

APPLICATION		REVISIONS				
NEXT ASSY	FINAL ASSY	LTR	DESCRIPTION	DATE	APPROVED	
		A	PRODUCTION RELEASE/E O. 38321	3/30/04	<i>[Signature]</i>	

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SHEET	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

**REVISION STATUS**

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						<b>MANUAL</b> <b>PDK-450U-XXXXXX</b> <b>INSTALLATION &amp; OPERATING INSTRUCTIONS</b>
	<b>DRAWN</b> R Rabb 3/11/04 <b>CHECK</b> <i>[Signature]</i> 3/30/04 <b>APPROVED</b> <i>[Signature]</i>		<b>SIZE</b> <b>A</b>	<b>CODE IDENT NO.</b> <b>05464</b>	<b>PDK-450U-INOPML</b>	
	<b>APPROVED</b>		<b>SCALE</b>		<b>SHEET 0 OF 18</b>	



**DISPLAYS  
KEYBOARDS  
INTEGRATED PANELS**

*Industrial Electronic Engineers, Inc. 7740 Lemona Ave., Van Nuys, CA 91409-9234, U.S.A. Tel (818) 787-0311*

## **PDK-450U-XXXXXX\* LCD Pole Display Kit**

### **INSTALLATION and OPERATING INSTRUCTIONS**

#### **Key Features:**

- **Liquid Crystal Display (LCD) – selectable 2 line – 12mm or 4 line – 7mm x 20 character 12x16 dot matrix – with anti-glare filter, USB 1.1 interface.**
- **5 V<sub>DC</sub> input power via USB host interface.**
- **IEE's extensive standard command and control set.**
- **Nine selectable character fonts with 4 user definable characters, underbar cursor, continuously scrolling message and selective blinking.**
- **Display module housed in a compact, impact resistant enclosure with four-position tilt-recline and 330° swivel adjustment. Pole and mounting base kit are included.**
- **Display certified to the requirements of UL (US & Canada), CE, CSA and FCC Part 15, Class A.**

(\* Refer to Page 16 for exact configuration of your kit).

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## PRODUCT SUPPORT INFORMATION

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For information not found in these Instructions, please contact IEE's Sales Application Engineering Department:

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PDK-450U-INOPML  
February 19, 2004

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## GENERAL SPECIFICATIONS

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### Electrical:

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<b>Power:</b>	Supply voltage	5.0 V <sub>DC</sub> +/-5%	<b>Pin Assignments:</b>	
	Supply current @ 5 V <sub>DC</sub>	230 ma (max)	<b>Host</b>	<b>USB-A</b>
	Supply risetime	100 milliseconds (max)	V+	1 V+
<b>Caution:</b>	Start cycle	The display is not ready to accept data until 1.2 seconds after application of power	D-	2 D-
			D+	3 D+
<b>Signal:</b>	USB	Transfer Data Rate 1M Byte/Sec	GND	4 GND
	USB input levels	D- GND (0 V <sub>DC</sub> )		
		D+ 3.3 V		

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### Environmental:

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- **Operating Temperature:** 0 to +50 °C (+32 to +122 °F)
- **Storage Temperature:** -20 to +70 °C (-4 to +158 °F)
- **Relative Humidity:** 0 to 95% (non-condensing)
- **Vibration:** 10-50 Hz. 2mm peak-to-peak (3 axes)
- **Shock:** 20 G (3 axes)

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## **ASSEMBLY & INSTALLATION**

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### **Installation Instructions:**

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The POS pole display comes with a surface mount base with the interface cable threaded through the mounting pieces as shown on pages 5 and 6. The other bases shown are optional.

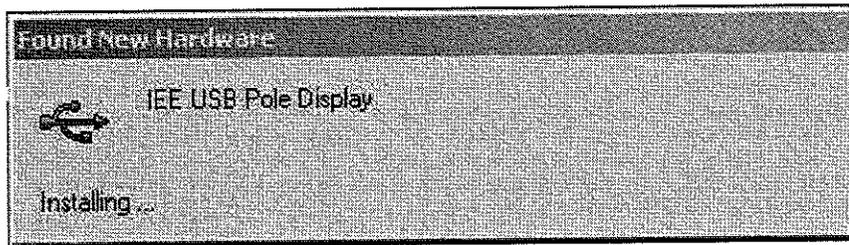
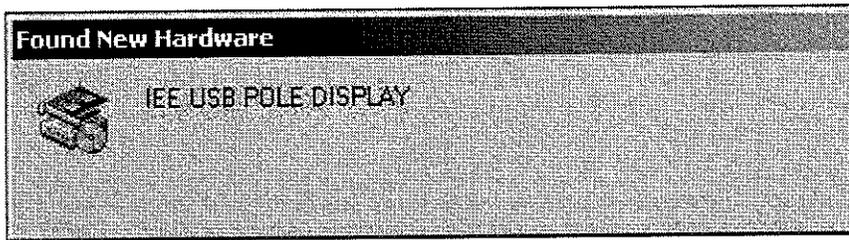
Perform the following electrical installation steps after, or as a part of the attachment instructions appropriate for the specific mechanical installation:

1. Connect the display USB connector to the desired host USB connector
2. Proceed to Page 5 for setup instructions.

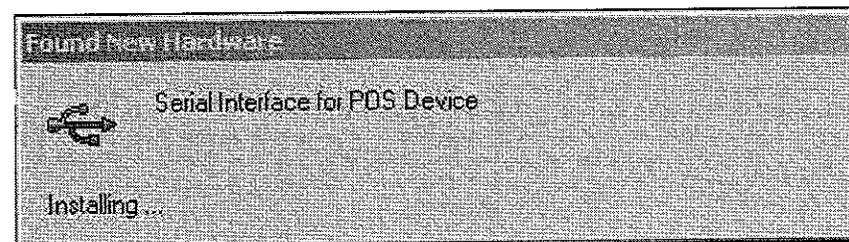
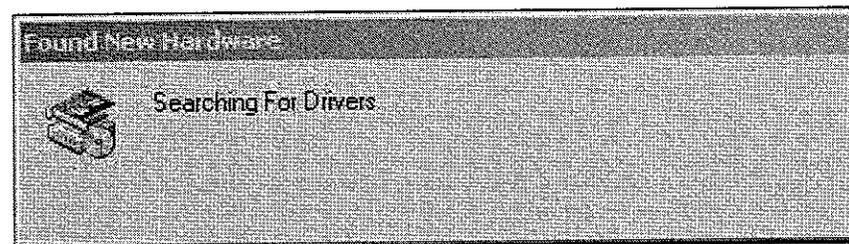
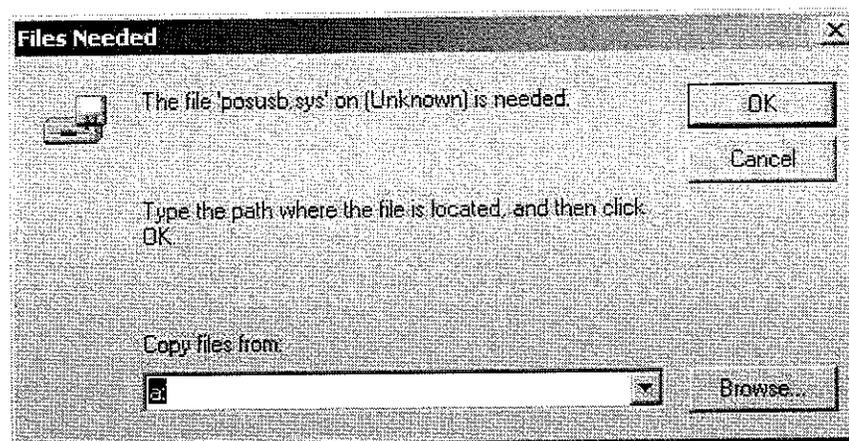
The display assembly breakdown is shown in Figure 1, with part numbers, to facilitate ordering replacement parts.

## Electrical Installation (USB Setup)

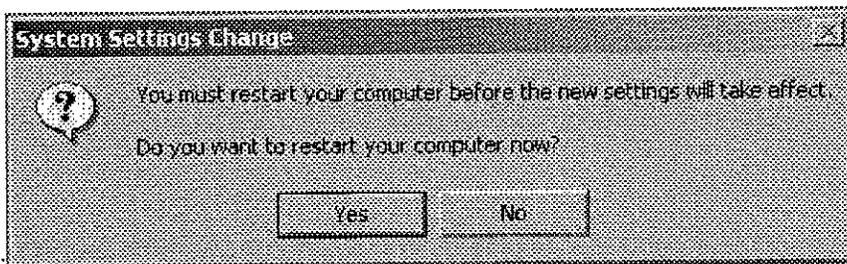
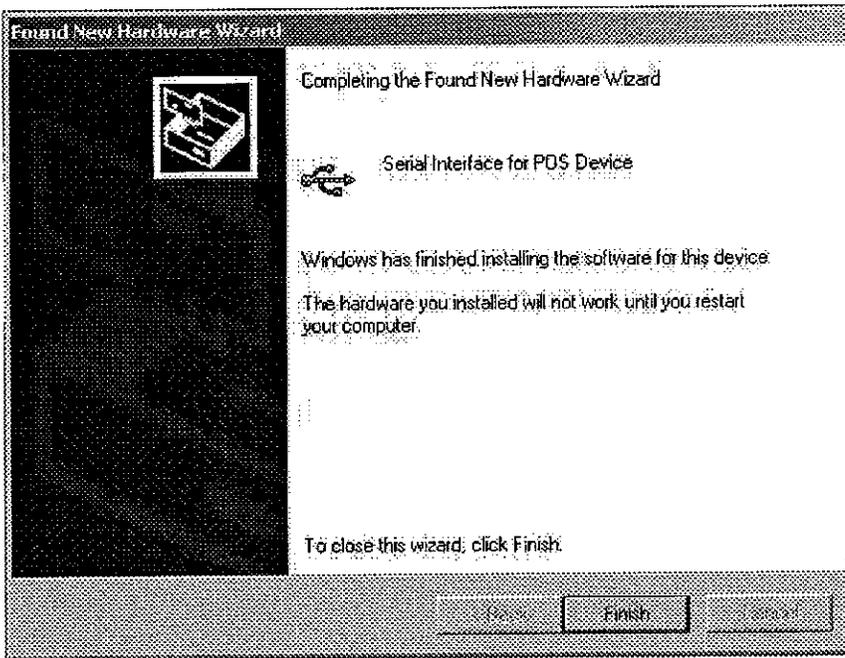
- 1 With power applied to the Host, plug the USB connector of the display into the appropriate host USB port.
- 2 Message windows will be displayed in sequence as follows:



With the following window displayed, insert the USB Driver diskette into drive a: and follow the instructions.



With the following window displayed, click **Finish** button.



3. After the computer is restarted then the display will indicate the following:

**IEE USB Pole Display**  
**Model: L450**  
**Version: 1.0 A2.34**  
**Port: COM4**

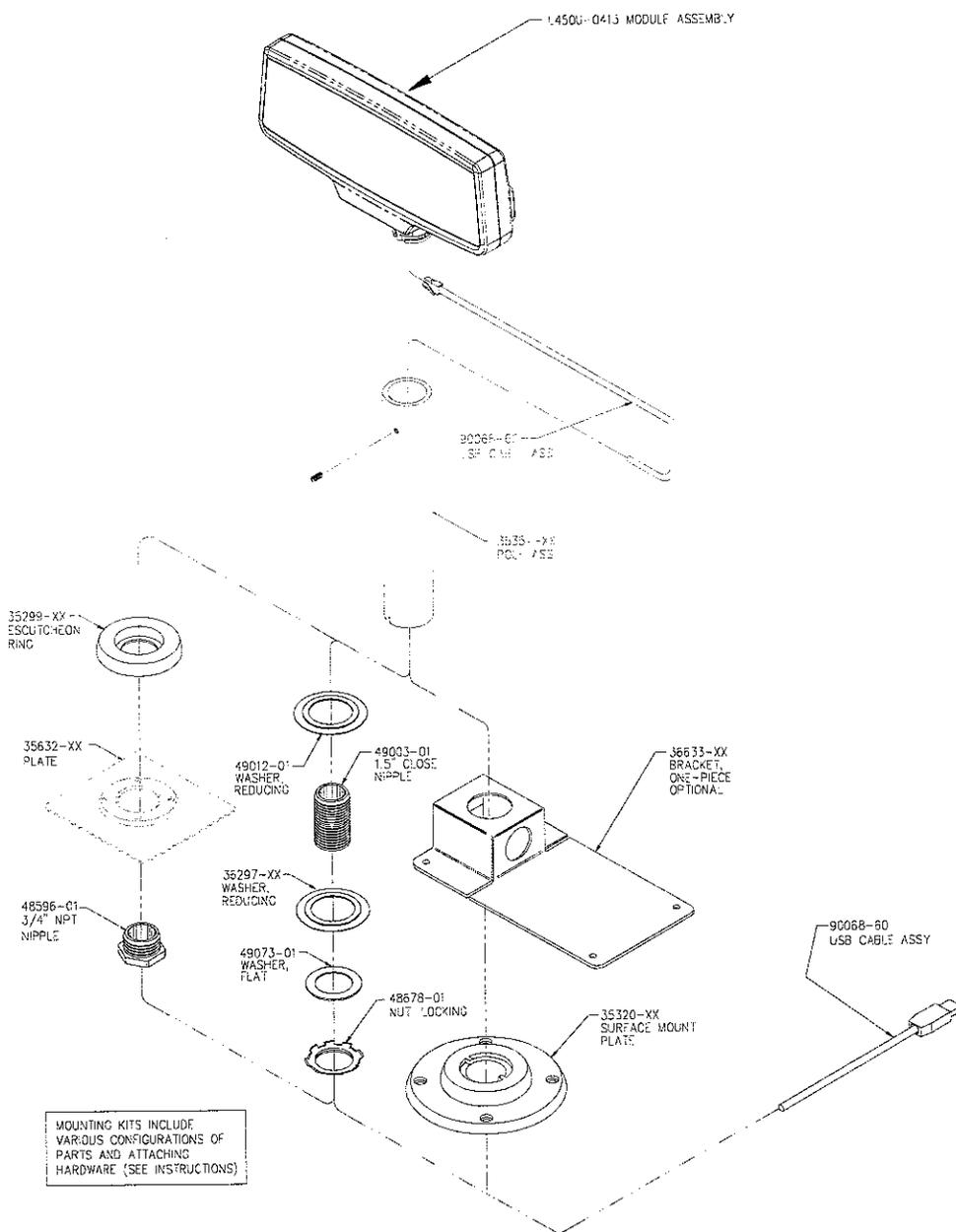
4. The display is now ready for use. You may run the IEE OPOS or JavaPOS programs, Microsoft's Hyper Terminal or any other utility capable of sending ASCII text and commands to the display

**NOTE: The L450 USB driver may be downloaded from the IEEINC.COM FTP website.**

# EXPLODED ASSEMBLY VIEW & PARTS REFERENCE

Figure 1 Exploded Assembly View

PDK-450U-XXXXXX  
 POS POLE DISPLAY DISTRIBUTOR KIT  
 TYPE 4C POD USB INTERFACE



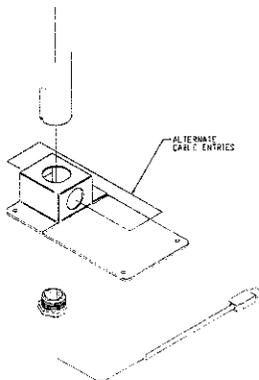
# ASSEMBLY DIAGRAMS

## Mounting kits:

- **35360-0X SURFACE MOUNTING KIT (Standard)**
  - (1) 35320-XX Surface Mount Plate
  - (1) 48596-01 Conduit Nipple
- **36634-0X MOUNTING KIT, SHEET METAL BASE**
  - (1) 36633-XX Base, Sheet Metal
  - (1) 48596-01 Conduit Nipple
  - (4) 48765-10 #8-18 Pan Head Screw, Thd Forming
- **35697-0X BASE KIT, HEAVY METAL**
  - (1) 35632-XX Plate, Multi-Purpose
  - (1) 35299-XX Escutcheon Ring
  - (1) 48596-01 Conduit Nipple

## Available Mounting Configurations:

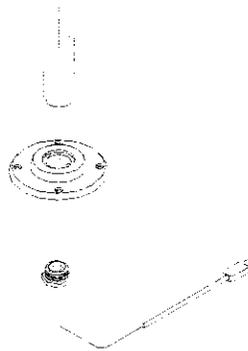
### Mounting Kit, Sheet Metal



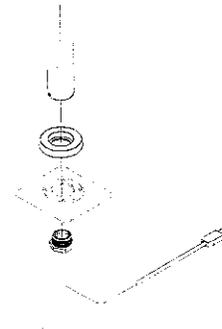
The assembly comes with the cable threaded through the conduit nipple, base (rear hole) and pole. If the assembly is correct for your installation, while holding the conduit nipple in place, screw the pole down snugly onto the bracket. The sheet metal base can be freestanding, mounted with 48765-10 screws or slid under the cash register, etc. If an alternate routing is required, the cable must be disconnected from the display module. To disconnect, unsnap the housing pieces and undo the RJ-45 connector. After re-threading the cable, reverse the procedure.

### Surface Mount Plate

The assembly comes with the cable threaded through the conduit nipple, base and pole. Drop the DB-9 connector through a hole in the mounting surface, or break out one of the tabs in the surface mount plate (use wide, square jaw pliers). Holding the pole in the plate, tighten the conduit nipple into the pole. Attach the mounting plate to the surface with 48765-10 screws, being careful to route the cables through the breakout tab if applicable.



### Base Kit, Heavy Metal



The assembly comes with the cable threaded through the conduit nipple, base and pole. Drop the DB-9 connector through a hole in the mounting surface, or use the milled slot in the base. Attach the mounting plate to the surface with 48765-10 screws, being careful to route the cables through the milled slot if applicable. Set the escutcheon ring and pole onto the plate. Holding the pole in the plate, tighten the conduit nipple into the pole.

Figure 2 Available Mounting Configurations

## Display Module and Pole Assembly:

The display module is attached to the pole assembly by inserting the display yoke into the pole at the end closest to the set screw, and then rotating the display.

1. Push any cable slack back into the pole.
2. Insert the display module partially into the pole and align the set screw with one of the two notches on the yoke bushing.
3. Push the yoke bushing completely into the pole, then rotate the module on the pole as desired.

### TO REMOVE THE MODULE:

Rotate the module in either direction until the set screw touches the stop on the yoke, then pull the module straight out from the pole. The housing must be opened to disconnect the cable from the module. To open the housing, gently pull the housing halves apart at the top center.

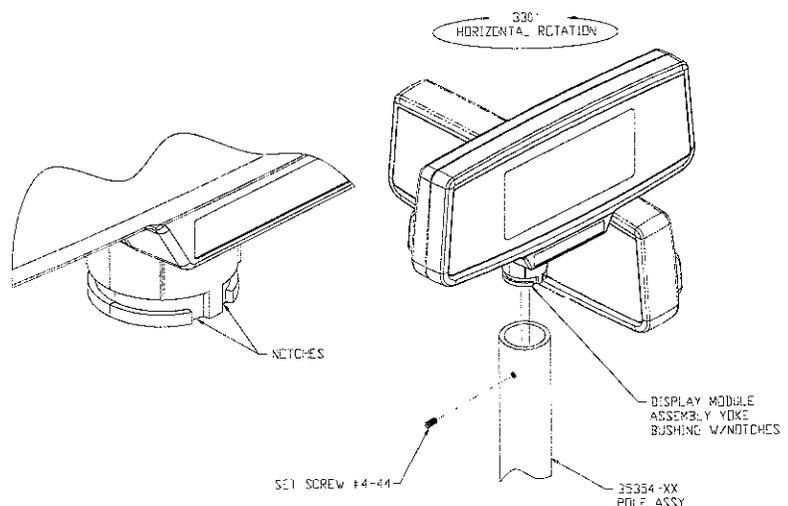


Figure 3 Module-Pole Assembly

# DISPLAY OPERATION

## Numeric Order Control Codes:

**NOTE: Care should be taken not to send undefined control or command codes to the POS display as this may cause a malfunction of the module.**

**01h** READ THE CHARACTER CAPACITY OF THE DISPLAY  
(Display responds sending 50h)

**02h** DISPLAY SOFTWARE CHECKSUM AND SOFTWARE NUMBER

**03h** READ CURSOR LOCATION VALUE  
(display responds with one byte)

For 11x13 dot characters For 11x24 dot characters  
01-14(h) for line1 01-14(h) for line1  
21-34(h) for line2 21-34(h) for line2  
41-54(h) for line1  
61-74(h) for line2

**04h** READ DATA AT CURRENT CURSOR LOCATION

**05h** 05-C-L-D GRAPHIC MODE: DISPLAYS 8 PIXEL DATA D ON LINE L IN COLUMN C  
C=01-1E(h) [30 columns, 8 pixels wide = 240 pixels]  
L=01-40(h) [64 pixel lines]  
D=8 pixel data

**06h** BEGIN BLINK FIELD AT CURRENT CURSOR LOCATION

**07h** END BLINK FIELD AT CURRENT CURSOR LOCATION

**08h** BACKSPACE CURSOR LOCATION ONE POSITION  
(except at HOME position)

**09h** ADVANCE CURSOR LOCATION ONE POSITION  
(cursor wraps to HOME from bottom right position)

**0Ah** LINE FEED  
(vertical scroll from bottom line; cursor position does not change)

**0Ch** CLEAR THE DISPLAY  
(cursor does not move)

**0Dh** CARRIAGE RETURN  
(returns cursor to left-most position on the same line)

**0Eh** MAKE CURSOR INDICATOR (FLASHING UNDERBAR) INVISIBLE  
(cursor location counter continues to function)

**0Fh** + MAKE CURSOR INDICATOR (FLASHING UNDERBAR) VISIBLE

**<10h>** BOTTOM LINE DATA ENTRY WITH AUTOMATIC CARRIAGE RETURN AND LINE FEED  
(moves cursor to left-most position on bottom line, when line is filled a vertical scroll occurs and the cursor is moved back to the left-most position on the bottom line)

**<11h>** + NORMAL DATA ENTRY WITH AUTOMATIC CARRIAGE RETURN AND LINE FEED  
(data enters from current cursor position, when bottom line is filled a vertical scroll occurs and the cursor is re-positioned to the left-most position on the bottom line)

**<12h>** OVERWRITE OF RIGHT-MOST CHARACTER ON THE CURRENT LINE  
(automatic Carriage Return is set to OFF)

**<13h>** HORIZONTAL SCROLL MODE  
(characters move from right to left on bottom line only after line has been filled)

**14h** RESET  
(sets display to DEFAULT configurations and clears User Defined Character locations)

**15h** + DISPLAY CLEAR  
(moves cursor to left-most position on bottom line in Mode 10h and HOME in Modes 11h 12h 13h and 1Ah)

**16h** + CURSOR HOME  
(returns cursor to upper left most position)

**17h** RESERVED FOR FACTORY USE

**18h** SCROLL SPEED

**19h** SET BIT SEVEN HIGH FOR NEXT BYTE ONLY

**<1Ah>** WRAP AROUND DATA ENTRY  
(after the bottom right character is entered the cursor is moved to the HOME position)

**1Bh** INITIATES THE FOLLOWING SEQUENCES:  
**1B-05-49** IEEE SPECIFIC RESPONSE CODE  
(the following message is sent to the host without regard for flow control):  
**D,2,IEEE 38184-01(CR) (18 BYTES)**

**1B-26-01-M-N** DOWNLOAD USER DEFINED CHARACTERS  
(11x13 dot characters only)  
M = Byte location to begin download (FC-FF)  
N = Number of characters to be downloaded  
Each character pattern is defined by 28 data bytes

**1B-3D-N**  
N=01 The display is not selected. All data from the host is not processed in the display  
N=02 The display is selected All data from the host is processed in the display

**+**

**1B-3F-N** DELETE DOWNLOADED CHARACTER LOCATION N  
N=FC-FF

**1B-40** TERMINATE SELF TEST  
(sets display to DEFAULT configurations and clears all USER DEFINED CHARACTER locations)

**1B-74-N** SELECT CHARACTER SET  
+  
N=01, ASCII and General European  
N=02 ASCII and Katakana  
N=03 ASCII and Cyrillic  
N=04 ASCII and Hebrew  
N=05 ASCII and ISO 8859-1  
N=06 ASCII and ISO 8859-2  
N=07 ASCII and Greek  
N=08, 12X24 DOT, 2-LINE (US ASCII only)

**1C-XX-XX** -0D DISPLAY CONTINUOUSLY SCROLLING MESSAGE IN TOP ROW  
(where XX is up to 42 characters)

**1D-05** EPSON SPECIFIC RESPONSE CODE  
(display sends 05 to host)

**1E-XX-XX** -0D DISPLAY CONTINUOUSLY SCROLLING MESSAGE IN BOTTOM ROW  
(where XX is up to 42 characters)

**1F** INITIATES FOLLOWING SEQUENCES:  
**1F-24-C-L** MOVE CURSOR TO COLUMN C LINE L  
For 11x13 dot characters For 11x24 dot characters  
C=01-14(h) C=01-14(h)  
L=01-04(h) L=01-02(h)

**1F-40** EXECUTE SELF TEST  
(use 1B-40 to terminate self test)

**1F-45-T** SET ALL DISPLAY BLINK FIELDS TO AN INTERVAL  
Interval = T x 50msec,  
Range of T=00h(OFF)-3Fh duty cycle=50%

**+** Display automatically defaults to these conditions after Power-up or RESET.  
**< >** These instructions are mutually exclusive.

**Note: The default display mode is 4X20-7mm.**

## User Defined Character Loading:

A maximum of four characters may be created temporarily (until power-off or reset) by a user-defined downloaded character pattern. To do so, enter the following sequence of commands and data:

BYTE	DESCRIPTION
1-3	Start load 1B-26-01 (HEX)
4	Location to begin download FC-FF (HEX)
5	Number of characters to download (01-04)
6-33	*Character dot data

- Repeat bytes 6-33 for number of characters to be downloaded.

## Character Charts:

Character Matrix

001	002	003	004	005	006	007	008	009	010	011
012	013	014	015	016	017	018	019	020	021	022
023	024	025	026	027	028	029	030	031	032	033
034	035	036	037	038	039	040	041	042	043	044
045	046	047	048	049	050	051	052	053	054	055
056	057	058	059	060	061	062	063	064	065	066
067	068	069	070	071	072	073	074	075	076	077
078	079	080	081	082	083	084	085	086	087	088
089	090	091	092	093	094	095	096	097	098	099
100	101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120	121
122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143
144	145	146	147	148	149	150	151	152	153	154

Character Dot Data

BYTE #	D7	D6	D5	D4	D3	D2	D1	D0
6	0	001	002	003	004	005	006	007
7	008	009	010	011	0	0	0	0
8	0	012	013	014	015	016	017	018
9	019	020	021	022	0	0	0	0
10	0	023	024	025	026	027	028	029
11	030	031	032	033	0	0	0	0
12	0	034	035	036	037	038	039	040
13	041	042	043	044	0	0	0	0
14	0	045	046	047	048	049	050	051
15	052	053	054	055	0	0	0	0
16	0	056	057	058	059	060	061	062
17	063	064	065	066	0	0	0	0
18	0	067	068	069	070	071	072	073
19	074	075	076	077	0	0	0	0
20	0	078	079	080	081	082	083	084
21	085	086	087	088	0	0	0	0
22	0	089	090	091	092	093	094	095
23	096	097	098	099	0	0	0	0
24	0	100	101	102	103	104	105	106
25	107	108	109	110	0	0	0	0
26	0	111	112	113	114	115	116	117
27	118	119	120	121	0	0	0	0
28	0	122	123	124	125	126	127	128
29	129	130	131	132	0	0	0	0
30	0	133	134	135	136	137	138	139
31	140	141	142	143	0	0	0	0
32	0	144	145	146	147	148	149	150
33	151	152	153	154	0	0	0	0

# CHARACTER FONTS

The **ASCII CHARACTER SET** is located in standard ASCII locations from 20 (HEX) to 7F (HEX).

The alternate character set is loaded into ASCII locations from 80 (HEX) to F7 (HEX)

**ASCII CHARACTER SET** – always available.

**European Character Set (Default setting)** – available at Power-up or Reset, can be re-loaded with command sequence 1B-74-01 (HEX).

**Katakana Character Set** – can be loaded with command sequence 1B-74-02 (HEX)

**Cyrillic Character Set** – can be loaded with command sequence 1B-74-03 (HEX).

**Hebrew Character Set** – can be loaded with command sequence 1B-74-04 (HEX).

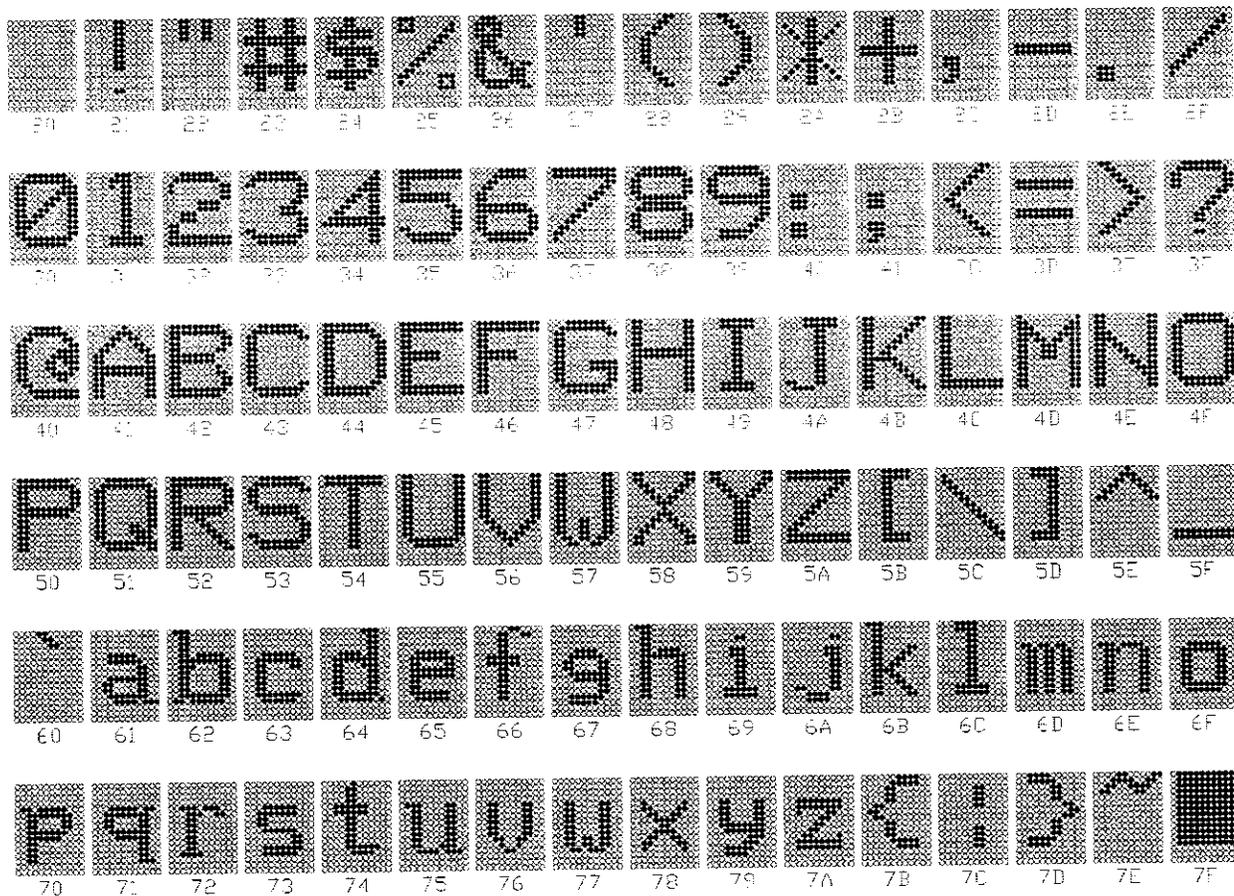
**ISO 8859-1 Character Set** – can be loaded with command sequence 1B-74-05 (HEX)

**ISO 8859-2 Character Set** – can be loaded with command sequence 1B-74-06 (HEX)

**Greek Character Set** – can be loaded with command sequence 1B-74-07 (HEX)

Note: in the USB display, fonts actually reside in the USB driver rather than in internal ROM. The command sequences are identical to a serial interface display operating on COM4.

Figure 4 Standard ASCII Character Set



# CHARACTER FONTS (cont.)

Figure 5 General European Character Set

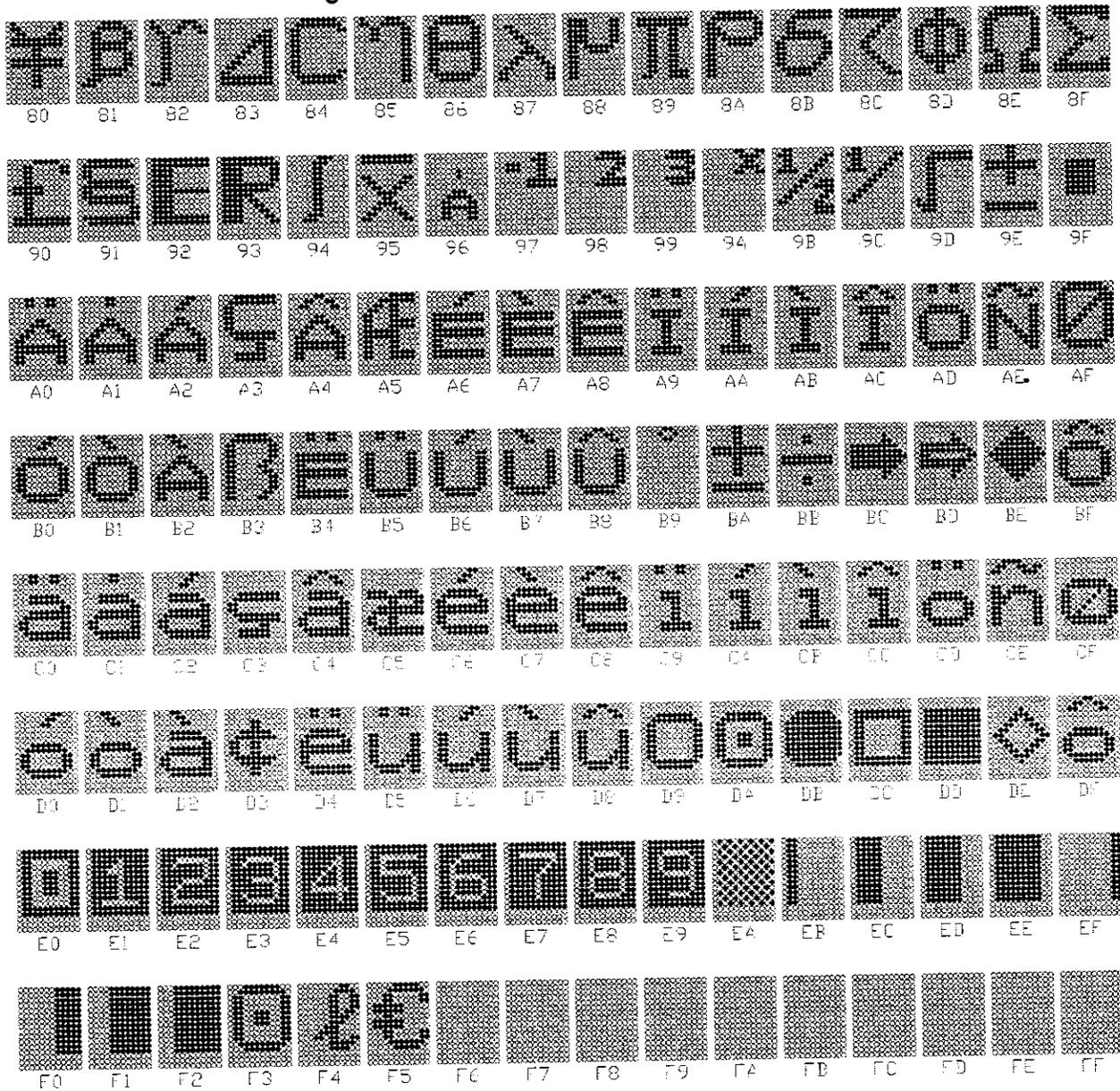


Figure 6 Katakana Character Set

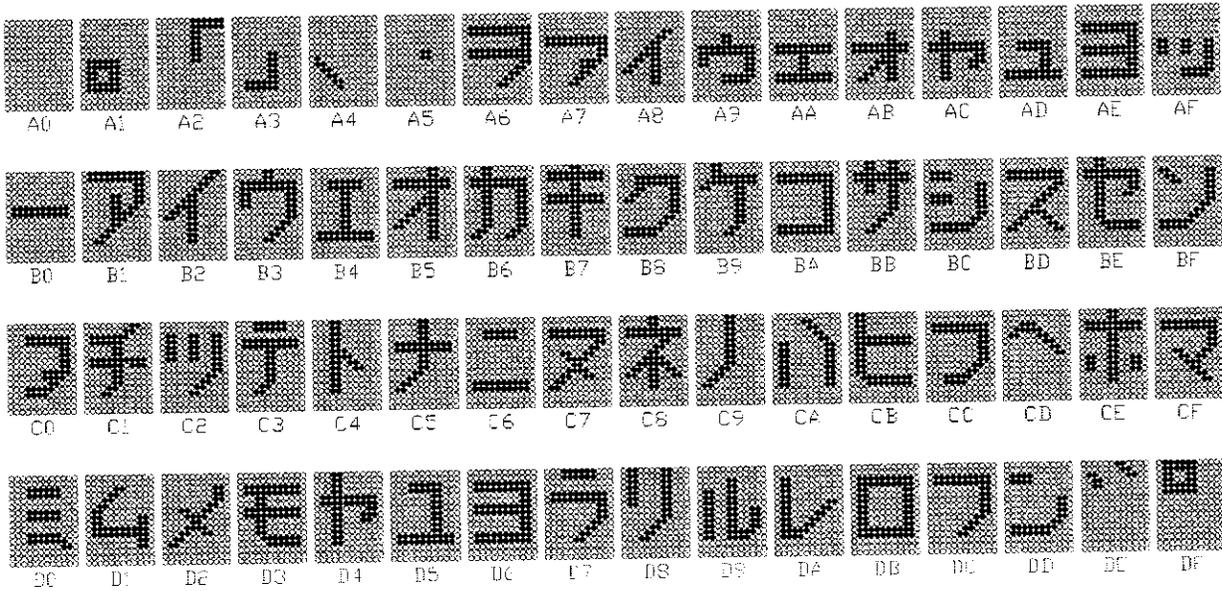


Figure 7 Cyrillic Character Set

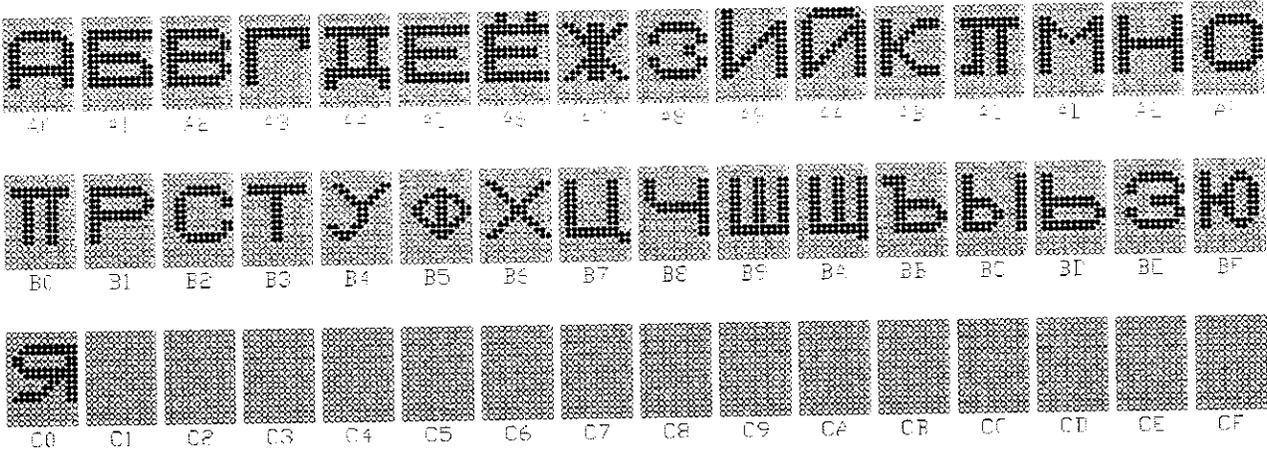


Figure 8 Hebrew Character Set

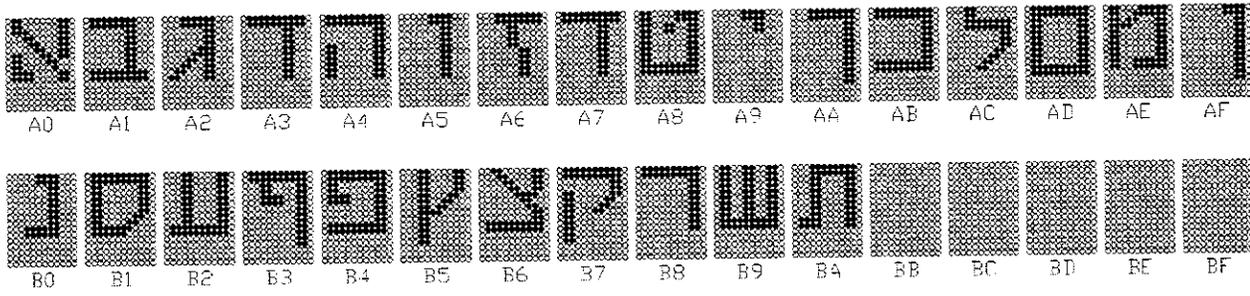
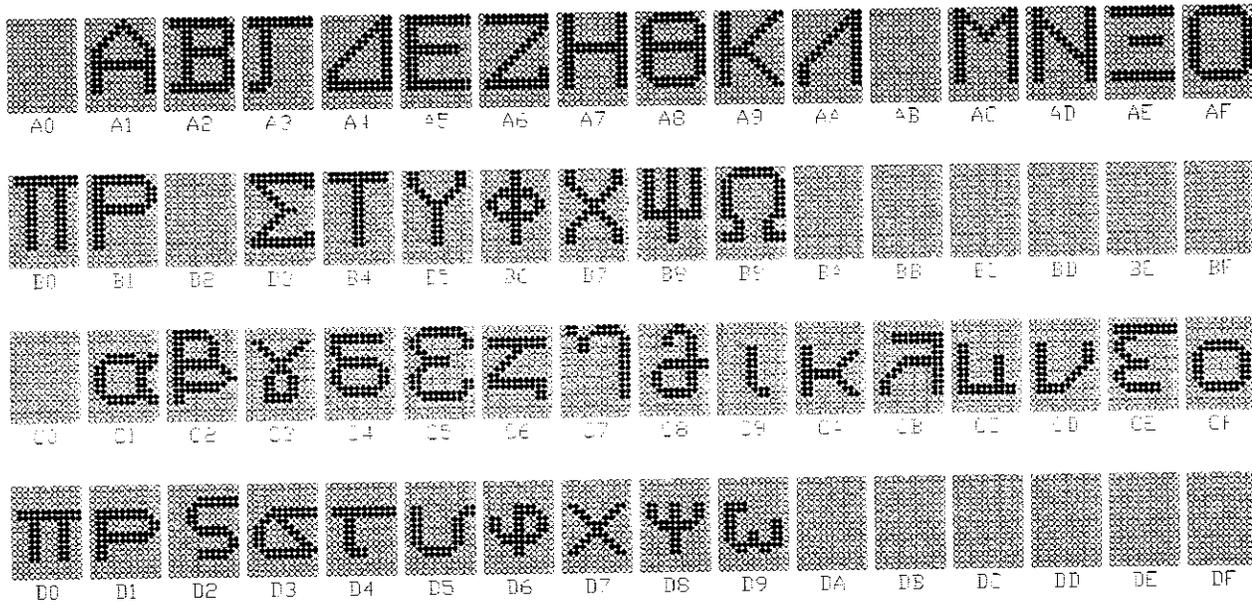
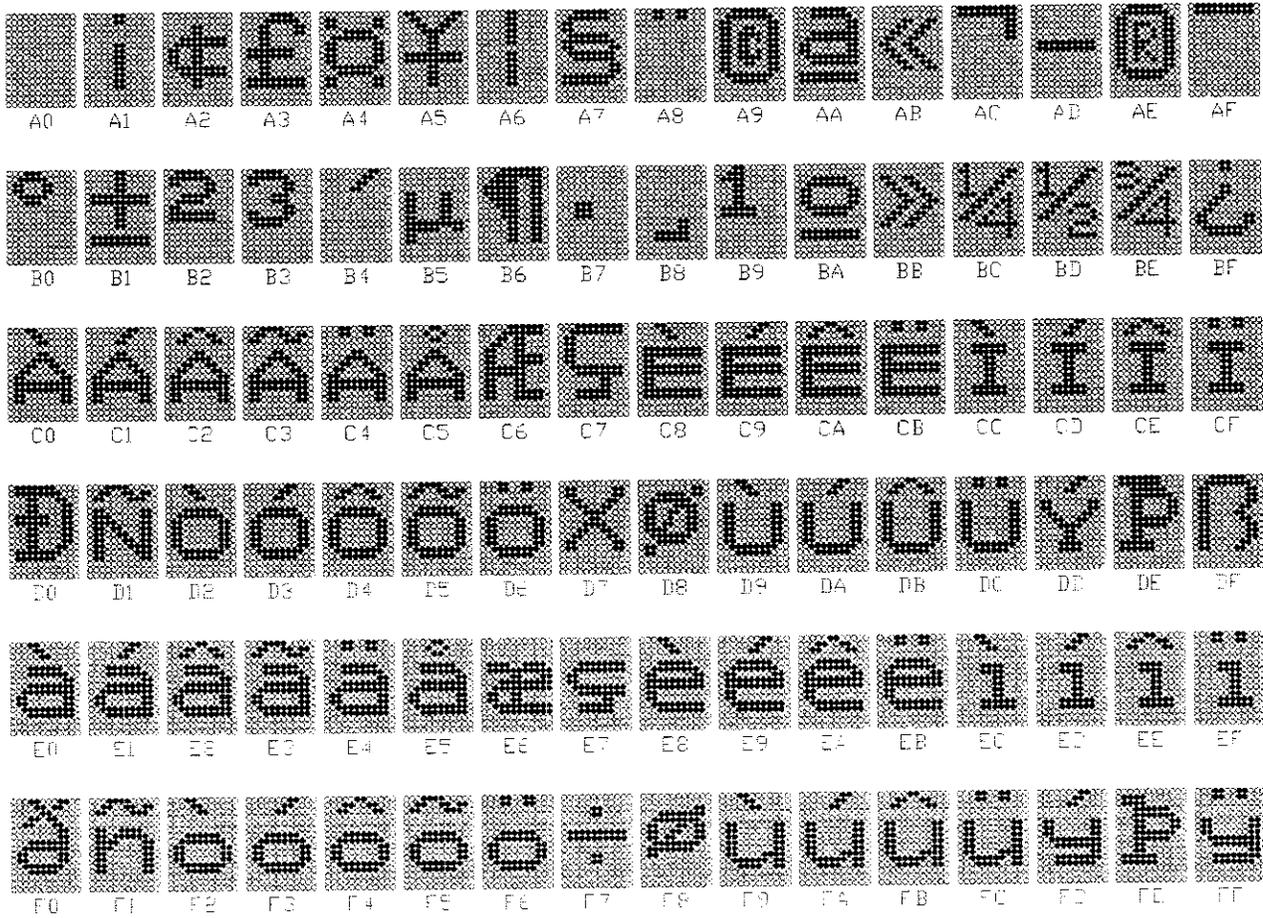


Figure 9 Greek Character Set



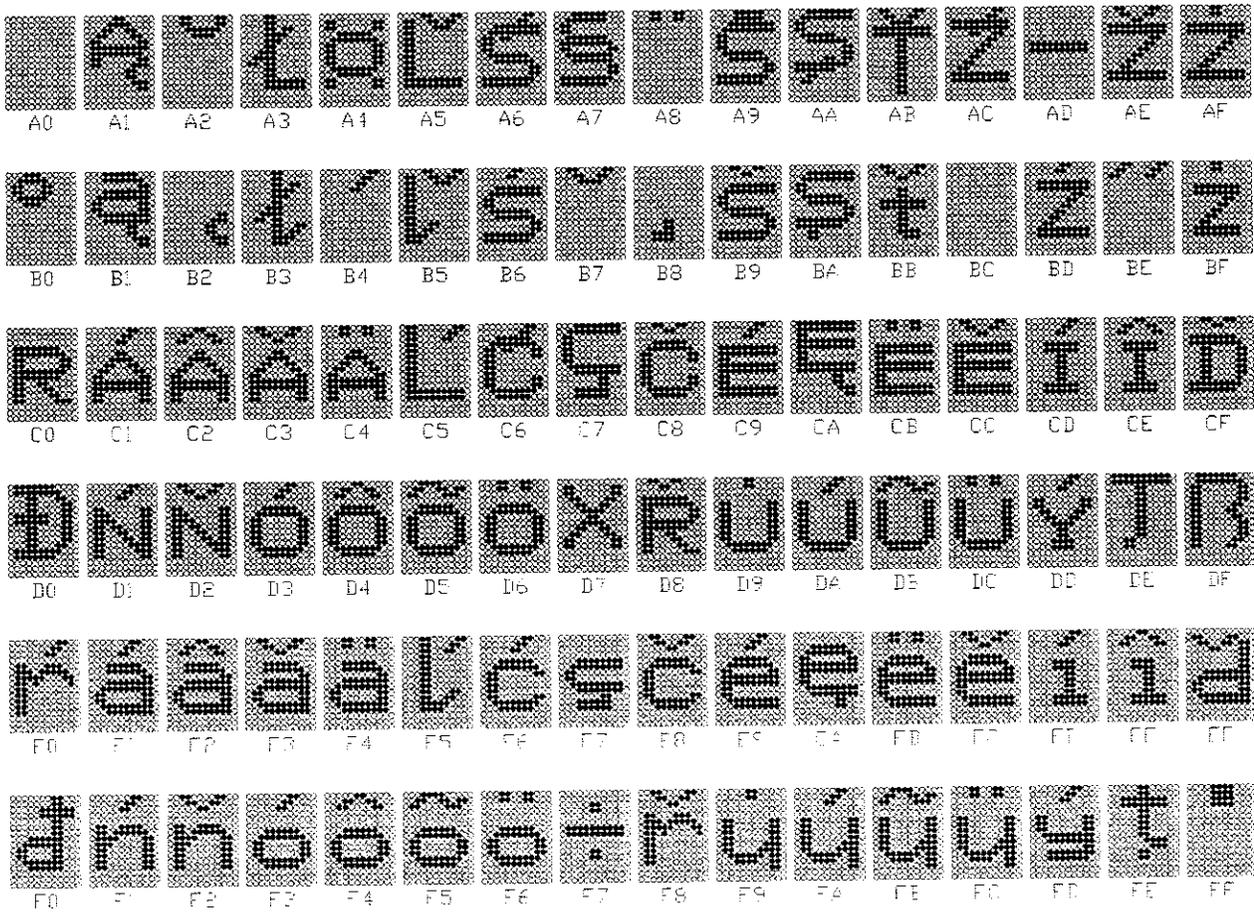
# CHARACTER FONTS (cont.)

Figure 10 ISO 8859-1 Character Set



# CHARACTER FONTS (cont.)

Figure 11 ISO 8859-2 Character Set

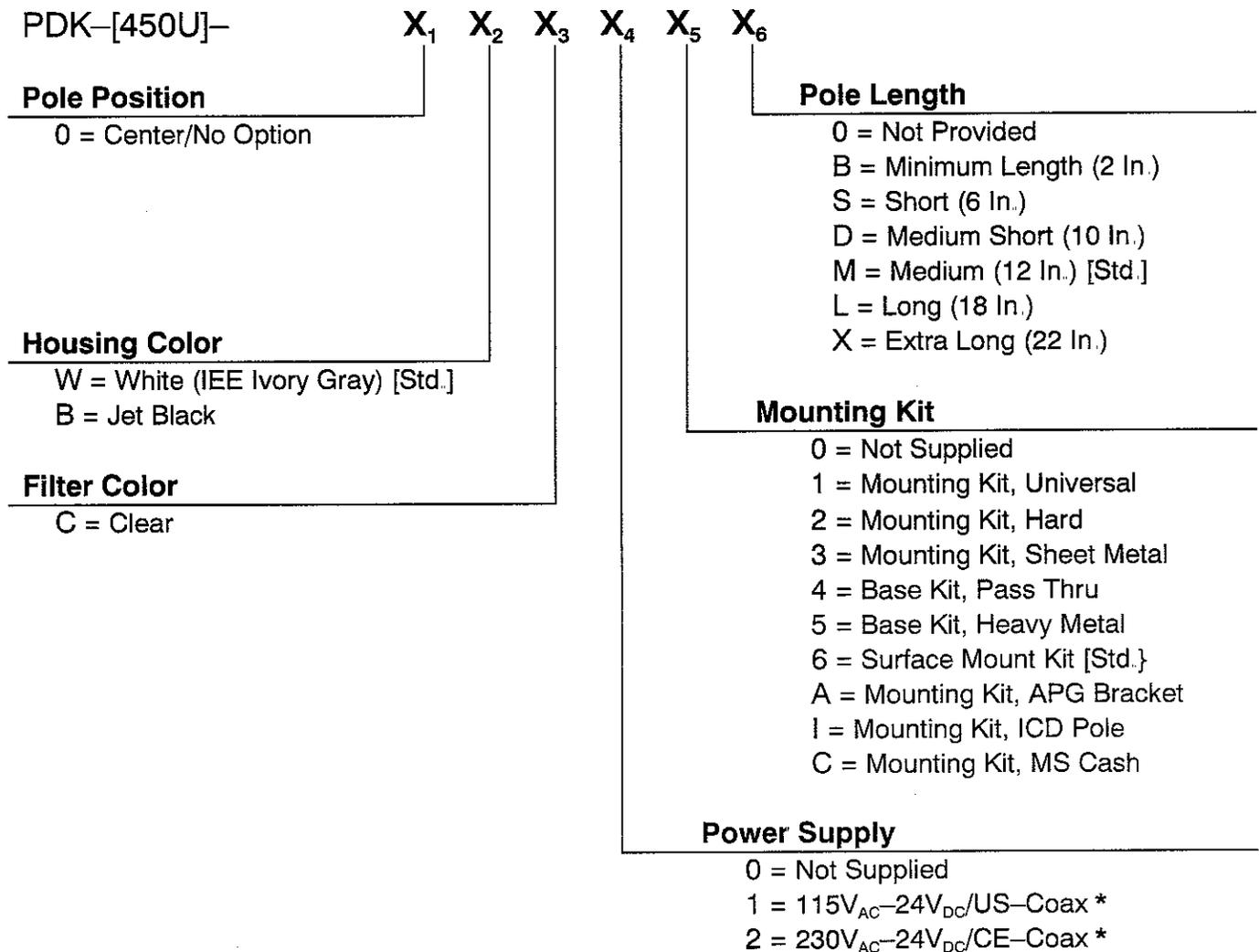


# CHARACTER FONTS (cont.)

Figure 12 Double Size Character Set



# KIT NUMBERING SCHEME



\* Necessary if power cannot be supplied via Pin 9 of serial port.

**NOTE:** The sub-set PDK-[450U]-x<sub>1</sub>x<sub>2</sub>x<sub>3</sub> defines the display assembly in this PDK kit.