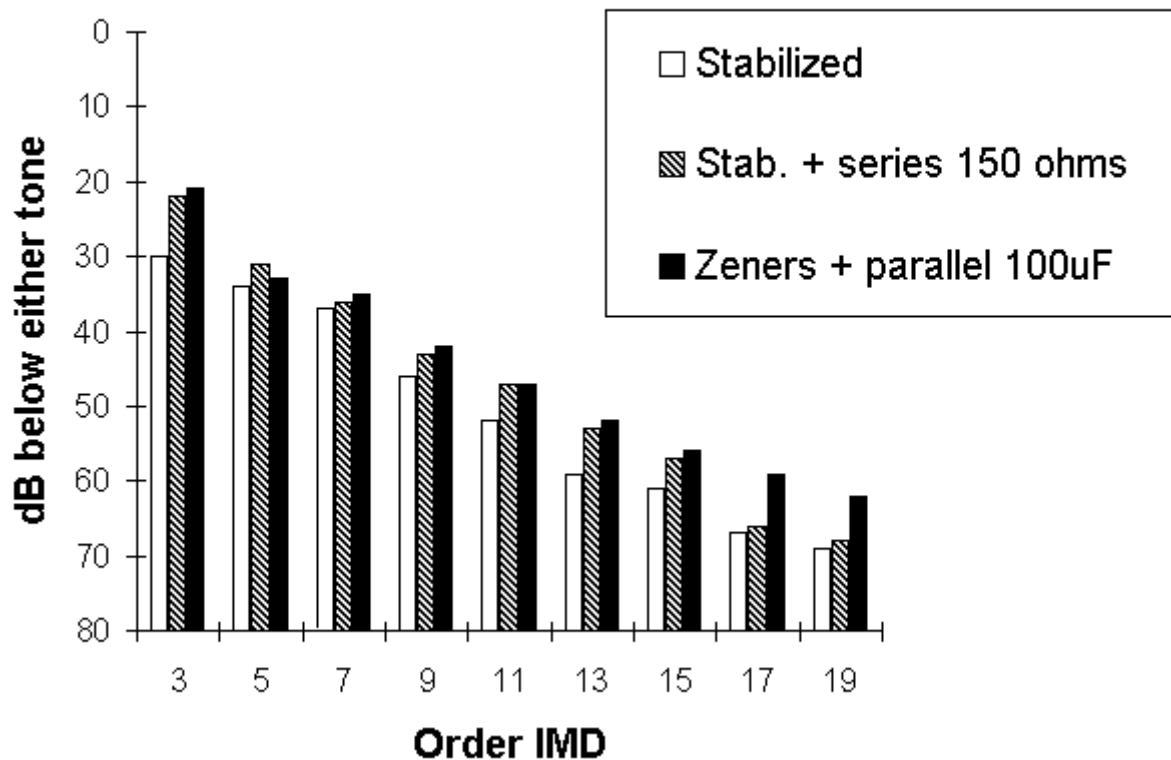


Lower IMD from Tetrode Power Amplifiers

John Nelson, GW4FRX has been a constant campaigner for cleaner signals, and has been responsible for many key developments in tetrode power supplies (see Chapters 6 and 11 of [The VHF/UHF DX Book](#)). This bar-chart shows his measurements of two-tone IMD performance of a pair of 4CX250Rs in class AB1 at 500W PEP output, with three different types of screen supply.

IMD for various screen supplies (GW4FRX)



Test conditions

- Two Eimac 4CX250Rs, operating (heater) time 4500hrs
- Va 2000V
- Vg2 350V
- Zero-signal anode current 100mA per tube
- Two-tone test signal, 1kHz spacing, class-AB1 drive conditions (no g1 current).

1. Amplifier tuned and loaded initially for -30dB 3rd-order IMD at 500W output, using GW4FRX stabilized screen supply (350V). IMD measured.
2. 150 ohms series resistance added to screen supply to simulate poorer regulation. IMD re-measured.
3. Screen supply replaced by 350V zeners with 100uF in parallel to improve audio-frequency regulation. IMD re-measured.

[See comments below](#)

Comments

- **The best IMD performance** (white bars) came from GW4FRX's own extremely well regulated supply. This has excellent DC stability and a very low dynamic impedance at all audio frequencies, from 3kHz down to syllabic frequencies of a few hertz.
- **Second best** (checkered bars) was the highly stabilized supply with a 150-ohm series resistor added to artificially increase the output

impedance.

- **A poor third** (black bars) – especially for higher-order IMD – is the traditional 'chain of zeners' stabilizer with a 100uF parallel reservoir capacitor.

Conclusions

1. A screen voltage regulator with low dynamic impedance **at all audio frequencies from 3kHz down to syllabic frequencies of a few hertz** will produce significantly better IMD performance, especially for the higher-order products that make your signal 'wide'.
2. Improved screen stabilization can give IMD performance that is notably better than stated in the Eimac data sheets.
3. **Zener stabilizers are no longer state-of-the-art.**

On the air, these conclusions have been verified by many British and European stations. Tight screen voltage regulation really does make a difference to your reputation!

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