# ECE 4723: Embedded Systems
## Spring 2019

**Lab 2**
**ESOS and the ECE 4723/6723 Target Board**

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# Board Assembly Procedure

## STEP 1: Power

LM2937

- Solder three terminals, as well as the heat sink to the heat plate pads on the reverse side.
- Check continuity between heat plate and the heat sink using a multimeter with probes between the heat plates on the reverse side and the heat sink on the chip.
- Confirm that pin 1 of the chip is connected to pad C of the JP1 pin junction.

C6

- Solder on 0.1uF capacitor.
- Check continuity between positive pad between C6 and pad C of JP1.
- Check continuity between negative pad between C6 and ground.

C7

- Solder on 10uF capacitor.
- Check continuity between positive pad of C7 and pin 3 of LM2937.
- Check continuity between negative pad of C7 and ground.

R1

- Solder on 1.5k Ohm resistor.
- Check continuity between pin 3 of LSM2937 to input of R1.

3.3V Power LED

- Discover cathode pad for LED by using continuity test between the pads and ground.
- Solder on Green LED.
- Check continuity between anode of LED and output of R1.

C1, C2, C3, C4, C5

- Check continuity between all input pads and 3.3V.
- Check continuity between all output pads and ground.

## STEP 2: MCU

dsPIC33EP512GP806

- Ensure the circle in the MCU is placed over the circle printed on the PCB.
- Ensure that all footprints line up on the PCB, and solder the MCU.

## STEP 3: MCU Output LEDs

LED1

- Discover cathode pad for LED by using continuity test between the pads and ground.
- Solder on Red LED.
- Check continuity between anode of LED and output pad of R2

LED2

- Discover cathode pad for LED by using continuity test between the pads and ground.
- Solder on Yellow LED.

- Check continuity between anode of LED and output pad of R3

LED3

- Discover anode pad for LED by using continuity test between the pads and output pad of R4.
- Solder on Green LED.
- Check continuity between cathode of LED and input to MCU LED3 signal.

R2

- Solder on 1.5k Ohm resistor.
- Check continuity between input of resistor and output of MCU LED1 signal.
- Check continuity between output of resistor and cathode of LED1.

R3

- Solder on 1.5k Ohm resistor.
- Check continuity between input of resistor and output of MCU LED1 signal.
- Check continuity between output of resistor and cathode of LED2.

R4

- Solder on 1.5k Ohm resistor.
- Check continuity between input of resistor and 3.3V.
- Check continuity between output of resistor and cathode of LED3.

## STEP 4: MCU Serial Connection to PC (FTDI - MCU)

FTDI

- Cut 6 pins off of the 40 pin part in the kit.
- Solder on the 6 pin header.
- Check continuity between MCUTX and MCURX pin headers (4,5) and MCUTX and MCURX pins on MCU.
- Solder jumper from MCLR (pin 1) on the serial header, to RTS# (pin 6) on the FTDI header
- Solder jumper from MCUTX to pin 1 on H1, check continuity between MCUTX and RF0.
- Check continuity between USB5V pin header and JB1 pad 1.
- Check continuity between Ground pin header and ground.

## STEP 5: MCU Programming (ICSP)

SV1

- Cut 6 pins off of the 40 pin part in the kit.
- Solder on the 6 pin header.
- Check continuity between MCLR, VICP, PGED, PGEC, and PGLVP pin headers (1,2,4,5,6) and their respective pins on the MCU.
- Check continuity between Ground pin header and ground.

## STEP 6: MCU Inputs (SW1, SW2, SW3, RPG1, and POT)

SW1

- Discover correct input of SW1 by testing continuity between SW1 MCU pin and pads of SW1 footprint.
- Solder the SPST switch.
- Check continuity between the output of SW1 and ground.

SW2

- Discover correct input of SW2 by testing continuity between SW2 MCU pin and pads of SW2 footprint.
- Solder the SPST switch.
- Check continuity between the output of SW2 and ground.

RESET switch

- Solder on SPST switch.
- Check continuity between output of R0 and input of switch.
- Check continuity between switch and ground.

C0

- Solder on 10uF capacitor.
- Check continuity between VCAP output on MCU and input of C0
- Check continuity between VCAP MCU pin and pads of C0 footprint.
- Check continuity between output of C0 and ground.

R0

- Check continuity between 3.3V MCU pin and pads of R0 footprint.

S0

- Solder on 10k Ohm resistor.
- Check continuity between output of R0 and RESET switch footprint.
- Solder the rotary encoder.
- Check continuity between the SW3 pad and the SW3 MCU pin.
- Check continuity between RPGA/B pads and the RPGA/B MCU pins.
- Check continuity between ground pad and ground.

POT

- Solder potentiometer.
- Check continuity between 3.3V footprint pad and 3.3V.
- Check continuity between VPOT footprint pad and VPOT MCU pin.
- Check continuity between ground footprint pad and ground.