

Hydrophone Circuit Design Update

Both the original P48, and the dual 9-volt battery powered boards hydrophone boards have been updated to Revision 2. The main change is the addition of input protection for the operational amplifier used in the circuit. This is the OPA1642. It does include internal diode protection for shunting voltages above or below the power supply pins to those voltage rails. There were a few situations where that has not been sufficient. The circuitry now contains a series input resistor and two specialized diodes for protection. Those are Schottky diodes that are designed for this purpose. They conduct at a lower threshold voltage than a traditional silicon PN junction. They also feature a much faster conduction time. This circuit was robustly tested to ensure it functions properly. The addition to the original circuit is shown in blue.

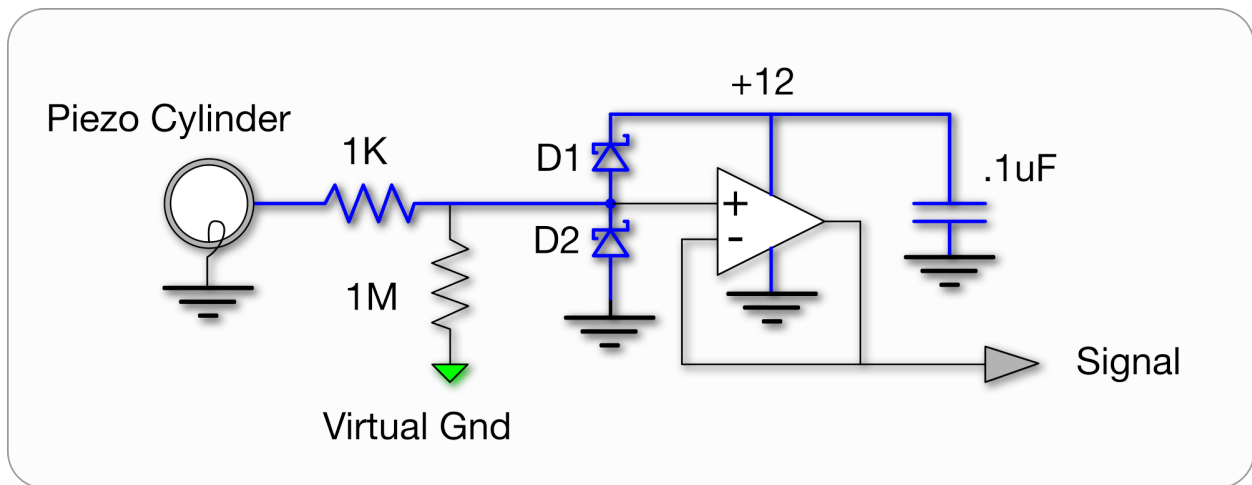


Figure 1: Protection circuitry

The Piezo Cylinder has a natural resonant frequency of 43Khz. When tapped or struck, it will resonant a bit like a bell. Initially the voltage spikes can be in the 10's of volts if not higher. This has the potential to damage the input to the OPA1642. If the input voltage exceeds +12 D1 will start to conduct. If the input voltage swings negative below ground D2 will conduct. In either case the .1uF capacitor will initially appear as a low impedance. At 43Khz, it appears as a 370hm resistor.

Will this affect the sonic qualities of the boards?

There are no changes to the sonic qualities of the board. While the 1K and the 1M resistor form a voltage divider, it results in .1% change in output level, or -.008dB level change, which is imperceptible.

We also changed the form factor to match the Piezo Cylinder and the moved the connection points to the edges of the PCB for ease of assembly.