

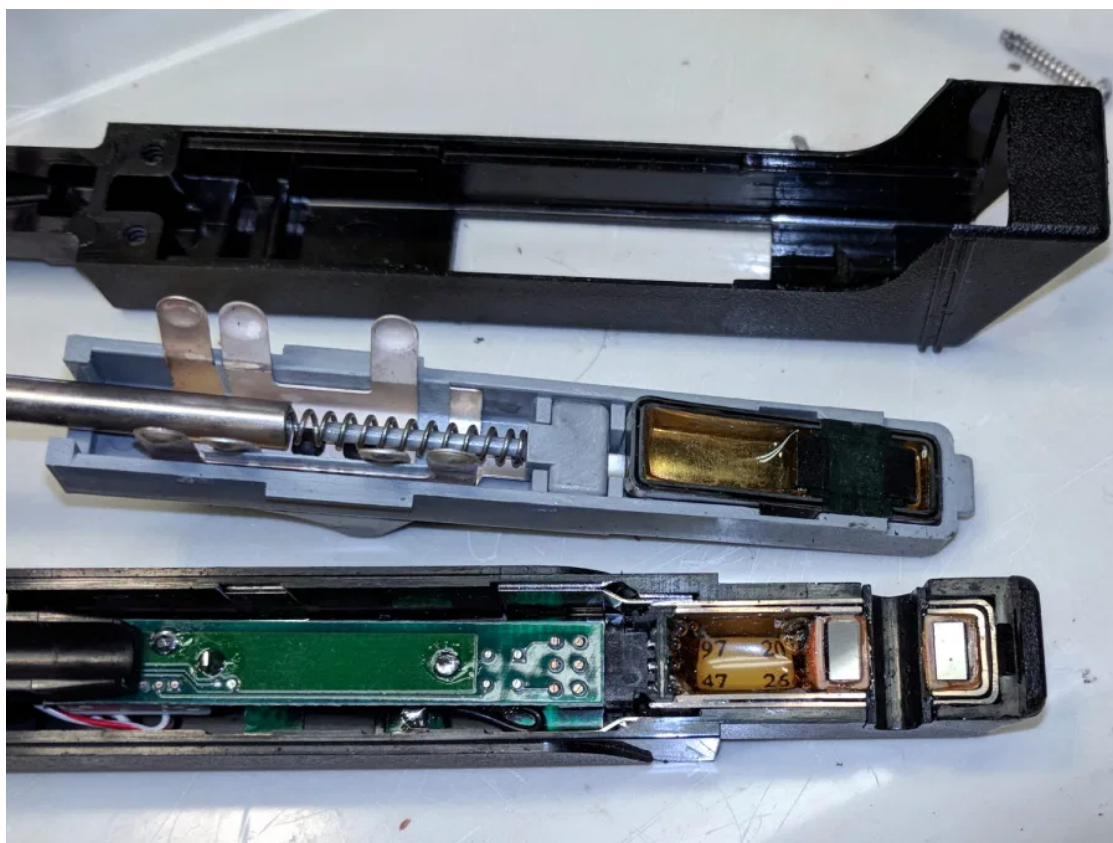
The Smell of Molten Projects in the Morning

ELECTRONICS WORKBENCH

Tek A6302 Current Probe: Offset Resistor Tweakage

A package deal of two Tektronix A6302 current probes arrived from eBay, with one probe having a small crack across its case (shown in the description and bought accordingly).

The other probe worked fine and was quite clean inside:

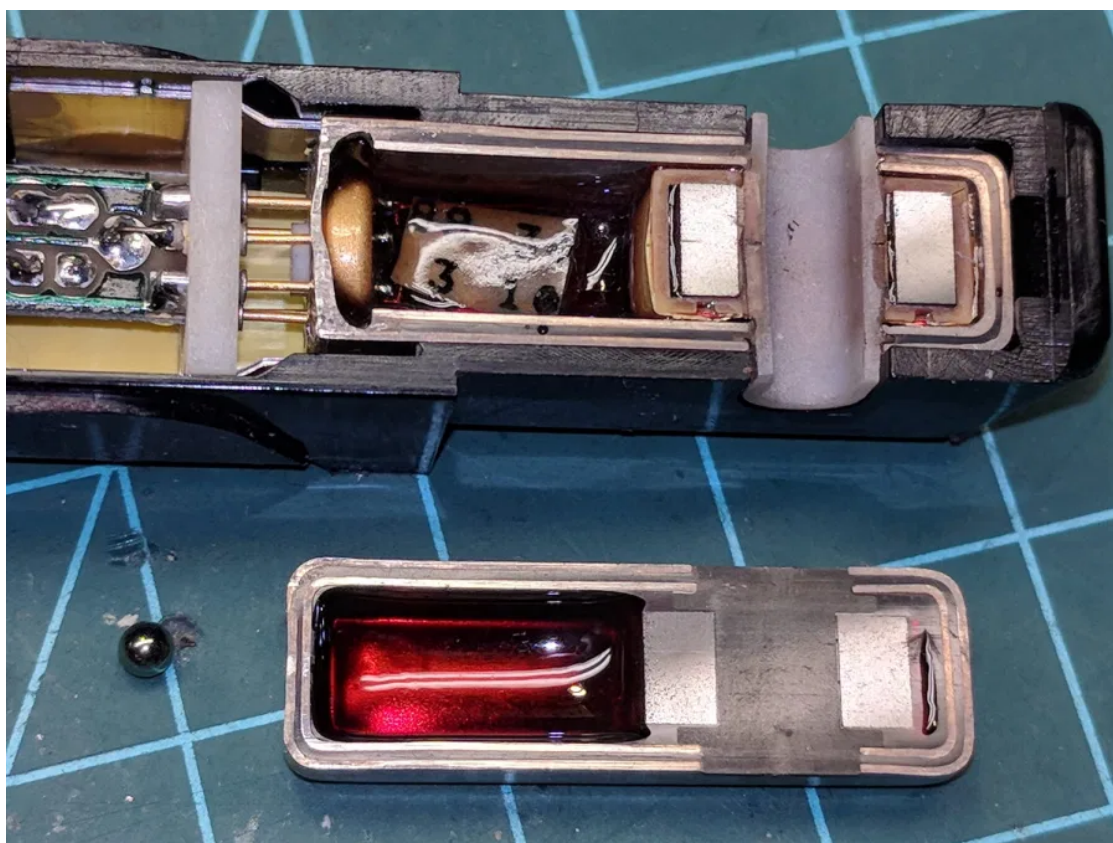


(https://softsolder.files.wordpress.com/2018/06/img_20180623_194157-a6302-b055461-major-sections.jpg).

A6302 B055461 – major sections

The cracked one couldn't be balanced, with the twiddlepot on the AM503 amp unable to bring the signal down to 0 V from a positive offset on any of the ranges.

The current transformer might have suffered some stress on the upper-left corner of the main part (in the probe body), but it doesn't have any obvious damage:



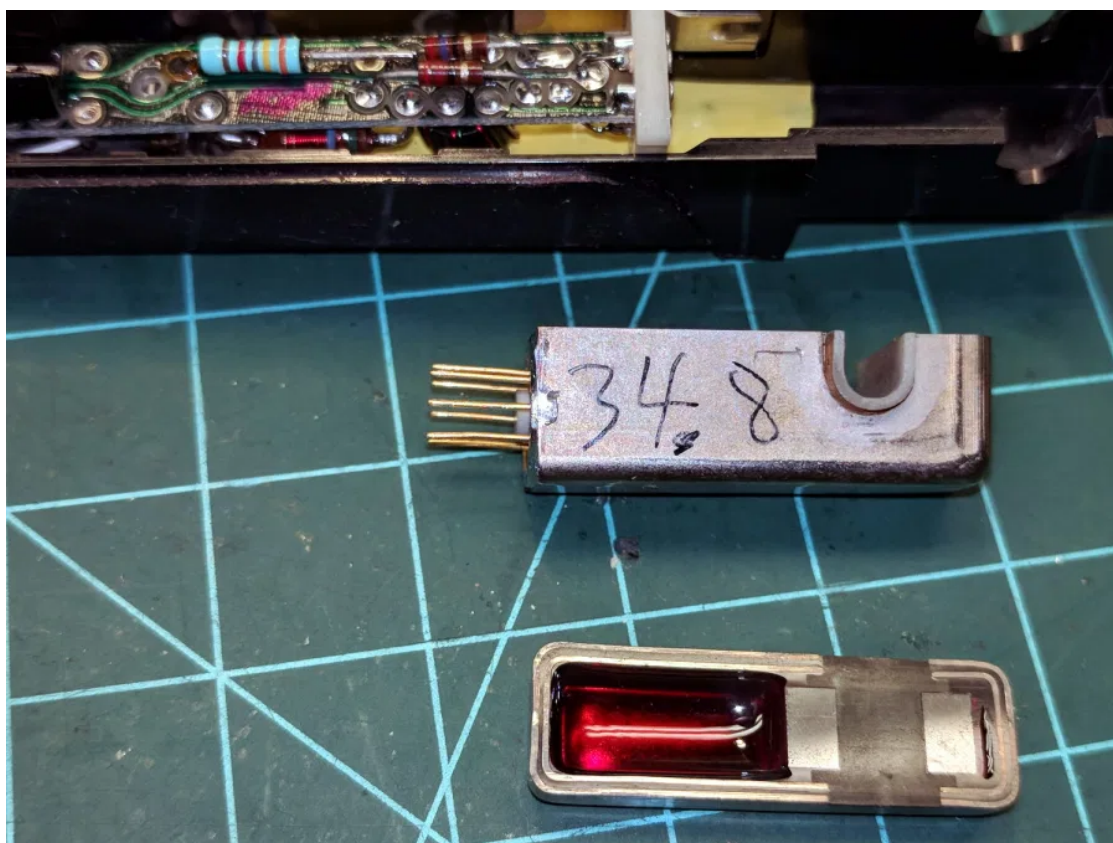
(https://softsolder.files.wordpress.com/2018/06/img_20180623_135447-a6302-b032444-ball-current-transformer-in-place.jpg).

A6302 B032444 – ball – current transformer in place

The small ball to the left of the transformer lid provides the slide detent; it's an ordinary $3/32 = 0.094$ inch bearing. Which, as it happens, is a Good Thing, because there's another one exactly like it somewhere in the litter under the Electronics Workbench.

Protip: follow the disassembly procedure in the instruction manual and do it over a towel or, at least, a shallow dish. You have been warned.

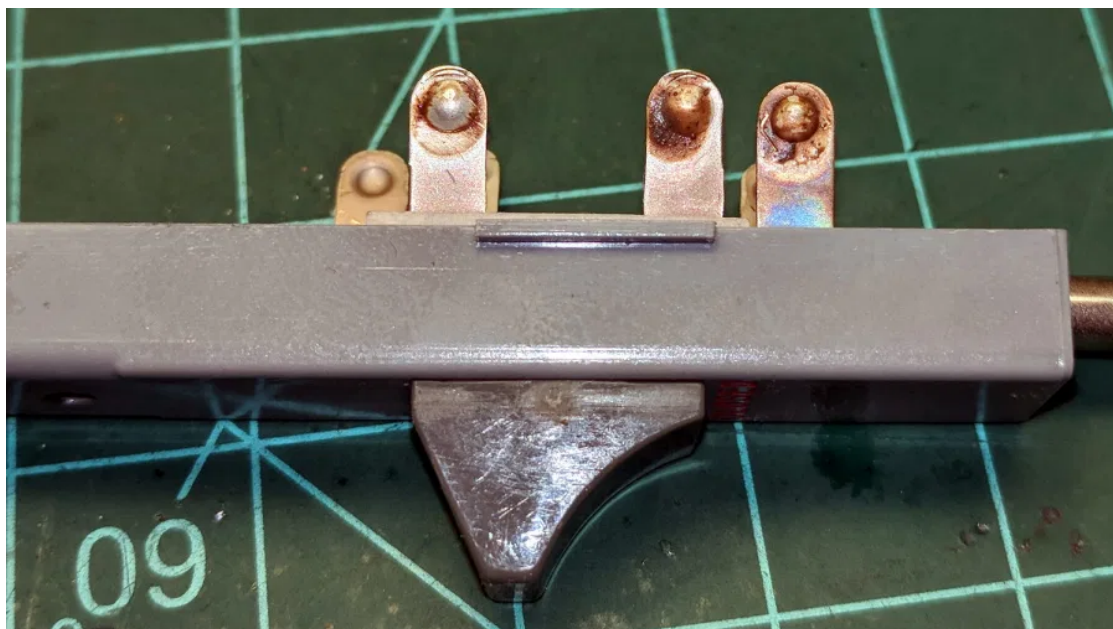
Extracting the transformer from the body revealed a numeric value I didn't recognize at the time:



(https://softsolder.files.wordpress.com/2018/06/img_20180623_135652-a6302-b032444-current-transformer.jpg).

A6302 B032444 – current transformer

The top slide contacts looked awful, but they're actually covered in semi-dried contact grease and cleaned up easily:



(https://softsolder.files.wordpress.com/2018/06/img_20180623_140146-a6302-b032444-slide-contacts.jpg).

A6302 B032444 – slide contacts

Swapping the “bad” transformer into the [P6302 probe I got a while ago](https://softsolder.com/2016/06/21/tektronix-am503-a6302-and-a6303-in-full-effect/) (<https://softsolder.com/2016/06/21/tektronix-am503-a6302-and-a6303-in-full-effect/>), showed it wouldn't balance, either, but the offset was far off into negative voltages. Putting the “good” transformer into the “bad” probe produced a similar too-positive offset. Conclusion: the transformer was probably good and Something Else was wrong.

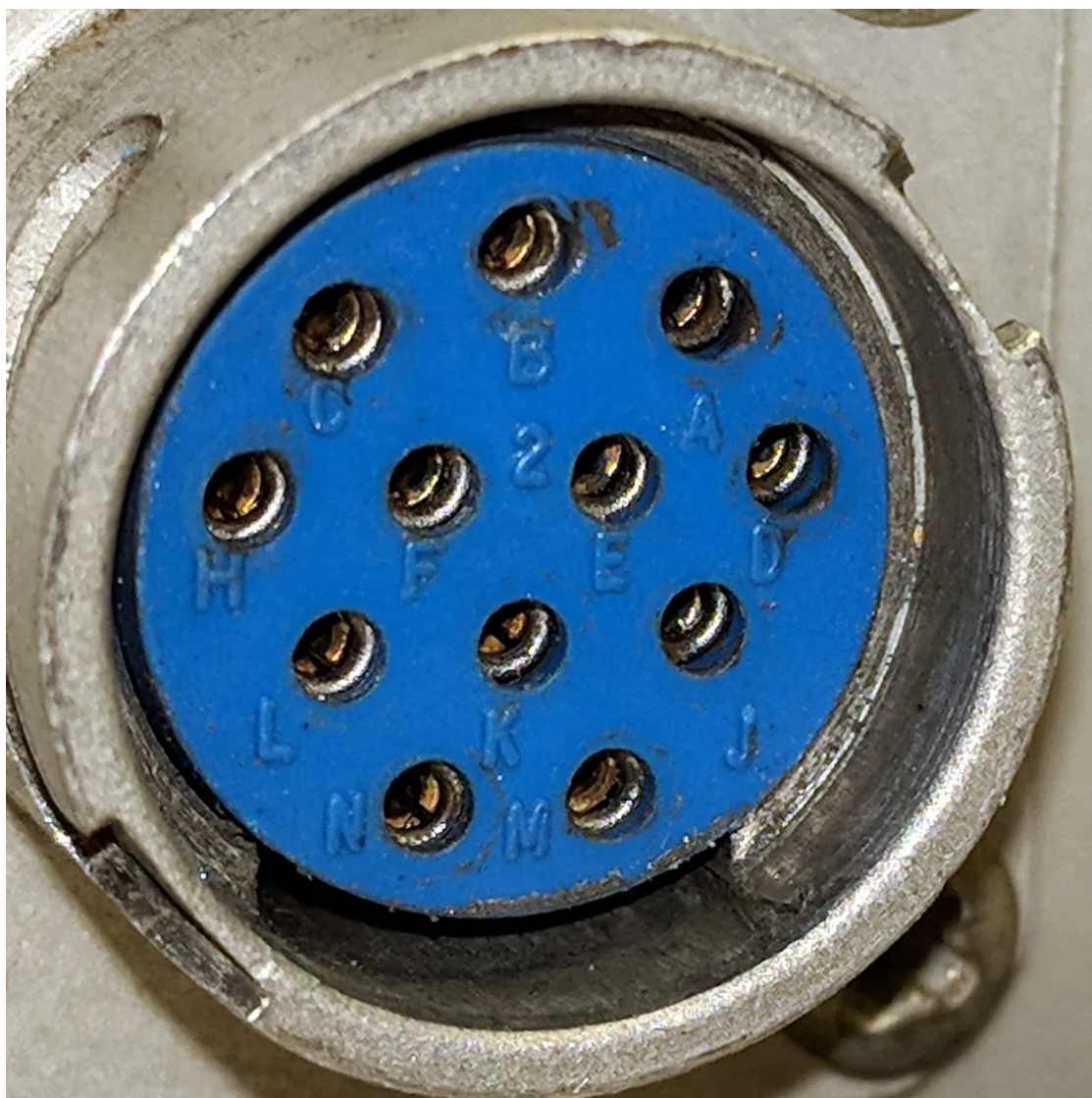
Spending more time with the manuals produced this hint in the AM503 Amplifier circuit description:

To cancel any offset from the Hall device, a portion of the Hall device dc bias voltage is applied through a selected resistor in the probe, via pin H of the INPUT connector and R102, to pin 2 of U110.

(<https://softsolder.files.wordpress.com/2018/06/am503-manual-hall-offset-probe-resistor-selection.png>)

AM503 manual – Hall offset – probe resistor selection

Fortunately, the AM503 probe connector has pin labels:



(https://softsolder.files.wordpress.com/2018/06/img_20180625_160504-tek-am503-amplifier-probe-connector-pin-id.jpg)

Tek AM503 Amplifier – Probe Connector – pin ID

Note the absence of pins G and I, probably to eliminate any confusion with “ground” and “one”, respectively.

Continuity checking reveals the left end of the 34.8 k Ω resistor connects to pin H:

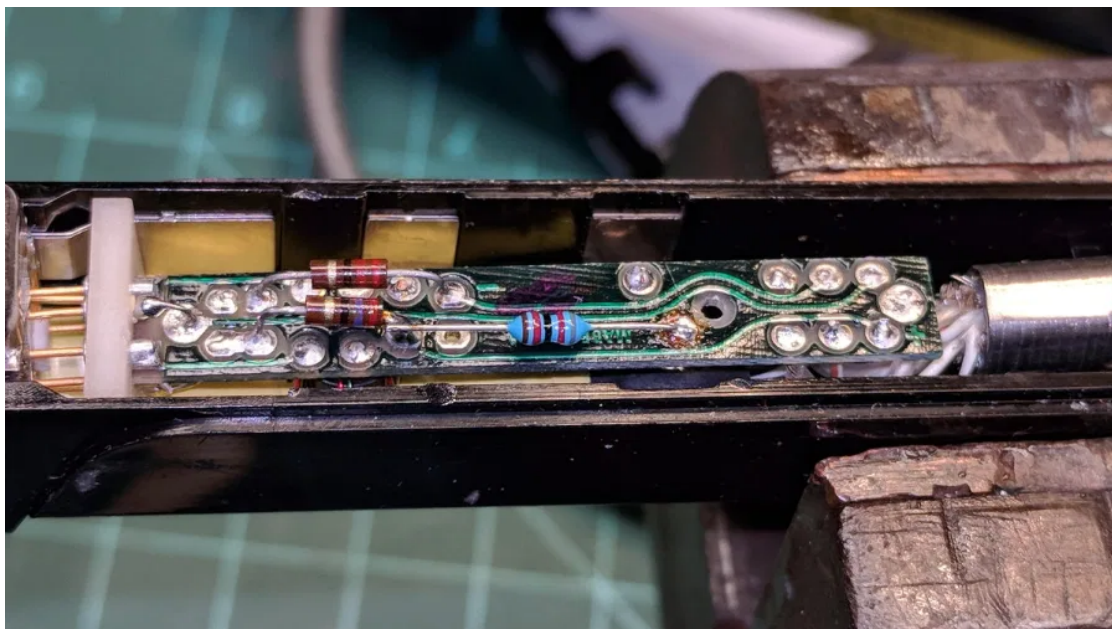


(https://softsolder.files.wordpress.com/2018/06/img_20180625_152610-a6302-b032444-pcb-34-8k-offset-r.jpg).

A6302 B032444 – PCB 34.8k offset R

Huh. Even a blind pig occasionally finds a truffle: where have we seen *that* value before? Apparently Tek measured each transformer / Hall sensor and wrote the appropriate offset resistor value exactly where it'd do the most good (<https://softsolder.com/2009/11/26/write-down-what-you-learn-where-youll-need-it/>).

Although I don't pretend to know *why* the transformer offset has changed, if Tek can select a resistor to correct the offset, so can I:

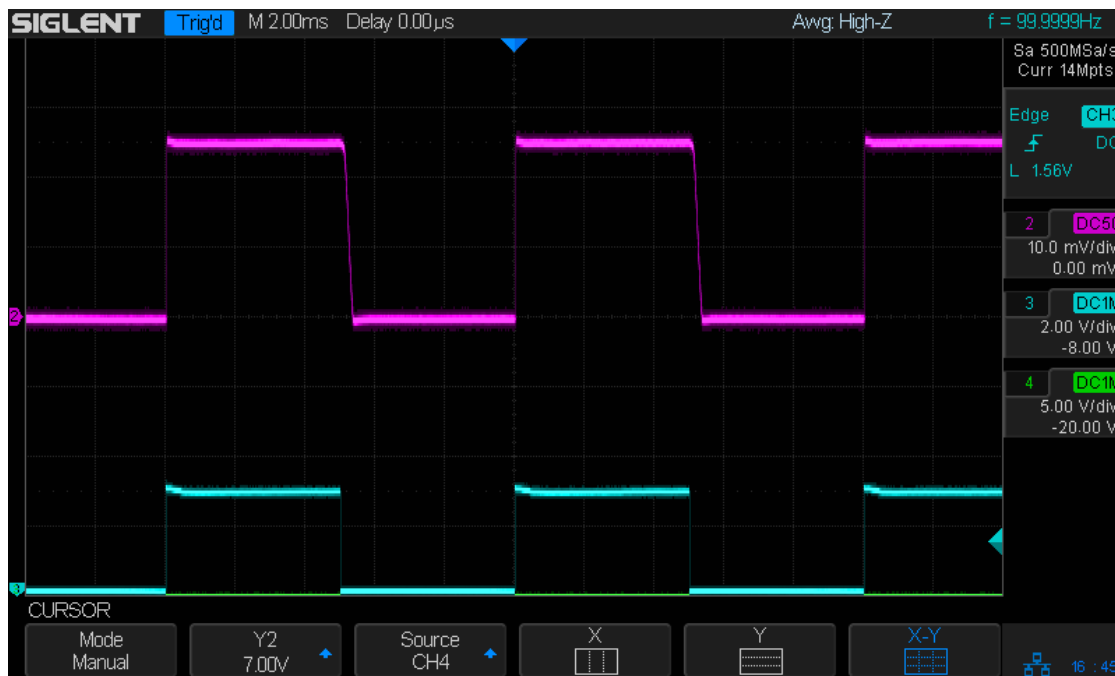


(https://softsolder.files.wordpress.com/2018/06/img_20180625_163731-a6302-b032444-pcb-tweaked-82k-offset-r.jpg).

A6302 B032444 – PCB – tweaked 82k offset R

The 82 kΩ value roughly centers the offset twiddlepot span around 0 V; it’s the result of a binary search through the resistor drawers, rather than a complex calculation.

With the resistor in place and the probe reassembled in reverse order, everything works the way it should:

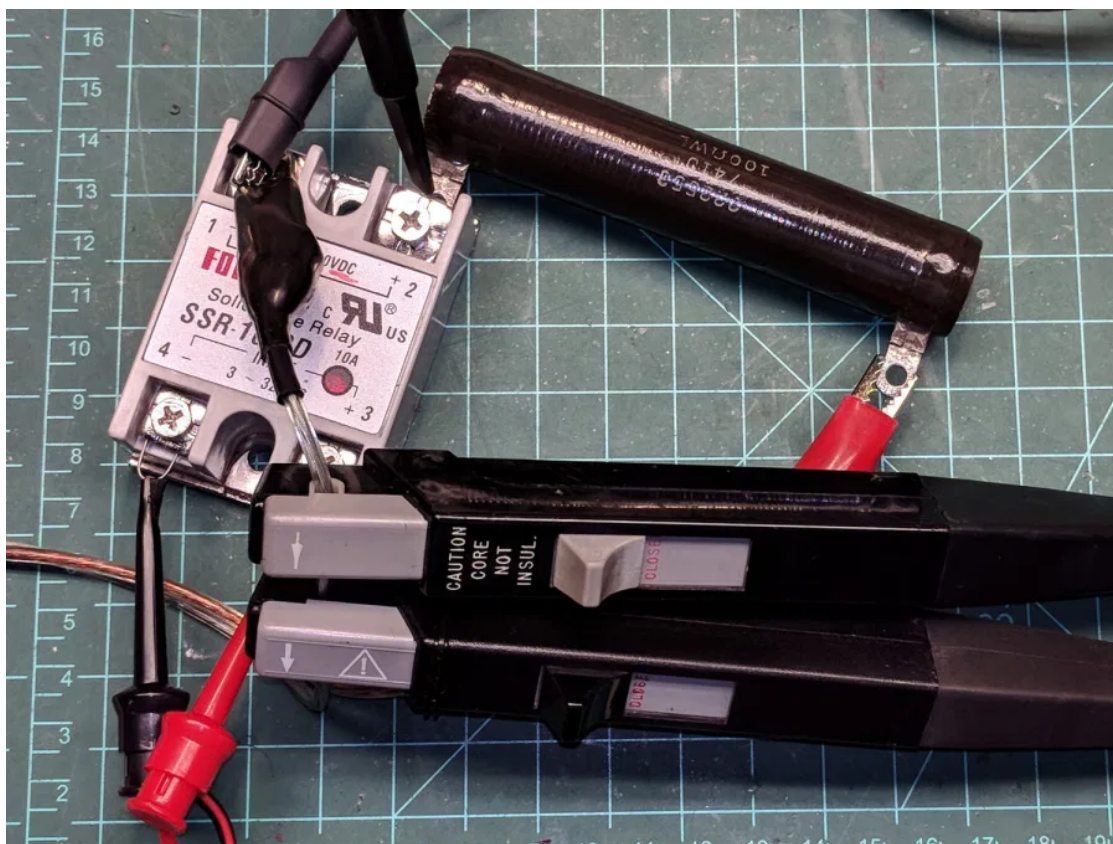


(<https://softsolder.files.wordpress.com/2018/06/tek-a6302-82k-ohm-offset-50-ma.png>)

Tek A6302 – 82k ohm offset – 50 mA

The lower trace is a square wave from the scope’s arb waveform generator into a (likely counterfeit) Fotek DC-DC solid-state relay, with the bench supply dialed to 5.7 V to put 5 V across a hulking 100 Ω power resistor, thus 50 mA through the probe. The purple trace comes from the repaired probe, with the

other one turned off for pedagogic purposes:



(https://softsolder.files.wordpress.com/2018/06/img_20180625_100925-tek-a6302-calibration-setup.jpg).

Tek A6302 Calibration Setup

That wasn't easy, but seems to solve the problem.

Dang, I loves me some good Tek current probe action ...

2018-07-192018-11-14 / Repairs

4 thoughts on “Tek A6302 Current Probe: Offset Resistor Tweakage”

1. EricMyers47 says:

2018-07-19 at 11:56

Did you erase the 34.8 written on the side and replace it with 82.0? If not, the job's not done.

Ed says:

2018-07-19 at 14:52

Well played, sir!

Does it count if I tucked the original resistor inside the probe? [grin]

2. Pingback: [Tek A6302 Current Probe: Reason for Being | The Smell of Molten Projects in the Morning](#)
3. Pingback: [Tektronix A503 Current Probe Amplifier: DC Level Fix | The Smell of Molten Projects in the Morning](#)

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