Subject: Re: And an even more indepth article
Posted by Wayne Parham on Fri, 04 Jun 2004 05:31:37 GMT
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That's a pretty big deal. The issue of back EMF and load impedance is significant.

I think the best way to get a handle on this is to start from a simple perspective and visualize the situation, progressing to more complex attributes in steps.

1. Take a look at a simple voltage divider using two resistors. Use a DC voltage as the source. You'll notice that there is a fixed division of voltage between the resistors.

2. Now use the same voltage divider, but use an AC signal to drive them. You'll see it also has a fixed division of the signal between resistors.

3. Substitute the load resistor with a purely reactive component. Try a capacitor first, then an inductor. You'll find that the capacitor has the highest amount of voltage across it at low frequencies and the lowest at high frequencies. Current through the circuit is highest at high frequencies and lowest at low frequencies. The inductor acts just the opposite.

4. Now make the load a complex impedance having resistance, inductance and capacitance. Try several configurations for the load network. Make some having mostly series inductance and resistance, like a voice coil (sans diaphragm w/mechanical resonance). Make some circuits that are tuned circuits like a radio tuner, notch filter or loudspeaker port. What you'll find now is that the voltage across the load changes in a predictable fashion depending on the frequency.

5. In each of the preceding steps, the source voltage and resistance were held constant. The source voltage frequency was changed, but the amplitude was fixed to a reference value. The source impedance - the series resistance of the voltage divider - was also held constant. But what if we no make this variable too? That's what happens when amplifier output characteristics change.

A good amplifier acts as a constant voltage source with very low output impedance. But the output impedance is not zero, so it becomes the source impedance. The output circuit, including the speaker wires, is the source impedance and forms a voltage divider with the loudspeaker as the load. So the higher the output impedance, the more fluctuation in signal results from a changing load impedance. And when the amplifier itself fluctuates impedance because of instability or whatever, that adds another level of complexity to the voltage division between these two things, the output source and the load.