



## PERFORMANCE MEDIA INDUSTRIES, LTD.

**Troubleshooting**  
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“I’m not paying you my balance until you fix this darned thing!”

The message was clear; the client was mad, and he wasn’t going to take any more. These words were spoken to an installer friend of mine who had already spent months trying to figure out why this client’s system was shutting down during loud passages. It only happened when the client cranked up SACD music, and a whole bunch of money was at stake.

The above situation could have been avoided by some careful analysis of the system and proper use of test gear to figure out the sources of the problem. That’s what I did when I was called in to play “Mr. Fix-it.”

It did turn out that the problem came from a serial succession of issues, which made it even harder to figure out. But methodical process and investigation did reveal the sources of trouble. With the right solutions, the client could play his Pink Floyd SACD at ear-piercing level until, of course, he popped the breaker...

Let’s take a look at this as a case study and see what can be learned from it.

- 1) The SACD/DVD-A player didn’t include proper bass management features. While the Center and surround analog outputs could be set to Small, thereby feeding their bass to the subwoofer send, the Left/Right outputs could only be full range. I confirmed this by measuring the frequency response of the signal feeding the speakers with a test DVD producing pink noise. An ICBM bass management unit from Outlaw Audio took care of this problem.
- 2) The front speakers, although relatively large in physical size, played down to only about 60 Hz, because they were appropriately designed to work with a subwoofer. The real issue was their 2 Ohm impedance at about 100 Hz – a very tough load for the amplifier. I measured the load with an AC impedance meter, but there is no fix for low impedance in the field. The speaker designer needs to

go back to the drawing board and revise the crossover so the impedance never goes below 3 Ohms. End of story.

- 3) The 5-channel power amplifier wasn't huge and had good protection circuitry, which shut it down when it saw too much current draw at its outputs. No problem here!
- 4) The system power was all fed through one circuit breaker. At high volume levels, the wall AC voltage drooped to about 105 V. (It should be around 120 V.) I saw it on an oscilloscope monitoring the line voltage. That's close to brown out conditions and can cause some digital products to shut down. Also, low line voltage limits power amplifier headroom. The solution, of course, is to spread the power feed across at least two or three breakers and make sure that the wire gauge is plenty large to avoid voltage drops. That fix couldn't be done here because of the existing house wiring, but an electrician should be called in to run another feed to the system.
- 5) The AC power itself wasn't very clean. While it did supply 117 V (at times), the waveform wasn't sinusoidal as viewed on an oscilloscope. It looked flat-topped, thereby presenting lots of harmonic content to the gear's power supplies. Who knows how different equipment reacts to clipped waveforms, but it can't be a good thing. What's the cause? A saturating transformer in the service feed? An intentional ploy by the power company? I'm not quite sure, but this one is *definitely* not field-repairable!

Along with the installer's technician, we went through all the diagnostics and repairs possible in the field. In the end, we got about 15dB of additional headroom out of the system before it shut down - this time because the breaker popped. We all smiled; the client seemed satisfied, and all peace was restored in home theater land. (The work of a super-hero is never done...)

How could all this have been avoided? Understand that no single item on its own could have caused the problem. Solving such a complex problem requires knowing how to deal with the system as a whole. Of course, setting technical standards for each component you use is a good start. For example, never use an SACD/DVD-A player without proper bass management (either internal or external); never put all the components on one 15 A breaker; never use speakers with low impedance curves; etc. These measures take some know-how on the technical side in addition to the procedure side. You need to gain this knowledge yourself, or at least hire an outside service. You also need to invest in test gear; it can all be had on eBay without breaking the bank, if that's what matters. Most of all, you have to be committed to technical excellence.

This article is based on a column published by A. Grimani in Residential Systems magazine March 2006. Chase Walton contributed to this article.