

A New and Important Audio Equipment Evaluation Criteria

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In the selection of audio equipment anyone involved in the design or installation of larger audio systems is concerned about the specifications of the inputs and output of the equipment. For example:

- Is it balanced?
- Is it low impedance out?
- Is it high impedance in?
- Does it have transformer or electronic inputs?
- What is the CMRR of the input?

On the strength of the answers to these and other questions we decide if we will use various equipment and how we will interface it into the system. For the most part, if we later have noise problems in our systems we will look to the system grounding (shields, ground conductors etc.) for solutions. There is an important oversight in this scenario.

I recently spoke on isolated grounds and the electrical code at a one day workshop entitled, GroudView: Noise in Audio. It was held by the Toronto Section of the Audio Engineering Society. As a part of their presentations, Neil Muncy (Neil Muncy and Associates) and John Windt (Windt Audio) presented a very compelling case on the importance of a seemingly overlooked or forgotten aspect of grounding. While many ideas were presented, what is being called *The Pin 1 Problem* seem to be the most important. Equipment with problem may be what is to blame for many unexplained noisy systems.

Oversimplified, *The Pin 1 Problem* makes equipment susceptible to EMI (electro-magnetic interference). A great many pieces of equipment from a wide assortment of reputable manufactures exhibit this deficiency. How the equipment manufacturer handles the grounding inside the chassis has a profound effect on what happens in a real world installation. Pin 1 of the XLR is used to terminate the shield of the signal wires entering or leaving a box. The shield, of course, is used to keep noise out of the signal wires. If pin 1 is grounded inside the chassis in such a way that it readily couples into the circuitry of the electronics then under field operating conditions that piece of equipment will be noisier than one, that, on the bench or in the specification sheet, appeared equivalent. Equipment that has lots of ins and outs, like a console or a switcher, is particularly prone. Pin 1 of audio equipment should not be grounded directly to the circuitry but to chassis at a point that

represents the hub of the star ground in the box. (John Windt is quick to point out that his involvement with improving the noise performance of several manufacturers' equipment has been considerable more sophisticated than this.)

John has a number of easily made gadgets that make it easy for anyone to do some basic equipment tests for immunity to noise. An AC plug-in supply (the type you buy at Radio Shack) is used to generate a small current that is injected into the ground systems of the product. This is done between Pin 1 on the inputs and Pin 1 on the outputs. (Pin 1 to chassis may also reveal problems.) John has made up adapters simplifying this. The output is then monitored on loudspeakers. You would hope that with no inputs connected everything would be quiet -- but it usually is not and it varies drastically from product to product! Once you have compared a number of products you will get a feel for which ones will be less susceptible to EMI in the field.

It is possible that we have been resorting to systems grounding in our efforts to quiet systems when, in fact, the problem is in the equipment we are using. Unfortunately there is, at this time, no specification which rates a piece of equipment's sensitivity to EMI. The Audio Engineering Society Working Group AES WG-03 is presently investigating this whole thorny subject and will be putting forward a document in the future. You may wish to follow their work. Until a time when some rating specification is arrived at and it appears on specification sheets, consider doing the The Pin 1 Test on equipment you are evaluating for your facility. If you find a piece of equipment that is prone to this type of EMI let the manufacturer know. Clever systems design may allow you to minimize the impact of sensitive equipment that must be used.

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