Subject: Effect of Length
Posted by Lancelot on Mon, 26 Jul 2010 18:24:38 GMT
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Does the length of a audio cord affects the quality of the sound produced? I know that this is true with the internet connection but how about with audio connection?

Subject: Re: Effect of Length
Posted by Wayne Parham on Mon, 26 Jul 2010 18:39:35 GMT
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Certainly. As length increases, so does resistance and reactance. For loudspeakers, it's the resistance that usually matters most and for interconnects, the reactance (capacitance and inductance).

Subject: Re: Effect of Length
Posted by Adveser on Tue, 27 Jul 2010 02:40:36 GMT
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Very very little. Let me know what you are dealing with, such as AWG and the specific length and I can give you exactly what the specs should be as far as Resistance. My circuits book has this stuff in there and i'll be glad to let you know.

Subject: Re: Effect of Length
Posted by Wayne Parham on Tue, 27 Jul 2010 03:56:10 GMT
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Let's say a guy doesn't really know the effects of speaker wire resistance and buys a spool of this stuff to wire his home:
22 guage speaker wireTwo rooms are pretty close to his 100 watt per channel home theater, and can be run up the wall, over the celing, and down the other wall with relatively short runs, 25 feet on one and 40 feet on the other. Another room takes 60 feet and the longest run takes 100 feet. Then he decides to wire some outdoor speakers that need 150 foot runs.

Since the speaker cable is a wire pair, the conductor length is twice the run length. In other words, the room that requires a 100 foot run has 200 feet of wire in the line...

...I think probably it would be best to understand that larger guage wire is going to be necessary, at least for the longer runs. The length of wire is enough to modify the response of the speakers by introducing a few ohms resistance, having a similar effect as raising Qes.

Subject: Re: Effect of Length
Posted by jesstasy on Fri, 30 Jul 2010 02:25:28 GMT
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There seems to be a confusion on the proper way to answer this question. One says it certainly matters. Someone else says it matters very, very little. Which is correct? I am also very curious about this matter as well but need some clarification.

Subject: Re: Effect of Length
Posted by Keith Larson on Sat, 31 Jul 2010 14:46:57 GMT
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Electrically you have a series connection of an amplifier, wire and speaker, so it comes down to ohms law, and thats nothing more than impedance ratios. Anyhow, if the wire impedance is high compared to the speaker (and amplifier) some of the signal will be show up in the wire instead of the load. This is calculated using the equation

dB(loss) = 20*log(Rload/(Rload+Rwire+Ramp))

Subject: Re: Effect of Length
Posted by Adveser on Sun, 01 Aug 2010 04:17:00 GMT
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Well, that is because the difference is typically very small. When I asked my teacher about this, he looked at me like I was crazy because he knows I am talking in the sense of a 16awg wire being a half inch shorter on one speaker. Naturally there are always conditions where it would become a bigger deal, but in a more general way, it isn't an issue, but some think it extremely important to correct even the slightest thing. Just use the chart and move the decimal places correctly. If it falls somewhere between the usual 10% tolerance, it is not worth the hassle. If you wanna be really accurate maybe go 2-5% tolerance. There is a calculator down at the bottom that might help.

Here is the chart:
http://www.powerstream.com/Wire_Size.htm

Subject: Re: Effect of Length
Posted by Lancelot on Mon, 02 Aug 2010 01:59:33 GMT
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Thank you guys for those inputs. I ask this question because of the speakers on my workplace. I work in a school and there are speakers in all buildings so everyone will hear any announcements. Some speakers sounded loud and some are not so loud. I guess I have the answer from the chart.

Subject: Re: Effect of Length
Posted by Shane on Mon, 02 Aug 2010 02:48:10 GMT
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Ummm....in our workspace we have volume adjustments on each of the ceiling mounted speakers....just a thought?

Subject: Re: Effect of Length
Posted by Wayne Parham on Mon, 02 Aug 2010 03:08:52 GMT
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I'm not really as concerned about power loss as I am with modifying the response. When the electrical resistance is increased, it reduces damping, much like what you get from a SET amplifier. In some cases, it isn't a problem but in some cases, it is.

Subject: Re: Effect of Length
Posted by Keith Larson on Mon, 02 Aug 2010 03:57:53 GMT
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Hm, maybe it would help to consider a hypothetical but not too unrealistic case?

As an example consider a speaker (or combination of speakers) whose impedance is nominally 8 ohms, with a 64 ohm peak in the bass, yet falls to 4 ohms at 20 kHz. Now suppose you are using a long (or crappy) cable with an R=1 ohms and 8uH inductance. The nominal loss would be 20*log(8/(8+1))=-1dB and the bass peak would be -0.134dB. However, at 20 kHz the cables total impedance is now 1+1j ohms (1.414 angle 45'). In this case the -2.6dB. The total variation is 2.5 dB, so a better cable might help, but from a simplistic view this is really not much more than a tone control. On the other hand, Wayne's point about damping comes to mind.

Incidentally when something sounds bad, what I usually find to be most problematic are bad connections, oxidation and corrosion. Basically this is loose screws, oxidized wire and incompatible metal contacts.

Subject: Re: Effect of Length

Posted by Lancelot on Mon, 02 Aug 2010 07:34:04 GMT
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Keith Larson wrote on Sun, 01 August 2010 22:57Incidentally when something sounds bad, what I usually find to be most problematic are bad connections, oxidation and corrosion. Basically this is loose screws, oxidized wire and incompatible metal contacts.

Does this mean that a wire subjected to environmental variables like rain or wind can change the volume or sound quality that run through it? I thought the cords are protected from these elements.

Subject: Re: Effect of Length
Posted by Keith Larson on Mon, 02 Aug 2010 14:27:29 GMT
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Insulated wires have two advantages. One is protecting the wire itself from abrasion and corrosion. As an example, you have probably seen plenty of copper wire turn green because of chemically reactive insulation, but this takes time. The other is maintaining a constant conductor spacing. For a one loop inductor, I'm pretty sire the inductance is a function of the area within the loop. Anyhow, if you 'unzip' a section of wire the inductance will go up by quite a bit.

In most instances where the wire is not severely undersized the ratio of wire to speaker resistance is usually large enough that the effects of wire resistance are un-noticeable. Its usually when the ratio is 1:10 or less that things start to become noticeable and eventually obvious. By the way I would like to add here that I understand that using the word 'noticeable' is very subjective. The bottom line is that if you have a good ear or know what to listen for, things become more noticeable, or, simpler yet, tilt your head a few degrees for a new experience! FWIW, as far as measuring goes, changes on this scale are easy to spot.

The only thing that really effects wire in the short term is temperature. The resistance of many metals (IE copper) is directly proportional to absolute temperature, so its not surprising that unless the wire is really bad and goes from cold to on fire, its not going to change much.

Note: Heat tends to build up much faster in the voice coil of the speaker with some coils potentially getting VERY hot. Temperature swings of 200'C are common, so were talking about nearly a (270+200)/270 change in resistance.

On the other hand, the connections are by far much more influenced by the environment.
