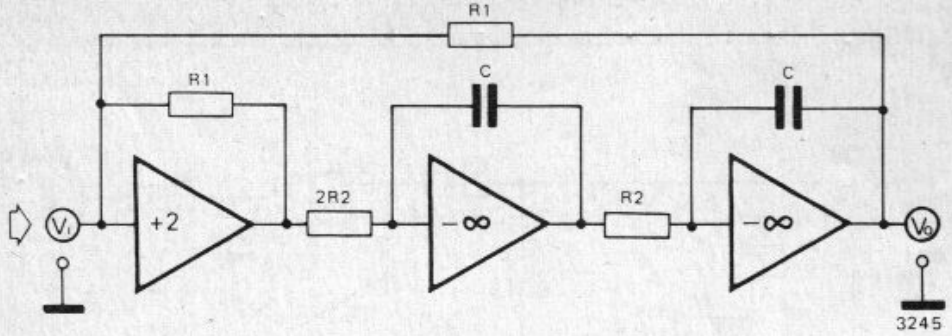
frequency dependent resistor



In the arrangement shown here the transfer function is:

$$\frac{v_o}{v_i} = \left(\frac{1}{j\omega\tau}\right)^2$$

in which

$$\tau = R_2 \times C$$

The input current is therefore:

$$i_i = \frac{v_i - v_o}{R_1} + \frac{v_i - 2v_i}{R_1} =$$

$$\frac{v_o}{R_1} = \frac{1}{R_1 \omega^2 \tau^2} \times v_i,$$

which means that the input impedance is:

$$z_i = \frac{v_i}{i_i} = R_1 \omega^2 \tau^2 .$$

This is a real resistance — with current and voltage in phase — but increasing with the square of the frequency.

(Int. J. Electronics)