

Stereo Noise

Power line noise in 12 volt systems can be a serious problem in that speaker noise late at night can easily ruin a romantic evening. The noise is frequently blamed on light dimmers because turning off the lights causes the noise to go away. Typically the root cause of the problem is not in the dimmer but in the power distribution system of a boat or RV. Most 12 Volt stereo's are based on automotive technology. Automotive stereo's are designed with the premise that the power leads from the battery are rarely more than 10 feet in length and the steel chassis is the ground. Boats and RV's rarely have the radio within 10 feet of the battery and both the 12 Volt lead and the Ground lead are needed since the hull is usually fiberglass. Further compounding the problem is the additional 12 Volt appliances typically found in boats and RV's. We typically find that water pumps, macerator pumps, and other electrical systems cause noise in the speakers. We have even found in some cases that the refrigerator can cause the noise. The main difference with the lights is that they are on all the time in the evening unlike the other appliances. The noise tends to be very annoying late in the evening.

Figure 1 illustrates a battery connected to a light dimmer driving a 20 watt bulb. The 12 volts is almost noise free (flat line). The battery is less than 1 foot from the light dimmer and bulb.

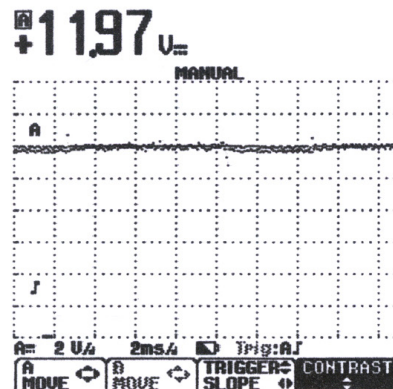


Figure 1

Figure 2 is the same dimmer with the same battery only with 18 feet of #18 wire for both the ground and power (36 feet total).

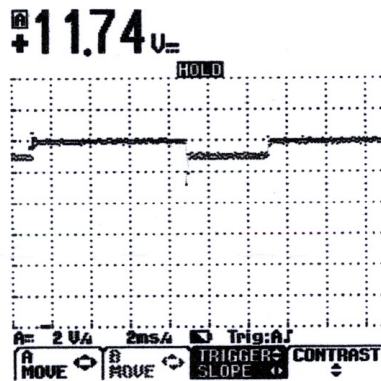


Figure 2

The noise in Figure 2 is now over 1 Volt. Most automotive stereos will simply pass this noise directly to the speakers causing a buzz. An easy low cost solution to this problem is to add one or more large value capacitor to the power grid. The capacitor acts like a battery by filtering out much of the noise as shown in Figure 3. The capacitor will also help prevent electronics damaging voltage spikes from getting on the 12 Volt grid from pumps and other motors.

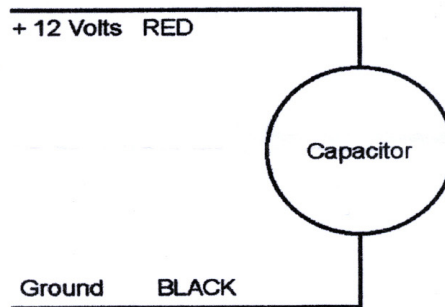


Figure 3

The capacitor should be connected as near as possible to the light dimmer or motors depending on the source of the noise.

Another common noise source is ground loop noise. This noise occurs when the booster amplifier and the radio are not directly connected to power and ground at the same point as shown in Figure 4.

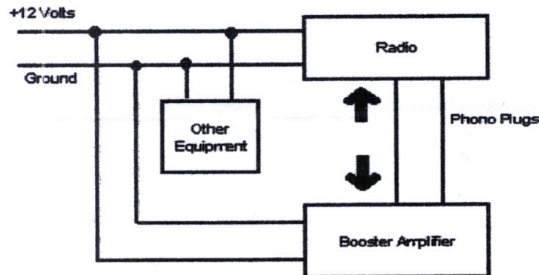


Figure 4

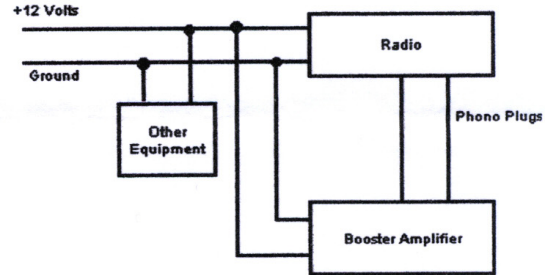


Figure 5

In Figure 4, when the Other Equipment is operating, Ground current will flow through the phono plug wires. Small amounts of Ground current in the phono plug wires will create buzzing sounds if the other device is a dimmer or motor. To correct this either rewire the stereo as in Figure 5 or install a Ground Loop Isolator (available at Radio Shack) in the phono plug lines. Be aware that if the antenna is grounded at more than one location Ground Loop currents can flow. If electricity can find more than one path.....it will, and it typically will create noise.