {n}:

0: ESC/P mode (default)

1: Raster mode (Be sure to switch to this mode.)

3: P-touch Template mode

Description

- Dynamically switches between the printer's command modes. A printer that receives this command operates in the specified command mode until the printer is turned off.
- The printer must be switched to raster mode before raster data is sent to it. Therefore, send this command to switch the printer to raster mode.

g Raster graphics transfer

ASCII:	g	{s}	{n}	{d1}	...	{dn}
Hexadecimal:	67	{s}	{n}	{d1}	...	{dn}

Parameters

{s} 00h

{n} Number of bytes of raster data (d1 to dh)

However, use the following value if no compression is specified as the compression mode.

n=104

{d1~dn} Raster data.

ESC i B Specify baud rate

ASCII:	ESC	i	B	{n1}	{n2}
Hexadecimal:	1B	69	42	{n1}	{n2}

Parameters

Setting= $n1+n2*256$

Setting: 96=9600 bps, 576=57600 bps, 1152=115200 bps

Description

- Changes the communications baud rate for the printer. The manufacturer's default setting is 9600 bps.

Z Zero raster graphics

ASCII:	Z
Hexadecimal:	5A

Description

- Fills raster line with 0 data.

FF Print command

ASCII:	FF
Hexadecimal:	0C

Description

- Used as a print command at the end of pages other than the last page when multiple pages are printed.

Control-Z Print command with feeding

ASCII:	Control-Z
Hexadecimal:	1A

Description

- Used as a print command at the end of the last page.

ESC i z Print information command

ASCII:	ESC	i	z	{n1}	{n2}	{n3}	{n4}	{n5}	{n6}	{n7}	{n8}	{n9}	{n10}
Hexadecimal:	1B	69	7A	{n1}	{n2}	{n3}	{n4}	{n5}	{n6}	{n7}	{n8}	{n9}	{n10}

Description

- Specifies the print information.
- Definitions of {n1} through {n10}

{n1}:	Valid flag; Specifies which values are valid #define PI_KIND 0x02 // Media type #define PI_WIDTH 0x04 // Media width #define PI_LENGTH 0x08 // Media length #define PI_QUALITY 0x40 // Priority given to print quality #define PI_RECOVER 0x80 // Printer recovery always on
{n2}:	Media type Continuous length tape: 0Ah Die-cut labels: 0Bh
{n3}:	{n3}: Media width (mm)
{n4}:	{n4}: Media length (mm) For the media of width 102 mm × length 152 mm, specify as n3=66h and n4=98h.
{n5-n8}:	Raster number = $n8 \times 256 \times 256 \times 256 + n7 \times 256 \times 256 + n6 \times 256 + n5$ If the media is not correctly loaded into the printer when the valid flag for PI_KIND, PI_WIDTH and PI_LENGTH are set to "ON", an error status is returned (Bit 0 of " (2) Error information 2 " is set to "ON".)
{n9}:	Starting page: 0 Other pages: 1
{n10}:	Fixed at 0

M Select compression mode

ASCII:	M	{n}
Hexadecimal:	4D	{n}

Parameters

Definitions of {n}

- 0 No-compression mode (Enabled)
- 1 Reserved (Disabled)
- 2 TIFF (Enabled)

Description

- Selects the compression mode. Data compression is available only for data in raster graphic transfer.

[TIFF(Pack Bits)]

- 1-byte units
- If the same data is repeated, the number of data units and that 1 byte of data are specified.
If different data is in a series, the number of data items and all of the different data are specified.
- If the same data is repeated, the number of data units is specified as the actual number minus 1, expressed as a negative number.
If different data is in a series, the number of data units is specified as the number of bytes minus 1, expressed as a positive number.
- If the above process results in more than 162 bytes of compressed data, the data is treated as being all different. As a result, the data will be 163 bytes, including the 1 byte that specifies the data length.

Example

1 raster of raster graphics transfer:

Without compression: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 22 22 23 BA BF A2 22 2B.....

With compression: ED 00 FF 22 05 23 BA BF A2 22 2B ...

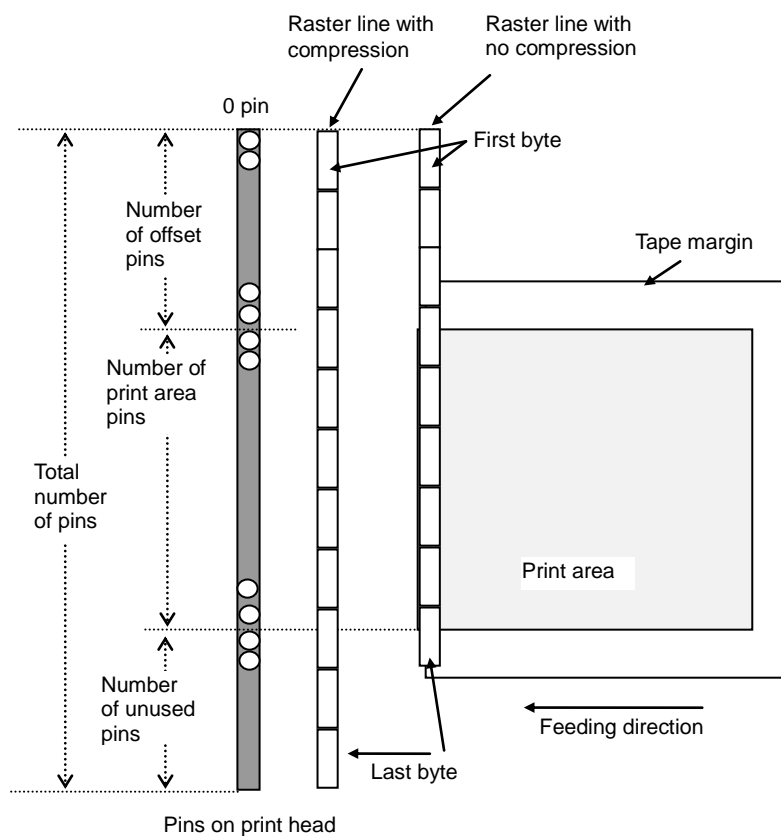
a b c

- a. Since "00h" is repeated for 20 bytes, 20d -> 19d -> 13h changed into a negative number is EDh.
Therefore: ED 00
- b. Since "22h" is repeated for 2 bytes, 2d -> 1d -> 1h changed into a negative number is FFh.
Therefore: FF 22
- c. The following 6 bytes remain unchanged. 6d -> 5d -> 5h
Therefore: 05 23 BA BF A2 22 2B

Continue for the remaining number of bytes for the uncompressed data. Even if 00h continues until the end, it cannot be omitted.

Explanation of “TIFF compression mode”

With compression, the data for the “raster graphics transfer” command is based on 104 bytes of the total number of pins (832). As shown below, with no compression, the sum of the number of offset pins and the number of pins within the print area is the byte data. However, with compression, the number of unused pins is also added to the data. In other words, with compression, this becomes 104 bytes when it is expanded by the printer, regardless of the tape width.



5. MCR Command Specifications

5.1. Command details

ESC #1 MCR on command

ASCII:	ESC	#	1	{n1}	{n2}	{n3}
Hexadecimal:	1B	23	31	{n1}	{n2}	{n3}

Description

- Turns on MCR. Does nothing if it is already on.
- Definitions of {n1} through {n3}

{n1}:	Set read/response mode																																			
00h:	Continuous reading mode																																			
01h:	Single reading mode (Reading ends even if it failed) *Does nothing if none of the above																																			
{n2}:	Timeout setting (seconds, 1 (min.) to 255 (max.)); 0 (00h) indicates no timeout.																																			
{n3}:	<div>Read track setting</div> <table><tr><th rowspan="2">{n3}</th><th colspan="3">Read track</th></tr><tr><th>Track3</th><th>Track2</th><th>Track1</th></tr><tr><td>1 (01h)</td><td>-</td><td>-</td><td>○</td></tr><tr><td>2 (02h)</td><td>-</td><td>○</td><td>-</td></tr><tr><td>3 (03h)</td><td>-</td><td>○</td><td>○</td></tr><tr><td>4 (04h)</td><td>○</td><td>-</td><td>-</td></tr><tr><td>5 (05h)</td><td>○</td><td>-</td><td>○</td></tr><tr><td>6 (06h)</td><td>○</td><td>○</td><td>-</td></tr><tr><td>7 (07h)</td><td>○</td><td>○</td><td>○</td></tr></table> <div>*7 (07h) if other than 1 through 7</div>	{n3}	Read track			Track3	Track2	Track1	1 (01h)	-	-	○	2 (02h)	-	○	-	3 (03h)	-	○	○	4 (04h)	○	-	-	5 (05h)	○	-	○	6 (06h)	○	○	-	7 (07h)	○	○	○
{n3}	Read track																																			
	Track3	Track2	Track1																																	
1 (01h)	-	-	○																																	
2 (02h)	-	○	-																																	
3 (03h)	-	○	○																																	
4 (04h)	○	-	-																																	
5 (05h)	○	-	○																																	
6 (06h)	○	○	-																																	
7 (07h)	○	○	○																																	

ESC #0 MCR off command

ASCII:	ESC	#	0
Hexadecimal:	1B	23	30

Description

- Turns off MCR. Does nothing if it is already off.

5.2. Response

Condition	Successful Reception Response (When there is data)						
Response	Hex	54h	[track]	3Ah	[data]	0Dh	0Ah
	ASCII	T	[track]	:	[data]	CR	LF
	Track number		Multiple bytes			Delimiter	
Description	Response that returns the read card data [track]: Track number (ASCII, '1' to '3') Track1: 31h, Track2: 32h, Track3: 33h [data]: Read data string (ASCII) SS start code and FC, AS, ES, SS, etc. symbols are not included.						

Condition	Successful Reception Response (When there is no data)						
Response	Hex	54h	[track]	3Ah	["empty"]	0Dh	0Ah
	ASCII	T	[track]	:	["empty"]	CR	LF
	Track number			Character string "empty"		Delimiter	
Description	Response indicating that there was no data on the track specified with the MCR on command This response is returned if the specified track does not exist on the card. [track]: Track number (ASCII, '1' to '3') Track1: 31h, Track2: 32h, Track3: 33h ["empty"]: The character string "empty" is entered.						
	Hex	65h	6Dh	70h	74h	79h	
	ASCII	e	m	p	t	y	

Reading multiple tracks

Data in the above-mentioned format is combined for the specified number of tracks and sent.

Example: Reading Track 1 and Track 2

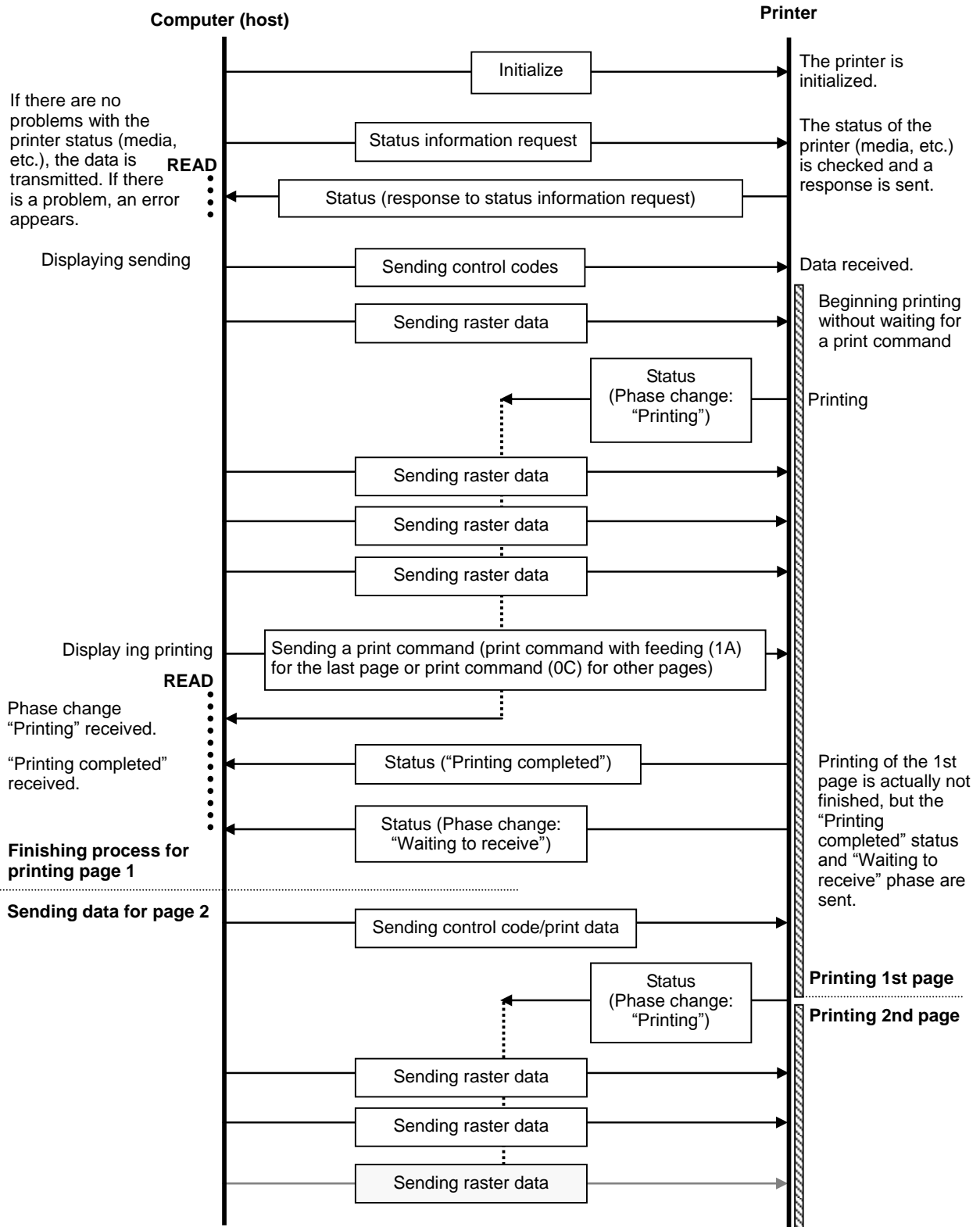
54h	31h	3Ah	[data]	0Dh	0Ah	54h	32h	3Ah	[data]	0Dh	0Ah
T	1	:	[data]	CR	LF	T	2	:	[data]	CR	LF

Condition	Failed Reception Response (Timeout)																							
Response	<table><tr><td>Hex</td><td>54h</td><td>30h</td><td>3Ah</td><td>["timeout"]</td><td>0Dh</td><td>0Ah</td></tr><tr><td>ASCII</td><td>T</td><td>0</td><td>:</td><td>["timeout"]</td><td>CR</td><td>LF</td></tr></table>								Hex	54h	30h	3Ah	["timeout"]	0Dh	0Ah	ASCII	T	0	:	["timeout"]	CR	LF		
	Hex	54h	30h	3Ah	["timeout"]	0Dh	0Ah																	
ASCII	T	0	:	["timeout"]	CR	LF																		
	Character string "timeout"					Delimiter																		
Description	Response indicating that it returned to the MCR off status due to a timeout ["timeout"]: The character string "timeout" is entered.																							
	<table><tr><td>Hex</td><td>74h</td><td>69h</td><td>6Dh</td><td>65h</td><td>6Fh</td><td>75h</td><td>74h</td></tr><tr><td>ASCII</td><td>t</td><td>i</td><td>m</td><td>e</td><td>o</td><td>u</td><td>t</td></tr></table>								Hex	74h	69h	6Dh	65h	6Fh	75h	74h	ASCII	t	i	m	e	o	u	t
	Hex	74h	69h	6Dh	65h	6Fh	75h	74h																
ASCII	t	i	m	e	o	u	t																	

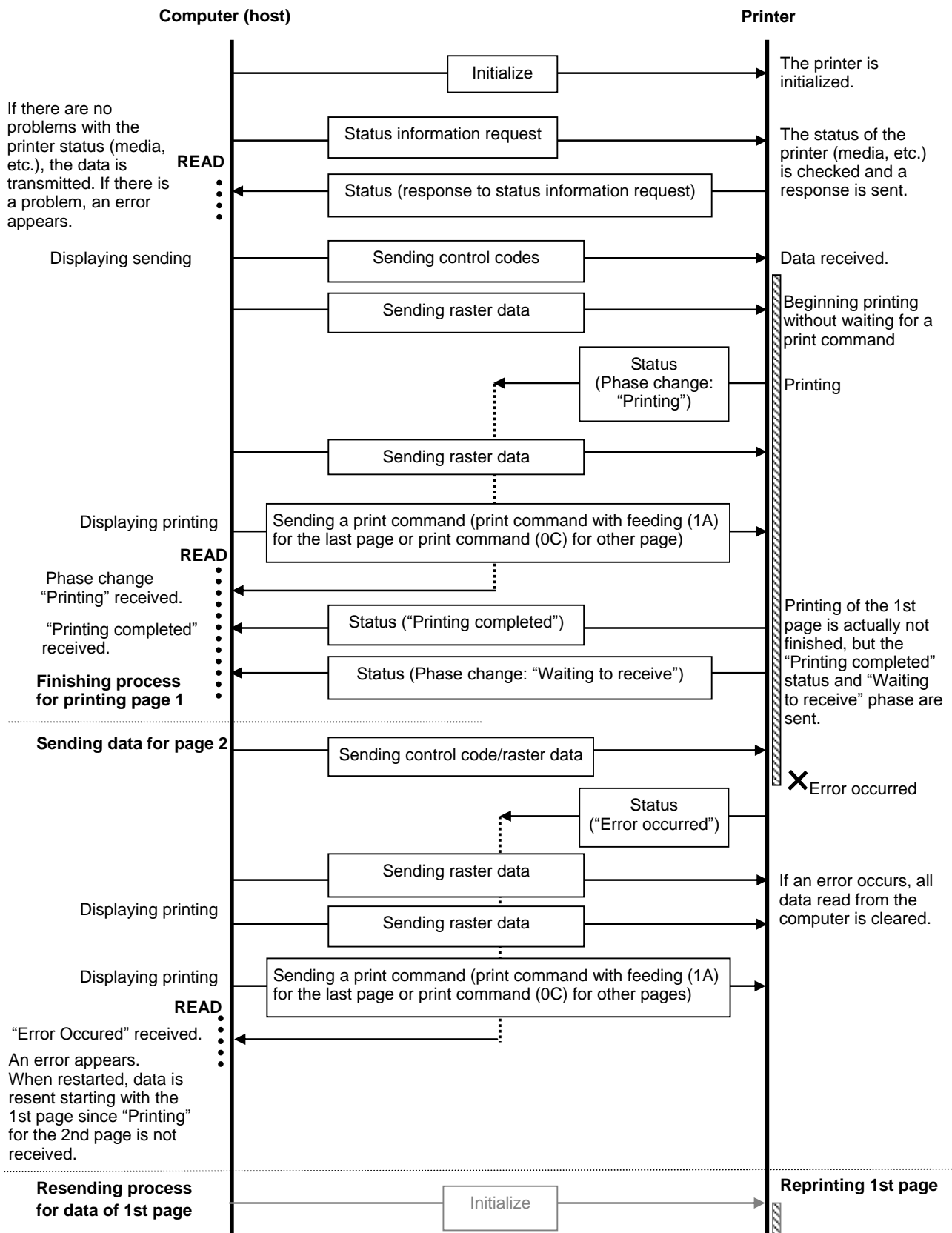
Condition	Failed Reception Response (Read Error)																																
Response	<table><tr><td>Hex</td><td>54h</td><td>30h</td><td>3Ah</td><td colspan="4">["can not read"]</td><td>0Dh</td><td>0Ah</td></tr><tr><td>ASCII</td><td>T</td><td>0</td><td>:</td><td colspan="4">["can not read"]</td><td>CR</td><td>LF</td></tr></table>													Hex	54h	30h	3Ah	["can not read"]				0Dh	0Ah	ASCII	T	0	:	["can not read"]				CR	LF
	Hex	54h	30h	3Ah	["can not read"]				0Dh	0Ah																							
	ASCII	T	0	:	["can not read"]				CR	LF																							
Character string "can not read"																																	

6. Flow Charts

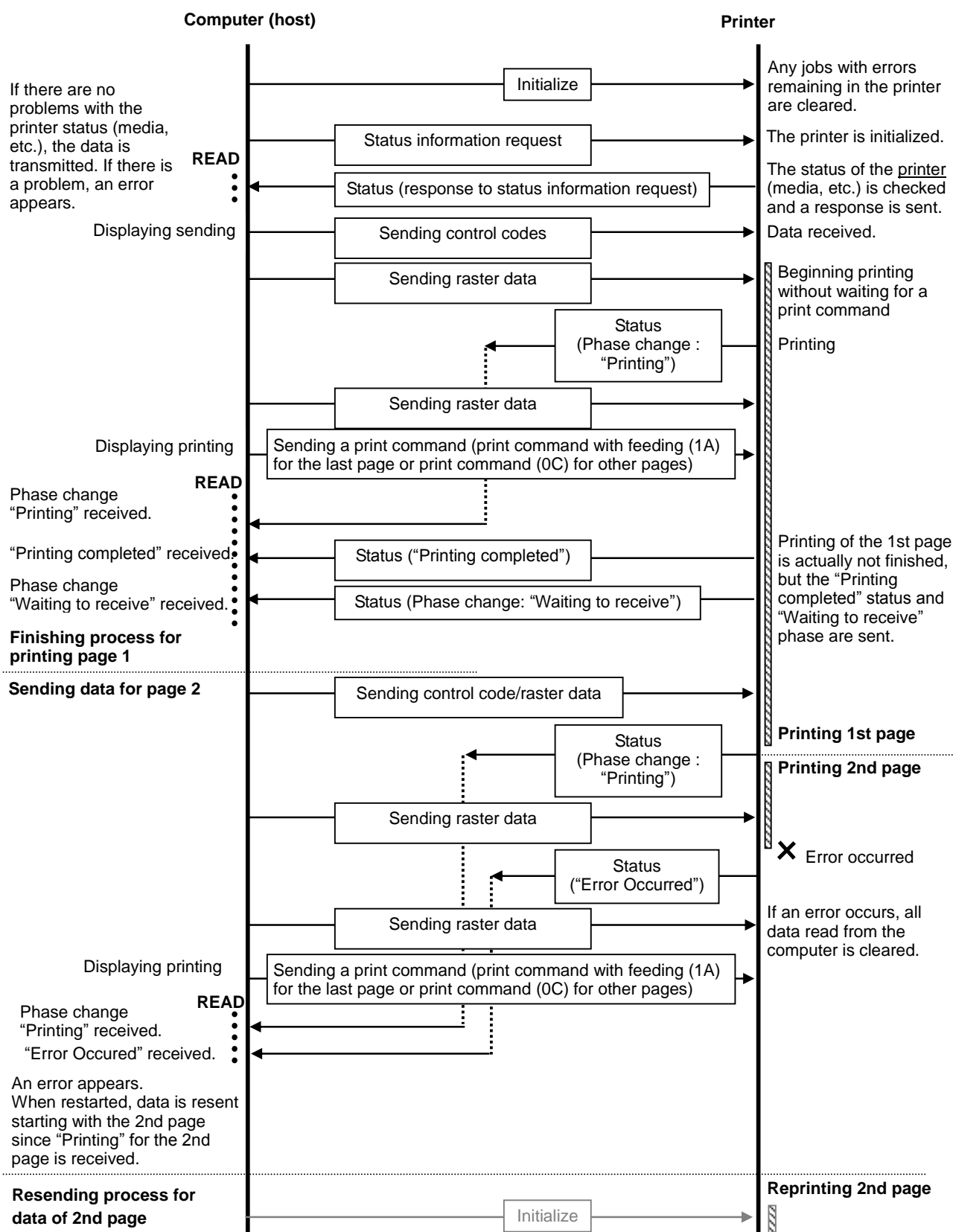
6.1 Normal flow for USB connection



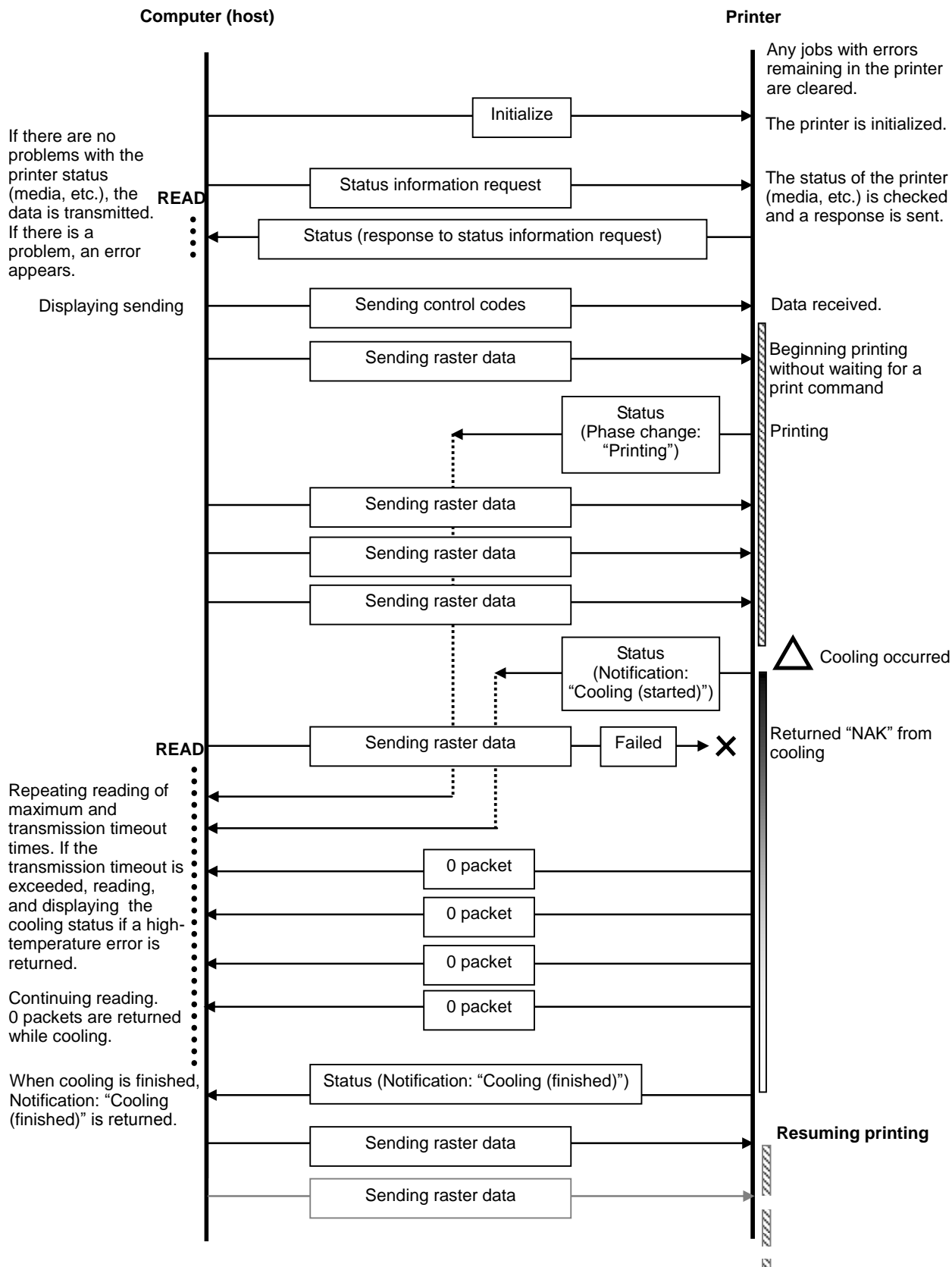
6.2 Error flow for USB connection (when feeding at the end of the page)



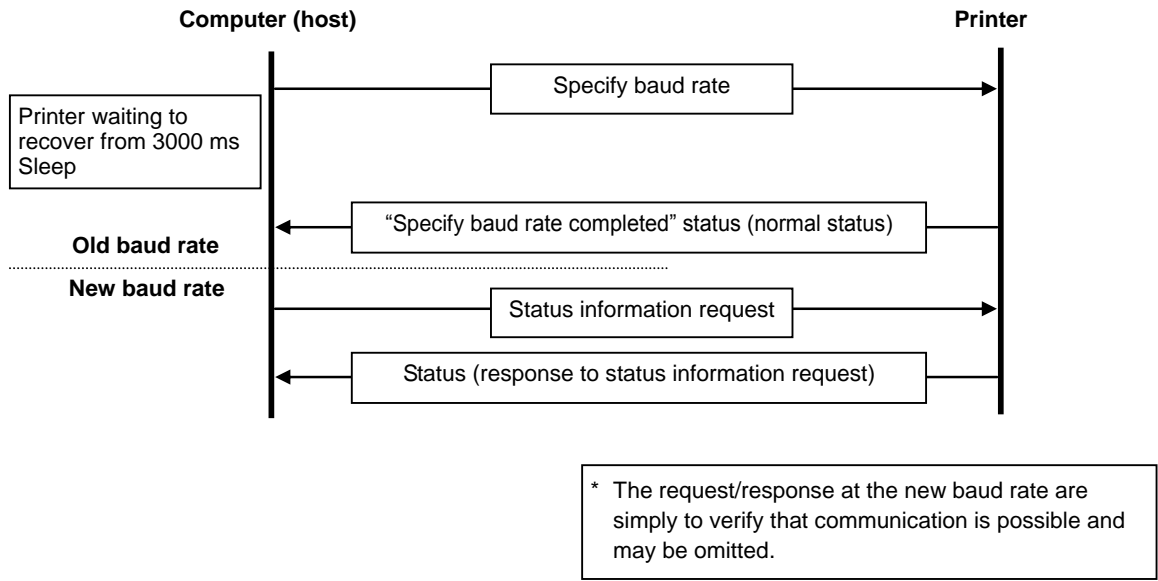
6.3 Error flow for USB connection (with a concurrent printing error such as end of tape)



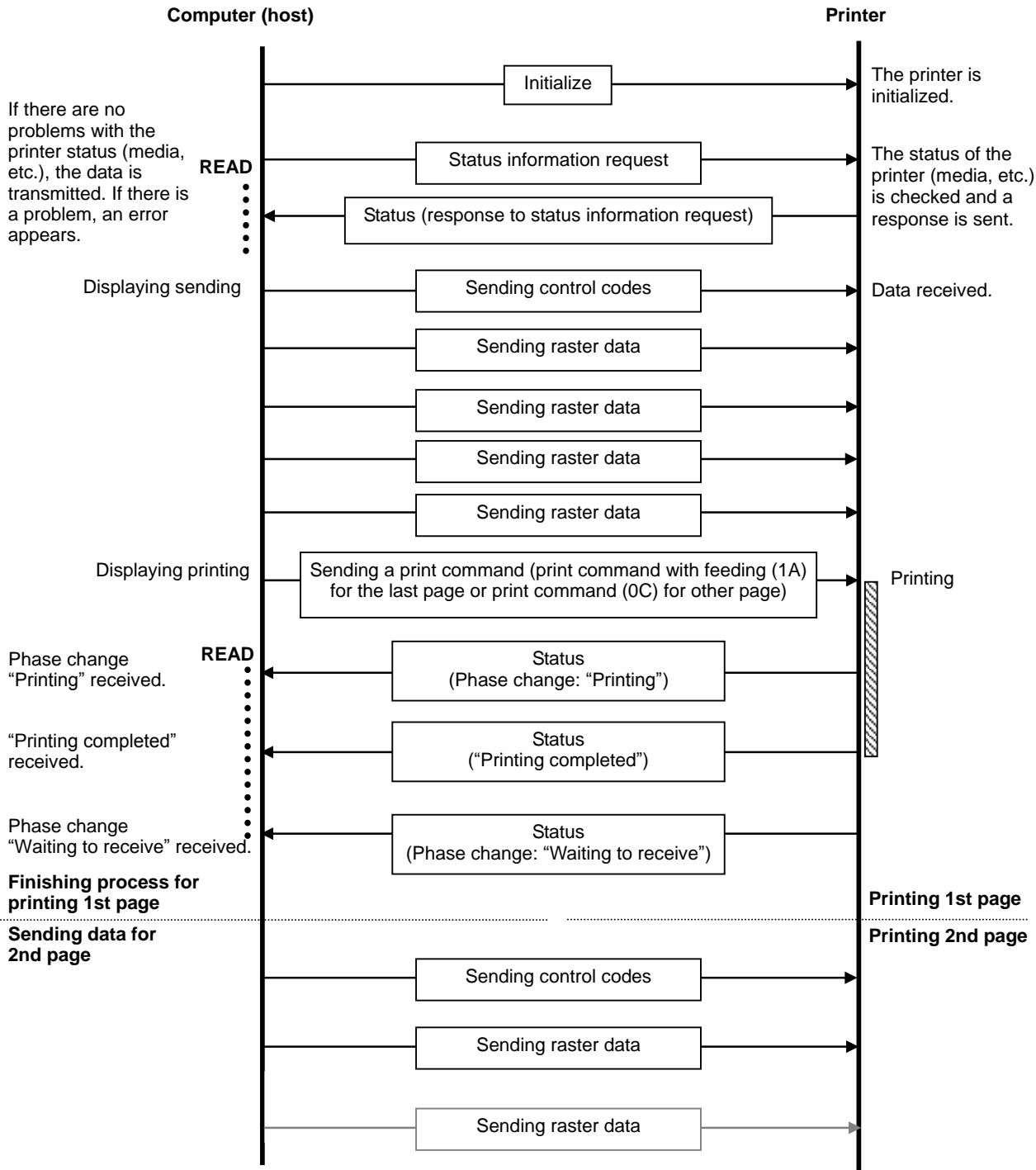
6.4 Cooling flow for USB connection



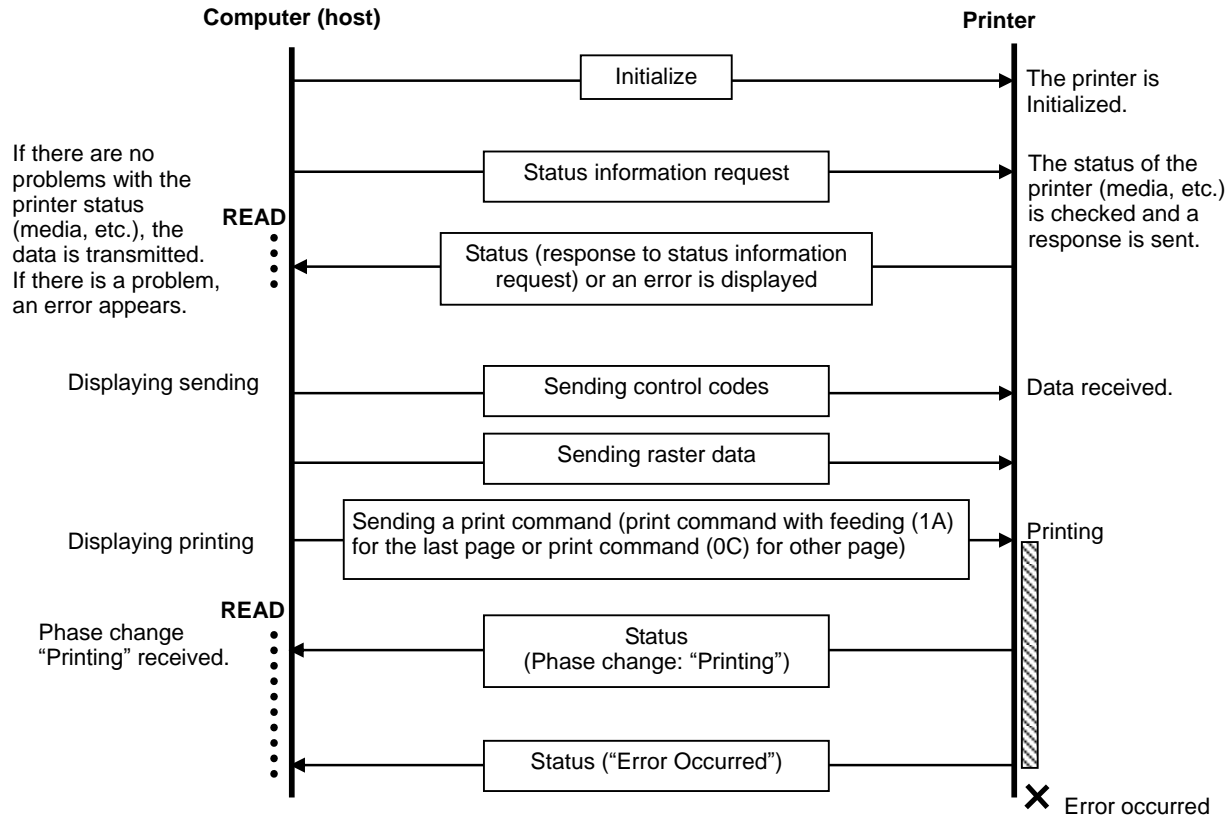
6.5 Flow for setting serial connection baud rate



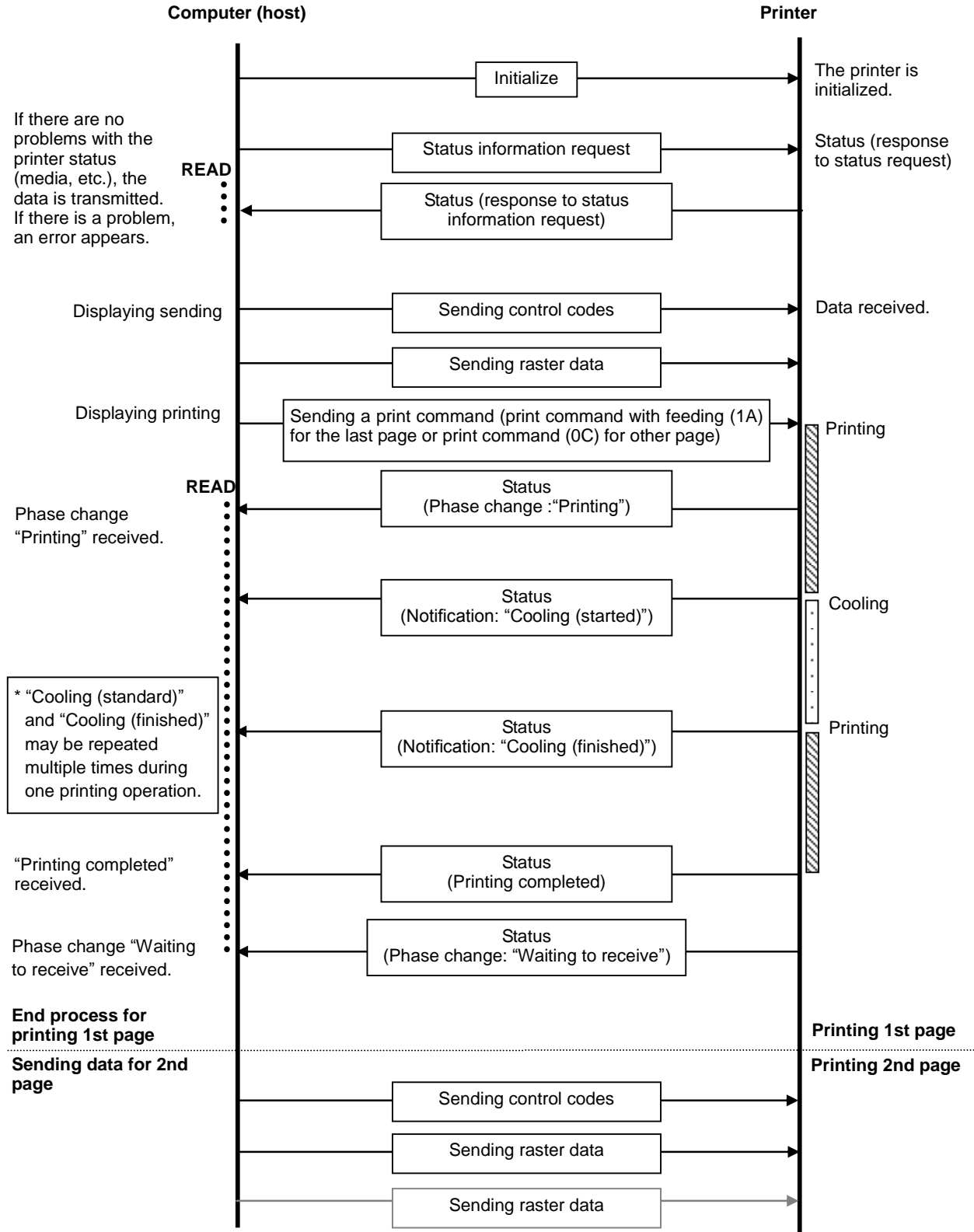
6.6 Normal flow for serial connection



6.7 Error flow for serial connection



6.8 Cleaning flow for serial connection



Appendix A: USB Specifications

USB specifications 1.1

Item	Description
Vendor ID	0x04F9
Product ID	RJ-4030:2045 RJ-4040:2046
Class	Printer Mass storage
Character string for manufacturer	Character string descriptor: 0x01 0x0409: "Brother"
Character string for product	Character string descriptor: 0x02 0x0409: "RJ-4030" 0x0409: "RJ-4040"
Character string for serial number	Character string descriptor: 0x03 0x0409: "000000001" Last nine digits of the printer's serial number
Device speed	Full speed
Number of interfaces	1 (No alternate interfaces)
Power supply	Self-powered (As a printer class, Bus power is also set to "ON".)
End point 1	In bulk (Sends the status from the printer to the computer.) Maximum packet size: 16 bytes
End point 2	Out bulk (Sends print commands and data from the computer to the printer.) Maximum packet size: 64 bytes

Appendix B: Introducing the Brother Developer Center

Useful information for developers, such as applications, tools, SDKs as well as FAQs, are provided in the Brother Developer Center.

<http://www.brother.com/product/dev/index.htm>

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