

## 107.056

### Miniature electronic organ



#### Parts list

- 1 Loudspeaker 8 Ohm
- 1 Transistor BC548
- 1 Transistor BC558
- 1 Capacitor 3,3nF
- 1 Capacitor 10n F
- 1 Resistor 150 K
- 1 Resistor 1 M
- 8 Trimmer 1 M
- 2 Bronze band 250 x 5,5 x 0.2mm
- 1 Plywood 165 x 115 x 8mm
- 50 Drawing pins
- 1 Cable 1 metre
- 1 Battery Clip 9Volt

#### Please Note

The OPITEC range of projects is not intended as play toys for young children. They are teaching aids for young people learning the skills of Craft, Design and Technology. These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old.

Some parts can be swallowed. Danger of suffocation!

## General

### Electronic sound generator

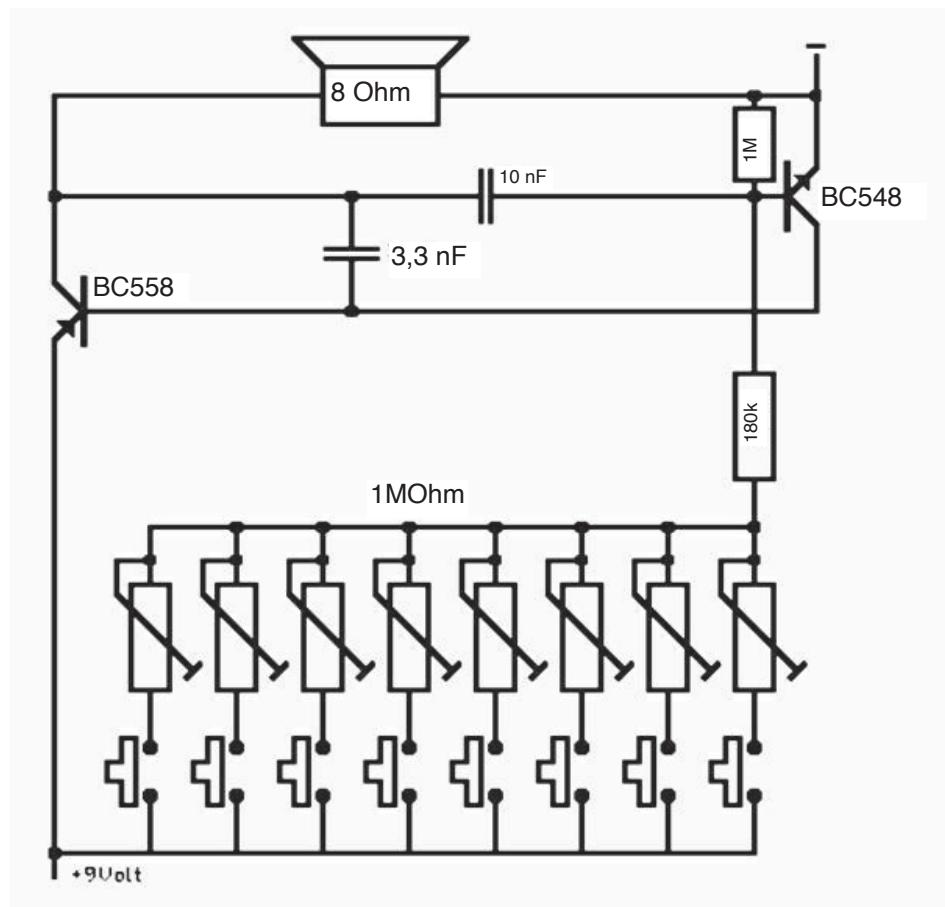
Experiments with electronic sound generation using valves, capacitors and transistors etc. have been made since the middle of the 1950s. Artists like the composer Karl Heinz Stockhausen and Pink Floyd used electronic sounds in their musical works to international acclaim.

Today there are electronic organs, pianos and keyboards of every variety

Our small mono-phone "Keyboard" allows us to make a range of electronic tones in a variety of frequencies, using capacitors and resistors. The control of the organ can be adjusted with electronic components called capacitors –trimmers (Here 1 M Ohm)

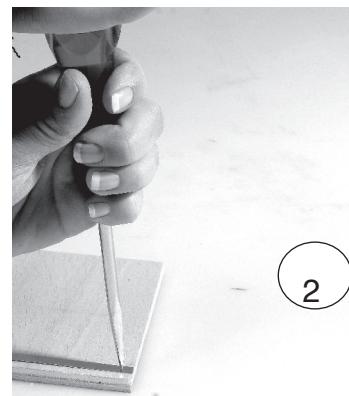
### The Electronic wiring plan

The electronic components and layout are standard, with the resistors determining the range of the capacitors. The 1 M Ohm resistor between the base an emitter of the BC548 of the transistor stops any clicking noise when a key is not pressed. It also reduces the current by the factor of 100 when not being used so that a switch for the circuit is not necessary.



## Making the circuit

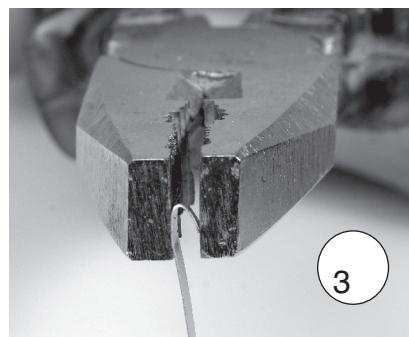
1. Cut the bronze band to 165mm long and fix it the plywood base with 3 drawing pins. Note use a hole maker to punch the holes for the pins  
 From the remaining bronze band cut 8 equal pieces each 40 mm long.)  
**Hinweis:** Löcher mit einem Vorstecher durchdrücken. (Bild 2)  
 Aus dem übrigen Bronzeband 8 gleiche Teile á 40mm zuschneiden.



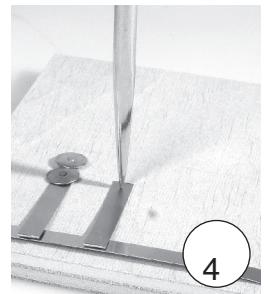
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## Making the keyboard switches

The keys are made from the 40mm long bronze band pieces. Using a pair of pliers bend over about 3-4 mm at the end of each metal piece ( Photo 3 ) Make a hole in the folded part ( Use hole maker ) (Photo 4 ) .Fix the keys with drawing pins to the wood base making sure that they are spaced equal distance from each other. Bend the fronts up from the long bronze strip in order to stop a permanent contact Finally add a further drawing pin in each strip this will serve as a soldering point.



3



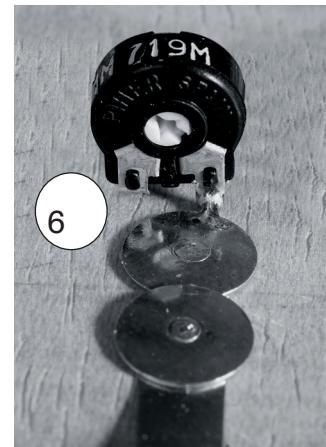
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- 2 Next snip the left leg away from the trimmer, this in order to make the soldering contacts easier and avoid mistakes ( Photo 5 ) Then bend the other two legs ( The right one to the front and the middle one to the back ).

Now you can solder the right leg of the trimmer to a keyboard switch ( (Photo 6) The middle legs of all the trimmers are connected with a piece of cable which runs from one side to the other. ( Cut off about 130mm cable and peel away the insulation )



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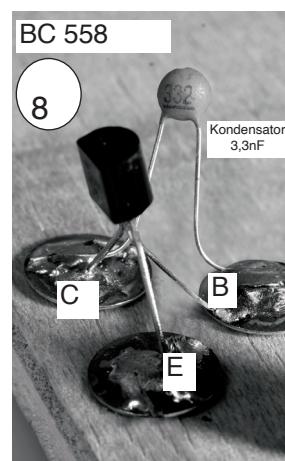


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- 3 Now solder the transistors on to 3 drawing pins mounted behind the keys

You must take care with the type and leg arrangement of the transistors.

(Look at the wiring diagram) Photo 8 (BCE) and Photo 10



BC 558

8

Kondensator  
3,3nF

C

B

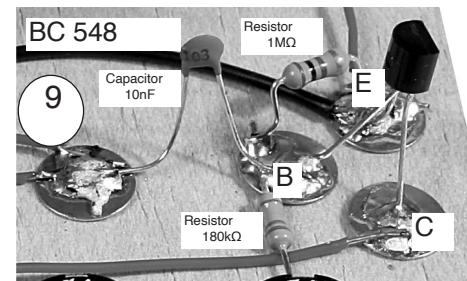
E

## Working steps

Take a 5cm long piece of cable, bare the end and solder it to the left hand drawing pin on to the bronze key. ( Photo 10 )

Solder on the left the transistor BC558 ( Photo 10 ) The base (B) ( middle leg ) to the right hand pin .The Emitter (E) seen from the front to the right to the lower drawing pin and the collector ( C ) to the remaining drawing pin ( Photo 8 )

Solder the transistor 548 ( Photo 10 ) on to the 3 right hand drawing pins Base B ( middle leg ) and the Emitter E on the top drawing pin finally the collector C on to the bottom drawing pin.



Now solder the capacitor (f, Photo 10 and Photo 8 ) to the base B of the transistor BC558 and the connection back to the collector on the transistor BC 548 see Photo 9

Solder the resistor 1 M Ohm ( k, photo 8 & 9 ) on the base (B) and the Emitter (E) from transistor C548. The resistor 180 Ohm ( Photo 9 and 10 ) to the base of transistor BC 548 and the soldering point from the trimmer. See Photo 10

Connect soldering point ( C ) and the transistor BC548 ( Diagram 9 ) and the soldering point ( B ) of the transistor BC 558 with an 140mm long piece of cable

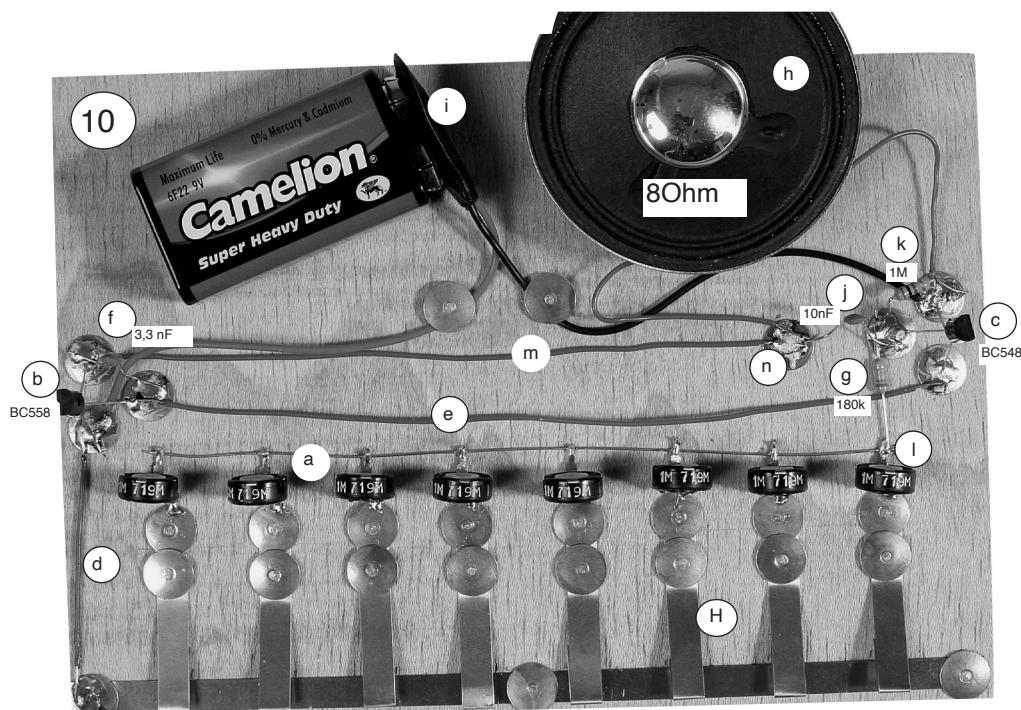
Connect together with a 130mm long cable with each other.

Starting at transistor BC558 © and ending at the last switch on the keyboard

Solder the loudspeaker –minus connection to the soldering point E on transistor BC548 and the plus connection to soldering point n ( h, Photo 10 )

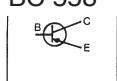
Battery clip (1) to the black cable connection (E) BC548 and the red cable to connection E on the transistor BC558.

Once the 9volt battery is connected the miniature electronic organ should work . To tune the keyboard adjust the individual capacitors with a small screwdriver.



BC 558

Transistor PNP BC 558



Emitter arrow is shown facing in towards the transistor  
Layout of the connections E, B and C

BC 548

BC548 Transistor NPN  
Layout of connections E, B and C

