Build your own hydrophone

Hydrophones are underwater microphones that can be easily built from a few components. These are all supplied in the Expedition box, except for the soldering iron.

1. Put the lid of the bottle on the coax cable.

2. Solder the two cable strands to each side of the crystal under a fume hood. Ideally, it should be possible to control the temperature of the soldering iron, so that it can be kept below 250°C to avoid damaging the sound-sensitive piezoelectric crystal. To make soldering easy at such low temperatures, it is best to use solder with a low melting point, e.g., solder containing silver. You should also be careful not inhaling the solder when it is warmed up; this can be avoided by soldering under a fume hood in a laboratory.

3. Connect the other end of the cable to the amplifier, connect its battery, and connect the output of the amplifier to the loudspeaker.

4. Do a ‘tap test’: Tap gently on the crystal, and you should hear a sharp noise coming through the loudspeaker. The piezoelectric crystal transform the pressure to a voltage. The voltage is picked up by the cable strands and amplified before sent to the loudspeaker.
Build your own hydrophone

5. Finally, you need to waterproof the crystal. Most easily is to pour vegetable oil into the small container, then move the crystal and the cable inside. The vegetable oil is not conductive electricity, but it does conduct sound waves: therefore, the underwater sound waves can reach the crystal without having the crystal being short-circuited. Now, screw the lid on and the hydrophone is ready!

6. Bring the hydrophone out to a dock by a lake or by the sea and sink it into the water. Be careful to keep the rest of the electronics dry! Splash your fingers in the water surface and throw a small stone into the water; listen to the sounds. Try to hear if you can detect fish or other biological sounds, or perhaps you can hear a passing boat?