

EPSON Perfection 610 / GT-6600

Command Specification, Rev. A



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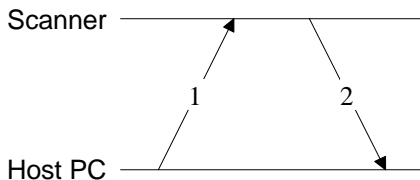
1. Scope

This specification is applied to control command of color image scanner "Perfection 610".

2. Procedure of Command handshaking

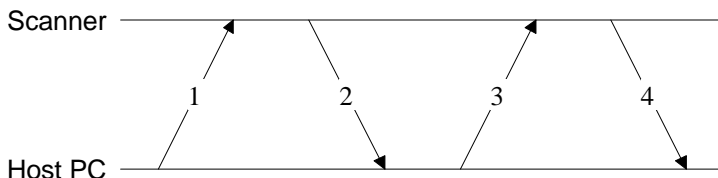
2.1. Procedure of Control code handshaking

2.1.1. Control codes without Parameters



1. Control code from the host computer
2. Response from the scanner
ACK (06H) Legal control code is received. (The scanner accepts the control code)
NACK(15H) Illegal control code is received. (The scanner does not accept the control code.)

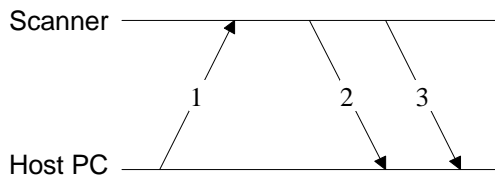
2.1.2. Control code with parameters



1. Control code from the host computer
2. Response from the scanner
ACK (06H) Legal control code is received. (The scanner accepts the control code)
NACK(15H) Illegal control code is received. (The scanner does not accept the control code.)
3. After the host receives ACK ,it sends the parameters.
4. Response from the scanner
ACK(06H) Legal parameters is received. (The scanner accepts the parameters.)
NACK(15H) Illegal parameters is received. (The scanner does not accept the parameters.)

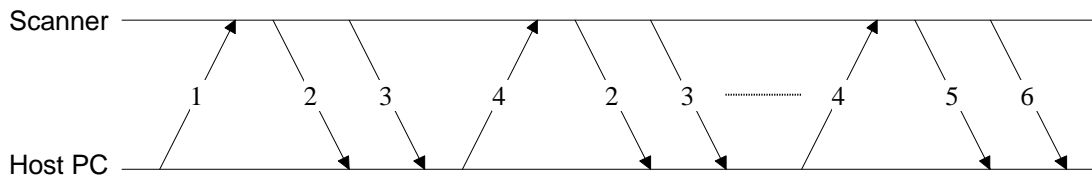
2.2. Procedure of Data-block handshaking

2.2.1. Control code of Data request



1. Control code from the host computer
2. Data block from the scanner (information block)
3. Data block from the scanner (image data)

2.2.2. Monochrome scanning (Line / Block transfer mode)



1. Control code from the host computer
2. Data block from the scanner (information block)
3. Data block from the scanner (image data)
4. Response from the host computer.
ACK (06H): Continue to scan
CAN (18H): Abort
5. The last Data-block (information block)
6. The last Data-block (image data)

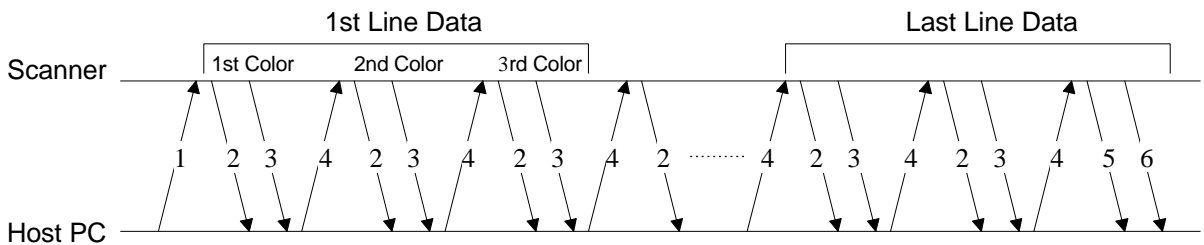
The host computer should not send [ACK] after receiving the last Data -Block.

In the case of Line transfer mode, one Data block consists of one line data.

In the case of Block transfer mode, Each Data block consists of n lines data except the last data block.
(However in the case that total line number is multiple of n, last data block also consists of n line data.)

- n • is line number that is set by [ESC d] code.

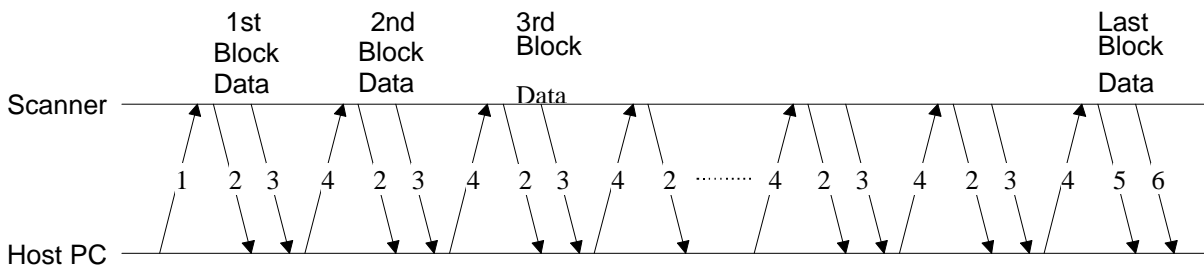
2.2.3. Line sequence mode (Line transfer mode)



- 1) Control code from the host computer
- 2) Data-Block from the scanner (information block)
- 3) Data-Block from the scanner (image data block)
- 4) Response from the host computer
 - ACK (06H) Continue to scan
 - CAN (18H) Abort
- 5) The last Data- Block (information block)
- 6) The last Date-Block (image data)

The host computer should not send [ACK] after receiving the last Data-Block.

2.2.4. Line sequence mode (Block transfer mode)



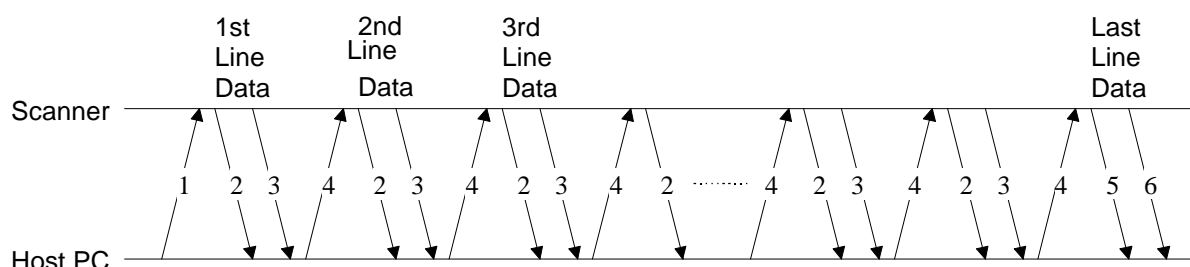
- 1) Control code from the host computer
- 2) Data-Block from the scanner (information block)
- 3) Data-Block from the scanner (image data)
- 4) Response from the host computer
 - ACK (06H) Continue to scan
 - CAN (18H) Abort
- 5) The last Data-Block (information block)
- 6) The last Data-Block (image data)

The host computer should not send [ACK] after receiving the last Data-Block.
Three color image data on a same sub-scan line is sent as three line data in each Data block of image data.
Each Data block consists of n lines data except the last data block.
(However in the case that total line number is multiple of n, last data block also consists of n line data.)
• n is line number that is set by [ESC d] code.

A form of an Image data(Example: n = 18)

1st Line	1st Line	1st Line	2nd Line	-	6th Line	6th Line	6th Line
1st Color	2nd Color	3rd Color	1st Color		1st Color	2nd Color	3rd Color

2.2.5. Byte sequence mode (Line transfer mode)



- 1) Control code from the host computer
- 2) Data-Block from the scanner (information block)
- 3) Data-Block from the scanner (image data)
- 4) Response from the host computer
ACK (06H) Continue to scan
CAN (18H) Abort
- 5) The last Data-Block (information block)
- 6) The last Data-Block (image data)

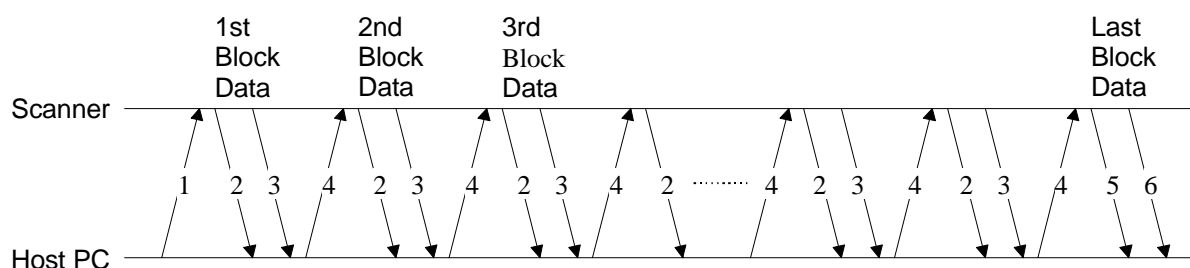
The host computer should not send [ACK] after receiving the last Data-Block.

Three color image data on same sub-scan line is sent as one line data in each data block of image data.

A form of a image data

1st Color 1st Pixel	2ndColor 1st Pixel	3rd Color 1st Pixel	1st Color 2nd Pixel	-	1st Color Last Pixel	2 nd Color Last Pixel	3rd Color Last Pixel
------------------------	-----------------------	------------------------	------------------------	---	----------------------------	--	----------------------------

2.2.6. Byte sequence mode (block transfer mode)



- 1) Control code from the host computer
- 2) Data-Block from the scanner (information block)
- 3) Data-Block from the scanner (image data)
- 4) Response from the host computer
ACK (06H) Continue to scan
CAN (18H) Abort
- 5) The last Data-Block (information block)
- 6) The last Data-Block (image data)

The host computer should not send [ACK] after receiving the last Data-Block.

Three color image data on the same sub-scan line is sent as one line in each Data block of image data.

Each Data block consists of n lines data except the last data block.

(However in the case that total line number is multiple of n, last data block also consists of n line data.)

• n• is line number that is set by [ESC d] code.

A form of a image data (Example:n = 17)

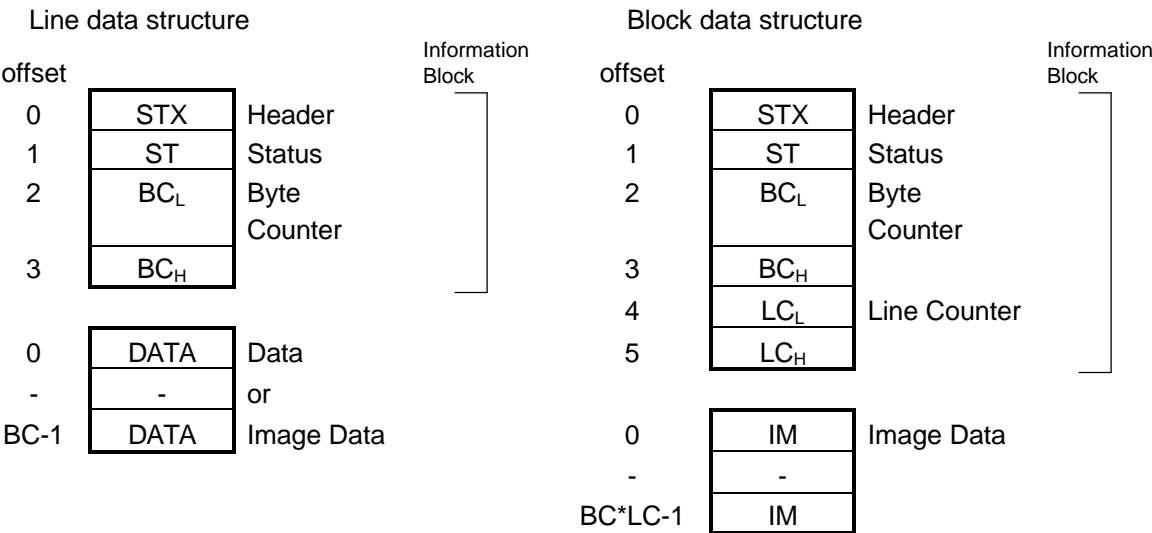
1st Line 1st Color 1st Pixel	1st Line 2nd color 1st Pixel	1st Line 3rd Color 1st Pixel	1st Line 1st Color 2nd Pixel	-	17 th Line 1 st Color Last Pixel	17th Line 2nd Color Last Pixel	17th Line 3rd Color Last Pixel
------------------------------------	------------------------------------	------------------------------------	------------------------------------	---	--	--------------------------------------	--

3. Structure of Data-Block

There are three types of the structure of the Data-Block is shown as below.

- (1)Line data structure : Includes 4 bytes of the information block and 1 line of the image data.
- (2)Block data structure: Includes 6 bytes of the information block and n line of the image data.
 n is indicated in the Line counter of the information block.

A form of the ordinary data block takes line data structure. When block line number is set by [ESC d] code and the scanning is started by [ESC G] code, it takes block data structure .



3.1. Line data Structure

A) Information block

(1) Header [STX(02H)]

The header indicates the beginning of a Data block.

(2) Status

(Refer to the section 3.3 The format of status bytes)

(3) Byte counter (BC)

The Bytes counter indicates the bytes number of transferred data or image data of data block.

It consists of 2 bytes integers, and lower byte precedes the higher byte.

The value of byte counter is solved by the following expression.

$$BC = \frac{\text{The length of main-scan}}{\text{Int} (8 / \text{the vale of data format })} \times \text{Ref.: [ESC A]} \times \text{Ref.: [ESC D]}$$

(x 3) (x 3) : byte sequence mode only

In Byte sequence mode , the value of BC must be three times.

The value of byte counter should be checked, before receiving every one line data.

B) Data

The data corresponds to the image data or the other data such as [ESC I] or [ESC S] code or etc.

The byte length of the data is indicated by the Byte counter (BC).

In the case of the color image scanning, the output color sequence is decided by [ESC C] code.

3.2. Block data structure

The Block data structure is available when line counter is not set •0• by [ESC d] code and the scanning is started by [ESC G] code.

A) Information block

(1) Header [STX(02H)]

The header indicates the beginning of a Data block.

(2) Status

(refer to the section 3.4 The format of status byte)

(3) Byte counter (BC)

The Byte counter indicates the bytes numbers of one main-scan line.

It consists of 2 bytes integers, and the lower byte precedes the higher byte.

The value of the bytes counter is solved as same as above the line data structure .

(4) Line Counter (LC)

The Line Counter indicates the line numbers of one Data block.

The Line Counter consists of 2 bytes integers, and the lower byte precedes the higher byte.

The Line Counter is set by [ESC d] code.

The Byte counter and the Line Counter should be checked, before receiving every data block.

B) Data

The data block corresponds to the image data block.

Total byte number of one Data block is expressed as [BC x LC].

In the case of the color image scanning, the output color sequence is decided by [ESC C] code.

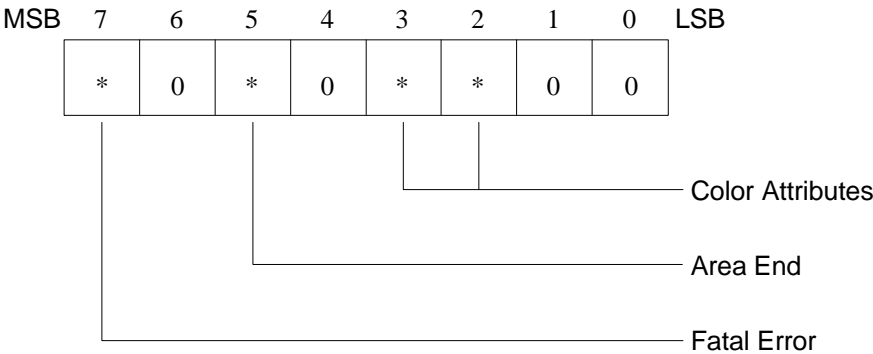
3.3. The format of status bytes

The status byte should have the format is shown as below.

Status indicates the current condition and error of the scanner.

Status is included in the information block of the data block.

Command which confirms only status is [ESC F] code.



[Detail of the status bits]

Bit7: Fatal Error	Fatal error flag. It is set • 1• when system error occurred. (If scanner is during worming up when scanner receive ESC G command, then it is set)
Bit6: (Reserved)	Always 0
Bit5: Area End	It is set, when it scans the last image data. In the case of the color page mode scanning, it is set • 1• in the last Data-Block of each color page. In the case of the monochrome mode ,color line mode scanning, set to • 1• in the last Data-Block.
Bit4: (Reserved)	Always 0
Bit3: Color Attributes	(See table below)
Bit2: Color Attributes	(See table below)
Bit1: (Reserved)	Always 0
Bit0: (Reserved)	Always 0

	ESC C	scanning color		Bit3	Bit2
monochrome mode	00H	--		0	0
dropout color mode	10H	green(G)		0	1
	20H	red(R)		1	0
	30H	blue(B)		1	1
Line sequence mode	02H,12H	Line transfer	green(G)	0	1
			red(R)	1	0
			blue(B)	1	1
		block transfer	RGB	1	0
Bytes sequence mode	03H,13H	RGB		1	0

4. Control code

4.1. Request Identity

(1) Code: ESC I

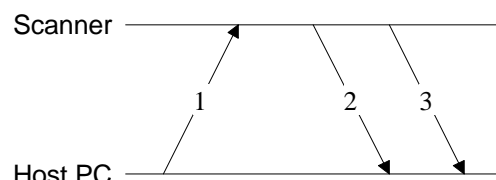
ASCII:	ESC	I
decimal:	27	73
hexadecimal:	1B	49

(2) Function

Requests the function information of the scanner.

For this request, the scanner returns the command level, available resolutions and the range of maximum scanning as the following format .

(3) Handshaking



- 1) ESC I code
- 2) Information block
- 3) Identity data

(4) Identity data structure

Identity data takes the following construction.

The byte counter of the information block is 19(13H).

•D, •1	:The command level identification
•R, 75, •R, 150,	:Available resolution description
•R, 300, •R, 600	(each numerical value is 2 bytes)
•A, 5100, 7036	:the direction of main and sub scanning maximum scanning area at the maximum resolution.

The letters which are bound by quotation mark are returned as ASCII code.

Each numerical value is 2 bytes integers, and the lower byte precedes the higher byte.

4.2. Request Identity 2

(1) Code: ESC i

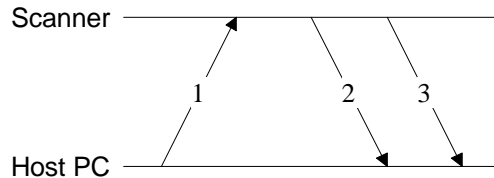
ASCII:	ESC	i
decimal:	27	105
hexadecimal:	1B	59

(2) Function

Requests the function information of the scanner.

For this request, the scanner returns the command level, available resolutions and the range of maximum scanning as the following format .

(3) Handshaking



- 1) ESC I code
- 2) Information block
- 3) Identity data

(4) Identity data structure

Identity 2 data takes the following construction. The byte counter of the information block is 44(2CH).

Offset	value	description
0,1	600	Optical resolution
2	d5h	structure of sensor
3	0	scanning order
4	8	line distance(1 st -2 nd line)
5	8	line distance(2 nd -3 rd line)
6-13	0	Reserved
14,15	50	main resolution (1)
16,17	75	main resolution (2)
18,19	100	main resolution (3)
20,21	150	main resolution (4)
22,23	200	main resolution (5)
24,25	300	main resolution (6)
26,27	600	main resolution (7)
28,29	0	delimiter
30,31	75	sub resolution (1)
32,33	150	sub resolution (2)
34,35	300	sub resolution (3)
36,37	600	sub resolution (4)
38,39	1200	sub resolution (5)
40,41	2400	sub resolution (6)
42,43	0	delimiter

Scanning order value

R→G→B : 0, R→B→G : 1, G→R→B : 2,

G→B→R : 3, B→R→G : 4, B→G→R : 5

structure of sensor

MS	B7	B6	B5	B4	B3	B2	B1	B0	LS
B									B
CIS/	staggered/N	R line	G line	B line					
CCD	ormal	number	number	number					

CIS/CCD : When CCD is used, it is set .

staggered/Normal: When Normal CCD is used , it is set.

Line number: number of each color sensor line.

Each numerical value are 2 bytes integers, and the lower byte precedes the higher byte.

Start Scanning

(1) Code: ESC G

ASCII:	ESC	G
decimal:	27	71
hexadecimal:	1B	47

(2) Function

Starts a scanning image, and the scanning image data is sent to the host computer.

(3) Handshaking

Handshaking depends on each scanning mode.

The description is referent to • 2.2 **Procedure of Data-block handshaking**•

After accepting the last scanning Data-Block, the host should not send [ACK] to the scanner.

The area end flag(bit 5) in the status of the last Data block is set.

Note:

In case fatal error bit is set at status in information block after host PC send this command, scanner may be in warming up. Check whether the scanner is in warming up by sending ESC f command.

If scanner is in warming up, it will finish in 60 seconds. So check whether scanner is in ready status within 60 second. if scanner is not in ready status, you should treat scanner is in fatal error.

After scanner is in ready status, you should send this command again.

4.3. Abort Scanning

(1) Code: CAN

ASCII: CAN

decimal: 24

hexadecimal: 18

(2) Function

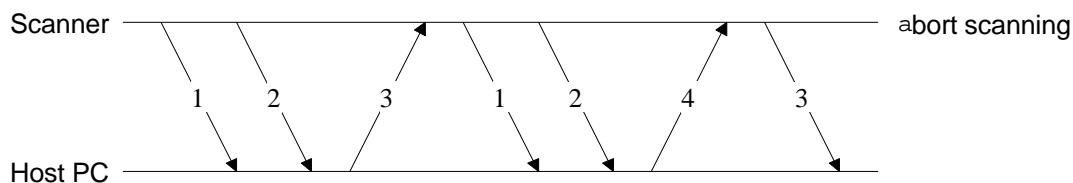
Terminates a scanning image, and the scanner returns to the command waiting mode.

The [CAN] code is available only when the scanner is waiting for an ACK code during a scanning operation.

As the [ACK] code is returned from the scanner after receiving the [CAN] code, the Host should receive it.

When this command is input during the command waiting mode, The scanner deal with it as a command error.

(3) Handshaking



- 1) information block
- 2) image data
- 3) ACK(06H)
- 4) CAN(18H)

4.4. Set Scanning Mode

(1) Code: ESC g

ASCII:	ESC	g	i
decimal:	27	103	i
hexadecimal:	1B	67	i

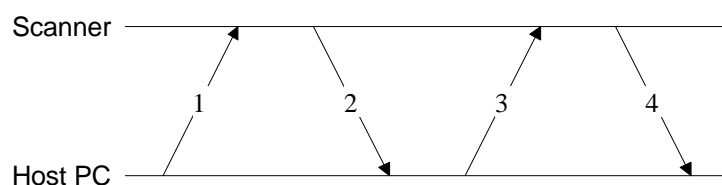
(2) Function

Sets the scanning mode.

i = 00h Normal mode
i = 01h High speed scan mode

Default value i = 00H

(3) Handshaking



- 1) ESC g code
- 2) ACK(06H)
- 3) Parameter i
- 4) ACK(06H) / NACK(15H)

4.5. Request Status

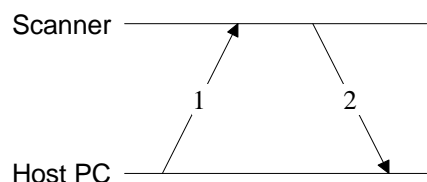
(1) Code: ESC F

ASCII:	ESC	F
decimal:	27	70
hexadecimal:	1B	46

(2) Function

Requests the Data-Block of scanner status.

(3) Handshaking



- 1) ESC F code
- 2) information block

(4) Contents of Data-Block

Only information block is transferred for this code.

The byte counter in information block is always 0.

4.6. Request Extended Status

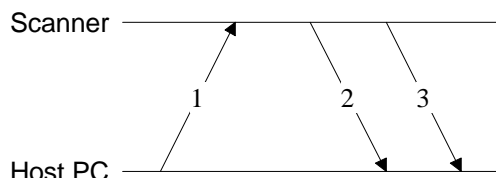
(1) Code: ESC f

ASCII: ESC f
decimal: 27 102
hexadecimal: 1B 66

(2) Function

Requests the status of the scanner and the optional equipment (ADF).

(3) Handshaking



- 1) ESC f Code
- 2) information block
- 3) extended status data

(4) Contents of Data-Block

Extended status takes the following data structure.

The byte counter of information block is 42(2AH).

Offset	bit								description
	7	6	5	4	3	2	1	0	
0	FER	/FBF	0	0	Rvd	Rvd	WU	PB	scanner status
1-25	Rvd								reserved
26-41	Product Name								product name(ASCII)

Rvd: Reserved (always 0)

FER: In Fatal error, FER=1

/ FBF: This is Flatbed type ,so always 0

PB: This scanner has push bottom, always 1

Product Name: Each product name is shown by ASCII code. 20H is used for space.

4.7. Initialize

(1) Code: ESC @

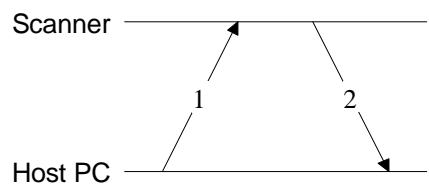
ASCII:	ESC	@
decimal:	27	64
hexadecimal:	1B	40

(2) Function

Initializes the scanner.

All parameters except down loaded data are initialized to the default value. Down loaded data is remained.

(3) Handshaking



- 1) ESC @ code
- 2) ACK(06H)

4.8. Set Resolution

(1) Code: ESC R

ASCII:	ESC R	n1 _L	n1 _H	n2 _L	n2 _H
decimal:	27 82	n1 _L	n1 _H	n2 _L	n2 _H
hexadecimal:	1B 52	n1 _L	n1 _H	n2 _L	n2 _H

(2)Function

Sets the scanning resolutions of main scan and sub scan.

n1: Main scan resolution data(in dpi)

n2: Sub scan resolution data (in dpi)

In color scanning, the each value of parameter should be set only the following value.

n1 = 50, 75, 100, 150, 200, 300, 600

n2 = 75, 150, 300, 600, 1200, 2400

In monochrome scanning, the each value of parameter should be set only the following value.

n1 = 75, 150, 300, 600

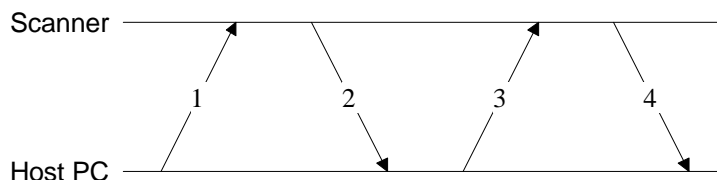
n2 = 75, 150, 300, 600, 1200, 2400

When the scanner accepts this control code , the scanning area is reset to the maximum value allowed in the current resolution setting. Therefore, resolution should be set before setting the scanning area.

(refer :ESC A)

Default value : n1 = 150, n2 = 150

(3) Handshaking



- 1) ESC R code
- 2) ACK(06H)
- 3) parameter n1,n2
- 4) ACK(06H) / NACK(15H)

Note

Please send the ESC C command before this command is sent. Because the available main scan resolution value is different between color scanning and monochrome scanning.

4.9. Set Scanning Area

(1) Code: ESC A

ASCII:	ESC A	n1 _L	n1 _H	n2 _L	n2 _H	n3 _L	n3 _H	n4 _L	n4 _H
decimal:	27 65	n1 _L	n1 _H	n2 _L	n2 _H	n3 _L	n3 _H	n4 _L	n4 _H
hexadecimal:	1B 41	n1 _L	n1 _H	n2 _L	n2 _H	n3 _L	n3 _H	n4 _L	n4 _H

(2) Function

Sets the scanning area of main scan and sub scan in the pixel number of the current resolution from origin.

n1 main scan offset length
n2 sub scan offset length
n3 main scan length
n4 sub scan length
(0 ≤ n1, 0 ≤ n2, 8 ≤ n3, 1 ≤ n4)

The maximum value is calculated from following expression:

the maximum value of main scan = 8.5 × main scan resolution

the maximum value of sub scan = 11.7 × sub scan resolution

And the each value of parameter should be set in the following range.

n1,n3,n1+n3 ≤ the maximum value of main scan

n2,n4,n2+n4 ≤ the maximum value of sub scan

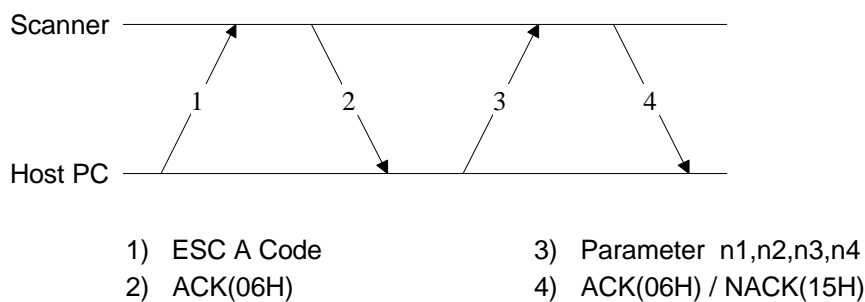
The width of main scanning (n3) is set by 8 pixel step.

The scanning area is reset when resolution is set.

Therefore, those setting should be made before setting the scanning area.

Default value n1 = 0, n2 = 0, n3 = 1216, n4 = 1720

(3) Handshaking



Note:

This scanner does not do line distance correction among R, G and B line.

Therefore, this command parameter of sub scan length should be set actual sub scan length added B-R line distance.

B-R line distance will change by sub scan resolution setting. B-R line distance value is calculated following expression.

B-R line distance value = B-R line distance of optical resolution / (optical resolution / sub scan resolution)

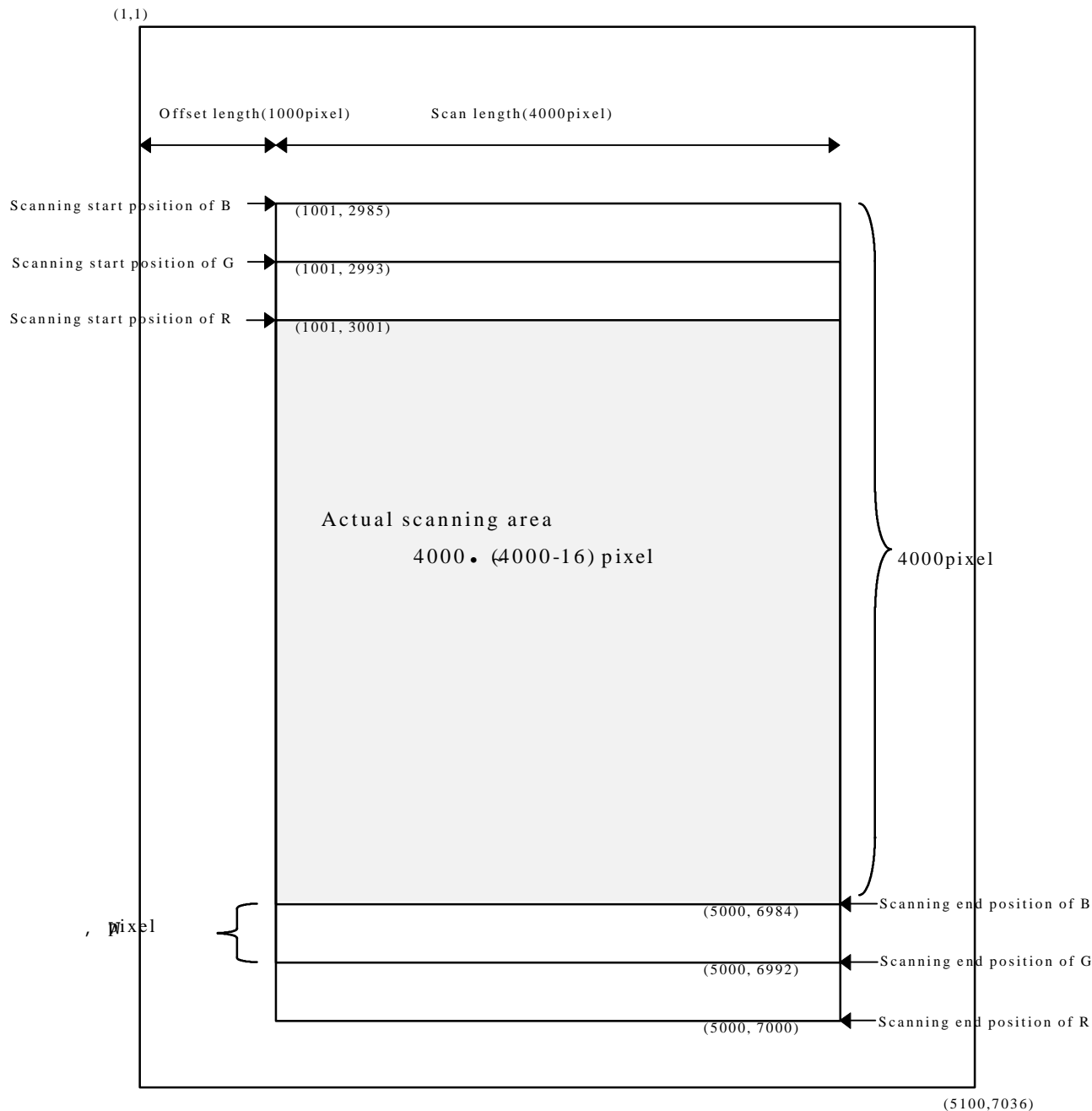
Line distance of Optical resolution can be confirmed ESC i code.

Optical resolution: 600dpi

(4) Scanning area (in the case of 600dpi * 600dpi color scanning)

Set parameter : offset length (1000, 3000), scan length (4000, 4000)

Line distance : 8



4.10. Set Data Format

(1) Code: ESC D

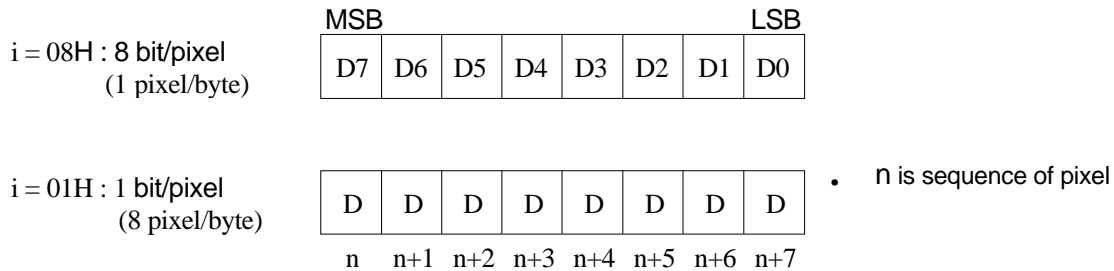
ASCII:	ESC	D	i
decimal:	27	68	i
hexadecimal:	1B	44	i

(2) Function

Specifies the number of bits per one pixel.

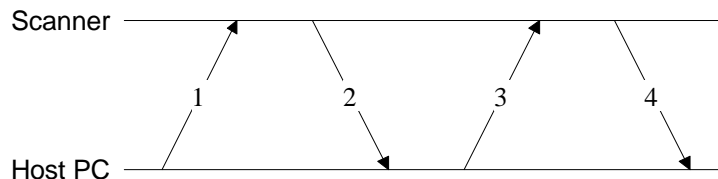
i = 1, 8

The output format of image data is the following



Default value i = 01H

(3) Handshaking



- 1) ESC D code
- 2) ACK(06H)
- 3) parameter i
- 4) ACK(06H) / NACK(15H)

Note:

ESC t command is available only when scanner receive this command with parameter i=1

When scanner receive this command with parameter i=1, only •ESC C• command with the parameter value of 00H, 10H and 20H is available. If other value is send, scanner returns NACK code.

If this command is sent with parameter i = • 1 • , parameter id ESC d command should be set even value.

4.11. Set Color

(1) Code: ESC C

ASCII:	ESC	C	i
decimal:	27	67	i
hexadecimal:	1B	43	i

(2) Function

Sets scanning color

i = 00H	monochrome scanning	
i = 10H	monochrome scanning	(drop- out color : red)
i = 20H	monochrome scanning	(drop- out color : green)
i = 30H	monochrome scanning	(drop- out color : blue)

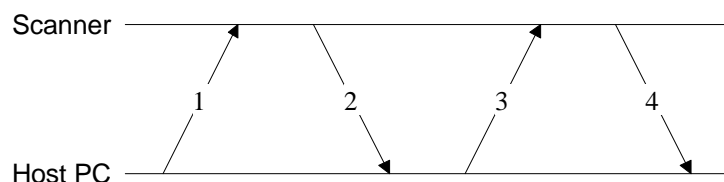
i = 12H Color line sequence mode (R->G->B order)

i = 13H Color byte sequence mode (R->G->B order)

refer to **[2.2 Procedure of Data-block handshaking]**

Default value i = 00H

(3) Handshaking



- 1) ESC C code
- 2) ACK(06H)
- 3) parameter i
- 4) ACK(06H) / NACK(15H)

Note

Please send the ESC R command after this command is sent. Because the available main scan resolution value is different between color scanning and monochrome scanning.

4.12. Set Gamma Correction

(1) code: ESC Z

ASCII:	ESC	Z	i
decimal:	27	90	i
hexadecimal:	1B	5A	i

(2) Function

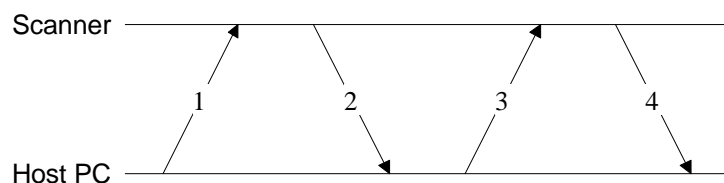
Specifies the gamma correction tables according to the output devices.

i = 03H	User defined table(Ref. ESC z)	(for Gamma=1.0)
i = 04H	User defined table(Ref. ESC z)	(for Gamma=1.8)

If user defined table is selected without having be downloaded gamma table, scanner sets the linear gamma table.

Default value i = 03H

(3) Handshaking



- 1) ESC Z code
- 2) ACK(06H)
- 3) parameter i
- 4) ACK(06H) / NACK(15H)

Note:

Send this command first, before ESC z command.

4.13. Down load Gamma Table

(1) Code: ESC z

ASCII:	ESC	z	i	d[256]
decimal:	27	122	i	d[256]
hexadecimal:	1B	7A	i	d[256]

(2) Function

Down loads user defined gamma table to the scanner.

Gamma table can be set on each color and color is selected as below.

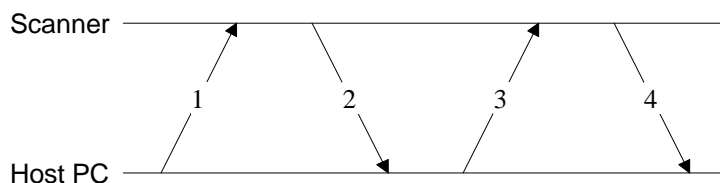
Upper case letter and lower case letter of ASCII code can be used for • i • .

When • i • is not as the following, the scanner returns [NACK] after receiving data,.

i = 'm' or 'M'	Monochrome
i = 'r' or 'R'	Red
i = 'g' or 'G'	Green
i = 'b' or 'B'	Blue

Default value same curve as [ESC Z = 01H] & [ESC L = 00H]
This table is not reset by [ESC @] code.

(3) Handshaking



- 1) ESC z code
- 2) ACK(06H)
- 3) color setting i and Gamma table data
- 4) ACK(06H) / NACK(15H)

Note:

Send ESC Z command first, before this command .

4.14. Set Line Counter

(1) Code: ESC d

ASCII:	ESC	d	i
decimal:	27	100	i
hexadecimal:	1B	64	i

(2) Function

Sets the line number (LC) of the Block data structure, and the parameter i indicates the number.

The Block data transfer mode is available only when this code is set.

$$1 \leq i \leq 255$$

This setting is not remained after executing a scanning start [ESC G] code. It means that the data transfer mode is the Line data mode without setting this code. Therefore this code should be set whenever the Block data structure is using.

In the case of the color line scanning mode, the number of the line for image data should be counted separately for each color R,G and B.

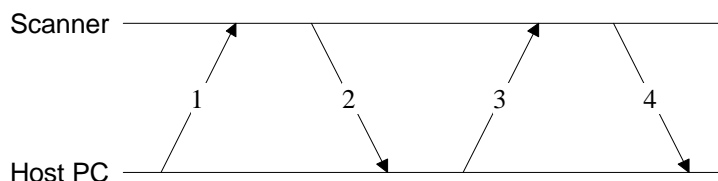
The number of the Line number (LC) in the last data block may not be i because it is calculated by the following expression. Therefore the Line number (LC) should be checked in order to receive the image data properly. The line number of last block is solved by the following expression.

$$\text{the number of the last block line counter (LC)} = \text{mod} \left[\frac{\left(\frac{\text{The length of sub-scan}}{i} \right) \times 3}{i} \right] \times 3 : \text{Line sequence mode only}$$

mod (n / i) is the remainder that n divided by i .

Default value i = 00H

(3) Handshaking



- 1) ESC d code
- 2) ACK(06H)
- 3) parameter i
- 4) ACK(06H)

Note:

Even value parameter • i • must be sent , in case of Bi-level scanning.

4.15. Set Threshold

(1) Code: ESC t

ASCII:	ESC	t	i
decimal:	27	116	i
hexadecimal:	1B	74	i

(2) Function

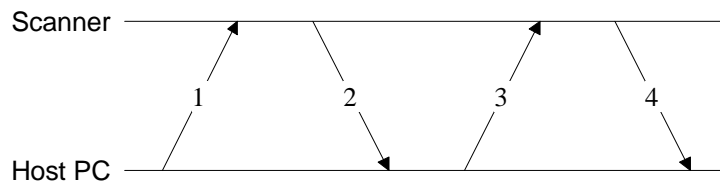
Sets threshold value of fixed threshold.

00H =< i =< FFH

This code is available in the case of ESC D= 01H.

Default value i = 80H

(3) Handshaking



- 1) ESC t code
- 2) ACK(06H)
- 3) parameter i
- 4) ACK(06H)

4.16. Request Push Button Status

(1) Code: ESC !

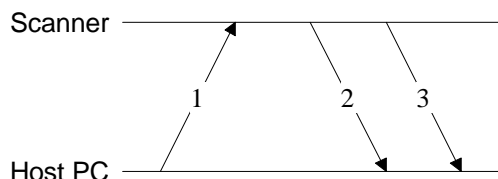
ASCII: ESC !
decimal: 27 33
hexadecimal: 1B 21

(2) Function

Requests the status of the Push Button.

The scanner resets (EN bit) • 0• , after receiving [ESC !], [ESC G], [ESC @] codes.

(3) Handshaking



- 1) ESC ! code
- 2) information block
- 3) Push Button status

(4) The structure of Push Button status

Push Button status takes the following structure. The byte counter of information block is 1(01H).

Offset	bit								description
	7	6	5	4	3	2	1	0	
0	-	-	-	-	-	-	-	EN	Push Button status

EN: 1: Push Button is pushed. 0: Push Button is not pushed.

5. List of Control code

classification	name	code
command	ID request	ESC I
	ID request	ESC i
	status request	ESC F
	extended status request	ESC f
	start scanning	ESC G
	Push Button status request	ESC !
set data form	set data format	ESC D i
	set resolution	ESC R n1 n2
	set scanning area	ESC A n1 n2 n3 n4
	set color	ESC C i
correction	set gamma correction	ESC Z i
	down load gamma table	ESC z i d[256]
image disposition	set threshold	ESC t i
support, and others	set scanning mode	ESC g i
	initialize	ESC @
	set line counter	ESC d i
control	normal response	ACK
	abnormal response	NACK
	stop scanning	CAN
	header	STX