



## ATV Hard Hat Cam

There are many emergency service applications where the on site commanders must remain in an emergency operations vehicle but would love to see what others are seeing. This is especially true when decisions must be made quickly and cannot wait for a voice description or interpretation. The Hard Hat Cam is ideal for transmitting to a portable repeater back to an emergency operations center. A picture *is* worth a thousand words.

This application note describes how to build into a hard hat a 50-100 milliwatt 434 MHz battery operated ATV transmitter and color camera. Snow free line of sight DX from the hard hat to a 8 dBd omni or 5 element beam is about 1/2 mile. Both the Videolynx ATV transmitter and CG-35a mini color camera are powered by two 9V alkaline batteries in parallel which can give over 10 hours of continuous operation. One should note, however, that drilling any holes in an approved hard hat cancels the OSHA certification, and reduces the amount of impact protection if you will be using it in a dangerous area. An alternative would be to package the transmitter in an aluminum box and clip it to the hard hat.

I purchased a plastic hard hat at Home Depot because I could not find a metal one. Metal would make a much better ground plane, but instead, I glued two 1.5x13 inch strips of aluminum foil in the shape of an X inside the plastic hard hat after drilling.

A 3/8 diameter hole is drilled in the top center for the antenna UG-1094 BNC chassis connector. Solder the coax braid directly to the top of the BNC shell. Next drill 1/8" diameter holes for the 9 Volt

battery holders with one 3" to the rear of the BNC and the other 2" to the front. I used 4-40x3/8 screws with the nut and lock washer on the outside of the hard hat to mount the battery holders. 1/16" holes are drilled for the slide switch approximately 1.5" forward and to one side from the BNC.

Drilling for the CG35a mini color camera is a little more involved. A hole must be drilled in both the camera bracket and hat with a .312 dia. drill so that the cable plug can be fed through from inside the hat. Drill 1/8" holes for the two camera bracket mounting holes, mount the bracket using two 4-40x3/8 screws, lock washers and nuts, then drill out the bracket and hat thus insuring good alignment of the holes. Remove the bracket. Remove the connectors on the camera cable.

Next, cut two 1.5x13" strips of aluminum foil and glue to the hat inside and centered on the antenna jack hole. Let it completely dry then cut the holes free with an Exact-O knife.

Make a 1" wide sheet aluminum or brass bracket for the Videolynx transmitter by first drilling a 3/8" diameter hole centered and 1/2" from one end. Make a right angle bend 1" from the drilled end. Loosely mount the bracket on the BNC jack. Then place the Videolynx against the bracket with the leads pointing toward the BNC and bend the metal tight around the transmitter module.

Mount the power slide switch, battery holders, and camera. Connect the camera red power cable and Videolynx power leads to each side of the dpdt slide switch on one end. Connect both of the 9V battery clip leads (3 if using the Z70A transmitter) to the respective center lugs - red +9 V on one side, black or ground on the other. Rather than splice the yellow video coax I put a RCA plug on the cable and plugged into the Videolynx video jack. The line audio cable is only used with the Z70A transmitter. Use a good resonant 50 Ohm antenna plugged into the BNC jack such as the Diamond RH519 available from us. You can also take the hard hat off and plug in a small beam like the OAL 5L-70cm to more than double the distance for fixed portable applications.



### Parts list and sources:

Videolynx 434 transmitter - P. C. Electronics \$99 or  
 Videolynx Z70A transmitter with sound - P. C. Electronics \$149  
 CG-35a mini color camera - P. C. Electronics \$89  
 Diamond RH519 whip antenna - Your favorite ham store

BNC jack(s) - UG-1094, [www.mpja.com](http://www.mpja.com)  
 RCA Plug(s) - Radio Shack 274-339  
 DPDT slide switch -Radio Shack 275-403  
 9V battery clips - Radio Shack 270-324  
 9V battery holders - Radio Shack 270-326