Micromite LCD Backpack Construction Notes

Important:

Download the Micromite firmware and manuals from http://geoffg.net/micromite.html#Downloads

The Micromite User Manual describes how to program the firmware into the PIC32 microcontroller, how to connect the console and how to program the Micromite.

In particular read the section titled "LCD Displays" as that describes the type of LCD display used in the Micromite LCD Backpack.

This document only provides information specific to building the Micromite LCD Backpack.

Parts List

- 1   PCB, 50mm x 86mm (for 2.8" LCD) or 45mm x77mm (for 2.4" LCD)
- 1   ILI9341 based LCD 320x240 pixels 2.2", 2.4" or 2.8" diagonal measurement.
- 1   Tactile switch thru hole, 4 pin
- 1   100Ω vertical mounting side adjust trimpot (Altronics R2579, Element14 9608044 or similar)
- 1   28-pin skinny DIP low profile IC socket
- 1   4 pin 0.1" male header (CON1)
- 1   18 pin 0.1" male header (CON2)
- 1   14 pin 0.1" female header socket (CON3)
- 1   6 pin 0.1" right angle male header (CON4)
- 4   12mm untapped spacers
- 4   16mm long M3 machine screws and nuts.

Semiconductors
- 1   Microchip PIC32MX170F256B-50I/SP microcontroller (IC1). A PIC32MX170F256B-I/SP can also be used but will be limited to 40MHz
- 1   Microchip MCP1700-3302E/TO voltage regulator (IC2)

Capacitors
- 2   100nF Monolithic
- 2   10µF 16V Tantalum
- 1   47µF 16V Tantalum

Resistors (0.25W 5%)
- 1   10KΩ

Console Connection

To configure the Micromite you use the console. This is a TTL serial interface running at 38400 baud, 8 bits data, no parity and one stop bit.

Generally this is done using a USB to serial converter.

There are many USB to serial converters on the market but I recommend units based on the Silicon Labs CP2102 chip. They can be found on eBay for a few dollars (search for "CP2102") and work perfectly with the Micromite. You should avoid converters based on the FTDI FT232RL chip as many Chinese manufacturers use clone chips which will not work with the current Windows drivers.

The converter has a ground pin and a 5V power output pin and these can be connected to the corresponding pins on CON1 on the Micromite LCD Backpack. The serial converter will then provide power to the backpack and the attached LCD, which is useful when you are editing or testing a program.

If you do not need the converter you should use the GND and 5V pins on CON1 as the main power input.

The following diagram illustrates how to connect a CP2102 converter to the Micromite LCD Backpack:
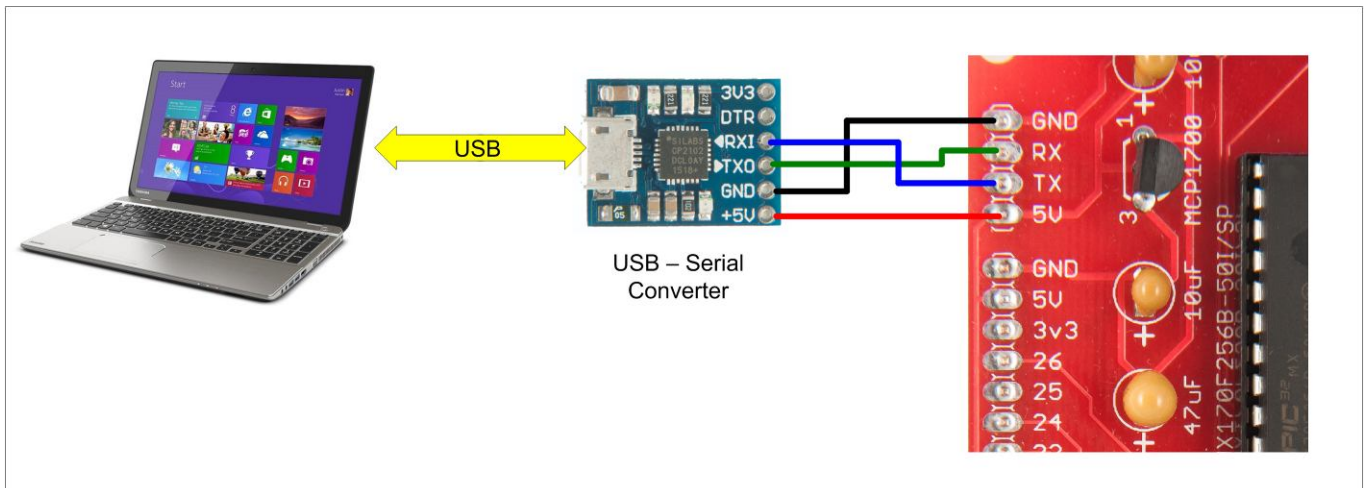
Configuring the Micromite

To configure the Micromite for the LCD Backpack you should follow these steps.

All settings are automatically saved in non volatile memory and will be automatically applied on power up. So they only need to be applied once.

Connect to the console and enter the following line at the command prompt:

OPTION LCDPANEL ILI9341, L, 2, 23, 6

This tells the Micromite that the LCD panel is connected and what I/O pins are used for critical signals such as reset and device select.

You can test the display by entering the following at the command prompt:

GUI TEST LCDPANEL

This will cause the Micromite to draw a series of rapidly overlapping coloured circles on the display. Press any key on the console to return to the command prompt.

To configure the touch feature you should enter the following:

OPTION TOUCH 7, 15

Similar to configuring the LCD panel this command allocates the I/O pins for the touch controller and initialises it.

You do not have to run this command if your panel does not have a touch sensitive screen but you must use it if your LCD does have a touch facility – even though you will not be using touch in your program. This is because the touch chip select line could float causing the touch controller to respond to commands intended for the panel's ILI9341 controller. With the touch feature configured MMBasic will know to keep the touch chip select line inactive.

Calibrate the touch facility with the following command:

GUI CALIBRATE

This will cause MMBasic to draw a target at the top left hand corner of the screen. Using a pointy object press on the exact centre of the target. In this fashion the target will be displayed on all four corners of the display and the touch feature will be calibrated for the display.

You can now test the touch facility with the command:

GUI TEST TOUCH

This will clear the screen and when you touch it pixels will be illuminated at the touch point. Pressing any key will terminate the test.

Interfacing

The Micromite LCD Backpack interface connections are on CON2. This connector is designed so that it can be plugged into a solderless breadboard or connect to a third board mounted on the back on the backpack.

The silk screen on the PCB identifies each pin on the connector. The GND, 5V and 3.3V pins can be used to power external interface circuitry. The maximum current that can be drawn from the 3.3V pin is 150mA while the maximum 5V load will depend on your 5V supply. The RESET pin is normally at 3.3V pulled up by the 10K resistor and if you pull it low the Micromite will reset.

The other I/O pins connect directly to the Micromite and are marked with the Micromite pin number, refer to the Micromite User Manual for details of each pin.

Three of the pins on CON2 (pins 3, 14 and 25) are also connected to the colour LCD for communicating with the display using the SPI protocol. For this reason they cannot be used as general purpose I/O pins, however they can still be used by you for SPI communications if needed. The user manual describes how to use the SPI interface simultaneously with the LCD however, for normal operation, do not use pins 3, 14 and 25 for general I/O.