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**Scan-print mechanism**  
**BS-U4A4**

**Programming Manual**  
**V1.00**

**Shandong New Beiyang Information Technology Co., Ltd**

## REVISION HISTORY

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# 1 Overview

## 1.1 Command classification

**Immediate commands:** These commands are acted on immediately upon being received by the scanner;

**System-level commands:** These commands are acted on one by one.

## 1.2 Key terms

**LockScan mode:** In this mode, scan is enabled once by sending command and then started through sensor identification.

**Non-LockScan mode:** In this mode, scan is directly started through sensor identification.

**Data correction:** Compensation based on CIS non-uniformity.

**Page mode:** In this mode, the scanner stores all data in a specified memory and thinks of this as a virtual page. The page is printed only when the scanner receives print command.

**RAM:** Random Access Memory

**DPI:** Dot Per Inch, scan or print dots per inch (1 inch equals to 25.4mm), which is used to identify the scan or print resolution. For example, 200DPI means 200 scan or print dots per inch.

## 1.3 Command format

**[Name]** Describe the form and name of commands.

**[Format]** The format of commands, all data and parameters are hexadecimal unless they are specified, and parameters with measurement unit are decimal.

**[Range]** The value range of parameter in the command, all descriptions inside parentheses are decimal values.

**[Description]** Describe the function of commands.

**[Note]** Explain the main features and application notices of commands.

**[Return]** Explain the information returned after calling command, all descriptions inside parentheses are decimal values.

**[Default]** The initial value used after the printer initialized, all descriptions inside parentheses are decimal values.

**[Example]** Several commands are called in a certain sequence to realize some typical function.

**[Reference]** Other commands related to current command

## 2 Command description

### 2.1 System-level commands

#### Set scanning width

---

**[Format]** 1A 40 mm nn

**[Description]** Set the scan image width, unit: mm.

mm: border width;

nn: effective scanning width

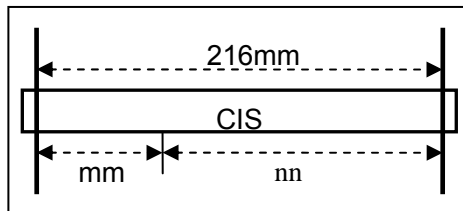
**[Range]** mm: 0 ~ D8 (0 ~ 216 mm)

nn: 0 ~ D8 (0 ~ 216 mm)

**[Note]** System-level command, data loss after power-down;

This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;

As shown in the figure, when setting the values, make sure  $mm + nn \leq (216mm)$ .



**Figure 4.1 scanning width setting**

This setting does not affect scanning speed;

It is recommended to use the default setting if there is no special requirement.

**[Default]** mm = 0 (0mm)

nn = D8 (216mm)

**[Reference]** Starting scanning

Disable immediate command.

#### Set scanning length

---

**[Format]** 1A 41 mm nn

**[Description]** Set scan image height, unit: mm

mm: set lower byte of scanning length parameters;

nn: set higher byte of scanning length parameters;

**[Range]** mm/nn = 00/00

mm/nn = 01/00~29/01 (1~297mm)

**[Note]** System-level command, data loss after power-down;

This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;

It is recommended to set the scanning length to 0 when scanning paper without need of printing marks.

- When the scanning length is set to 0:

The scanner identifies the scan image data of the whole paper based on feed/paper out sensor status change.

- When the scanning length is set to a value between (1~297mm):

The scanner gets the scan image data based on the set length.

**[Default]** mm/nn = 00/00

**[Reference]** Starting scanning

### Set scan image type

---

**[Format]** 1A 42 mm nn

**[Description]** Set the scan image type, binary image or 8 bit (256 grades) gray scale image.

**[Range]** mm: 0: binary image; 1: 8 bit gray scale image;  
 nn: 0: save data to RAM, data loss after power-down; 1: save data to EEPROM, no data loss after power-down;

**[Note]** System-level command;

This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;

When needing to save data to EEPROM, EEPROM write-in enable command must be used first; otherwise nn setting will be ignored and the data will be always saved to RAM;

The erasing operation of Flash has lifetime limitation, so it is recommended to save data to RAM when setting frequently.

**[Default]** mm=0

**[Reference]** EEPROM write-in enable

### Set scan resolution

---

**[Format]** 1A 43 mm nn

**[Description]** Set the resolution of the scan image.

**[Range]** mm: 04: 100DPI; 08: 200DPI; 10: 400DPI  
 nn: 0: save data to RAM, cleared after power down; 1: save data to EEPROM, no cleared after power down;

**[Note]** System-level command;

This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;

When scanning images of the same type, the scanning speed when setting the resolution to 100DPI will be 1.5 times the scanning speed when setting the resolution to 200DPI;

For OMR and ordinary barcode identification, it is recommended to adopt 100DPI resolution;

For scratch-open lottery barcode identification, 200DPI resolution must be adopted;



When saving data to EEPROM, EEPROM write-in enable command must be used first; otherwise nn setting will be ignored and the data will be always saved to RAM;

The erasing operation of Flash has lifetime limitation, so it is recommended to save data to RAM when setting frequently.

**[Default]** mm = 04

**[Reference]** EEPROM write-in enable  
Disable immediate command.

### Set scan start mode

---

**[Format]** 1A 44 mm nn

**[Description]** Used to select scan start mode, scan automatically after sensor detects paper or control starting scan by scan start command (LockScan mode).

**[Range]** mm: 0: non-LockScan mode; 1: LockScan mode;  
nn: 0: save data to RAM, cleared after power down; 1: save data to EEPROM, no cleared after power down;

**[Note]** System-level command;  
This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;  
When saving data to EEPROM, EEPROM write-in enable command must be used first; otherwise nn setting will be ignored and the data will be always saved to RAM;  
The erasing operation of Flash has lifetime limitation, so it is recommended to save data to RAM when setting frequently.

**[Default]** mm = 1

**[Reference]** EEPROM write-in enable  
Starting scanning

### Start scanning

---

**[Format]** 1A 45 mm nn

**[Description]** Start scan process  
mm: set action selection after scan is completed;  
nn: reserved;

**[Range]** mm: 0: no action after completing scan; 1: automatically feed to the position of print line after completing scan; 2: send paper out after completing scan (send paper out of paper path);

**[Note]** System-level command;  
This command is valid only when the system is under idle status, and the system is under scanning status during scanning. The status after scanning is completed (including the transmission of scan data) changes with the value of mm. When mm=0 or 1, the system status turns into waiting status and when mm=2, system status turns into idle status;

Before starting scanning, use the corresponding commands to set the scanning width, length, resolution, image type, etc.; otherwise the scanner will scan according to the default configuration or the configuration of last scan after power-on;

After starting scanning, use command (pipe 2) or Automatic Status Back (pipe 3) to query device status and judge whether the device has image data to upload. If any, read the scan image data (pipe 4);

When mm is set to 1, if the paper top has not passed the position of print line when completing scan, the scanner will feed paper to print line position automatically; if it has passed the print line position, the scanner will stop in the current position;

If the scan start mode is set to non-LockScan mode, this command is disabled.

- [Reference]** Setting scanning width  
 Setting scanning length  
 Setting scan image type  
 Setting scan resolution  
 Setting scan start mode

### Set print darkness

---

**[Format]** 1A 46 mm nn

**[Description]** Setting print darkness, unit: us

**[Range]** mm: 00~FF (calculation formular of strobe time:  $mm*2+50$ )  
 nn: 0: save data to RAM, cleared after power down; 1: save data to EEPROM, no cleared after power down;

**[Note]** System-level command;  
 This command is valid when the system is under idle or waiting status, and the system status does not change during or after the setting;  
 Abnormal setting of print darkness may cause damage to print head, so please try to keep the factory configuration. If it must be set, use the command in strict accordance with the setting range under guidance of manufacturer;  
 When saving data to EEPROM, EEPROM write-in enable command must be used first; otherwise nn setting will be ignored and the data will be always saved to RAM;  
 The erasing operation of Flash has lifetime limitation, so it is recommended to save data to RAM when setting frequently.

**[Default]** mm = A0

**[Reference]** EEPROM write-in enable

### Set print buffer (initialization command of page edition)

---

**[Format]** 1A 47 pp qq

**[Description]** Set the vertical start coordinate and vertical print area of print buffer, unit: mm.

pp: set the lower byte of vertical print area of print buffer;  
 qq: set the higher byte of vertical print area of print buffer;

- [Range]** pp/qq : 00/00~29/01 (0~297mm)
- [Note]** System-level command, cleared after power down;  
 This command is valid only when the system is under waiting status, and the system is in printing status during or after the setting;  
 The print function of scanner is developed based on page mode. The print content of the whole page needs to be produced before printing. This command is the initialization command of page edition operation. Refer to print start command for the operation process of page edition;  
 It is recommended to query the paper position before using this command;  
 The horizontal start coordinate of print buffer is fixed to 0, and vertical print start coordinate is fixed to the current position of paper after actions such as scanning and feeding paper stop, neither of which is provided with setting function;  
 The print width of print head used by the scanner is 32mm, therefore the horizontal print area of print buffer is 32mm, no setting function provided;  
 The vertical print area of print buffer should be set according to the actual paper length and the current position of paper top; otherwise the print content range may exceed the actual paper breadth;  
 The current positions of paper top and print line can be queried via command of querying paper position.

**[Reference]** Query paper position

### Set bitmap and print coordinate

---

- [Format]** 1A 48 xx mm nn Name\_Char <cr>
- [Description]** Set bitmap and print horizontal and vertical start coordinate (relative coordinate based on print buffer), unit: mm.  
 xx: print horizontal start coordinate;  
 mm: lower byte of print vertical start coordinate;  
 nn: higher byte of print vertical start coordinate;  
 Name\_Char: name of bitmap to be printed;  
 <cr>: carriage return (indicating command end);
- [Range]** xx: 00~20 (0 ~ 32mm)  
 mm/nn: 00/00~29/01 (0~297mm)  
 Name\_Char: at most 8 bytes. If there are images with the same name in Ram/Flash, take the first qualified image, first search in RAM, and then search in Flash.  
 <cr>: 0D (ASCII code)
- [Note]** System-level command, cleared after power down;  
 Print buffer must be set first before using this command and the system status does not change during or after the setting;  
 The print coordinate parameters in the command are relative coordinate relative to print buffer (see figure 4.2).

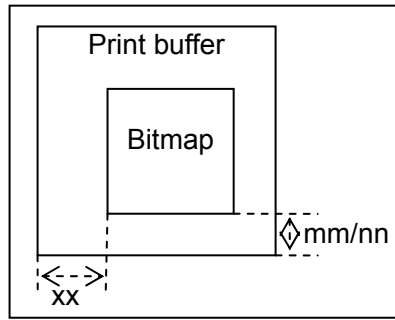


Figure 4.2: bitmap print coordinate setting

**[Reference]** Set print buffer  
 Disable immediate command.

**Set character, rotation angle and print coordinate**

**[Format]** 1A 49 dd xx mm nn pp qq character\_string <cr>

**[Description]** Set character font, rotation angle, print horizontal and vertical start coordinate (relative coordinate based on the start coordinate of print buffer), print coordinate unit: mm.

dd: character rotation angle;

xx: print horizontal start coordinate;

mm: lower byte of print vertical start coordinate;

nn: higher byte of print vertical start coordinate;

pp: font parent-category (single-byte font/Courier font/ASD font/GB2312)

qq: font sub-category

character\_string: character string to be printed (ASCII mode)

<cr>: 0D (ASCII code)

**[Range]** dd: 0: 0° clockwise rotation; 1: 90° clockwise rotation; 2: 180° clockwise rotation; 3: 270° clockwise rotation;

xx: 00~20 (0 ~ 32mm)

mm/nn: 00/00~29/01 (0~297mm)

pp: "0" single-byte font / "9" (Courier font) / "P" (ASD font) / "G" (GB2312 font)

Note: pp setting parameters are represented by ASCII code;

qq: qq is defined as below when pp setting is different:

Parent-category	Sub-category (decimal)	Explanation
pp=0x30 (single-byte font)	qq=0~8	Font0~Font8
pp=0x39 (Courier font)	qq=0~7	900~907
pp=0x50 (ASD font)	qq=6, 8, 10, 12, 14, 18	P06, P08, P10, P12, P14, P18
pp=0x47 (GB2312 font)	qq=1	No sub-category, qq fixed to 1

character\_string: character string composed of 0~9, a~z, A~Z and other ASCII characters when the first three fonts are set; all GB2312 fonts can be printed when

GB2312 font is set.

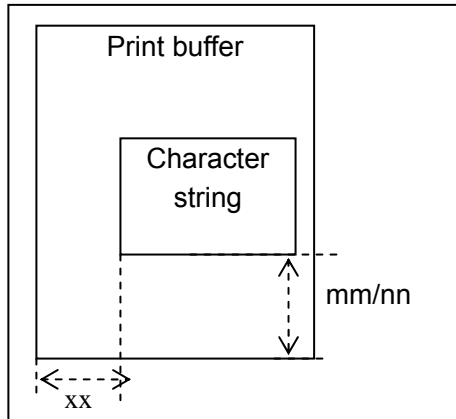
<cr>: 0D (ASCII code)

**[Note]**

System-level command, cleared after power down;

Set the print buffer first before using this command and the system does not change its status during or after the setting;

The print coordinate parameters in the command are relative coordinate relative to print buffer (see figure 4.3).



**Figure 4.3: character print coordinate setting**

**[Reference]**

Set print buffer

Disable immediate command

**Start printing (page edition end command)**

**[Format]**

1A 4A mm nn

**[Description]** Start scanner printing process.

mm: start printing;

nn: action selection after completing printing;

**[Range]**

mm: 0: invalid; 1: start printing;

nn: 0: stop after completing printing; 1: paper out automatically after completing printing (send paper out of paper path)

**[Note]**

The print function of scanner is developed based on page mode. The print content of the whole page needs to be produced before printing. This command is the end command of page edition operation;

In the process of page edition, set the print buffer first, then set the bitmap or character to be printed, the print content of desired page will be produced (see figure 4.4), and at last use this command to end page edition process and start printing process.

The system is under printing status during printing. The system status after printing changes with the variation of nn. When nn=0, system moves to waiting status; when nn=1, system moves to idle status.

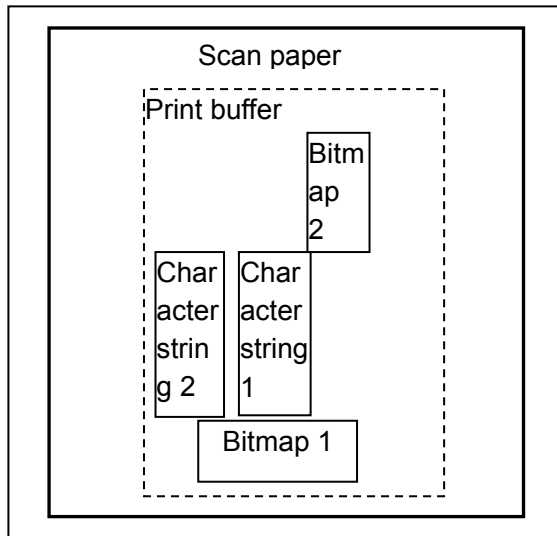


Figure 4.4: print page produced by command

- [Reference] Set print buffer
- Set bitmap and print coordinate
- Set character, rotation angle and print coordinate

**Start feeding paper**

[Format] 1A 4B mm nn

[Description] Start motor paper feed process of scanner, including feeding (scan direction) or retracting paper;

mm: paper feed direction setting;  
 nn: paper feed distance setting, unit: mm;

[Range] mm: 0: feed paper; 1: retract paper;  
 nn: 00: paper out (send paper out of paper path); 01~FF: feed paper (1~255) mm;

[Note] System-level command;  
 This command is valid only when the system is under waiting or idle status. The system is under paper feed status when feeding paper and the status after paper feeding changes with the variation of nn. When sending the command under waiting status, if  $nn > 0$  and media has not gone out of the scan path, the system will move to waiting status; if  $nn=0$  or media has gone out of the scan path, the system will move to idle status; when sending this command under idle status, if media enters the path and has not gone out of it during command execution, the system will move to waiting status; if media enters the path and has gone out of it during command execution or no media enters the path, the system will move to idle status.

It is recommended to use position query command to query the current position information of paper before using this command;

When paper bottom has passed the print platen roller, it is not allowed to use paper retraction command.

[Reference] Query paper position

---

**Start CIS data correction**

---

**[Format]** 1A 4C

**[Description]** Enter CIS data correction mode;

**[Note]** System-level command;

The command is valid only when the system is under idle status. The system status is not decided during correction and is under idle status after correction.

**[Reference]** Query correction result.

Store correction data.

---

**Store correction data**

---

**[Format]** 1A 4E

**[Description]** Write the uniform correction data and yield value produced during CIS data correction to Flash for storage;

**[Note]** System-level command;

This command is used with data correction, enabled when sent after the correction succeeds, and the system does not change its status during and after storage;

The command rewrites Flash, thus please avoid using it frequently.

**[Reference]** Start CIS data correction

Query correction result.

---

**Start sensor calibration**

---

**[Format]** 1A 55

**[Description]** Enter sensor calibration mode;

**[Note]** System-level command;

The command is valid only when sent under idle status. The system is under waiting status during sensor calibration, and is in idle status after calibration;

The sensor reference value produced after calibration succeeds will be written into EEPROM, therefore please use EEPROM write-in enable command before using this command; otherwise sensor reference value will be written into RAM;

For sensor calibration operation, refer to Service Manual.

**[Reference]** EEPROM write-in enable

Query sensor reference value.

---

**Erase download area for RAM bitmaps**

---

**[Format]** 1A 68

**[Description]** Erase all data in the download area for RAM bitmaps;

**[Note]** System-level command;

This command is valid when sent under idle or waiting status, and the system does not change its status during or after the erasing.

### Download bmp binary bitmap

---

**[Format]** 1A 69 mm bb NAME\_string <cr>

**[Description]** Download binary bitmap and bitmap name to Ram or Flash.

mm: bitmap store location;

bb: download bitmap type;

NAME (at most 8 bytes)\_string: download image name character string (ASCII mode)

<cr>: 0D (ASCII code)

**[Range]** mm: "A" indicates downloading to RAM; "B" indicates downloading to Flash;

bb: "B" downloading normal image, "b" downloading white/black reverse image;

<cr>: 0D (ASCII code)

**[Note]** Disable immediate command before downloading bitmap; otherwise it may cause download failure or system error;

This command is valid when sent under idle or waiting status, and the system does not change its status during or after the downloading.

At most 127 bitmaps can be downloaded to RAM or Flash;

Flash download size: 382kB, RAM download size: 131.7kB.

**[Reference]** Disable immediate command.

### Erase Flash bitmap download area

---

**[Format]** 1A 6A

**[Description]** Erase all the data in Flash bitmap download area;

**[Note]** System-level command;

This command is valid when sent under idle or waiting status, and the system does not change its status during or after the erasing.

This command needs about 5 seconds to erase Flash block, and the erasing process cannot be interrupted; otherwise it may damage Flash and cause bitmap download failure. Disable immediate command before using this command.

**[Reference]** Disable immediate command.

### Query bitmap download quantity

---

**[Format]** 1A 6B mm

**[Description]** Query bitmap download quantity in Flash or RAM;

mm: bitmap store location

**[Range]** mm: "A": RAM "B": Flash;



cc dd : lower two bytes of remaining download size  
 ee ff: higher two bytes of remaining download size

**[Note]**

System-level command;

This command is valid when sent under idle or waiting status, and the system does not change its status during or after the query.

This command is system-level command. When used, it should cooperate with 1B 4B to return data.

**[Return]**

aa bb cc dd ee ff, details are as follows:

Parameter	Definition	Description
aa	Bitmap store location	“A”: RAM; “B”: Flash;
bb	Bitmap quantity	0 ~ 127 (decimal)
cc dd	Lower two bytes of remaining download size	
ee ff	Higher two bytes of remaining download size	

**[Reference]**

Return system-level command query data

**Query bitmap name**

**[Format]**

1A 6C mm nn

**[Description]**

Query the name of No. X (X=nn) bitmap in Flash or RAM;

mm: bitmap store location;

nn: bitmap No.

**[Range]**

mm: “A”: RAM “B”: Flash;

nn: 0~127

**[Note]**

System-level command;

This command is valid when sent under idle or waiting status, and the system does not change its status during or after the query.

This command is system-level command. When used, it should cooperate with 1B 4B to return data.

Only use meaningful characters when calling bitmap, with example as follows:

Return 0x42 0x41 0x30 0xff 0xff 0xff 0xff 0xff after query, and use 0x42 0x41 0x30 (BA0) as valid bitmap name to call this bitmap.

**[Return]**

aa 00 Name\_Char, details are as follows:

Parameter	Definition	Description
aa	Bitmap store location	“A”: RAM; “B”: Flash;
Name_Char	Bitmap name (8 bytes in all)	Meaningful name is visible characters (0x20~0x7e); (0x20~0x7e); Meaningless name is 0xff.

**[Reference]**

Set bitmap and print coordinate

Return system-level command query data

---

## Set image binarization method and threshold value

---

**[Format]** 1A 75 mm nn pp qq

**[Description]** Set image binarization method and threshold value.

**[Range]** mm: 0: use fixed threshold value for binarization;  
 nn: 0~FF, binarization threshold, used for gray scale image binarization;  
 pp: reserved;  
 qq: 0: write to RAM, cleared after power down; 1: write to EEPROM, not cleared after power down.

**[Note]** System-level command;  
 This command is valid when sent under idle or waiting status, and the system does not change its status during or after the setting.

**[Default]** mm=0; nn=160, pp=95 qq=0

**[Reference]** EEPROM write-in enable  
 Disable immediate command

---

## Set CIS temperature compensation enable

---

**[Format]** 1A 82 mm nn

**[Description]** Set CIS temperature compensation enable.

**[Range]** mm: 0, CIS temperature compensation disabled; 1, CIS temperature compensation enabled.  
 nn: 0: write to RAM, cleared after power down; 1: write to EEPROM, not cleared after power down;

**[Note]** System-level command;  
 This command is valid when sent under idle or waiting status, and the system does not change its status during or after the setting.

**[Default]** mm=1; nn=1

**[Reference]** EEPROM write-in enable  
 Disable immediate command

## 2.2 Immediate commands

---

### Reset

---

**[Format]** 1B 40

**[Description]** Clear the content in image buffer and print buffer, and the settings of scanner recovers to the default value when power-on;

**[Note]** Immediate command;  
 This command produces the same effect with power-on, so please use it carefully.

## Cancel/stop scanning

---

**[Format]** 1B 41

**[Description]** Cancel or stop the scan process of scanner, and turn off CIS light source;

**[Note]** Immediate command;

Empty image buffer after stopping scan, no image data saved;

The current paper position can be queried by using paper position command after stopping scan;

This command is mainly used under the following three situations:

- Change scan setting or cancel this operation after starting scan;
- Exit scan in the process of scan;
- Turn off CIS light source after turning it on.

## Query scan area setting

---

**[Format]** 1B 42

**[Description]** Query the current scan area setting, including image width, height, etc.

**[Note]** Immediate command;

**[Return]** mm nn kk ll, details are as follows:

Parameter	Definition	Description
mm	Image border width setting	0 ~ D8 (0 ~ 216 mm)
nn	Image scanning width setting	0 ~ D8 (0 ~ 216 mm)
kk	Lower byte of image height setting	0000: identify and capture the image data of whole paper based on paper feed/out sensor status; 01/00~29/01 (1~297mm)

## Query device status

---

**[Format]** 1B 43

**[Description]** Query device status, including normal status, error status and other information.

**[Note]** Immediate command;

Use this command to query device status before calling scan, print, feed and other related commands;

Get device status information by ASB function (pipe 3), and the information is the same as the status information acquired by this query command;

Get information such as image type through the 6th and 7th bit of the third byte;

In the process of reading the image data, the information about whether the device has data block to transmit, whether the current data block is the last block and the size of the data block (pp, qq, xx, yy) can be captured based on the 2nd and 3rd bit of the third byte;

Information about whether the mark is printed successfully can be captured through the

most significant bit of the first byte after sending print command.

[Return]

mm nn kk ll pp qq xx yy, details are as follows:

Parameter	Bit	Definition
mm	Bit0	Fixed to 0
	Bit1	0: print head temperature is normal; 1: print head is overheating;
	Bit2	0: top cover is closed; 1: top cover is lifted up;
	Bit3	0: smooth paper path; 1: paper jam;
	Bit4	Fixed to 0
	Bit5	0: receive command correctly; 1: receive command incorrectly;
	Bit6	0: normal operation; 1: paper to be marked is not put on the print head;
	Bit7	0: mark printing failure; 1: mark printing success;
nn	Bit0	Fixed to 1
	Bit1	0: invalid; 1: device is in idle status;
	Bit2	0: invalid; 1: scan process;
	Bit3	0: invalid 1: waiting status Note: Waiting status includes the interval between scan process and print process or paper feed process, i.e. the status when paper is still in the path but has no command action.
	Bit4	Fixed to 0
	Bit5	0: invalid; 1: print process;
	Bit6	0: invalid; 1: paper feed process;
	Bit7	0: invalid; 1: error status (details are given by mm)
kk	Bit0	History status of the sensor close to print head at paper exit during scanning: 0: no paper 1: there was paper
	Bit1	0: invalid; 1: device has image data block to upload;
	Bit2	0: not the last data block; 1: the last data block Note: When this bit indicates the last data block, the 5 <sup>th</sup> , 6 <sup>th</sup> , 7 <sup>th</sup> , and 8 <sup>th</sup> bytes return the byte number of the last data block.
	Bit3	Vertical scan resolution setting information: 0: 100DPI 1: 200DPI;
	Bit4	Fixed to 1
	Bit5	Horizontal scan resolution setting information: 0: 200DPI 1: 400DPI;
	Bit6	0: binary image; 1: 8 bit gray scale image;
	Bit7	0: non-LockScan mode; 1: LockScan mode
ll	Bit0	History status of the sensor in the middle of paper exit during scanning: 0: no paper 1: there was paper
	Bit1	Status of the sensor close to print head at paper exit during scanning: 0: always no paper 1: there was paper
	Bit2	Status of sensor close to print head at paper entrance: 0: no paper 1: paper exists
	Bit3	Status of the sensor in the middle of paper entrance: 0: no paper 1: paper exists
	Bit4	History status of the sensor close to motor at paper exit during scanning: 0: no paper 1: there was paper
	Bit5	0: Bitmap is not allowed to be downloaded to Flash; 1: Bitmap is allowed to

		be downloaded to Flash.
	Bit6	0: no status return;                      1: status return
	Bit7	Status of the sensor close to motor at paper entrance: 0: no paper                                      1: paper exists
pp		When it is the last data block, return the lower two bytes of the data block byte number information. pp is the lower byte and qq is the higher byte.
qq		
xx		When it is the last data block, return the higher two bytes of the data block byte number information. xx is the lower byte and yy is the higher byte.
yy		

Table 1: status return information description

**Query paper position**

[Format]        1B 44

[Description] Query the paper position in paper path, unit: mm.

[Note]         Immediate command;

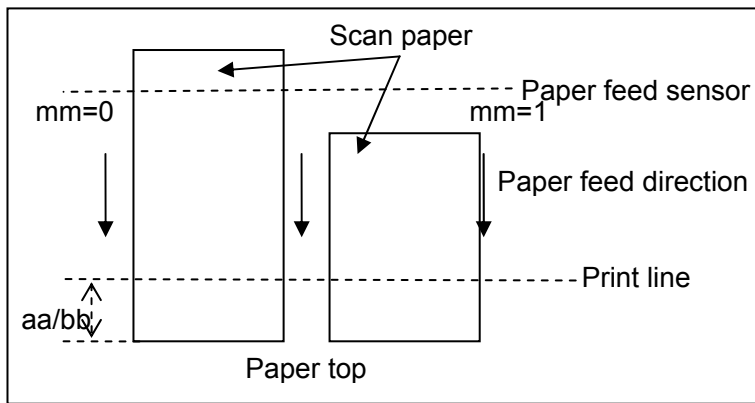


Figure 4.5: paper position parameter after scan

[Return]        mm 00 kk ll

mm: whether paper bottom has passed the print line;

=0: not passed;

=1: passed;

kk: lower byte of the distance between paper top and print line in the paper feed direction;

ll: higher byte of the distance between paper top and print line in the paper feed direction;

Note: when paper top has not passed print line, kk/ll=0.

**Query correction result**

[Format]        1B 45

[Description] Query if CIS data correction operation succeeds or not and the yield value after correction.

[Note]         Immediate command;

This command should be used during data correction, with reference to Service Manual.

**[Return]** aa bb mm nn pp qq ll kk, details are as follows:

Parameter	Definition	Explanation
aa	100dpi correct the lighting timeof red light	
bb	200dpi correct the lighting timeof red light	
mm	AFE yield value parameters	
nn	The current lighting time	This is the value after temperature compensation, enabled after the first scanning.
pp	This byte is fixed to 0.	0
qq	System temperature during correction.	Low seven bits indicate the absolute value of system temperature during correction; the highest bit indicates the positive and negative values of temperature. The value is 1 when the temperature $\geq 0^{\circ}\text{C}$ ; otherwise it is 0.
ll	BIT0, CIS temperature compensation mark	0, temperature compensation invalid; 1, temperature compensation valid
	BIT1, print head temperature sensor existence mark	0, no temperature sensor; 1, temperature sensor exists
	Others	Reserved, default value is 0.
kk	Correction result mark	0: during correction; 1: correction success; 2: correction failure; 3: no correction.

**[Reference]** Start CIS data correction

### Clear false paper jam error

**[Format]** 1B 46

**[Description]** Clear false paper jam error status due to misoperation, usually caused by the situation when scan paper is put into the paper entrance, but pulled out after scan process is started;

The error cannot be cleared with paper under paper feed/out sensor;

Clear the error status without paper on print head when printing;

**[Note]** Immediate command

### Query version number

**[Format]** 1B 49

**[Description]** Query the current firmware version number and the release time of this version;

**[Note]** Immediate command;

**[Return]** "V" kk "." ll mm nn "/" pp qq "/" ss tt "/" xx yy, details are as follows:

kk: one digit before the decimal point of the firmware version number, represented by ASCII code;

ll mm nn: three digits after the decimal point of the firmware version number, represented by ASCII code;

pp qq: two digits after year, represented by ASCII code;

ss tt: month, represented by ASCII code;

xx yy: date, represented by ASCII code;

Example: V1.261/06/03/12 indicates the current firmware version number is V1.261, which was released on March 12th, 2006.

### Return system-level command query data

**[Format]** 1B 4B

**[Description]** After sending system-level command which requires to return data, because the system command cannot prepare the data to be returned in time, the data to be returned will be sent after the system has prepared the data;

**[Note]** Immediate command;

This command is used together with the system-level command which needs to return data.

**[Reference]** Query bitmap download quantity  
Query bitmap name

### Query sensor reference value

**[Format]** 1B 4C

**[Description]** Query the reference values of 8 sensors after sensor calibration and paper existence/end voltage value to judge the output voltage of sensors are normal or not.

**[Note]** Immediate command;

If the reference value returned is 0 or 0xff, the corresponding sensor is abnormal.

**[Return]** aa bb cc dd ee gg hh zz YY XX AA BB CC DD EE ZZ ii jj kk ll mm nn pp qq rr ss tt uu vv  
ww xx yy, details are as follows:

Parameter	Definition
aa bb cc dd ee	Reference values of 5 paper feed sensors, from left to right
gg hh zz	Reference values of 3 paper out sensors, from left to right
YY	Reference value of the sensor at printer lift-up device
XX	Reflective sensor pwm cycle, unit us
AA BB CC DD EE	Valid pwm width of 5 reflective sensors (paper feed), unit us
ZZ	Valid pwm width of the sensor at printer lift-up device, unit us
ii jj kk ll mm nn pp qq rr ss	AD value of 5 paper out sensor voltage, paper existence voltage before paper end voltage
tt uu vv xx yy	AD value of 3 paper out sensor voltage, paper existence voltage before paper end voltage

Note: facing paper entrance, print head side is left;

li indicates the paper existence voltage of the left paper feed sensor; jj indicates paper end voltage of the left paper feed sensor; other sequences are in the same way.

**[Reference]** Start sensor calibration.



## 3 Command usage guide

### 3.1 Explanation of command usage guide

1. This guide is written to enable the user adopting command programming mode to grasp the command set of the scanner quickly;
2. All the demo parameters of command in this chapter, unless specified as decimal, are hexadecimal; data with measurement unit is decimal;
3. All normal font and characters in this chapter are data, no more note for the data in command demo. Bold underlined font and characters are commands, for example **1B 40**;

In this chapter, all the content in bracket behind the command is to explain the meaning of this command, and the bracket and the content in bracket are not commands to be sent to the scanner.

### 3.2 Key term explanation of command usage guide

Five working statuses of the scanner:

Idle status: No scan start command received after the system is powered on, or the status when the system completes scanning, printing or feeding paper and paper has been sent out of paper path:

1. Waiting status: The status when the system completes scanning, printing or feeding paper and paper has not been sent out of paper path;

Scanning status: The status when system is executing the scanning task, only when the system is in idle status can the scanning task be started;

2. Print status: The status when the system is executing printing task, only when the system is in waiting status can the printing task be started;

Feeding status: The status when the system is executing feeding task, only when the system is in waiting status can the feeding task be started.

### 3.3 Typical command example

#### 3.3.1 Scan setting

1. Scan setting of LOCKSCAN mode
  - 1) Set scanning width **1A 40 mm nn** (set the width and border width of scan image)
  - 2) Set scanning length **1A 41 mm nn** (set the length of scan image)
  - 3) Set scan image type **1A 42 mm nn** (set scan image type to white and black or gray scale)
  - 4) Set vertical scan resolution **1A 43 mm nn** (set the vertical scan resolution to 100DPI or 200DPI)
  - 5) Set scan start mode **1A 44 mm nn** (set scan start mode to LOCKSCAN or non-LOCKSCAN mode)
  - 6) Start scan **1A 45 mm nn** (start scanning and set the paper out action after scan)

Example is as follows: In LOCKSCAN mode, scan the gray scale image with 10mm border width, 70mm scanning width and 150mm length, vertical resolution: 100DPI, and send paper out after scanning (all settings are saved in RAM, invalid after power-down).

**1A 40 0A 46** (mm=0A border width is 10mm, nn=46 scanning width is 70mm)

**1A 41 96 00** (lower byte mm=96 higher byte nn=00, scanning length: 150mm)

**1A 42 01 00** (mm=1 scan image type is gray scale image)

**1A 43 04 00** (mm=04 vertical scan resolution is 100DPI)

**1A 44 01 00** (mm=1 scan start mode is LOCKSCAN mode)

**1A 45 02 00** (mm=2 start scanning and send paper out of paper path after scanning)

Note: After sending scan start command, system starts scanning when sensor detects paper; under this setting, there should be no paper in the paper path after completing scanning task, and at this time, the system is in idle status.

## 2. Scan setting under non-LOCKSCAN mode

The settings of scan image width and length, image type, scan resolution and scan start mode under non-LOCKSCAN are the same as the settings under LOCKSCAN mode; the difference is that under non-LOCKSCAN mode, scan can be started without sending scan start command (system starts scanning when the sensor detects paper), and the motor stops action when feeding the paper to print head after scan is completed. There is still paper in the paper path, and system is in waiting status.

### 3.3.2 Print setting

The printing is realized under page mode.

- 1) Set the vertical buffer of printing **1A 47 pp qq** (set the vertical length of print buffer with mm as unit)
- 2) Set bitmap and print coordinate **1A 48 xx mm nn Name Char <cr>**
- 3) Set character, rotation angle and print coordinate **1A 49 dd xx mm nn pp qq character string <cr>**
- 4) Start printing **1A 4A mm nn** (start printing and set whether to send paper out of paper path after printing is completed)

Note: 1) ,2) ,and 3) are used to edit the page content to be printed. Choose one from 2) and 3) (print character or bitmap), or choose both (there are both character and bitmap on the page to be printed); the horizontal width of buffer when printing is 32mm; ensure there is paper on print head before starting printing; if choosing to stop after printing is completed, there will still be paper in the paper path and system is in waiting status; if choosing to send paper out after printing is completed, there will be no paper in the paper path and system is in idle status.

Example is as follows: print the bitmap BMP0 (32mm\*20mm) and character string HELLO in Flash on the page, font type of character string: Font 2, character rotation: 180°; the vertical length of print buffer: 80mm, bitmap on the upper, character string on the lower, the distance between bitmap and character string: 10mm; stop immediately after the printing is completed;

**1A 47 50 00** (pp=0x50, qq=00, vertical length of print buffer is 80mm)

**1A 48 00 0A 00 42 4D 50 30 0D** (xx=00 abscissa of the print bitmap is 0; mm=0A nn=00 ordinate of print bitmap is 10mm; Name\_Char=42 4D 50 30, the name of bitmap to be printed is BMP0; this command ends with 0D, i.e. <cr>)

**1A 49 02 05 32 00 30 02 48 45 4C 4C 4F 0D** (dd=2 character rotation angle is 180°; xx=05 abscissa of print character is 5mm; mm=28 nn=00 ordinate of print character is 40mm;

character\_string=48 45 4C 4C 4F (character string HELLO is indicated by ASCII code), i.e. the character to be printed is HELLO; this command ends with 0D, i.e. <cr>)

**1A 4A 01 00** (nn=0 start printing and set motor to stop action immediately after printing)

### 3.3.3 Bitmap download

#### 1. Bitmap download

The scanner provides bitmap download function, which can download BMP binary bitmap or reverse bitmap to RAM or Flash for printing. The size of single bitmap must be less than 32\*297mm<sup>2</sup>; at most 127 (decimal) bitmaps can be downloaded, i.e. No. 0~126 (decimal).

The process of downloading bitmap cannot be interrupted; otherwise Flash may be damaged, therefore immediate command should be disabled before downloading bitmap.

- 1) Disable immediate command **1B 4A**
- 2) Download BMP binary bitmap **1A 69 mm bb NAME\_string <cr>** +bitmap data
- 3) Enable immediate command **1A 53**

Example is as follows: download reverse binary bitmap BMP0 to Flash.

**1B 4A** (disable immediate command)

**1A 69 42 62 42 4D 50 30 0D** +bitmap data (mm=42 download bitmap to Flash; bb=62 download the reverse mode of the specified bitmap; NAME\_string=42 4D 50 30, i.e. name the downloaded reverse bitmap BMP0; the command ends with 0D, i.e. <cr>)

**1A 53 enable immediate command**

Note: The name of the downloaded bitmap can not exceed 8 bytes; if immediate command needs to be used after download is completed, after sending the command **1A 69 42 62 42 4D 50 30 0D** + **bitmap data**, only after 30 seconds can the command **1A 53** be sent to enable immediate command, because downloading Flash bitmap needs some time.

#### 2. Bitmap query

The scanner supports query of name and quantity of the bitmap downloaded to RAM and Flash.

- 1) Query bitmap download quantity **1A 6B mm** (query bitmap quantity in RAM or Flash)
- 2) Return system-level command query data **1B 4B** (send this command to return the downloaded bitmap quantity, and return **aa bb cc dd ee ff**)
- 3) Query the name of the downloaded bitmap **1A 6C mm nn** (query the name of the bitmap in RAM or Flash)
- 4) Return system-level command query data **1B 4B** (send this command to return the name of downloaded bitmap, and return **aa 00 Name\_Char**)

Example is as follows: ① no bitmap downloaded in RAM, query bitmap quantity in RAM; ② three 2.5K bitmaps downloaded in Flash, names of which are 1, 2, 3 respectively, query bitmap quantity in Flash and name of 0th bitmap.

① **1A 6B 41** (mm=41 query bitmap quantity in RAM)

**1B 4B** return system-level command query data

Returned data are as follows: 41 00 D0 0E 02 00 (aa=41 query bitmap quantity in RAM; bb=00 bitmap quantity in RAM is 0; cc=D0 dd=0E ee=03 ff=00 remaining size of RAM is 30ED0, i.e.

195.7Kbytes, size of whole print buffer).

② **1A 6B 42** (mm=42 query bitmap quantity in Flash)

**1B 4B** (return system-level command query data)

Returned data are as follows: 42 03 0C DA 05 00 (aa=42 query bitmap quantity in Flash; bb=03 bitmap quantity in Flash is 3; cc=0C dd=DA ee=05 ff=00 remaining size of RAM is 5DA0C, i.e. 374.6Kbytes; size of whole Flash bitmap area is 382.4 Kbytes, therefore the bitmap size in Flash is 7.8Kbytes).

**1A 6C 42 00** (mm=42 query bitmap name in Flash; nn=00 query name of 0<sup>th</sup> bitmap in Flash)

**1B 4B** (return system-level command query data)

Returned data are as follows: 42 00 31 FF FF FF FF FF FF (aa=42 query name of bitmap in Flash; Name\_Char=31, the remaining last 7 bytes are disabled).

### 3. Flash bitmap erasing

The scanner provides the function of erasing Flash bitmap. The process of erasing Flash bitmap cannot be interrupted; otherwise Flash will be damaged, therefore disable the immediate commands before downloading bitmap.

- 1> Disable immediate command **1B 4A**
- 2> Erase Flash bitmap download area
- 3> Enable immediate command **1A 53**

Note: If immediate command needs to be used after erasing is completed, after sending command **1A 6A**, only after 30 seconds can the command **1A 53** be sent to enable immediate command, because erasing Flash bitmap needs some time; after erasing Flash bitmap, the function of querying bitmap download quantity can be used to confirm whether the bitmap quantity in Flash is 0 or not.

#### 3.3.4 Error status and troubleshooting

The scanner has 5 error types in total, i.e. top cover lift-up, paper jam, command grammar error, no paper on print head, and print head overheating.

1. Top cover lift-up: return this error when the top cover of scanner is lifted up;  
Troubleshooting: close top cover.
2. Paper jam: return this error when paper is jammed into the mechanism and cannot be sent out or false paper jam error occurs;  
Troubleshooting: lift up the top cover of scanner, take paper out and close top cover; if it is false paper jam error, send the command **1B 46** to clear this error.
3. Command grammar error: return this error when sending error commands (format error, parameter outside value range or incomplete command) to the system;  
Troubleshooting: send command **1B 43** which can get current status of system.
4. No paper on print head: return this error via ASB when finding no paper on print head before the system executes print task;  
Troubleshooting: send command **1B 46** which can clear false paper jam error.
5. Print head overheating: return this error automatically when the system detects the print head temperature exceeds 65°C during printing;

Troubleshooting: The error is cleared automatically after the print head temperature is lower than 60°C.

**3.4 Recommended application process & cautions**

**3.4.1 USB Pipe instruction**

Pipe 0: control pipe, used for USB identification;

Pipe 1: command pipe, used to send command;

Pipe 2: immediate command return pipe, used to read the returned information after sending immediate command;

Pipe 3: ASB pipe, used to read device status information;

Pipe 4: image data pipe, used to read image data.

**3.4.2 Image scanning & data capture**

Host (PC)		Device (scanner)
Send scan start command 1A 45 mm nn	----->	
Send device status query command 1B 43	-----> ←-----	Return device status information (pipe 2) Status information returned automatically on pipe 3 can be read directly.
When there is data block to be read in the firmware level, software level can capture image data block by reading USB pipe 4. Before reading every image data block, device status and information about whether it is the last data block and size of the data block can be queried through pipe 3 until completing reading process. Image data are original data without compression and data block is 64 dot lines of binary data.		

**3.4.3 Printing process after scanning**

If the system process is to print after scan is completed, when starting scan, it is recommended to select feeding to print head after completing scanning, in case the error of no paper on print head occurs when printing.

If the paper has passed the ideal position for printing and paper bottom has not passed paper entrance during printing, use command of querying paper position to query the distance from paper top to print line at this time, then use the feed start command to back the paper to the ideal position; if paper bottom has passed the paper entrance, use feed start command to send paper out of paper path, then scan the fixed length again to locate it to the ideal position for printing.



## Font 4: 21dots widthx43dots height

20H - 2FH:       #\$%& (\*)+,-./  
30H - 3FH:       0123456789:  
40H - 4FH:       ABCDEFGHIJKLMNO  
50H - 5FH:       PQRSTUVWXYZ  
60H - 6FH:       ABCDEFGHIJKLMNO  
70H - 7FH:       PQRSTUVWXYZ  
80H - 8FH:       Ç                               ÅÅ  
90H - 9FH:       É Æ               ÖÜ £Ø  
A0H - AFH:       Ñ ¿  
B0H - B2H:       ß

## Font 5: 21dots widthx59dots height

20H - 2FH:       #\$%& (\*)+,-./  
30H - 3FH:       0123456789:  
40H - 4FH:       ABCDEFGHIJKLMNO  
50H - 5FH:       PQRSTUVWXYZ  
60H - 6FH:       ABCDEFGHIJKLMNO  
70H - 7FH:       PQRSTUVWXYZ  
80H - 8FH:       Ç                               ÅÅ  
90H - 9FH:       É Æ               ÖÜ £Ø  
A0H - AFH:       Ñ ¿  
B0H - B2H:       ß

**Font 6: 36dots widthx67dots height**

20H - 2FH:	# \$ % & ( ) * + , - . /
30H - 3FH:	0 1 2 3 4 5 6 7 8 9 :
40H - 4FH:	A B C D E F G H I J K L M N O
50H - 5FH:	P Q R S T U V W X Y Z
60H - 6FH:	A B C D E F G H I J K L M N O
70H - 7FH:	P Q R S T U V W X Y Z
80H - 8FH:	Ç Å Å
90H - 9FH:	É Æ Ö Ü £ Ø
A0H - AFH:	Ñ ¿
E0H - E2H:	ß

**Font 7: 20dots widthx35dots height**

20H - 3FH:	! " # \$ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
40H - 5FH:	@ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _
60H - 7FH:	h a b c d e f g h i j k l m n o p q r s t u v w x y z {   } ~

**Font 8: 20dots widthx31dots height**

20H - 3FH:	+ 0 1 2 3 4 5 6 7 8 9 < >
40H - 5FH:	C E N S T X Z
60H - 7FH:	C E N S T X Z I

**ASD smooth font**

**6 points: 5dots widthx23dots height**

20H - 3FH:	! " # \$ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?
40H - 5FH:	@ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [ \ ] ^ _
60H - 7FH:	' a b c d e f g h i j k l m n o p q r s t u v w x y z {   } ~
A0H - BFH:	á í ó ú ñ Ñ º ½ ¼ ¡ Á Â Ã Ä Å Ç ¥
C0H - CFH:	ã Ä å Æ È É Ê Ë Ì Í Î Ï
E0H - FFH:	Ó Ô Õ ö ÷ ø ù þ Ù Ú Û Ü Ý Þ ß à á â ã



**8 points: 7dots widthx30dots height**

**20H - 3FH:** !"#\$%&'()\*+,-./0123456789;<=>?  
**40H - 5FH:** @ABCDEFGHIJKLMNopqrstuvwxyz[\]^\_  
**60H - 7FH:** 'abcdefghijklmnopqrstuvwxyz{|}~  
**AOH - BFH:** áíóúñÑªº¼½¾¿ ÁÂÃ© ¤¥  
**COH - CFH:** ãÄ åÐÊËÈÍÎÏ Ì  
**EOH - FFH:** ÓÔÕöõµþÞÚÛÜýÝ ± ¾ ÷ ¸ °´·

**10 points: 8dots widthx36dots height**

**20H - 3FH:** !"#\$%&'()\*+,-./0123456789;<=>?  
**40H - 5FH:** @ABCDEFGHIJKLMNopqrstuvwxyz[\]^\_  
**60H - 7FH:** 'abcdefghijklmnopqrstuvwxyz{|}~  
**AOH - BFH:** áíóúñÑªº¼½¾¿ ÁÂÃ© ¤¥  
**COH - CFH:** ãÄ åÐÊËÈÍÎÏ Ì  
**EOH - FFH:** ÓÔÕöõµþÞÚÛÜýÝ ± ¾ ÷ ¸ °´·

**12 points: 10dots widthx42dots height**

**20H - 3FH:** !"#\$%&'()\*+,-./0123456789;<=>?  
**40H - 4FH:** @ABCDEFGHIJKLMNO  
**50H - 5FH:** PQRSTUVWXYZ[\]^\_  
**60H - 7FH:** 'abcdefghijklmnopqrstuvwxyz{|}~  
**AOH - BFH:** áíóúñÑªº¼½¾¿ ÁÂÃ© ¤¥  
**COH - CFH:** ãÄ åÐÊËÈÍÎÏ Ì  
**EOH - FFH:** ÓÔÕöõµþÞÚÛÜýÝ ± ¾ ÷ ¸ °´·

14 Points: 12dots widthx50dots height

21H - 3FH: !"#\$%&'()\*+,-./0123456789:;<=>?  
 40H - 4FH: @ABCDEFGHIJKLMNO  
 50H - 5FH: PQRSTUVWXYZ[\]^\_  
 60H - 7FH: 'abcdefghijklmnopqrstuvwxyz{|}~  
 A0H - BFH: áíóúñÑ<sup>ao</sup>¿<sup>®</sup> ½¼¡ ÁÂÀ<sup>©</sup> ¢¥  
 C0H - CFH: ãÃ ðÐÊËÈÍÎ Ì  
 E0H - FFH: ÓÔÕÖØµϐÚÛÜÝ ± ¾ ÷ ¸ °´.

18 points: 15dots widthx64dots height

20H - 2FH: !"#\$%&'()\*+,-./  
 30H - 3FH: 0123456789:;<=>?  
 40H - 4FH: @ABCDEFGHIJKLMNO  
 50H - 5FH: PQRSTUVWXYZ[\]^\_  
 60H - 6FH: 'abcdefghijklmnop  
 70H - 7FH: pqrstuvwxyz{|}~  
 A0H - AFH: áíóúñÑ<sup>ao</sup>¿<sup>®</sup> ½¼¡  
 B0H - CFH: ÁÂÀ<sup>©</sup> ¢¥  
 C0H - CFH: ãÃ  
 D0H - DFH: ðÐÊËÈÍÎ Ì  
 E0H - EFH: ÓÔÕÖØµϐÚÛÜÝ  
 F0H - FFH: ± ¾ ÷ ¸ °´.

Courier font

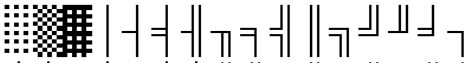
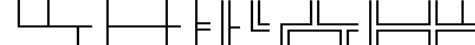
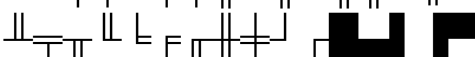
900 Roman-8: 25dots widthx50dots height

20H - 2FH: !"#\$%&'()\*+,-./  
30H - 3FH: 0123456789:;<=>?  
40H - 4FH: @ABCDEFGHIJKLMNO  
50H - 5FH: PQRSTUVWXYZ[\]^\_  
60H - 6FH: `abcdefghijklmno  
70H - 7FH: pqrstuvwxyz{|}~  
AOH - AFH: ÀÂÊËËÎÏÏ`^`~ÛÛ£  
BOH - BFH: ¯Ýý°ÇçÑñ;¿£¥\$fç  
COH - CFH: âêôûáéóúàèòùäëöü  
DOH - DFH: ÅîØÆåíøæÄìÖÜÉíßÔ  
EOH - EFH: ÁÃãÐðÍÌÍÓÒõÕŠšÚÿÿ  
FOH - FFH: Þþ·μ¶¼-¼½¿ « ■ » ±

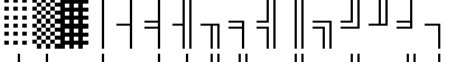
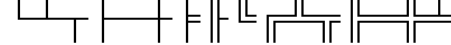
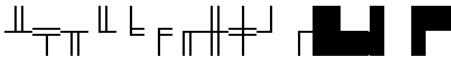
901 ECMA\_94: 25dots widthx50dots height

20H - 2FH: !"#\$%&'()\*+,-./  
30H - 3FH: 0123456789:;<=>?  
40H - 4FH: @ABCDEFGHIJKLMNO  
50H - 5FH: PQRSTUVWXYZ[\]^\_  
60H - 6FH: `abcdefghijklmno  
70H - 7FH: pqrstuvwxyz{|}~  
AOH - AFH: ¡¢£¤¥¦§¨ª«¬®¯  
BOH - BFH: °±²³´µ¶·¸¹º»¼½¾¿  
COH - CFH: ÀÁÂÃÄÅÆÇÈÉÊËÌÍÎÏ  
DOH - DFH: ÑÒÓÔÕÖ×ØÙÚÛÜÝÞß  
EOH - EFH: àáâãäåæçèéêëìíîï  
FOH - FFH: ðñòóôõ÷øùúûüýþÿ

902 PC: 25dots widthx50dots height

20H - 2FH: ! " # \$ % & ' ( ) \* + , - . /  
 30H - 3FH: 0 1 2 3 4 5 6 7 8 9 : ; < = > ?  
 40H - 4FH: @ A B C D E F G H I J K L M N O  
 50H - 5FH: P Q R S T U V W X Y Z [ \ ] ^ \_  
 60H - 6FH: ` a b c d e f g h i j k l m n o  
 70H - 7FH: p q r s t u v w x y z { | } ~  $\Delta$   
 80H - 8FH: Ç ü é â ä å ç è ë è ì î ï Ä Å  
 90H - 9FH: É æ Æ ö ö ò û ù ÿ Ö Ü ç £ ¥ P t f  
 A0H - AFH: á í ó ú ñ Ñ ã õ ç ì ï ð ñ ò « »  
 B0H - BFH:   
 C0H - CFH:   
 D0H - DFH:   
 E0H - EFH: α β Γ π Σ σ μ τ Φ Θ Ω δ ∞ φ ε ∩  
 F0H - FFH: ≡ ± ≥ ≤ ∫ ÷ ≈ ° • √ n 2 ■

903 PC-A: 25dots widthx50dots height

20H - 2FH: ! " # \$ % & ' ( ) \* + , - . /  
 30H - 3FH: 0 1 2 3 4 5 6 7 8 9 : ; < = > ?  
 40H - 4FH: @ A B C D E F G H I J K L M N O  
 50H - 5FH: P Q R S T U V W X Y Z [ \ ] ^ \_  
 60H - 6FH: ` a b c d e f g h i j k l m n o  
 70H - 7FH: p q r s t u v w x y z { | } ~  $\Delta$   
 80H - 8FH: Ç ü é â ä å ç è ë è ì î ï Ä Å  
 90H - 9FH: É æ Æ ö ö ò û ù ÿ Ö Ü ø £ Ø L l  
 A0H - AFH: á í ó ú ñ Ñ õ Õ ç ã Æ ℓ n ; <sup>3</sup> α  
 B0H - BFH:   
 C0H - CFH:   
 D0H - DFH:   
 E0H - EFH: α β Γ π Σ σ μ τ Φ Θ Ω δ ∞ φ ε ∩  
 F0H - FFH: ≡ ± ≥ ≤ ∫ ÷ ≈ ° • √ n 2 ■

904 PC-B: 25dots widthx50dots height

20H - 2FH: !"#%&'()\*+,-./  
 30H - 3FH: 0123456789:;<=>?  
 40H - 4FH: @ABCDEFGHIJKLMNO  
 50H - 5FH: PQRSTUVWXYZ[\]^\_  
 60H - 6FH: `abcdefghijklmnop  
 70H - 7FH: pqrstuvwxyz{|}~△  
 80H - 8FH: ÇüéâäåçêëèïîÏÄÅ  
 90H - 9FH: ÉæÆôöòûùÿÖÜø£Ø×ƒ  
 A0H - AFH: áíóúñÑªº¿®¬½¼¡«»  
 B0H - BFH: ▨▩|⌣|ÁÂÀ©||⌋⌌⌍⌎⌏⌐⌑⌒⌓⌔⌕⌖⌗⌘⌙  
 C0H - CFH: ⌠⌡⌢⌣⌤⌥⌦⌧⌨〈〉⌫⌬⌭⌮⌯⌰⌱⌲⌳⌴⌵⌶⌷⌸⌹⌺⌻⌼⌽⌾⌿  
 D0H - DFH: ⓪ⓁⓂⓃⓄⓅⓆⓇⓈⓉⓊⓋⓌⓍⓎⓏⓐⓑⓓⓔⓕⓖⓗⓘⓙⓜⓝⓞⓟⓠⓡⓢⓣⓤⓥⓦⓧⓨⓩ⓪⓫⓬⓭⓮⓯⓰⓱⓲⓳⓴⓵⓶⓷⓸⓹⓺⓻⓼⓽⓾⓿  
 E0H - EFH: ÓβÔòõÕμϖΡÚÛÜýÝ´ˆ  
 F0H - FFH: −±¼¾℥\$÷, °¨·132■

905 Legal: 25dots widthx50dots height

20H - 2FH: !"#%&'()\*+,-./  
 30H - 3FH: 0123456789:;=¢?  
 40H - 4FH: @ABCDEFGHIJKLMNO  
 50H - 5FH: PQRSTUVWXYZ[®]©\_  
 60H - 6FH: °abcdefghijklmnop  
 70H - 7FH: pqrstuvwxyz\$℥†™▣

906 Greek: 25dots widthx50dots height

20H - 2FH:	!"#\$%&'()*+,-./
30H - 3FH:	0123456789:<=>?
40H - 4FH:	@ABCDEFGHIJKLMNO
50H - 5FH:	PQRSTUVWXYZ[\]^_
60H - 6FH:	`abcdefghijklmnopqrstuvwxyz
70H - 7FH:	{ }~△
80H - 8FH:	ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠ
90H - 9FH:	ΡΣΤΥΦΧΨΩαβγδεζηθ
A0H - AFH:	ι κ λ μ ν ξ ο π ρ σ ς τ υ φ χ ψ
B0H - CFH:	
C0H - CFH:	
D0H - DFH:	
E0H - EFH:	ωάέήϊ ί ό ύ ü ῶ Ἄ Ἐ Η Ί Ο Ὑ
F0H - FFH:	Ω ± ≥ ≤ ρ ∫ ÷ ≈ ° £ ¥ √ n 2 ■

907 Russian: 25dots widthx50dots height

20H - 2FH:	!"#\$%&'()*+,-./
30H - 3FH:	0123456789:<=>?
40H - 4FH:	@ABCDEFGHIJKLMNO
50H - 5FH:	PQRSTUVWXYZ[\]^_
60H - 6FH:	`abcdefghijklmnopqrstuvwxyz
70H - 7FH:	{ }~△
80H - 8FH:	АБВГДЕЖЗИЙКЛМНОП
90H - 9FH:	РСТУФХЦЧШЩЬЪЫЬЗЮЯ
A0H - AFH:	абвгдежзийклмноп
B0H - CFH:	
C0H - CFH:	
D0H - DFH:	
E0H - EFH:	рстуфхцчшщъьыьзюя
F0H - FFH:	Ёё ≥ ≤ ρ ∫ ÷ ≈ ° • √ n 2 ■