Those who would audition their audio equipment for the effects of dielectric material in the coupling capacitors and oxygen in their speaker cables have long been ridiculed by the rest of us who merely use our hi-fi to listen to the music. Ultra-sensitive audio measuring instrumentation seems to provide evidence that the golden ears brigade might be right after all. Audio consultant Ben Duncan reports.

PROOF FOR THE GOLDEN EARS HYPOTHESIS?

Audio Precision, a US company founded by ex-Tektronix engineers, presently makes some of the world's most advanced audio test equipment.

Highly dependent on complex digital signal processing to produce its results, AP's recent software update has introduced challenging new tests for analogue audio, using DSP sampling at up to 192kHz. This can eke error signals out of the noise through steep but fast settling filtering with a degree of precision not previously possible.

One of the new tests enables individual harmonics up to the 10th to be plotted against frequency, down to some 0.00006% (60ppm). The other prods the DUT with a tone, typically 1kHz, which it cancels to <–130dB, and plots the resulting spectra. This shows both harmonics and intermod products. The sensitivity of the new tests is producing seemingly objective evidence of effects previously held to be utter rubbish by hard line objectivists.

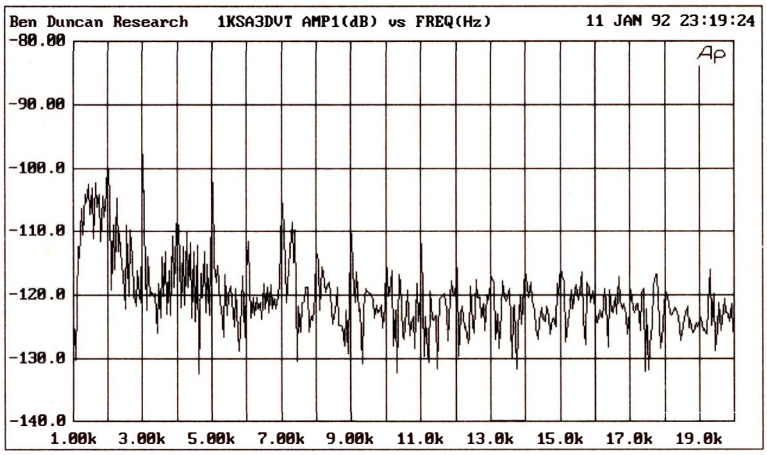

Fig. 1 Before the capacitor change. The output spectra of a Rauch DVT-50s professional power amp at 13dB below clip into 8Ω. Under these conditions, odd harmonics dominate.

Figure 1 shows the output spectra of a Rauch *DVT-50s* professional power amp at 13dB below clip into 8Ω. Under these conditions, odd harmonics dominate. In **Fig. 2**, the 100µF DC blocking capacitor in the grounding arm of the amplifier negative feedback loop has been changed for back-to-back elcaps totalling 165µF. The sonic benefits of doing this have long been recognised. All other conditions remain the same.

Figure. 2 clearly documents differences that corroborate the audible change. Looking carefully, one can see that the reversible elcap increases all the even harmonics up to the 8th, making them almost dominant. It also changes the residue so the odd harmonics above the 9th slope off monotonically. The full effect of

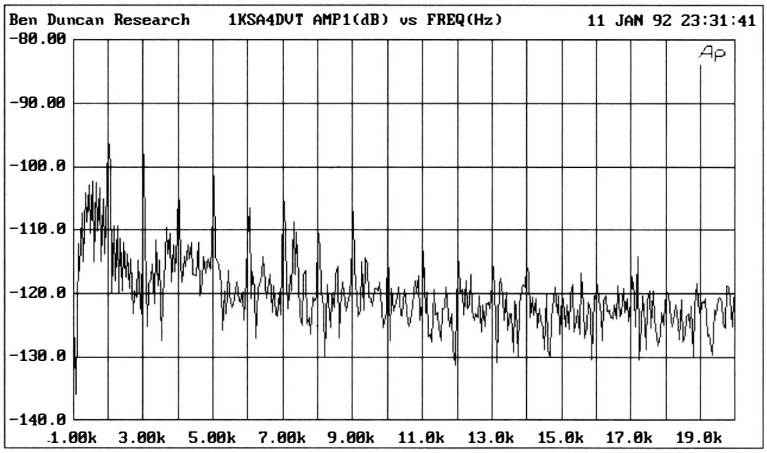

Fig. 2. And afterwards... the 100μF DC blocking capacitor in the grounding arm of the amplifier negative feedback loop has been changed for back-to-back elcaps totalling 165μF. Looking carefully, one can see that the reversible elcap increases all the even harmonics up to the 8th, making them almost dominant. It also changes the residue so the odd harmonics above the 9th slope off monotonically.

this change can be more fully appreciated by overlaying psychoacoustic weighting[1], but the principle is clear enough. **Figure 3** shows how a traditional THD+N vs frequency measurement misses the point; THD in the modified unit (upper plot) appears to be unchanged below 1kHz and slightly higher above 1kHz, leading to false conclusions. The new tests are so sensitive that the effects of changing and upgrading individual components can be seen.

Reference

1. J.R.Stuart, *Psychoacoustic models for evaluating errors in audio systems*, Proc IOA Vol. 13 Pt.7, 1991.

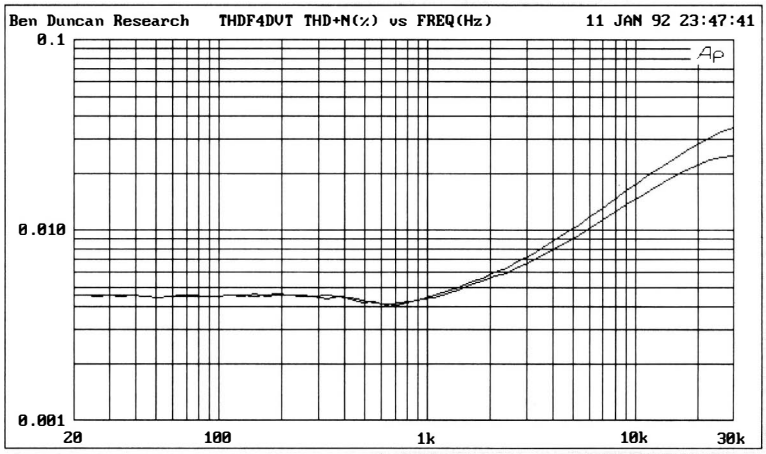

Fig. 3 shows how a traditional THD+N vs frequency measurement misses the point: THD in the modified unit (upper plot) appears to be unchanged below 1kHz and slightly higher above 1kHz. Even so, general opinion holds that the modified amplifier with the apparently higher THD levels sounds better.