

## **The Wing; A Low-Cost Underwater Acoustic Locator**

### **1. Overview**

The stereo underwater listening wing was designed and built by the Cornell Bioacoustics Research Program. The purpose of the unit is to provide an inexpensive method of collecting sounds and identifying locations of the emitters while in the field. The wing unit employs standard preamplified hydrophones in a stereo configuration and can either be towed or dropped from an anchored boat into a moving current.

The wing's hydrophones are mounted roughly five times the distance of separation for a typical person's inner ears. This separation factor is based on the fact that sound travels five times faster in seawater than in air. This allows the listener to fairly accurately identify the bearing of the sound source being monitored without complex computer processing equipment (we are just using the built-in spatial processing ability of the human brain).

### **2. Fabrication**

The drawings in the appendix should provide adequate information as to the construction of the wing.

For the hydrophones, we employed a couple of old sonobuoy hydrophones (flattened rectangles), but any hydrophone can be used, provided you can mount it. If necessary, provided the hydrophone is also cast of a urethane or similar resin, it can also be machined to provide better hydrodynamics (and hence, minimal flow noise). Alternatively, you may wish to construct your own. See the other documents we provide on hydrophone fabrication, usage, etc.

The lead ballast weight was fabricated by creating a wooden form and then using sand casting. You should probably fabricate several different weights for different tow conditions. Protect the weights by dipping them in PlastiCote compound.

The tow cable consists of the tow line (we employed 140lb test planar board line), and the 2 hydrophone cables. All three lines are bundled using black UV-protective helical cable wrap which makes it easier to deploy and stow the same.

### **3. Deployment**

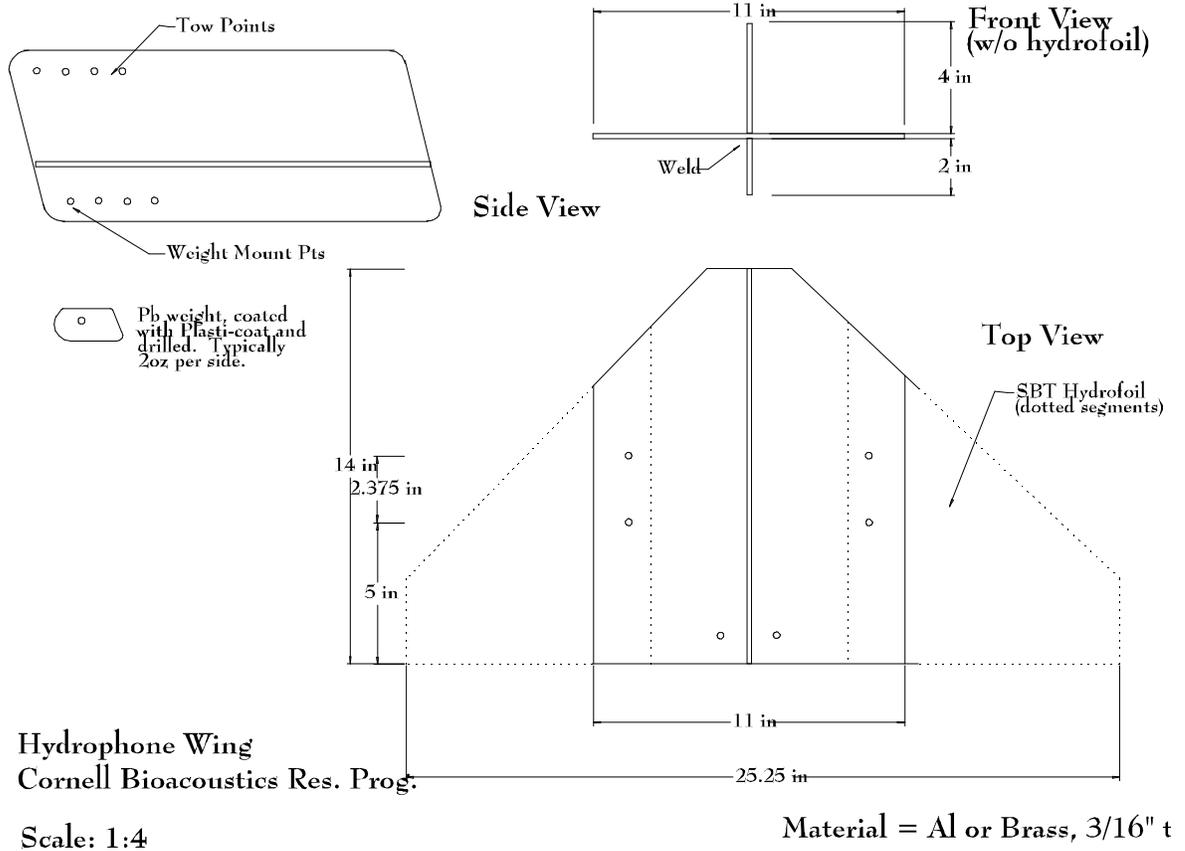
The wing was designed to work in at least some current -- this keeps the proper orientation. Deploy the wing from a standing boat. If you plan to tow the unit, begin movement after the wing is completely in the water and the tie line is secured to the boat. In a towed configuration, the use of a side-mounted outrigger (5 to 15') is recommended to prevent the unit from getting caught up in the props.

For your particular usage, the tow line and ballast positions may need to be adjusted. For standing configurations (dropped into current from an anchored boat), the ballast should be in the most forward position and the tow line may be in the 2nd position from the front. In towed configurations, both should be at the most forward position. A standard marine U-bolt can be used for easier reconfiguration (of the tow cable); but note that you may get clicking or similar noises from the movement of the same during deployment.

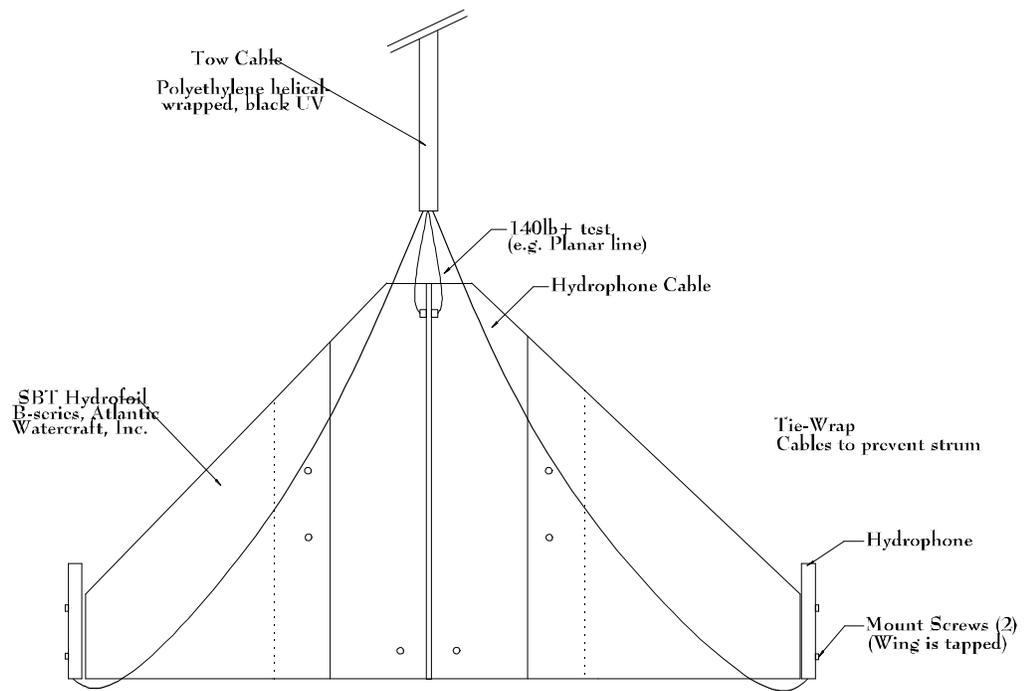
The buoy is employed for standing configurations only. It is tied to the tow cable near the boat to provide isolation of wave movement and surface cable noise from the wing's hydrophones. Secure the buoy via the surgical tubing, by tying the tubing tightly into the tow cable's helical wrap.

Note that when using the wing, you will not be able to discern between sounds directly in front or behind the wing. This is due to the sound arriving at both hydrophones at the same time.

# Appendix A. Drawings

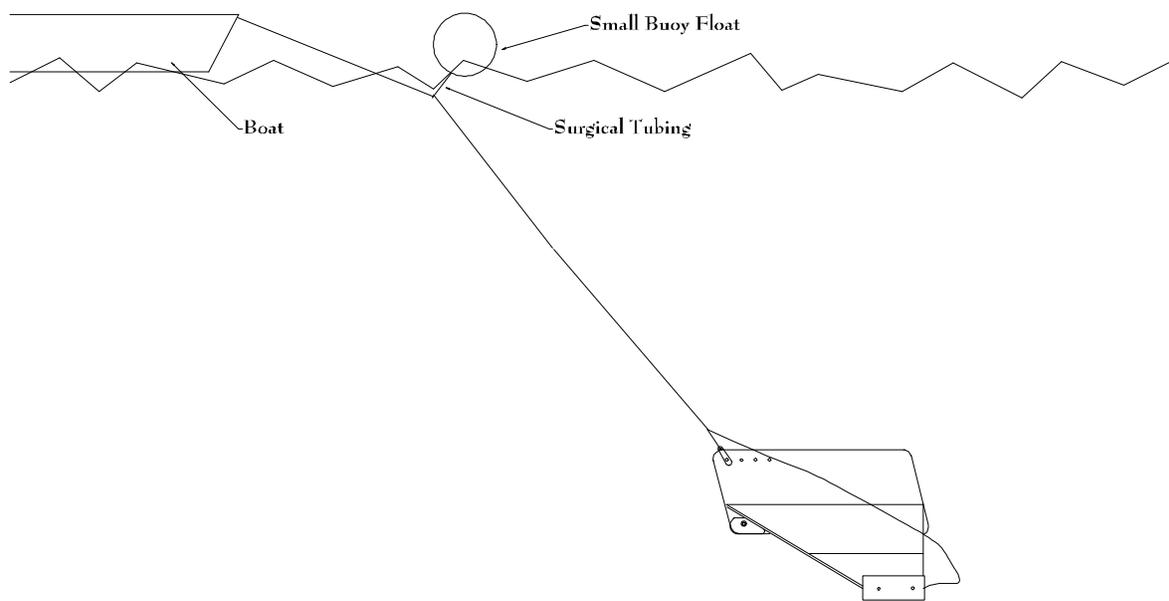


**Figure 1. Wing Components**



Hydrophone Wing, Configured  
 Cornell Bioacoustics Res. Prog.  
 Scale: 1:4

**Figure 2.** Wing Configured for Deployment



Hydrophone Wing, Deployment  
Cornell Bioacoustics Res. Prog.

**Figure 3.** Wing in Use