## Power Distribution

Circuits have been built/tested on a breadboard before ordering PCB. Theoretically should work.

### Steps for testing (before power)

1. Check that all components are populated that needed to be (also check orientation if applicable)  
   - if there are any missing then these should be added before continuing.
2. Check most basic connections using test points and terminals.

The following tests should be done without inserting the fuses or connecting anything to the outputs.

### Test 1: check input (no fuse inserted)

1. Check that the input terminal works (was the actual circuit correct). If V+ and ground are connected is that what the board will get supplied with.

### Test 2: testing the switching circuit

1. Check resistor values.
2. Connect 12V to the Supply test point (probably should have had header pins here instead of a test point).
3. Check that the toggle switch works as expected with circuit.
4. Check that following is true:  
   
5. Connect LED to J7 and check that it also only switches on when Vout is high.

### Test 3: check output

1. Supply voltage to Vout and check that barrel jacks at output have this voltage. Once again would have been useful to have header pins here instead of just a testpoint.
2. Barrel jacks should have V+ in centre rod and GND on the outer ring (bottom connector)

### Notes

* Should have included more header pins, especially for powering the circuits separately for testing and fault finding.

## Temperature Controller

### Steps for testing (before power)

1. Check that all components are populated that needed to be (also check orientation if applicable)  
   - if there are any missing then these should be added before continuing.
2. Check most basic connections using test points and terminals.

Unit tests for temperature controller PCB

### Test 1: check wheatstone bridge

1. Check that resistor values.
2. Connect PT100 (need to get MOLEX connectors for this) or could use potentiometer to vary this value manually – just need to ensure that the resistor values from the pot are the same as range expected for PT100.

### Test 2: Instrumentation amplifier testing

1. If all connections are correct can power using +3V3 (this circuit is only connected to the wheatstone bridge)
2. Vary the voltage at Va (can either use jumpers and breadboard connected to J1 and manually swap out resistors or use a potentiometer).
3. Scope TempReading testpoint and compare value for various resistors to the expected/calculated values (should have a MATLAB script to do this).

### Test 3: inputs and outputs

1. Check connections and resistor values.
2. Connect the push button and LED and check that the circuit works.
3. Check barrel jack connections.

### Test 4: Relay circuit

1. Missing components are for the relay circuit – just need to talk to Justin about this.
2. Check that switching circuit works with a voltage of 3V3 at PD2 (this would be from the microcontroller).
3. Check that voltage across COM and NO only go high when PD2 goes high.

### Test 5: Temperature control code

1. Retest code developed previously.
2. Connect output from instrumentation amplifier only – use UART to print out the values being read for specific resistors values (check that ADC and code works properly). Should use same resistors/values as in test 2 step 3.
3. Disconnect instrumentation output. Connect the GPIO pins to the push button and LED and check that these work with code.
4. Check that the orientation of the board is correct so that it can fit onto the STM Nucleo.

### Notes

* Board was designed to use be power by the Nucleo via the micro-USB.
* Barrel jack power input is only for the relay circuit.
* Looking back – would have added a voltage regulator circuit to get a 5V output from the 12V which could be used to power the board and supply power to the relays.