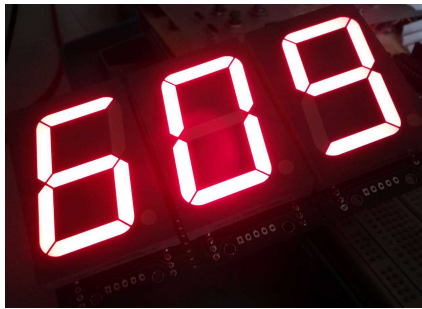
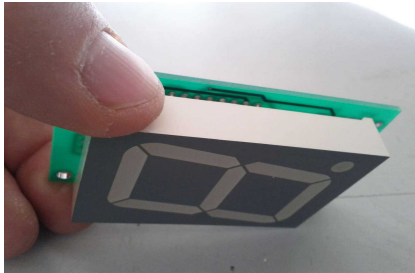


Large 7 segment LED display

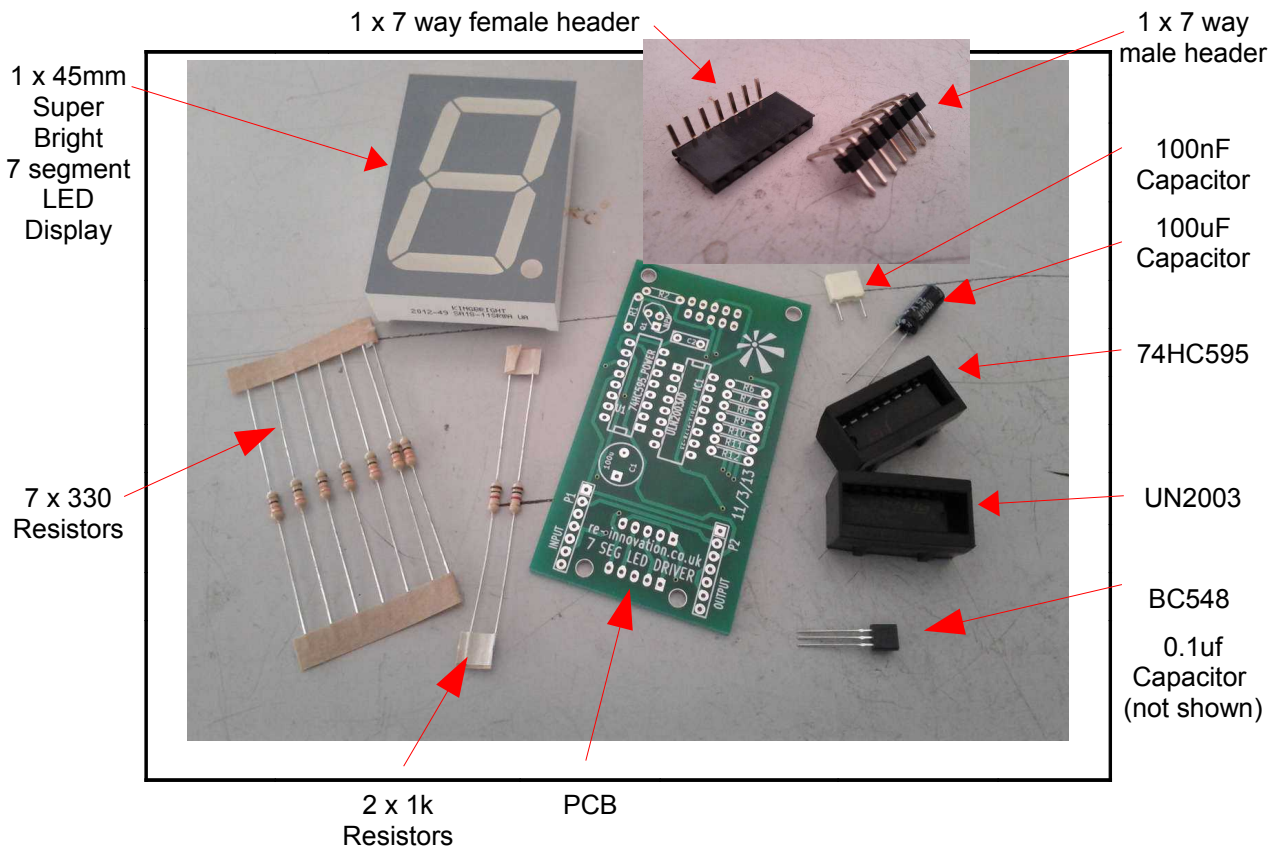
Date:	09/05/13	Version:	1.0	By:	Matt Little
-------	----------	----------	-----	-----	-------------



Ever needed to have a large visual numerical display?
 This kit is a series connected large 7 segment LED driver.
 It can drive a 1.75" (45mm) LED unit (included)
 It requires 12V to function.
 It is designed to connect to an Arduino or other micro-controller. Example code for the Arduino is available.
 A 74HC595 shift register is used along with a UN2003 transistor array.
 The decimal point can also be utilised.

Note: this kit will require an Arduino or other micro-controller to run.

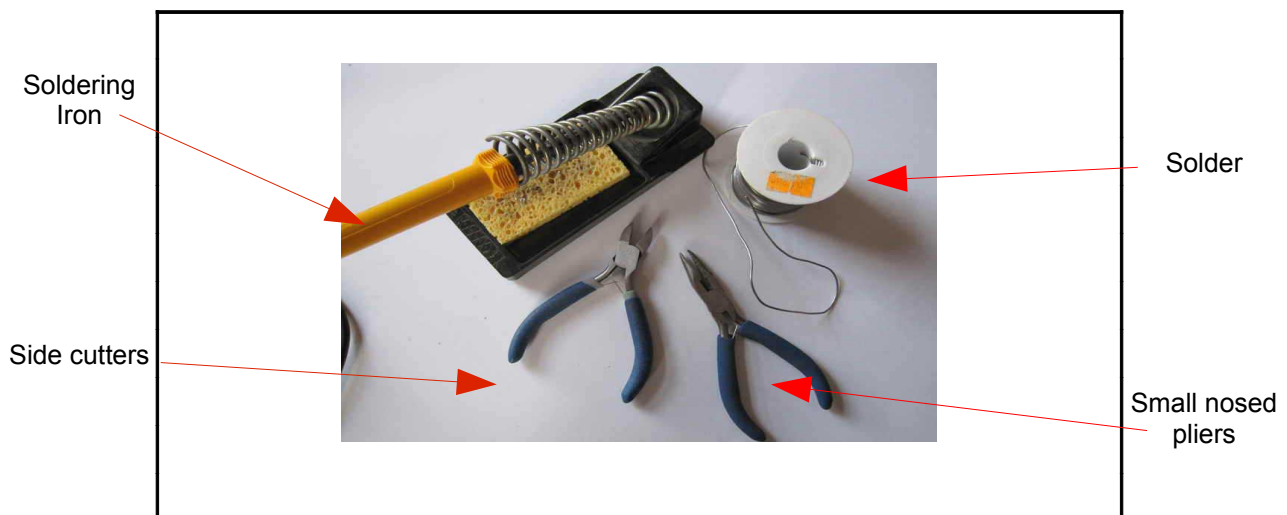
Parts included:



Parts list:

Ref	Description	Value/Code
7SEG1	Super Bright Common Annode. 7 Segment LED. Kingbright. 45mm	SA18-11_CA
C1	Decoupling capacitor	100uf
C2	Decoupling capacitor	100nf
C	Filter capacitor (not on diagram)	0.1uf
IC1	Transistor array	ULN2003AD
P1	INPUT	6 way 90 degree pin
P2	OUTPUT	6 way 90 degree socket
Q1	NPN for Decimal Point	BC548
R1	Limit transistor base current	1k
R2	Limit current to DP	1k
R6	Limit current to LED chain	330
R7	Limit current to LED chain	330
R8	Limit current to LED chain	330
R9	Limit current to LED chain	330
R10	Limit current to LED chain	330
R11	Limit current to LED chain	330
R12	Limit current to LED chain	330
U1	Shift register	74HC595_POWER
	Circuit board	PCB

Tools required:



This kit has been designed and produced by:

Renewable Energy Innovation.

info@re-innovation.co.uk

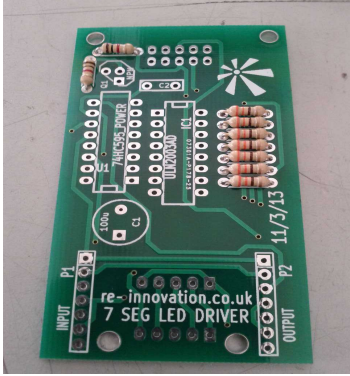
www.re-innovation.co.uk

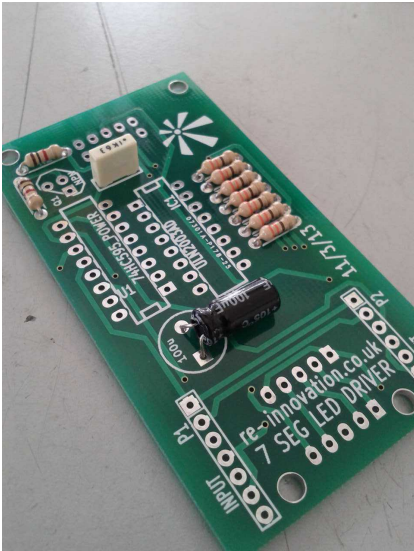

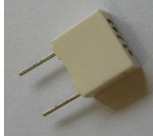
Hopkinson Gallery, 21 Station Street, Nottingham, NG7 6PD

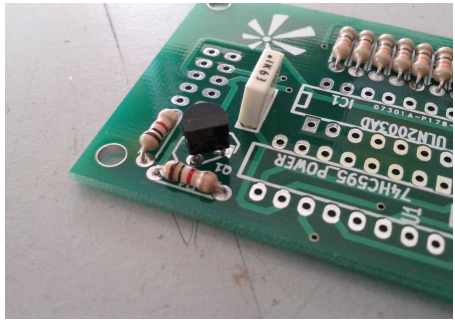
Instructions:

Step: 1	Solder the resistors	
Identify all the resistors. You will have:		
Quantity	Value	Part Reference
2	1k	R1,2
7	330	R6 to R12

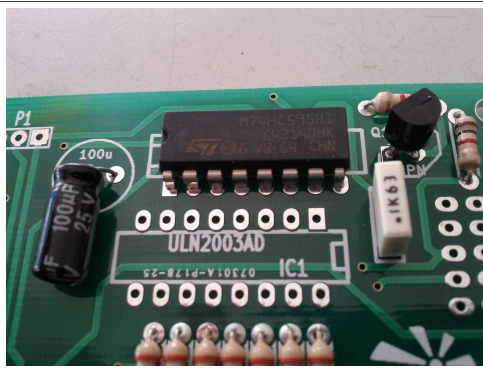
Use the identify chart at the end of these instructions or a multimeter.
Solder into the relevant places.
Their orientation does not matter.



Step: 2	Solder the capacitors C1 and C2			
	Identify and then solder in the capacitors.			
	Quantity	Value	Reference	Photo
	1	100uf	C1	
1	100nf	C2		
<p>Check the orientation of C1. The white line on the side of C1 signifies negative side. The round pad on the PCB signifies negative. The longer lead signifies positive. The square pad on the PCB is positive. To reduce the height of these components, bend over C1 as shown in the photo.</p>				

Step: 3	Solder the transistor	
<p>Check BC548 orientation. This fits into Q1</p>		

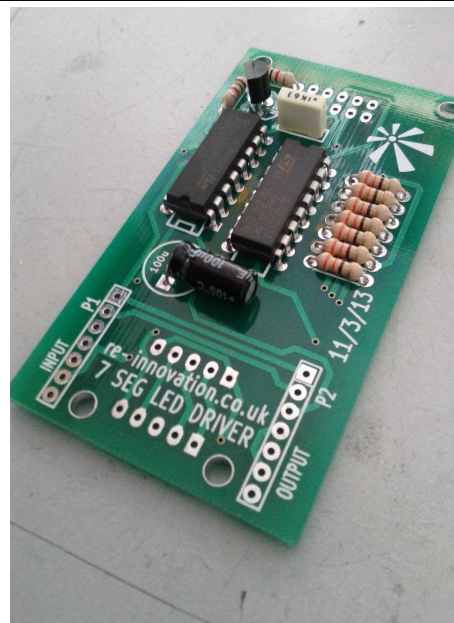
Step: 4	Solder the 74HC595 shift register	
----------------	-----------------------------------	--



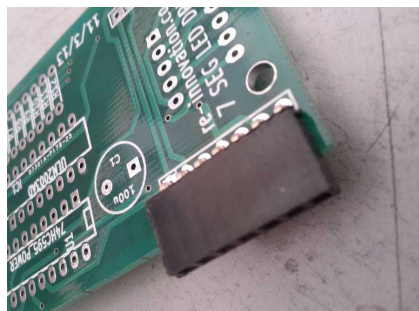
To keep the profile low, no IC holders are used in this design. You can add them if you would like to. Ensure the 74HC595 is fitted into the correct socket. Ensure the notch on the component lines up with the notch on the circuit board silk-screen. **DOUBLE CHECK THIS** (if soldering directly in). It will be **VERY** difficult to change if you get it wrong.

Step: 5 Solder the UN2003 transistor array

To keep the profile low, no IC holders are used in this design. You can add them if you would like to. Ensure the UN2003 is fitted into the correct socket. Ensure the notch on the component lines up with the notch on the circuit board silk-screen. **DOUBLE CHECK THIS** (if soldering directly in). It will be **VERY** difficult to change if you get it wrong.



Step: 6 Solder on P1 and P2 connectors



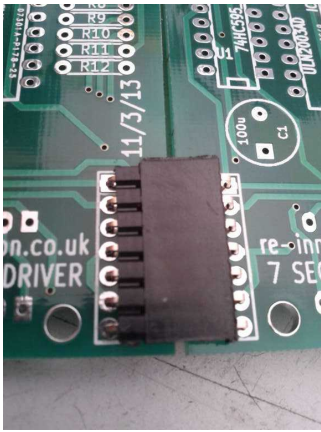
If you are going to link up a number of these units then you will need to add the INPUT and OUTPUT connectors. These are labelled P1 and P2.

To do this there are 7-way male and female header pins. I place the male in P2 (the output) and the female in P1 (the input).

In order for the connector to lie flat, the male header pins are NOT inserted in the usual way.

Instead we use the longer pins to go into the PCB (see photo). Solder them in.

The black plastic strip can then be pushed back to expose more of the pins.



Cut off the excess from the pins through the circuit board.

These connectors are only needed if you are putting two or more boards together.

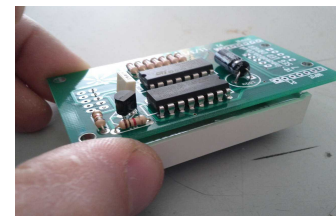
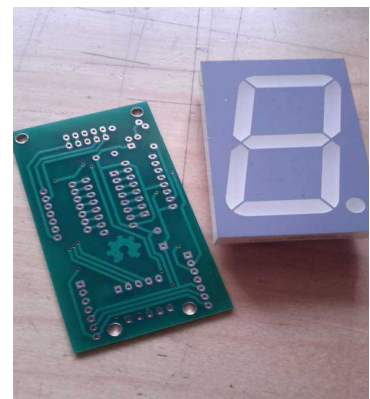
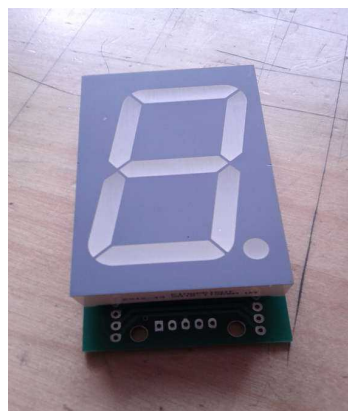
Step: 7 Solder the LED display

The LED display is soldered on the reverse (solder) side of the PCB. This makes the whole unit much thinner.

You must ensure the correct orientation of the display.

The decimal point goes towards the bottom right hand corner of the PCB when looking at the solder side. The decimal point is on the end with P1 and P2, the input and output connections.

DOUBLE CHECK THIS (if soldering directly in). It will be **VERY** difficult to change if you get it wrong.



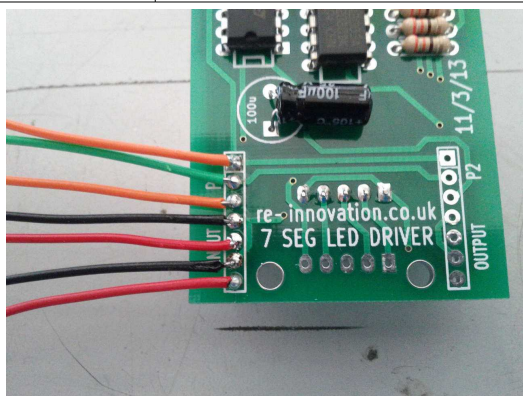
Step: 8 Build is finished!



Have a nice cup of tea.

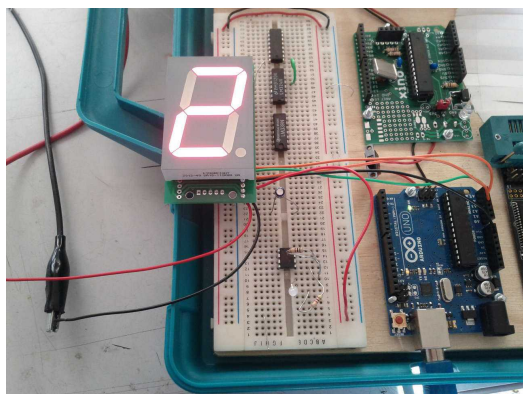
Once the device is constructed, the next step is check it powers up OK and then to test with a programmed Arduino....

Step: 9 Connect to an Arduino



There are 7 connections to the 7 segment LED boards. Pin 1 is the square pad. The connections are:

- Pin 1 → Serial LATCH → A3 Arduino
- Pin 2 → Serial CLOCK → A5 Arduino
- Pin 3 → Serial DATA → A4 Arduino
- Pin 4 → GROUND → GND Arduino
- Pin 5 → +5V → +5Arduino
- Pin 6 → GROUND
- Pin 7 → +12V



In the example code for the Arduino, pin 1 (LATCH) is connected to A3, pin 2 (CLOCK) is connected to A5 and pin 3 (DATA) is connected to A4. The Ground and +5 must also be connected.

Step: 10 Upload the example sketch

Note: These instructions assume you are familiar with the Arduino IDE and uploading Sketches. If not search online for some great tutorials.

This was tested on version 1.02.

Download the example code from www.re-innovation.co.uk.

Add this to your sketches folder.

Open and upload to your Arduino.

This should then run through the various example functions.

Check the notes within the code for more details.

Step: 11 Apply a 12V power supply

The LED unit requires 12V DC to operate. This is due to the large size of the LED display, with four LEDs in each segment. The required voltage must be 8V or higher. The 330 ohm resistors limit the current from the 12V supply.

Apply 12V to pins 6 (Ground) and 7 (+12V DC). Use an adjustable current limit power supply (if possible) when testing this. If there are any bad connections, check your soldering and orientation of all components.

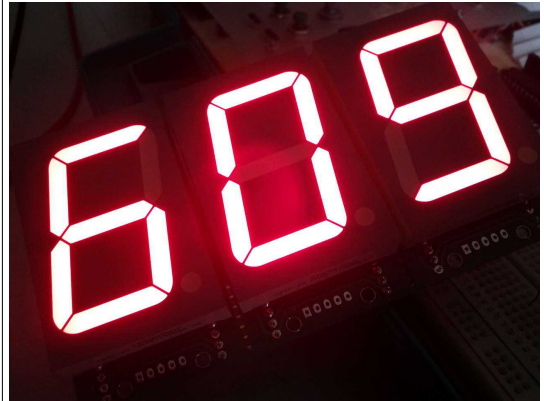
Note: If using a battery the ALWAYS ensure there is a fuse in the 12V power line.

Step: 12 Set it running

Check out www.re-innovation.co.uk for more examples and videos.

Note: If the display flickers when updated, you might need a 0.1uF capacitor (included) between Pin 1 (LATCH) and Pin 4 (Ground). Attach this to the output connector of the last display in your serial chain.

See the ShiftOut example on the Arduino reference website for more information:
<http://arduino.cc/en/Tutorial/ShiftOut>

**Step: 13** Build your project

Check www.re-innovation.co.uk for some examples of this kit in action. We would love to hear and see your application and ideas. Please email any photos to info@re-innovation.co.uk, or leave comments.

Arduino code information:

An example sketch for getting your project running is available at www.re-innovation.co.uk.

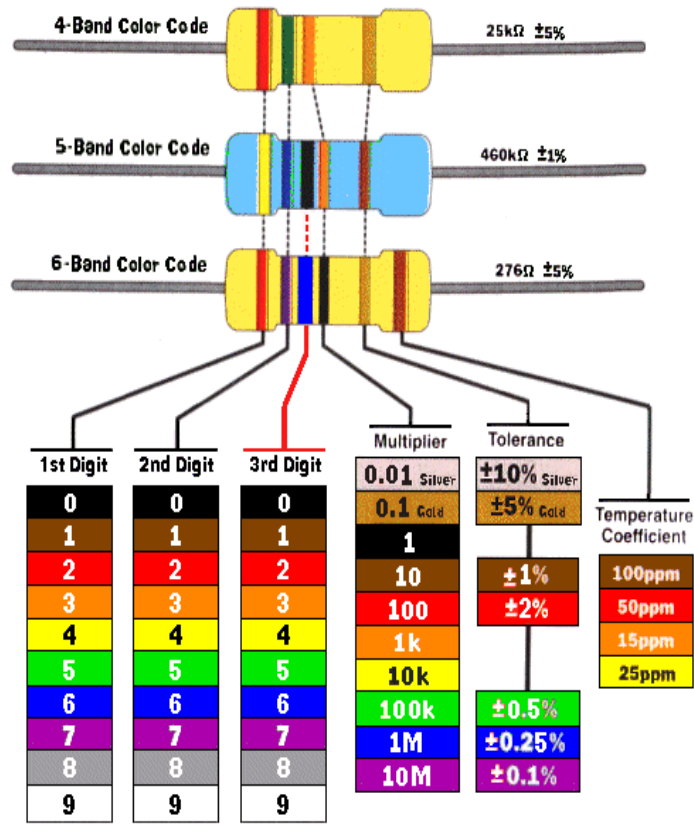
Contact details:

We would like you to be happy with this kit. If you are not happy for any reason then please contact us and we can help to sort it out. Please email info@re-innovation.co.uk with any questions or comments.

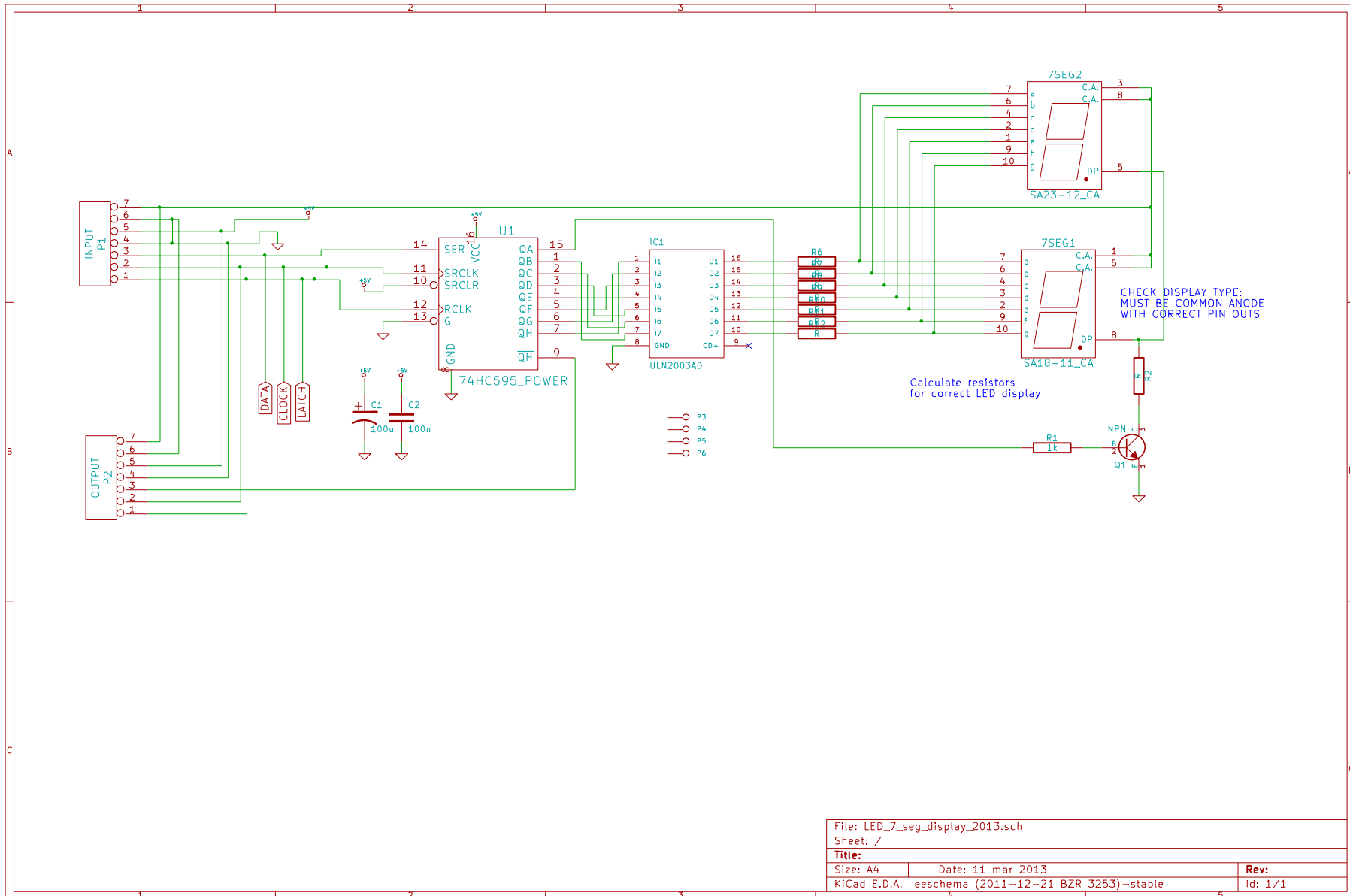
If any parts are missing from your kit then please email info@re-innovation.co.uk with details, including where the kit was purchased.

More technical information can be found via www.re-innovation.co.uk.

Useful Information:

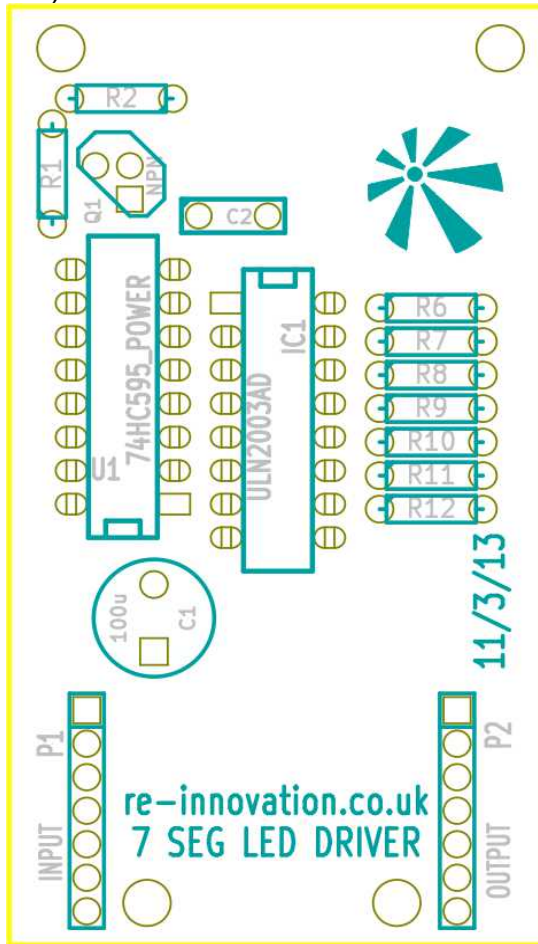


Circuit schematic:

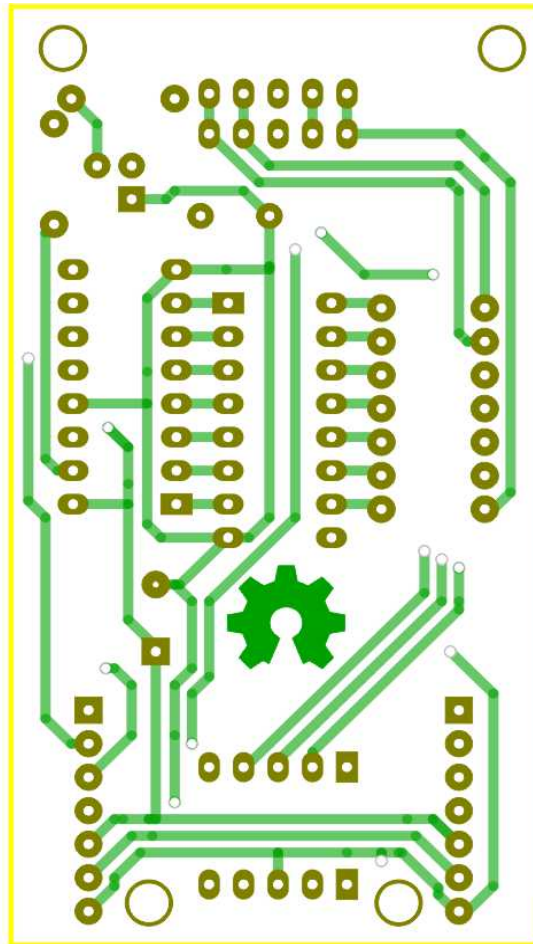


Printed Circuit Board

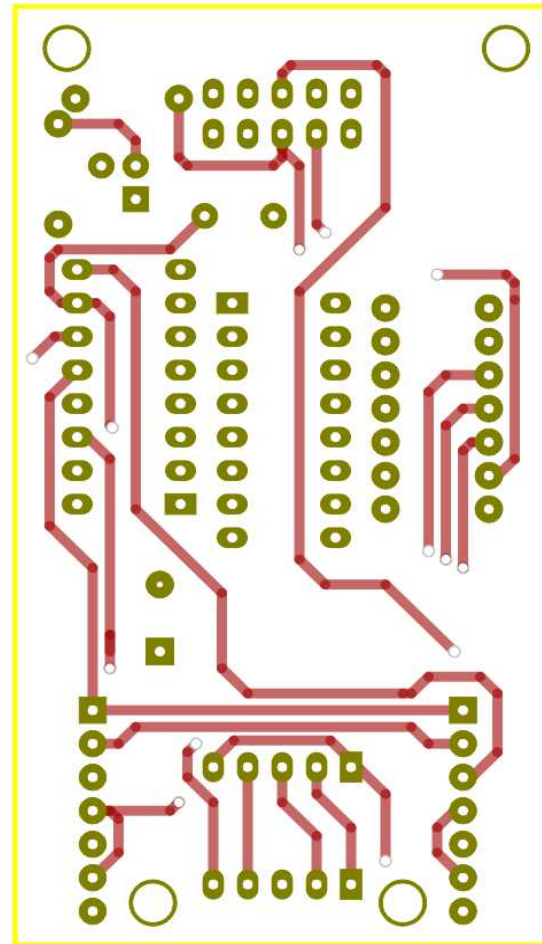
(not to scale!)



Silk Screen



Back Copper



Front Copper