VIDEO 56

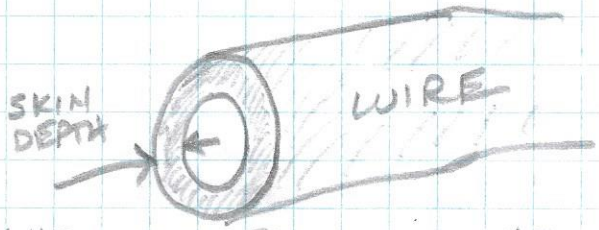
ALL COMPONENTS HAVE PARASITIC PROPERTIES (WHICH MAKE THE COMPONENTS NON-IDEAL)

- COMPONENT LEADS HAVE INDUCTANCE.

  EXAMPLE: 2" (5cm) OF 22 AWG WIRE ≈ 57 nH !

- COMPONENT LEADS HAVE RESISTANCE, SO DOES WIRE ~~THAT~~ MAKES UP AN INDUCTOR.

- AS FREQUENCY GOES UP - SKIN EFFECT GETS WORSE



@ 1MHz, SKIN DEPTH IS 0.007cm, OR 0.00275"

THE HIGHER THE FREQUENCY, THE THINNER THE SKIN DEPTH

- CAUSES RESISTIVE LOSSES TO GO UP

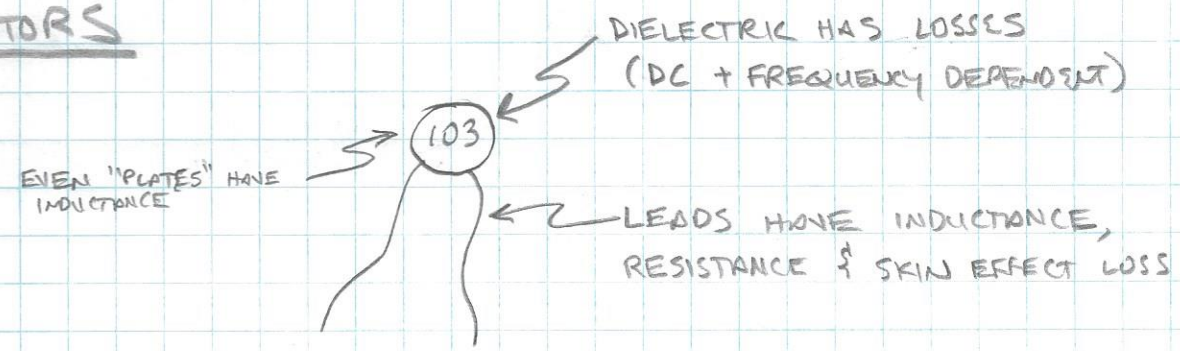
22 AWG ≈ 25.3 mils ≈ 0.0643 cm

- INSULATORS CAN HAVE LEAKAGE (RESISTANCE) AND FREQUENCY DEPENDENT LOSS

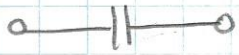
- PHYSICAL CONSTRUCTION INFLUENCES THESE AND OTHER PARASITIC PROPERTIES

LETS EXAMINE ...

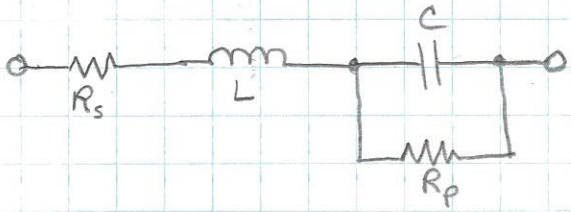
CAPACITORS



IDEAL CAPACITOR



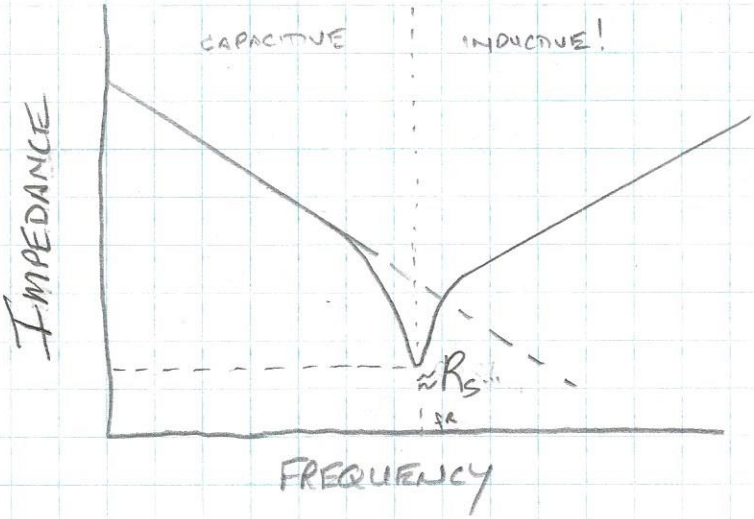
REAL WORLD CAPACITOR



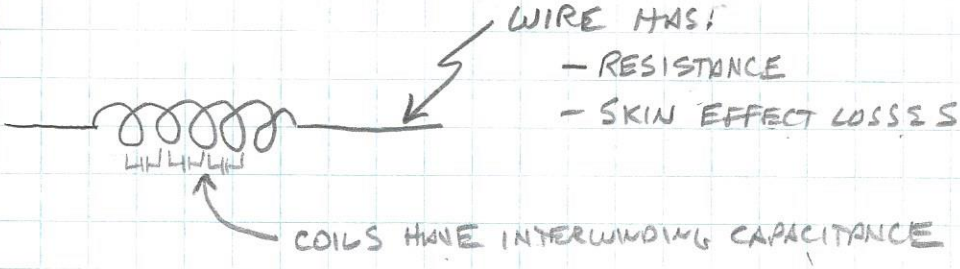
THUS, AS FREQUENCY GOES UP, THE CAPACITOR BECOMES LESS IDEAL... INDUCTIVE REACTANCE INCREASES

AT SOME FREQUENCY, $X_L = X_C$ = SELF RESONANCE

ABOVE SELF RESONANCE, THE CAPACITOR BEHAVES LIKE AN INDUCTOR!!!

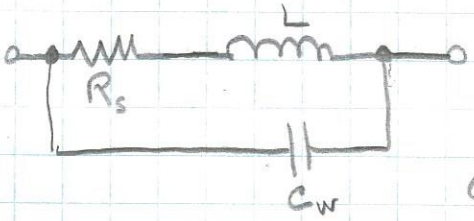


INDUCTORS



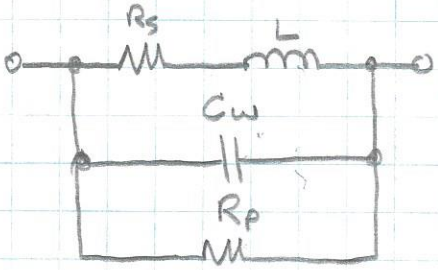
IDEAL INDUCTOR

REAL WORLD INDUCTOR

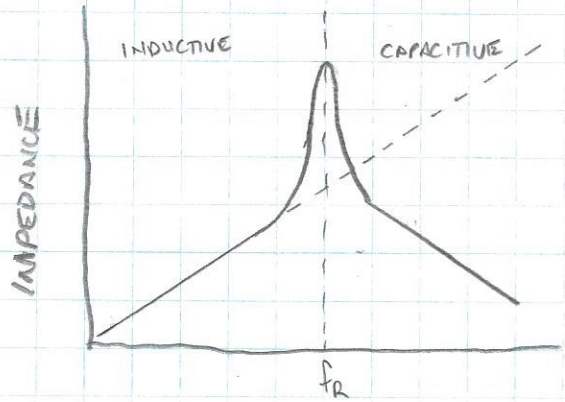


$$Q = \frac{X_L}{R_S}$$

IF A MAGNETIC CORE IS USED
- IT REDUCES THE # OF TURNS DRAMATICALLY, BUT
- ADDS ANOTHER LOSS TERM (FREQUENCY + CURRENT DEPENDENT)



- JUST LIKE CAPACITORS, INDUCTORS HAVE SELF-RESONANCE TOO!



ABOVE f_R, THE INDUCTOR LOOKS CAPACITIVE!