Subject: Re: Simple (very) math
Posted by Wayne Parham on Fri, 31 Oct 2003 20:13:56 GMT
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Power is directly proportional to the reciprocal of impedance and to the square of voltage, so a small increase in impedance requires a larger increase in voltage to develop the same amount of power across the load. Large power amplifiers are typically good current sources, and can be viewed as current multipliers. But still, the output voltage is what is typically constant, not the current.So if you set two different impedance loads across two amps that are generating the same voltage output, the one with higher impedance will dissipate less power than the one with lower impedance. If you set them so that both are dissipating the same amount of power, then the higher impedance load requires a higher voltage output as described by the formula.A horn loudspeaker can be described as having an electrical-to-mechanical transformation and a mechanical-to-acoustic transformation. The acoustic load generated by the horn is reflected back through the mechanico-acoustic transformation to modify the diaphragm's reactive and resistive properties. It acts to modify the primary resonant frequency and adds a few more, which is described by its reactance. It also impedes motion of the diaphragm as a damping force. This resistive component is more linear at higher frequencies, but is present to some degree at all frequencies in its passband.These mechanical transformations are reflected back through the electro-mechanical transformation to modify the electrical impedance curve. It has both a resistive and reactive component, and the increased resistance is an indication of the horn's increased efficiency. It also means that less electrical power is transferred at a given voltage, even though the horn's efficiency increase may have made the acoustic output greater. So a horn loaded driver can be expected to operate safely at a higher voltage, because its impedance is higher. But that is what we're really talking about here, and not the electrical power transferred to the load.