Subject: Single-point connections
Posted by Wayne Parham on Thu, 13 Nov 2003 15:59:19 GMT
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Have you ever looked into the conditions that cause a ground loop? In high-current situations, the conductor path and node-to-node impedance can become significant. For example, if there is 0.1 ohms resistance between two points and earth ground, and 10 amps flows along this ground line, then the two points will be separated by 1 volt. The first connection junction will be ground and the second will not - It will be elevated to 1 volt. So that can be a problem, espcially if the signal passed between two devices in this system is only 0.775V. With the ground reference of one device being 1 volt above the other, the ground reference level would be higher than the maximum signal level and the system simply would not work.The paragraph above describes a typical example of a ground loop condition in a power circuit that disrupts the interconnections between devices in a system. It is not limited to power circuits though, and can be applied to all interconnects. The example also only described a DC condition and when AC signals are presented, we can have slightly different effects at different frequencies based on transmission line reactance, i.e. inductance and capacitance. And there is also a pseudo-reactive component called "skin effect" that causes conductor impedance to be higher as frequency goes up. These all represent unintended "circuit values" that are introduced by the interconnections between components. Such values are often assumed to be all zero - pure conductance, with no reactive or other properties - But this is obviously not the case.However, it isn't like the properties are large either. In audio circuits, frequency is low so that the reactive components of short low-impedance (speaker output level) interconnects are very small. They aren't zero, but they are extremely small. Since audibility requires a pretty large energy spread, I've always questioned the audibility of things at this scale. I mean, 3dB is double power. So if we have a signal modification of 0.000001, it is pretty reasonable for me to round it to zero.So I dunno. On the one hand, I can definitely see that the difference between a single-point ground and a buss-ground can be significant in a high-current situation. In that sense, we're talking about impedance rising high enough in relation to current requirements that there is a measurable voltage drop. And the bi-wire approach is really the same sort of thing. But on the other hand, I don't know that I would expect a big change in circuit conditions unless the signals were large and the conductors were fairly resistive or reactive.I don't think I've ever seen or heard a situation where I could easily identify an improvement when changing from a buss configuration to a star configuration on the negative terminals of a loudspeaker crossover rated at a few hundred watts. The currents involved are just too small. If reasonable guage is used and the connections are good, then the foot or two of cable inside just isn't enough to develop a potential across it. But then again, the single point ground approach is best, and so this is also true of the bi-wire approach. In fact, I'm certain that's where the idea came from.