

# A Low Cost and Easily Made Counterbore, version 3

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By Steve-S'pore as told to R. G. Sparber with help from CT2.

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## Introduction

Back on May 31, 2011, Steve-S'pore of the Yahoo group `gingery_machines` wrote:

“Nice info you got there...perhaps Ron is correct not to use mill cutters on the spindle chuck. My approach is different; I learnt this trick from my training school long ago. I would grind my drill bit almost flat. With a 0.5mm normal drill bits slightly bigger, I drill a shallow step as a guide and use this flat drill to counterbore and c'sink or debur with a hand-drill. If the c'sunk hole is deep, I would use the ratchet brace like the pdf file.”



Here is my first attempt at one of Steve's low cost counter bores. I have taken an old drill and ground the end square on my grinder. I then put some relief back into the cutting edges. A regular drill bit is shown for comparison on the right.

Sort of like they say on those TV infomercials, “but wait, there is less!”



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Here is a close up view of the finished hole.

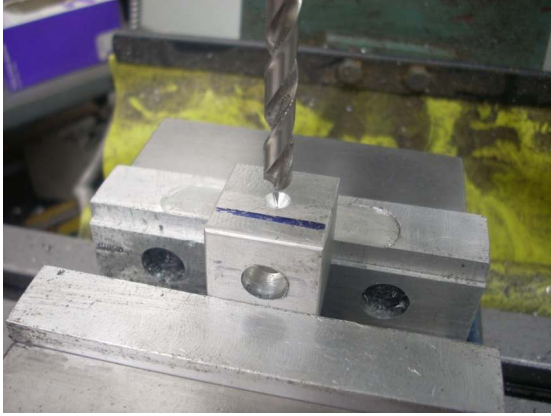


I first marked out the hole location and used my layout punch to form a dimple.



Then I used my spotting drill to cut a cone shaped hole.





I next used my screw's clearance drill.



I then lower the counterbore's clearance drill down until it contacts the surface. The tip will extend into the screw's clearance hole.



I then drill down a depth equal to the height of the screw head's height.



The last step is to run the counterbore down until it bottoms out. You can feel it cutting more and more material and then when it runs out of pilot hole, it starts to rub.



Here is a close up of the finished hole.



And another close up with the Socket Head Cap Screw installed.

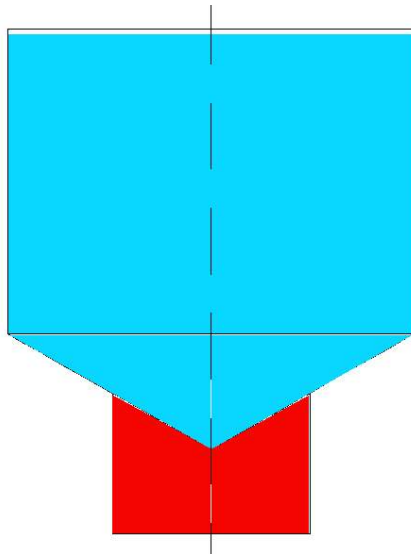
Way to go Steve!

But wait, there is more... no, actually less!

## A Closer Look



Here is a cross section of what we want to cut. The larger diameter is our counterbore and the smaller cross section is our screw's clearance hole. The distance from the top to the step is the height of our socket head.



**Here is the cool part:** notice that the counterbore is cutting on a sloped surface. This surface acts the same as back relief on the cutter. *So it turns out that you don't need any back relief on the counterbore.* Just grind the end of a drill flat and it work great. You feed in until it stops cutting. You have then run out of sloped surface.