

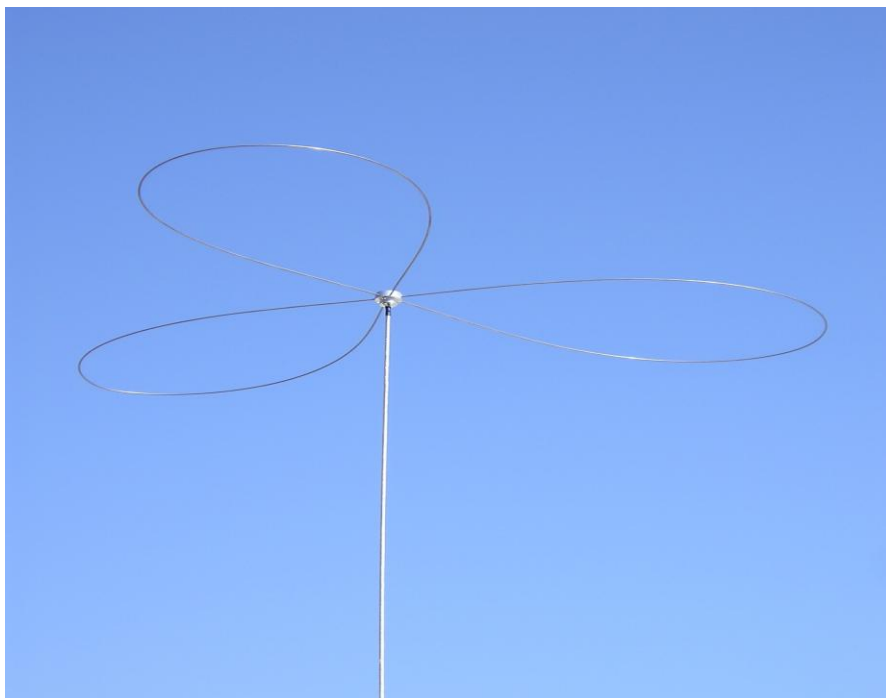
# How to build a Capacity Hat

Ken Muggli K0HL

A Capacity hat (cap-hat) is an interesting device, which can effectively increase the efficiency of your HF mobile antenna. Building a Cap-Hat for your antenna is an easy and rewarding project, well within the ability of those with a modest machinist background. Since this is a how-to article, I'll leave the theory to others.

Cap hats come in many configurations, but most of them consist of spokes, loops or wagon wheel type structures. The larger they are, the more effective they can be. However, the larger they are, the higher the winding loading. So what you see here is a compromise between effectiveness, and wind loading. The latter was especially important as the support of choice was to be a 60 inch long, shortened CB whip.

The following description is based on the machinery I have on hand in my shop. If your machinery is more sophisticated, you will likely do it differently. In other words, there is more than one way to machine this hub. Use the best techniques appropriate to your machinery, and



operational safety.

My capacity hat consists of two main components—the hub and three .125 inch diameter, 17-7 stainless steel wire loops. The loops are held in place by 10x32 stainless steel, allen head, set screws.

Here is a list of raw materials, needed to build the cap-hat, and the URLs where the materials can be purchased.

Aluminum shaft 1.5" dia. 6061 temper T6, supplier Speedy Speedy Metals  
<http://www.speedymetals.com/>

Stainless Steel straightened wire .125 dia. X 60" 17-7 PH, supplier Small Parts Inc.  
<http://www.smallparts.com>

Stainless Steel 10x32 set screws, supplier Micro Fastener  
<http://www.microfasteners.com/catalog/index.cfm>

What follows is not a step-by-step set of instructions, as part of the process should be based around the machining equipment at hand. In other words, it is just an outline of how I built my cap hat hub.

- 1) Cut a blank off of the raw material, slightly longer than 1.125 inches.
- 2) Face both ends for an overall length of 1.125 inches.
- 3) Turn the shank of the hub to 1.00 diameter (+/- .002), and .5 inches deep.
- 4) Blue and carefully mark the locations for the (6) 10/32 setscrews. I used a spin gig to facilitate accurate layout of the holes.
- 5) Blue and carefully mark the locations for the (6) .128 dia. hole for the wire. I again used a spin gig to facilitate accurate layout of the holes.
- 6) Blue and carefully mark the location for the shank setscrew C/T the 1.00 dia.
- 7) Drill the center hole (.200) larger or smaller to match the diameter of your antenna. It could also be drilled and tapped to 3/8x24—the standard antenna mounting thread.
- 8) Center punch all locations, drill and tap accordingly.
- 9) Deburr and clean.

If you read the print work carefully, you will end up with a nice functional hub for your cap-hat.

If you have the ability to carefully layout additional holes, you may drill some lightening holes in the ends surfaces. The amount of metal removed is small, but it may be worth the the extra effort in some cases.

Install the 17-7 PH wires into the hub, secure with the SS setscrews. Warning: This wire is STIFF! Wear gloves and safety glasses, and use caution when inserting the loop wires.

