Tech Tips: **Ground Loop Hum**

Sooner or later every sound person encounters a 'ground loop hum' in their sound system. Most people think that adding a Peavey PL–2 transformer module to the power amplifier rack will eliminate the problem, but this is not always the case.

In professional audio, the audio signal path should only be grounded at a single point. This single point grounding is circumvented when 2 pieces of AC powered gear are connected to each other. (Our USA National Electrical Code (NEC) specifies that all electrical equipment that draws potentially harmful amounts of current from the AC Mains must have its metal chassis grounded to the electrical systems 'earth' ground) With this being the case, any AC powered piece of gear with a 3-prong AC plug will more than likely have it's signal grounds at "earth ground" potential. This usually gives the quietest operation for the equipment.

Now, if we connect 2 or more pieces of AC powered audio gear together via signal cables, we now have the sound system's audio signal path connected to ground at two points, creating paths that also connect the audio signal to the electrical 'earth' ground. The resultant hum is directly related to the differences in current that flow in the respective electrical circuits, which all share the same earth ground.

If the audio signal path is only connected to ground at a single point, the differences in ground currents will not induce any interference from the power line, so the sound system will not hum.

Using the little gray three pin to two pin electrical AC adapter on the end of the power cord of (1) of the AC powered devices will usually solve the problem, but is not the recommended solution.

The most common problem lies in the fact that the balanced (XLR) audio connections between the mixer and amplifier have a common audio signal ground that finds its way to the electrical ground via multiple chassis ground connections.

The solution is to lift the audio signal or pin #1 of the balanced connector at the source of the balanced audio signal line. In this case, pin #1 should be lifted at the mixer position. This can be done with an **XLR Ground Lift adapter**, or if you're adept at electronics, you can lift pin #1 from ground on one end of the balanced cable, this will eliminate the ground loop hum but you may then experience 'RFI' (radio frequency interference) in the system. The solution is this case is to add a small capacitor (such as a .001 mFd) from the shield or ground wire to pin #1. Adding the capacitor allows the balanced line to be lifted (open) from ground at audio frequencies, while acting as a closed circuit for radio frequencies.

The real cause of the ground loops has to do with the way that our electrical power is distributed. In order to explain in any further detail would require a thorough discussion of electrical power distribution.

The foundation of the above tip is: **Not allowing the audio signal path to go ground in more than one place.**