User Manual

Nov. 2009 Revision 0.03

P07303-II Series
Customer Display

Manual Version 0.03

Safety
IMPORTANT SAFETY INSTRUCTIONS

1. To disconnect the machine from the electrial power supply, turn off the power switch and remove the power cord plug from the wall socket. The wall socket must be easily accessible and in close proximity to the machine.

2. Read these instructions carefully. Save these instructions for future reference.

3. Follow all warnings and instructions marked on the product.

4. Do not use this product near water.

5. Do not place this product on an unstable cart,stand,or table.The product may fall, causing serious damage to the product.

6. Slots and openings in the cabinet and the back or bottom are provided for ventilation;to ensure reliable operation of the product and to protect it from overheating. These openings must not be blocked or covered.The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface.This product should never be placed near or over a radiator or heat register,or in a built-in installation unless proper ventilation is provided.

7. This product should be operated from the type of power indicated on the marking label.If you are not sure of the type of power available, consult your dealer or local power company.

8. Do not allow anything to rest on the power cord. Do not locate this product where persons will walk on the cord.

9. Never push objects of any kind into this product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a fire or electric shock.Never spill liquid of any kind on the product.

FCC

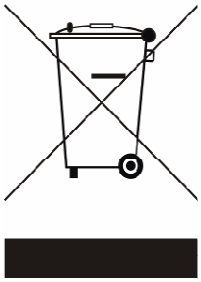
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference
(2) This device must accept any interference received, including interference that may cause undesired operation.

CE Mark

This device complies with the requirements of the EEC directive 89/336/EEC with regard to “Electromagnetic compatibility” and 73/23/EEC “Low Voltage Directive”.

LEGISLATION AND WEEE SYMBOL

2002/96/EC Waste Electrical and Electronic Equipment Directive on the treatment, collection, recycling and disposal of electric and electronic devices and their components.



The crossed dustbin symbol on the device means that it should not be disposed of with other household wastes at the end of its working life. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure.
To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources.

Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take this item for environmentally safe recycling.

Business users should contact their supplier and check the terms and conditions of the purchase contract.

This product should not be mixed with other commercial wastes for disposal.

Revision History

Revision Number	Description	Revision Date
0.01	Initial version	2009/11/3
0.02	Add POS7300 commands that same with EPSON command.	2009/11/4
0.03	Add RS232 Data Length Setting Command	2009/12/2

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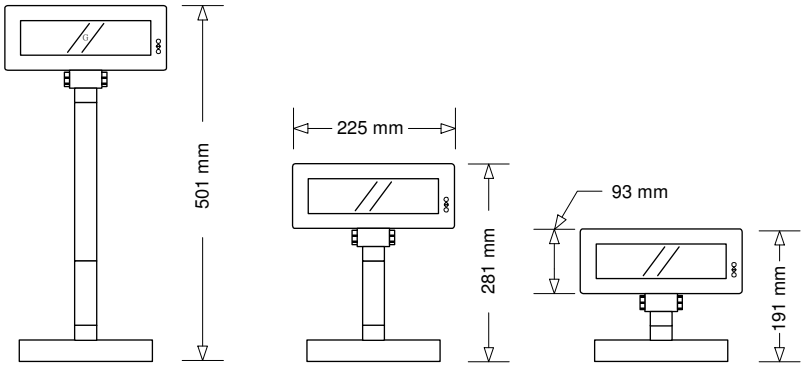
1. Checklist



- ☐ Pole Display Module
- ☐ Flat Cable (DB-9P to DB-9P Flat Cable Connector)
- ☐ Base Unit
- ☐ Two Pieces of Pole Support (1x22cm, 1x9cm)
- ☐ Installation Guide
- ☐ Power Adapter

2. Features

1. Data can be display on 20 columns x 2 lines.
2. Blue–green color and large character are easy to see.
3. System command set provide stored in non-volatile EEPROM that without the switches
4. Command emulation modes include: POS7300, EPSON ESC/POS, DSP800, ADM787/ ADM788, AEDEX/ EMAX, UTC, and CD5220.
5. Display area can be controlled by window function.
6. Provides an interface based in RS-232C, and baud rate from 4800 to 38400 bps.
7. Reverse characters can be specified using the Epson command set.
8. USB interface support (virtual COM port, driver install request)
9. Customer Display pass through function allows printer and customer display to share one port. (RS232 interface only)
10. Support software designing user-defined characters and downloading setup parameters to the display. Once in the display new characters are stored in non-volatile EEPROM.

3. Specification

NO	Item	Description
1	Display method	Vacuum fluorescent display
2	Number of character	40 characters (20 columns x 2 lines)
3	Character font	5 x 7 Dot matrix
4	Display color	Blue green
5	Brightness	700 cd /m2
6	Character type	96 alphanumeric 25 kinds of international character set 1 user define character
7	Character size	9.0mm x 5.25mm
8	Power supply	12 ~ 24VDC Manufacture offer +12V power adapter
9	Power consumption	3 ~ 6 W
10	MTBF	25000 hours (power on time)
11	Panel dimensions	224 (W) x 93 (H) x 50(D) mm
12	Support dimensions	Long support : 22 cm Short support : 9 cm
13	Base dimensions	190(w)x55(h)x96(d)mm
14	Viewing angle	-5 ~ 60 degrees
15	Rotation angle	Maximum 270 degrees
16	Weight	1.25 Kg
17	Operating temperature	5 ~ 45^{o}C
18	Operating Humidity	30% ~ 85%
19	Storage Temperature	-10 ~ 55 ^{o}C
20	Storage Humidity	10% ~ 85%

4. Interface

There are two types of stand-alone VFD Pole Display – One is support “pass-through” and “flow control” function, the other is only support “flow control”.

4.1. Interface Specification

Data transmission	Serial
Synchronization	Asynchronous
Signal level	MARK = -3 to -15 V (logic “1”) SPACE = +3 to +15 V (logic “0”)
Baud rates	4800, 9600, 19200, 38400 bps
Parity	None, even
Bit length	8 bits
Stop bits	1 bit
Hardware flow control	Support hardware flow control to indicator the device input buffer full. The connection is base on cable define (connect to PC’s CTS and/or DSR pin)
Pass-Through	Support by pass through version with DTR/DSR handshake control

4.2. Display Base (No pass through function)

Figure of VFD Pole Display Base

4.3. Connector (No pass through function)

PWR1 **COM2** **RJ451**

4.4. Display Base (with pass through function)

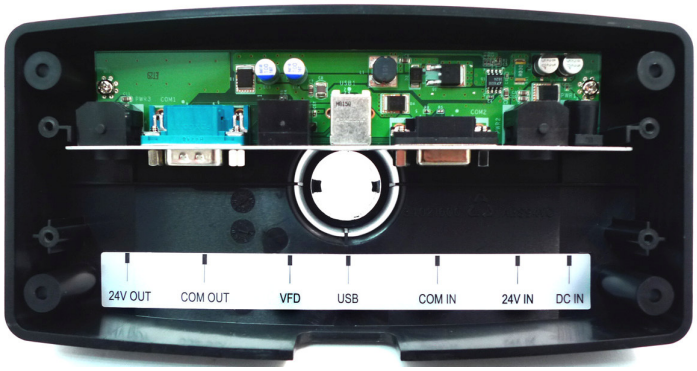
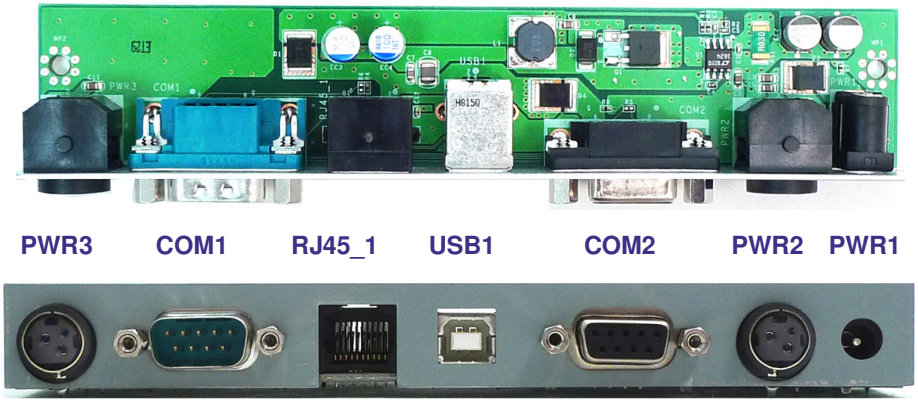


Figure of VFD Pole Display Base with "pass through" function

4.5. Connector (with pass through function)



Connector Definition:

Name	Connect to	Function description
PWR3	Printer	24V output connector, provide power to thermal printer.
COM1	Printer	RS-232 connector, connect to printer.
RJ45_1	VFD	RJ45 connector, connect to VFD display panel.
USB1	PC	USB connector, connect to PC/Host.
COM2	PC	RS-232 connector, connect to PC /Host.
PWR2	PC / Adapter	24V input connector, from PC/Host or adapter.
PWR1	Adapter	12V DC input jack connector, from power adapter.

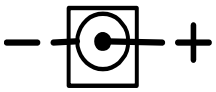
Remark:

- **Handshaking** is a confirmable function when signal is transmitted from transmission end to receipt end. A process of advance control signal or character is exchanged transmission during both of device or system to be linked.
- **Hardware flow control** is sometimes referred to as RTS / CTS flow control. This term mentions the extra input and outputs used on the serial device to perform this type of handshaking. RTS / CTS in its original outlook is used for handshaking between a computer and a device connected to it such as a modem.
- **Pass Through**, a signal transmission, is gauged by MCU which assigns to one of devices on the transmission line.

4.6. Connector Pin Definition

PWR1: Power input connector from adapter

- Connector type: DC jack (5.5/2.1)

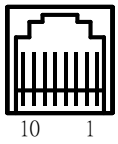


- Pin assignment

No	Signal
+	Vin
-	GND

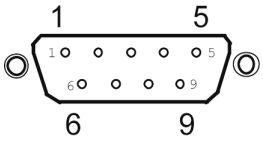
RJ451: Connect to display panel

- Connector type: Phone-jack 10P/8C



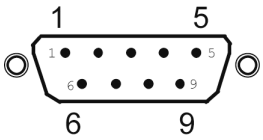
COM2: RS232C link to PC/HOST connector (9-pin)

- Connector type: D-sub 9 pin female



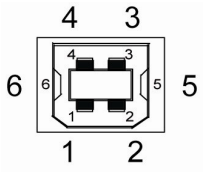
COM1: RS232C link to LPT connector (9-pin)

- Connector type: D-sub 9 pin male



USB1: B Type link to to PC/HOST

- Connector type: B Type USB

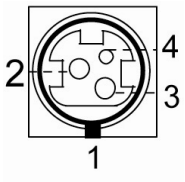


- USB Pin Definition

Pin #	Definition
1	+5V_VBUS
2	USB_P-
3	USB_P+
4	GND
5	GND
6	GND

PWR2: +24V Input

- Connector Type: DC Jack with lock

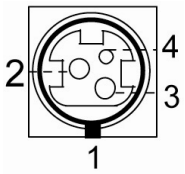


- Pin Definition:

Pin #	Definition
1	+24V
2	GND
3	GND
4	N/C

PWR3: +24V Output

- Connector Type: DC Jack with lock



- Pin Definition:

Pin #	Definition
1	+24V
2	GND
3	GND
4	N/C

5. Software Status Setting Commands

When the device is POWER ON, it will read the EEPROM Setting to set the **Command Type**, **Baud Rate**, **Parity**, **Data Length**, **Demo Mode** and **International Character**. User can re-set the Software Status Setting Commands as following, and Status Setting will be saving to EEPROM:

5.1. Baud Rate Setting Command

STX 05 B n ETX	/Change the baud rate setting/
ASCII Format	STX 05 B **n** ETX
Dec. Format	[02] [05] [66] **n** [03]
Hex. Format	[02h][05h][42h] **n** [03h] 30h≦**n**≦33h
Description	Change the display communication baud rate. The baud rate setting can be selected from 4800 to 38400.

n	Baud rate
30h	4800
31h	9600
32h	19200
33h	38400

5.2. Parity Check Setting Command

STX 05 P n ETX	/Change the Parity check setting/
ASCII Format	STX 05 P **n** ETX
Dec. Format	[02] [05] [80] **n** [03]
Hex. Format	[02h][05h][50h] **n** [03h] **n**=30h, 31h
Description	Change the display communication parity. Set 8 data bit and the parity set for even or non-parity.

n	Parity check
30h	None-parity
31h	Even-parity

5.3. Data Length Setting Command

STX 05 L n ETX	/Change the Data Length Setting/
ASCII Format	STX 05 L **n** ETX
Dec. Format	[02] [05] [76] **n** [03]
Hex. Format	[02h][05h][4Ch] **n** [03h] **n**=37h, 38h
Description	Change the display communication data length. Set 8-bits or 7-bits data length.

n	Data Length
37h	7 bits
38h	8 bits

5.4. International Character Set Setting Command

STX 05 S n ETX /Change the international character set/
ASCII Format STX 05 S **n** ETX
Dec. Format [02] [05] [83] **n** [03]
Hex. Format [02h][05h][53h] **n** [03h] 30h≦**n**≦4Fh
Description Change the display international character font.

n	Character Set (20h – 7Fh)	Code Table (80H-FFH)	Note
30h	U.S.A.	CP-437 (USA, Standard Europe)	
31h	FRANCE	CP-858 (Multilingual + Euro Symbol)	
32h	GERMANY		
33h	U.K.		
34h	DENMARK I		
35h	SWEDEN		
36h	ITALY		
37h	SPAIN		
38h	JAPAN	Katakana	
39h	NORWAY	CP-858 (Multilingual+ Euro Symbol)	
3Ah	DENMARK II		
3Bh	Slawie		
3Ch	RUSSIA		
3Dh	U.S.A.	CP-860 (Portuguese)	
3Eh	U.K.	Greek	
3Fh	U.S.A.	CP-852 (Hungary)	
40h	U.S.A.	CP-862 (Hebrew)	
41h	U.S.A.	CP-863 (Canadian-French)	
42h	U.S.A.	CP-865 (Nordic)	
43h	U.S.A.	CP-866 (Cyrillic)	
44h	U.S.A.	Windows-1251 (Cyrillic)	
45h	U.S.A.	Windows-1252 (West European Latin)	
46h	U.S.A.	Windows-1255 (Hebrew)	
47h	U.S.A.	Windows-1257 (Baltic)	
48h	U.S.A.	Windows-1253 (Greek)	
49h	U.S.A.	Windows-1250 (East European Latin)	
4Ah ~ 4Eh	Reserved	Reserved	
4Fh	User-Define Character		

5.5. Select International Character Set Command

STX 05 T n ETX /Select International Character Set Command/
ASCII Format STX 05 T **n** ETX
Dec. Format [02] [05] [84] **n** [03]
Hex. Format [02h][05h][54h] **n** [03h] 00h≦**n**≦1Fh
Description Select International Character Set

Select international character set (20H~7Fh) by command “STX 05 T n ETX”

n	International character set	n	International character set	n	International character set
00h	U.S.A.	**06h**	ITALY	**0Ch**	RUSSIA
01h	FRANCE	**07h**	SPAIN	**0Dh**	Not used
02h	GERMANY	**08h**	JAPAN	**0Eh**	Not used
03h	U.K.	**09h**	NORWAY	**0Fh**	Not used
04h	DENMARK I	**0Ah**	DENMARK II	**1Fh**	User-Define
05h	SWEDEN	**0Bh**	SLAVONIC		

5.6. Select Character Code Table Command

STX 05 U n ETX /Select Character Code Table Command/
ASCII Format STX 05 U **n** ETX
Dec. Format [02] [05] [85] **n** [03]
Hex. Format [02h][05h][55h] **n** [03h] 00h≦**n**≦1Fh
Description Select Character Code Table

Select character code table (80H~FFh) by command “**STX 05 U n ETX**”

n	Character code table	n	Character code table	n	Character code table
00h	CP-437 (USA, Standard Europe)	**07h**	Russia	**0Fh**	Windows-1257 (Baltic)
01h	Katakana (for Japan)	**08h**	Greek	**10h**	Windows-1252 (West European Latin)
02h	CP-850 (Multilingual)	**09h**	CP-852 (Hungary)	**11h**	Windows-1253 (Greek)
03h	CP-860 (Portuguese)	**0Ah**	CP-862 (Hebrew)	**12h**	Windows-1250 (East European Latin)
04h	CP-863 (Canadian-French)	**0Bh**	CP-866 (Cyrillic)	**13h**	CP-858 (Multilingual+ Euro Symbol)
05h	CP-865 (Nordic)	**0Ch**	Windows-1251 (Cyrillic)	**1Fh**	User-Define
06h	Slawie	**0Eh**	Windows-1255 (Hebrew)		

5.7. Command Type Setting Command

STX 05 C n ETX /Change the command type setting/
ASCII Format STX 05 C **n** ETX
Dec. Format [02] [05] [67] **n** [03]
Hex. Format [02h][05h][43h] **n** [03h] 30h≦ **n** ≦37h
Description This command will change the command type and initialize the display.
The display emulation mode is based on DSP800/ ESC/ ADM 787/ POS7300/ AEDEX/ UTC/ CD5220 mode.

n	Command Type	n	Command Type
30h	POS7300	34h	AEDEX
31h	ESC/POS	35h	UTC/P
32h	ADM 787	36h	UTC/S
33h	DSP800	37h	CD5220

5.8. Run Demo message

STX 05 D 08 ETX /Run demo message/
ASCII Format STX 05 D 08 ETX
Dec. Format [02][05][68][08][03]
Hex. Format [02h][05h][44h][08h][03h]
Description Run demo message for the display.
The display emulation mode is based on PA7300, DSP800, EPSON ESC/POS, CD5220 command type.

5.9. Show Firmware Version

STX 05 V 01 ETX /Show Firmware Version/
ASCII Format STX 05 V 01 ETX
Dec. Format [02][05][86][01][03]
Hex. Format [02h][05h][56h][01h][03h]
Description Show firmware version.

5.10. User-Define Character Command-Set

Function	Command	Description
Del 1 Character	[02h][FDh][55h][00h][**n**]	Delete 1 user define character data [**n**] = 20h ~ FFh for displayable character code
Del All Characters	[02h][FDh][55h][01h][00h]	Delete All User-Define Characters
Set 1 Character	[02h][FDh][55h][02h][**n**] [**m1**][**m2**][**m3**][**m4**][**m5**]	Set 1 user define character [**n**] = 20h ~ FFh for displayable character code [**m1**]~[**m5**] = Character data byte 1 ~ 5 Ref. table in bellow
Read 1 Character	[02h][FDh][55h][03h][**n**]	Read 1 user define character data [**n**] = 20h ~ FFh for displayable character code
Read All Characters	[02h][FDh][55h][04h][00h]	Read all user define character data (Character 20h ~ FFh)

Set User-Define Character 5x7 dot layer out

Bit assignment:

bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit0

5x7 dot bit assignment: 1 means fill dot, 0 means empty dot.

m1 bit 7	m1 bit 6	m1 bit 5	m1 bit 4	m1 bit 3
m1 bit 2	m1 bit 1	m1 bit 0	m2 bit 7	m2 bit 6
m2 bit 5	m2 bit 4	m2 bit 3	m2 bit 2	m2 bit 1
m2 bit 0	m3 bit 7	m3 bit 6	m3 bit 5	m3 bit 4
m3 bit 3	m3 bit 2	m3 bit 1	m3 bit 0	m4 bit 7
m4 bit 6	m4 bit 5	m4 bit 4	m4 bit 3	m4 bit 2
m4 bit 1	m4 bit 0	m5 bit 7	m5 bit 6	m5 bit 5

Ex: character “0”

0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	1	0	0	1
1	0	0	0	1
0	1	1	1	0

m1 byte data = 0x74
m2 byte data = 0x67
m3 byte data = 0x5C
m4 byte data = 0xC5
m5 byte data = 0xC0

6. Command List Table

Command / Command Set	POS7300	CD5220	EPSON D101	UTC/S	UTC/P	AEDEX	ADM788	DSP800
Move cursor right	O	O	O					
Move cursor left	O	O	O					
Move cursor up	O	O	O					
Move cursor down	O	O	O					
Move cursor to right-most position	O	O	O					
Move cursor to left-most position	O	O	O					
Move cursor to home position	O	O	O					
Move cursor to bottom position	O	O	O					
Move cursor to specified position	O	O	O					O
Clear display screen	O	O	O	O			O	
Clear cursor line	O	O	O					
Brightness adjustment	O	O	O					O
Blink display screen	O	O	O					O
Initialize display	O	O	O					O
Select character code table	O	O	O					
Select international character set	O	O	O					O
Select/cancel reverse character	O		O					
Overwrite mode	O	O	O	O				
Vertical scroll mode	O	O	O	O				
Horizontal scroll mode	O	O	O					
Set/cancel the window range	O	O	O					
Select peripheral device	O	O	O					O
Set starting/ending position of macro definition			O					
Execute and quit macro			O					
Execute self-test	O	O	O					O
Display time	O		O		O	O		
Display time continuously	O		O					
Display position	O			O				
Cursor on/off	O	O	O	O				
Change to UTC enhanced mode				O				
Change to UTC standard mode					O			
Write string to upper line	O	O			O	O		
Upper line message continuous scroll	O	O			O	O		
Bottom line message scroll continuously	O							
Message vertical down scroll continuously	O							
Message vertical upper scroll continuously	O							
Carriage return	O			O			O	
Line feed	O			O				
Back space	O			O				
Horizontal tab	O			O				
Command type select		O	O					O
Upper line message scroll once pass					O	O		
Change attention code					O	O		
Two line display					O	O		
Clear upper line and move cursor to upper left-end position							O	

Command / Command Set	POS7300	CD5220	EPSON D101	UTC/S	UTC/P	AEDEX	ADM788	DSP800
Clear bottom line and move cursor to bottom left-end position							O	
Set period to upper line, last n position							O	
Set line blinking, upper line	O						O	
Clear line blinking, upper line	O						O	
Clear field 1 and move cursor to field 1, first position							O	
Clear field 2 and move cursor to field 2,first position							O	
Clear display range from n position to m position and move cursor to n position								O
Save the current displaying data to n layer for demo display								O
Turn annunciator on/off	O		O					
Specify period	O		O					
Specify comma	O		O					
Specify semicolon (period + comma)	O		O					
Set/Cancel User-Define Character Set			O					
Create User-define Character			O					O
Delete All User-Define Character			O					
Store User-Define Character to EEPROM			O					
Load User-Define Character from EEPROM			O					
Delete 1 User-Define Character								O

7. Command Details

7.1. POS7300 Series Command List

Command	Code (hex)	Function Description
ESC F A **[DATA]** CR	1B 46 41 **[DATA]** 0D	Write string to upper line ➢ Maximal **[DATA]** length is 40
ESC F B **[DATA]** CR	1B 46 42 **[DATA]** 0D	Write string to lower line ➢ Maximal **[DATA]** length is 40
ESC F D **[DATA]** CR	1B 46 44 **[DATA]** 0D	Upper line message scroll continuously ➢ Maximal **[DATA]** length is 40
ESC F O **[DATA]** CR	1B 46 4F **[DATA]** 0D	Bottom line message scroll continuously ➢ Maximal **[DATA]** length is 40
ESC P **x y**	1B 50 **x y**	Move cursor to specified position ➢ **x** = 1 ~ 14h, for columns location. ➢ **y** = 1 ~ 2, for lines location.
ESC _ **n**	1B 5F **n**	Set cursor on/off ➢ **n** = 00 ~ 01
ESC DC1	1B 11	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode
ESC @	1B 40	Initialize display
US MD1 **n**	1F 01 **n**	Message vertical upper scroll continuously ➢ **n** = 01 ~ 0Ch
US MD2 **n**	1F 02 **n**	Message vertical down scroll continuously ➢ **n** = 01 ~ 0Ch
US DC1 **n**	1F 11 **n**	Set line blinking ➢ **n** = '1' ~ '2' ■ **n** = '1' up line ■ **n** = '2' low line
US DC2 **n**	1F 12 **n**	Clear line blinking ➢ **n** = '1' ~ '2' ■ **n** = '1' up line ■ **n** = '2' low line
US # **n x**	1F 23 **n x**	Turn annunciator on/off. ➢ **n** = 0 for annunciator off **n** = 1 for annunciator on ➢ **x** = 1 ~ 14h, for columns location.
US , **n**	1F 2C **n**	Specify comma ➢ **n** = a displayable character code
US . **n**	1F 2E **n**	Specify period ➢ **n** = a displayable character code
US ; **n**	1F 3B **n**	Specify semicolon (period + comma) ➢ **n** = a displayable character code
US @	1F 40	Execute self - test
US E **n**	1F 45 **n**	Blink display screen ➢ **n** = 00h ~ FFh ■ **n** = 0 for no blink
US T h m	1F 54 h m	Display time ➢ 0 ≦ h ≦ 17h, for hours setting. ➢ 0 ≦ m ≦ 3Bh, for minutes setting.

Command	Code (hex)	Function Description
US U	1F 55	Display time continuously
US X **n**	1F 58 **n**	Brightness adjustment ➢ **n** = 1 ~ 4
US r **n**	1F 72 **n**	Select/cancel reverse character. ➢ **n** = 00,01
NULL H	0 48	Move cursor up
NULL K	0 4B	Move cursor left
NULL M	0 4D	Move cursor right
NULL P	0 50	Move cursor down
NULL G	0 47	Move cursor to left-most position
NULL O	0 4F	Move cursor to right-most position
BS	08	Back space
HT	09	Horizontal tab
LF	0A	Line feed
HOM	0B	Move cursor to home position
US B	1F 42	Move cursor to bottom position
CLR	0C	Clear display screen
CLR	12	
CR	0D	Carriage return
CAN	18	Clear cursor line, and clear string mode
DLE n	10 n	Display position ➢ n = 0 ~ 27h, for location.
ESC W **n s x1 y1 x2 y2**	1B 57 **n s x1 y1 x2 y2**	Set or cancel the window range ➢ **n** = 1 ~ 4, for window number ➢ **s** = 0: cancel **s** = 1: set ➢ 1 ≦ **x1** ≦ **x2** ≦ 14h, for columns location. ➢ 1 ≦ **y1** ≦ **y2** ≦ 2, for lines location.
ESC R n	1B 52 n	Select international character set (20H~7Fh). ➢ n = 00 ~ 1Fh. See note *1
ESC t n	1B 74 n	Select character code table (80H~FFh). ➢ n = 00 ~ 1Fh. See note *2
ESC = n	1B 3D n	Select peripheral device, display or printer ➢ n = 1~3 ■ n = '1': enable printer only ■ n = '2': enable display only ■ n = '3': enable both of printer and display

Note:

1. Select international character set (20H~7Fh) by command “ESC R **n**”

n	International character set	n	International character set	n	International character set
00h	U.S.A.	**05h**	SWEDEN	**0Ah**	DENMARK II
01h	FRANCE	**06h**	ITALY	**0Bh**	SLAVONIC
02h	GERMANY	**07h**	SPAIN	**0Ch**	RUSSIA
03h	U.K.	**08h**	JAPAN		
04h	DENMARK I	**09h**	NORWAY	**1Fh**	User-Define

2. Select character code table (80H~FFh) by command “ESC t **n**”

n	Character code table	n	Character code table	n	Character code table
00h	CP-437 (USA, Standard Europe)	**07h**	Russia	**0Fh**	Windows-1257 (Baltic)
01h	Katakana (for Japan)	**08h**	Greek	**10h**	Windows-1252 (West European Latin)
02h	CP-850 (Multilingual)	**09h**	CP-852 (Hungary)	**11h**	Windows-1253 (Greek)
03h	CP-860 (Portuguese)	**0Ah**	CP-862 (Hebrew)	**12h**	Windows-1250 (East European Latin)
04h	CP-863 (Canadian-French)	**0Bh**	CP-866 (Cyrillic)	**13h**	CP-858 (Multilingual+ Euro Symbol)
05h	CP-865 (Nordic)	**0Ch**	Windows-1251 (Cyrillic)		
06h	Slawie	**0Eh**	Windows-1255 (Hebrew)	**1Fh**	User-Define

7.2. CD5220 Standard Mode Command List

Command	Code (hex)	Function Description
ESC DC1	1B 11	Overwrite mode
US SOH	1F 01	
ESC DC2	1B 12	Vertical scroll mode
US STX	1F 02	
ESC DC3	1B 13	Horizontal scroll mode
US ETX	1F 03	
ESC Q A **[DATA]** CR	1B 51 41 **[DATA]** 0D	Set the string display mode, write string to upper line. *1 ➢ Maximal **[DATA]** length is 20
ESC Q B **[DATA]** CR	1B 51 42 **[DATA]** 0D	Set the string display mode, write string to lower line. *1 ➢ Maximal **[DATA]** length is 20
ESC Q D **[DATA]** CR	1B 51 44 **[DATA]** 0D	Upper line message scroll continuously. *1 *2 ➢ Maximal **[DATA]** length is 40
ESD [D	1B 5B 44	Move cursor left
BS	08	
ESC [C	1B 5B 43	Move cursor right
HT	09	
ESC [A	1B 5B 41	Move cursor up
US LF	1F 0A	
ESC [B	1B 5B 42	Move cursor down
LF	0A	
ESC [H	1B 5B 48	Move cursor to home position
HOM	0B	
ESC [L	1B 5B 4C	Move cursor to left-most position
CR	0D	
ESC [R	1B 5B 52	Move cursor to right-most position
US CR	1F 0D	
ESC [K	1B 5B 4B	Move cursor to bottom position
US B	1F 42	
ESC # **n**	1B 23 **n**	Command type select ➢ **n** = 30h ~ 37h
US @	1F 40	Execute self test
US E **n**	1F 45 **n**	Blink display screen ➢ **n** = 00h ~ FFh ■ **n** = 0 for no blink
ESC l **x y**	1B 6C **x y**	Move cursor to specified position ➢ **x** = 1 ~ 14h, for columns location. ➢ **y** = 1,2, for lines location.
US $ **x y**	1F 24 **x y**	
ESC # **n**	1B 23 **n**	Command type select ➢ **n** = 30h ~ 37h
US E **n**	1F 45 **n**	Blink display screen ➢ **n** = 00h ~ FFh ■ **n** = 0 for no blink
ESC l **x y**	1B 6C **x y**	Move cursor to specified position ➢ **x** = 1 ~ 14h, for columns location. ➢ **y** = 1,2, for lines location.
ESC @	1B 40	Initialize display

Command	Code (hex)	Function Description
ESC W **s x1 x2 y**	1B 57 **s x1 x2 y**	Set or cancel the window range at horizontal scroll mode ➢ 1 ≦ **x1** ≦ **x2** ≦ 14h, for columns location. ➢ **y** = 1~2, for lines location. ➢ **s** = 0: cancel **s** = 1: set
CLR	0C	Clear display screen, and clear string mode
CAN	18	Clear cursor line, and clear string mode
ESC * **n**	1B 2A **n**	Brightness adjustment ➢ **n** = 1 ~ 4, **n** = 4 for highest brightness
US X **n**	1F 58 **n**	
ESC _ **n**	1B 5F **n**	Set cursor on/off ➢ **n** = 1: cursor on **n** = 0: cursor off
ESC f **n**	1B 66 **n**	Select international Character ➢ About **n**, refer. *3
ESC c **n**	1B 63 **n**	Select character code table ➢ About **n**, refer. *4
ESC = **n**	1B 3D **n**	Select peripheral device, display or printer ➢ **n**='1': enable printer only **n**='2': enable display only **n**='3': enable both of printer and display

Note:

1. While using command “ESC Q A” or “ESC Q B”, other commands cannot be used except when using command “CLR” or “CAN” to change operating mode.
2. When using command “ESC Q D”, the upper line message will scroll continuously until a new command is received, it will then clear the upper line and move the cursor to the upper left-end position.
3. Select the international Character set (20h – 7Fh) by command “ESC f **n**”.

Parameter “n”		International Character Set	Parameter “n”		International Character Set
Character	**Hex**		**Character**	**Hex**	
‘A’	41h	U.S.A.	‘N’	4Eh	Norway
‘G’	47h	Germany	‘W’	57h	Sweden
’I’	49h	Italy	‘D’	44h	Denmark I
‘J’	4Ah	Japan	‘E’	45h	Denmark II
‘U’	55h	U.K.	‘L’	4Ch	Slavonic
‘F’	46h	France	‘R’	52h	Russia
‘S’	53h	Spain		1Fh	User-Define

4. Select character code table (80H-FFH) by command “ESC c **n**”.

Parameter “n”		**character Code Table**
Character	**Hex**	
‘A’	41h	Compliance with ASCII code (CP-437)
‘J’	4Ah	Compliance with JIS code (Katakana)
‘L’	4Ch	Compliance with Slawie code
‘R’	52h	Compliance with RUSSIA code
‘M’	4Dh	CP-850 (Multilingual)
‘P’	50h	CP-858 (Multilingual+ Euro Symbol)
‘p’	70h	CP-860 (Portuguese)
‘F’	46h	CP-863 (Canadian-French)
‘N’	4Eh	CP-865 (Nordic)
‘u’	75h	CP-852 (Hungary)
‘H’	48h	CP-862 (Hebrew)
‘C’	43h	CP-866 (Cyrillic)
‘G’	47h	Greek
‘c’	63h	Windows-1251 (Cyrillic)
‘W’	57h	Windows-1252 (West European Latin)
‘h’	68h	Windows-1255 (Hebrew)
‘B’	42h	Windows-1257 (Baltic)
‘g’	67h	Windows-1253 (Greek)
‘E’	45h	Windows-1250 (East European Latin)
	1Fh	User-Define

7.3. UTC Standard Mode Command List

Command	Code (hex)	Function Description
BS	08	Back space
HT	09	Horizontal tab
LF	0A	Line feed
CR	0D	Carriage return
DLE **n**	10 **n**	Display position ➢ **n** = 0 ~ 27h, for location.
DC1	11	Over write display mode
DC2	12	Vertical scroll mode
DC3	13	Cursor on
DC4	14	Cursor off
US	1F	Clear display
ESC d	1B 64	Change to UTC enhanced mode

7.4. UTC Enhanced Mode Command List

Command	Code (hex)	Function Description
ESC u A **[DATA]** CR	1B 75 41 **[DATA]** 0D	Upper line display ➢ Maximal **[DATA]** length is 20
ESC u B **[DATA]** CR	1B 75 42 **[DATA]** 0D	Bottom line display ➢ Maximal **[DATA]** length is 20
ESC u D **[DATA]** CR	1B 75 44 **[DATA]** 0D	Upper line message scroll continuously ➢ Maximal **[DATA]** length is 40
ESC u E **h h** : **m m** CR	1B 75 45 **h h** ':' **m m** 0D	Display time ➢ **h**, **m** = '0' ~ '9'
ESC u F **[DATA]** CR	1B 75 46 **[DATA]** 0D	Upper line message scroll Once pass ➢ Maximal **[DATA]** length is 40
ESC u H **n m** CR	1B 75 48 **n m** 0D	Change attention code ➢ **n** = 1 ~ 20h ➢ **m** = 1 ~ 20h
ESC u I **[DATA]** CR	1B 75 49 **[DATA]** 0D	Two line display ➢ Maximal **[DATA]** length is 40
ESC RS CR	1B 0F 0D	Change to UTC standard mode

7.5. AEDEX/EMAX Mode Command List

Command	Code (hex)	Function Description
! # 4 **[DATA]** CR	21 23 34 **[DATA]** 0D	Upper line message scroll ➢ Maximal **[DATA]** length is 40
! # 5 **h h** : **m m** CR	21 23 35 **h h** ':' **m m** 0D	Display time ➢ **h**, **m** = '0' ~ '9'
! # 8 **n m** CR	21 23 38 **n m** 0D	Change attention code ➢ **n**, **m** = 1 ~ 20
! # 9 **[DATA]** CR	21 23 39 **[DATA]** 0D	Two line display ➢ Maximal **[DATA]** length is 40
! # 6 **[DATA]** CR	21 23 36 **[DATA]** 0D	Upper line message scroll once pass ➢ Maximal **[DATA]** length is 40

7.6. ADM787/788 mode command list

Command	Code (hex)	Function Description
CLR	0C	Clear display
CR	0D	Carriage return
SLE1	0E	Clear upper line and move cursor to upper left-end position
SLE2	0F	Clear bottom line and move, Cursor to bottom left-end position
DC0 **n**	10 **n**	Set period to upper line last n position ➢ **n** = 31H ~ 37H
DC1 **n**	11 **n**	Set line blinking, upper line ➢ **n** = '1' ~ '2' ■ **n** = '1': up line ■ **n** = '2': low line
DC2 **n**	12 **n**	Clear line blinking, upper line ➢ **n** = '1' ~ '2' ■ **n** = '1': up line ■ **n** = '2': low line
SF1	1E	Clear field 1 and move cursor to field 1, first position
SF2	1F	Clear field 2 and move cursor to field 2, first position

7.7. DSP800 Mode Command List

Command	Code (hex)	Function Description
EOT SOH I **n** ETB	04 01 49 **n** 17	Select international character set ➢ **n** = 00 ~ 1Fh or 30 ~ 4Fh See note *[1]
EOT SOH P **n** ETB	04 01 50 **n** 17	Move cursor to specified position ➢ **n** = 31h ~ 58h
EOT SOH C **n m** ETB	04 01 43 **n m** 17	Clear display range from n position to m position and move cursor to n position ➢ 31h ≦ **n** ≦ **m** ≦ 58h
EOT SOH S **n** ETB	04 01 53 **n** 17	Save current view message to n layer for demo view data ➢ **n** = 31h ~ 35h
EOT SOH D **n m** ETB	04 01 44 **n m** 17	Display the saved demo message ➢ **n** = 31h ~ 4Fh ➢ **m** = 31h ~ 33h
EOT SOH A **n** ETB	04 01 41 **n** 17 **n** =31h-34h	Brightness adjustment
EOT SOH F **n** ETB	04 01 46 **n** 17 00h≦**n**≦FFh	Blink display Screen ➢ **n** = 00h ~ FFh, **n** = 0 for no blink
EOT SOH # **n** ETB	04 01 23 **n** 17 **n** =30~37h	Command type select
EOT SOH % ETB	04 01 25 17	Initialize display
EOT SOH @ ETB	04 01 40 17	Execute self-test
EOT SOH & **n** [**m1~m5**] ETB	04 01 26 **n [m1~m5]** 17	Set One User-Define Character **n** = 20h ~ FFh for displayable character code [**m1 ~ m5**] Byte1~Byte5 Define Character
EOT SOH ? **n** ETB	04 01 3F **n** 17	Delete One User-Define Character **n** = 20h ~ FFh for displayable character code
EOT SOH = **n** ETB	04 01 3D **n** 17	Select peripheral device, display or printer ➢ **n** = '1': enable printer only **n** = '2': enable display only **n** = '3': enable both of printer and display

Note:

1. Select international character set (20H~7Fh) by command "EOT SOH I **n** ETB"

n	International character set	n	International character set	n	International character set
00h	U.S.A.	**05h**	SWEDEN	**0Ah**	DENMARK II
01h	FRANCE	**06h**	ITALY	**0Bh**	SLAVONIC
02h	GERMANY	**07h**	SPAIN	**0Ch**	RUSSIA
03h	U.K.	**08h**	JAPAN		
04h	DENMARK I	**09h**	NORWAY	**1Fh**	User-Define
30h	U.S.A.	**35h**	SWEDEN	**3Ah**	DENMARK II
31h	FRANCE	**36h**	ITALY	**3Bh**	SLAVONIC
32h	GERMANY	**37h**	SPAIN	**3Ch**	RUSSIA
33h	U.K.	**38h**	JAPAN		
34h	DENMARK I	**39h**	NORWAY	**4Fh**	User-Define

7.8. EPSON ESC/POS Command List

Command	Code (hex)	Function Description
US r **n**	1F 72 **n**	Select/cancel reverse character. ➢ **n** = 00,01
US MD1	1F 01	Specify overwrite mode.
US MD2	1F 02	Specify vertical scroll mode.
US MD3	1F 03	Specify horizontal scroll mode.
CAN	18	Clear cursor line
ESC # **n**	1B 23 **n**	Command type select ➢ **n** = 30h ~ 37h
US # **n x**	1F 23 **n x**	Turn annunciator on/off. ➢ **n** = 0 for annunciator off **n** = 1 for annunciator on ➢ **x** = 1 ~ 14h, for columns location.
US C **n**	1F 43 **n**	Set cursor on/off ➢ **n** = 00, 01
BS	08	Move cursor left
HT	09	Move cursor right
US LF	1F 0A	Move cursor up
LF	0A	Move cursor down
US CR	1F 0D	Move cursor to right-most position
CR	0D	Move cursor to left-most position
HOM	0B	Move cursor to home position
US B	1F 42	Move cursor to bottom position
US $ **x y**	1F 24 **x y**	Move cursor to specified position ➢ **x** = 1 ~ 14h, for columns location. ➢ **y** = 1 ~ 2, for lines location.
CLR	0C	Clear display screen
US E **n**	1F 45 **n**	Blink display screen ➢ **n** = 00h ~ FFh **n** = 0 for no blink
ESC @	1B 40	Initialize display
US , **n**	1F 2C **n**	Specify comma ➢ **n** = a displayable character code
US . **n**	1F 2E **n**	Specify period ➢ **n** = a displayable character code
US ; **n**	1F 3B **n**	Specify semicolon (period + comma) ➢ **n** = a displayable character code
US :	1F 3A	Set starting/ending position of macro definition. Ex.: 1F 3A … (macro string) … 1F 3A
US ^ **n m**	1F 5E **n m**	Execute and quit macro. It's an interval of n between the two words. It's an interval of m between the two strings. ➢ 00 ≦ (**n**, **m**) ≦ FFh ■ **n** = Word time ■ **m** = show string time
US @	1F 40	Execute self - test
US T h m	1F 54 h m	Display time ➢ 0 ≦ h ≦ 17h, for hours setting. ➢ 0 ≦ m ≦ 3Bh, for minutes setting.
US U	1F 55	Display time continuously
US X **n**	1F 58 **n**	Brightness adjustment ➢ **n** = 1 ~ 4

Command	Code (hex)	Function Description
ESC W **n s x1 y1 x2 y2**	1B 57 **n s x1 y1 x2 y2**	Set or cancel the window range ➢ **n** = 1 ~ 4, for window number ➢ **s** = 0: cancel **s** = 1: set ➢ 1 ≦ **x1** ≦ **x2** ≦ 14h, for columns location. ➢ 1 ≦ **y1** ≦ **y2** ≦ 2, for lines location.
ESC R **n**	1B 52 **n**	Select international character set (20H~7Fh). ➢ **n** = 00 ~ 1Fh. See note *1
ESC t **n**	1B 74 **n**	Select character code table (80H~FFh). ➢ **n** = 00 ~ 1Fh. See note *2
ESC = **n**	1B 3D **n**	Select peripheral device, display or printer **n** = '1': enable printer only **n** = '2': enable display only **n** = '3': enable both of printer and display
ESC % **n**	1B 25 **n**	Set/Cancel User-Define Character Set ➢ **n** = 0: Cancel User-Define Character Set ➢ **n** = 1: Set User-Define Character Set
ESC & SOH **n m** [**b1**~**b5**] * **K**	1B 26 01 **n m** [**b1** ~ **b5**] * **K**	Create User-define Character 20h ≤ **n** ≤ **m** ≤ FFh [b1 ~ b5] Byte1~Byte5 Define Character (Ref. ***User-Define Character Command-Set*** 5x7 dot layout) **K** = (m-n+1) → 1 ~ 5, Max. 5 character.
ESC ?	1B 3F	Delete User-Define Character
ESC s SOH	1B 73 01	Store User-Define Character in EEPROM
ESC d SOH	1B 64 01	Load User-Define Character from EEPROM

Note:

1. Select international character set (20H~7Fh) by command "ESC R **n**"

n	International character set	n	International character set	n	International character set
00h	U.S.A.	**05h**	SWEDEN	**0Ah**	DENMARK II
01h	FRANCE	**06h**	ITALY	**0Bh**	SLAVONIC
02h	GERMANY	**07h**	SPAIN	**0Ch**	RUSSIA
03h	U.K.	**08h**	JAPAN		
04h	DENMARK I	**09h**	NORWAY	**1Fh**	User-Define

2. Select character code table (80H~FFh) by command "ESC t **n**"

n	Character code table	n	Character code table	n	Character code table
00h	CP-437 (USA, Standard Europe)	**07h**	Russia	**0Fh**	Windows-1257 (Baltic)
01h	Katakana (for Japan)	**08h**	Greek	**10h**	Windows-1252 (West European Latin)
02h	CP-850 (Multilingual)	**09h**	CP-852 (Hungary)	**11h**	Windows-1253 (Greek)
03h	CP-860 (Portuguese)	**0Ah**	CP-862 (Hebrew)	**12h**	Windows-1250 (East European Latin)
04h	CP-863 (Canadian-French)	**0Bh**	CP-866 (Cyrillic)	**13h**	CP-858 (Multilingual+ Euro Symbol)
05h	CP-865 (Nordic)	**0Ch**	Windows-1251 (Cyrillic)		
06h	Slawie	**0Eh**	Windows-1255 (Hebrew)	**1Fh**	User-Define

8. Character Set

8.1. Character Code 20H – 7FH

8.1.1 International Character Sets

Character Code Number												
Country \ Hex		23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
Country \ Dec		35	36	64	91	92	93	94	96	123	124	125	126
U.S.A		#	$	@	[	\	]	^	`	{	¦	}	~
France		#	$	à	°	ç	§	^	`	é	ù	è	¨
Germany		#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	β
U.K		£	$	@	[	\	]	^	`	{	¦	}	~
Denmark I		#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden		#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy		#	$	@	°	\	é	^	ù	à	ò	è	ì
Spain		Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
Japan		#	$	@	[	¥	]	^	`	{	¦	}	~
Norway		#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II		#	$	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Slavonic		#	$	@	[	\	]	^	`	{	¦	}	~
Russia		#	$	@	[	\	]	^	`	{	¦	}	~

8.1.2 USA, Standard Character Sets

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
20h		!	“	#	$	%	&	‘	(	)	*	+	,	-	.	/
30h	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40h	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50h	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60h	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70h	p	q	r	s	t	u	v	w	x	y	z	{	¦	}	~	

8.2. Character Code 80H – FFH

8.2.1 CP-437 (USA, Standard Europe)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90h	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	¢	£	¥	Pt	ƒ
A0h	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
B0h	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0h	α	ß	Γ	π	Σ	σ	µ	τ	Φ	θ	Ω	δ	∞	ø	ε	∩
F0h	≡	±	≥	≤	⌠	⌡	÷	≈	°	•	·	√	n	2	■	

8.2.2 CP-850 (Multilingual)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90h	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	Ü	ø	£	Ø	×	ƒ
A0h	á	í	ó	ú	ñ	Ñ	a	o	¿	®	¬	½	¼	¡	«	»
B0h	░	▒	▓	│	┤	Á	Â	À	©	╣	║	╗	╝	¢	¥	┐
C0h	└	┴	┬	├	─	┼	ã	Ã	╚	╔	╩	╦	╠	═	╬	¤
D0h	ð	Ð	Ê	Ë	È	ı	Í	Î	Ï	┘	┌	█	▄	¦	Ì	▀
E0h	ó	ß	ô	ò	õ	Õ	µ	þ	Þ	Ú	Û	Ù	ý	Ý	¯	´
F0h		±	=	¾	¶	§	÷	¸	°	¨	·	1	3	2	■	

8.2.3 CP-858 (Multilingual + Euro Symbol)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90h	É	æ	Æ	ô	ö	ò	û	ù	ÿ	ö	Ü	ø	£	Ø	×	ƒ
A0h	á	í	ó	ú	ñ	Ñ	a	o	¿	®	¬	½	¼	¡	«	»
B0h	░	▒	▓	│	┤	Á	Â	À	©	╣	║	╗	╝	¢	¥	┐
C0h	└	┴	┬	├	─	┼	ã	Ã	╚	╔	╩	╦	╠	═	╬	¤
D0h	ð	Ð	Ê	Ë	È	€	Í	Î	Ï	┘	┌	█	▄	¦	Ì	▀
E0h	ó	ß	ô	ò	õ	Õ	µ	þ	Þ	Ú	Û	Ù	ý	Ý	¯	´
F0h		±	=	¾	¶	§	÷	¸	°	¨	·	1	3	2	■	

8.2.4 Katakana for Japan

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	α	β	γ	⊿	є	η	θ	λ	μ	π	ρ	σ	τ	Φ	Ω	∑
90h	£	§	IE	IR	∫	x̄	Ā	$^{-1}$	^{2}	^{3}	^{x}	½	$^{1}/$	√	±	■
A0h		◦	｢	｣	､	•	ヲ	ァ	ィ	ゥ	ェ	ォ	ャ	ュ	ョ	ッ
B0h	ー	ア	イ	ウ	エ	オ	カ	キ	ク	ケ	コ	サ	シ	ス	セ	ソ
C0h	タ	チ	ツ	テ	ト	ナ	ニ	ヌ	ネ	ノ	ハ	ヒ	フ	ヘ	ホ	マ
D0h	ミ	ム	メ	モ	ヤ	ユ	ヨ	ラ	リ	ル	レ	ロ	ワ	ン	゛	゜
E0h	↑	↓	←	→	↵	↳	↱	↰	⇤	⇥	”	“	«	»	∴	∵
F0h	≤	≥	≠	≒	‖	⎮	⊥	∞	α	∼	~	≡	∓	♀	⊕	Θ

8.2.5 Slawie

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	ů	ć	ç	ļ	ë	õ	õ	î	ź	ä	ć
90h	é	Ĺ	í	ô	ö	Ľ	ĭ	ś	ś	Ö	Ü	ť	ť	ł	x	č
A0h	á	í	ó	ú	ą	ą	ž	ž	ę	ę		ź	č	ş	«	»
B0h	▒	▒	▓	▏	┤	á	â	ě	ş					ŧ	ŧ	
C0h					─	┼	ă	ă						═		¤
D0h	đ	đ	ď	ë	ď	ň	í	î	ě			▉	▄	ţ	ů	▀
E0h	ó	β	ô	ń	ń	ň	š	š	ŕ	ú	ŕ	ũ	ý	ý	ţ	´
F0h	–	˜	˛	ˇ	˘	§	÷	˚	°	¨	˙	ũ	ř	ř	■	

8.2.6 Russia

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	А	Б	В	Г	Д	Е	Ж	З	и	Й	К	Л	М	Н	О	П
90h	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
A0h	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
B0h																
C0h																
D0h																
E0h	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	Э	ю	я
F0h	∂	Ғ	Қ	Ң	θ	Ұ	Ү	Һ	∂	ғ	қ	ң	θ	ұ	Ү	

8.2.7 CP-860 (Portuguese)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ã	à	Á	ç	ê	Ê	è	Í	Ô	ì	Ã	Â
90h	É	À	È	ô	õ	ò	Ú	ù	Ì	Õ	Ü	¢	£	Ù	₧	Ó
A0h	á	í	ó	ú	ñ	Ñ	ª	º	¿	Ò	¬	½	¼	¡	«	»
B0h	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0h	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	ø	ϵ	∩
F0h	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	

8.2.8 Greek

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O	Π
90h	P	Σ	T	Y	Φ	X	Ψ	Ω	α	β	γ	δ	ε	ζ	η	θ
A0h	ι	κ	λ	µ	ν	ξ	ο	π	ρ	σ	ς	τ	υ	φ	χ	ψ
B0h																
C0h																
D0h																
E0h	ω															
F0h										£				-		

8.2.9 CP-852 (Hungary)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	ů	ć	ç	ł	ë	Ő	ő	î	Ź	Ä	Ć
90h	É	Ĺ	Í	ô	ö	Ľ	ľ	Ś	ś	Ö	Ü	Ť	ť	Ł	x	č
A0h	á	í	Ó	ú	Ą	ą	Ž	ž	Ę	ę	¬	ź	Č	ş	«	»
B0h	░	▒	▓	│	┤	Á	Â	Ě	Ş	╣	║	╗	╝	ż	ż	┐
C0h	└	┴	┬	├	─	┼	Ă	ă	╚	╔	╩	╦	╠	═	╬	¤
D0h	đ	Đ	Ď	Ë	ď	Ň	Í	Î	ě	┘	┌	█	▄	Ţ	Ů	▀
E0h	Ó	ß	Ô	Ń	ń	ň	Š	š	Ŕ	Ú	ŕ	Ű	ý	Ý	ţ	´
F0h		˜	˛	ˇ	˘	§	÷	¸	°	¨	˙	ũ	Ř	ř	■	

8.2.10 CP-862 (Hebrew)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	ם	מ	ן
90h	נ	ס	ע	ף	פ	ץ	צ	ק	ר	ש	ת	¢	£	¥	Pts	*ƒ*
A0h	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	»
B0h	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0h	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0h	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	

8.2.11 CP-863 (Canadian- French)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	Â	à	¶	ç	ê	ë	è	ï	î	=	Ä	§
90h	É	È	Ê	ô	Ë	Ï	û	ù	¤	Ô	Ü	¢	£	Ù	Û	*ƒ*
A0h	¦	í	‘	ó	ú	¨	¸	¯	Î	⌐	¬	½	¼	¾	«	»
B0h	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0h	α	ß	Γ	π	Σ	σ	µ	τ	Φ	Θ	Ω	δ	∞	φ	ε	∩
F0h	≡	±	≥	≤	⌠	⌡	÷	≈	°	∙	·	√	ⁿ	²	■	

8.2.12 CP-865 (Nordic)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ç	ü	é	â	ä	à	å	ç	ê	ë	è	ï	î	ì	Ä	Å
90h	É	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	Pt	*ƒ*
A0h	á	í	ó	ú	ñ	Ñ	ª	º	¿	⌐	¬	½	¼	¡	«	¤
B0h	░	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	█	▄	▌	▐	▀
E0h	α	ß	Γ	π	Σ	σ	µ	τ	Φ	θ	Ω	δ	∞	ø	ε	∩
F0h	≡	±	≥	≤	⌠	⌡	÷	≈	°	•	·	√	ⁿ	²	■	

8.2.13 CP-866 (Cyrillic)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
90h	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
A0h	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
B0h	▒	▒	▓	│	┤	╡	╢	╖	╕	╣	║	╗	╝	╜	╛	┐
C0h	└	┴	┬	├	─	┼	╞	╟	╚	╔	╩	╦	╠	═	╬	╧
D0h	╨	╤	╥	╙	╘	╒	╓	╫	╪	┘	┌	▀	▄	▌	▐	■
E0h	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я
F0h	Ё	ё	Є	є	Ї	ї	Ў	ў	°	∙	·	√	№	¤	■	

8.2.14 Windows-1250

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	€		‚		„	…	†	‡		‰	Š	‹	Ś	Ť	Ž	Ź
90h		‘	’	“	”	•	–	—		™	š	›	ś	ť	ž	ź
A0h		ˇ	˘	Ł	¤	Ą	¦	§	¨	©	Ş	«	¬		®	Ż
B0h	°	±	˛	ł	´	µ	¶	·	¸	ą	ş	»	Ľ	˝	ľ	ż
C0h	Ŕ	Á	Â	Ă	Ä	Ĺ	Ć	Ç	Č	É	Ę	Ë	Ě	Í	Î	Ď
D0h	Đ	Ń	Ň	Ó	Ô	Ő	Ö	×	Ř	Ů	Ú	Ű	Ü	Ý	Ţ	ß
E0h	ŕ	á	â	ă	ä	ĺ	ć	ç	č	é	ę	ë	ě	í	î	ď
F0h	đ	ń	ň	ó	ô	ő	ö	÷	ř	ů	ú	ű	ü	ý	ţ	˙

8.2.15 Windows-1251 (Cyrillic)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	Ђ	Ѓ	‚	ѓ	„	…	†	‡	€	‰	Љ	‹	Њ	Ќ	Ћ	Џ
90h	ђ	‘	’	“	”	•	–	—		™	љ	›	њ	ќ	ћ	џ
A0h		Ў	ў	Ј	¤	Ґ	¦	§	Ё	©	Є	«	¬		®	Ї
B0h	°	±	І	і	ґ	µ	¶	·	ё	№	є	»	ј	Ѕ	ѕ	ї
C0h	А	Б	В	Г	Д	Е	Ж	З	И	Й	К	Л	М	Н	О	П
D0h	Р	С	Т	У	Ф	Х	Ц	Ч	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я
E0h	а	б	в	г	д	е	ж	з	и	й	к	л	м	н	о	п
F0h	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь	э	ю	я

8.2.16 Windows-1252 (West European Latin)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	€		‚	ƒ	„	…	†	‡	ˆ	‰	Š	‹	Œ		Ž	
90h		‘	’	“	”	•	–	—	˜	™	š	›	œ		ž	Ÿ
A0h		¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬		®	¯
B0h	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C0h	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D0h	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
E0h	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F0h	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

□晴恒□ 帟□□3 (Greek)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	€		‚	ƒ	„	…	†	‡		‰		‹				
90h		‘	’	“	”	•	–	—		™		›				
A0h		΅	Ά	£	¤	¥	¦	§	¨	©		«	¬	–	®	―
B0h	°	±	²	³	΄	µ	¶	·	Έ	Ή	Ί	»	Ό	½	Ύ	Ώ
C0h	ΐ	Α	Β	Γ	Δ	Ε	Ζ	Η	Θ	Ι	Κ	Λ	Μ	Ν	Ξ	Ο
D0h	Π	Ρ		Σ	Τ	Υ	Φ	Χ	Ψ	Ω	Ϊ	Ϋ	ά	έ	ή	ί
E0h	ΰ	α	β	γ	δ	ε	ζ	η	θ	ι	κ	λ	μ	ν	ξ	ο
F0h	π	ρ	ς	σ	τ	υ	φ	χ	ψ	ω	ϊ	ϋ	ό	ύ	ώ	

8.2.18 Windows-1255 (Hebrew)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	€		‚	ƒ	„	…	†	‡	ˆ	‰		‹				
90h		‘	’	“	”	•	–	—	˜	™		›				
A0h		¡	¢	£	₪	¥	¦	§	¨	©	×	«	¬	–	®	¯
B0h	°	±	²	³	´	µ	¶	·	¸	¹	÷	»	¼	½	¾	¿
C0h	ְ	ֱ	ֲ	ֳ	ִ	ֵ	ֶ	ַ	ָ	ֹ		ֻ	ּ	ֽ	־	ֿ
D0h	׀	ׁ	ׂ	׃	װ	ױ	ײ	׳	״	,	:	;	.	!	?	
E0h	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	ם	מ	ן
F0h	נ	ס	ע	ף	פ	ץ	צ	ק	ר	ש	ת					

8.2.19 Windows-1257 (Baltic)

	00h	01h	02h	03h	04h	05h	06h	07h	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
80h	€		‚		„	…	†	‡		‰		‹		¨	ˇ	¸
90h		‘	’	“	”	•	–	—		™		›		¯	˛	
A0h			¢	£	¤		¦	§	Ø	©	Ŗ	«	¬	–	®	Æ
B0h	°	±	²	³	´	µ	¶	·	ø	¹	ŗ	»	¼	½	¾	æ
C0h	Ą	Į	Ā	Ć	Ä	Å	Ę	Ē	Č	É	Ź	Ė	Ģ	Ķ	Ī	Ļ
D0h	Š	Ń	Ņ	Ó	Ō	Õ	Ö	×	Ų	Ł	Ś	Ū	Ü	Ż	Ž	ß
E0h	ą	į	ā	ć	ä	å	ę	ē	č	é	ź	ė	ģ	ķ	ī	ļ
F0h	š	ń	ņ	ó	ō	õ	ö	÷	ų	ł	ś	ū	ü	ż	ž	˙

Appendix A - Command Details

A.1. Overwrite mode

In this mode, the cursor will move towards the right and begin from the upper left position. When the cursor has reached the end of the upper line, the cursor will move down to the bottom left position to continue. When the cursor has reached the end of the bottom line, it will move to up the upper left position and overwrite the previous characters.

A.2. Vertical scroll mode

In this mode, the cursor will move towards the right. The cursor will begin from the upper left position until it has reached the end of the upper line. The cursor will then move down to the bottom left position to continue until it has reached the end of the bottom line.

A.3. Horizontal scroll mode

In this mode, the extent of the cursor activity is bound by a predefined range, limited to the upper line. (Please refer to Set or cancel window command), where the default window is the whole upper line. The cursor will begin from the left-end of the range and move rightward until it reached the end of the range, to continue, the characters that comes thereafter will start pushing the previous characters leftward from the right-end, scrolling the characters to the left.

A.4. Set the string display mode and write string to display

Set the string display mode, write to upper or lower line d1 d2 d3 … dn {$1 \leqq n \leqq 20$}. 'A' stands for the upper line, 'B' stands for the lower line. The string display mode will be cancelled and the display will return to the previous mode after receiving CLR or CAN.

A.5. Upper line message continuous scroll

The message (previously defined) will scroll continuously in the horizontal direction until a new command is received.

A.6. Move cursor left

When the current cursor is at the left-end position, this command operates differently depending on the display mode.

- **Overwrite mode:** When the cursor reached the left-end of the lower line, it will continue to the right-end of the upper line, overwrite previous characters. When it reached the left end of the upper line, it will continue to the right-end of the lower line.
- **Vertical scroll mode:** When the cursor reached the left-end of the lower line, the lower line will scroll up and replace the previous upper line, the lower line will be cleared and the cursor will continue to the right end of the lower line.
- **Horizontal scroll mode:** The cursor will remain stationary.

A.7. Move cursor right

Move the cursor to the right. When the cursor has reached the right-end, this command operates differently depending on the display mode.

- **Overwrite mode:** When the cursor has reached the right-end of the lower line, it will continue to the left-end of the upper line and overwrite previous characters. When it has reached the right-end of the upper line, it will continue to the right-end of the lower line.
- **Vertical scroll mode:** When the cursor has reached the right-end of the lower line, the lower line will scroll up to replace the upper line, the lower line is cleared and ready to continue characters thereafter.
- **Horizontal scroll mode:** The cursor will remain stationary.

A.8. Move cursor up

Move the cursor up one line. When the cursor is on the upper line, this command operates differently depending on the display mode.

- **Overwrite mode:** The cursor is moved to the same column the lower line.
- **Vertical scroll mode:** The characters displayed on the upper line is scrolled to the lower line, and the upper line is cleared. The cursor will remain at the same position.
- **Horizontal scroll mode:** The cursor will remain stationary.

A.9. Move cursor down

Move the cursor down one line. When the cursor is on the lower line, this command operates differently depending on the display mode.

- **Overwrite mode:** The cursor is moved to the same column on the upper line.
- **Vertical scroll mode:** The characters displayed on the lower line are scrolled to the upper line, and the lower line is cleared. The cursor will remain at the same position.
- **Horizontal scroll mode:** The cursor will remain stationary.

A.10. Move cursor to home position

The cursor will move to the left-end position of the upper line.

A.11. Move cursor to left-most position

The cursor will be moved to the left-end position of the current line.

A.12. Move cursor to right-most position

The cursor will be moved to the right-end position of the current line.

A.13. Move cursor to bottom position

The cursor will be moved to the right-end position on the lower line.

A.14. Move cursor to specified position

The cursor will be moved to column x on line y.

A.15. Initialize display

The data in the input buffer will be cleared and reset from default.

A.16. Reset the window

Reset the window on the display.
When s=0, the window is cancelled (values: x1, x2, and y are not required.)
When s=1, the window will be reset (values: x1, x2, and y are required.)
The x1 and x2 set the position of the left column and right column, respectively, of the window.
The y sets the upper line or the lower line of the window.
This function is valid within the horizontal mode.

A.17. Clear display screen and clear string mode

All the display characters will be cleared, and the string mode will be cancelled.

A.18. Clear current line and cancel string mode

The current line is cleared, and the string mode is cancelled.

A.19. Brightness adjustment

Adjust the brightness of the vacuum fluorescent display.
When n=3, brightness=70%
When n=4, brightness=100%

A.20. Set cursor ON or OFF

When n=0, cursor is OFF
When n=1, cursor is ON

Appendix B - Control Code Set

HEX	CODE	HEX	CODE
00H	NULL	10H	DLE
01H	SOH, MD1	11H	DC1
02H	STX, MD2	12H	DC2
03H	ETX, MD3	13H	DC3
04H	EOT, MD4	14H	DC4
05H	ENQ, MD5	15H	NAK
06H	ACK, MD6	16H	SYN
07H	BEL, MD7	17H	ETB
08H	BS, MD8	18H	CAN
09H	HT	19H	EM
0AH	LF	1AH	SUB
0BH	VT, HOM	1BH	ESC
0CH	FF, CLR	1CH	FS
0DH	CR	1DH	GS
0EH	SO, SLE1	1EH	RS, SF1
0FH	SI, SLE2	1FH	US, SF2