Subject: Re: Fixed Bias v. Cathode Bias
Posted by Thermionic on Sun, 17 Jul 2005 02:25:04 GMT
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Some personal musings on bias: Grid bias exhibits lower distortion (and more power, as Forty2wo noted) than cathode bias does, and the orders of distortion artifacts present with each differ. Output Z and therefore damping factor as well also vary with the bias method, and whether or not the cathode resistor is bypassed. With a cathode biased stage there is indeed degenerative feedback, but the parallel bypass cap provides a low impedance AC path to ground and breaks it. Adding the bypass cap increases gain, distortion, and stabilizes the bias effect.A grid biased stage can be either Class A or Class AB operating class. A cathode biased stage found in a hi-fi amp is typically gonna be Class A, while a cathode biased PP guitar amp may be either class. The reason is that with Class AB operation the plate current increases significantly with output, and an increase in current drawn through the cathode resistor creates a higher bias voltage, according to Ohm's Law. If an amp is (cathode) biased into Class AB operation far enough away from Class A, it will increase it's bias voltage on the fly enough with increased output wattage to the point where crossover notch distortion becomes horrendous. As you increase the volume further, it'll sound more and more distorted until it actually starts losing volume from the power tubes being cut off!That's of course worthless for hi-fi. But, there are a few guitar amps like the legendary Vox AC30 (and boutique clones) that use a cathode biased Class AB output stage to produce a unique set of harmonics as the amp is turned up. The AC30 is biased close to Class A operation, so the power tubes' current draw doesn't increase really sharply with output, which keeps it out of trouble.Another difference with cathode and grid bias is that with cathode bias, the plate voltage you measure is NOT the real plate voltage. The real plate voltage is the plate to cathode voltage potential. Subtract the cathode voltage from the measured plate voltage, and you have the real plate voltage. This must be taken into account when designing a cathode biased stage on the plate characteristic curves.Thermionic