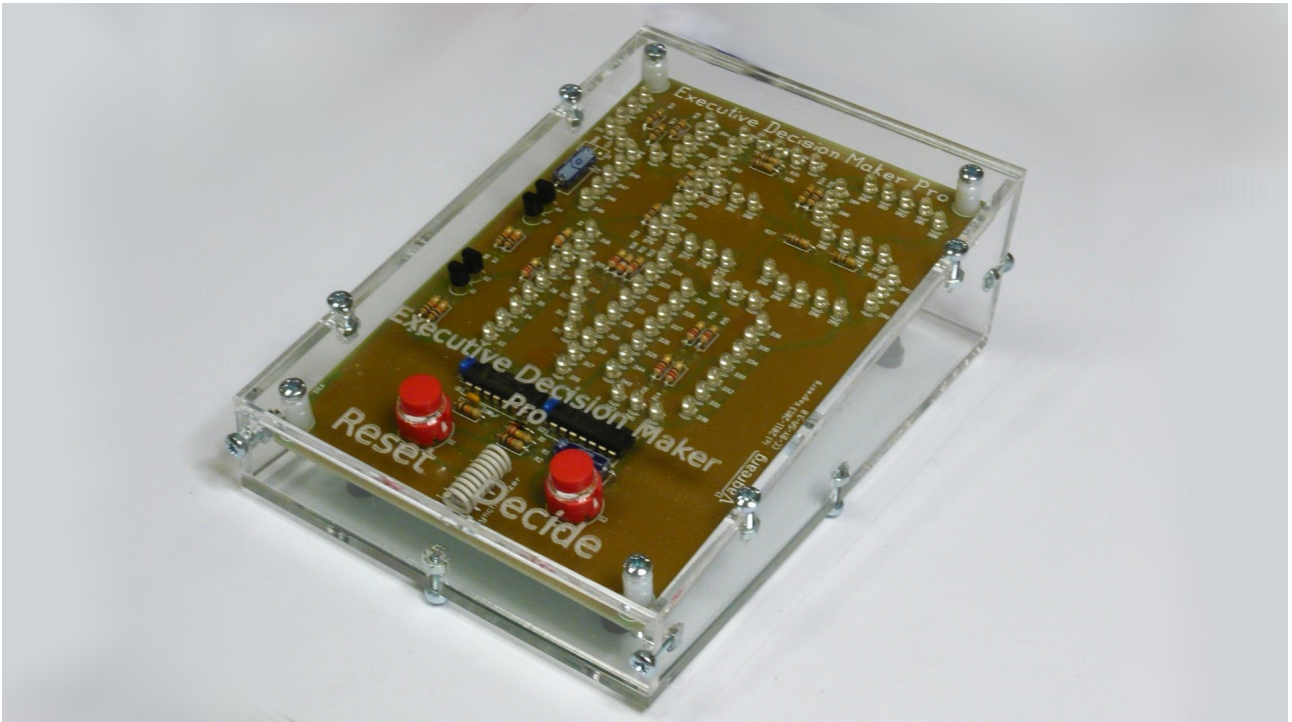# Executive Decision Maker Pro Assembly Guide

1 Introduction

Congratulations with acquiring your Executive Decision Make Pro. This guide attempts to follow you through the entire assembly process and should give you help to find order in the chaos of many components.

If you acquired the fully assembled printed circuit board (PCB) option, then you may proceed to chapter 13 on page 17 for instructions how to assemble the case.

PCB assembly will require some tools and skills. You need a soldering iron, tin, cutting tool, a screwdriver and a bit of patience. Please note that some soldering experience would be helpful. You should never hesitate to ask a more experienced person for help if you have any problems. An experienced tinkerer can assemble the device in about two hours, but you should set aside enough time and not hurry assembly.

You are advised to read the entire assembly guide prior to starting the assembly process to get an overview of what is needed.

2   LEDs

Mounting the LEDs as the first thing has the advantage of being able to align them better. You may start with the red or green LEDs. If you acquired the LED mounting help-tool (for assembly and alignment), then you should start with the LEDs as the first thing to assemble.
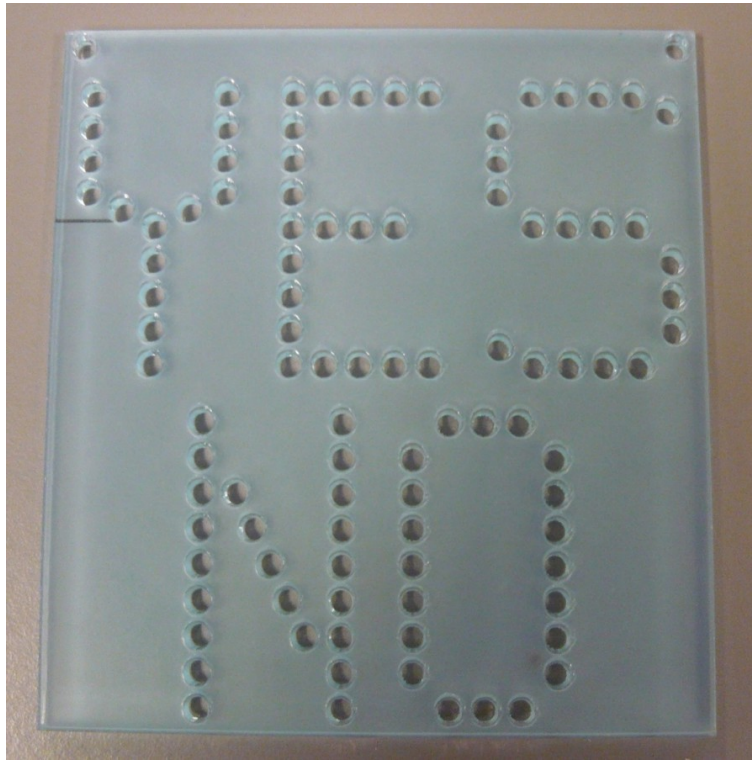

Illustration 1: LED mounting help tool

You should start with one color of LEDs and finish either "yes" (green) or "no" (red) completely before moving on. All LEDs are transparent and can be hard to distinguish if mixed.

There are 43 red LEDs for "no" and 55 green LEDs for "yes". All LEDs are polarized and the *short lead* is the cathode (negative). The cathode is marked on the printed circuit board with a dot. I.e. the short lead goes into the hole where the dot is located. All LEDs are oriented exactly the same on the entire printed circuit board for your convenience.
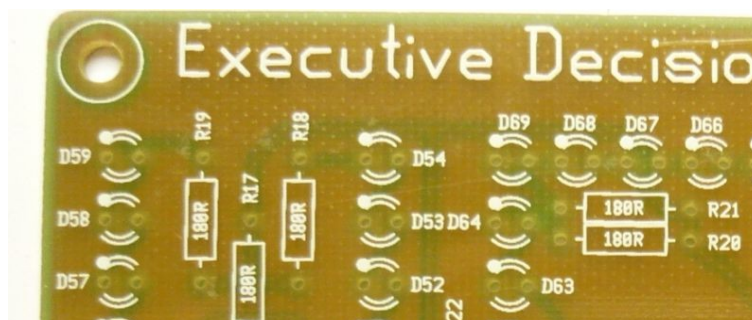

Illustration 2: Dot on silkscreen indicating cathode

Soldering without the LED mounting (assembly/alignment) help-tool can be a bit tricky. Any case, you should cut the leads *before* soldering. Long leads tend to carry heat away and that makes it harder to solder properly. You may bend the leads before cutting so that the component has a better hold in the holes before soldering.
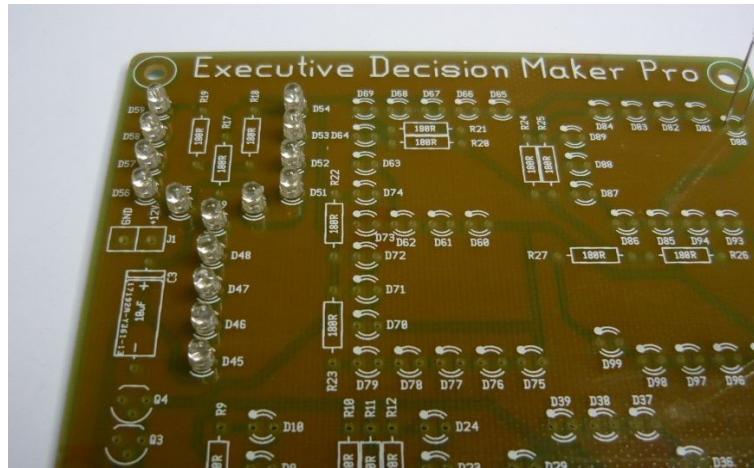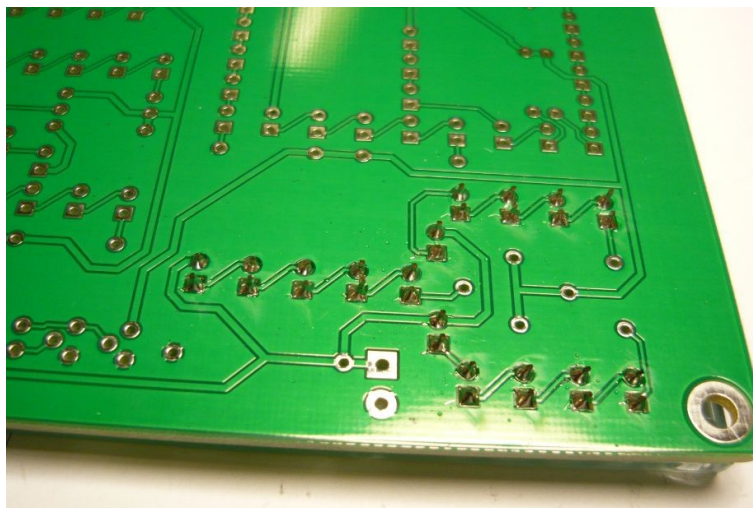

Illustration 3: LEDs Y mounted

Illustration 4: LEDs Y-mounted solder side

You must align each and every LED manually if you do not use the LED mounting (assembly/alignment) help-tool. For this you should only solder one lead and then adjust the LED's position, evt. with touching the solder-joint for better movement. It may still be advantageous to start with the LEDs with manual alignment because it can make the easier to retain overview and access to these parts.

Please make sure you check the polarity and mount the LEDs correctly. Fixing this later is, though possible, a very messy job and no guarantees are given.

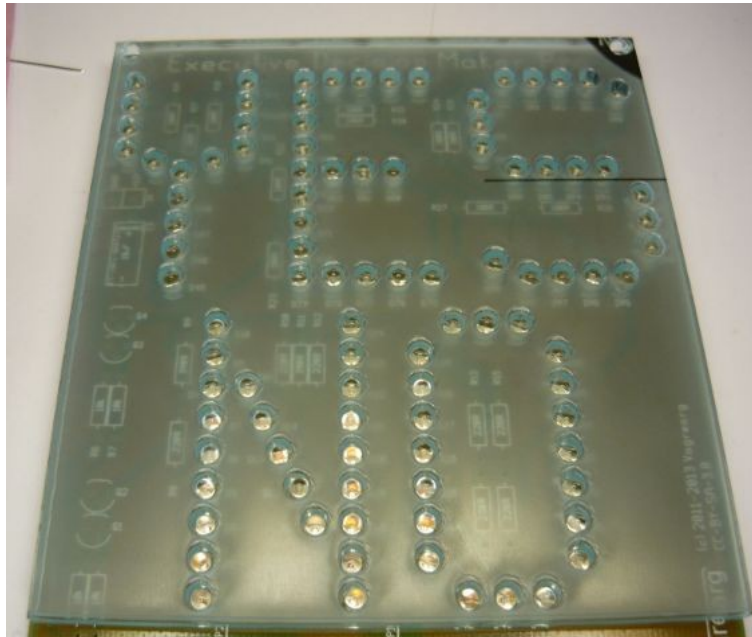With the help of the assembly tool you have something like this:

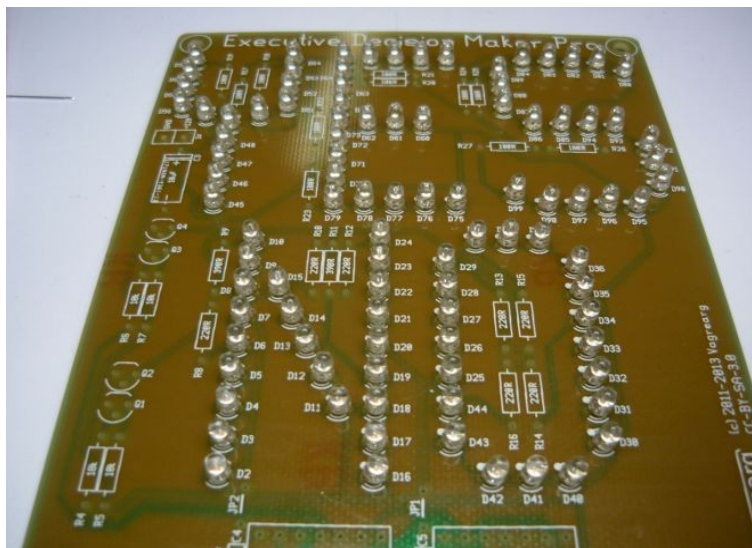*Illustration 5: LEDs with assembly tool for alignment*

Illustration 6: All LEDs assembled

3   Resistors

There are 27 resistors to be mounted. The order as listed below is easy to perform, but by no means mandatory. The resistors can be identified by their color bands.

Illustration 7: Resistor values and colors

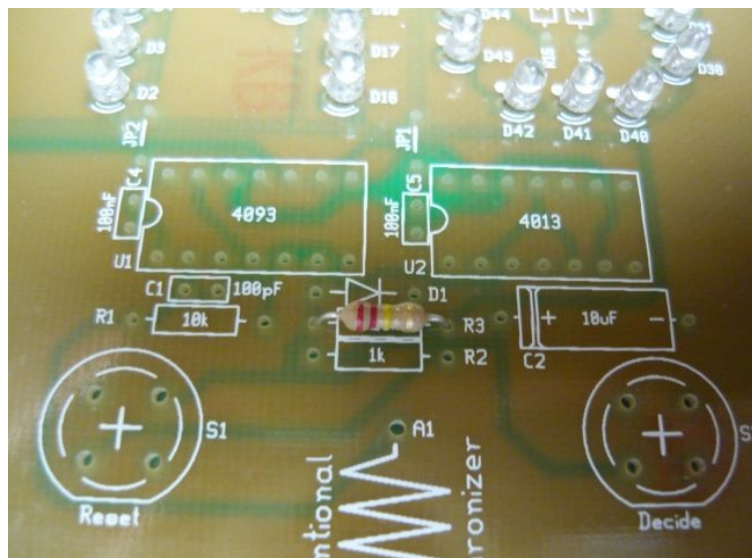## 3.1   Resistor 220kΩ (Red-Red-Yellow; 1 pcs)

Illustration 8: Resistor 220kΩ (R3)

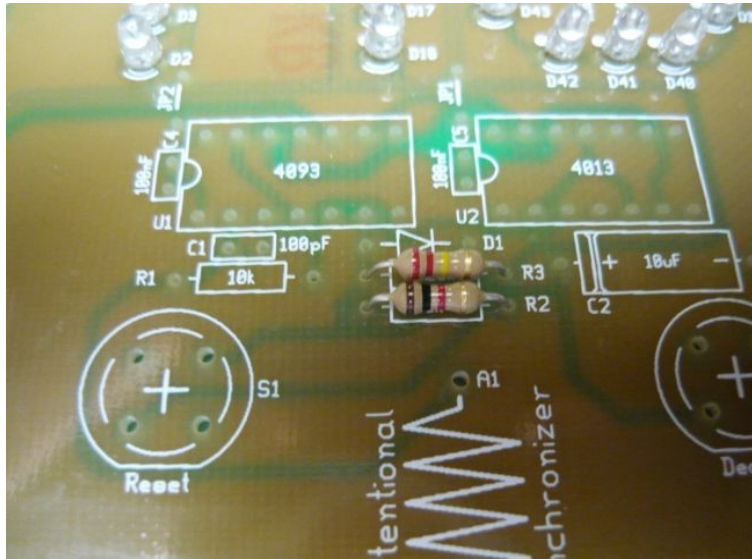## 3.2   Resistor 1kΩ (Brown-Black-Red; 1 pcs)

Illustration 9: Resistor 1kΩ (R2)

3.3   Resistor 10kΩ (Brown-Black-Orange; 5 pcs)

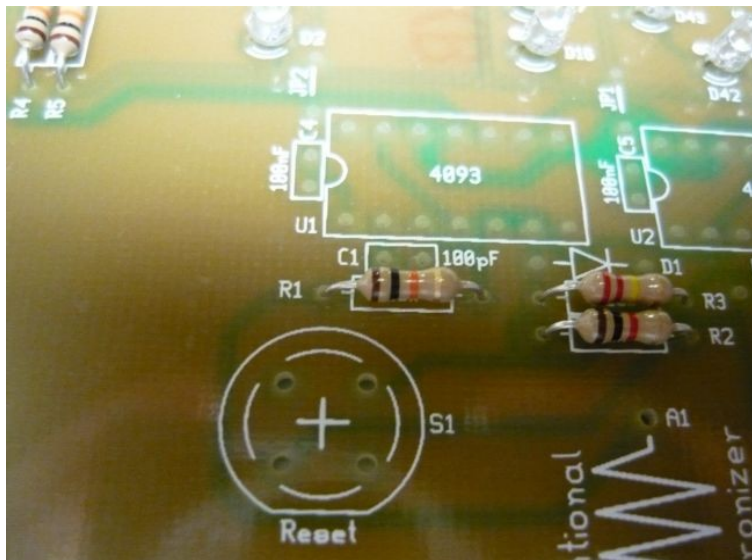There are two images showing different locations for the 10kΩ resistors.
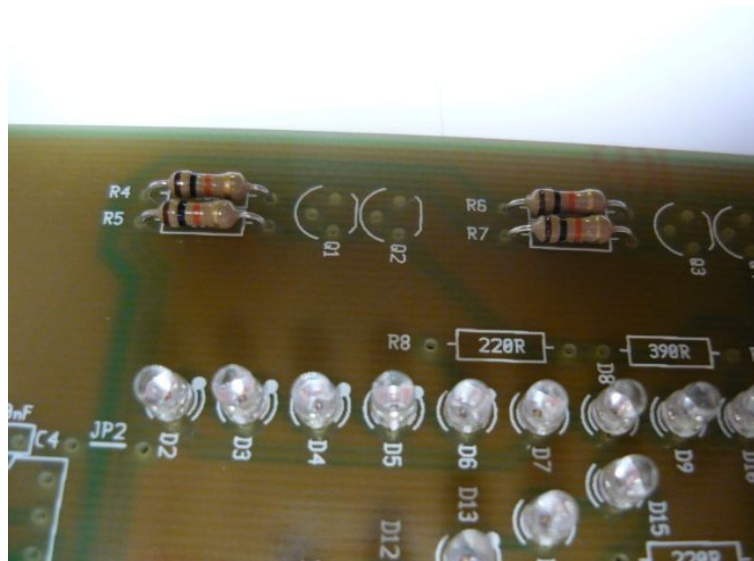

Illustration 10: Resistor 10kΩ (R1)

Illustration 11: Resistor 10kΩ (R4..R7)

3.4 Resistor 390Ω (Orange-White-Brown; 2 pcs)

Illustration 12: Resistor 390Ω (R9, R11)

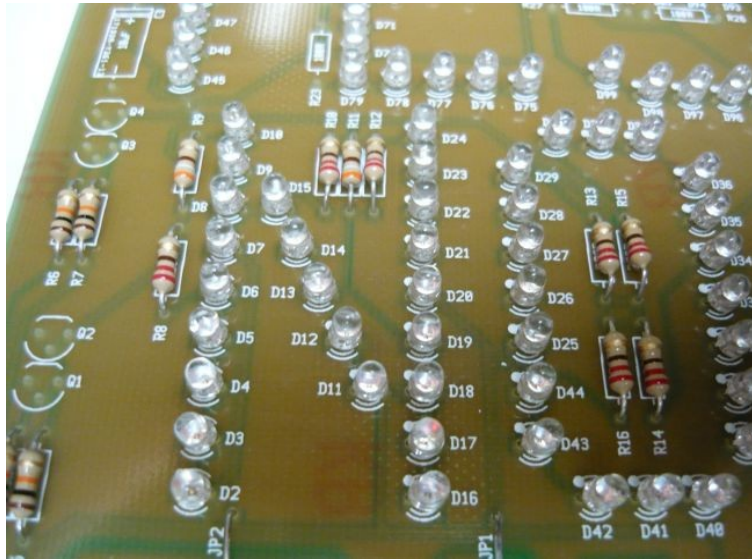### 3.5   Resistor 220Ω (Red-Red-Brown; 7 pcs)

Illustration 13: Resistor 220Ω (R8, R10, R12..R16)

3.6   Resistor 180Ω (Brown-Gray-Brown; 11 pcs)
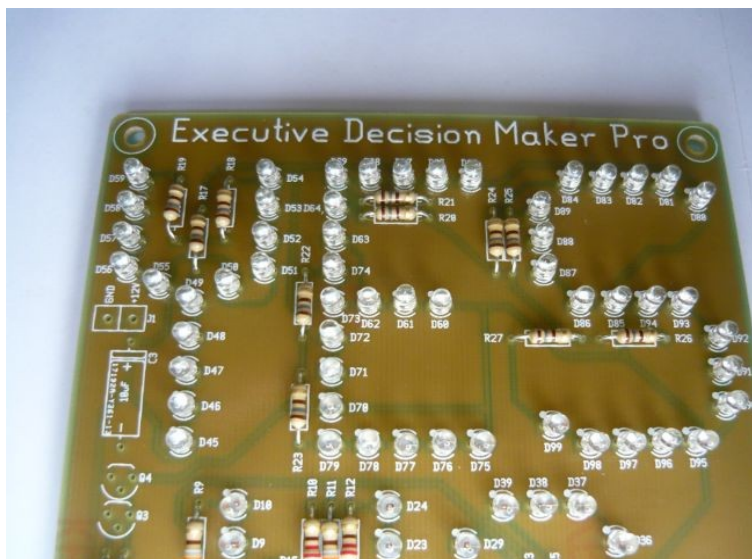

Illustration 14: Resistor 180Ω (R17..R27)

4   Diode

There is one normal diode on the printed circuit board. Diodes are polarized and must be mounted in the correct orientation. The cathode (negative) is marked with a dark/black band.
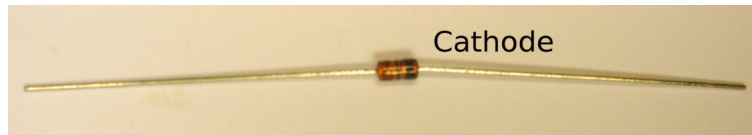

Illustration 15: Diode cathode marking
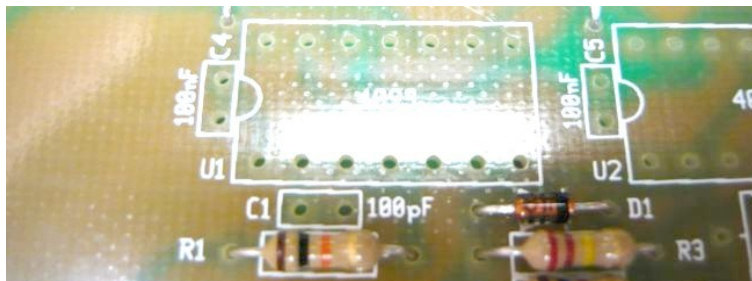
4.1   Diode 1N4148 (1 pcs)

Illustration 16: Diode (D1)

5   Jumpers

There are two jumper wires required on the board. You can use some of the cut-off leads as jumper wires:
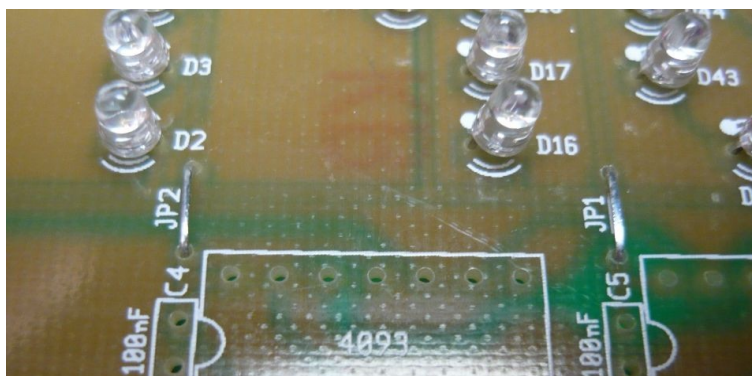

Illustration 17: Jumper wires (JP1, JP2)

6   Ceramic capacitors

Ceramic capacitors have a marking on the case indicating the capacity in pF. The number is expressed with two digits followed by and exponent. The digits are, in this case, "10" and the exponent is 1 or 4. The value follows from the calculation $10 * 10^1 pF = 100pF$ and $10 * 10^4 pF = 100000pF = 100nF$. There is no polarity for ceramic capacitors.

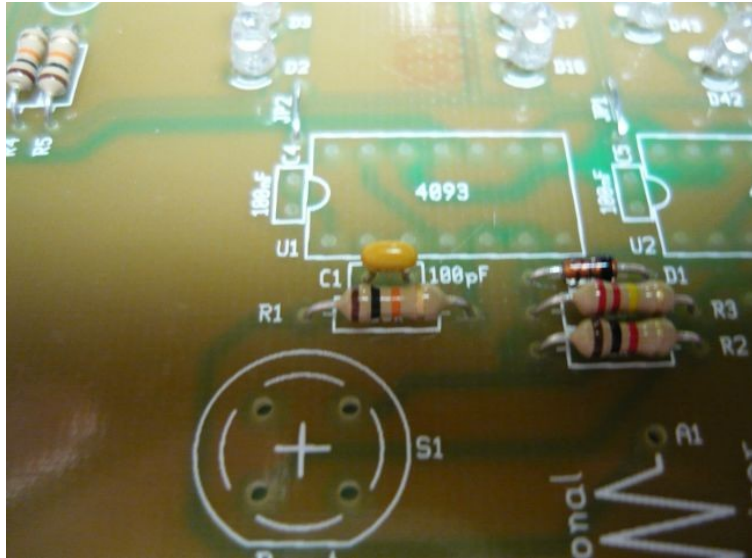## 6.1   Capacitor 100pF ("101"; 1 pcs)

Illustration 18: Capacitor 100pF (C1)
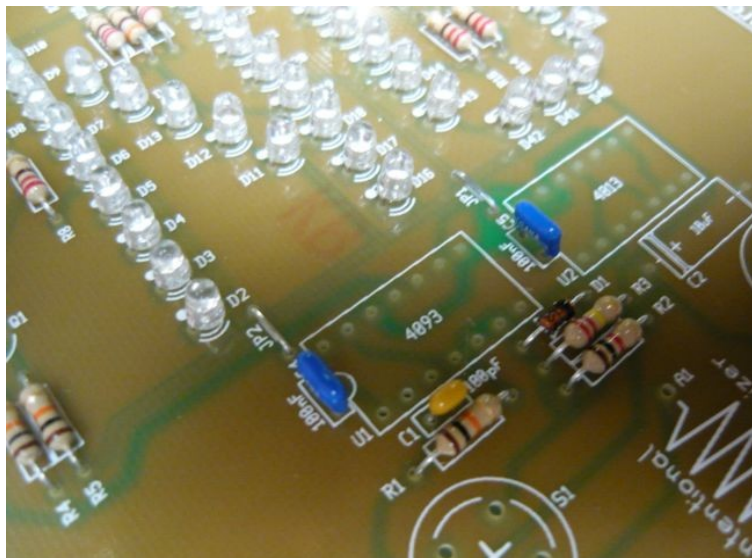
6.2   Capacitor 100nF ("104"; 2 pcs)

Illustration 19: Capacitor 100nF (C4, C5)

7 Transistors

Transistors are active elements used for switching in the design. They turn the LEDs on and off. Transistors are polarity sensitive and the drawing on the printed circuit board indicates the correct orientation. The transistor's housing is flattened on one side.

7.1 Transistor BC337 (4 pcs)

Illustration 20: Transistors BC337 (Q1..Q4)

8 Aluminium capacitors

There are two aluminium capacitors on the printed circuit board. Both have the same value of 10µF. Aluminium capacitors are polarized and must be mounted in correct orientation. The "dent" in the capacitor's housing indicates the positive terminal and the negative is indicated with an arrow on the housing.

The drawing on the printed circuit board also indicates the "dent" and it should be aligned properly with the component.
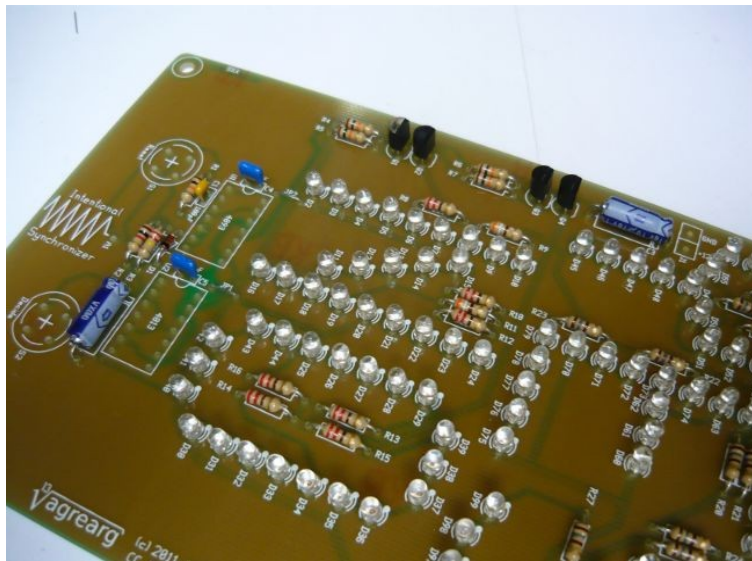
8.1 Capacitor 10µF (2 pcs)

Illustration 21: Aluminium capacitor 10µF (C2, C3)

9 Integrated circuits

Integrated circuits are the calculating elements. Please note that the integrated circuits are sensitive to electro-static discharge and should be handled with care. You may need to bend the leads to point vertical down. You can do so _carefully_ by pressing all leads from one side simultaneously down on the table, reinforcing the angle, followed by the opposite side.
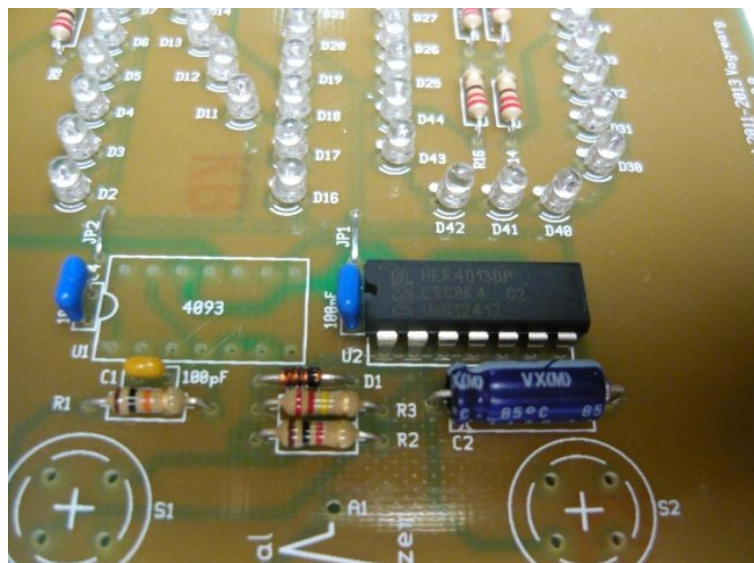
9.1 IC 4013 (1 pcs)

Illustration 22: Integrated circuit 4013 (U2)
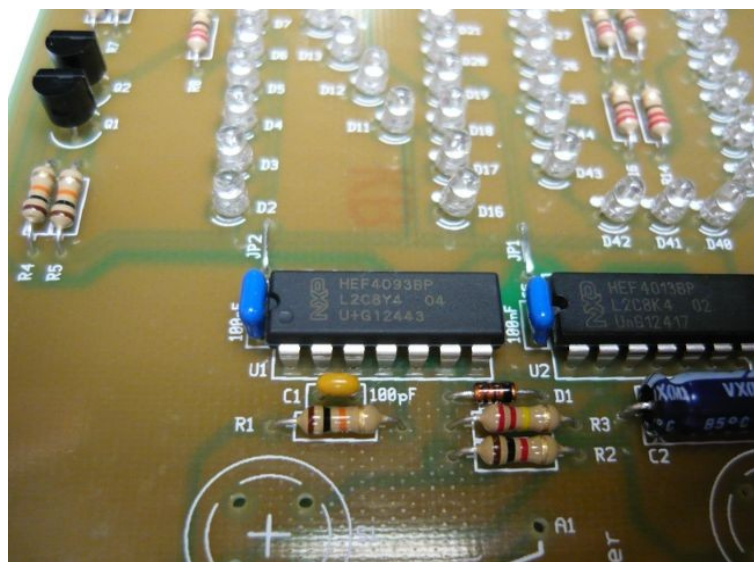
9.2 IC 4093 (1 pcs)

Illustration 23: Integrated cirsuit 4093 (U1)

10 Buttons

The push buttons do not have an orientation, but there is a "flat" side. This flat side should be located downward, as indicated on the printed circuit board.
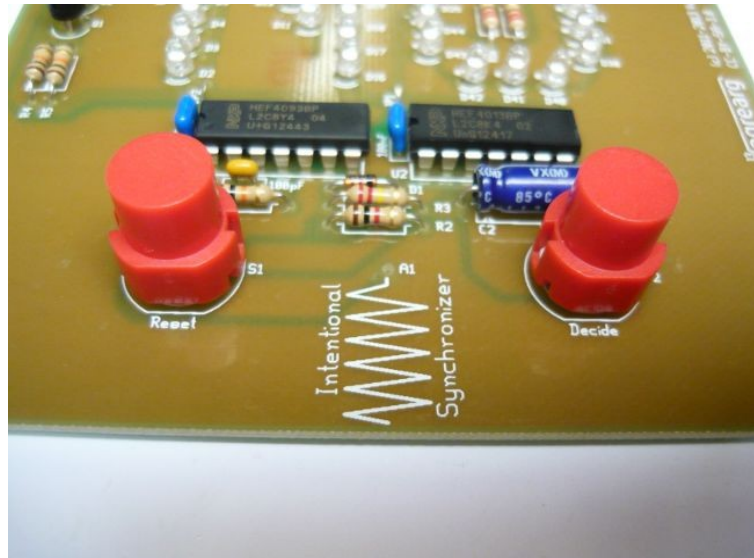

Illustration 24: Push buttons (S1, S2)

11 Intentional Synchronizer

The Intentional Synchronizer is a coil/antenna to receive your brainwaves. It is the final component to mount.
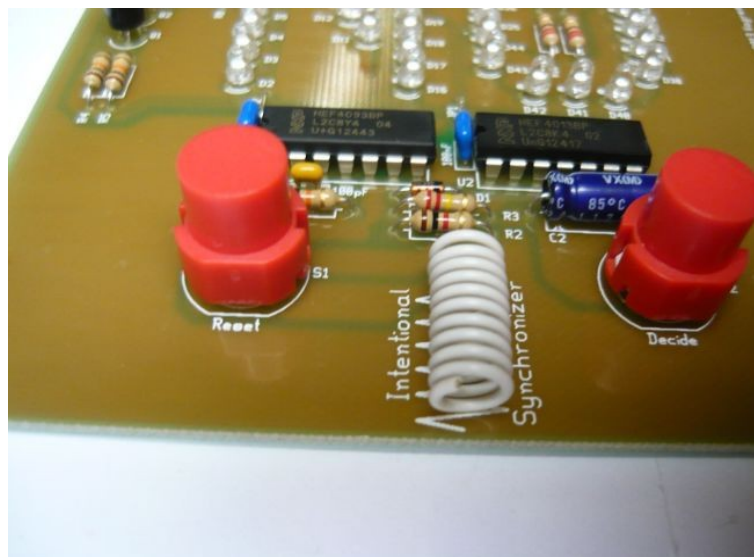

Illustration 25: Intentional Synchronizer (A1)

12 Wiring

You need to connect the DC power input plug to the printed circuit board. There is a black and red wire included in the kit. The red wire will become positive and the black one negative.

Firstly, remove 3..4mm of the isolation on both sides of the wire and apply tin to the ends. Secondly, solder one side of the red and black wires to the printed circuit board _on the backside_, as shown below.
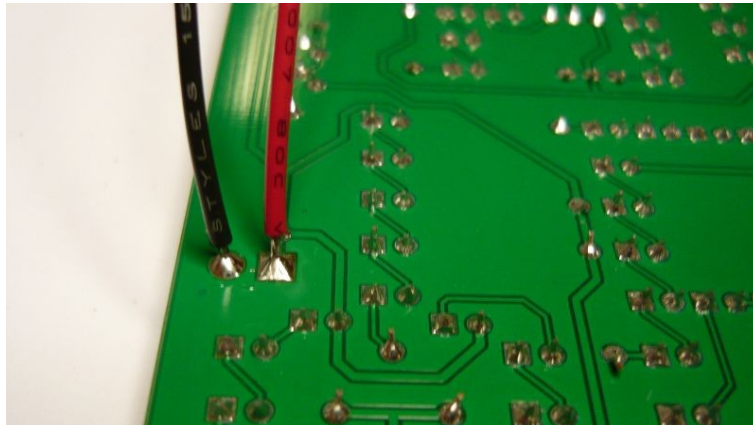

Illustration 26: Wire connection to PCB

The red wire is connected to the square pad.

Next, screw the DC connector into the back-plate as shown below:

Illustration 27: Connector screwed into back plate

The connector will fit correctly in the hole and is protected from turning by the hole's shape.

Finally, solder the wires to the connector. The red wire will be the center connection (the positive) and the black wire the outside connection (negative). Please note that the connector has an unused built-in switch. The correct attachment place for the black wire is the connection farthest away from the center.

Illustration 28: Wires to connector

13 Case assembly

The case consists of six Plexiglas plates and a set of screws, nuts and spacers.

Illustration 29: Case plate components

You should wash your hands before removing the protecting plastic coating to reduce dirty fingerprints on the inside of the case. ***DO NOT USE ALCOHOL OR ORGANIC SOLVENTS*** to clean the Plexiglas plates. Alcohol and organic solvents cause the Plexiglas to crack and cracking is irreversible. Use water (with very dilute soap if required) and a soft cloth for cleaning only.

Fastening the screws and nuts must be done carefully. ***DO NOT TIGHTEN TOO HARD*** or cracking may occur after a short period of time. If you hear it squeak then you are tightening too hard.

Engraving residues may be removed with a brush.

13.1 Top-plate PCB assembly

Case assembly starts with the mounting of the printed circuit board with the top plate.

Illustration 30: 20mm screws and nuts and spacers

The screws go through the top plate and the printed circuit board is mounted with the spacers in between. The engraving should be on the inside and readable from the top.
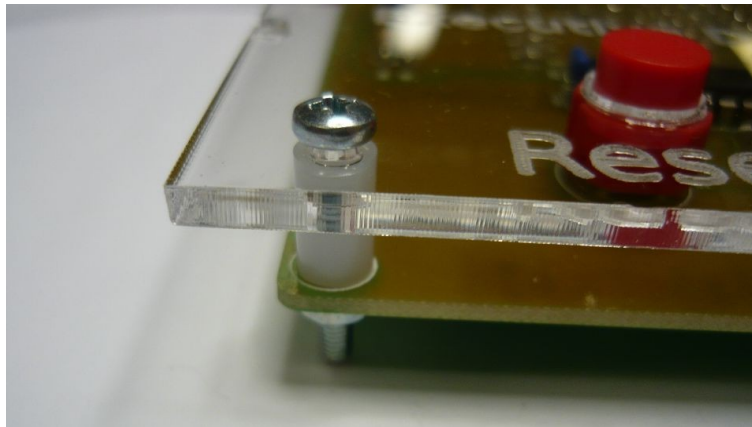

Illustration 31: Screw top-place PCB detail
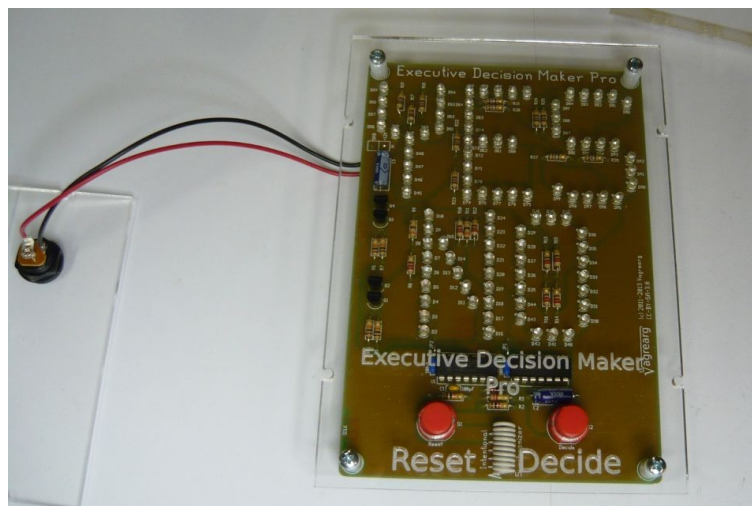
The assembly should look like this:

Illustration 32: PCB mounted on top-plate

13.2 Base-plate feet mounting

There are four rubber feet for the bottom plate:

Illustration 33: Rubber feet

The feet are mounted on the base-plate such that the text is readable from the bottom (engraving on the inside).

Illustration 34: Rubber foot through base-plate

Illustration 35: All feet mounted

13.3   Sides assembly

Next are the side-plates. The sides must be mounted such that they will curve slightly outward. The laser-cut is slightly angled and you should ensure that the short-side of the cut is on the outside of the case. The reason for this is the ease of aligning and mounting the rest.
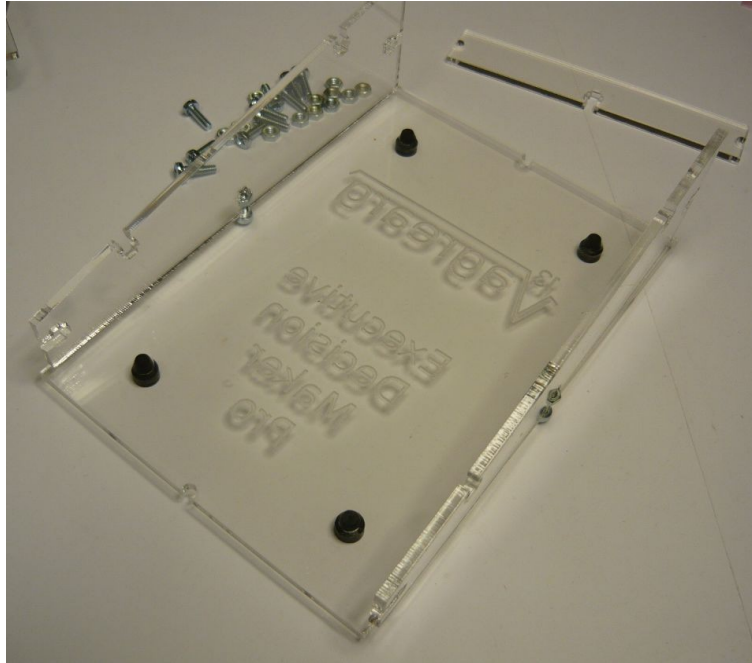

Illustration 36: Side-plates on base

The screws and nuts are mounted in following way:

Illustration 37: Screw and nut detail

Do not yet fasten too much. Other case components must be attached first and aligned properly before the final fastening can be done.

Next is the front- and back-plate. All plates are screwed together. You can fasten the screws when all sides are properly placed and positioned. Do not fasten too much or cracking may occur later on.

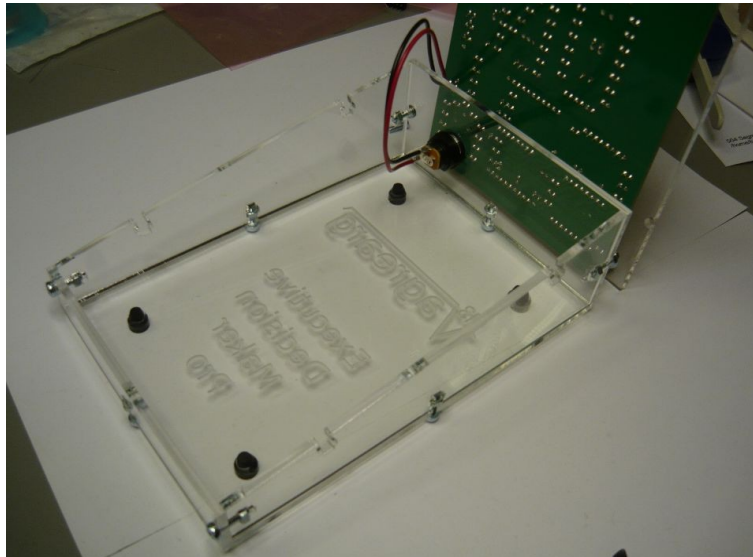When done you should have something like this:

Illustration 38: All sides mounted to the bottom

The top is now assembled onto the rest of the case. Be careful not to drop a nut in the case. Tweezers may be helpful to hold the nut until you have the screw in it.

Fasten all screws so that the case is stable, but not too fast that you hear squeaking.
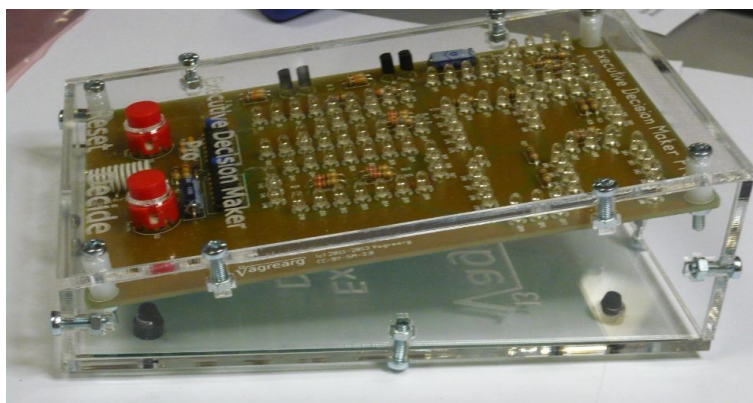
And done:

Illustration 39: Case done

You are now proud owner of the Executive Decision Makes Pro.