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Subject: It's not that hard to calculate.

Posted by [Mark Kelly](#) on Fri, 15 Apr 2005 00:04:37 GMT

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As you said, only part of the filament goes negative WRT grid because the heater voltage is applied along the filament. The voltage drop along the filament can be taken to be linear so the sum of grid current potential will be the area under a triangular section "north" of the crossing point. The actual grid current will vary according to  $k \cdot \sqrt{E_g / E_p}$  for  $E_g > E_p$  (logically at the inflection point  $E_g = E_p$  the current is  $k \cdot E_g / E_p$  which is the convenient point at which to calculate  $k$ ). Assuming you stay with grid voltage below plate voltage the grid current will be an integral over the square root function derived from the above. The calculation is left to the reader as an exercise (don't you hate that in EE texts?)

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