

## Tip #45 Impeding Your Progress

You hear a lot of talk about impedance these days:

*"Use speakers of the correct impedance."*

*"This receiver has low-impedance drive capability."*

*"When you parallel speakers together, their impedance drops."*

And so on. Unfortunately, not many people understand this stuff. Not all installers (some of whom were installing central vacs last week), and certainly not many end users, since it's been decades since audio was a hobby and people actually found this kind of thing interesting.

So we'll do our best to explain this in plain language, without trying to turn anyone into an electrical engineer.

When a speaker is connected to an amplifier or receiver, the speaker "presents" a certain resistive load to the amplifier. We express the resistive load in **ohms**. We say a speaker is a "16 ohm" speaker or an "8 ohm" speaker or a "4 ohm" speaker or whatever. (Actually, a speaker's impedance varies over its range; its impedance rating is an overall average impedance, or what engineers call "nominal.")

Now, let's change the perspective a little and look at things from the amplifier's vantage point. Pretend that the amplifier is a dam in a river. (See figure 1.) The river flowing to the dam is the electrical current. All dams open their floodgates to let the water through. You can think of the water that flows through the dam as the power that an amplifier produces.

The floodgate can be thought of as the impedance that a speaker presents to an amplifier. If the floodgate is only open a little bit (the impedance is

high, say 16 ohms), then the amount of water that flows through the dam is small (only a little power is produced by the amplifier).

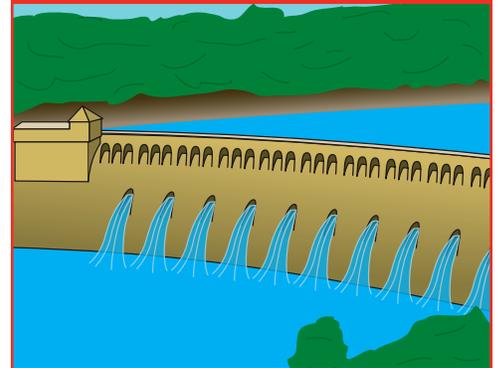
Well, you say, let's use lower-impedance speakers—8 ohm instead of 16 ohm—to get more power from the amplifier. (Let's open the floodgates wider to get more water to flow through the dam.) OK, that works—up to a point.

You've got to be careful how much water you let rush through the dam's floodgates. If you open the floodgates too much and the water rushes through too fast, then **BOOM!** Disaster. The dam will crumble under the weight of too much water rushing through too fast. (See figure 2.)

Same thing with receivers. Many can't handle low-impedance loads. If you connect a 4-ohm speaker (or try to run two 8-ohm speakers connected together in **parallel**, which equals 4 ohms), then it's the electrical equivalent of "opening the floodgates too much," and the amplifier's output stage can self-destruct (burn out, essentially). Kind of like the dam crumbling when the current rushes through too fast and the weight of all that water is simply more than it can handle.

Moral of the story: Keep the impedance load of the speakers within the safe operating zone of the receiver. If it says to use only 8-16 ohm speakers, don't use 4 ohm speakers. A too-low impedance load will cause the amplifier to try to produce more electrical current than it can safely deliver, sometimes with extremely unpleasant—and expensive—results.

Figure 1



*The dam is the receiver*

*The water flowing through the floodgates is the power (watts per channel)*

*The degree to which the floodgates are open is the speakers' resistance in ohms*

Figure 2



*If the resistance is too low—the floodgates are open too wide—the current flows too fast and the receiver (the dam) self-destructs.*

### Other Tech Tips:

Tip 41: Why the 6.1 Is So Good

Tip 42: Center Channel Dispersion

Tip 43: How H-PAS works

Tip 44: Power Response