Objective:
- Verify that the addition of a parallel capacitor can increase the power factor in an inductive load.

Procedure:
1. Construct the circuit shown in Figure 1. Connect one channel of the oscilloscope to node A and the other channel to node B.
2. While measuring the voltage at node A on the scope adjust the amplitude of the function generator to produce a $5 \, \text{V}_{\text{RMS}}$ (7.07 V peak amplitude) output at a frequency of $f = 10 \, \text{kHz}$.
3. The 50 $\Omega$ resistor will be used as a current sensing resistor. Since the scope can not directly measure current we will determine the current indirectly by measuring the voltage across the resistor (from node B to ground) and applying Ohm's law. The impedance of the current sensing resistor is so small compared to that of other impedances in the circuit it is assumed to have negligible effect on circuit current. Measure the amplitude and phase of the voltage at node B. Take care to measure the phase angle as accurately as possible. (The phase angle is measured relative to the input voltage at node A. It is necessary to display both voltages on the scope at the same time.) Convert the amplitude to RMS and then apply Ohm's law to determine the (complex) phasor RMS current $I$.
4. Calculate the complex power and corresponding power factor for the circuit in Figure 1.
5. Add a 0.005 $\mu$F capacitor to the circuit as shown in Figure 2. (It may be necessary to use two 0.01 $\mu$F capacitors connected in series.) Verify that the voltage at node A is still $10 \, \text{V}_{\text{RMS}}$ and adjust if necessary. Determine the new values of current, complex power and power factor as in steps 3 and 4.
6. Verify your measured results with an LTSpice simulation.

Discussion:
Compare the amount of real and reactive power used in both circuits. Compare the magnitude of the total current in both circuits.