

iLCD Intelligent Serial LCD Programming Guide Version 5.0

Overview

Traditional Text Liquid Crystal Displays (LCDs) requires 7 - 11 pins from a Microcontroller / Microprocessor to display text on the LCD.

The iLCD Serial LCD Display allows any device to display to the LCD with only 1 pin using the standard Serial RS-232 protocol.

This simplifies the effort and reduces the firmware code required by your favourite Microcontroller. Because only 1 pin is required, other pins can be used for other purposes.

The iLCD module (plus LCD) consumes only 6mA of current while active if the backlight is not switched on, thus is suitable for battery powered applications.

It is able to **Hard Reset** the LCD display if ever the display "hangs" or becomes garbled, this means the user need not physically switch off and back on the unit to reset it.

When powered up, the iLCD will automatically display its firmware Version Number and baud rate as seen below.



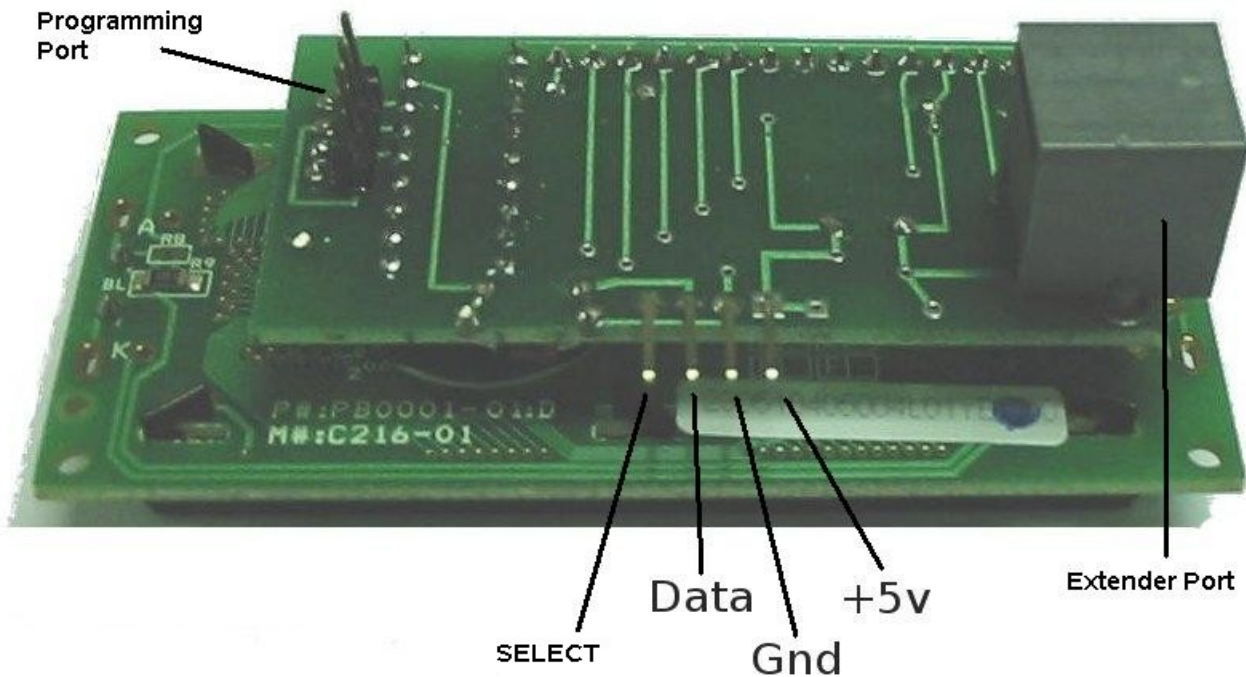
Front View

iLCD Outstanding Features

The iLCD system presents a new "Intelligent" interface not found in other serial LCD displays including

1. Text positioning directly references to line numbers, allowing portable code that works with different LCD displays.
2. Auto Power Off for BackLight to save current / battery
3. Automatic Text Wrap at the end of each line to the next line
4. Correct handling of Carriage Return <CR> character, moves to next line
5. BackLight control commands
6. Hard Reset function which powers down the LCD display and up again
7. Can work with both RS232 or TTL voltage levels with any settings
8. Correct handing of Backspace character
9. Commands to clear any Display Line without clearing the whole screen
10. Automatic contrast setting, which can be set to Light, Normal or Dark by serial commands.
11. Able to display byte value as a decimal number on the LCD.
12. Able to display byte value as a number with a zero in front if number is less than 10. Very useful for Date, Time and Cents displays.
13. Able to display byte value as a Hexadecimal number on the screen. Very important for debugging.
14. All commands can be tested from a PC terminal for easy verification.

iLCD Connection Interface



Back View

Connecting iLCD pins.

Please allow 0.8 second delay after power is applied before sending text or commands to the iLCD module.

The power supply should be +5 volts regulated capable of supplying at least 60mA if you want to use the LCD backlight.

The Select Pin can be used to reduce the baud rate to 2400bps by pulling it to ground.

Leaving the Select Pin unconnected keeps the baud rate at 9600bps.

The serial data is sent to the iLCD module via the Data pin.

The Extender Port is optional. It allows moving the iLCD module up to 20 feet away from the PC or Microcontroller using a standard 4 wire flat phone cable with RJ11 plug.

The Programming port is used for future upgrades of the iLCD firmware and should not be connected.

Serial Interface Settings

The iLCD module can accept both standard RS232C signals (+12 to -12v) or TTL Level signals (+5v to 0v). It can also work directly with 3.3v Microcontrollers like the Propeller.

Before sending text to iLCD to be displayed, make sure the baud rate and other serial settings are correct.

The default baud rate on iLCD is 9600bps. To change the baud rate to 2400bps, connect the Select pin to ground. Upon power up, the new baud rate will be shown on the screen.

If you need a different baud rate that is neither 9600 or 2400, please inform the us on the baud rate that you need when placing an order.

The other serial settings should be

1. 1 Start Bit
2. 1 Stop Bit
3. 8 Data bits
4. No parity bit
5. Flow Control – None

Don't worry if you are not sure about all these settings above, because they are actually standard default settings for serial ports.

If you are not sure, just try to send anyway, it will probably work.

Displaying Text to iLCD

To send a string of Text to the iLCD module, just send the string via the serial pin.

There is no need for any commands.

See examples below for some popular microcontrollers.

Basic Stamp II Example

```
N96N con $4054 ' define 9600 baud, inverted, no parity.  
serout 1,N96N,["Hello"] ' send out on pin 1 to display on LCD
```

C-Stamp Example for RS-232 Port

```
BYTE Buff[] = "Hello"; // Allocate message  
// Display string at 9600 baud, 8 bits, no parity, no flow control, no pace  
SEROUT(0, 0, 9.6, 0, 8, 0, 0, Buff, 5);
```

C-Stamp Example for any other Pin

```
BYTE Buff[] = "Hello"; // Allocate message  
// Display string sent via Pin 1 at 9600 baud, 8 bits, no parity, no flow control, no pace  
SEROUT2(0, 0, 9.6, 0, 8, 0, 0, Buff, 5, 1);
```

BasicX Example

```
Call OpenQueue(InBuff,20) ' allocate buffer for input  
Call OpenQueue(OutBuff,20) ' allocate buffer for output  
Call OpenCom(1,9600,InBuff,OutBuff) ' open com port 1, 9600 baud  
Call PutQueueStr(OutBuff,"Hello") ' display string of text
```

Sending Commands to iLCD Display

All commands must be preceded by a ESC (decimal 27) character.
For example, to clear the screen , you must send char 27 before sending char 1.

iLCD Basic Commands

<i>CMD</i>	<i>Description</i>	<i>Char Sequence</i>	<i>Remarks</i>
1	Clear Screen	ESC, 1	After clear, wait 10ms for LCD to recover
I	Set cursor at line number, column 1	ESC, I, '2'	This example sets the cursor at Line2 Column 1 without clearing line 2
L	Clears one line and sets cursor at column 1 of that line	ESC, L, '2'	This example clears all text on Line2 and sets the cursor at Line2 Column 1
C	Shows cursor	ESC, C	Shows the cursor
O	Hides cursor	ESC, O	Hides the cursor
M	Show number	ESC, M, Byte	If the value of Byte is 138, the screen will display "138".
N	Show number with zero padding in front if less than 10.	ESC, N, Byte	If the value of Byte is 9, the screen will display "09". Useful for displaying minutes or cents.
H	Show byte value as a Hexadecimal number	ESC, H, Byte	If the value Byte is 171 decimal, then "AB" will be displayed. Useful for debugging.
B	Switch on backlight	ESC, B, \$A0	In this example, the LCD backlight will be switched on for 10 seconds. The 3 rd byte allows 2 to 255 seconds ON time. Backlight cannot be switched on indefinitely.
S	Switch off backlight	ESC, S	The LCD backlight will be switched off immediately.

Advanced Commands

<i>CMD</i>	<i>Description</i>	<i>Char Sequence</i>	<i>Remarks</i>
0	Hard Reset Module	ESC, 0	After this command, wait 0.9 seconds for LCD to recover. Only use this command if Clear Screen command fails to work.
P	Set cursor position	ESC, P, \$C0	Set exact cursor location, for example line1col1 = \$80 hex, line1col3 = \$83 hex line2col1 = \$C0 hex, line2col4 = \$C4 hex We recommend that you use the I command or the L command instead. Using this command will make your code not portable to other LCD displays.
D	Set Display Contrast	ESC, D, +	Sets Display Contrast to Darkest setting
		ESC, D, -	Set Display Contrast to Lightest setting
		ESC, D, =	Set Display contrast to Normal setting The is the default setting during power up.