HO SCALE
DOUBLE SLIP SWITCH
ROUTE INDICATOR PANEL

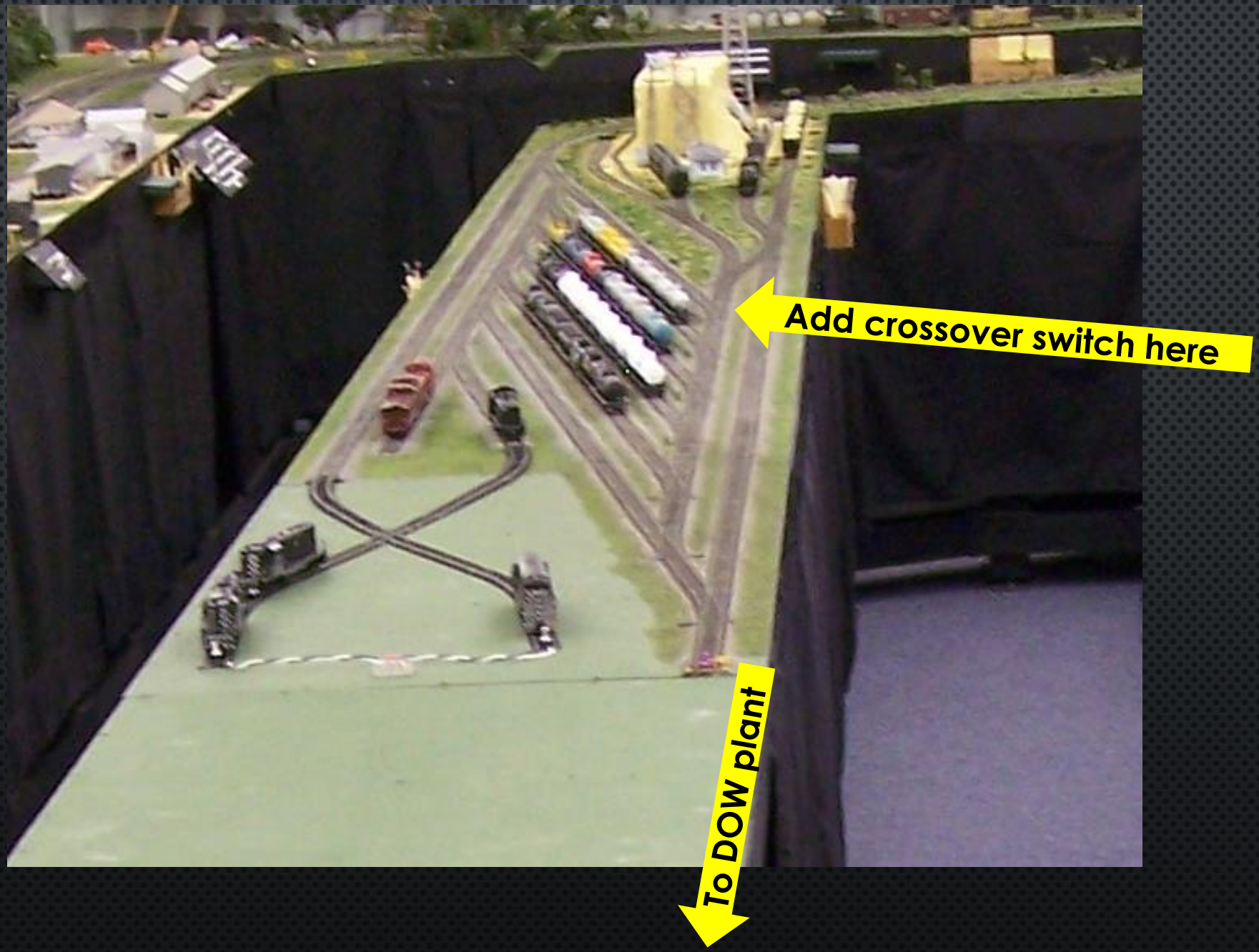
BY JIM WILLIAMS

THE MODELLING PROCESS

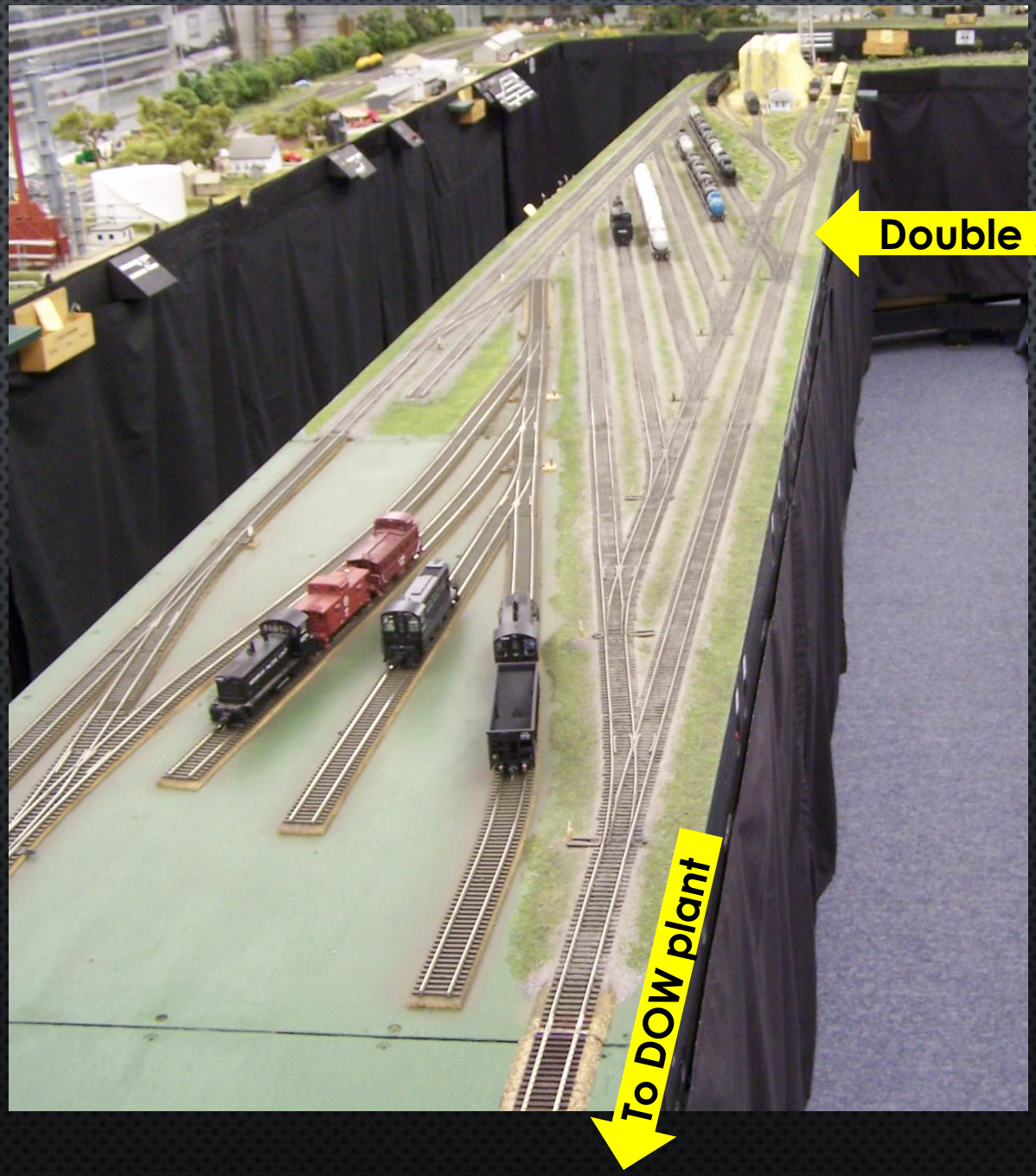
1. THE PLAN
2. COMPONENTS
3. CONSTRUCTION
4. INSTALLATION
5. FINAL DETAILS

Routing trains through Clute yard to get to Dow plant can get congested when switchers are present.

Let's add a double slip switch crossover to get to get direct access to the Dow Plant.



Added a double slip switch crossover to get to get direct access to the Dow Plant.



Using the double slip switch requires coordinating the route and the switch-points position.

Visually this takes time and may be error prone.

Let's add a panel to show the route and use an Arduino to illuminate the five LEDs.

Steve Priest's layout has a double-slip switch with an LED-illuminated panel to show the route.

1.A INSERT DO IT YOURSELF ARDUINO TRAINING STEP

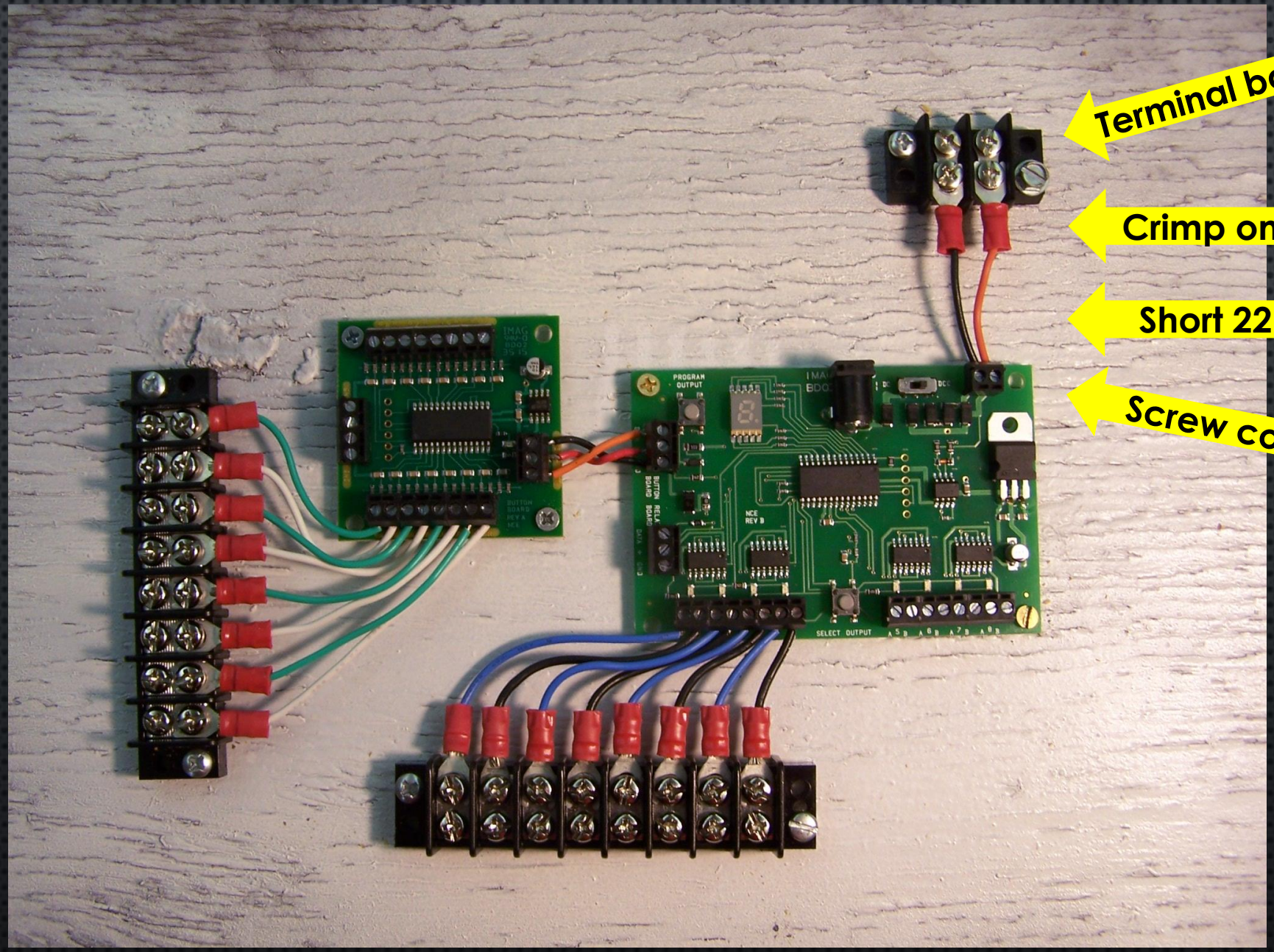
BOUGHT A SPARKFUN KIT

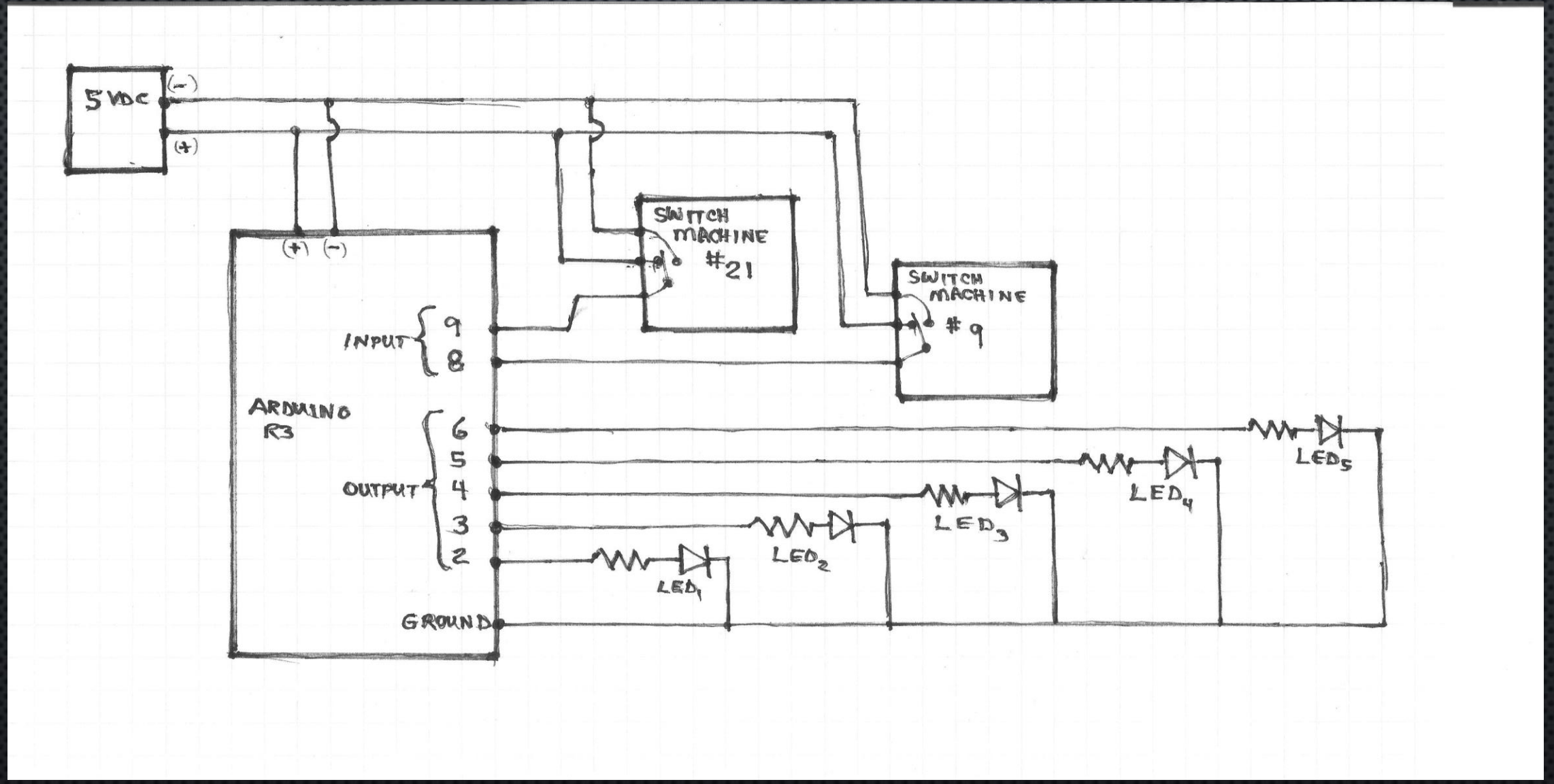
1.B WIRING PROTOCOL

TERMINAL BARRIER STRIPS

Wiring protocol example:

Connect electrical device screw connectors to terminal barrier strips.

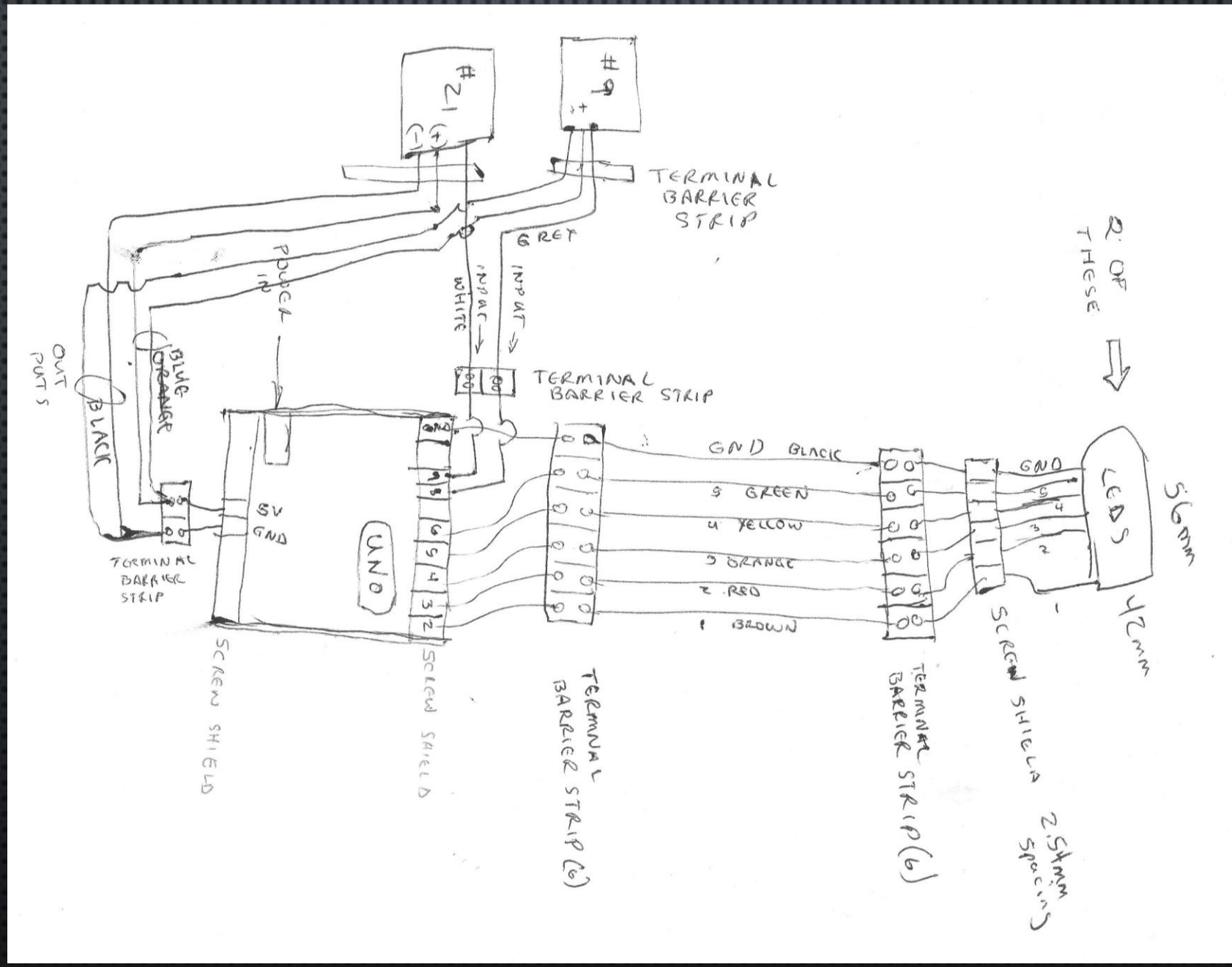




This diagram shows the outputs of an Arduino connected to the five LED's, the two switch machines providing position input information to the Arduino, and the five volt DC power supply.

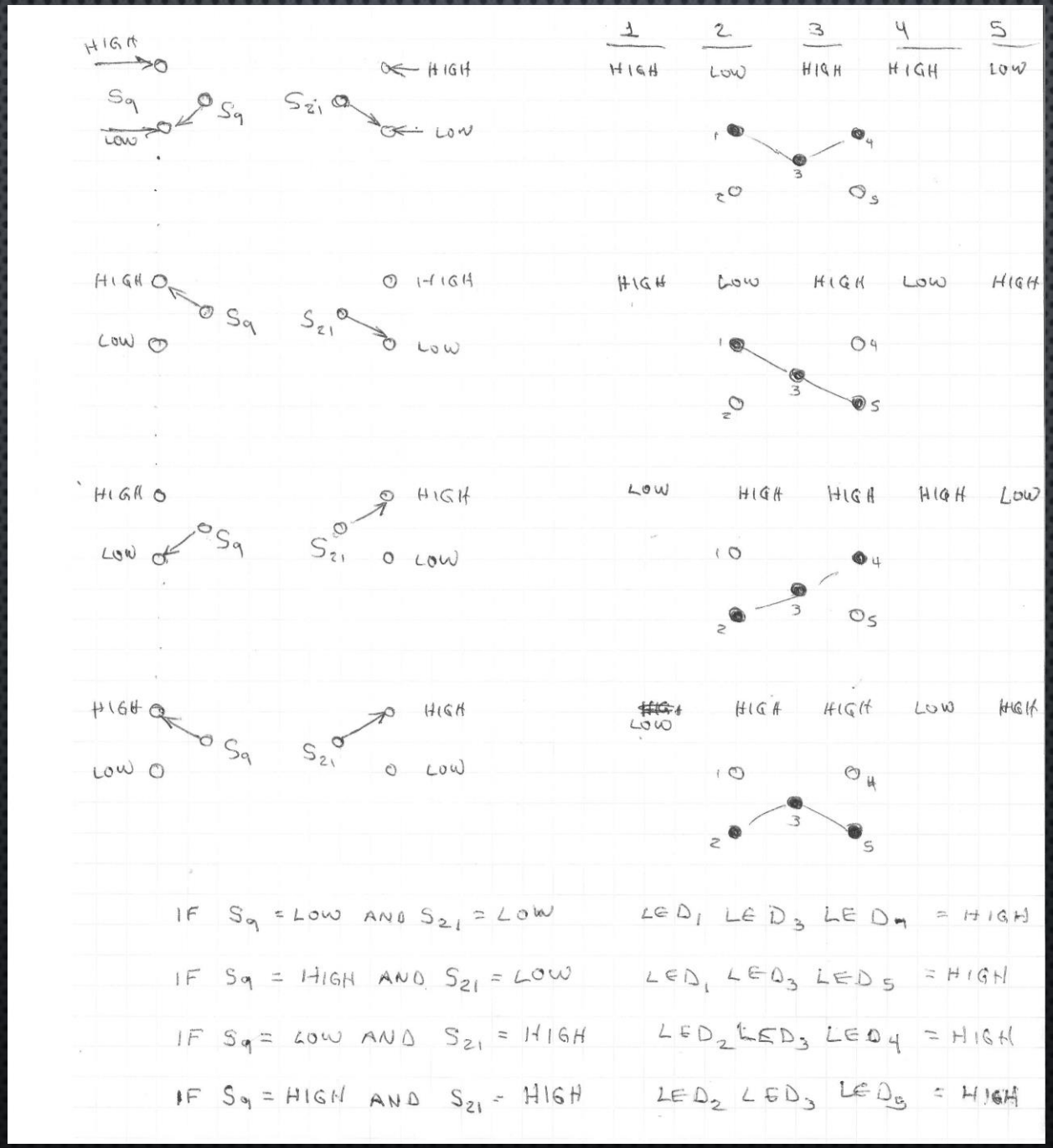
Rough sketch used to identify the connector hardware needed.

Numbering the wires, and color selection is identified.



Notes on relationship between switch positions (Tortoise) and illuminated LEDs.

The switch machines happened to be numbered S9 and S21 on the BVRS club layout.



Measured output from the Tortoise switch-machines:

"High" is 5 vdc

"Low" is 0 vdc

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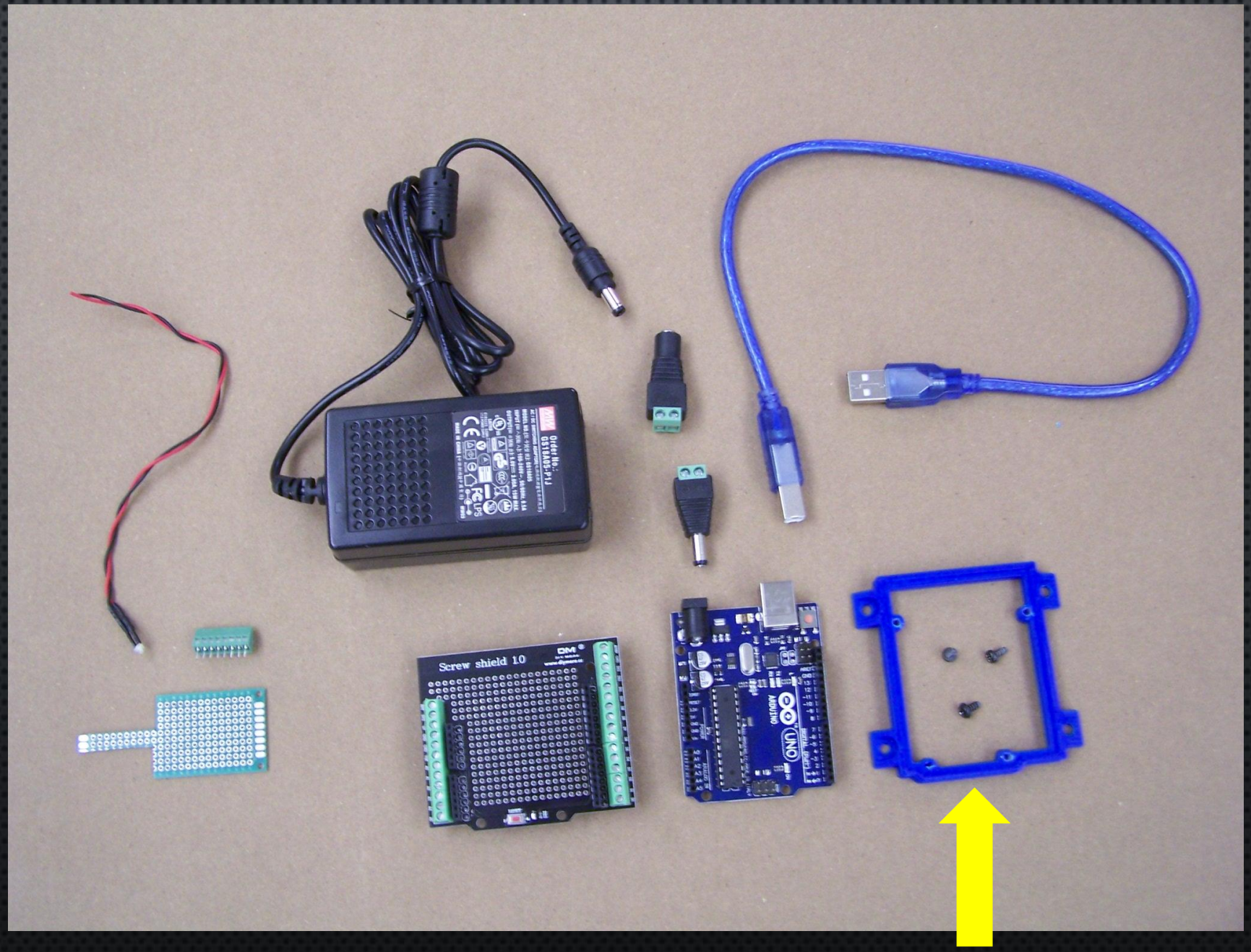
Major components:

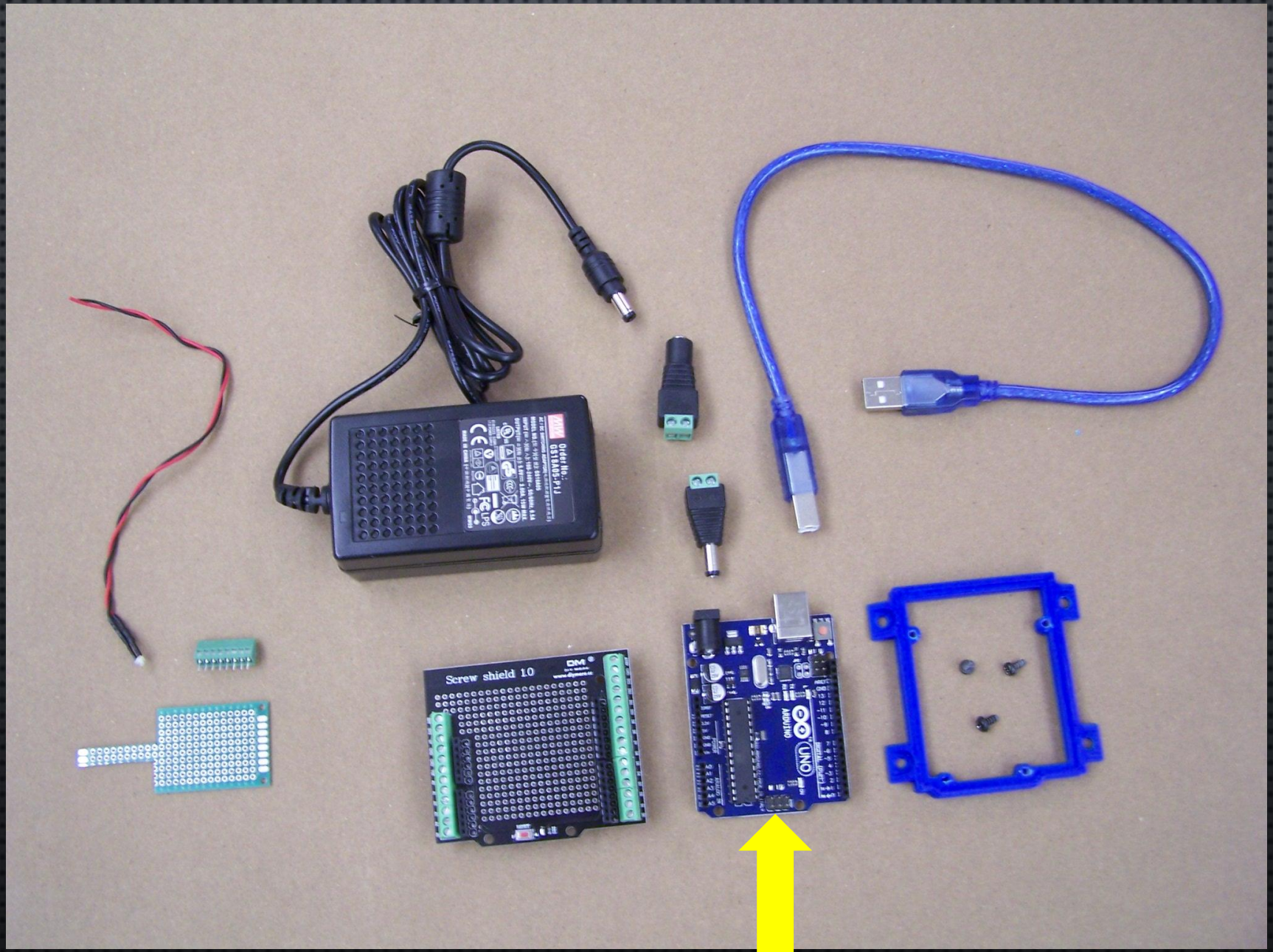
Mounting bracket to attach to underside of layout.

Arduino R3 attaches to this bracket.



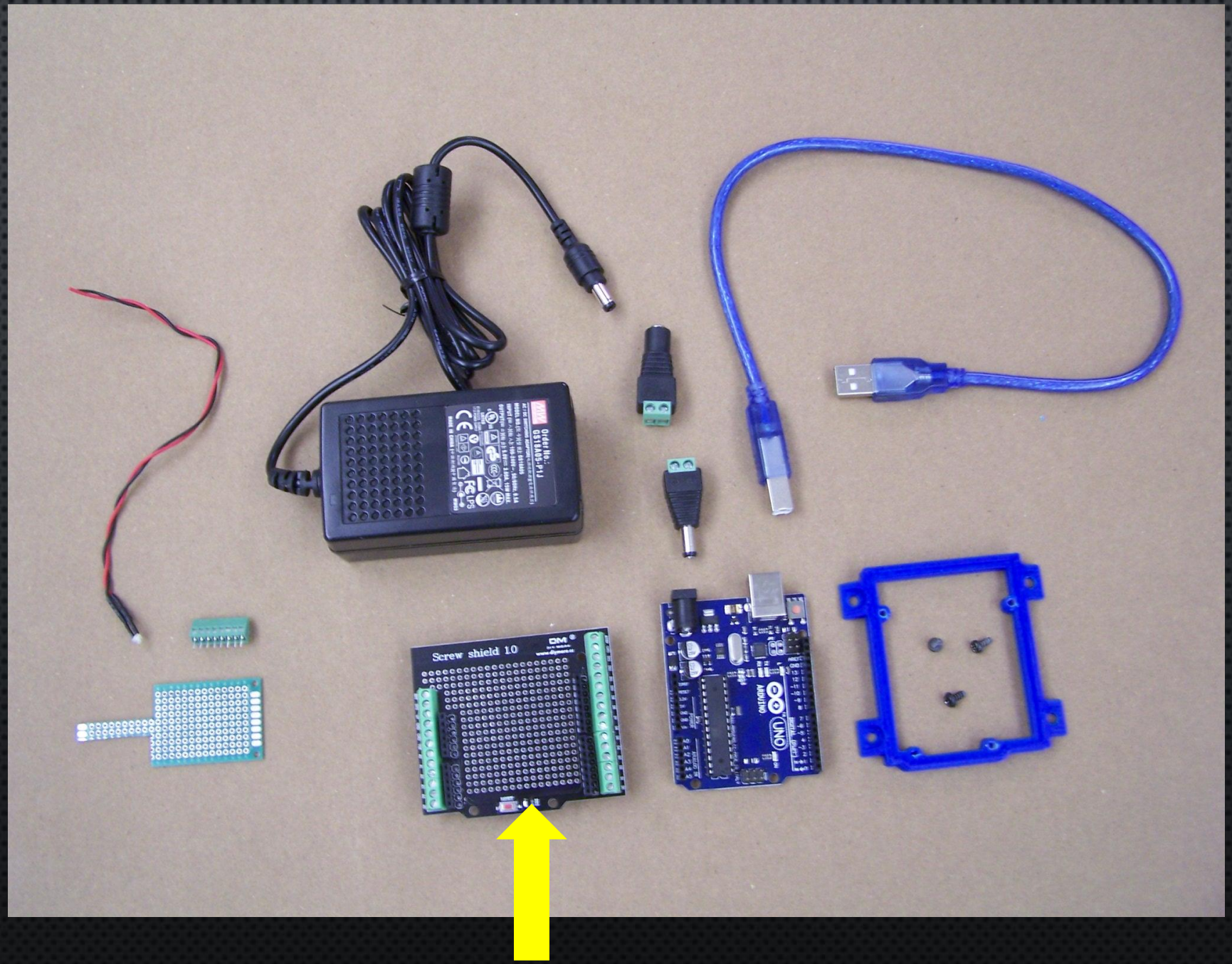
Major components:

Arduino UNO R3 computer



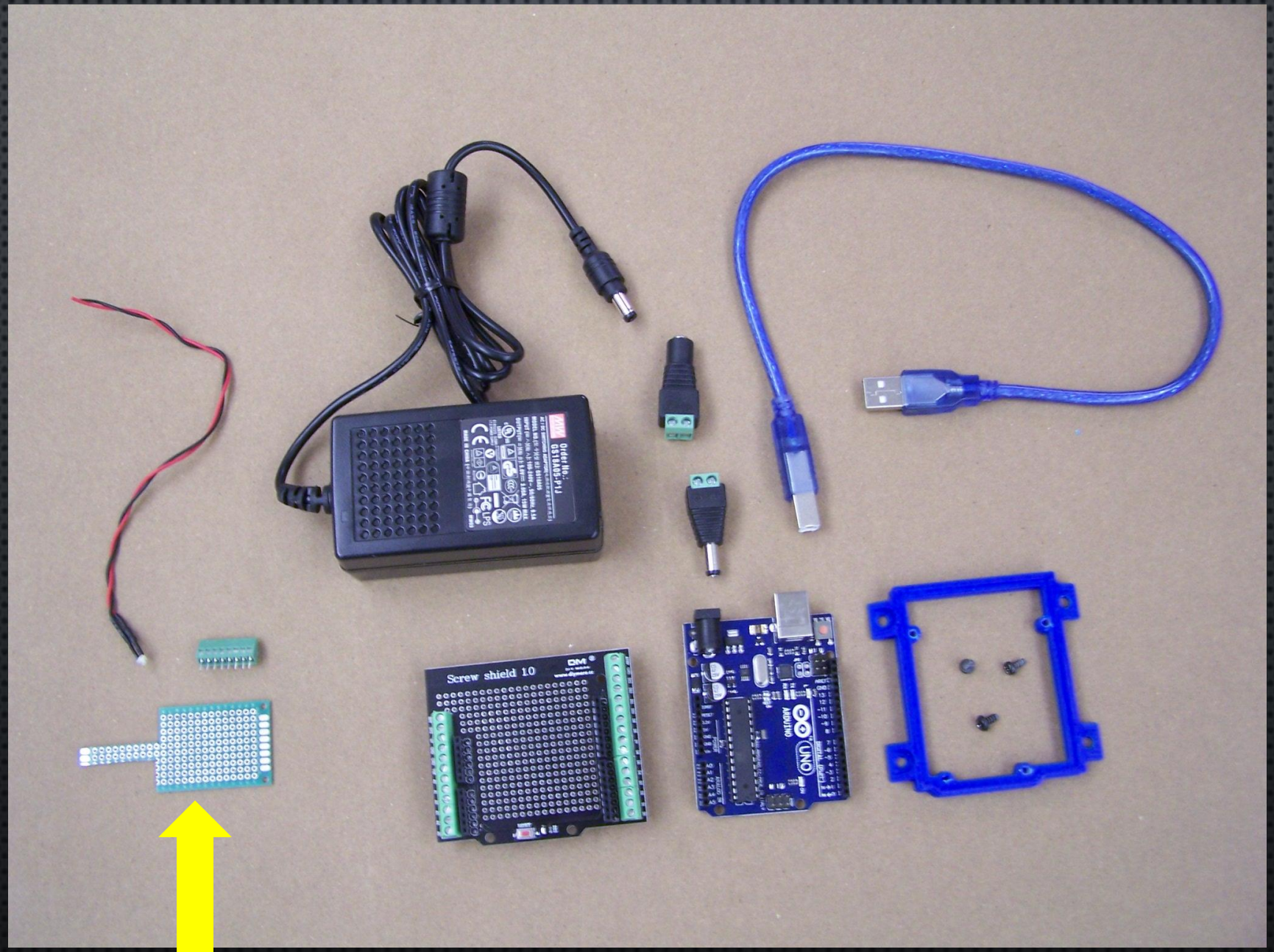
Major components:

Screw terminal connector plate (shield) mounts on top of the Arduino for wire connections.



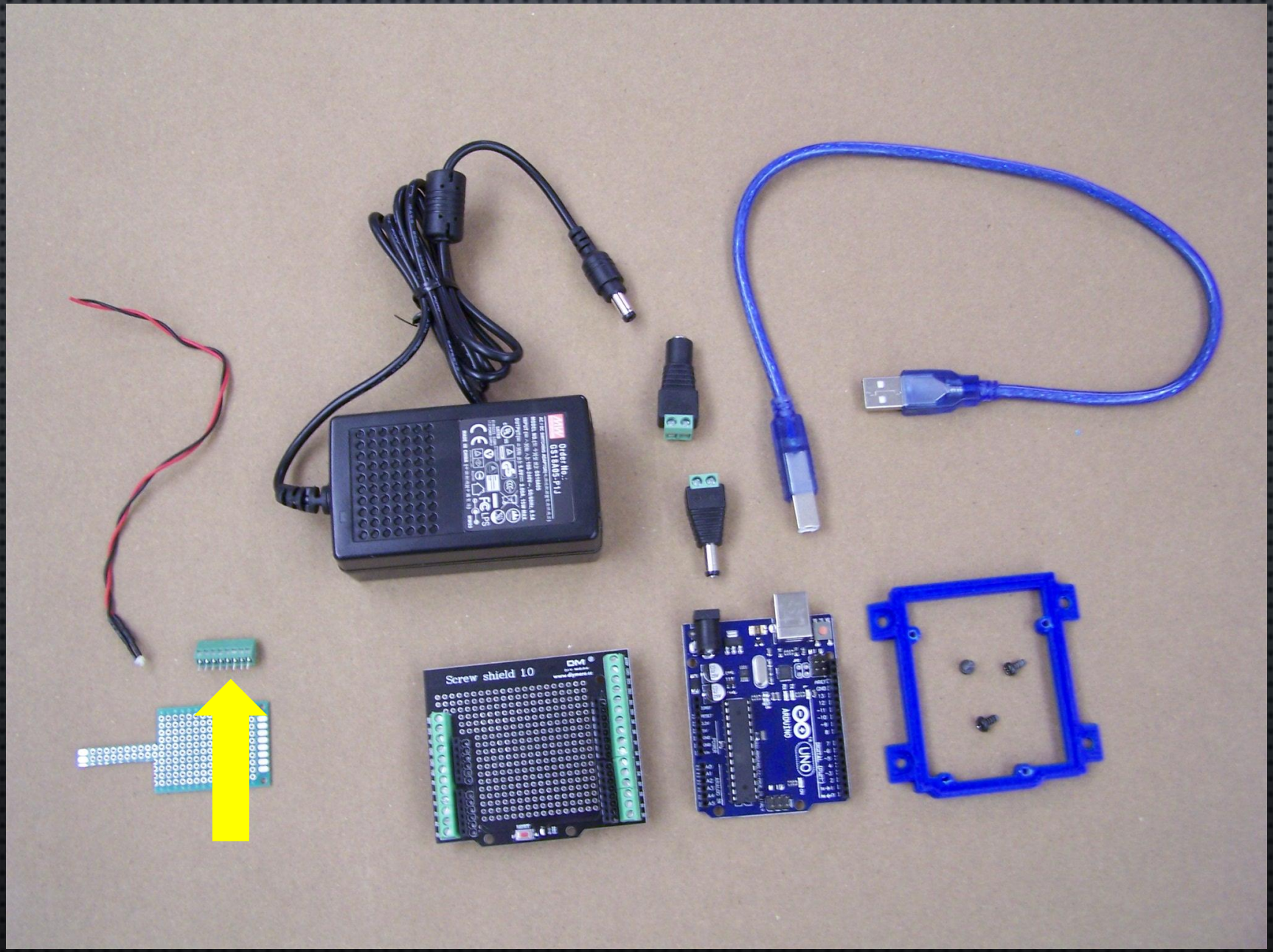
Major components:

PC component soldering board, 2.3 mm hole spacing.



Major components:

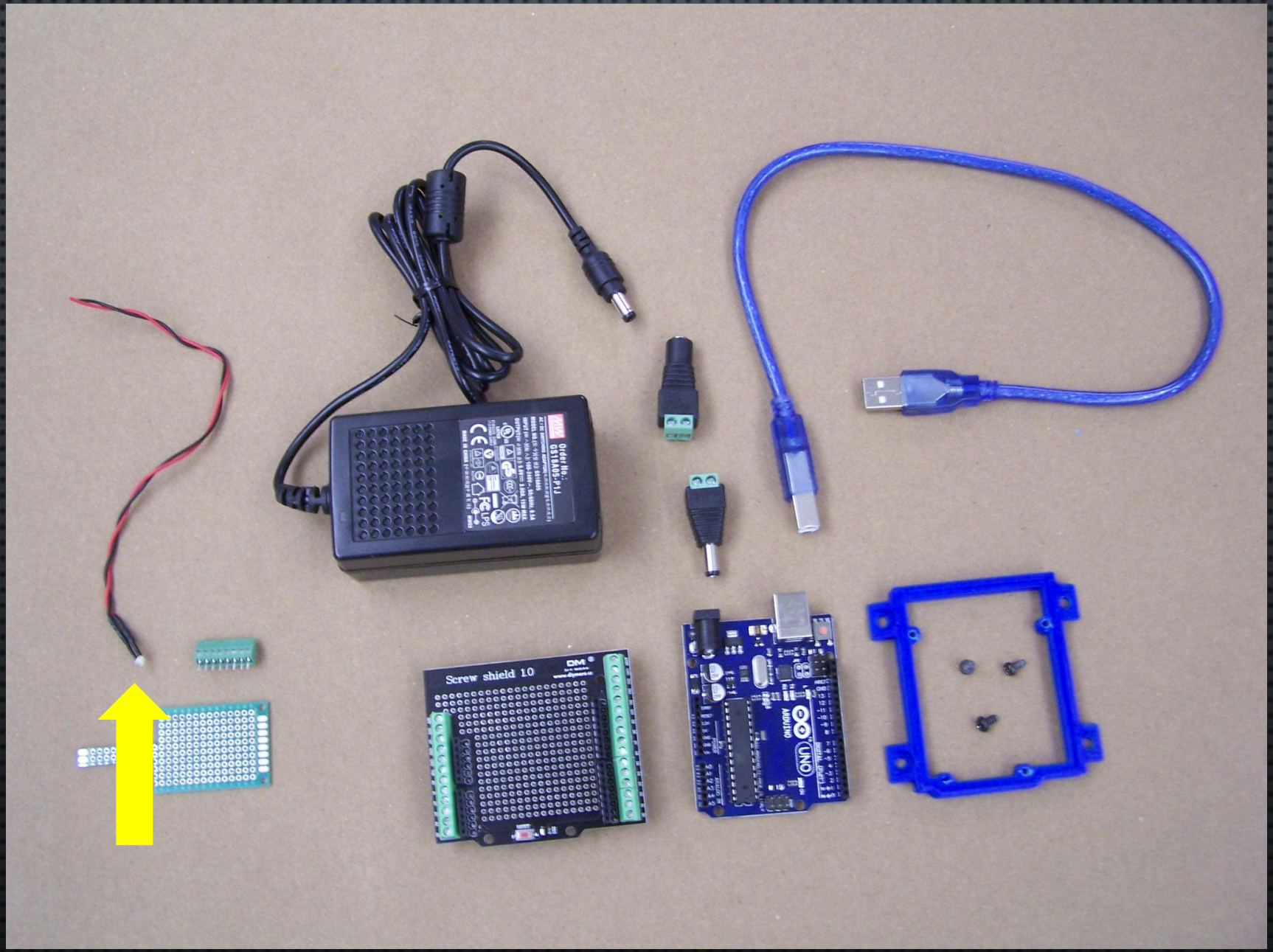
6 screw terminal connector, 2.3 mm spacing



Major components:

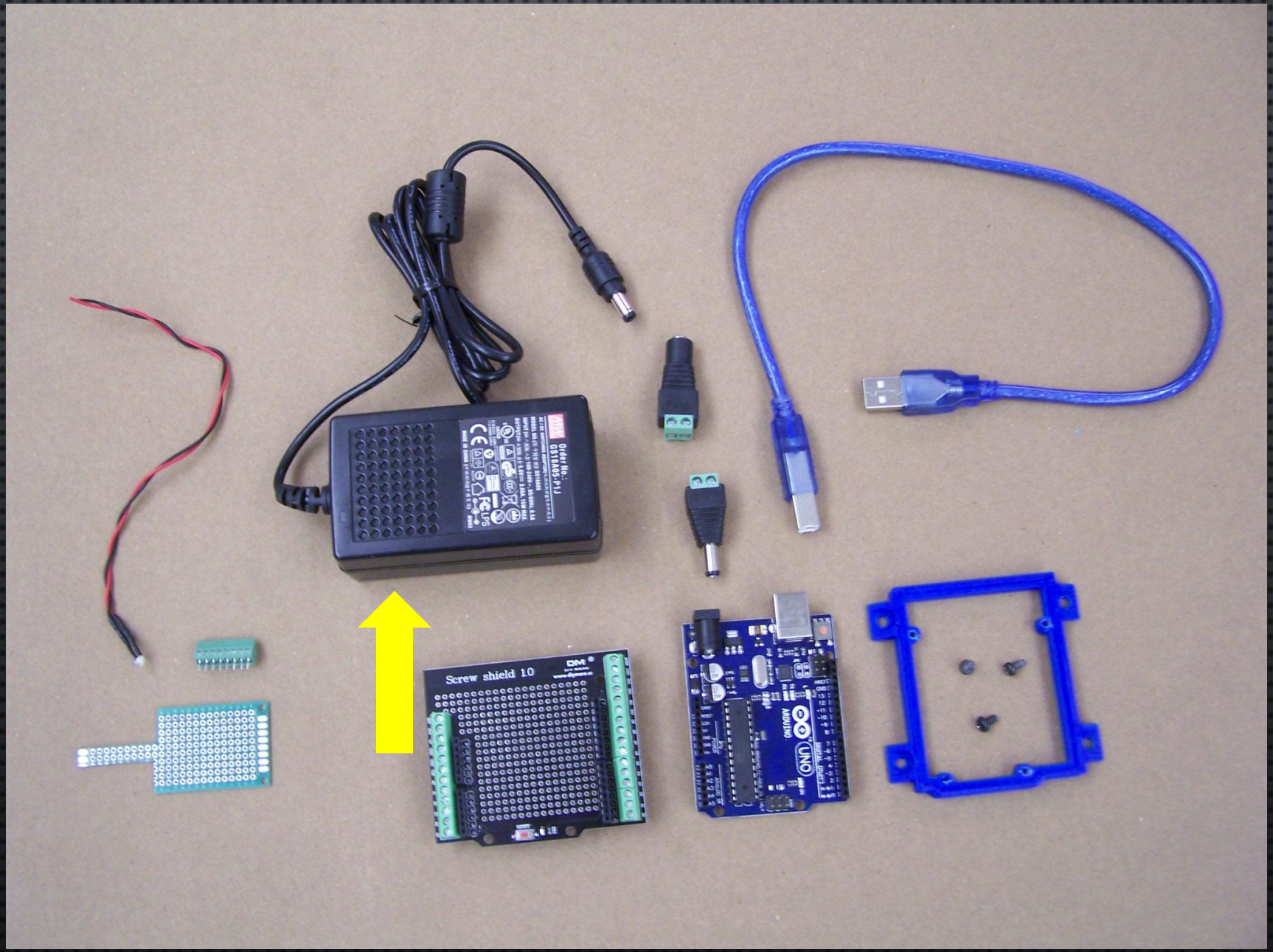
1.8 mm green LED with resistor

Will need ten of these, five per panel



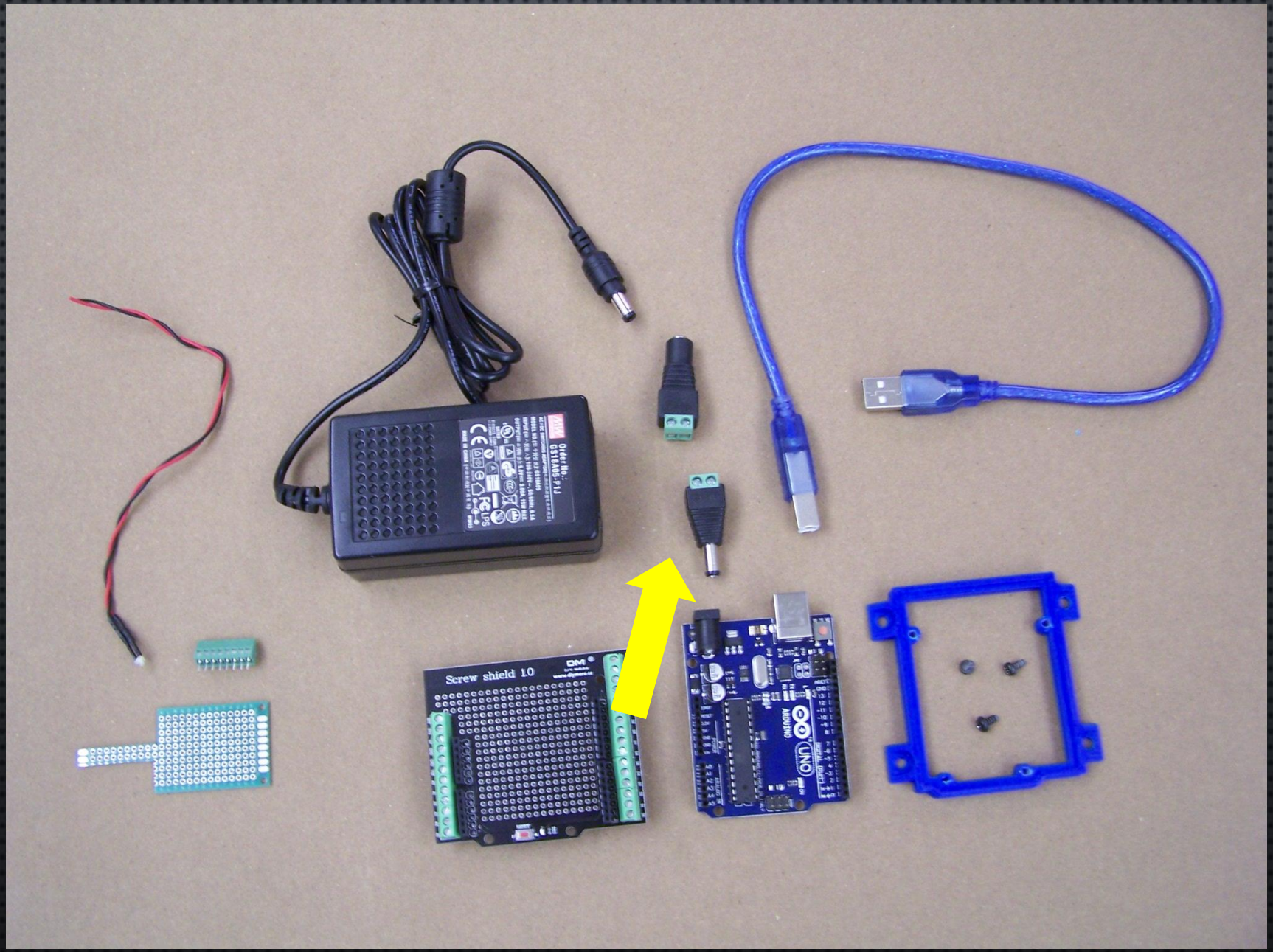
Major components:

5 volt dc regulated power supply, mfg is Mean Well.



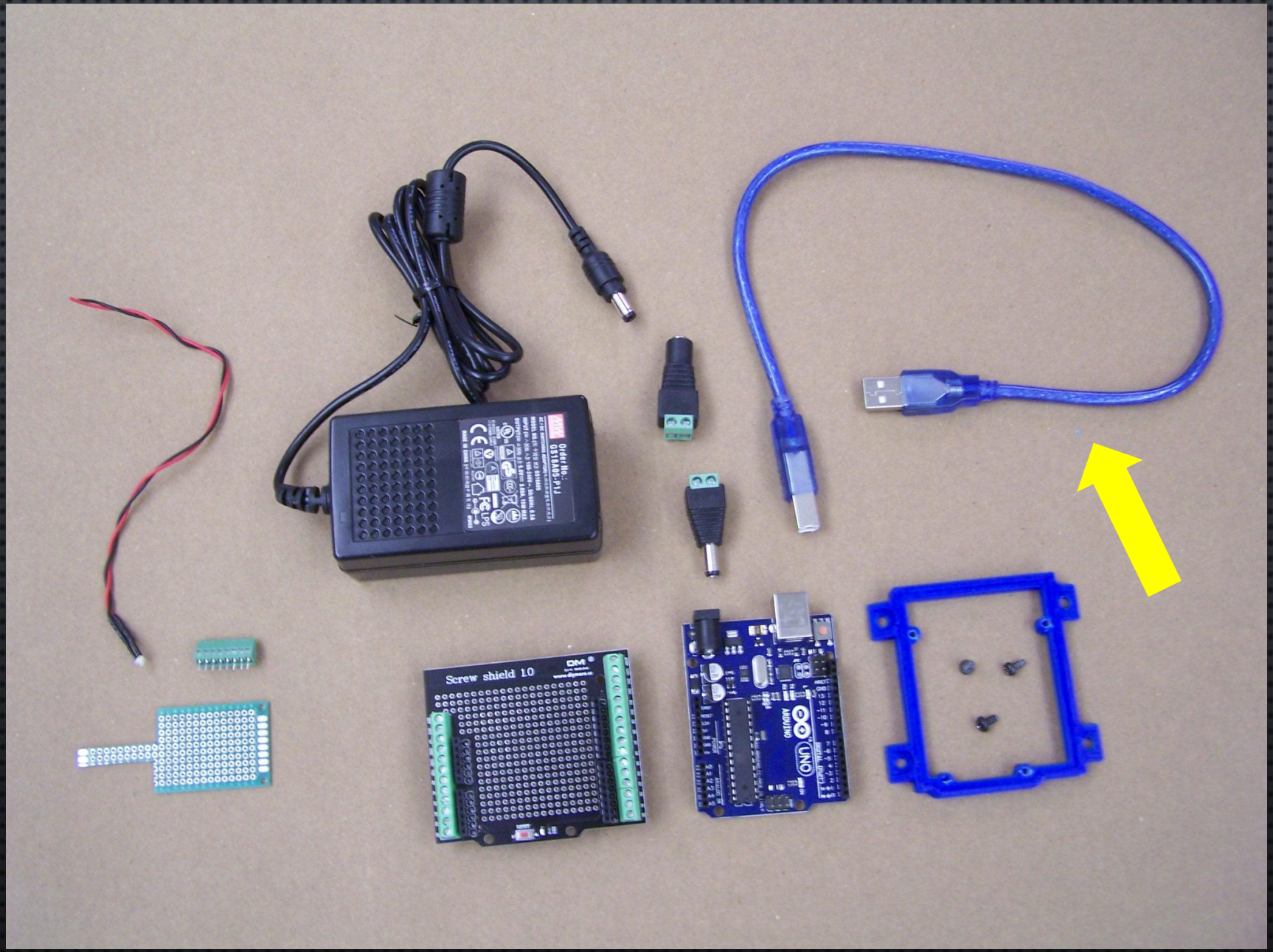
Major components:

3.5-mm male and female plugs to screw terminal adapters.



Major components:

USB cable used for down loading the program to the Arduino



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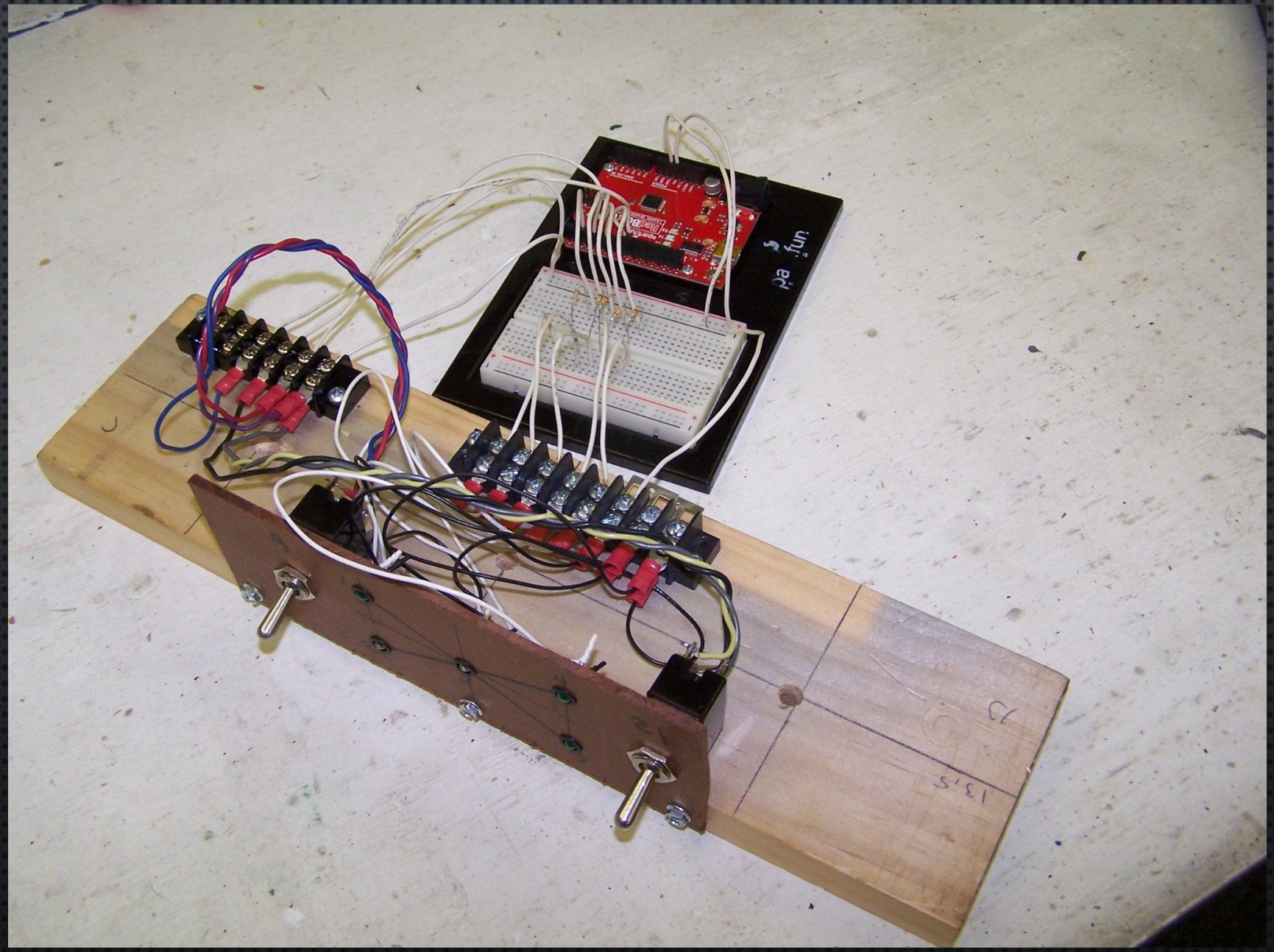
Testing the program on a slip switch simulator.

The toggle switches simulate two switch machines.

The red Arduino and the white breadboard is part of a Spark Fun test kit.



The program code for the Arduino (written in C language)

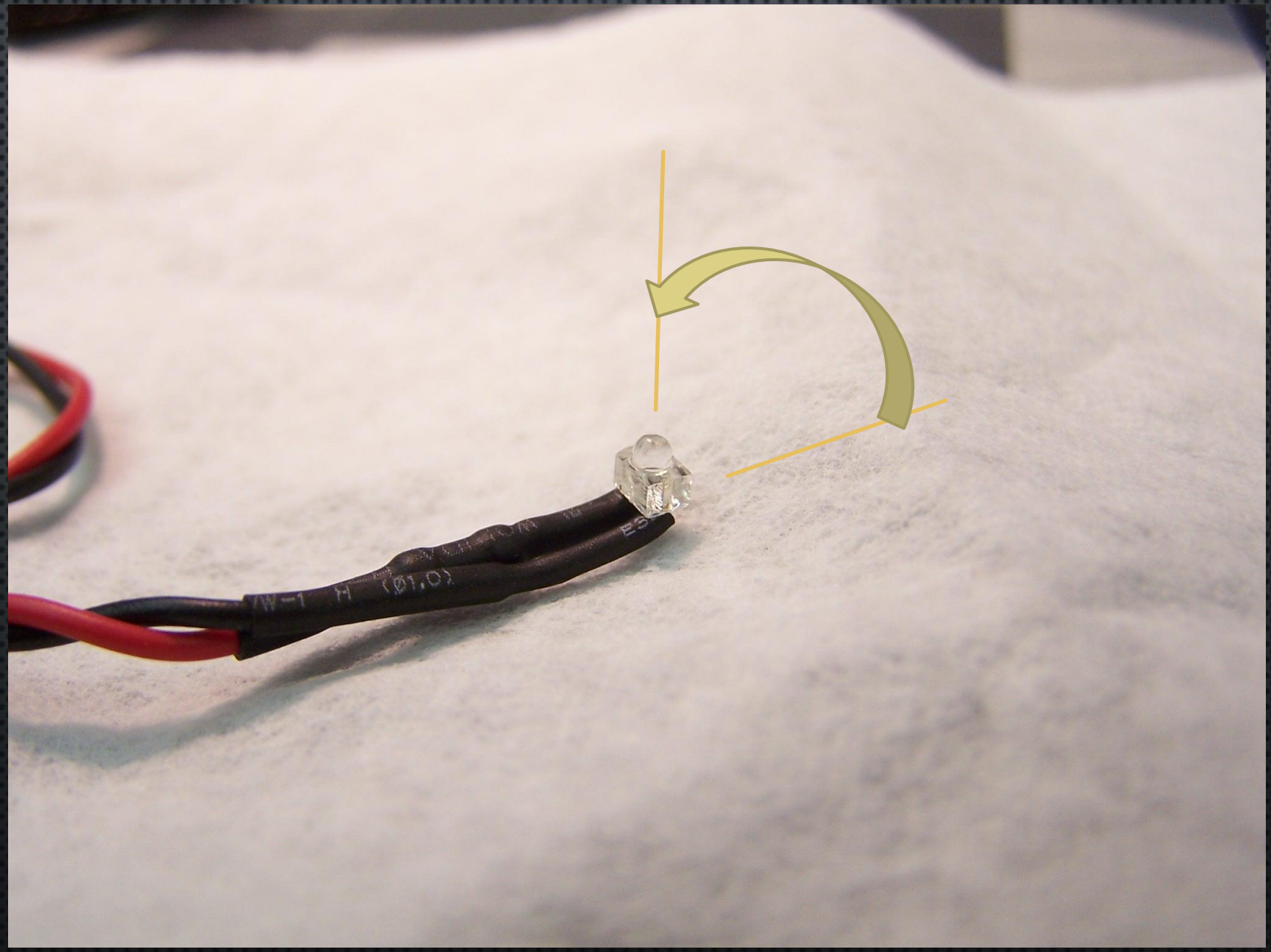
```
/*
 DOUBLE SLIP SWITCH

 Function: sets the leds to show route selected through a double slip sw

 update 1  9/30/18 change to switchs 9 and 21, and digitalRead
 update 2  9/30/18 add logic for switch combinations
 update 3 12/15/18 remove print statements

 */
 int led1out = 2;
 int led2out = 3;
 int led3out = 4;
 int led4out = 5;
 int led5out = 6;

 int switch9Pin = 8;  // pin for track switch 9
 int switch21Pin = 9; // pin for track switch 21
 int switch9 = 0;     // value for track switch 9
 int switch21 = 0;    // value for track switch 21

void setup()
{

  //setup led outputs
  pinMode(led1out, OUTPUT);
  pinMode(led2out, OUTPUT);
  pinMode(led3out, OUTPUT);
  pinMode(led4out, OUTPUT);
  pinMode(led5out, OUTPUT);
  // setup inputs
  pinMode(switch9, INPUT);
  pinMode(switch21, INPUT);

  // turn off all leds
  digitalWrite(led1out, LOW);   // Turn off the LED
  delay(1);             // Wait for one msecond
  digitalWrite(led2out, LOW);    // Turn off the LED
  delay(1);             // Wait for one msecond
  digitalWrite(led3out, LOW);   // Turn off the LED
  delay(1);             // Wait for one msecond
  digitalWrite(led4out, LOW);    // Turn off the LED
  delay(1);             // Wait for one msecond
  digitalWrite(led5out, LOW);   // Turn off the LED
  delay(1000);          // Wait for one second

}
```

```
void loop()
{
 /* loop to read state of switches #9 and #21
  * then set LEDs on as appropriate
  */
 switch9 = digitalRead (switch9Pin);
 switch21 = digitalRead (switch21Pin);

 if (switch9 == LOW && switch21 == LOW){
   delay(2);
   digitalWrite(led1out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led2out, LOW);    // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led3out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led4out, HIGH);    // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led5out, LOW);   // Turn off the LED
   delay(10);             // Wait for ten milliseconds
 }

 if (switch9 == HIGH && switch21 == LOW){
   delay(2);
   digitalWrite(led1out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led2out, LOW);    // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led3out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led4out, LOW);    // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led5out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
 }
```

```
 if (switch9 == LOW && switch21 == HIGH){
   delay(2);
   digitalWrite(led1out, LOW);   // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led2out, HIGH);    // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led3out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led4out, HIGH);    // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led5out, LOW);   // Turn off the LED
   delay(10);             // Wait for ten milliseconds
 }

 if (switch9 == HIGH && switch21 == HIGH){
   delay(2);
   digitalWrite(led1out, LOW);   // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led2out, HIGH);    // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led3out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led4out, LOW);    // Turn off the LED
   delay(10);             // Wait for ten milliseconds
   digitalWrite(led5out, HIGH);   // Turn on the LED
   delay(10);             // Wait for ten milliseconds
 }

 delay(1000);            // Wait for one second, and repeat

}
```

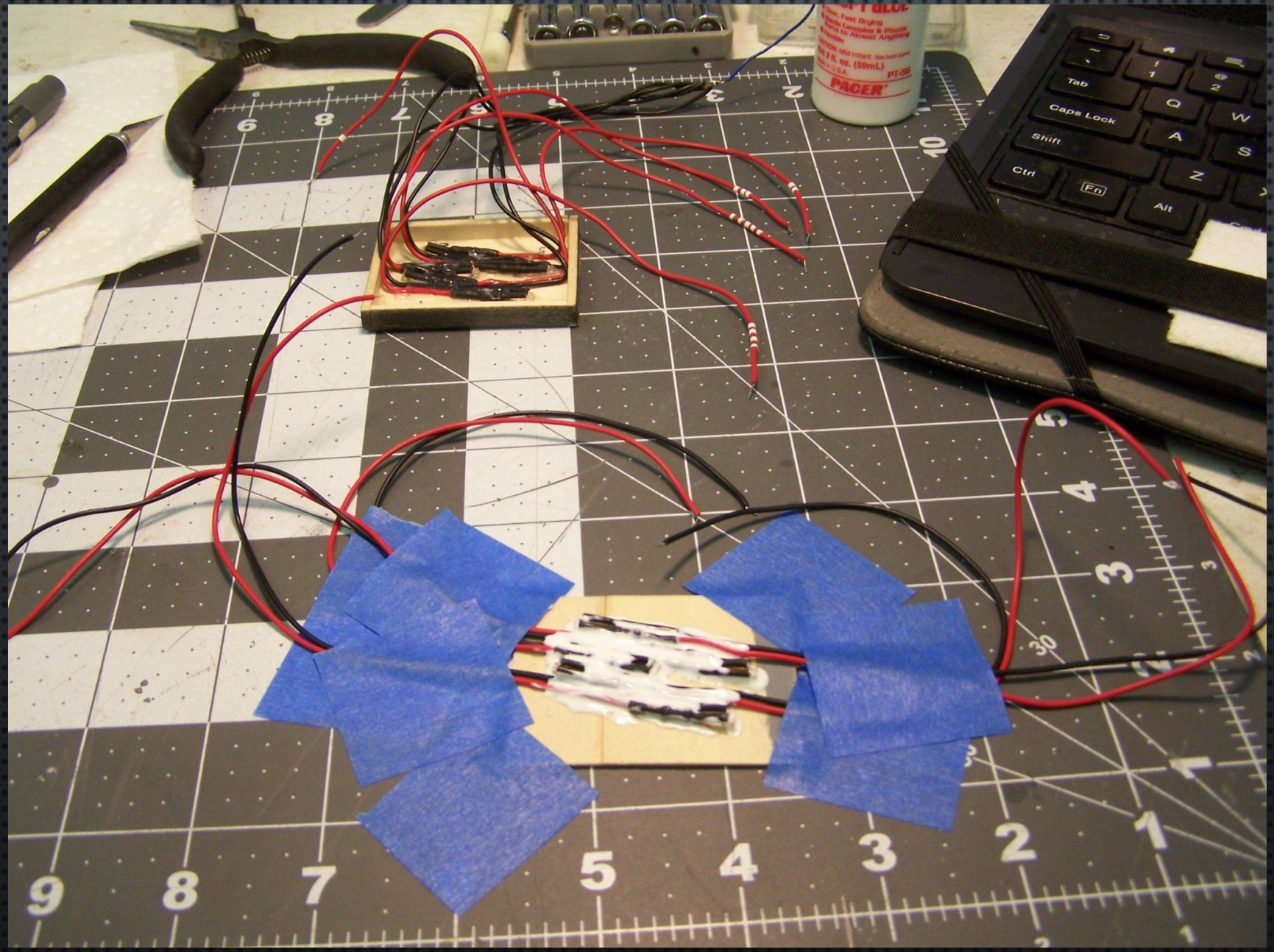
Bend the 1.8 mm LEDs so that the light will shine through holes in the small panels and the wires will lay flat on the panels back-side.

The two LED wires may break.



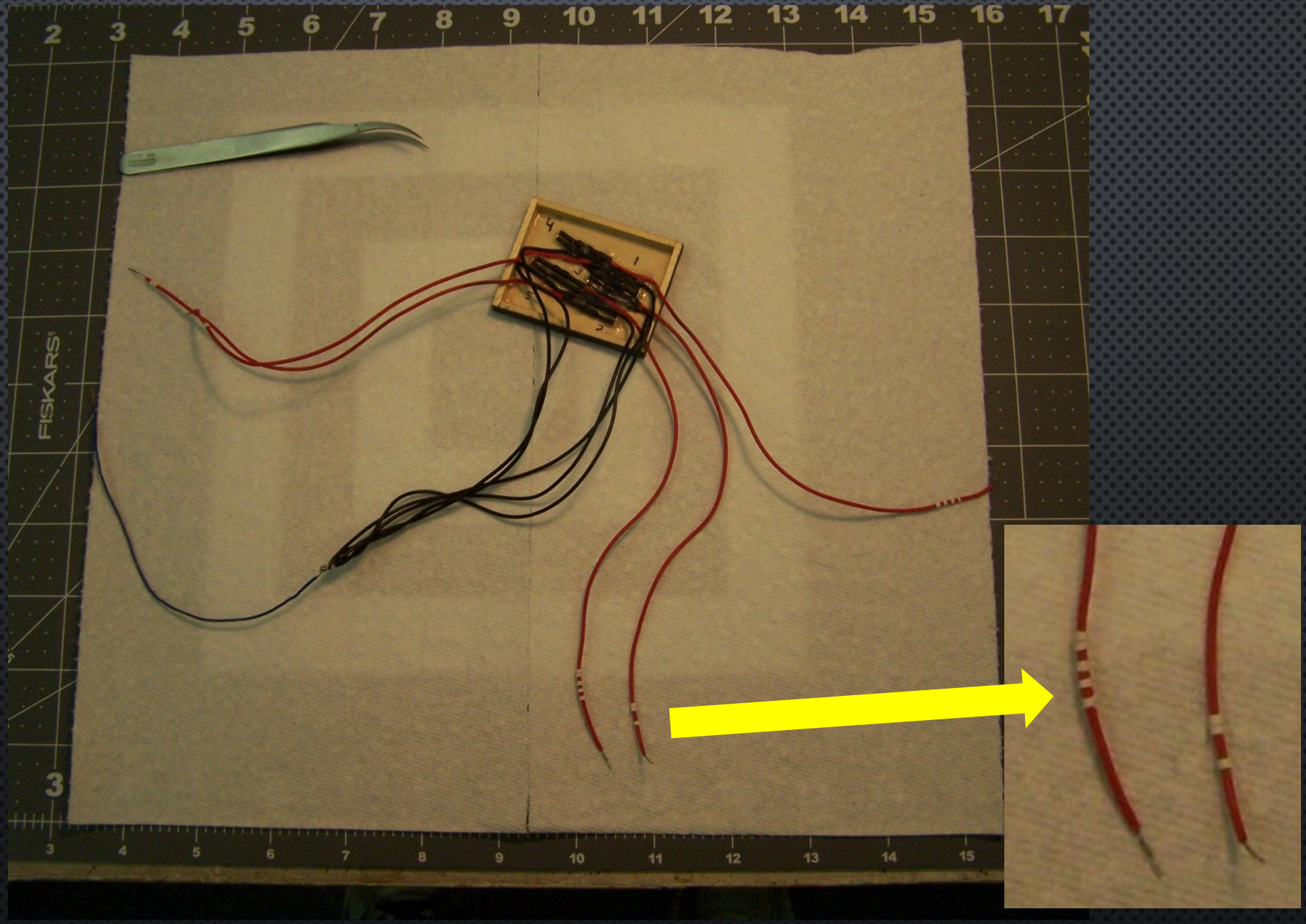
Two 56mm x 42mm panels are used, one for each side of the peninsula table.

Canopy glue was used to attach the LEDs to the boards.

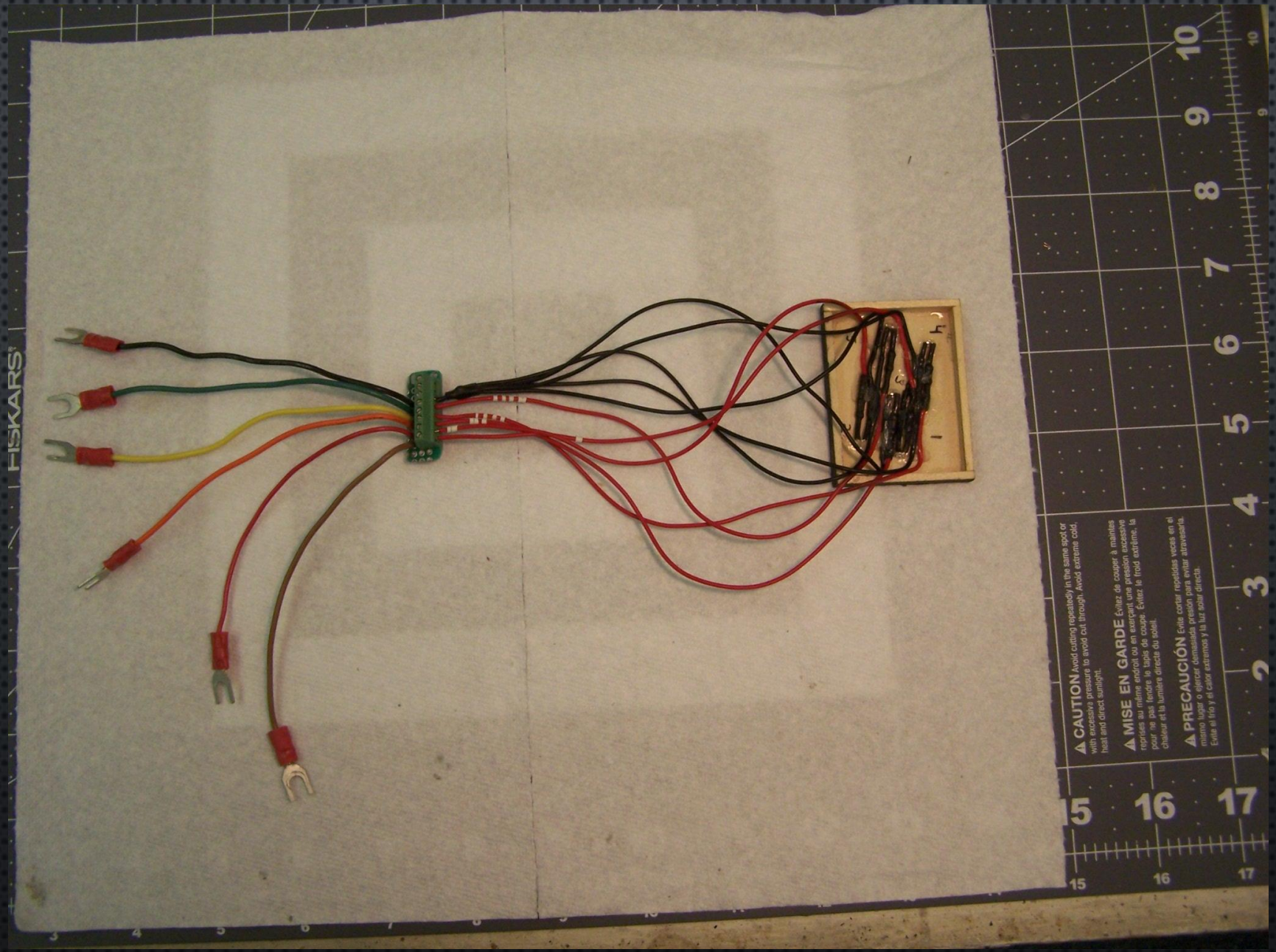


The common wires for the five diodes are connected together.

The wires are numbered using white bands of heat shrink tubing.

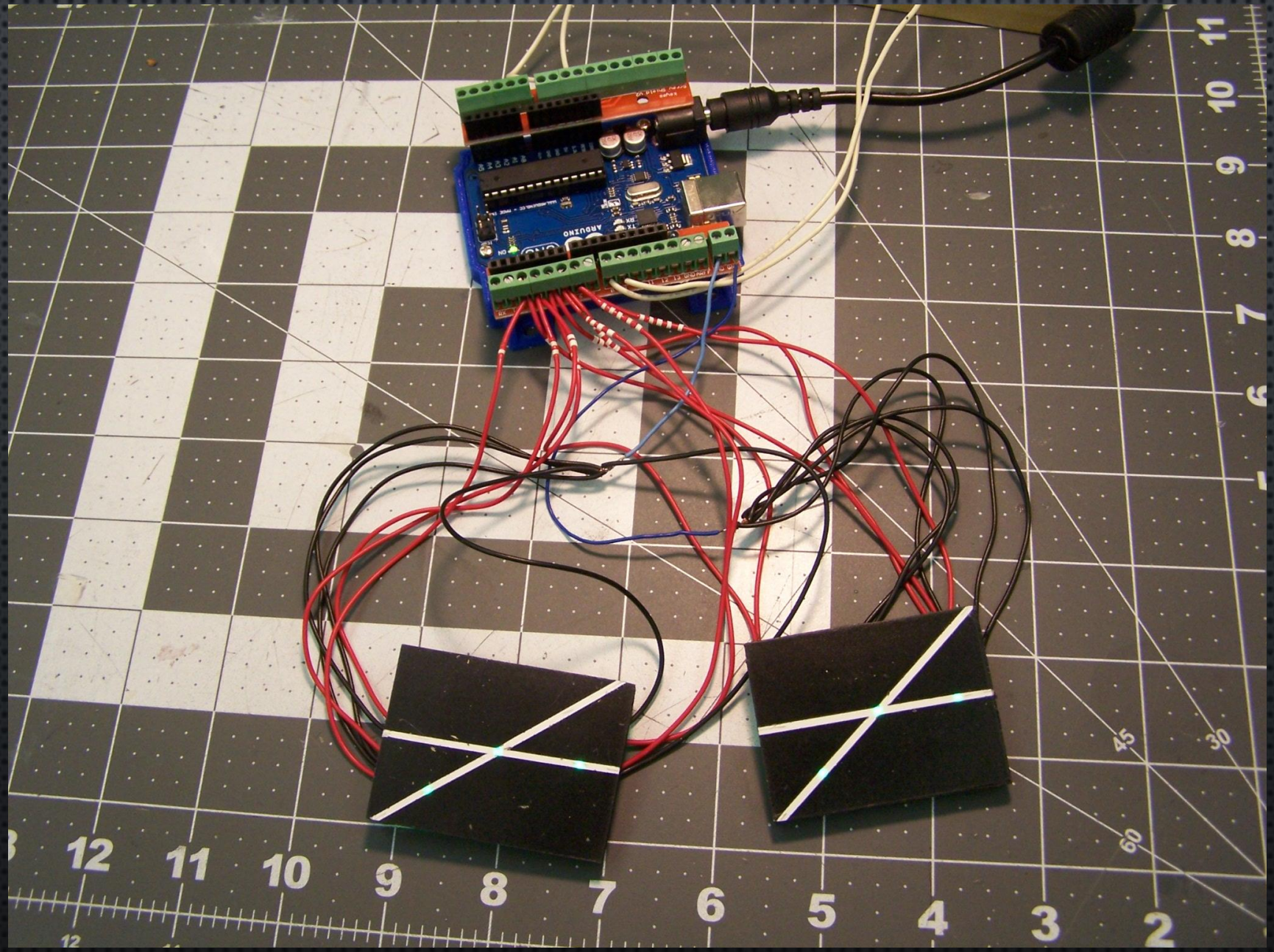


The wires from the panels are connected to 6 terminal connector strip, and the 20 ga wires are soldered to them.



The two panels are connected to the Arduino for final testing of the panels.

0.010” flat styrene plastic covers added over the panels and painted black



THE MODELLING PROCESS

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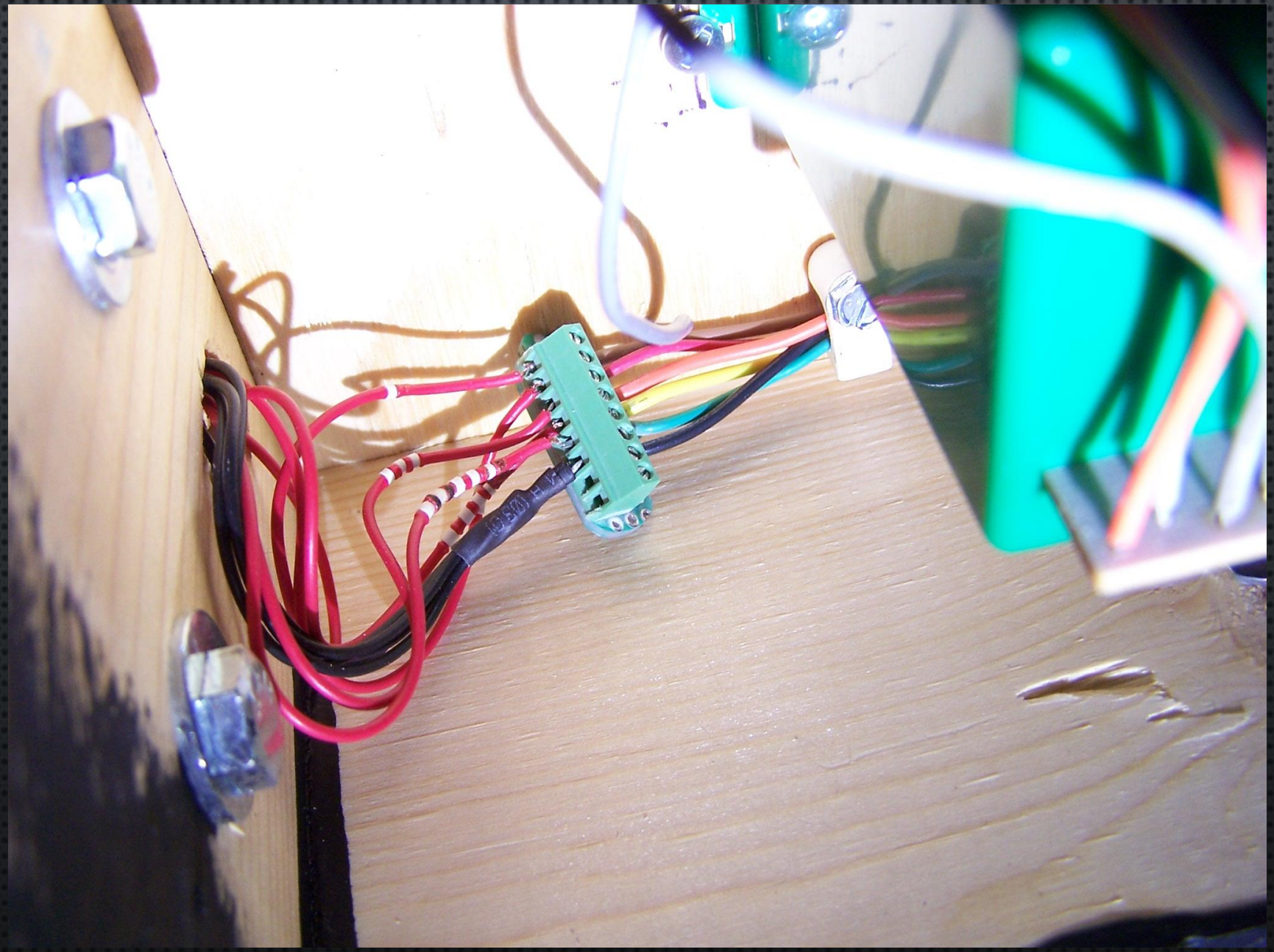
Remove left hand turnout, add space for the double slip switch, and space for the crossover switch on the outside track

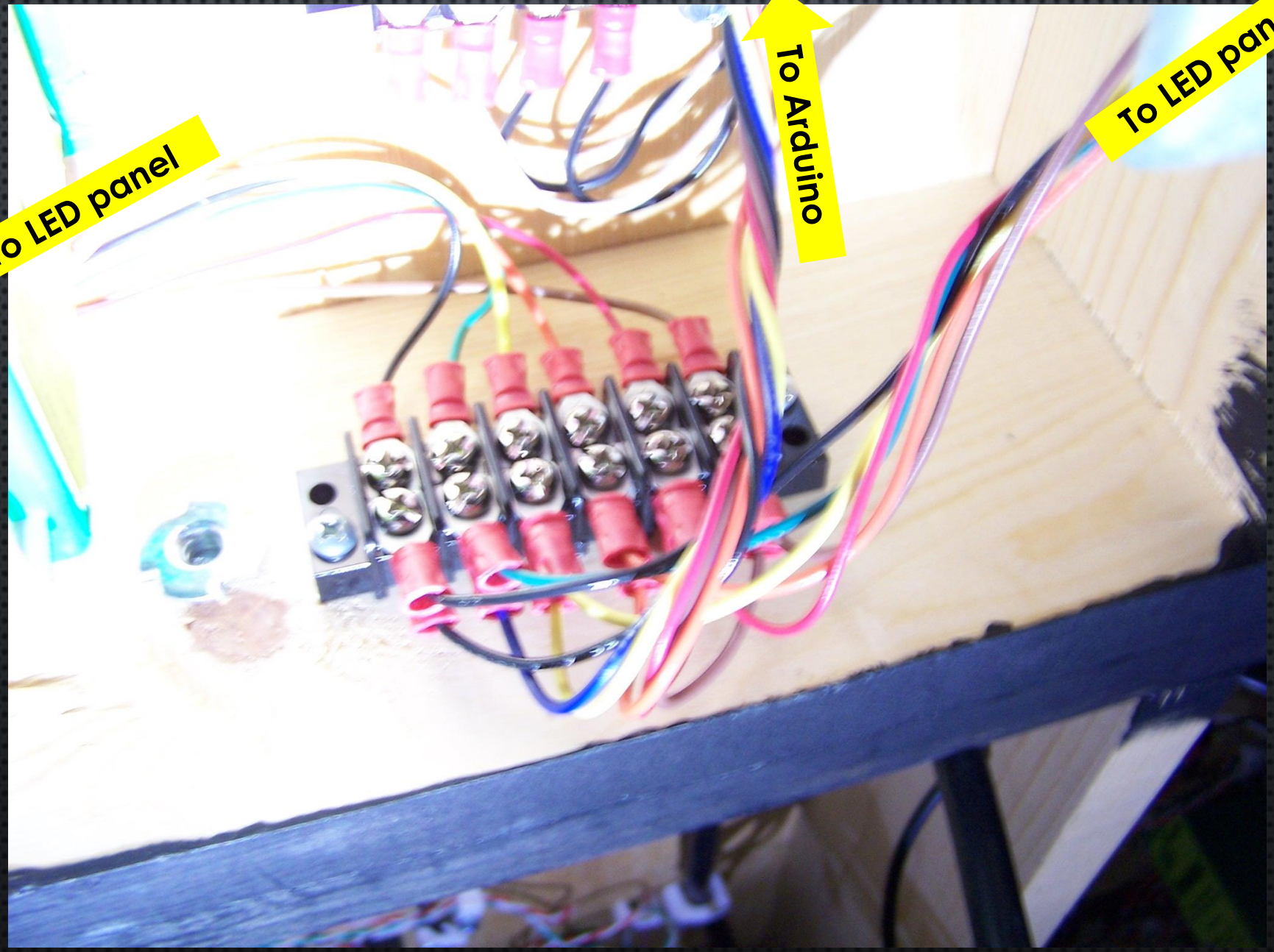
New ballast being added to the new cross over.

View of one of the screw terminal connectors between one of the LED panels and the wires to the Arduino.

Drilled a 5/8” hole through side of the table for wires

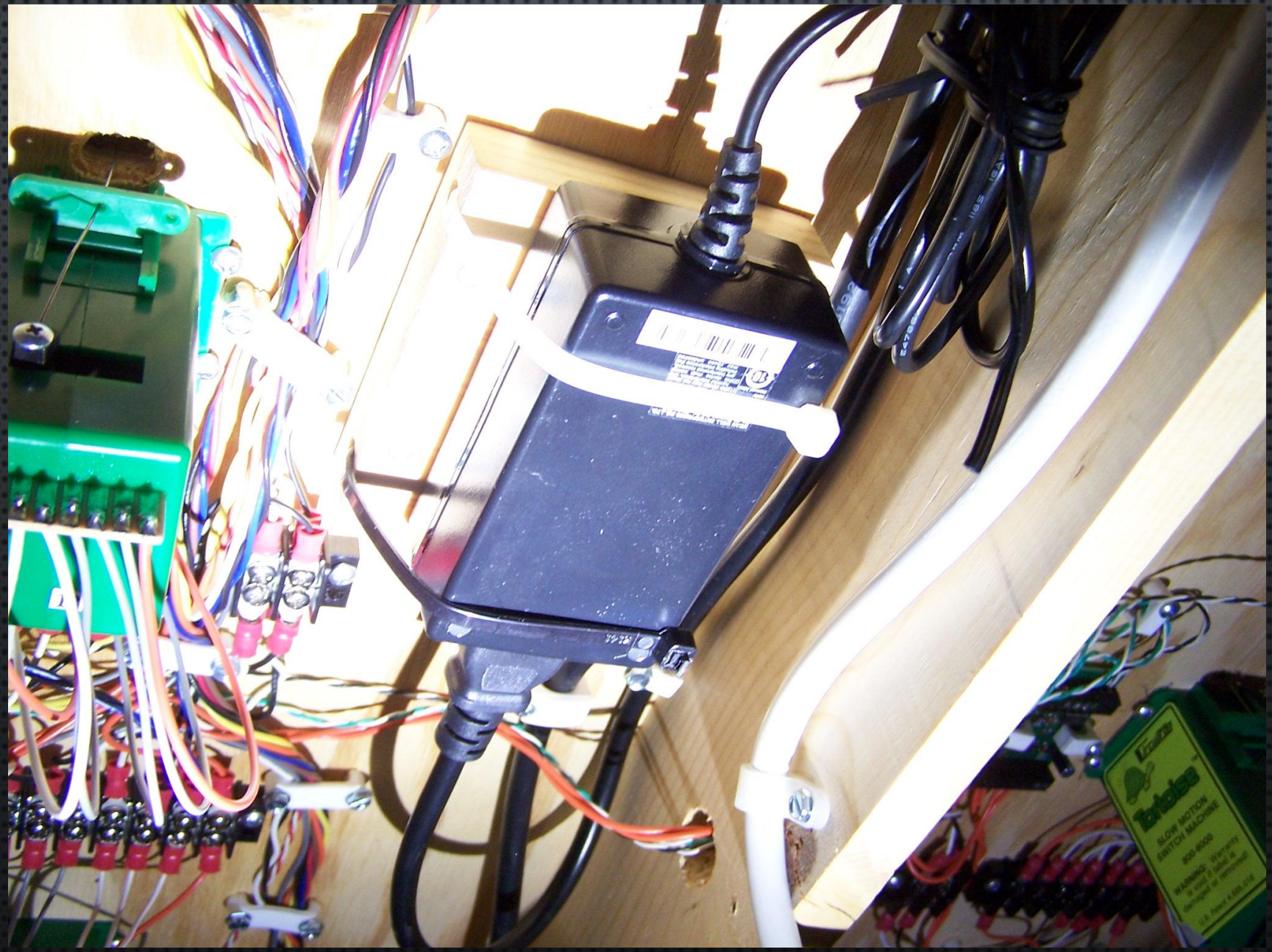


Terminal barrier strip for wires from the Arduino to the two LED panels.



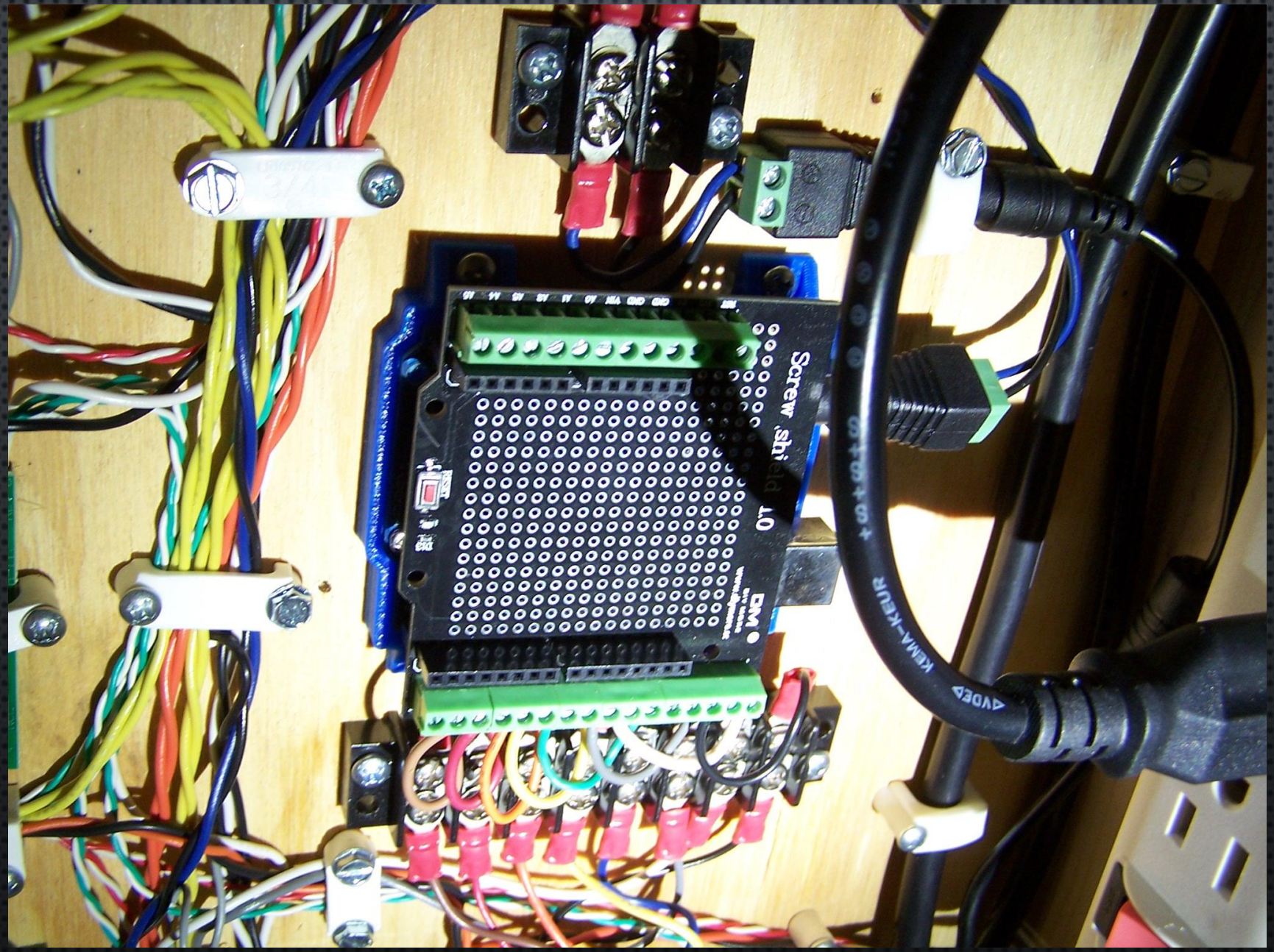
5 VDC power supply is attached to a scrap board with cable ties

The board is screwed to the underside of the layout.



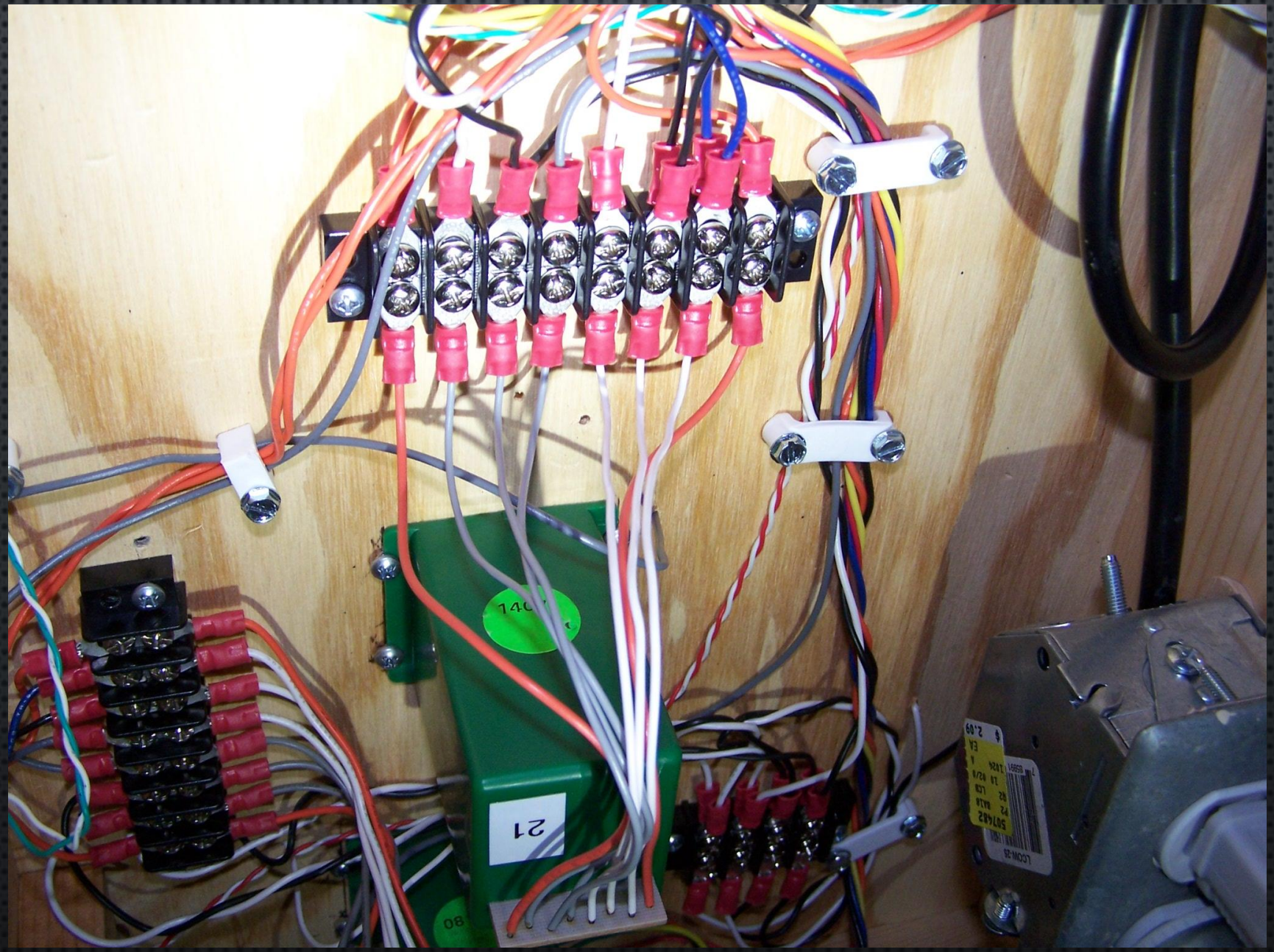
The Arduino stack is mounted to the underside of the layout.

The blue wire is the +5vdc from the power supply.

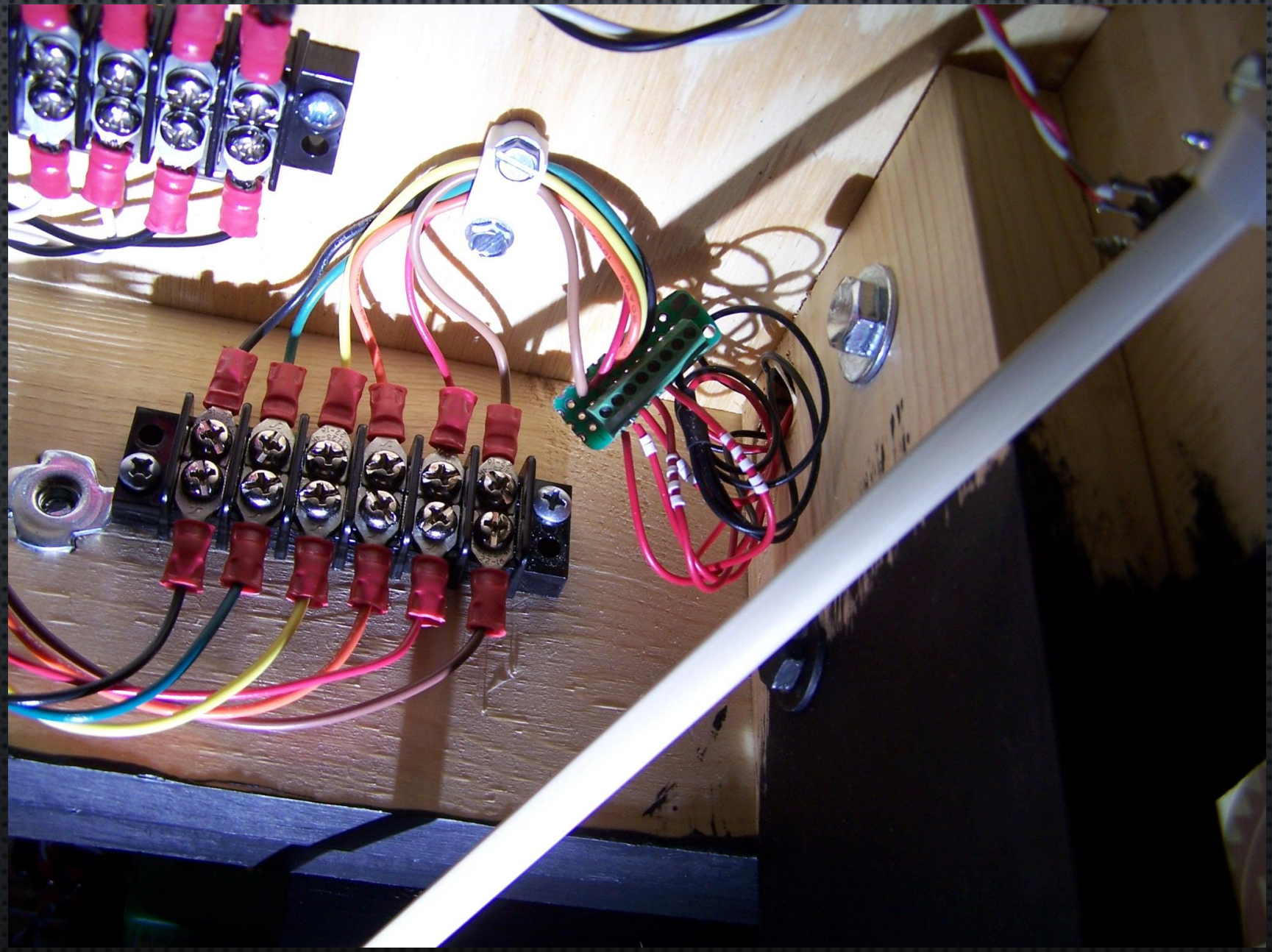


This is one of the two switch machines for the double slip switch.

I used blue & black wire color for the 5v dc circuits.



The other panel's LED wires.



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The completed panels are recessed into the tables.

The double slip-switch is in the middle of the screen.

The LED's are very bright, so a 0.010" white plastic sheet covered them.

THE END