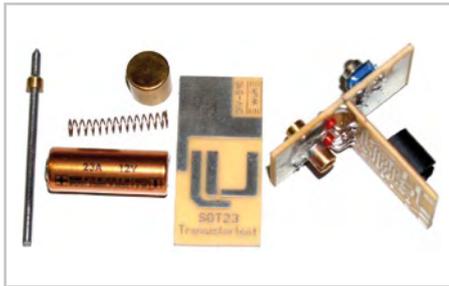


# SMD Transistor Tester

Ludwig Libertin (Austria)



The article 'SMD Soldering Aid' by Gert Baars in the December 2005 issue of *Elektor* [1] was the original inspiration for a truly 'electromechanical' version of this design for a transistor tester for SMD transistors in SOT23 case outline. However, Gert's strip metal construction method was not chosen and instead an alternative design was created out of strips of soldered PCB material. Glassfibre epoxy resin PCB material cannot compare with strip metal for springiness so the spring from a discarded ballpoint pen was used, which provides adequate clamping pressure. The key advantage of this choice of materials is that the TUT (transistor under test) is pressed hard onto three PCB tracks that lead directly to sockets into which a conventional transistor tester can be plugged. It really is this simple (without any soldering) to check whether the TUT is flaky or worth keeping for reuse.

The actual procedure for using this SMD transistor tester is no different from checking out transistors that have wire leads. In most cases all you are interested in is whether the TUT is dead or alive and also if it is of the NPN or PNP variety. This much you can discover with-

out the need to hook up an external transistor (and the extra bother).

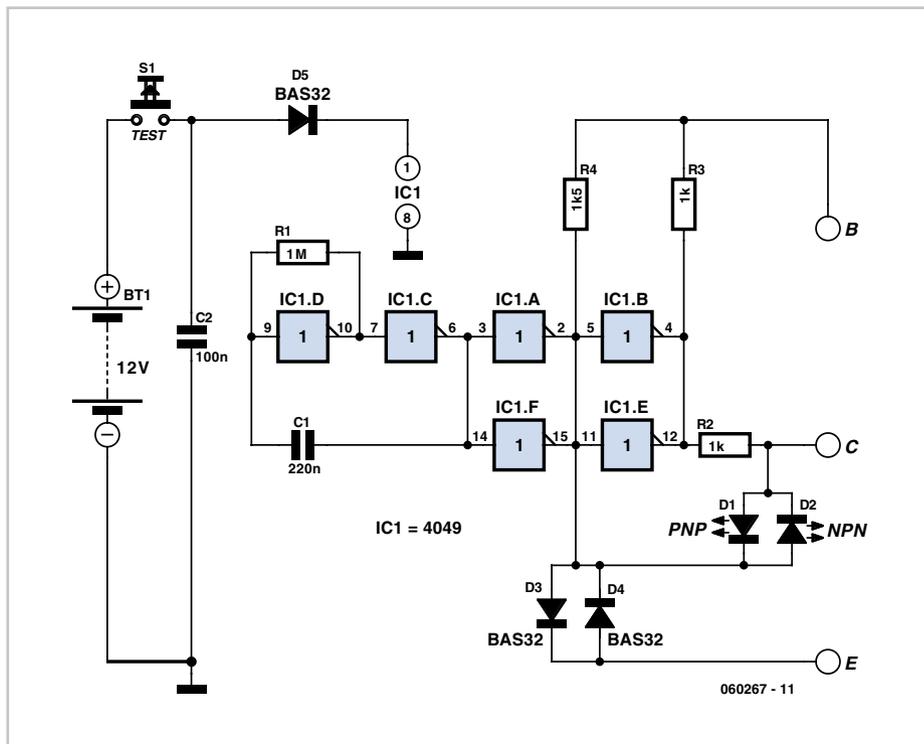
No sooner said than done. The result is a project that's equally useful as a simple 'test connector' hook-up for the TUT and as a simple transistor tester. The very minimalist circuit consists of a CD4049 (CMOS HEX inverter/buffer) and a few additional components — naturally all in SMD form factor. IC1.D and IC1.C together with R1 and C1 form a squarewave generator with a frequency of around 2 Hz. This drives inverters IC1.A and IC1.F (connected in parallel for higher output current),

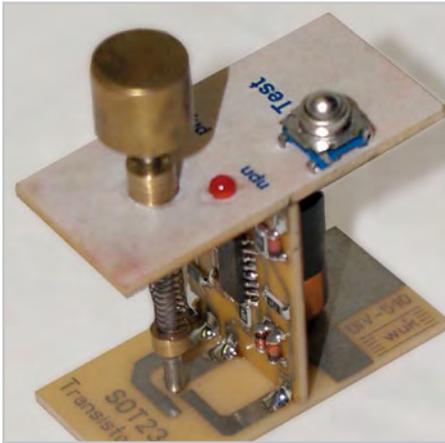
## Features

- Standalone SMD transistor tester
- Identifies defective transistors
- Distinguishes NPN from PNP

which in turn feed IC1.B and IC1.E. If no transistor under test is connected, LEDs D1 and D2 will both flash together in anti-phase and half the operating voltage will be present at base connection B.

Now insert a transistor in the test device:



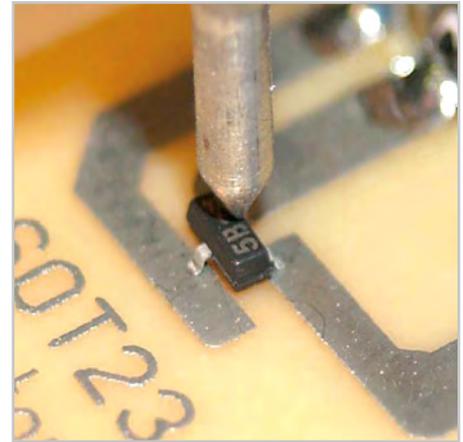


flashes. In similar fashion only D1 flashes for a PNP device. The circuit draws only 10 mA or so and using pushbutton S1 for operation means that the battery will have a very long life.

The type GP23A 12 V battery is an integral part of the mechanical structure and is clamped between the upper and lower printed circuit boards. A small section sawn from a piece of plastic pipe is used as a *de facto* battery clip glues to the vertical printed circuit board improves stability (2). The nail-like metal pin is passed through a small ring of brass soldered to the upper PCB. To simplify the task of replicating the PCBs the author has made the layout files of the three small PCBs available on the article's web page [2]. To use these you will not need the full version of the Sprint-Layout software, as you can open the files just as well with the free Viewer programme [3].

both LEDs flashing indicate an open circuit, in other words the transistor is defective. An internal short circuit (connection between C and E) is indicated by the two LEDs glowing dimly. A functional NPN transistor conducts only when the voltage on C is higher than on E. LED D1 is now short-circuited and only D2

(060267)



## Internet Links

- [1] [www.elektor.com/magazines/2005/december/smd-soldering-aid.57995.lynx](http://www.elektor.com/magazines/2005/december/smd-soldering-aid.57995.lynx)
- [2] [www.elektor.com/060267](http://www.elektor.com/060267)
- [3] [www.abacom-online.de/html/dateien/demos/splan-viewer60.exe](http://www.abacom-online.de/html/dateien/demos/splan-viewer60.exe)

## COMPONENT LIST

### Resistors

R1 = 1M $\Omega$   
 R2 = 1k $\Omega$   
 R3, R4 = 10k $\Omega$

### Capacitors

C1 = 220nF  
 C2 = 100nF

### Semiconductors

D1, D2 = LED, 3 mm  
 D3, D4 = BAS32  
 IC1 = 4049 (SO16)

### Miscellaneous

S1 = pushbutton, push to make  
 12 V battery GP23A  
 Mechanical parts as described  
 PCBs (see text)

