

**A universal adapter for curve tracers
for small signal transistors and leaded diodes**

Version: 21st April 2014, Author: Magnus Tölle

References:

- Tektronix 5CT1N Curve Tracer Instruction and Service Manual
- JEDEC standard for transistor outlines: <http://www.jedec.org/standards-documents/focus/registered-outlines-jep95/transistor-outlines-archive>

Parts list:

- 1 pcs. - ABS plastics enclosure, type 1551K, manufacturer Hammond
<http://www.hammondmfg.com/pdf/1551K.pdf>
- 1 pcs. - 28 pin-ZIF adapter, type 228-3345-00-0605, manufacturer: 3M Textool,
inexpensively available from surplus dealers
- 3 pcs. - 4mm/banana adapters
- 1 pcs - miniature switch 3PST, Miyama MS-500 series
- Plenty of ferrite beads, stranded wire in different colours
- Labels for a good-quality label printer

This basic adapter allows testing of common small-signal transistors and most diodes with curve tracers. The adapter is compatible with the following transistor packages:

- TO-5/-18
- TO-71/78
- TO-92
- TO-126
- TO-220

The adapter fits common curve tracers including the Tektronix 7CT1N/5CT1N plug-ins for the Tektronix 7000/5000-series oscilloscopes as well as other curve tracers such as the Heathkit model IT-1121 etc. Most curve tracers-adapters accommodate only one type of transistor package. However, I was after a more universal adapter, which shall allow tests of the most commonly found packages with minimum effort. ZIF/burn-in sockets for ICs in DIL-packages were expensive items back in their days, but they are inexpensively available these days (in 2014). I have read over some mechanical specifications from JEDEC, and found out that a common ZIF-socket shall accommodate most packages for small-signal transistors; with only a minimum of mechanical effort, i.e. for bending pins to fit.

For example, the JEDEC JEP92 standard specifies the pin-to-pin spacing for TO-92 packages between 1.15 mm and 1.39 mm (0.045/0.055 inches respectively) and all three pins aligned. The specifications for the TO-18 package for the pin-to-pin spacing are 1.27 mm (0.05 inches respectively), but with a vertical 1.27 mm offset for the middle pin. My thought was that a ZIF socket shall fit both packages, and even more... Also, fitting a standard TO-92 transistor with 1.27 mm spacing into a ZIF socket with 2.54 mm spacing shall be easily possible. I have evaluated this, and these tests have led to positive results, see the pictures below.

The adapter is electrically trivial, so schematics are not provided. All connections to the transistor pins CBE/DGS are wired in parallel, with ferrite beads to prevent or minimize unwanted oscillations.

A DREMEL tool with a new cutter was used to cut two rectangular holes to fit the two pin rows of the ZIF socket. I have hot glued the socket onto the housing. The housing is very small, so that the switch had to be mounted flat to fit. I would recommend a larger housing to allow a different mounting of the switch.

I was interested to see, if Teflon-washers would reduce the parasitic capacitance between the curve tracer connectors, but my simple tests have not confirmed this. The parasitic capacitance was found to be almost identical when measuring it with a simple LC-meter, see the pictures below.

I hope that this might inspire other owners of curve tracers / group members to build their own adapters.

Cheers,

Magnus



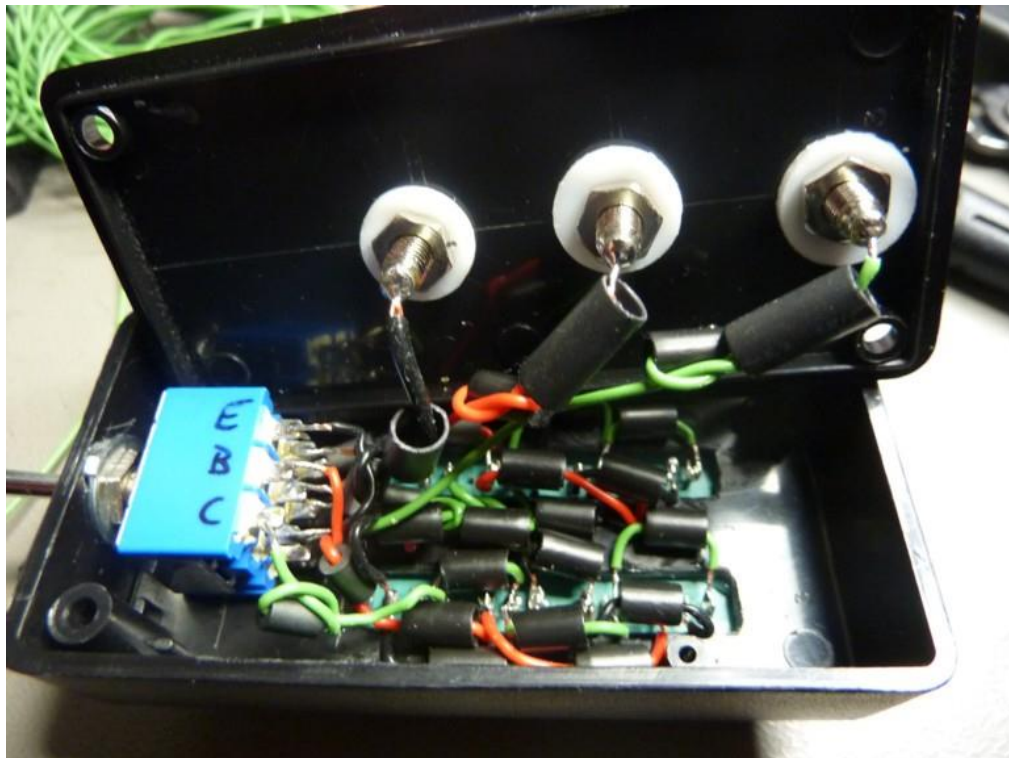
Picture 1: Dimensions pencilled in...



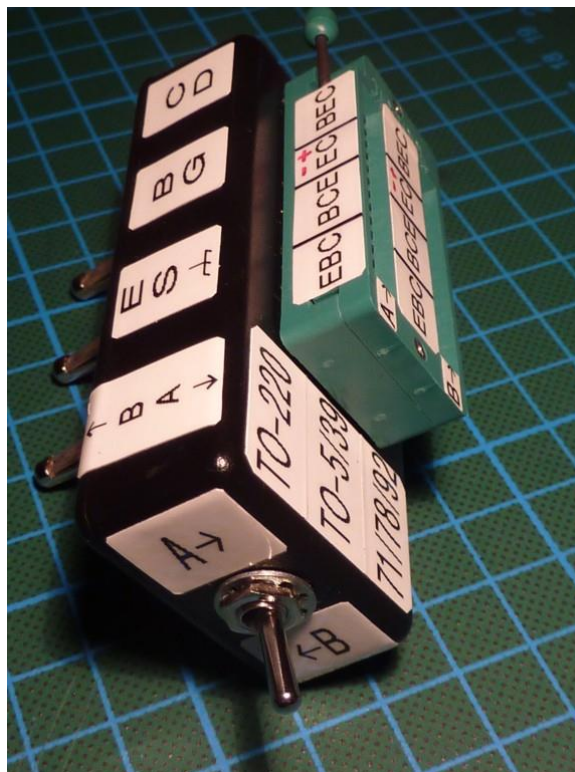
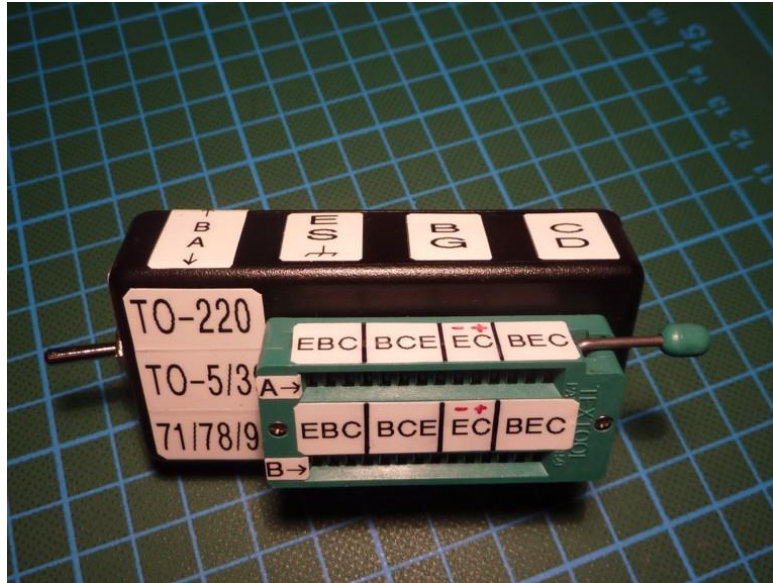
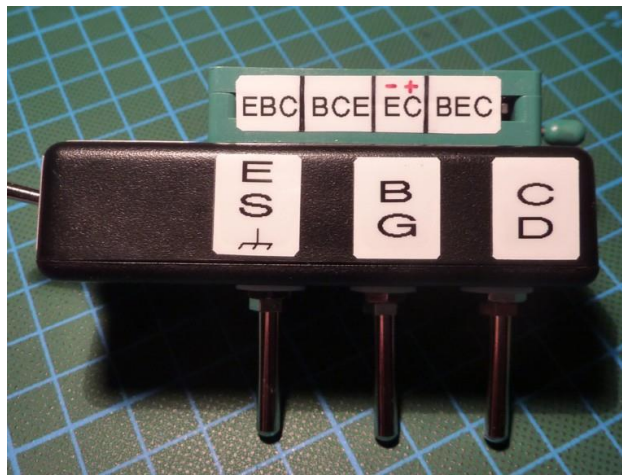
Picture 2: Enclosure ready for assembly



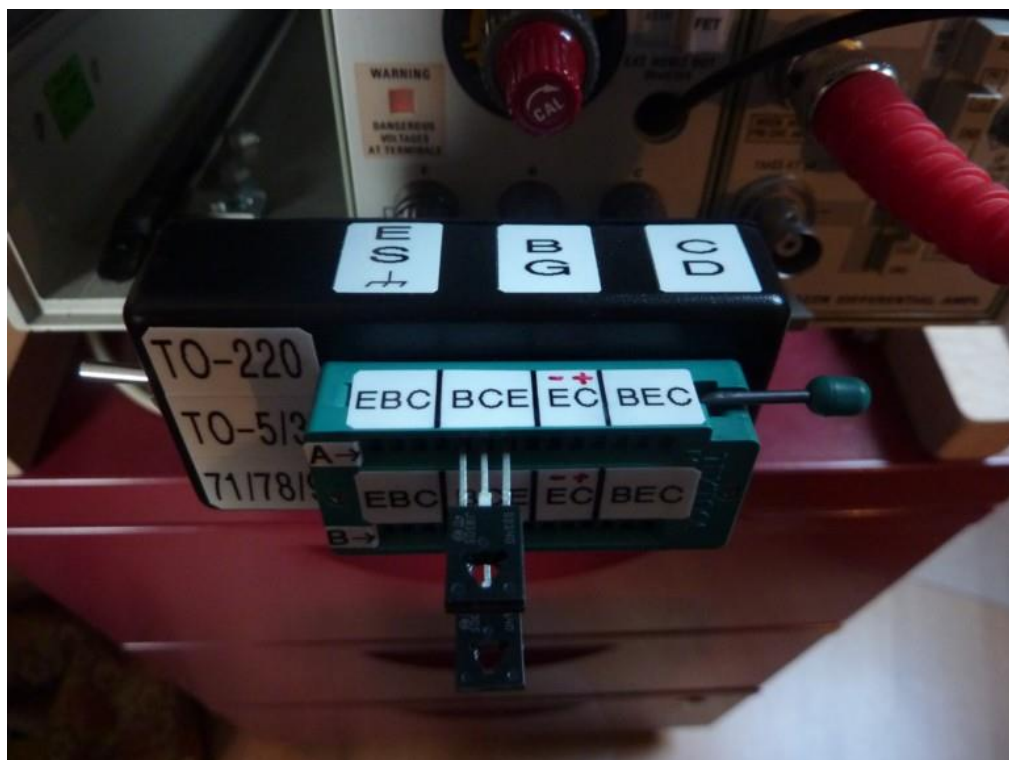
Pictures 3, 4: Testing Teflon-washers for parasitic capacitance – no improvement over standard steel washers and ABS plastics



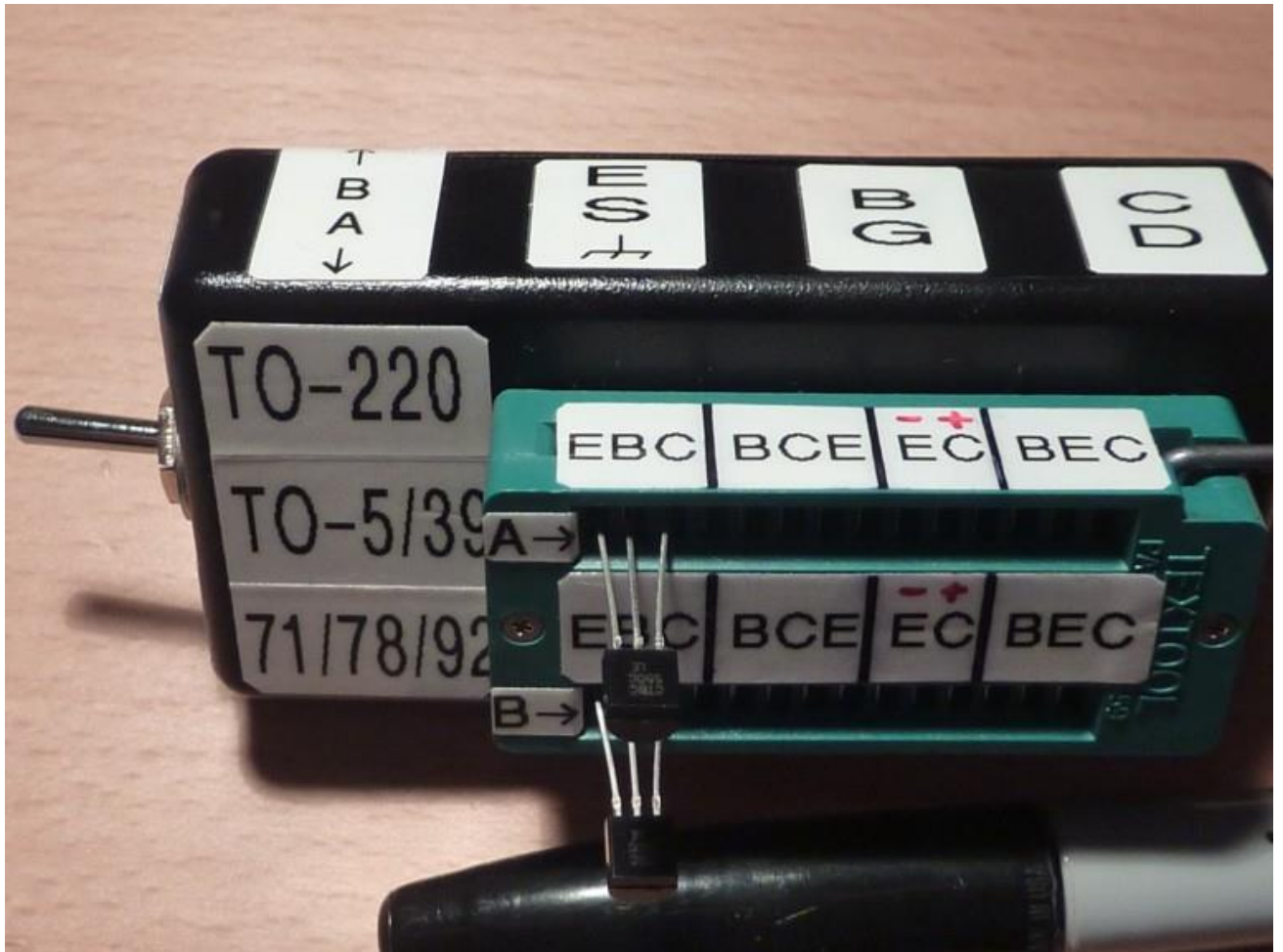
Picture 5: Finished wiring, a bit of a “rat’s nest”, but functional



Pictures 6, 7 and 8: The finished adapter, with multiple connections to fit the most common transistor pin-outs, and plenty of labels. The mounting orientation allows the use of the adapter with many different curve tracers



Pictures 9 and 10: Testing BD140 PNP-transistors in TO-126 housing with a 5CT1N curve tracer



Picture 11: Standard BC550 transistors with TO-92 package also fit...

Please note: No liability is accepted, and no warranty is given. **Warning:** Any repair may expose you to potentially lethal voltages. Use common sense and follow electrical safety rules and general guidelines. Remember that you are working at your own risk!