Loudspeaker Damping as a Function of Plate Resistance

(from preceding page)

$\sqrt{\frac{2500}{10}} = 15.8$ to 1. The impedance reflected into the secondary becomes $(1/15.8)^2 \times 1000 = 4$ ohms. Consider another tube having a plate resistance of 5000 ohms and a desirable load of 12,500 ohms (2½ times the plate resistance as for the first tube). To feed a 10-ohm loudspeaker requires a turns ratio of $\sqrt{\frac{12,500}{10}} = 35.3$ to 1. The impedance reflected into the secondary becomes $(1/35.3)^2 \times 5000 = 4$ ohms, the same as for the first tube.

Comparisons

This does not mean of course that all triodes *as actually used* have the same damping properties. What it does show is that if the choice of load impedance is governed by allowable distortion for each tube type, one type may give better speaker damping than the other *for the particular load impedances chosen.* Clearly the higher the ratio of load impedance to plate resistance, the greater the amount of speaker damping. Fortunately, in the case of triodes, the higher the ratio of load to plate resistance the lower the distortion, so that one does not have to sacrifice speaker damping for distortion or vice versa.

To summarize, when using triodes, the ratio of load impedance to plate resistance, (sometimes called the damping factor), is always greater than one because this relationship produces low distortion. When using pentodes or beam tetrodes, the damping factor is always less than one because such a condition gives lower distortion. Hence, triodes are superior to tetrodes or pentodes, but as far as speaker damping only is concerned all triodes must be considered about equally as effective.