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Relationship between Capacitance and Loop Tuning Frequency

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Changing 'C' to adjust tuning frequency

Resonant frequency change is the basis of inductive vehicle detection

ω is the frequency in radians/sec

For a resonant circuit:

$$\omega = 1 / \text{SQRT}(LC)$$

Therefore ω is proportional to $1/\text{SQRT}(L)$ or $L^{-0.5}$

In other words any variation in L of X% translates to a much smaller variation of ω . However, this variation is not affected by C. C only affects the absolute value of ω .

What does all this mean?

Changing the resonant frequency point for a fixed inductor (a loop) requires changing the capacitance 'C'.

Since C is not related to the change in ω when L changes - it can be stated that doing so is a pointless exercise unless the frequency is shifted by at least 5Khz and the device must easily accommodate site variations while incurring preset incremental capacitance steps.