



Controlling Noise in the Electrophysiology Lab

Now that ADInstruments is selling Dagan equipment, PowerLab customers will be able to perform electrophysiology experiments with ease. However, electrophysiology labs have the inevitable problem of noise interfering with a signal. There are countless sources of electrical interference in a lab. Everything from light fixtures to computer monitors can cause enough noise to interrupt experiments. Before beginning experimentation, it is a good idea to observe the noise alone to determine how much source elimination is needed. If possible, minimize the noise before using the filtering options in PowerLab. The PowerLab has two types of filtering, both analog and digital. Built-in filters that can be controlled in the input amplifier dialog box. These include low pass and high pass filters. There are also the digital filtering options. This set of filters is very advantageous if a certain frequency of noise is identified in post-collection analysis. Below are a few tips to help eliminate noise before data collection begins:

- 1) Try to keep away from fluorescent and halogen lights. Instead, use only incandescent lamps.
- 2) Many electrophysiology lab setups take place on isolation tables to remove oscillations. However, these tables often contain large amounts of metal, which can cause the tables to act as large antennas. Connecting the table to the common ground will eliminate this problem.
- 3) Monitors often act as overlooked sources of noise. While facing the monitor away from the setup can usually take care of the problem, some cases require that the monitor be moved a few feet away.
- 4) Researchers often have amplifiers and a variety of electrical equipment scattered throughout their lab. Because disorganization of equipment makes noise control very difficult, try to keep all of your equipment racked in one place. Racks also make grounding the devices much more convenient. Simply use an alligator clip to connect each device to the rack support. Only one ground is needed at the bottom of the rack to take care of the noise from each of the separate devices.
- 5) Microscopes and light sources that are not in use during the recording can cause noise. Consider turning them off when not in use.
- 6) Many of the devices directly in contact with the experiment preparation have a tendency to pick noise. These devices included the headstage, the pipette holder and manipulator, and in some cases, the in-vivo stereotaxic setup. Grounding with alligator clips should be enough to take care of these problems. However, foil around some of the devices might also be helpful, especially with devices such as the pipette holder. Keep in mind that, like the preparation equipment, the animal should also be grounded.
- 7) Use short, insulated pieces of wire. Long, unshielded wires act as antennas for all the noise being emitted by surrounding devices.
- 8) Talk with building maintenance to determine if the power circuits in the lab can be filtered to prevent transients.

If you finds that these suggestions still do not keep electrical interference under control, you might consider building a Faraday cage. A Faraday cage is an enclosure around the preparation equipment that acts as an electromagnetic shield, which can reduce electrical field changes

near your setup. Cages can be as simple as a box with wire mesh walls connected to the common ground.

Control of electrical interference can seem like a large task. However, following steps above will allow you to minimize noise and obtain quality recordings.