**Supplement Guide**

**For**

**Setting Up LCD Display**

**List of Commands for LCD Display**

|  |  |  |
| --- | --- | --- |
| **COMMAND** | **BASE CODE** | **WHAT HAPPENS** |
| Clear Display | **00000001b** | Display is cleared |
| Cursor Home | **0000001\*b** | Cursor goes home (00) |
| Entry Mode | **000001XXb** | How characters displayed |
| Display Control | **00001XXXb** | On/Off, Cursor, Blink |
| Cursor Display Shift | **000100\*\*b** | Cursor Shift control |
| 8-Bit or 4-Bit Setup | **001XXX\*\*b** | 8-Bit/4-Bit, 1 or 2 lines |
| CGRAM Setup | **01XXXXXXb** | Character Generator |
| Sets DDRAM Address | **1XXXXXXXb** | Sets DDRAM Address |

\* = Bits that are ignored (in the program code just make them a "0")

X = Bits that an option needs to be selected

**Selection of 8-Bit/2 Line mode**

**COMMAND: Selecting 8-Bit/4-Bit mode, 1 or 2 Lines** **(001XXX\*\*b)**

BIT-0 Ignored (make = 0)

BIT-1 Ignored (make = 0)

BIT-2 = 0 Font of characters is 5x7 Dots (always select this option)

BIT-2 = 1 Font of characters is 5x10 Dots (not common)

BIT-3 = 0 Information displayed on 1 line

BIT-3 = 1 Information displayed on 2 lines (always select this option)

BIT-4 = 0 Commands and Data sent in 4-Bit format

BIT-4 = 1 Commands and Data sent in 8-Bit format

**#00111000b** Selects 8-bit mode/2 line mode for entry of information

Look at the example code listings to see how the binary number for this command is sent to the LCD display.

Nothing to see ... the LCD is set up for 8-Bit/2 Line entry of information



**Clear Display**

**COMMAND: Clear Display** **(00000001b)**

**#00000001b** Clears Display and places cursor at home position

Home Position (DDRAM address 00)



Note: After this Command a 5 millisecond or longer delay is needed

**Setting where you want the characters displayed**

**COMMAND: Sets DDRAM Address** **(1XXXXXXXb)**

This instruction sets the position on the 16x2 LCD display where the first character will be displayed. Arriving at the correct number to enter can be confusing, however, follow the example below. There are 32 possible DDRAM addresses (defined by a unique number for each location). To select a particular location, add the unique number to the base number (#10000000b) as shown below.



32 Possible Character Spaces

DDRAM Addresses (Decimal Notation)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 |
| 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |

EXAMPLE (Letter "K" placed in DDRAM address 73)

[#10000000b = 128 (base number) ] + [#01001001b = 73 ]

[ 128 + 73 ] = 201 Conversion to Binary = #11001001b

**#11001001b** Places “K” in DDRAM Address 73



The Letter "K" in DDRAM address 73

**Display Control**

**COMMAND: Display Control** **(00001XXXb)**

BIT-0 = 0 Cursor Blinking OFF

BIT-0 = 1 Cursor Blinking ON

BIT-1 = 0 Cursor OFF

BIT-1 = 1 Cursor ON

BIT-2 = 0 Display OFF

BIT-2 = 1 Display ON

**#00001000b** Display OFF, Cursor OFF, Cursor Blinking OFF



**#00001100b** Display ON, Cursor OFF, Cursor Blinking OFF



**#00001110b** Display ON, Cursor ON, Cursor Blinking OFF



**#00001111b** Display ON, Cursor ON, Cursor Blinking ON



**Display Shift (Left or Right)**

**COMMAND: Display Shift/Cursor Move (Right or Left)** **(000001XXb)**

BIT-0 = 0 Display shift OFF

BIT-0 = 1 Display shift ON

BIT-1 = 0 Cursor moves one space to the left (for next character)

BIT-1 = 1 Cursor moves one space to the right (for next character)

**#00000100b** Display Shift OFF / Cursor to the Left



(The K stays in DDRAM 73 while the next characters go in on the Left)

**#00000110b** Display Shift OFF / Cursor to the Right



(The K stays in DDRAM 73 while the next characters go in on the right)

**#00000101b** Display Shift ON / Cursor to the Left



(The Cursor stays in DDRAM 73 and stays on the Left while the K moves)

**#00000111b** Display Shift ON / Cursor to the Right



(The Cursor stays in DDRAM 73 and stays on the Right while the K moves)