

When designing or building an ordinary vacuum tube audio amplifier with a pentode front end we can for the most part ignore the screen supply resistance. Simply set it to be in the range of 3-4 times the plate resistor & the circuit will perform satisfactorily. As long as the screen resistor is adequately bypassed there are no significant problems.

That all changes when the intention is to use NFB. Most folks would assume that the RC time constant is simply the screen resistor times the screen bypass capacitor. That can lead to problems since the screen supply resistor is actually in parallel with the resistance of the screen grid itself as seen looking into the tube. Some calculations using the available published tube data indicates the screen resistance of common audio voltage amplifier pentodes to be in the range of 50K.

This simple setup makes measurements leading to the incremental screen resistance of the pentode section of a 6U8 vacuum tube while in operation. The tube is connected to a plate supply of 300 volts. The screen is fed from this supply thru a total of 730K resistance. But interposed on that is a means of applying an interfering One KHz test signal. Any audio transformer of high impedance primary & secondary can be used to couple the audio signal generator to the high voltage on the screen. I used an old Hammond 447 Interstage Transformer.

Just two measurements are required. Using a differential probe the AC voltage drop across the 730K is measured, then the AC voltage from common to screen.

The results are as follows-

**First Pass- Drop across 730K was 0.9V**

**So  $I_{g2}$  is  $0.9 \text{ V} / 0.73 \text{ M}$ ,  $1.23 \mu\text{A}$  And  $E_{g2}$  measured  $0.043\text{V}$**

**So  $r_s$  is  $\Delta E / \Delta I$   $r_s = (0.043\text{V} / 1.23 \mu\text{A})\text{K}$  or  $35.0\text{K}$**

**2<sup>nd</sup> Pass- Drop across 730K was 2.83V**

**So  $I_{g2}$  is  $2.83 \text{ V} / 0.73 \text{ M}$ ,  $3.88 \mu\text{A}$  And  $E_{g2}$  measured  $0.133\text{V}$**

**So  $r_s$  is  $\Delta E / \Delta I$   $r_s = (0.133\text{V} / 3.88 \mu\text{A})\text{K}$  or  $34.3\text{K}$  Done**



