

Making the Ultimate 'Back Probe' Tool

Introduction:

Time is money- For any vehicle diagnostic work it is vital to have a quick, reliable method of testing electrical circuits that doesn't pierce the wiring or damage the connectors. It's not acceptable to compromise weather sealing protection in the harsh automotive environment.

The best method is 'back probing' connectors to perform your test measurements.



Aim:

To show you how to make cheap and simple 'back probe' tools that are superior to nearly all the commercial products.

This design evolved through years of professional experience and experimenting with commercial and home made probes. They can be made in batches and take about 5-10 minutes to make.

Why make them:

What's wrong with most commercial probes (or paper clips)?

- They often need an alligator clip to be attached, this leads to poor connection when the engine is running and vibrating. These use a direct banana plug connection.
- They are cheap to make at approximately \$2 each, no need to cry when you lose them or have to bend them into unusual shapes.
- They are highly flexible to slide down past the wires and make positive contact with the actual terminals.



- The small diameter wire will slip into even the highest density connector shells and you can use even finer wire if required.
- Small body (especially if 'shrink' covered and not re-using the banana shell) allows use in tight areas and for probing pins that are extremely close together without the probes interfering with each other.

Materials:

Spring steel wire-

Also called piano or music wire. Available from nearly all model shops in various diameters, they often make model parts such as landing gear from it.

I suggest 0.025" diameter as a compromise between strength and flexibility. 0.015" can be also used to make a few for special fine applications.

Banana plugs-

The ones you need are part numbers P9280 to P9284 (Colour choice is irrelevant) from Altronics, www.Altronics.com.au. They have a centre screw to secure the wire and when modified as shown only a shallow hole needs drilling.

Glue shrink (optional, for a minimal diameter probe)-

Heat shrink with a meltable glue lining, available from Altronics. Diameter of about 8 - 10mm, it must be able to slide over the terminal as shown later (best to test). Standard heat shrink could be used but glue shrink is more durable and insulates better.

Steps:

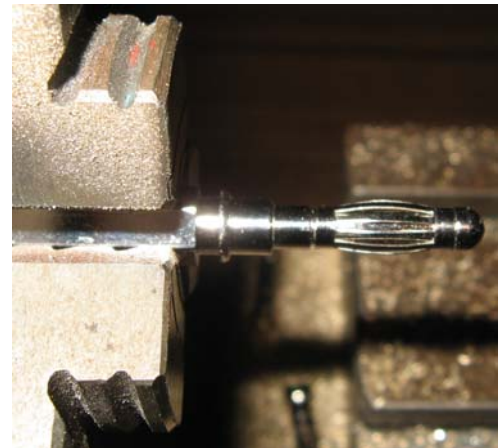


Push the insides out of the banana plug by standing on its tip and tapping the plastic (open end) with a small hammer.

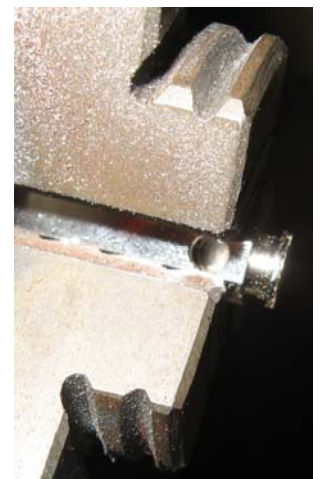
Remove centre screw so doesn't vibrate loose, don't lose it.

Mount the plugs metal centre in a lathe.

Note: the next few steps could be done with a vice and hand drill if absolutely necessary but you would need to be careful drilling the small hole not to break drill bits!



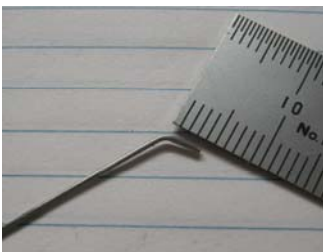
Hacksaw off the plugs end hard up against the small ridge shown, this will leave minimal material to drill through for inserting the probe wire.



File the end square so the drill doesn't run off centre in the next step.



Drill a small hole (about 1mm diameter) until breaks through into the plugs cavity, I found a small centre drill (1.2mm) was all I needed and was strong so no breakages occurred when making large numbers of probes quickly.



Cut about a 60mm length of spring steel wire.

Roughen / clean about 10mm of one end with approx 240 grade wet and dry or equivalent emery paper, this is to ensure that the solder adheres successfully.

Bend about 3mm of the roughened wire end at about 45° angle; this will help it be captured by the internal screw.



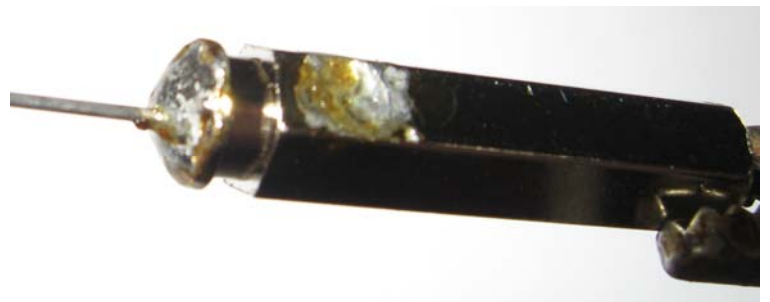
Inset the bent wire into the modified banana plugs drilled end, insert the screw and tighten extremely tight. Bend the protruding probe wire until it's approximately straight with plug body as below.



Hold the assembly in clamp such as an alligator clip, using a vice or other large device will make soldering harder as heat will be 'drawn away' from plug when soldering.

Insert soldering iron tip into the side hole and patiently hold whilst the plug heats up sufficiently. Feed solder into fill the hole when ready to flow. Next apply solder to the cut off end to further secure the wire.

I find the best approach with these materials is to use a tiny amount of 'acid core' solder first to tin the wire and surface, then follow up with normal 60/40 solder (perhaps a suitable flux applied would also help if 'acid core' solder is not available). Experiment with a small piece of roughened wire first to check solder adherence.

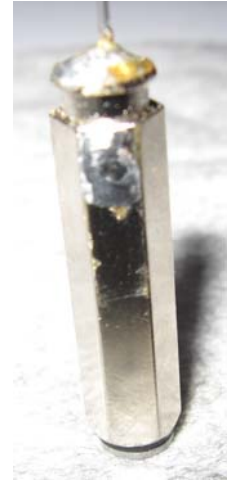


DIY Automotive Test Probes



Note: The following application of a 'glue shrink' cover is only necessary if you want a minimal diameter. You can always just re-insert the probe back into the plastic banana plug casing!

Stand the probe upright on a small spacer screw, this gives enough 'overhang' of the glue shrink to fold under when heated and provide insulation for the probes end area. I used a 3mm allen bolt with the head ground down to 1.5mm thick (therefore 1.5mm of overhang created)



Push a 33mm length of glue shrink down over the probe with the spacer screw inserted.

Shrink the top section around the wire with a heat gun flame; I use a small propane torch.



or



Pick up the probe to allow the spacer screw to fall free and then shrink the rest of the glue shrink.



Trim the wire so the whole probe is about 75mm long and grind a point on the wires end.

Enjoy,
Darren Todd.

