

# *User's Manual*

# **DSP** 888

*VFD display, 2 x 20 characters  
RS232 + USB interface*



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## Federal Communications Commission (FCC)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

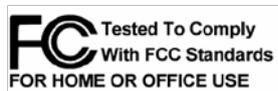
## Declaration of Conformity

These devices comply with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. These devices may not cause harmful interference.
2. These devices must accept any interference received, including interference that may cause undesired operation.

## WEEE (Waste from Electrical and Electronic Equipment)

The WEEE wheeled bin symbol on the product or on its packaging indicates that the product must not be disposed of with other waste. It should be the user's responsibility to dispose of their waste equipment by handing it over to an approved location for the recycling of waste electrical and electronic equipment. For more information about where to send your waste equipment for recycling, please contact your local city office, your household waste disposal service or where you purchased the product.



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## Important Safety Instructions

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Failure to observe these safety instructions may cause bodily injury, or damage to the product. Read these instructions carefully and keep this user's manual in an accessible location for future reference.

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**The product may cause a fire or electric shock when it is used improperly. Observe the above safety measures at all times.**



**If the product is damaged, immediately turn off the power and disconnect the power cord. Contact your dealer for assistance.**

1. Do not plug in or unplug the power cord with wet hands.
  2. Do not plug the product into an AC outlet with the incorrect voltage. (Be sure to use a voltage that is between AC 100V~240V)
  3. Do not plug several products into one multi-outlet.
  4. Do not apply pressure to the power cord or place heavy objects on it.
  5. Immediately stop using the product if it emits strange noise, odor, or smoke.
  6. Do not use aerosol sprayers containing flammable gas inside or around the product.
  7. Do not allow foreign objects or liquids to enter the product, or serious damage may result.
  8. Do not place the product on an unstable surface. The product may cause a fire if it is dropped, damaged, or broken.
- 

The following instructions will help you to make better use of this product.

1. Keep the machine away from locations subject to high humidity, dust, or temperatures that exceed the specification.
2. Clean the product only by using a dry cloth or a cloth soaked with detergent. Never use thinner or other volatile solvents for cleaning.
3. At the end of the day, clean and inspect the exterior of the machine after the machine is powered off.
4. Use only specified accessories.
5. Do not expose the accessories directly to sunlight, high temperatures, humidity, dust, or gas.
6. Do not place heavy objects on top of the product or lean them against the product. These items may fall down and cause injury.  
Do not block the air vent of the product as this can cause heat accumulation inside the box machine and may cause a fire.



# ***Table Of Contents***

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<b>CHAPTER 1 INTRODUCTION .....</b>	<b>2</b>
1.1 Unpacking .....	2
1.2 Features.....	3
1.3 Specification .....	4
<b>CHAPTER 2 INTERFACE.....</b>	<b>5</b>
2.1 Connection to Display Panel .....	5
2.2 DSP-880.....	5
2.3 DSP-880 USB .....	6
2.4 DSP-880 RS232.....	6
<b>CHAPTER 3 INSTALLATION.....</b>	<b>8</b>
3.1 Physical Function.....	8
3.2 Configuration .....	10
3.3 Driver Installation.....	13
<b>CHAPTER 4 CONFIGURE YOUR DEVICE .....</b>	<b>14</b>
4.1 Before starting .....	14
4.2 Configure System Parameters .....	16
4.3 Define Welcome Message .....	18
4.4 Define Your Own Font .....	20
<b>CHAPTER 5 SOFTWARE SETTING COMMAND.....</b>	<b>22</b>
5.1 Baud Rate Setting Command .....	22
5.2 Parity Check Setting Command .....	22
5.3 USB Class Setting Command.....	22
5.4 Command Type Setting Command.....	23
5.5 International Character Set Setting Command.....	23
<b>CHAPTER 6 COMMAND SET .....</b>	<b>24</b>
6.1 ESC/POS Mode Command Set .....	24
6.2 ADM787/788 Mode Command Set .....	26
6.3 EMAX (AEDEX) Mode Command Set.....	27

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6.4	UTC Mode Command Set .....	27
6.5	CD5220 Mode Command Set.....	28
6.6	DSP-800 Mode Command Set .....	31
<b>CHAPTER 7 CHARACTER SET.....</b>		<b>32</b>
7.1	Character Code (20h-7Eh) .....	32
7.2	Character Code Page (80h-FFh).....	33

# CHAPTER 1 INTRODUCTION

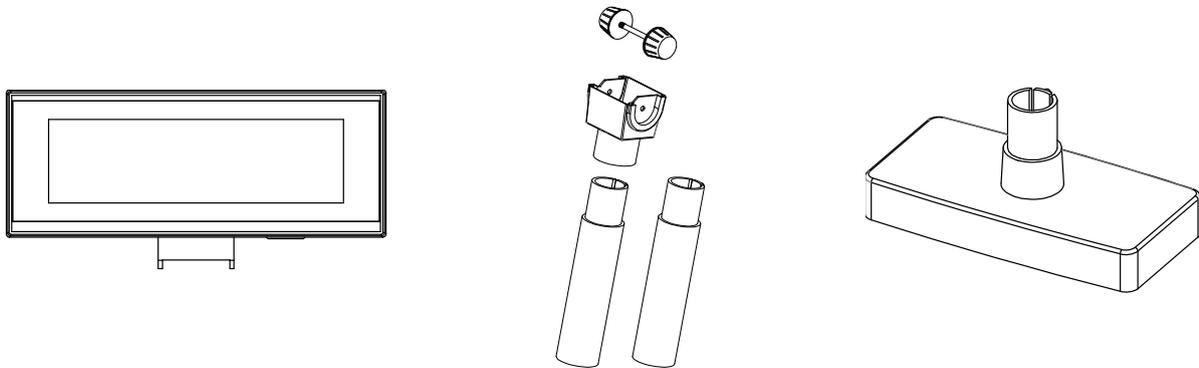
## Welcome

Thank you for choosing the DSP-880 Series Customer Pole Display. The DSP-880 Series is a 20 columns x 2 lines customer Vacuum display with Fluorescent Display panel. VFD emits a very bright light contrast. with high Based on VFD display method, the DSP-880 Series gives a better view of message in bright blue-green display fonts.

## 1.1 Unpacking

Confirm that all the following items are contained in the carton. If any item is missing or damaged, contact the dealer from whom you purchased the product.

■ DSP-880 Series Customer Pole Display Set:



Display Panel

Pole: 120 mm x 2

Stand Base

■ Accessory Kit:



Quick Reference Guide

Driver CD  
(User's Manual included)

Dual Interface Cable  
(For DSP-880)



RS232 Cable  
(For DSP-880)



USB Cable  
(For DSP-880)

## 1.2 Features

1. Vacuum Fluorescent Display
2. Eye-catching bright blue-green display font
3. Unique panel design to vitalize your retail interior.
4. Supports 14 language characters, including those from the USA, France, Germany, UK, Sweden, Denmark I and II, Italy, Spain, Norway, Greek, Slavonic, Russian and Portuguese.
5. Provides 6 command modes: EPSON ESC/POS, ADM787/788, UTC/S, UTC/P, EMAX (AEDEX), CD5220 and DSP-800.
6. The wide-range of power supplies input to prevent misuse.
7. Low power consumption achieves optimal energy use and reliability.
8. Innovative hinge design for quick panel adjustment.
9. User-programmable for all fonts and customer messages.
10. Hardware Interface:
  - Standard
  - Full speed data transfer using the USB 2.0 protocol.
  - RS-232C Interface with baud rates selectable from 9600 to 115200 bps.
11. Mechanical:
  - Provides a wide range of rotation and tilt angles.
  - Selectable pole length for best position installation.

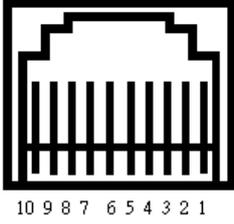
## 1.3 Specification

<b>Model</b>	<b>DSP-880 Series</b>
Display Method	Vacuum Fluorescent Display (VFD)
Number of Characters	40 characters (20 columns x 2 lines)
Display Color	Blue-green
Brightness	700 cd/m <sup>2</sup>
Font	I. 96 alphanumeric II. 14 sets of international characters: USA, France, Germany, UK, Sweden, Denmark I and II, Italy, Spain, Norway, Japan (Katakana), Slavonic, Russian and Portuguese III. One set of user downloadable characters
Character Size	5x7 Dot Matrix 9.03 mm x 5.25 mm
Command Set	1. EPSON ESC/POS 2. ADM787/788 3. EMAX (AEDEX) 4. UTC/S, UTC/P 5. CD5220 6. DSP-800
Interface	Dual Interface (USB+RS232C) / USB / RS232C
Power Supply	DC 5V (via USB or DB9)
Power Consumption	<3W
MTBF	30,000 hrs
<b>Physical Dimension</b>	
Head (W x D x H)	225.5 x 50 x 87 mm
Support (H x Ø)	(120 x 35 mm) X 2
Base (W x D x H)	187 x 92 x 27 mm
Weight	N.W. 0.8kg
<b>Environment</b>	
EMC & Safety	CE/FCC Class A
Operation Temperature	5~45°C
Storage Temperature	-20~70°C
Operation Humidity	15%~80% RH
Storage Humidity	10%~90% RH
<b>Mechanical</b>	
Housing Color	Black

## CHAPTER 2 INTERFACE

### 2.1 Connection to Display Panel

All the DSP-880 Series has RJ-45 connector to display end. Connector Type: 10 Pin Phone Jack Pin assignment

Pin No.	Signal	I/O	Function	Illustration
1	GND	-	Ground	
2	USB		Data -	
3	USB		Data +	
4	USB		VBUS	
5	TXD	Output	Transmit Data	
6	DSR	Output	Data Set Ready	
7	RXD	Input	Receive Data	
8	DTR	Input	Data Terminal Ready	
9	VIN	Input	+5V	
10	GND	-	Ground	

### 2.2 DSP-880

#### ■ RS232C Type

Data transmission	Serial
Synchronization	Asynchronous
Handshaking	None
Signal level	MARK = -3 to -15V (logical "1" OFF) SPACE = +3 to +15V (logical "0" ON)
Baud rate	9600, 19200, 38400, 115200 bps
Parity	None, Even
Bit length (Data word)	8 bits
Stop bits	1 bit

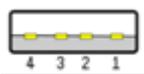
#### ■ USB Type

The DSP-880 Series is compatible to the High-speed USB 2.0 protocol which has a raw data rate of 12 megabits per second (Mbps).

## 2.3 DSP-880 USB

Connector Type: USB 2.0 B Type

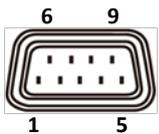
Pin assignment

Pin No.	Signal	Illustration
Pin 1	VCC	 Type A
Pin 2	Data -	
Pin 3	Data +	
Pin 4	GND	

## 2.4 DSP-880 RS232

Connector Type: D-sub 9Pin (Female)

Pin assignment

Pin No.	Signal	I/O	Function	Illustration
2	TXD	Output	Transmit Data	
3	RXD	Input	Receive Data	
4, 7	DTR/RTS	Output	Data Terminal Ready	
5	GND	-	Ground	
6,8	DSR/CTS	Input	Data Set Ready	

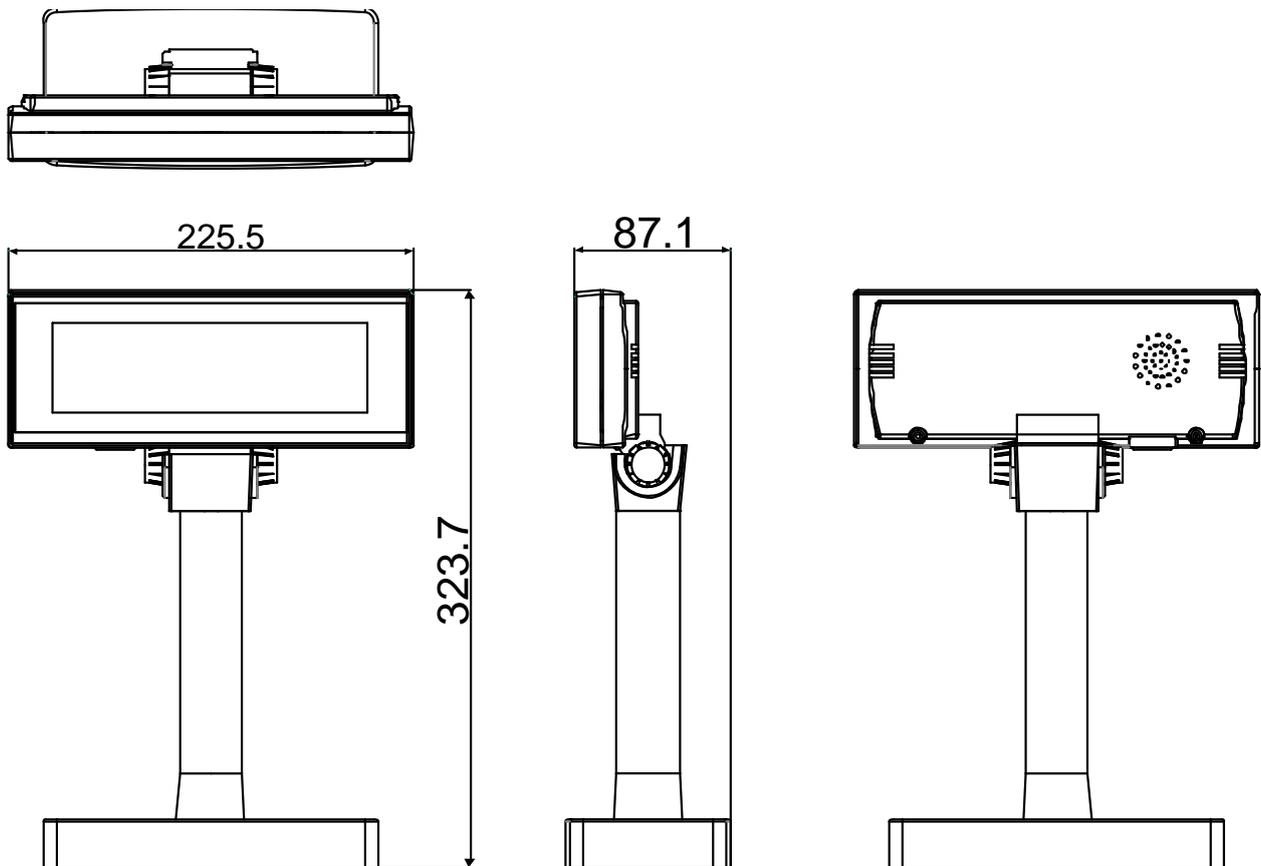
**NOTE:** PIN9 DC input is necessarily required when DB9 functions as power source.



## CHAPTER 3 INSTALLATION

The DSP-880 Series Customer Pole Display is easy to install by following the instructions in this chapter. No special training or tools are necessary. As this manual contains required information on the installation and programming of DSP-880 Series Customer Pole Display, it is recommended that you read the entire manual carefully prior to initiating installations.

### 3.1 Physical Function



#### 3.1.2 Assembling

Insert the RJ45 end of the dual interface cable through the base and the pipe then into the panel and connect to the RJ45 slot. You can extend the pole to the desired height by attaching the extension pole for different heights:

Low 200 (mm), Mid 323.7 (mm) and Highest 443.7 (mm).

**NOTE: Attach the joint of the extension pole or stand base to the Display Panel until it is properly locked.**

**ATTENTION**

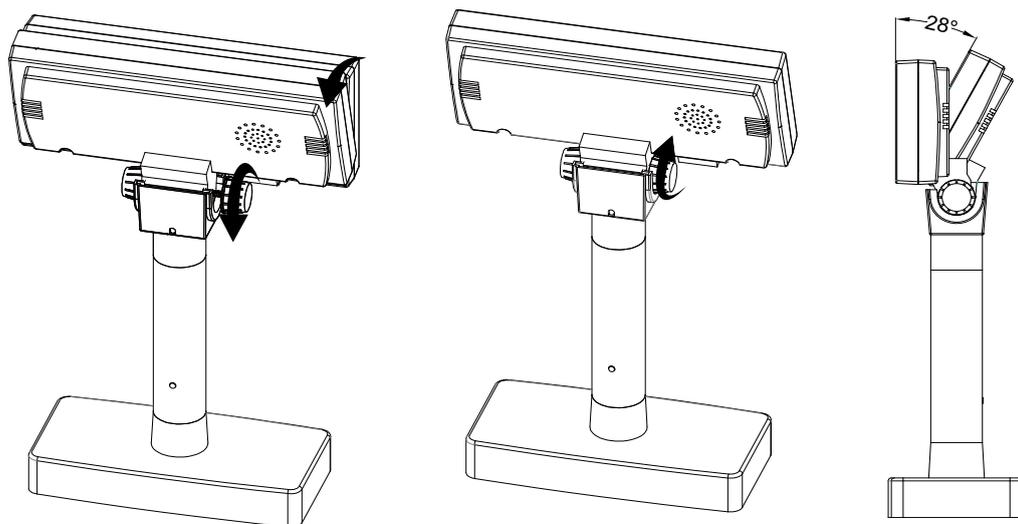
- (1) Violently rotating the Display Panel may cause damages of the Display Panel.
- (2) Secure the Display Panel properly after attaching the extension pole to a desired height.

**3.1.4 Angling**

This product allows 0~28 degree tilt angle adjustment. The Display Panel can be easily tilted to the desired position by using a hinge design.

**How to Adjust**

- (1) Locate the hinge section on the backside of Display Panel.
- (2) Pull the tab downward and tilt the panel up or down to the desired position.



## 3.2 Configuration

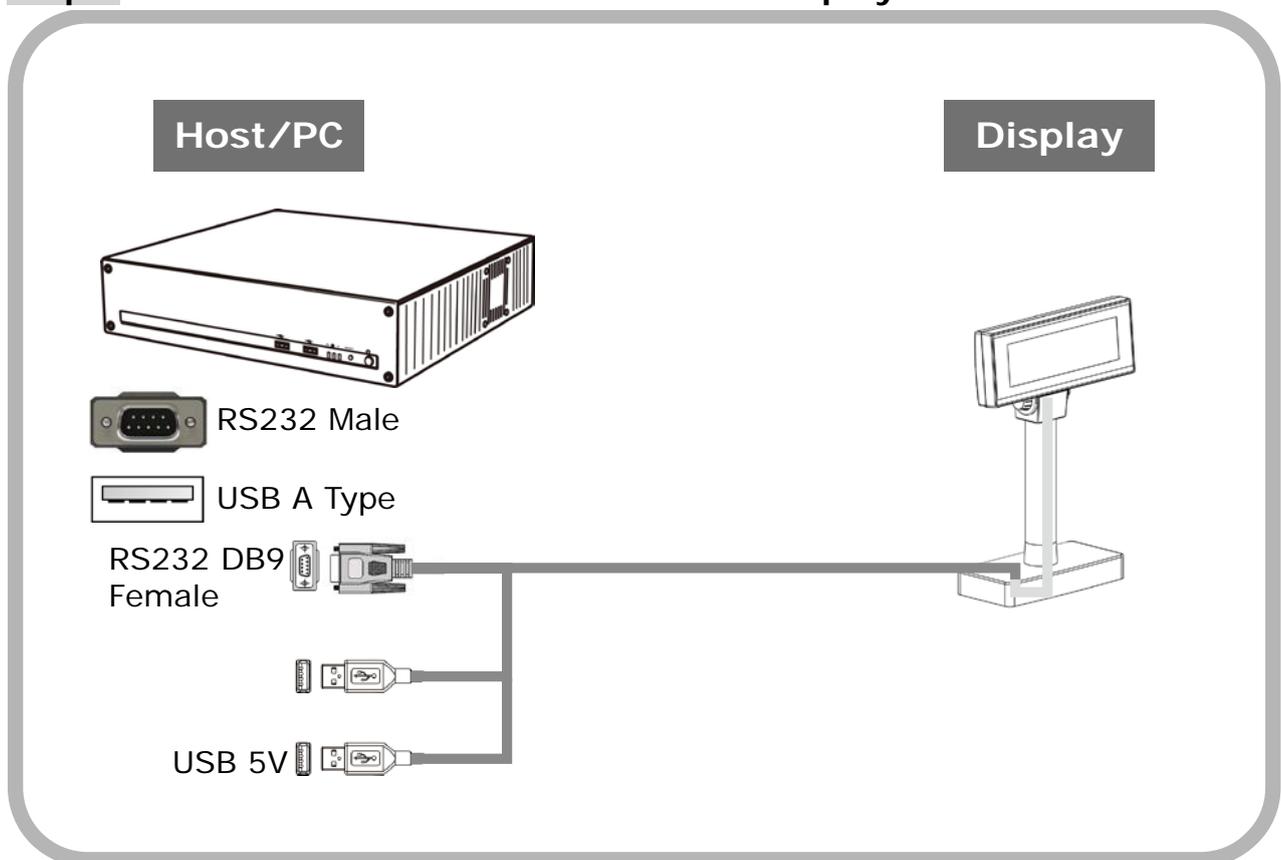
### 3.2.1 Dual Interface Cable Connection

**Step 1 Turn OFF the system power**

Before you start the installation, ensure that the host computer and the DSP-880 Series Customer Pole Display are powered off.

**Step 2 Connect all the dual Interface cable**

**Step 3 Start the host PC and switch on the display.**



**ATTENTION**

With the dual interface cable, the DSP-880 Series is able to be powered only by the USB 5V.

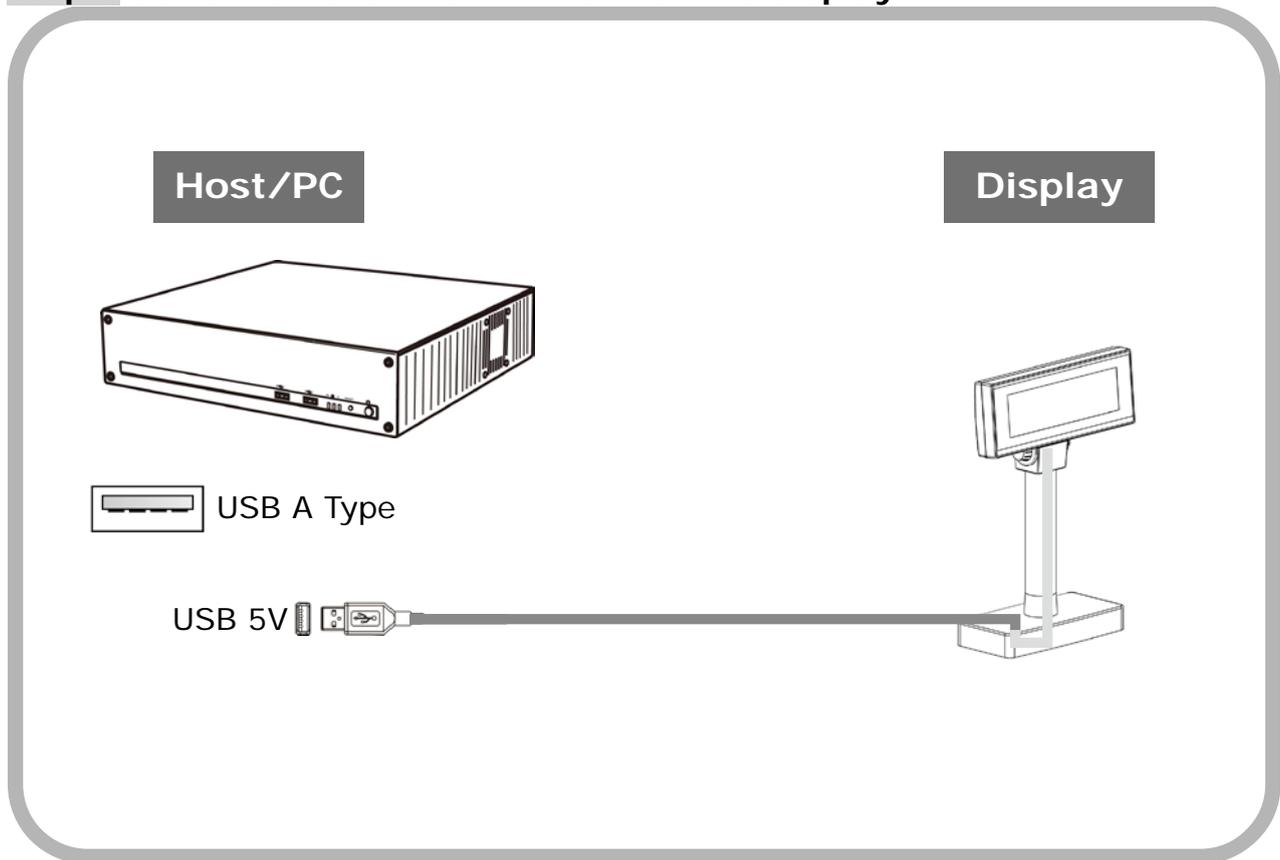
### 3.2.2 USB Connection

#### Step 1 Turn OFF the system power

Before you start the installation, ensure that the host computer and the DSP-880 Series Customer Pole Display are powered off.

#### Step 2 Connect the USB cable

#### Step 3 Start the host PC and switch on the display.



#### **ATTENTION**

With the dual interface cable, the DSP-880 Series is able to be powered only by the USB 5V.

### 3.2.3 RS232 Connection

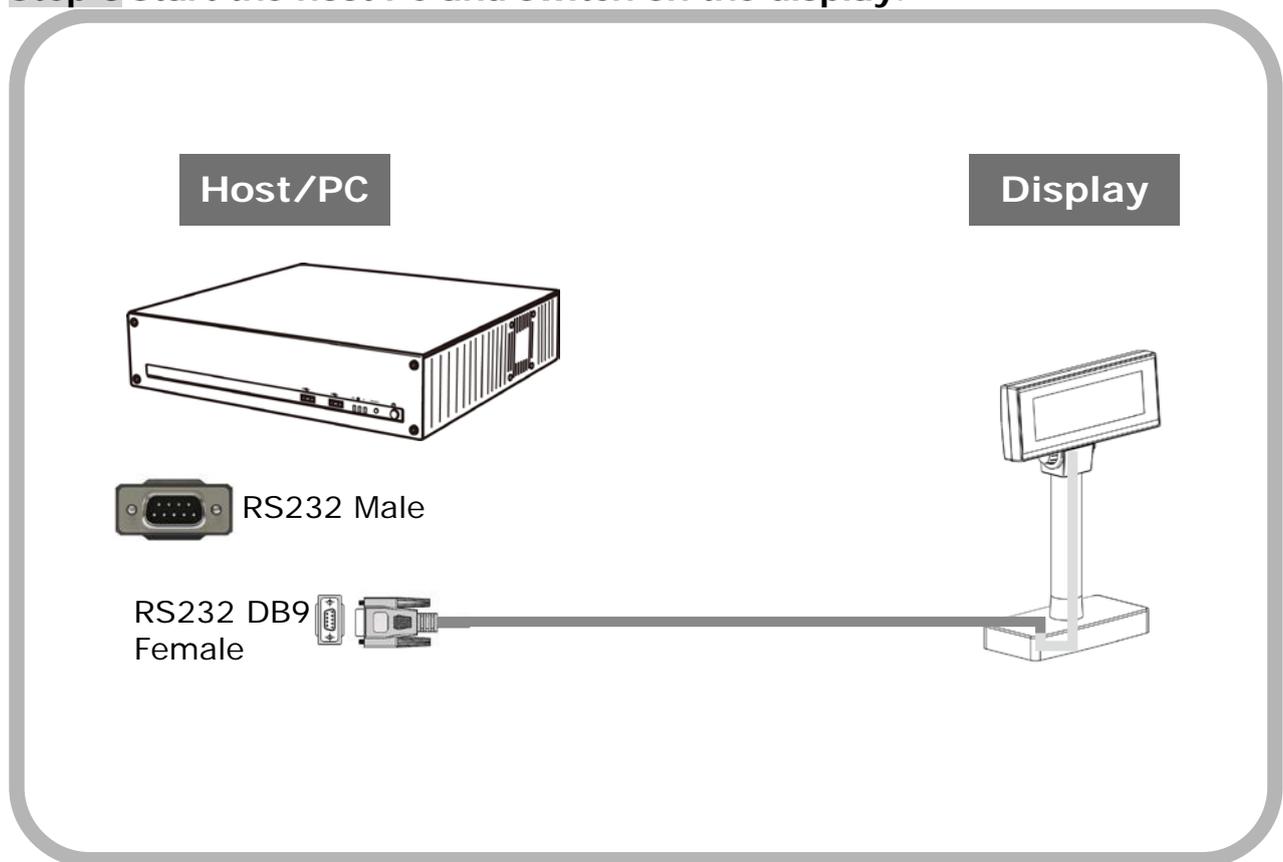
#### Step 1 Turn OFF the system power

Before you start the installation, ensure that the host computer and the DSP-880 Series Customer Pole Display are powered off.

#### Step 2 Connect the RS232 cable

Plug the DB9 Female connector of RS232 cable and make sure the 9th pin of the com port on the PC is powered by 5V.

#### Step 3 Start the host PC and switch on the display.

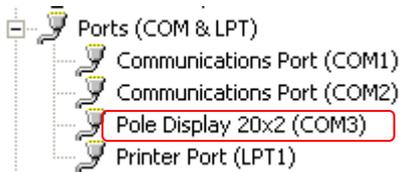


### 3.3 Driver Installation

The firmware for the USB port is divided into CDC class (Virtual COM) and printer class. To recognize which firmware version it is, check the starting status of your customer display as Pic 1a, Pic 1b, Pic 1c.

In case your USB port is in CDC class and your application software is connected by USB port, you must install the driver:

- Click CDC Class as Pic 2.
- check the device manager to find the COM port number as below.



If your Application Software needs to install the printer mode driver:

- Click Printer Class as Pic 3 and select:
- Serial/Virtual for COM Connection.
- USB for USB Connection.



Pic 1a



Pic 1b



Pic 1c



Pic 2



Pic 3

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## CHAPTER 4 CONFIGURE YOUR DEVICE

The system parameters of DSP-880 Series can be set by using VFD Utility software tool. You can find the tool in the companion disk. In addition to setting system parameters, you can configure welcome message and user font with the software tool. The system parameters include the following items.

- Language Character Set
- Command Type
- Baud rate
- Parity Check

### 4.1 Before starting

Before starting the software, please make sure the DSP-880 Series is connected to your PC and it works. If you use USB interface or device driver, please install device driver before starting the software. If the connection is OK, execute the software.

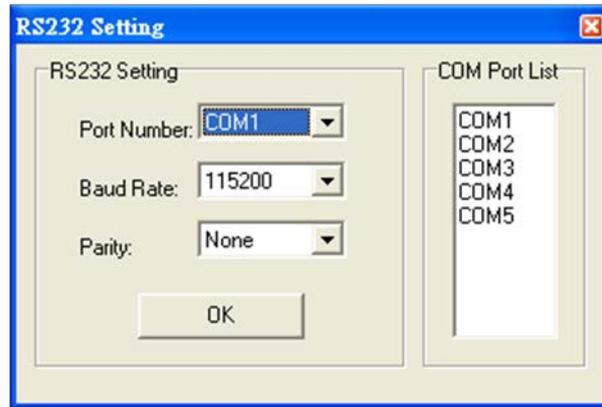
#### 4.1.1 Select a proper interface

After starting the software, the following dialog will pop up. Select a proper interface.



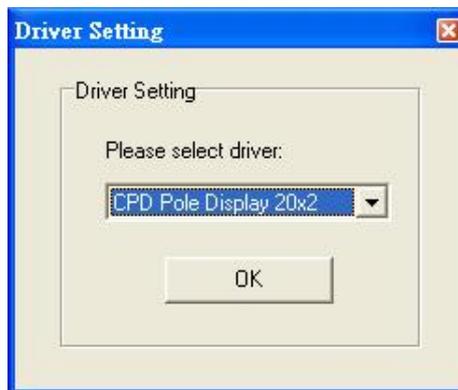
### 4.1.2 RS-232 Interface

If you select the item COM port (RS232 only), the dialog of RS-232 setting will show up to configure the RS-232 interface. Please make sure the parameters that you type here are the same as the settings of your host PC. If the parameters aren't the same, the communication between host PC and your machine will fail.



### 4.1.3 Selecting Device Driver

Please select your device from the pull-down list on following dialog. If the device driver is installed, your device shall be shown on the list.

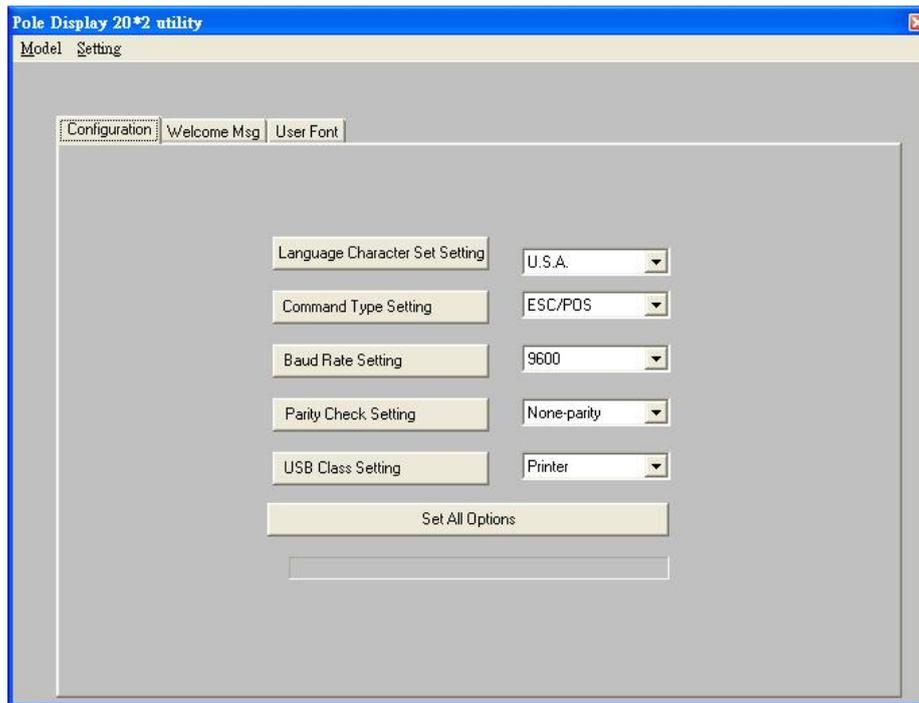


### 4.1.4 Select Model Name

Before continue, please select a proper model name that matches with your device's model. The model name can be selected on the upper-right corner of the window. If the model name does not match with your device, the configuration may not take effect.

## 4.2 Configure System Parameters

There are three pages on the main dialog. The first one is the Configuration Page. You can select desired character type, command set and baud rate of RS-232 interface. After all items are set to desired condition, press SET button to send all the settings to your device. These settings will be stored on the non-volatile memory. Every time when you start the device, these settings will be retrieved from non-volatile memory.



### 4.2.1 Command Type

The DSP-880 Series supports up to 8 command sets. They are listed on the following table. Please select one from the pull-down list.

Command Type	Default
EPSON ESC/POS	*
DSP-800	
ADM787/788	
EMAX(AEDEX)	
UTC/S	
UTC/P	
CD5220	
Reserved	

### 4.2.2 Language Character Set Selection

The DSP-880 Series supports the following language character set. Please refer to following table for character code page.

Character Set(20h-7Fh)	Code Table (80H-FFH)	Default
U.S.A	PC-437 (USA, Standard Europe)	*
France	PC-858	
Germany		
U.K.		
Denmark I		
Sweden		
Italy		
Spain		
Reserved		
Norway	PC-858	
Denmark II		
U.S.A	Slavonic	
U.S.A	Russia	
U.S.A	PC-860 (Portuguese)	
U.K.	Greek	
U.S.A	PC850	
U.S.A	PC852	
U.S.A	PC863	
U.S.A	PC865	
U.S.A	WPC1252	
U.S.A	WPC1255	
U.S.A	WPC1257	
Japan	Katakana	
User Font		

### 4.2.3 Baud Rate Selection

Baud Rate (bps)	Default
9600	*
19200	
38400	
115200	

### 4.2.4 Parity Check Selection

Parity Check	Default
None-parity	*
Even-parity	

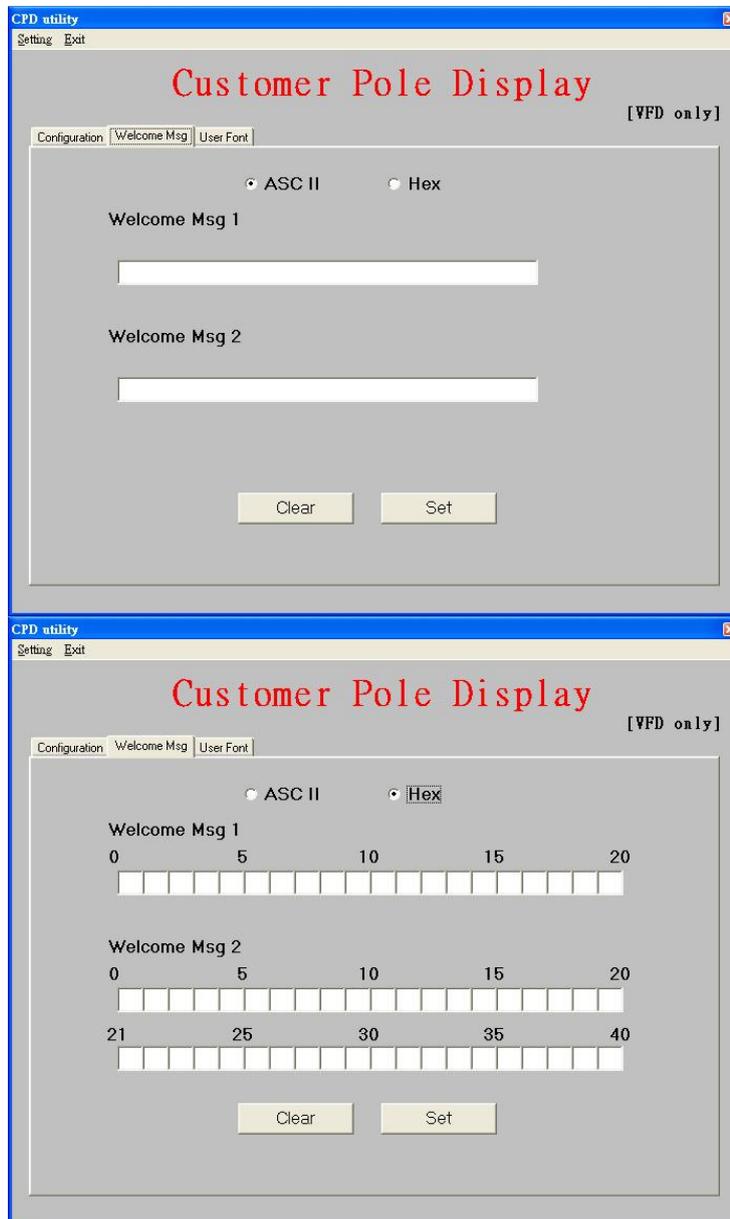
### 4.2.5 USB Class Selection

USB Class	Default
Printer class	*
CDC class	

## 4.3 Define Welcome Message

You can define your own message in the display. The Msg1 will blink on upper line while the Msg2 is displayed on lower line in marquee status.

You can type the character on keyboard in ASCII mode or type others in Hex mode. Press Set button to send the messages to the machine.

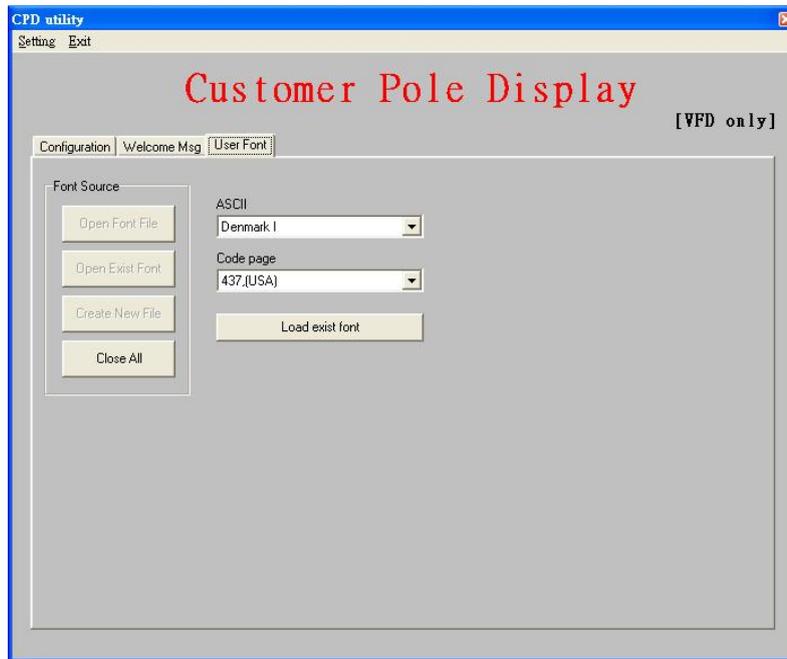


## 4.4 Define Your Own Font

You can create your own font and download it with the software tool. There are three ways to create the font:

### 4.4.1 From an Existing Font

You can see the following dialog by pressing “Open Exist Font” button. Please select a font to be your font base and modify it to fit your requirement.



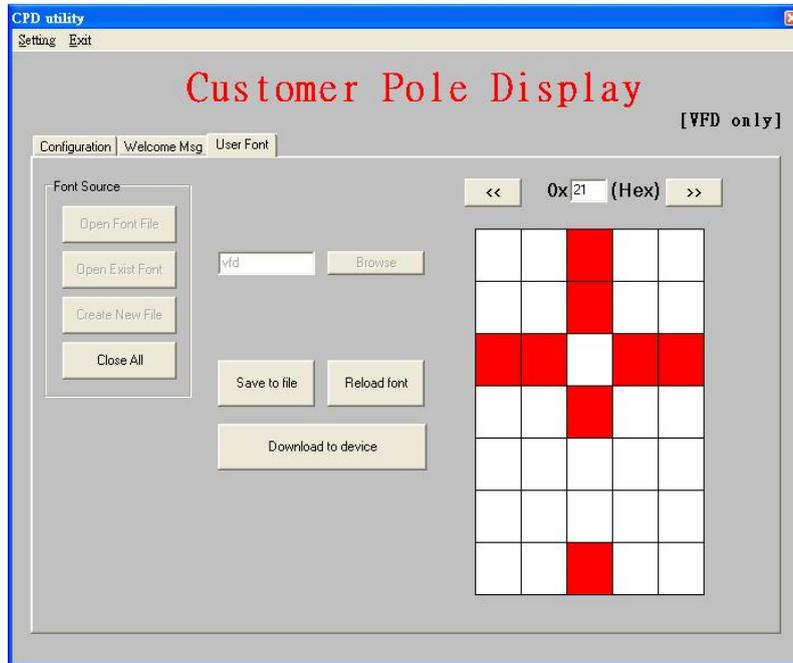
1, The first part is ASCII code which contains the characters coded as 0x20~0x7f. Within the ASCII, some of characters own different definition in different country. Please refer to the user’s manual for the details of the code table.

2, The second part is 0x80~0xff which is the range that code page refer to. You can select a desired code page from the list as a base of your font.

After selecting these existing font, press “Load Existing Font” and the font will be loaded into system memory. Once you finish editing font, you can choose either to save your font to a file by pressing “Save to file” or download your font to device by pressing “Download to device”. If you want to quit current modification, you can press “Reload font” button to load the font again. All your modification will be lost after reloading font. Press “Reset” button also let you abandon current modification and restart the whole operation.

### 4.4.2 From Your Font File

You can modify previously edited and saved font file. Press "Open Font File" button the following dialog will be shown. After select a file, the font contained in that file will be loaded into memory. Then, you can edit font, save font to a file or download the font to device.



### 4.4.3 From your scratch

If you want to build your font from scratch, press "Create New File" button to create an empty font. After finishing your edit, you can save font to a file or download the font to device. It is a difficult job to build font from zero. It is recommended to build your font from existing font.

## CHAPTER 5 SOFTWARE SETTING COMMAND

User can re-set the default configuration by using the following software commands:

### 5.1 Baud Rate Setting Command

**STX 05 B n ETX** Change the baud rate  
 ASCII Format STX 05 B n ETX STX 05 E N ETX  
 Dec. Format [02][05][66] n [03] [02] [05] [49] [78] [03]  $49 \leq n \leq 51$   
 Hex. Format [02h][05h][42h] n [03h][02h][05h][45h][4eh][03h]  $31h \leq n \leq 33h$   
 Description Change the display communication baud rate. The baud rate setting can be selected from 9600~115200 bps.

N	Baud rate
30h	115200
31h	38400
32h	19200
33h	9600

### 5.2 Parity Check Setting Command

**STX 05 P n ETX** Change the parity check  
 ASCII Format STX 05 P n ETX STX 05 E N ETX  
 Dec. Format [02][05][80] n [03] [02] [05] [69] [78] [03]  $n=48,49$   
 Hex. Format [02h][05h][50h] n [03h][02h][05h][45h][4eh][03h]  $n=30h,31h$   
 Description

n	Parity check
30h	None parity
31h	Even parity

### 5.3 USB Class Setting Command

**STX 05 U n ETX** Change the USB class  
 ASCII Format STX 05 U n ETX STX 05 E N ETX  
 Dec. Format [02][05][85] n [03] [02] [05] [69] [78] [03]  $n=48,49$   
 Hex. Format [02h][05h][55h] n [03h][02h][05h][45h][4eh][03h]  $n=30h,31h$   
 Description

n	USB class
30h	Printer class
31h	CDC class

## 5.4 Command Type Setting Command

STX 05 C n ETX	Change the command type
ASCII Format	STX 05 C n ETX STX 05 E N ETX
Dec. Format	[02][05][67] n [03] [02] [05] [69] [78] [03] n=49,51,55
Hex. Format	[02h][05h][43h] n [03h][02h][05h][45h][4eh][03h] n=31h,33h,37h
Description	Change the command type and initialize the display

n	Command type	n	Command type
31h	ESC/POS	35h	UTC/P
32h	ADM787/788 (option)	36h	UTC/S
33h	DSP-800 (option)	37h	CD5220
34h	EMAX (AEDEX)		

## 5.5 International Character Set Setting Command

STX 05 S n ETX	Change the International character set
ASCII Format	STX 05 S n ETX STX 05 E N ETX
Dec. Format	[02][05][83] n [03] [02] [05] [69] [78] [03] $48 \leq n \leq 63$
Hex. Format	[02h][05h][53h] n [03h] [02h][05h][45h][4eh][03h] $30h \leq n \leq 3Fh$
Description	Change the display International character set

n	Character Set (20h–7Fh)	Code Table (80H-FFH)
30h	U.S.A.	PC-437 (USA, Standard Europe)
31h	France	PC-858
32h	Germany	
33h	U.K.	
34h	Denmark I	
35h	Sweden	
36h	Italy	
37h	Spain	
38h	Reserved	
39h	Norway	PC-858
3Ah	Denmark II	
3Bh	U.S.A.	Slavonic
3Ch	U.S.A.	Russia
3Dh	U.S.A.	PC-860 (Portuguese)
3Eh	U.K.	Greek
3Fh	User Font	

## CHAPTER 6 COMMAND SET

### 6.1 ESC/POS Mode Command Set

Command	Code (hex)	Function description
HT	09	Move cursor right.
BS	08	Move cursor left.
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 01h ≤ x ≤ 14h, y=01h, 02h	Move cursor to specified position.
CAN	18	Clear cursor line.
CLR	0C	Clear display screen.
US X n	1F 58 n 01h ≤ n ≤ 04h (=brightest)	Brightness adjustment.
US E n	1F 45 n 00h ≤ n ≤ FFh	Blink display screen.
ESC @	1B 40	Initialize display.
ESC # n	1B 23 n 30h ≤ n ≤ 38h	Command type select
ESC R n	1B 52 n 00h ≤ n ≤ 0Ch	Select international character set. <b>(see Table 5-A)</b>
ESC t n	1B 74 n n=00h, 01h..07h, 10h, 13h,0Ah~0Dh	Select character code table. <b>(see Table 5-B)</b>
US r n	1F 72 n n=00h, 01h	Select/Cancel reverse character. n=01 select, n=00 cancel
US # n m	1F 23 n m n=00h, 01h, 01h < m ≤ 14h	Turn annunciator on/off n=01 on, n=00 off
US C n	1F 43 n n=00h, 01h	Set cursor on/off n=01 on, n=00 off
US MD1	1F 01	Specify overwrite mode.
US MD2	1F 02	Specify vertical scroll mode.
US MD3	1F 03	Specify horizontal scroll mode.
US @	1F 40	Execute self-test.
US . n	1F 2E n	Specify period

	n=a displayable character code	
US , n	1F 2C n n=a displayable character code	Specify comma
US ; n	1F 3B n n=a displayable character code	Specify semicolon (period + comma)
ESC & s n m [a(p1..pa)]x m-n+1	1B 26 1 n m [a(p1..pa)]x m-n+1 $21h \leq n \leq m \leq FFh$ ; $1 \leq a \leq 5$ p1..p5=row1...row5	Define download characters.
ESC ? n	1B 3F n $21h \leq n \leq FFh$	Delete download characters.
ESC % n	1B 25 n n=00h, 01h	Select/cancel download character set. n=01 select, n=00 cancel
ESC W n s x1 y1 x2 y2	1B 57 n s x1 y1 x2 y2 $1 \leq n \leq 4$ , s=00h,01h $01h \leq x1 \leq x2 \leq 14h$ $01h \leq y1 \leq y2 \leq 02h$	Specify/cancel the window range. s=01 specify, 00 cancel n=select the window x= column position y= row position
ESC = n	1B 3D n n=01h, 02h, 03h	Select peripheral device. n=01h, select printer n=02h, select display n=03h, select printer + display
US :	1F 3A	Set starting/ending position of macro definition.
US ^ n m	1F 5E n m $00h \leq n \leq FFh$ $00h \leq m \leq FFh$	Execute and quit macro. n=word time m=show string time
US T h m	1F 54 h m $00h \leq h \leq 17h$ $00h \leq m \leq 3bh$	Display time
US U	1F 55	Display time continuously
US V n	1F 56 n $00h \leq n \leq 01h$	Status confirmation by DTR signal

n	International Font
00	U.S.A.
01	France
02	Germany
03	U.K.
04	Denmark I
05	Sweden
06	Italy
07	Spain
08	Japan
09	Norway
0A	Denmark II
0B	Slavonic
0C	Russia

Table 5-A Select International font

n	Code Table (80H-FFH)
00	Page 0, (PC437, USA standard Euro)
01	Page 1, (Green)
02	Page 2, (PC850, Multilingual)
03	Page 3, (PC860, Portuguese)
04	Page 4, (PC863, Canadian-French)
05	Page 5, (PC865, Nordic)
06	Page 6, (Slavonic)
07	Page 7, (Russian)
13h	Page 19, (PC858, +Euro symbol)
10h	Page 16, (WPC1252)
0A	Page 10, (Katakana)
0B	Page 11, (PC852)
0C	Page 12, (WPC1255)
0D	Page 13, (WPC1257)

Table 5-B Select code table

## 6.2 ADM787/788 Mode Command Set

Command	Code (hex)	Function Description
CLR	0C	Clear display
CR	0D	Carriage return
SLE1	0E	Clear filed 1 (upper-left line) and move cursor to the first position
SLE2	0F	Clear filed 2 (bottom-left line) and move cursor to the first position
DC0	10 n 31H ≤ n ≤ 37H	Set the period to the upper line last n position
DC1	11 n n=31h, 32h	Set line blinking, n=31h upper line; n=32h bottom line
DC2	12 n n=31h, 32h	Clear line blinking, n=31h upper line; n=32h bottom line
SF1	1E	Clear field 3 (upper-right line) and move cursor to the first position

SF2	1F	Clear field 4 (bottom-right line) and move cursor to the first position
-----	----	---

## 6.3 EMAX (AEDEX) Mode Command Set

Command	Code (hex)	Function Description
! # 1 ... CR	21 23 31 [d1, d2...dn] 0D $1 \leq n \leq 20$	Upper line display
! # 2 ... CR	21 23 32 [d1, d2...dn] 0D $1 \leq n \leq 20$	Bottom line display
! # 4 ... CR	21 23 34 [d1, d2...dn] 0D $1 \leq n \leq 40$	Upper line message scroll continuously
! # 5 ... CR	21 23 35 h1h2 ":" m1m2 0D ":"=3A $30h \leq h1 \leq 32h; 30h \leq m1 \leq 35h$ $30h \leq h2, m2 \leq 39h$	Display time h=hour m=minute
! # 6 ... CR	21 23 36 [d1, d2...dn] 0D $1 \leq n \leq 64$	Upper line message scroll once pass
! # 8 ... CR	21 23 38 n m 0D $20h \leq n, m$	Change attention code
! # 9 ... CR	21 23 39 [d1, d2...dn] 0D $1 \leq n \leq 40$	Two line display

## 6.4 UTC Mode Command Set

### UTC/S (STANDARD)

Command	Code (hex)	Function Description
BS	08	Back space
HT	09	Horizontal tab
LF	0A	Line feed
CR	0D	Carriage return
DLE	10 n $00h \leq n \leq 27h$	Display cursor position
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

**UTC/P (ENHANCED)**

Command	Code (hex)	Function Description
ESC u A ....CR	1B 75 41 [d1, d2...dn] 0D $1 \leq n \leq 20$	Upper line display
ESC u B ....CR	1B 75 42 [d1, d2...dn] 0D $1 \leq n \leq 20$	Bottom line display
ESC u D ....CR	1B 75 44 [d1, d2...dn] 0D $1 \leq n \leq 40$	Upper line message scroll continuously
ESC u E ....CR	1B 75 45 h1h2 ":" m1m2 0D ":"=3A $30h \leq h1 \leq 32h$ ; $30h \leq m1 \leq 35h$ $30h \leq h2 \leq 34h$ , $30h \leq m2 \leq 39h$	Display time hh= hour mm= minute
ESC u F ....CR	1B 75 46 [d1, d2...dn] 0D $1 \leq n \leq 40$	Upper line message scroll once pass
ESC u H ....CR	1B 75 48 n m 0D $20h \leq n, m$	Change attention code
ESC u I ....CR	1B 75 49 [d1, d2...dn] 0D $1 \leq n \leq 40$	Two line display
ESC RS ....CR	1B 0F 0D	Change to UTC standard mode

**6.5 CD5220 Mode Command Set**

Command	Code (hex)	Function description
ESC DC1	1B 11	Overwrite mode
US SOH	1F 01	Overwrite mode
ESC DC2	1B 12	Vertical scroll mode
US STX	1F 02	Vertical scroll mode
ESC DC3	1B 13	Horizontal scroll mode
US ETX	1F 03	Horizontal scroll mode
ESC QA ....CR	1B 51 41 [d1, d2...dn] 0D $1 \leq n \leq 20$	Set the string display mode, write string to upper line <b>(see Note 1)</b>
ESC QB ....CR	1B 51 42 [d1, d2...dn] 0D $1 \leq n \leq 20$	Set the string display mode, write string to bottom line <b>(see Note 1)</b>
ESC QD ....CR	1B 51 44 [d1, d2...dn]xm 0D $m \leq 40$	Upper line message scroll continuously <b>(see Note 2)</b>
ESC [ D	1B 5B 44	Move cursor left
BS	08	Move cursor left
ESC [ C	1B 5B 43	Move cursor right
HT	09	Move cursor right

ESC [ A	1B 5B 41	Move cursor up
US LF	1F 0A	Move cursor up
ESC [ B	1B 5B 42	Move cursor down
LF	0A	Move cursor down
ESC [ H	1B 5B 48	Move cursor to home position
HOM	0B	Move cursor to home position
ESC [ L	1B 5B 4C	Move cursor to top-left position
CR	0D	Move cursor to top-left position
ESC [ R	1B 5B 52	Move cursor to top-right position
US CR	1F 0D	Move cursor to top-right position
ESC [ K	1B 5B 4B	Move cursor to bottom position
US B	1F 42	Move cursor to bottom position
ESC # n	1B 23 n n=31h~37h	Command type select
US @	1F 40	Execute self test
US E n	1F 45 n n=00h~FFh	Blink display screen n=00h for no blink
ESC I x y	1B 6C x y $1 \leq x \leq 14h$ y=01h, 02h	Move cursor to specified position x= column position y= row position
US \$ x y	1F 24 x y $01h \leq x \leq 14h$ ; y=01h, 02h	Move cursor to specified position
ESC @	1B 40	Initialize display
ESC W s x1 x2 y	1B 57 s x1 x2 y $01h \leq x1 \leq x2 \leq 13h$ y=01h, 02h, s=00h, 01h	Set/Cancel the window range at horizontal scroll mode x= column position y= row position
CLR	0C	Clear display screen and clear string mode
CAN	18	Clear cursor line and clear string mode
ESC * n	1B 2A n $01h \leq n \leq 04h$ (=brightest)	Brightness adjustment
US X n	1F 58 n $01h \leq n \leq 04h$ (=brightest)	Brightness adjustment
ESC & s n m [a(p1..pa)]x (m-n+1)	1B 26 1 n m [a (p1..pa)] x (m-n+1) $20h \leq n \leq m \leq FFh$ $1 \leq a \leq 5$ p1...p5=row1...row5	Define download characters

COMMAND SET

ESC ? n	1B 3F	Delete download characters
ESC % n	1B 25 n n=00h, 01h	Select/Cancel download character set n=01 select, n=00 cancel
ESC _ n	1B 5F n n=00h, 01h	Set cursor on/off n=01 cursor on, n=00 cursor off
ESC f n	1B 66 n	Select international font set <b>(see Note 3)</b>
ESC c n	1B 63 n	Select code <b>(see Note 4)</b>
ESC = n	1B 3D n n=01, 02h, 03h	Select peripheral device n=01h, select printer n=02h, select display n=03h, select printer + display
ESC s 1	1B 73 01	Store the user defined character into EEPROM.
ESC d 1	1B 64 01	Download the user defined character from EEPROM.

**NOTE:**

1. While using the command "ESC Q A" or "ESC Q B", other commands cannot be used except for "CLR" or "CAN" to change the operating mode.
2. When using the 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. The parameters of the international font set control command "ESC f n".

Parameter "n"		International Font Set
'A'	41h	U.S.A.
'G'	47h	Germany
'I'	49h	Italy
'J'	4Ah	Japan
'U'	55h	U.K.
'F'	46h	France
'S'	53h	Spain
'N'	4Eh	Norway
'W'	57h	Sweden
'D'	44h	Denmark I
'E'	45h	Denmark II
'L'	4Ch	Slavonic
'R'	52h	Russia

4. The parameters of the code table control command "ESC c n".

Parameter "n"		International Font Set
'A'	41h	Compliance with ASCII code
'L'	4Ch	Compliance with SLOVONIC code
'R'	52h	Compliance with RUSSIA code

## 6.6 DSP-800 Mode Command Set

Command	Code (hex)	Function Description
EOT SOH I n ETB	04 01 49 n 17 n=00~0Fh or 30~3Fh	Select International character set <b>(see Table 5-C)</b>
EOT SOH P n ETB	04 01 50 n 17 31h ≤ n ≤ 58h	Move cursor to specified position
EOT SOH C n m ETB	04 01 43 n m 17 31h ≤ n ≤ m ≤ 58h	Clear display range from n to m position and move cursor to n position
EOT SOH S n ETB	04 01 53 n 17 31h ≤ n ≤ 35h	Save the current view data to n layer for demo display
EOT SOH D n m ETB	04 01 44 n m 17 31h ≤ n ≤ 4Fh 31h ≤ m ≤ 33h	Display the saved demo message <b>(see Table 5-D)</b>
EOT SOH A n ETB	04 01 41 n 17 31h ≤ n ≤ 34h	Brightness adjustment
EOT SOH F n ETB	04 01 46 n 17 00h ≤ n ≤ FFh	Blink display screen n=00h for no blink
EOT SOH & n [px5] ETB	04 01 26 n p1...p5 17 20h ≤ n ≤ FFh	Define download characters
EOT SOH ? n ETB	04 01 3F n 17 20h ≤ n ≤ FFh	Delete download characters
EOT SOH = n ETB	04 01 3D n 17 n=31h, 32h, 33h	Select peripheral device. n=31h, select printer n=32h, select display n=33h, select printer + display
EOT SOH % ETB	04 01 25 17	Initialize display
EOT SOH @ ETB	04 01 40 17	Execute self-test
EOT SOH # n ETB	04 01 23 n 17	Command type select

n	International Font
30h	USA
31h	France
32h	Germany
33h	UK
34h	Denmark I
35h	Sweden
36h	Italy
37h	Spain
38h	Japan
39h	Norway
3Ah	Denmark II

Table 5-C International Font Set

n	Layer select
bit 0=1	Layer 1
bit 1=1	Layer 2
bit 2=1	Layer 3
bit 3=1	Layer 4
bit 4=0	Layer 5

m	Show mode
bit 0=1	Show mode 1
bit 1=1	Show mode 2

Table 5-D Layer table for saving data

## CHAPTER 7 CHARACTER SET

### 7.1 Character Code (20h-7Eh)

#### 7.1.1 USA Standard Character Set

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
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	{		}	~	

#### 7.1.2 International Character Set

		Character Code Number													
Country	Hex	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E		
	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	ß		
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	\$	@	ı	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		#	\$	@	[	\	]	^	`	{		}	~		
Portuguese		#	\$	@	[	\	]	^	`	{		}	~		

## 7.2 Character Code Page (80h-FFh)

### 7.2.1 Page 0 PC437: USA, Standard Europe

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	£	¥	Pt	f
A0H	á	í	ó	ú	ñ	Ñ	à	ó	¿	¬	½	¼	¡	«	»	
B0H	⌘	⌘	⌘		†	‡	‡	π	¶	¶	¶	¶	¶	¶	¶	¶
C0H	L	⊥	⊥	†	—	†	†	†	⊥	⊥	⊥	⊥	⊥	=	≠	±
D0H	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	⊥	■	■	■	■	■
E0H	α	β	Γ	π	Σ	σ	μ	τ	Φ	θ	Ω	δ	∞	ø	ε	∩
F0H	≡	±	≥	≤			÷	≈	°	•	·	√	ⁿ	²	■	SP

### 7.2.2 Greek

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
80H	A	B	Γ	Δ	E	Z	H	Θ	I	K	Λ	M	N	Ξ	O	Π
90H	P	Σ	T	Υ	Φ	X	Ψ	Ω	α	β	Υ	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										£				-		

### 7.2.3 Page 2 PC850: Multilingual

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	×	f
A0H	á	í	ó	ú	ñ	Ñ	à	ó	¿	®	¬	½	¼	¡	«	»
B0H	⌘	⌘	⌘		†	Á	Â	À	©	¶	¶	¶	¶	ø	¥	¶
C0H	L	⊥	⊥	†	—	†	ã	Ã	⊥	⊥	⊥	⊥	⊥	=	≠	α
D0H	ø	Ð	Ê	Ë	È	Í	Î	Ï	⊥	⊥	⊥	■	■	■	■	■
E0H	Ó	β	Ô	Ò	õ	Õ	μ	þ	Ɔ	Ú	Û	Ù	ý	Ý	-	'
F0H	-	±	=	¾	¶	§	÷	,	°	¨	·	¹	³	²	■	SP

### 7.2.4 Page 3 PC860: Portuguese

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
80H	Ç	ü	é	â	ä	à	Á	ç	ê	Ê	è	ï	Ô	ì	Ä	Å
90H	É	À	È	ô	ö	ò	ú	ù	ì	Ö	Ü	ø	£	ù	Pt	Ó
A0H	á	í	ó	ú	ñ	Ñ	ã	õ	¿	¬	½	¼	ì	«	»	
B0H	☼	☼	☼		┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘
C0H	L	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌
D0H	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌	┐
E0H	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	∅	ε	∩
F0H	≡	±	≥	≤		J	÷	≈	°	•	·	√	ⁿ	²	■	

### 7.2.5 Page 4 PC863: Canadian-French

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
80H	Ç	ü	é	â	Â	à	¶	ç	ê	ë	è	ï	î	=	À	§
90H	É	È	Ê	ô	Ë	ï	û	ù	æ	Ô	Ü	ç	£	Ù	Û	f
A0H	ı	í	ó	ú	¨	³	-	î	¬	¬	½	¼	¾	«	»	
B0H	☼	☼	☼		┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘
C0H	L	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌
D0H	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌	┐
E0H	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	∅	ε	∩
F0H	≡	±	≥	≤		J	÷	≈	°	•	·	√	ⁿ	²	■	

### 7.2.6 Page 5 PC865: Nordic

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	f
A0H	á	í	ó	ú	ñ	Ñ	ã	õ	¿	¬	¬	½	¼	ì	«	»
B0H	☼	☼	☼		┌	┐	└	┘	┌	┐	└	┘	┌	┐	└	┘
C0H	L	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌
D0H	└	┐	┌	┘	└	┘	┌	┐	└	┘	┌	┐	└	┘	┌	┐
E0H	α	β	Γ	π	Σ	σ	μ	τ	Φ	Θ	Ω	δ	∞	∅	ε	∩
F0H	≡	±	≥	≤		J	÷	≈	°	•	·	√	ⁿ	²	■	

### 7.2.7 Page 6 Slavonic

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
80H	Ç	ü	é	â	ä	û	ć	ç	ł	ë	Õ	õ	î	Ž	ä	Ć
90H	é	Ł	í	ô	ö	ł	ł	ś	ś	Ö	Ü	ł	ł	ł	x	č
A0H	á	í	ó	ú	ą	ą	ż	ż	ę	ę		ż	č	ş	«	»
B0H	☼	☼	☼		┌	á	â	ě	Ş					ž	ž	
C0H					—	†	ă	ă						=		α
D0H	đ	Đ	Đ	Ë	đ	Ń	í	î	ě			■	■	‡	Ů	■
E0H	Ó	ß	Ô	ń	ń	ň	š	š	ř	Ú	ř	Ů	ý	Ý	‡	´
F0H	-	ˆ	ˆ	ˆ	ˆ	§	÷		°	ˆ	ˆ	ú	ř	ř	■	

### 7.2.8 Page 7 Russia

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
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	ø	ƒ	K	H	θ	¥	Υ	h	ø	ƒ	k	H	θ	¥	Υ	

### 7.2.9 Page 19 PC858: Multilingual + Euro Symbol

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
80H	Ç	ü	é	â	ä	à	â	ç	ê	ë	è	ï	î	ì	Ä	Å
90H	Ë	æ	Æ	ô	ö	ò	û	ù	ÿ	Ö	Ü	ø	£	Ø	x	f
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### 7.2.10 Page 16 WPC1252: West European Latin

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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

### 7.2.11 Page 10 PC852: Slavonic

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90H	É	Í	Í	ô	ö	Ł	ł	Ś	ś	Ö	Ü	Ť	ť	Ł	×	č
A0H	á	í	ó	ú	Ą	ą	Ż	ż	Ę	ę	¬	ż	Č	§	«	»
B0H	☐	☐	☐		†	Á	Â	Ě	Ş	‡		¶	¶	Ž	ž	ŕ
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E0H	Ó	β	Ō	Ń	ń	ň	š	ś	Ř	Ú	ř	Ů	ý	Ý	ţ	˘
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### 7.2.12 Page 11 Katakana: Japanese

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A0H	á	°	「	」	、	・	ヲ	ア	イ	ウ	エ	オ	ヤ	ユ	ヨ	ツ
B0H	一	ア	イ	ウ	エ	オ	カ	キ	ク	ケ	コ	サ	シ	ス	セ	ソ
C0H	夕	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	ゝ	°
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F0H	×	円	年	月	日	時	分	秒	〒	市	區	町	村	人	☐	

### 7.2.11 Page 12 WPC1255: Hebrew

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B0H	°	±	²	³	´	µ	¶	·	¸	¹	÷	»	¼	½	¾	¿
C0H	:	;	;	;	.	-	-	-	-	-	-	~	.	.	-	-
D0H	א	ב	ג	ד	ה	ו	ז	ח	ט	י	ך	כ	ל	ם	נ	ן
F0H	ג	ס	ע	ף	פ	ץ	צ	ק	ר	ש	ת			LRM	RLM	

### 7.2.11 Page 13 WPC1257: Baltic

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A0H	NBSP		ç	£	¤		ı	§	∅	©	Ŕ	«	¬	SHY	®	Æ
B0H	°	±	²	³	´	µ	¶	·	∅	¹	ŕ	»	¼	½	¾	æ
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F0H	š	ń	ņ	ó	ō	õ	ö	÷	ų	ł	ś	ū	ü	ż	ž	·