

Key mathematical relationships include the following:

$$\mu = \frac{\Delta E_b}{\Delta E_{c1}}$$

$$R_p = \frac{\Delta E_b}{\Delta I_b}$$

$$S_m = \frac{\Delta I_b}{\Delta E_{c1}}$$

Where:

μ = amplification factor (with plate current held constant)

R_p = dynamic plate resistance

S_m = transconductance (also may be denoted G_m)

E_b = total instantaneous plate voltage

E_{c1} = total instantaneous control grid voltage

I_b = total instantaneous plate current

The total cathode current of an ideal triode can be determined from

$$I_k = K \left\{ E_c + \frac{E_b}{\mu} \right\}^{3/2}$$

Where:

I_k = cathode current

K = a constant determined by tube dimensions

E_c = grid voltage

E_b = plate voltage

μ = amplification factor