Subject: Linear measurements in audio gear
Posted by gofar99 on Fri, 30 May 2025 03:17:27 GMT
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Hi Everyone, In my addled mind today I wondered if there was a good or easy (or both) way to measure how linear the gain is in an amplifier. Not the frequency response as I can do that easily on one of my PC scopes (Bode plots are great). But more like if you put in one unit of voltage and get out say 3, will you get 6 out if you put in 2. That is simplistic as a scope trace over a good percentage of the ability of the amplifier is what I would like to see. Related is what effect would phase shifts have on the linearity. It would seem like some sort of saw tooth signal of the right magnitude and frequency might work. Something that the ramp would seem like a signal to the amp and if it started at essentially zero and went to something that would drive the amp to nearly full power and was of a frequency (think low) that the ramp would be treated not as DC but a slow raising AC voltage and the duration of the ramp would be suitable for a scope to display. Something like a saw tooth wave. The straightness of the ramp would indicate how linear the amp was. SS gear might not have an issue with this but tube gear might. Any thoughts?

Subject: Re: Linear measurements in audio gear
Posted by Wayne Parham on Fri, 30 May 2025 13:20:55 GMT
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Oh yes, that's huge. I think you're essentially talking about load line analysis, yes?

Subject: Re: Linear measurements in audio gear
Posted by gofar99 on Sat, 31 May 2025 02:26:11 GMT
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Hi Yes. But I can't find an easy way to test or measure it.

Subject: Re: Linear measurements in audio gear
Posted by Wayne Parham on Sat, 31 May 2025 14:39:47 GMT
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That's an interesting problem. My instinct is to create a series of precision equally-spaced input voltages. Then measure the output voltages for each input.

This would work great, but obviously the difficulty is in the precision of the input voltage. That would be the hard part - generating the input series and making it precise.

As DUT gain increases, input precision becomes more and more critical.

I'm thinking you might look into precision DACs. My first thought was to build a resistor-ladder DAC, but even then, you would have to "dial it in" with the resistor values, making sure each was exactly equal. I think the precision DACs from Analog Devices and Texas Instruments would give better results. A single voltage divider on the output of the DAC can allow setting the overall amplitude range.

Subject: Re: Linear measurements in audio gear
Posted by gofar99 on Sun, 01 Jun 2025 02:33:01 GMT
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Hi Wayne, a possibility. I have a precision calibration source for checking my DVMs. It has 4 place accuracy with values of 2.500 5.000, 7.500 and 10.00. It might be a sufficient range. I can get any number of 1% resistors and make other steps. A plot of the voltages vs time using it to sync one of my PC scopes. Food for thought.
