

## ANTENNA LOADING

You will sometimes want to use one antenna system for transmitting and receiving on several different frequencies. The antenna must always be in resonance with the applied frequency, you may need to either physically or electrically lengthen or shorten the antenna. Physically lengthening the antenna is not very practical. But you can achieve the same result by changing the electrical length of the antenna. To change the electrical length, you can insert either an inductor or a capacitor in series with the antenna. This is shown below in views A and B. Changing the electrical length by this method is known as LUMPED-IMPEDANCE TUNING, or LOADING. The electrical length of any antenna wire can be increased or decreased by loading.

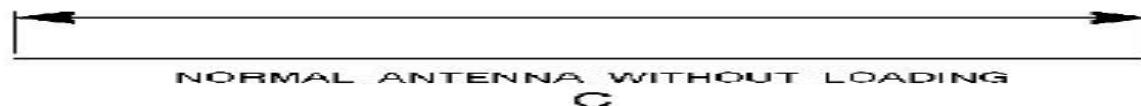
If the antenna is too short for the wavelength being used, it is resonant at a higher frequency than that at which it is being excited, it offers a capacitive reactance at the excitation frequency. Capacitive reactance can be compensated for by introducing a lumped-inductive reactance, as shown in view A.

If the antenna is too long for the wavelength being used, it is resonant at a lower frequency than that at which it is being excited, it offers an inductive reactance at the excitation frequency. Inductive reactance can be compensated for by introducing a lumped-capacitive reactance, as shown in view B.

If the Antenna is Electrically to "Short" add "L"



If the Antenna is electrically to to "Long" add "C"



A RESONANT FREQUENCY ( $f_r$ ) IS THAT FREQUENCY OF "ALTERNATING CURRENT (AC)" WHERE THE CIRCUIT "CAPACITIVE REACTANCE ( $X_c$ )" AND THE "INDUCTIVE REACTANCE ( $X_L$ )" ARE EQUAL IN MAGNITUDE BUT OPPOSITE IN POLARITY AND EFFECTIVELY CANCEL EACH OTHER OUT AND ONLY THE CIRCUIT "RESISTANCE (R)" IS LEFT. EXAMPLE:  $X_C = +12V$ , AND  $X_L = -12V$ . THIS OCCURS AT ONLY "ONE" FREQUENCY IN ANY AC CIRCUIT.

If installing a 'Fan Dipole' the Elements may be SHORTENED to RAISE the fundamental frequency of the pair, LENGTHENED to LOWER the fundamental frequency for the pair.