

18. The linear relationship between θ (the knob angle in degrees) and frequency f is

$$f = f_0 \left(1 + \frac{\theta}{180^\circ} \right) \implies \theta = 180^\circ \left(\frac{f}{f_0} - 1 \right)$$

where $f_0 = 2 \times 10^5$ Hz. Since $f = \omega/2\pi = 1/2\pi\sqrt{LC}$, we are able to solve for C in terms of θ :

$$C = \frac{1}{4\pi^2 L f_0^2 \left(1 + \frac{\theta}{180^\circ} \right)^2} = \frac{81}{400000\pi^2 (180^\circ + \theta)^2}$$

with SI units understood. After multiplying by 10^{12} (to convert to picofarads), this is plotted, below.

