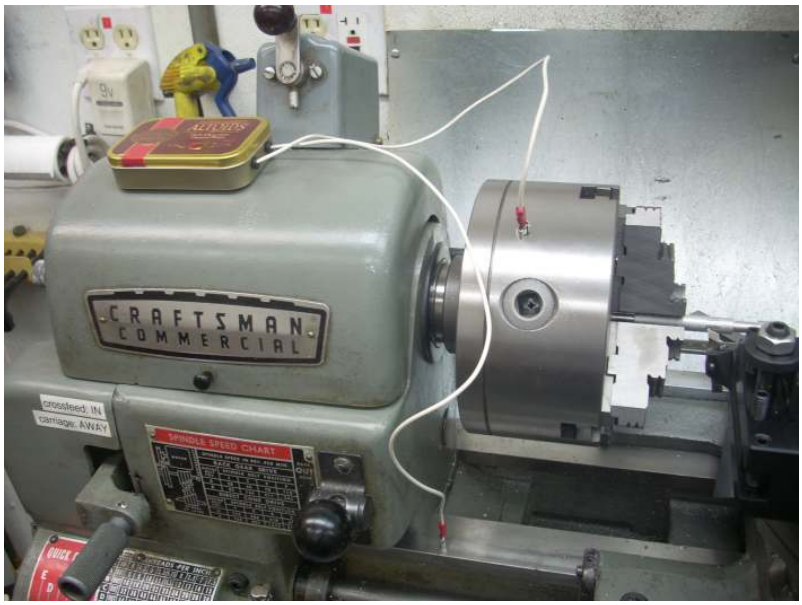
An Ultra Low Tech, Low Cost Electronic Edge Finder

By R. G. Sparber



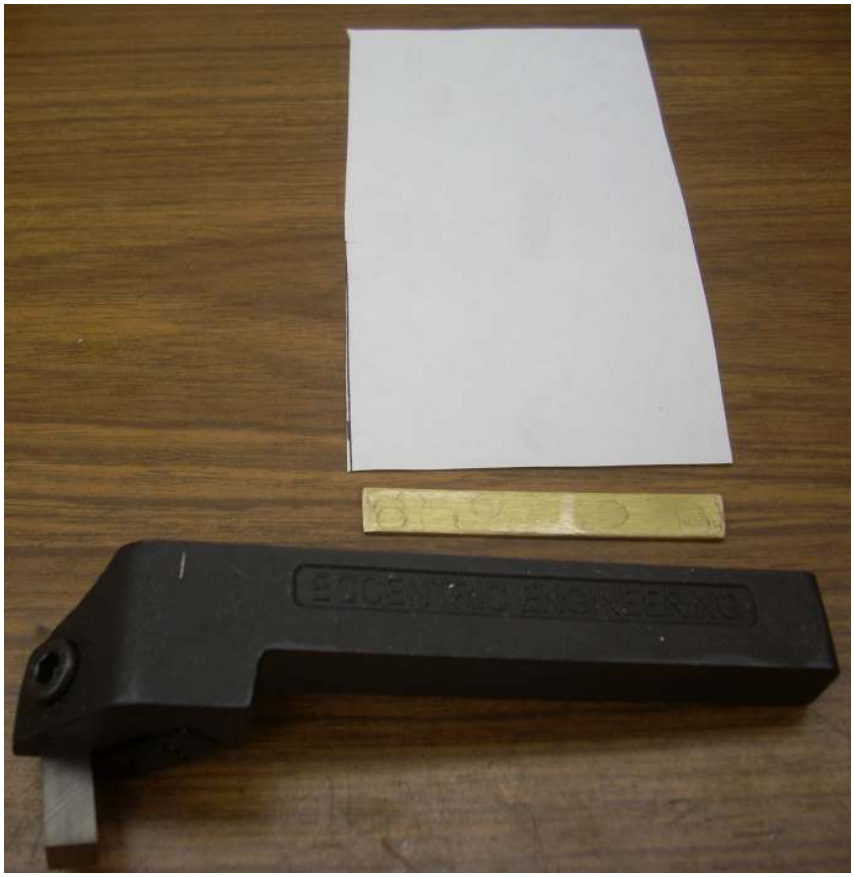
Recently I developed an Electronic Edge Finder that would work on both my mill and lathe. It was able to detect the difference between the resistance from cutter to work piece as it touched down. This required the circuit to detect when the resistance dropped from above 2 ohms to below 2 ohms. Most continuity detectors cannot do this.

The problem with this circuit quickly became evident as people stepped forward with readings from their machines. Those with sleeve bearings, babbitted bearings, and commercial machines all read resistances far below 2 ohms. After much thought, some design work, but mostly good discussion with the community, I concluded that the best way to solve this problem was to ***change*** the problem. So rather than trying to live with such low resistance, I raised the resistance.

[1] You are free to copy and distribute this document but not change it.

The Lathe Solution

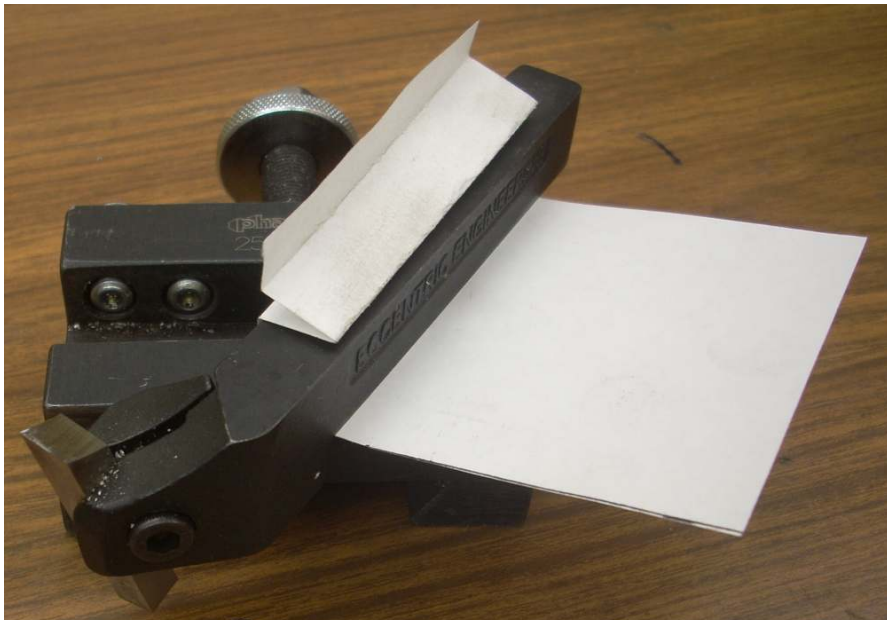
I have a tangential cutter holder that mounts in a Quick Change Tool Post tool holder.

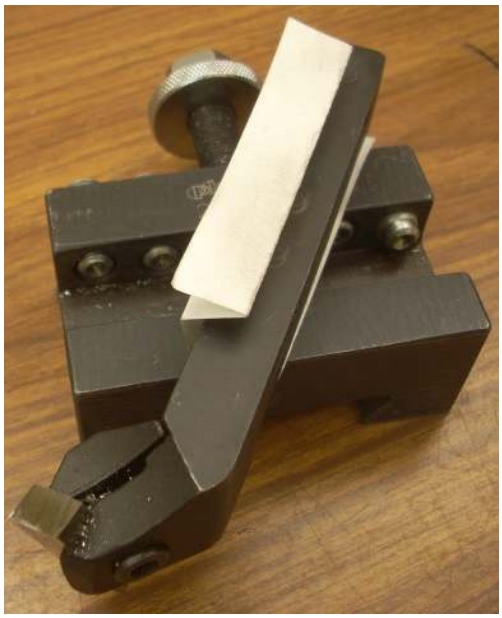


Add to this a piece of copier paper and a small piece of sheet metal. The sheet metal should be about as wide as the cutter holder and long enough to contact all set screws used to clamp the cutter holder to the tool holder. It should be as thick as possible. If too thin, the set screws will distort the sheet metal and punch through the paper. If too thick, it won't fit in the tool holder.

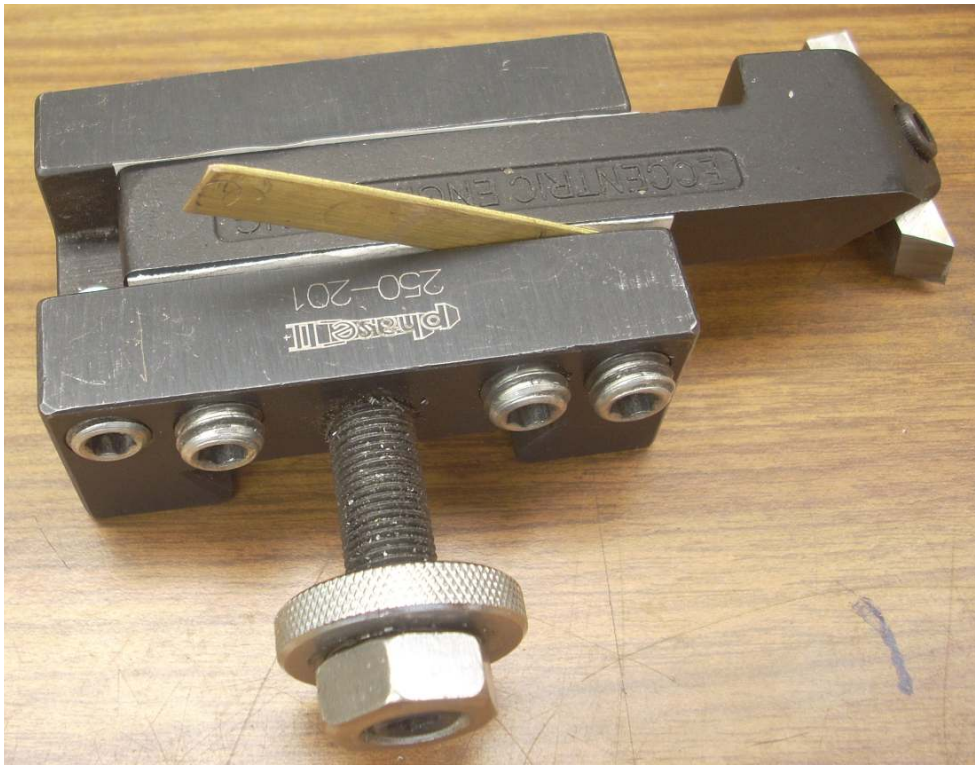
Of prime importance here is that there must be no burrs on any surface that contacts the paper. Even the smallest breach in the paper will cause a short circuit.

Fold the paper so it is double on the top, wraps around the back side of the cutter holder, and comes out the bottom.





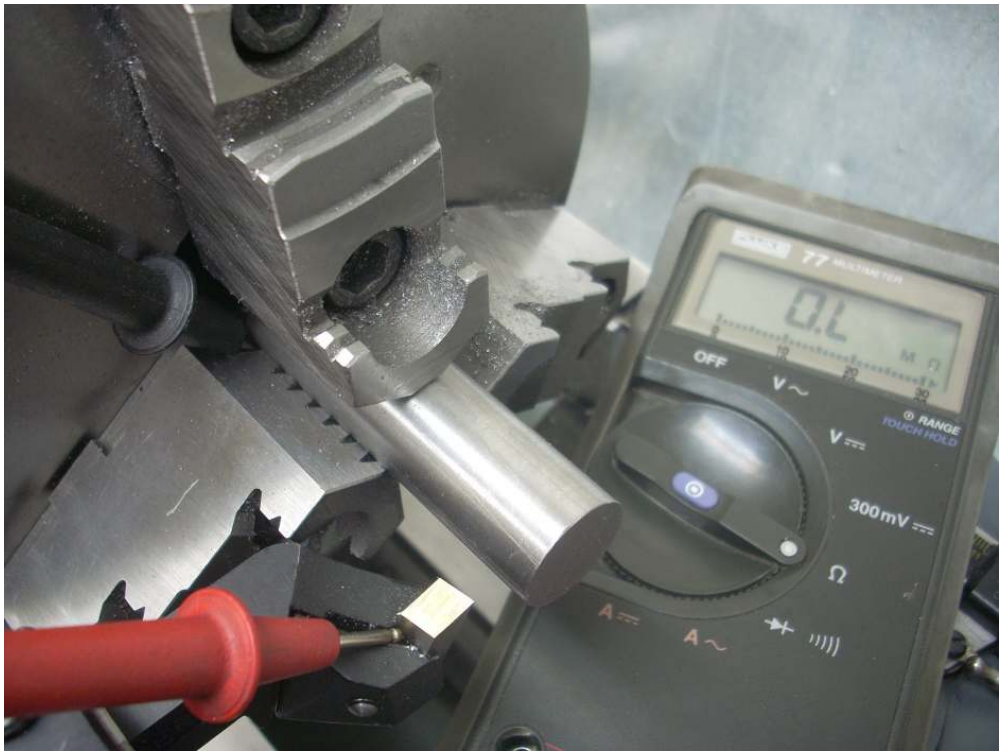
Trim off the excess paper.



The strip of sheet metal is then slid in place.

Believe it or not, this can be rather tricky. It took me a few tries before I found and removed all burrs.

Use an ohm meter to verify there are no shorts. All set screws must be fully tight yet there should be an open circuit between cutter holder and tool holder.



I used my ohm meter to verify that there was an open circuit between cutter and spindle.

Then at touch-down I see less than an ohm[2].

Just about any continuity checker can detect this large a change. Even a battery and light bulb would work here.

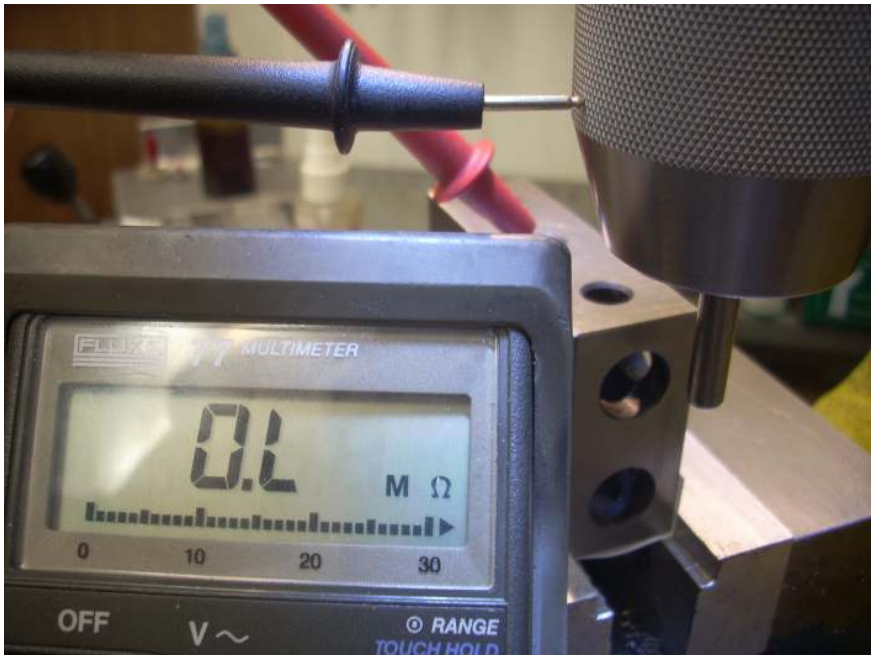
Do remember to clean all surfaces to remove swarf and oil before using this method to detect touch-down. I have found it to be able to detect touch-down to better than 0.0002".

[2] Although the meter reads 0.6 ohms, this is really just the resistance of the probes.

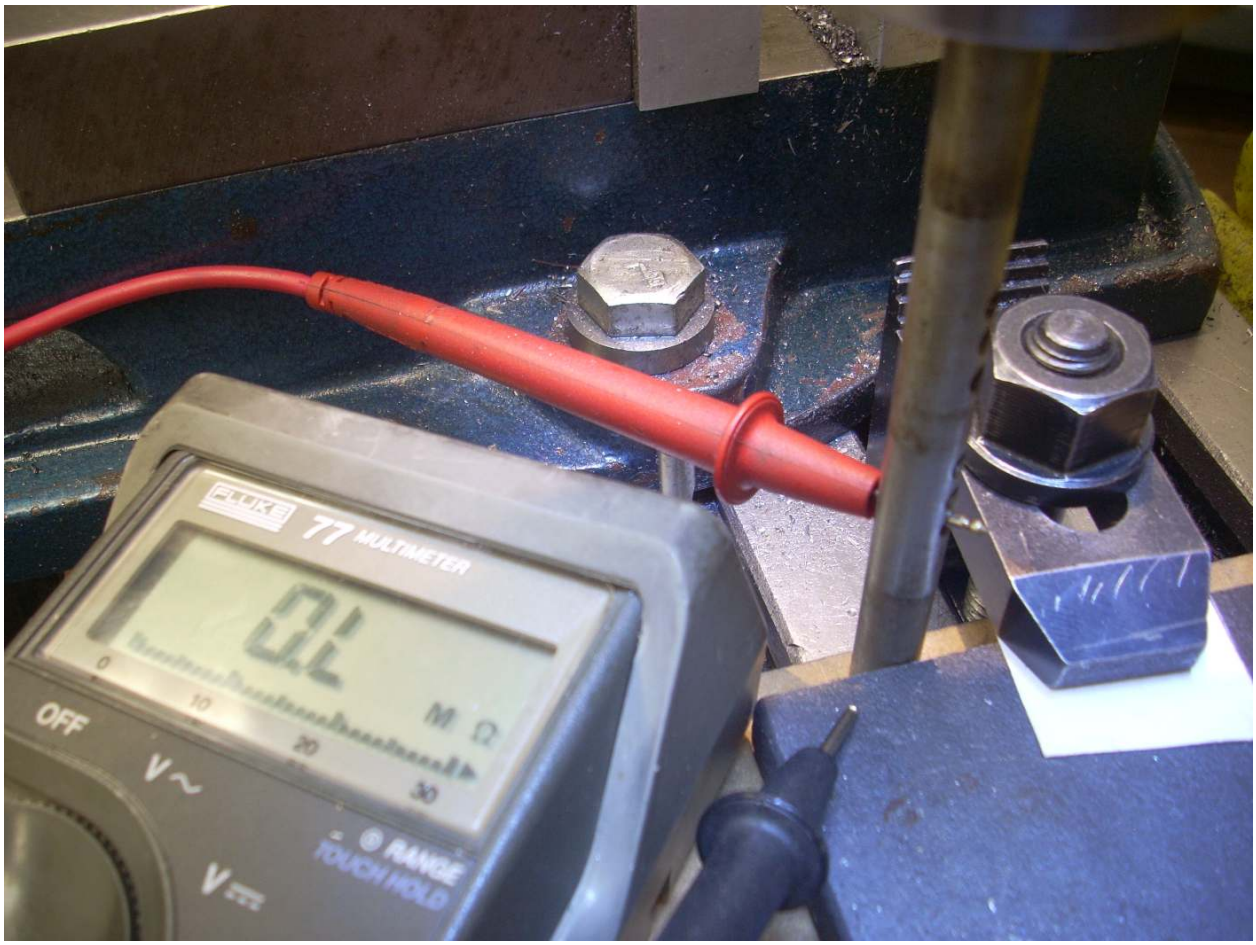
The Mill Solution

This solution came from Jon Elson.

My mill has a resistance between spindle and table of much greater than 2 ohms so my EEF works fine here. However, many people see less than 2 ohms before touch-down.



The solution is to put a layer of paper between work piece and clamp. In this case I am using my vise and a 1-2-3 block. My EEF probe is a piece of ¼" drill rod. At touch-down I see less than 2 ohms.



In this example, I have a plate resting on a piece of Medium Density Fiberboard. The MDF lets me side mill without hitting my table. I have placed a small square of paper between each clamp and the work piece.

My EEF probe is a piece of 3/8" rod that is nice and straight. I read an open circuit between my probe and the work piece. At touch-down it reads less than 2 ohms.

Regular copier paper is very uniform. It should not add appreciable error to your set up but I encourage you to verify this. A nice side benefit of using paper between mating surfaces is that it increases holding power by filling in the microscopic gaps.

Acknowledgements

Thanks to Jon Elson for seeing the simple solution for a mill.

Many people on the mill_drill and atlas_craftsman BBS supplied measurements that convinced me that my EEF circuit was not universally useful. Thanks to Jay B., Mike Marshall, Rob, Steve Haskell, Andy B, and Guenther Paul. If I missed anyone, please let me know.

Special thanks to Dan Benoit for letting me measure his machines. Thanks to John Lea for offering his machines for the same tests.

These generous people again demonstrate that "all of us are smarter than any one of us".

I welcome your comments and questions.

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