A readily available Velleman "Super Stereo Ear" Mini Kit, or manufactured "for the hard of hearing," microphone/amplifier assemblies, plus some PVC tubing, foam inserts, a few pieces of wood, and a handful of nuts, bolts, and volts is all that is needed to build a stereo microphone system that lets you pick up distant acoustic signals with clarity and accuracy.

Using electronics to listen in on birdcalls or other distant sounds is not a new undertaking. I used the guidelines given by Charles D. Rakes in his December 2002 Poptronics article, "An Ear to the Outside World" (pp. 55-58), to construct the long-range microphones presented in this article but with one big difference — my design incorporates a dual microphone system so that the listener can hear in stereo. I find that using two microphone/amplifier systems (one for each ear) placed at spacings of two to three times the normal ear-to-ear

Friends, birders, electronics enthusiasts, lend me your ears so that you may listen to faraway sounds using these easily built long-range stereo microphones.

(with apologies to William Shakespeare and Mark Anthony)
distance (about 6-7 inches for an adult) enhances the listening experience in terms of sensitivity to nearly inaudible sounds and sensitivity to direction. I constructed two systems. One system, which I call “Big Mike” (see Figure 1), follows more closely the instructions given by Rakes for creating a mono, long-distance mic. Figures 2a, 2b, and 2c show the details for constructing “Big Mike.” I had a hard time finding thin sheets of foam rubber to act as sound insulating material and instead cut up a plastic foam camping mattress that was about half an inch thick (see Figure 3).

The microphones are sensitive electret elements that are part of the Velleman kit MK136 “Super Stereo Ear,” which is ideal for this project. Figure 4 shows the placement of the stereo amplifier and the battery holder on top of the wood mounting platform. Figure 5 shows where the electret microphone elements — glued inside orange plastic funnels — are located in order to channel the sound at the end of each tube. Close-ups showing details of the microphone element-to-funnel assemblies are shown in Figure 6.

The two 3 x 24 inch PVC tubes with insulating foam and end caps weigh about 10 lbs. I found it necessary to attach them to a crude (but effective!) wood altazimuth mount.
(see Figure 4) using four-inch PVC pipe as a pier. The optical telescope in the middle between the two mics is not necessary, but if you are looking for an excuse to make and use a Galilean telescope (which provides a correct, right-side-up view), this is a reasonable construction opportunity. The catalog from Anchor Optical Surplus (www.anchoroptical.com) has instructions for building a Galilean telescope with lenses you can order from them.

A second, smaller system, based on the same principles as Big Mike, was constructed as a handheld unit (Little Mike) and is shown in Figure 7. This project makes use of readily available components and a small wooden mount that requires only a little cutting and gluing. The two microphone/amplifier assemblies (see Figure 8) are the type you find in household gadget catalogs with names that include “Sonic” and “Super Ear.” They work quite well, but the earphones accompanying them are wired for mono listening with the single microphone/amplifier.

A little cutting and soldering will allow you to connect the left earphone to one microphone/amplifier and connect the right earphone from the same headset to the other microphone/amplifier so you can listen in stereo. And yes,
since you bought two complete microphone/amplifier systems, you have one headset left over—think of it as a spare.

The two PVC pipes used to house the microphones are, fortuitously, slightly greater than two inches inside diameter and will nicely accommodate the polyethylene foam-pipe insulating material that is two inches outside diameter (see Figure 9). This makes for easy construction; simply cut off an appropriate length of the two-inch PVC pipe (you can try longer lengths than the 13-inch length I used with perhaps better results) and then cut off the same length of the polyethylene foam-pipe insulation and insert it into the PVC tube.

The microphones, which have their own black foam cover, fit exactly into the inside diameter of the polyethylene foam insulating tube. I used 2 x 1-1/2 inch PVC pipe increasers as end pieces so I could glue the amplifier housings onto them to make rigid assemblies that could be placed at the end of the PVC pipes. I did not glue the microphone/amplifier/pipe increaser units to the end of the PVC pipes, but simply used a press fit, which turned out to be very snug and won’t come apart unless you tap them lightly with a small hammer.

I used a 12 x 5-1/2 x 3/4 inch wooden platform and plastic cable ties to fasten the PVC microphone/amplifier assemblies nine inches apart. A six-inch long, one-inch-diameter dowel attached to the underside of the wooden platform acts as a handle. This system, although much lighter than Big Mike, weighs about 3-1/2 lbs. and can be tedious to hold for long periods of time. A four-foot by one-inch PVC pipe, with a 1-1/4-inch rubber chair tip to act as a foot at one end, can be used as a monopod—just slip the one-inch-diameter dowel handle into the pipe opening (the dowel handle visible in Figure 9 is shown mounted in the monopod pipe in Figure 10), and you can effortlessly aim the microphones anywhere you want.

Both setups work well and have advantages and disadvantages. There are obvious differences in transporting ease and handling ability, due to size and weight. Big Mike is more sensitive to direction but is also noisier.

Little Mike has two separate amplifiers with separate volume controls, which may be useful if you are more hard of hearing in one ear compared to the other, but it does take a few seconds to balance the sounds. In any case, they are certainly fun to use, and they do attract a crowd! NV