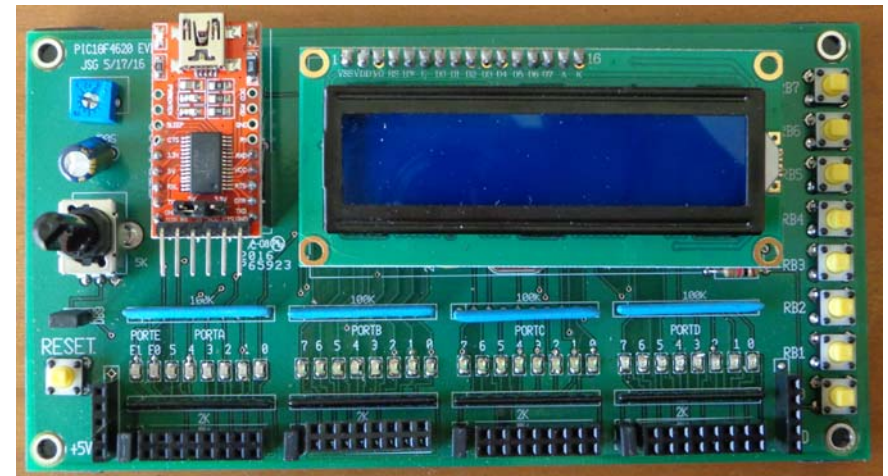
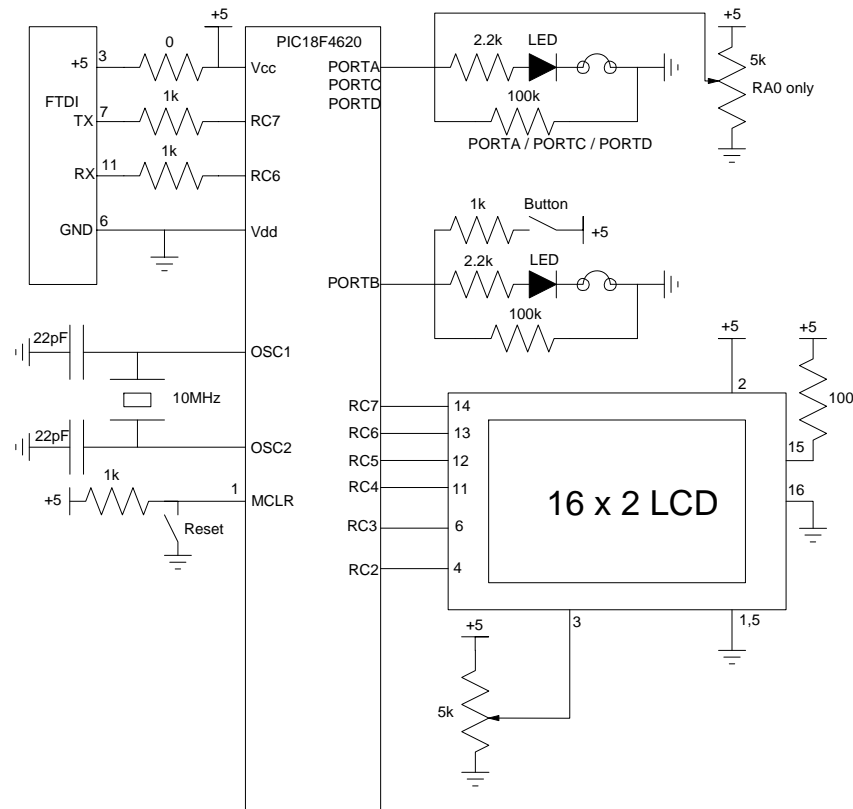


Schematics

ECE 376 - Lab Kit

Please visit www.BisonAcademy.com for more information



Soldering Your Circuit Board:

If you've never soldered before, don't worry: that's part of the reason this kit is used in ECE 376. The lab for the first two weeks consists of soldering your boards. On Tuesdays and Thursdays, there will be someone in ECE 211 and/or ECE 237 labs to help you get started. It's not that hard - you just have to be patient.

A video walk-through for soldering your board should be posted on BisonAcademy.com shortly in the ECE 376 page.

If you have soldered before and don't need help, please feel free to start on your own. Solder and soldering irons are available in rooms ECE 211 and ECE 237. All ECE 376 students should also have card-key access to these rooms.

Soldering Step by Step

Step 1: Surface Mount Parts:

The LEDs are 0805 (80 mil x 50 mil) surface mount parts. They're used in this kit because they're pretty. They also let you see that surface mount parts aren't that bad to solder. They'll let you see your boards much smaller in senior design if you're not afraid of them.

- 0805 parts are easy to solder by hand – if you have a good soldering iron and a good pair of tweezers.
- 0402 parts are easy to solder if you have a microscope and a sharp tip on your soldering iron

- SOP parts are surface mount versions of your chips. They have 50 mil spacing – about the same as the 0805. They're pretty easy to solder as well.

TSSOP or SSOP parts are 25 mil spacing and HARD for me to solder. I'd avoid them.

1a) Place your soldering iron on one pad on your board. Place a bead of solder on this pad. Repeat for on pad for each surface mount part.

1b) Hold the LED with tweezers. Place the soldering iron on the soldered pad and align the LED so it's over both pads. Important: The green stripe is ground. It goes to the bottom of your board. Remove the soldering iron when aligned.

1c) Solder the other pad. Place the soldering iron on the part and the pad. Touch the pad with solder and it should flow on.

Step 2: IC's in Sockets (40-pin PIC, 16-pin UART): Place the socketed parts on your board on the top side. Flip the board over and solder the back side for each pin. It's a little tricky keeping the part from falling out when you flip it over. Sockets allow you to replace your parts (PIC, UART) if it gets fried during the semester. It does happen.

Step 3: Resistors: Place your resistors in each resistor spot. You'll need to bend the pins to get them in. You might bend the pins slightly on the back side to get them to stay. Solder the back side of the board. Clip the extra wires on the back side.

Caution: The resistor arrays (10x1 pin parts) are very difficult to take out. Make sure the 2.2k array (label = 222 = 22×10^2 Ohms) is on top, 100k array (label = 104 = 10×10^4 Ohms) is on the bottom.

Note: Color Codes are

- **1k** brown - black - red
- **100** brown - black - brown
- **50** single black line (actually this is a 0 ohm resistor due to a design change)

Step 5: Other parts: The order doesn't really matter. It all gets soldered on your board eventually. Just save the LCD display for last.

Step 6: Jumpers: Break your 30x1 header into five 2x1 sections. Add a jumper to each 2x1 header on the long side. The jumper insulates it so you don't burn your fingers as badly. It also makes sure you don't solder them into the board upside down.

Hold the plastic jumper, place each 2x1 header into its spot on the board and solder it in. It will get hot.

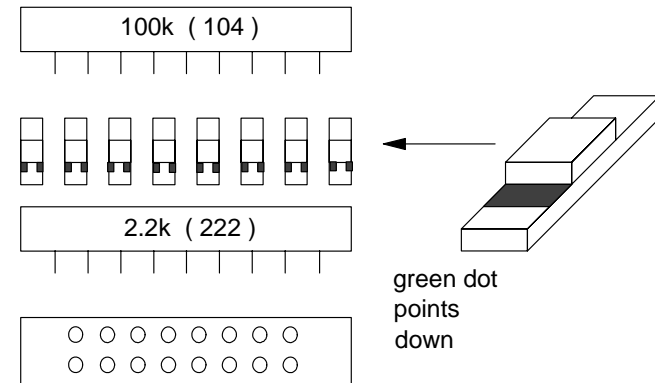
Last Step: LCD Display: Your PCB is set up so you can replace the LCD display fairly easily. A 16x1 socket is provided along with a header block so you can add and remove the LCD display as needed.

Break the 30x1 header so it has 16 pins on it. Solder these to your LCD display.

Solder the 16x1 socket onto your PCB so that the LCD connects through this socket. Power up your PCB

- If you get nothing on your LCD, adjust the contrast potentiometer (blue pot).
- If you still get nothing, see Jeff Erikson for a new LCD display.

Problems: About 1/3rd of the boards will quit working during the semester. This is usually a bad solder connection which eventually oxidized and opened up. If your board quits working, just retouch all your solder points. Hold a soldering iron on each pin for 2-3 seconds to remelt the solder. This usually fixes the problem.



note: When connecting the resistor arrays, please be careful to place them in the correct sockets (222 = 2.2k, 104 = 100k). If you follow someone else's board, the color of the resistor arrays is just decorative (and changes year to year).