

## QUESTIONS

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the notion that high plate voltage improves your low-end response. If you increase the voltage, your output tubes will swing more, but you'll also shorten the life of the tubes unless you bias it back. If you pull it down with bias, you move from class AB1, which is normal Fender or Marshall, toward class AB2. This is going to give you a raunchier sound because you're going to get more crossover distortion. You can also run into transformer saturation problems because the higher voltage increases power. It's a question of taste, but transformer saturation and crossover distortion from the tubes being biased toward AB2 doesn't sound very nice. Maybe some of the death metal guys would like it because it's so nasty. As far as increasing voltages on the preamp, though, I'm all for it. The sound will clean up when you lower your guitar volume, and the amp becomes very sensitive to your fingers.

**Bruce Zinky:** It's always nice to have as much voltage as possible on power tubes except that you can quickly roast them. You get

more voltage swing with higher plate voltage, and that translates to more spank, bigger sound, increased headroom, and better dynamics. But if you go *too* high, you get an amp that sounds cold. You also want to see what the plate voltage is when the amp is at full power because if the voltage sags, the amp will sound very clean at low volume but distort a lot at high volume. EL34s want high voltages: 450 volts is not adequate for an EL34 to produce good tone; 480 volts and up is where it's at. When you first get an EL34 in a high-voltage amp it sounds better than anything for about 20 minutes. After a while, though, it kind of softens up and sounds average.

**Andy Marshall:** I have seen 100-watt JMP Marshalls with EL34s that had plate voltages ranging from 440 to 540 volts. The measurable difference is in headroom. At 440 volts, a 100-watt JMP will start clipping at about 65 watts. At full distortion, it will give you around 130 to 140 watts. I've had some Marshalls in here with 500 volts or more on the plates that didn't even start clipping until they were putting out around 135 watts. At full output, they were delivering 240 watts! If the plate voltage gets *too* high, though, and everything else remains the

same, the amp will become brittle-sounding. Most EL34s on the market are happiest between about 460 and 490 volts. After listening to a bunch of JMP Marshalls, the ones we liked best were sitting at about 470 volts. That's why we put our amp at 470 volts.

As the plate voltage changes, the impedance of the tube changes. A push-pull pair of EL34s at 470 volts is about a 5k $\Omega$  load plate-to-plate. If you take it up to 530 volts, you've got an impedance of about 9k $\Omega$ . That'll make all the difference in the world because you're completely mismatching the impedance to your output transformer. Of course, we're talking guitar amps where linearity is not the ultimate goal—but it is still important. When you change the impedance, the entire frequency-response curve changes. If you're trying to determine the effect of increased voltage on tubes, then as you change voltage you need to change the output transformers. With four different amps, four different voltages, and four different impedances, you could start analyzing the effects of voltage on the tubes. But Marshall and Fender didn't change their output transformers, they just boosted the voltage. ■

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