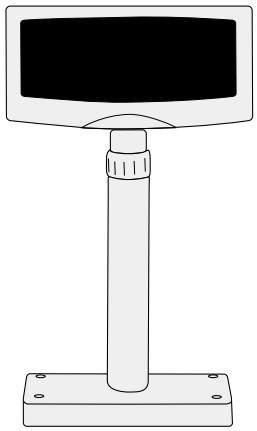
User's Manual

VFD-450/550 Series

VFD Customer Display



Contents

VFD Customer Display

Model VFD Series

1.Information

A. Standard Package:

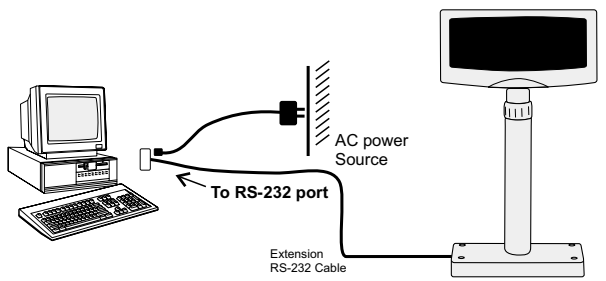
1. Display Unit 1 PC
2. User's Manual 1 PC
3. Demo Software and Utility Diskette 2 PCS
4. Power Kit 1 PC
   to retrieve power 12 VDC from switching power supply inside computer

B. Optional Accessories:

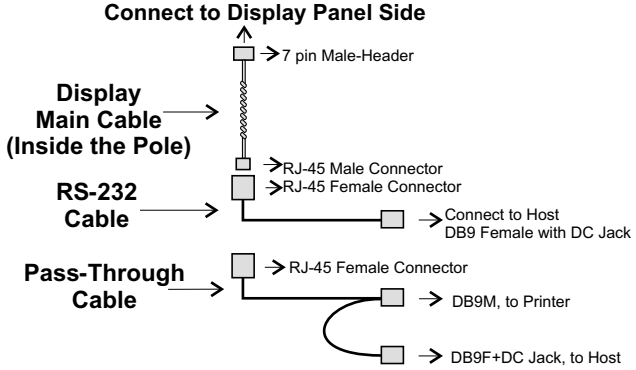
1. Switch-Mode Power Supply:
   Input: 100V AC~240V AC, 50Hz~60Hz
   Output: DC 9V, 1.33A
2. Y-connection cable: for printer pass-through connection
3. Option Pole/Base:
   a. DSP-B01: Long pole with small round base
   b. DSP-B02: Metal base (should be used with DSP-B01)
   c. DSP-B03: Short pole with square base
   d. DSP-B04: Side wall mounting brocket (used with DSP-B01)
4. Option Double Sides Display:
   a. VFD-458: Double sides VFD Display
   b. VFD-455: Front VFD with Back LCD Display

2. Installation (RS-232 Interface)

Step 1: Turn the computer system power off.
Step 2: Connect the Display Cable to the RS-232 Port of the computer.
Step 3: Connect the DC power source by the appropriate DC power adapter.
Step 4: Turn on the computer and the power supply unit, the display will be on and ready for receiving data.

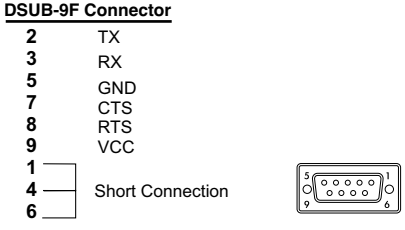


3. Interfaces (Cable Connections)

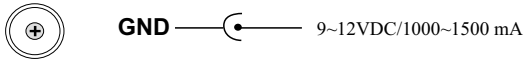


For pass-through connection, the RS-232 cable should be replaced by the pass-through cable.

1. RS-232 Cable-end

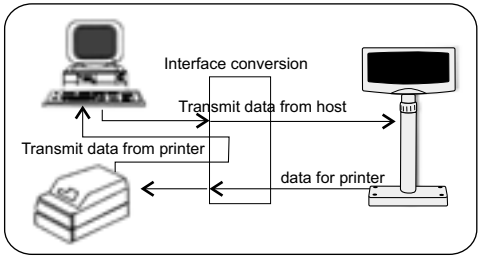


2. DC Power Jack



3. Pass-through Connection

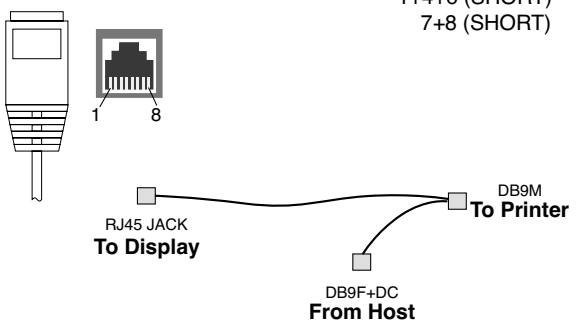
All the data transmitted from the host will be processed, and if it is for the printer, it will be transmitted to the printer. Whether the data is for the display or the printer can be switched using the peripheral device selection command.



To Display	To Printer	From Host
RJ45(8P8C) JACK	DB9M	DB9F+DC JACK

TXD	1----------	2
RXD	2----------	3
VCC	3----------	+ (INNER)
GND	4----------5----------	5---------- − (Outer)
FROM NEXT	5----------2	
TO NEXT	6----------3	

1+4+6 (SHORT)
7+8 (SHORT)



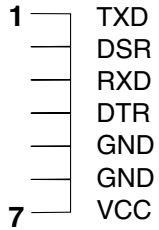
4. Interface of Display Panel Side

- Specifications

Data transmission method : Asynchronous Serial.
Default protocol : 9600 bps, non-parity,
8 data bits, 1 stop bit.

- Interface connector (display panel side)

7 pin Male-Header
Pin assignments:

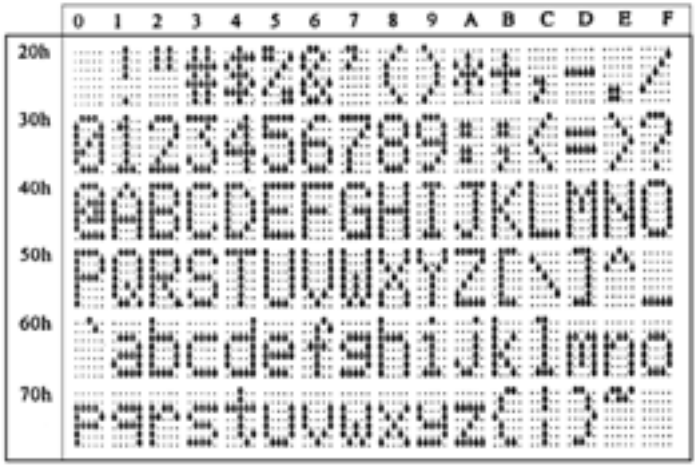


4. Character Fonts Table

4.1 Control code set

HEX	CODE	HEX	CODE
00H	NULL	10H	DLE
01H	MD1	11H	DC1
02H	MD2	12H	DC2
03H	MD3	13H	DC3
04H	MD4	14H	DC4
05H	MD5	15H	
06H	MD6	16H	
07H	MD7	17H	
08H	BS,MD8	18H	CAN
09H	HT	19H	
0AH	LF	1AH	
0BH	HOM	1BH	ESC
0CH	CLR	1CH	
0DH	CR	1DH	
0EH	SLE1	1EH	SF1
0FH	RS,SLE2	1FH	US,SF2

4.2 U.S.A. font set

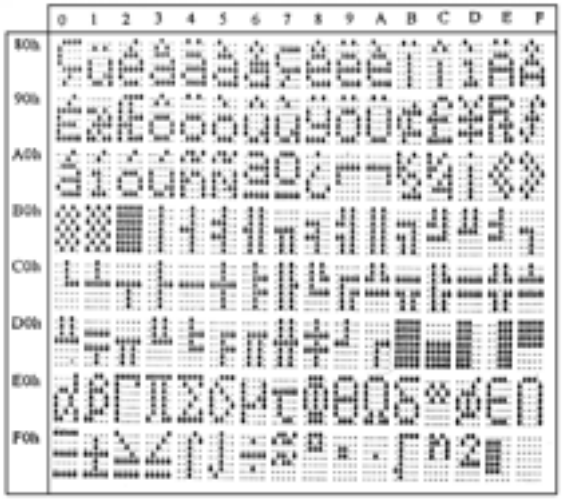


4.3 International character selection

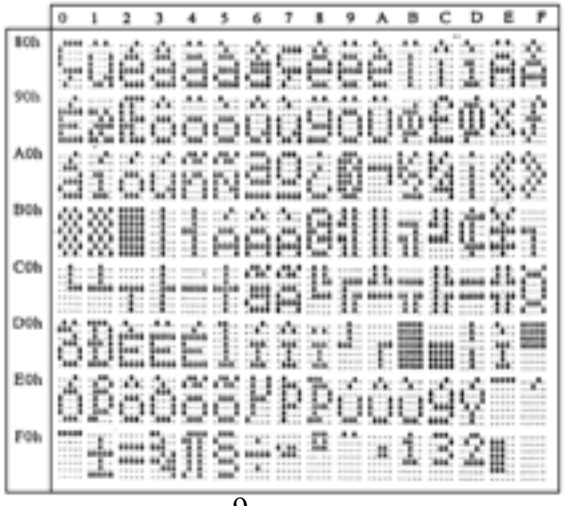
ASCII CODE

Hex. Value	International	23	24	40	5B	5C	5D	5E	60	7B	7C	7D	7E
30H	USA	#	$	@	[	\	]	^	`	{	|	}	~
31H	FRANCE	#	$	à	°	ç	§	^	`	é	ù	è	¨
32H	GERMANY	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
33H	U.K.	£	$	@	[	\	]	^	`	{	|	}	~
34H	DENMARK I	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
35H	SWEDEN	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
36H	ITALY	#	$	@	°	ç	é	^	ù	à	ò	è	ì
37H	SPAIN	Pt	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~
38H	JAPAN	#	$	@	[	¥	]	^	`	{	|	}	~
39H	NORWAY	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
3AH	DENMARK II	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
3BH	SLAVONIC	#	$	@	[	\	]	^	`	{	|	}	~
3CH	RUSSIA	#	$	@	[	\	]	^	`	{	|	}	~

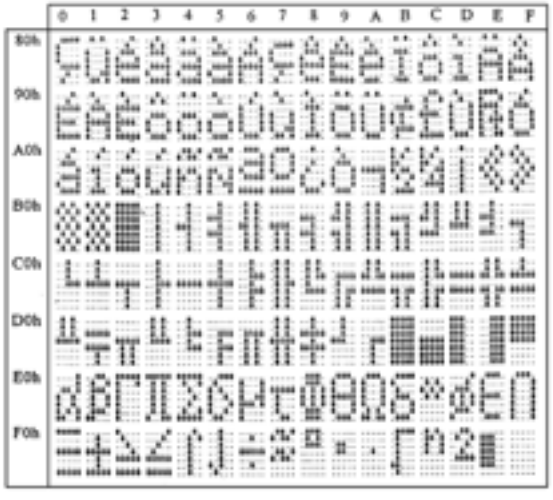
3DH: Standard Europe international font set



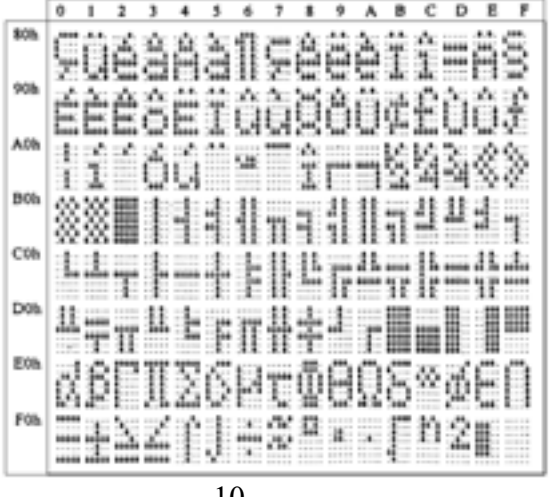
3EH: Multingual international font set



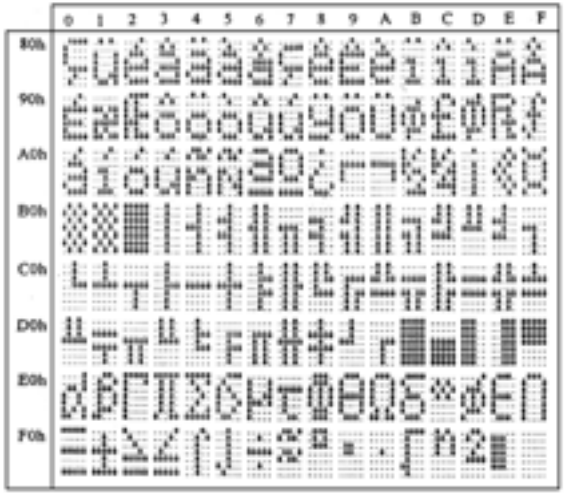
3FH: Portuguese international font set



40H: Canadian French international font set

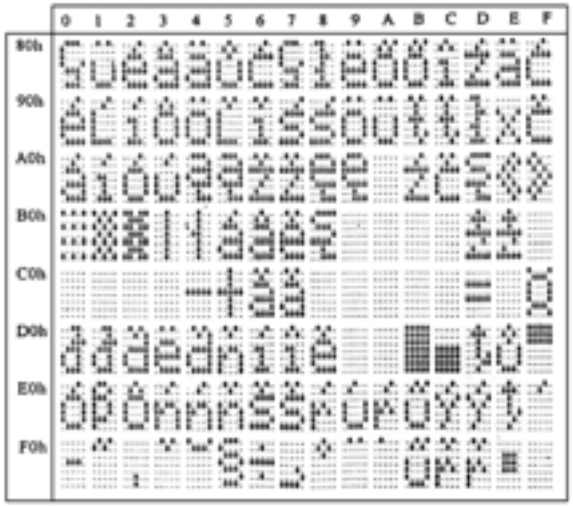


41H: NORDIC internatinal font set

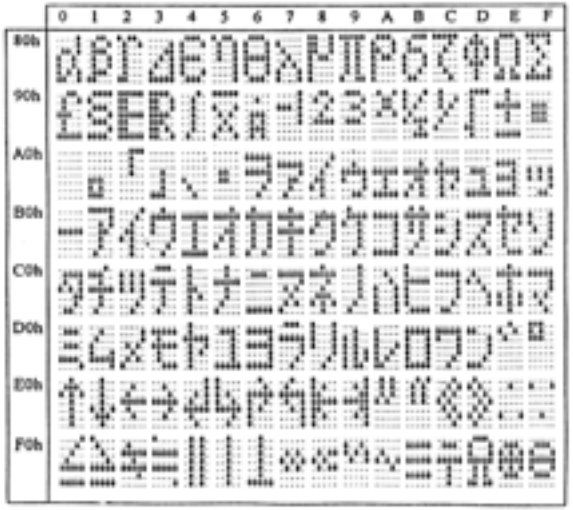


42H: RUSSIA font set

43H: SLAVONIC Font set



44H: Katakana font set



5. Specifications:

A. Tube Display:

VFD Display

• Customer display	Vacuum Fluorescent Display
• Display pattern	5 x 7 dot matrix
• Brightness	700 cd/m^2
• Character type	96 Alphanumeric & 13 Kinds of international character set and user definable character set.
• Character size	6.4mm (W) x 9.2mm(H)
• Character number	20 x 2(40 characters) / 20 x 2x 2(80 characters)
• Character font	5x7 dots matrix, comma, decimal point

B.Environment:

• Operating temperature	0°C to +40°C
• Storage temperature	-10°C to +50°C
• Relative humidity	0% to 90% RH

C. Driver Interface:

• Driver interface	RS-232
• Driver command	ESC commands

D. Overall Dimensions:

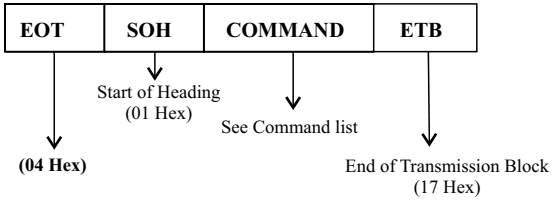
• Dimension (panel)	110mm H x 220 mm L x 45 mm D
• Dimension (support)	Telescopic pole from 270 to 440 mm
• Dimension (base)	12 mm Height with 80mm OD
• Viewing angle	Max. 45°
• Horizontal rotation	Max. 360°
• Weight	About 0.8 Kg

E. Electricity

• Power source	DC +9V~12V (Optional +5V, +24V)
• Power consumption	4.5 watts for single side display 8.0 watts for double sides display
• Central control unit	CPU 8031 BH ROM 64K flash ROM RAM 32K SRAM
• Speed	29 MHz
• Connector	8 pins phone jack, D-SUB 9, or 25 pins connector

6. System Commands

6.1. Command format



6.2. Commands list

6.2.1. Set Baud Rate

COMMAND: B

COMPUTER:	EOT	SOH	'B'	'BAUD RATE'	'N'	ETB
ASCII	(04H)	(01H)	(42H)	(31H~37H)	(4EH)	(17H)
Byte	1	1	1	1	1	1

DISPLAY:	ACK		(or NACK if failed)
ASCII	(06H)		(15H)
Byte	1		1

Note: Baud rates

31H : 9600
32H : 4800
33H : 2400
34H : 1200
35H : 600
36H : 300
37H :19200

6.2.2. Select international code table

COMMAND: I

COMPUTER:	EOT	SOH	'I'	'CHAR'	ETB
ASCII	(04H)	(01H)	(49H)	(30H~44H)	(17H)
Byte	1	1	1	1	1

DISPLAY:	ACK		(or NACK if failed)
ASCII	(06H)		(15H)
Byte	1		1

Note : International Character Code

30H : U. S. A.	3BH : Slavonic
31H : France	3CH : Russia
32H : Germany	3DH : Standard Europe International font set
33H : U. K.	3EH : Multingual International font set
34H : Denmark I	3FH : Portuguese International font set
35H : Sweden	40H : Canadian French International font set
36H : Italian	41H : Nordic International font set
37H : Spain	42H : Russia font set
38H : Japan	43H : Slavonic font set
39H : Norway	44H : Katakana font set
3AH : Denmark II	

Please refer to 4.3 International Character Selection.

6.2.3. Save the current view message

(Save Demo view data)

COMMAND: S

COMPUTER:	EOT	SOH	'S'	'Layer'	ETB
ASCII	(04H)	(01H)	(53H)	(31H~33H)	(17H)
Byte	1	1	1	1	1

DISPLAY:	ACK		(or NACK if failed)
ASCII	(06H)		(15H)
Byte	1		1

Note : 31H: Layer 1 / 32H: Layer 2 / 33H: Layer 3

6.2.4. Set cursor position

COMMAND: P

COMPUTER:	EOT	SOH	'P'	'Position'	ETB
ASCII	(04H)	(01H)	(50H)	(31H~58H)	(17H)
Byte	1	1	1	1	1

DISPLAY:	ACK			(or NACK if failed)	
ASCII	(06H)			(15H)	
Byte	1			1	

Note: The cursor can be set to the position from 1 to 40
Position 1 means the upper left corner position.
Position 20 means the upper right corner position.
Position 21 means the lower left corner position.
Position 40 means the lower right corner position.

6.2.5. Clear display range

COMMAND: C

COMPUTER:	EOT	SOH	'C'	'START'	'END'	ETB
ASCII	(04H)	(01H)	(43H)	(31H~58H)	(31H~58H)	(17H)
Byte	1	1	1	1	1	1

DISPLAY:	ACK			(or NACK if failed)	
ASCII	(06H)			(15H)	
Byte	1			1	

Note: Some part of the current view messages can be cleared by this COMMAND. It can start clearing between position 1 and position 40.

6.2.6. Display the saved DEMO message

COMMAND: D

COMPUTER:	EOT	SOH	'D'	'Layer'	'Mode'	ETB
ASCII	(04H)	(01H)	(44H)	(31H~37H)	(31H~33H)	(17H)
Byte	1	1	1	1	1	1

DISPLAY:	ACK			(or NACK if failed)	
ASCII	(06H)			(15H)	
Byte	1			1	

Note:

1) There are three layers of saved view messages as described on COMMAND "S"
2) There are two modes of display:
   Mode 1 is running the saved messages from right to left, which is a horizontal scroll mode.
   Mode 2 is running the saved messages from the lower line to the upper line, which is a vertical scroll mode.
3) For display layers:
   select 31H means display the message saved on layer 1.
   select 32H means display the message saved on layer 2.
   select 33H means display the message saved on layer 1+ layer 2.
   select 34H means display the message saved on layer 3.
   select 35H means display the two messages saved on layer 1 + layer 3.
   select 36H means display the two messages saved on layer 2 + layer 3.
   select 37H means display all the messages saved on layer 1 + layer 2 + layer 3.
4) For display modes,
   select 31H means display the message with Mode 1.
   select 32H means display the message with Mode 2.
   select 33H means display the message with Mode 1+Mode 2.
   For this Demo display function, you must have saved the message by COMMAND "S" previously, For example, select 37H for displaying layers and select 33H for displaying modes, DSP would display all the three messages saved on layer 1+ layer 2 + layer 3 with both Mode 1 + Mode 2 displaying modes.
5) Any new message from the computer would stop this Demo display function and DSP would display that new message from the computer.

6.2.7. Select the Command Mode

COMMAND: M

COMPUTER:	EOT	SOH	'M'	'Mode'	ETB
	ASCII (04H)	(01H)	(4DH)	(30H~38H)	(17H)
	Byte 1	1	1	1	1
DISPLAY:	ACK		(or NACK if failed)		
	ASCII (06H)		(15H)		
	Byte 1		1		

Note:

Command Modes Selection	
30H : VFD-450/550	35H : ICD 2002
31H : EPSON ESC/POS	36H : CD 5220
32H : UTC/S	37H : DSP-800
33H : UTC/E	38H : ADM 787/788
34H : AEDEX	

6.2.8. Set all default

COMMAND: X

COMPUTER:	EOT	SOH	'X'	ETB
	ASCII (04H)	(01H)	(58H)	(17H)
	Byte 1	1	1	1

6.2.9. Select the drive ON/OFF setting

(This command feature is for Y cable printer pass-through connection only.)

PRINTER ON COMMAND:

COMPUTER:	ESC	'G'
	ASCII (1BH)	(47H)
	Byte 1	1

PRINTER OFF COMMAND:

COMPUTER:	ESC	'S'
	ASCII (1BH)	(53H)
	Byte 1	1

Note: The driver feature mode selections are as following:

a. PRINTER ON COMMAND (Format as above) features PRINTER ON and DISPLAY OFF

b. PRINTER OFF COMMAND (Format as above) features PRINTER OFF and DISPLAY ON

6.3. Transmission method

Each ASCII character is transmitted with

1 start bit
8 data bits
1 stop bit
No parity

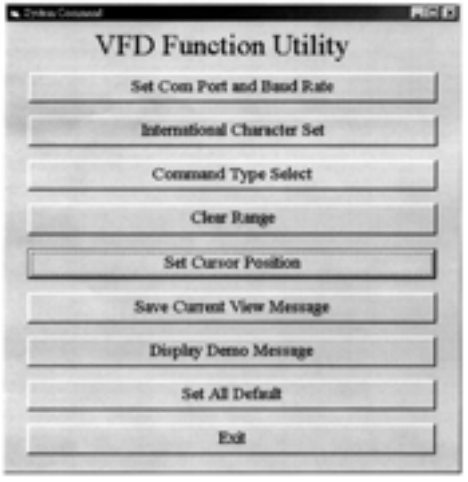
Note: You may generate your own application software to run the display according to the standard RS-232C communication protocols and the SOFTWARE CONTROL information listed on this chapter.

7. VFD Function Demo Software (Windows Version)

Note: For the first installation, you had better connect the Display with the COM1 port of the computer due to the initial value COM1 for Display

7.1. How to run the demo software

1. Find the enclosed two diskettes.
2. Make sure the installation of Display is completed.
3. Enter the Windows system to start your computer.
4. Copy the software of bundled diskettes from Drive A: into sub-directory VFD of Hard Drive C: in your computer under Windows system, then execute setup.exe and install the VFD Function Utility. After successfully installing, you can find VFD file in Program Files, click the VFD file, you will see the following screen:



5. Then, follow this menu to run the demo software.
   a. Click "Set COM Port and Baud Rate", to set RS-232 communication of the computer. Select COM port, baud rate must also be set as the same as the baud rate shown on the lower line of the display, such as "9600 N 8 1" means baud rate 9600, no parity, 8 data bits, and 1 stop bit.
   b. Click "International Character Set" to select International character Code Set.
   c. Click "Command Type Select" to select the command type that you want the display to run.
   d. Click "Clear Range" to select the start and end position that you want to clear.
   e. Click "Set Cursor Position" to move the cursor position.
   f. Click "Save Current View Message" to save the current view message into the memory of Display.
   g. Click "Display Demo Message" to display the previously saved message.
   h. Click "Set All Default" to default the Display as it just come from manufacturer.

7.2. After the handshaking between the Display and computer is completed, the Display would display any message character from the computer. Any new message from the computer would cover the old message on the display. You may enter any message to display.

Note: First of all, instal the Display to the COM1 of your computer to run this demo software. The Default value of Display communication parameters are:

COM port : COM1
Baud rate = 9600
Parity = None
Data bits = 8
Stop bit = 1

Appendix:
SELECT COMMAND MODES

Refer to Chapter 7 VFD Function Demo Software, you can select various command modes which are compatible to most popular displays, then the user can easily replace the used display and no need to modify the application software.

Mode 0 : VFD-450/550 (Default setting)

Mode 1 : EPSON Esc/POS

Mode 2 : UTC Standard

Mode 3 : UTC Enhanced

Mode 4 : AEDEX

Mode 5 : ICD 2002

Mode 6 : CD 5220

Mode 7 : DSP-800

Mode 8 : ADM 787/788

Mode 0: VFD-450/550 mode commands list
Refer to page 16

Command	Hexadecimal Codes	Function
B	42H	Set baud rate and parity
I	49H	Select international character set
S	53H	Save the current view message
P	50H	Set cursor position
C	43H	Clear display message
D	44H	Display the saved DEMO message
ESC G ESC S	IBH 47H IBH 53H	Printer ON command Printer OFF command
M	4DH	Select command mode
X	58H	Set all default

Mode 1: EPSON Esc/POS mode commands list

Command	Code description (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 X=1-20 y=01,02	move cursor to specified position
CLR	0C	clear display screen
CAN	18	clear cursor line
US E n	1F 45 n n=00-ff	blink display screen
ESC @	1B 40	initialize display
ESC R n	1B 52 n n=30~44	select international character set
US MD1	1F 01	specify overwrite mode
US MD2	1F 02	specify vertical scroll mode
US MD3	1F 03	specify horizontal scroll mode
ESC W n s x1 y1 x2 y2	1B 57 n s x1 y1 x2 y2 n=1,2,3,4 s=0, 1	specify/cancel the window range 1<=x1<=x2<=20 1<=y1<=y2<=2
ESC = n	1B 3D n n=31H, enable printer, disable display n=32H, enable printer, disable printer n=33H, enable printer, enable printer	select peripheral device n=32H (default)
	n=34H, message for customer side n=35H, message for operator side	only for double sides display

Command	Code description (hex)	Function description
US:	1F 3A	set starting/ending position of macro definition
US ^ n m	1F 5E n m 00<=(n,m)<=ff	execute and quit macro
US @	1F 40	execute self-test
US T h m	1F 54 h m 0<=h<=17, 0<=m<=3b	display time
US U	1F 55	display time continuously
US.n	1F 2E n	n= a displayable character code Display the code with a dot
US,n	1F 2C n	n= a displayable character code Display the code with a comma
US;n	1F 3B n	n= a displayable character code Display the code with a semicolon
US#nm	1F 23 n m n = 0 ro 1 0 <=m<=20	Turn the anuciator (▼) ON/OFF

Mode 2 : UTC standard mode commands list

Command	Code description (hex)	Function description
BS	08	back space
HT	09	horizontal tab
LF	0A	line feed
CR	0D	carriage return
DLE	0F	display position
DC1	11	over write display mode
DC2	12	vertical scroll mode
DC3	13	cursor on
DC4	14	cursor off
ESC d	1B 64	change to UTC enhanced mode
US	1F	clear display

Mode 3 : UTC enhanced mode commands list

Command	Code description (hex)	Function description
ESC u ACR	1B 75 41 [data x 20] 0D	upper line display
ESC u BCR	1B 75 42 [data x 20] 0D	bottom line display
ESC u DCR	1B 75 44 [data x 20] 0D	upper line message scroll continuously
ESC u ECR	1B 75 45 hh ':' mm 0D h,m='0'-'9'	display time
ESC u FCR	1B 75 46 [data x 20] 0D	upper line message scroll once pass
ESC u HCR	1B 75 48 n m 0D 20h<=n,m	change attention code
ESC u ICR	1B 75 49 [data x 40] 0D	two line display
ESC RS CR	1B 0F 0D	change to UTC standard mode

Mode 4 : AEDEX mode commands list

Command	Code description (hex)	Function description
! # 1CR	21 23 31 [data x 20] 0D	upper line display
! # 2CR	21 23 32 [data x 20] 0D	bottom line display
! # 4CR	21 23 34 [data x 20] 0D	upper line message scroll continuously
! # 5CR	21 23 35 hh ':' mm 0D h,m='0'-'9'	display time
! # 6CR	21 23 36 [data x 20] 0D	upper line message scroll once pass
! # 8CR	21 23 38 n m 0D 20h<=n,m	change attention code
! # 9CR	21 23 39 [data x 40] 0D	two line display
! # ACR	21 23 41 [data x 20] 0D	upper line scroll message
! # BCR	21 23 42 [data x 20] 0D	bottom line display message

Mode 5 : ICD 2002 mode commands list

Command	Code description (hex)	Function description
HT	09	move cursor right (only valid in overwrite mode)
BS	08	move cursor left (only valid in overwrite mode)
CR	0D	move cursor to left-most position (only valid in overwrite mode)
ESC @	1B 40	initialize customer display to initial state, clears display buffer, set display mode to shift and sets current display row to upper row
ESC U	1B 55	select upper row as current row (initial default)
ESC D	1B 44	select lower row as current row
ESC A z	1B 41 z	sets customer display disable or enable z 'D'=disable, 'E'=enable
ESC C r c	1B 43 r c	move cursor to specified position (only valid in overwrite mode) -r Row ('U'=upper,'D'=lower) -c Column number (range from 1~20)
ESC E r z	1B 45 r z	set special effect or display mode of specified row

Command	Code description (hex)	Function description
ESC R n	1B 52 n n=30~44	set international font sets -n international fonts code
ESC = n	1B 3D n n=31~33	select peripheral -n 31=printer only, 32=customer display only, 33=both peripheral
	n=34H n=35H	only for double sides display n 34=message for customer side 35=message for operator side

(REMARK)*Using command "ESC E r z", the value of parameter:

r 58 = all rows
55 = upper row
44 = lower row

z special function, the value is one of
30 = shift mode(default display mode)
31 = rotation mode
32 = blink mode
33 = clear this row and switch to shift mode
34 = overwrite mode
35 = vertical mode

Mode 6: CD 5220 standard mode commands list

Command	Code description (hex)	Function description
ESC DC1	1B 11	overwrite mode
ESC DC2	1B 12	vertical scroll mode
ESC DC3	1B 13	horizontal scroll mode
ESC Q A.....CR	1B 51 41 [n]x20 0D	set the string display mode, write string to upper line
ESC Q B.....CR	1B 51 42 [n]x20 0D	set the string display mode, write string to lower line
ESC Q D.....CR	1B 51 44 [n]x20 0D	upper line message scroll continuously
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
ESC [B	1B 5B 42	move cursor down
LF	0A	move cursor down
ESD [H	1B 5B 48	move cursor to home position
HOM	0B	move cursor to home position
ESC [L	1B 5B 4C	move cursor to left-most position
CR	0D	move cursor to left-most position
ESC [R	1B 5B 52	move cursor to right-most position
ESC [K	1B 5B 4B	move cursor to bottom position
ESC 1 x y	1B 6C x y 1<=x<=20, y=1,2	move cursor to specified position

Command	Code description (hex)	Function description
ESC @	1B 40	initialize display
ESC W s x1 x2 y	1B 57 1 x1 x2 y 1<=x1<=x2<=20 y=1,2	set or cancel the window range at horizontal scroll mode
CLR	0C	clear display screen, and clear string mode
CAN	18	clear cursor line, and clear string mode
ESC _ n	1B 5F n n=0,1	set cursor ON/OFF
ESC f n	1B 66 n n=30~44	select international fonts set
ESC = n	1B 3D n n=31,32,33	select peripheral device, Display or Printer n=31 select printer ON, display off n=32 select display ON, display off n=33 select both

30H : U. S. A.	3BH : Slavonic
31H : France	3CH : Russia
32H : Germany	3DH : Standard Europe International font set
33H : U. K.	3EH : Multingual International font set
34H : Denmark I	3FH : Portuguese International font set
35H : Sweden	40H : Canadian French International font set
36H : Italian	41H : Nordic International font set
37H : Spain	42H : Russia font set
38H : Japan	43H : Slavonic font set
39H : Norway	44H : Katakana font set
3AH : Denmark II	

Mode 7: DSP-800 mode commands list

Command	Code description (hex)	Function description
EOT SOH I n ETB	04 01 49 n 17	select international fonts set.
EOT SOH P n ETB	04 01 50 n 17 n=31H-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 position to m position and move cursor to n position.
EOT SOH S n ETB	04 01 53 n 17 n=31H-35H	save the current displaying data to n layer for demo display
EOT SOH D n m ETB	04 01 44 n m 17 n=31H-4FH m=31H-33H	display the saved data
ESC G ESC S	IBH 47H IBH 53H	Printer ON Printer OFF Select the driver ON/OFF
EOT SOH T ETB	04 01 54 17	transmit the current view message to computer
EOT SOH B n N ETB	04 01 42 n 4E 17 n=31H: 9600 n=32H: 4800 n=33H: 2400 n=34H: 1200 n=35H: 600 n=36H: 300	set baud rate

Mode 8: ADM 787/788 commands list

Command	Code description (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	10 n	set period to upper line, last n position 31h≤n≤37h
DC1	11 n	set line blinking, upper line n ='1', bottom line n='2'
DC2	12 n	clear line blinking, upper line n ='1', bottom line n='2'
SF1	1E	clear field 1 and move cursor to field 1, first position
SF2	1E	clear field 2 and move cursor to field 2, first position