

Miniature Hi-Z scope Probe Notes

Probe is useful as a scope probe, 1001:1 divider, 7KV rating, 1Gohm 1% input. Designed for Tektronix 7A26 input set for DC coupling **ONLY**.

**** WARNING ****

Plugin AC coupling capacitor will be subjected to probe input voltage if AC coupling is used; the input plugin resistance completes the high voltage circuit on DC coupling.

Made from a B&K TL-1 multimeter test lead (plastic body 5.0" long, about 3/8" tapered diameter).

Carefully pull metal probe out of body, then unsolder wire, leaving the solder hole free of solder for later needs.

An Ohmite Mini-Mox MOX1125231007 1,000 Megohm resistor is used inside the probe handle, soldered to the probe tip on one end. The resistor is rated at 7.5KV; I de-rated the probe to 7KV for safety. The leads are cut to about 1/4 inch long and shrink tubing is cut to the length of the resistor and shrunk on using the lowest possible temperature, about 100C. The shrink adds protective insulation.

The probe body inside must be enlarged with a #15 (0.180") drill, carefully working from both ends, keeping the hole straight and centered.

A Jameco 111482 is a six-foot RG175/U cable with BNC connectors on both ends. I cut it in half for this probe, so the compensation scheme was empirically derived with only three feet of coax.

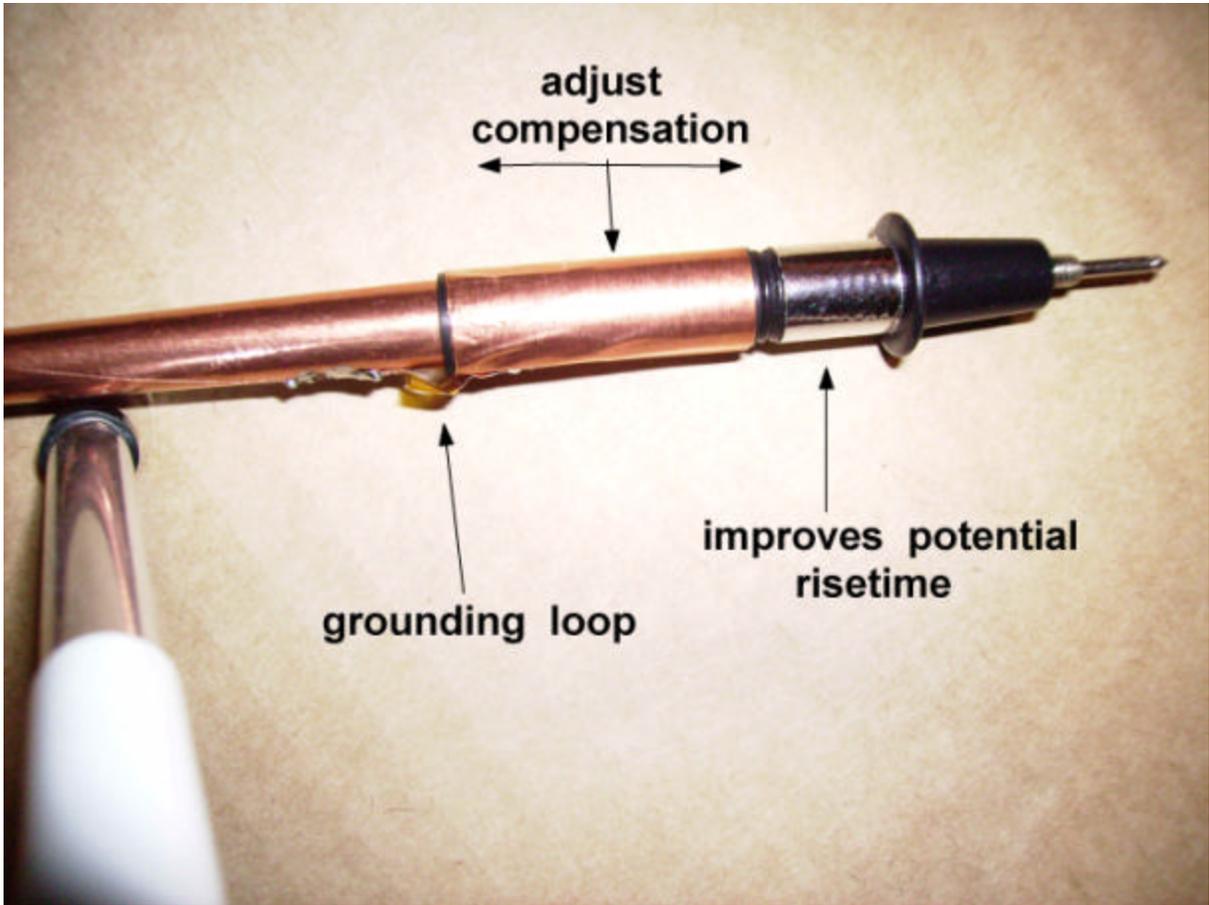
Three inches of the outer insulation of the coax is carefully removed and the center conductor is teased out at the insulation end, so that a three-inch grounding strap is available for use. Lay back this strap with minimal addition of coax thickness, and use a short piece of shrink tubing for protection. The resulting diameter should just fit into the enlarged hole of the test probe.

To accurately cut and strip the RG174/U coax, place the probe tip-resistor combination along the side of the probe body, and align the resistor end of the probe tip to the large diameter safety guard. Then place the stripped coax inner conductor so that the short piece of the shrink is near the handle end of the probe body, about 1/8" to 1/4" toward the probe tip end. This gives a visual tip for trimming and stripping the exposed inner coax conductor for later soldering to the resistor end.

Slip a 1.25-inch long 3/8" diameter shrink tube onto the RG174/U coax cable; this will not be heated because it will become part of a variable capacitor. Then insert the coax cable all the way thru the probe handle for soldering to the resistor. Carefully pull coax and push probe-resistor combination so that the whole assembly is completely inside the probe body.

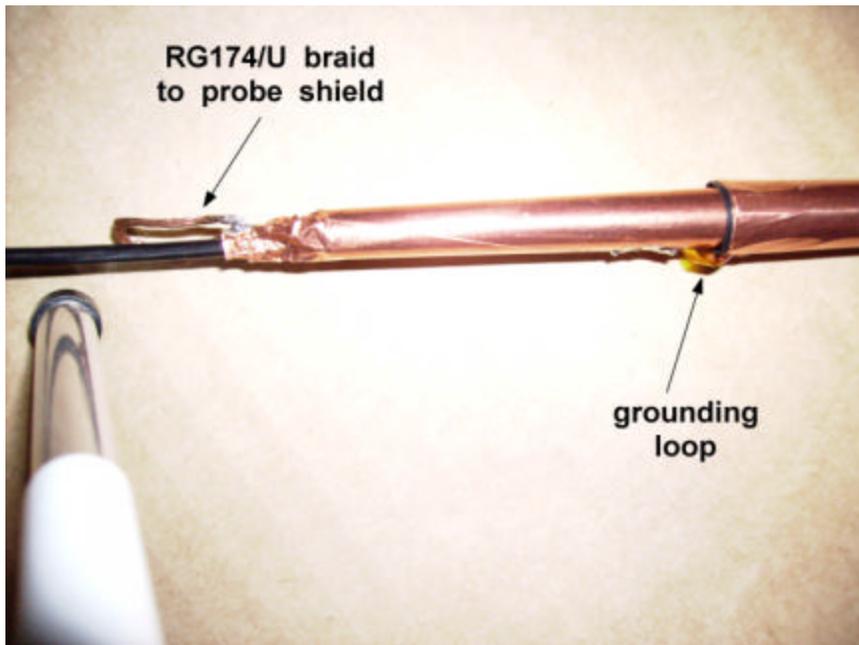
Place a one-half inch wide adhesive backed metallic foil strip right behind the large diameter safety guard. I used a strip of aluminum tape, since it was available and pre-cut to width. Smooth 1.25" wide adhesive-lined copper has been found in rolls in garden centers and used for snail abatement.

See photo Probe-1.jpg on next page.



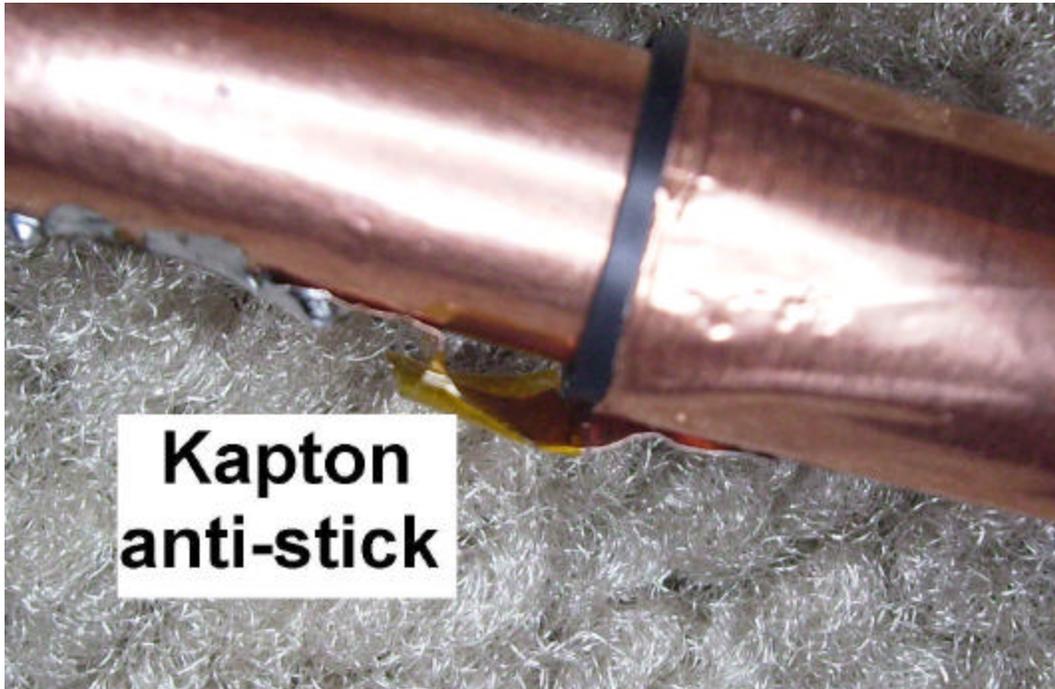
Probe-1.jpg

Cut a three-inch long strip of 1.25" wide adhesive-lined copper and wrap it around the probe body using a slight angle so that the probe-end is reasonably straight. Make sure about one-half an inch goes beyond the body for compression and soldering to the coax grounding strap as seen in photo Probe-2.jpg below.



Probe-2.jpg

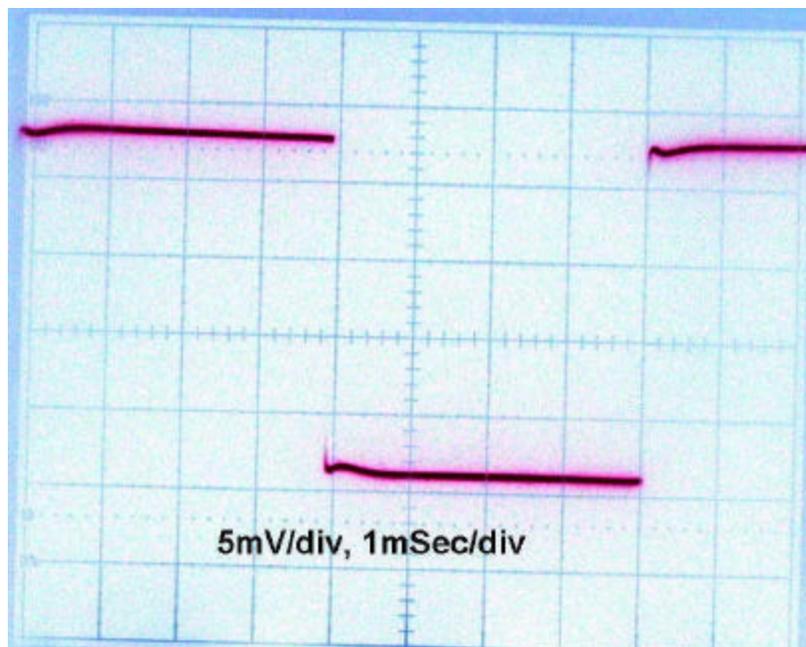
Now move the 3/8" shrink toward the large diameter safety guard and wrap an adhesive-lined copper strip around the shrink. Slide this adjustable gimmick capacitor toward the probe tip, leaving a gap of about one rib. Make a narrow grounding strap for interconnection, and use Kapton™ or other high-temperature insulator to stick onto the back to prevent sticking in the future. Solder to the two conductors as shown in close-up photo Probe-3.jpg below.



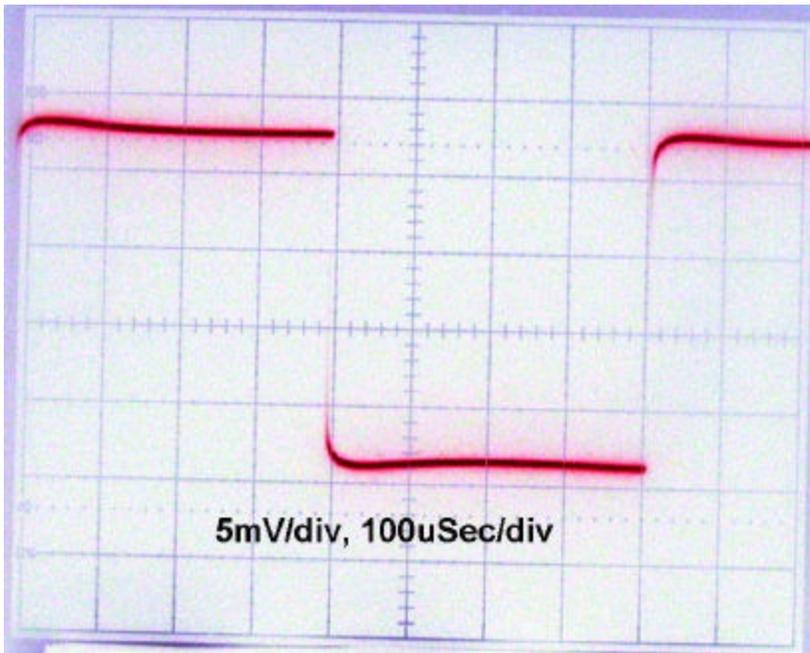
Probe-3.jpg

Adjustment for "optimum" waveform is via sliding the gimmick as shown in photo Probe-1.jpg to about two full ribs away from the isolated ring at the large diameter safety guard.

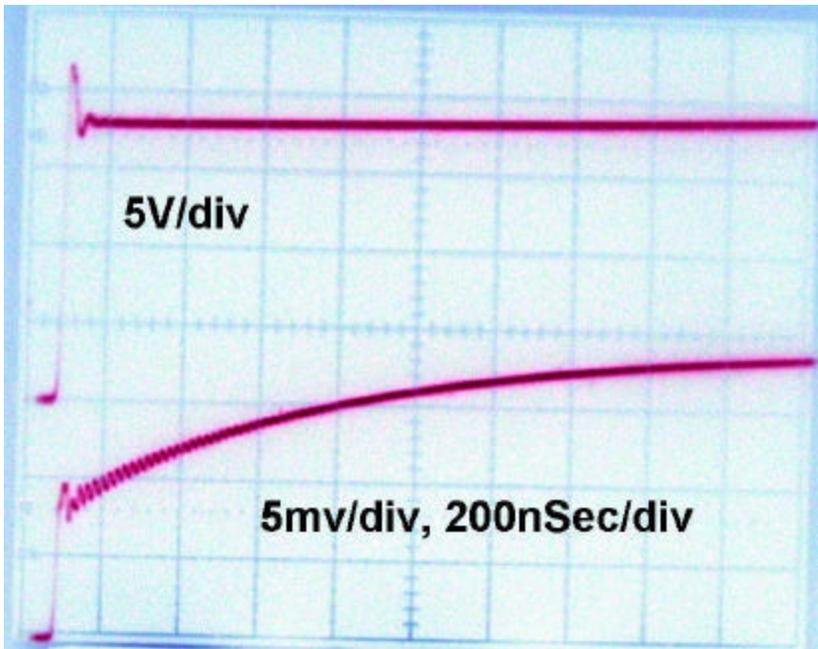
Waveforms seen are shown in photos Probe1Gohm-1.jpg thru Probe1Gohm-4.jpg below.



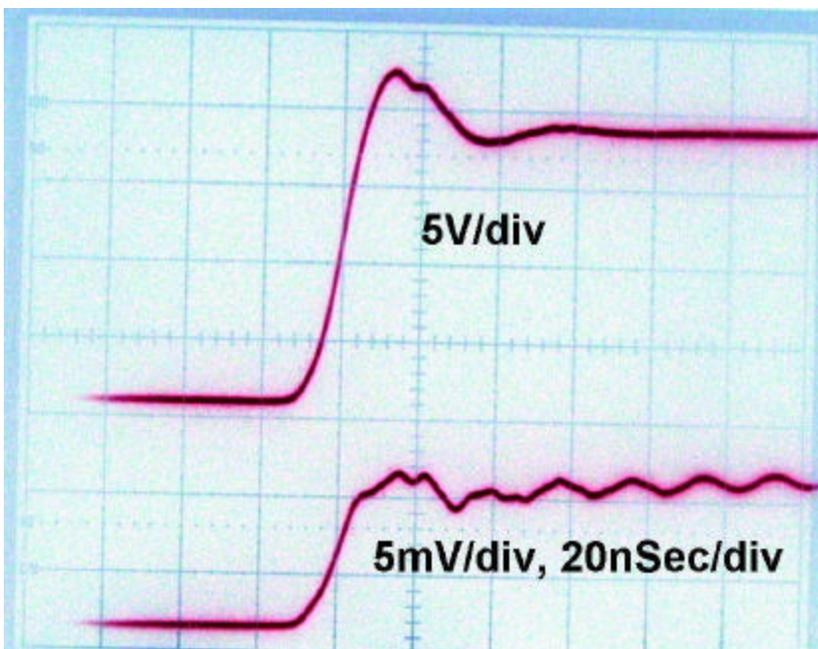
Probe1Gohm-1.jpg



Probe1Gohm-2.jpg



Probe1Gohm-3.jpg



Probe1Gohm-4.jpg

Signal used was 20V square wave from an HP3312A and viewed with a Tektronix 7A26 input set for DC coupling **ONLY**.

Top trace in photos ProbelGohm-3.jpg and ProbelGohm-4.jpg show the input waveform; overshoot due to unterminated 50-ohm generator.

***NOTES:**

It is believed that at least an order of magnitude improvement in the output waveform of this probe is possible by using a complex R-C "termination" scheme similar to that used for the Tektronix P6015 high voltage probe.