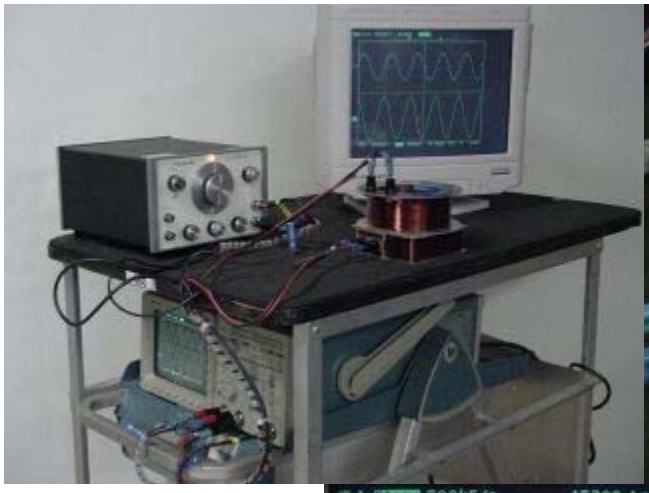
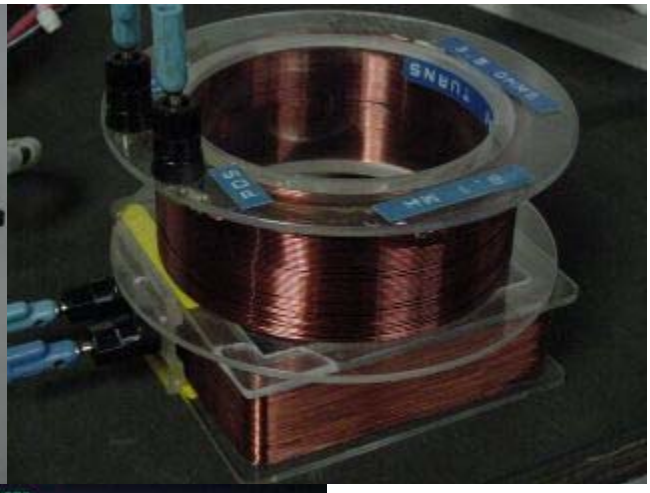
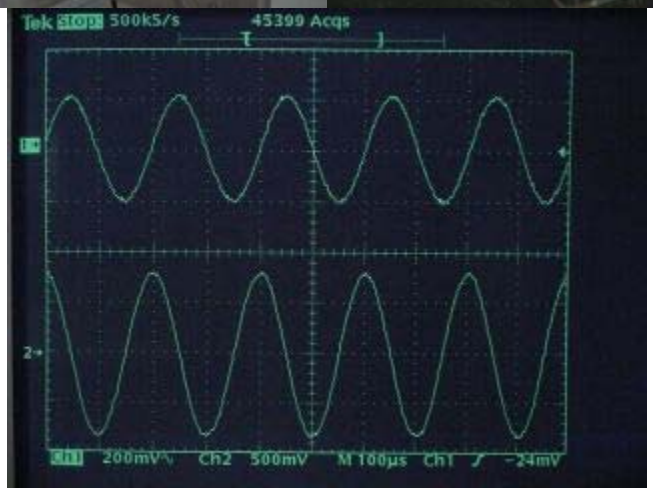
Question #270

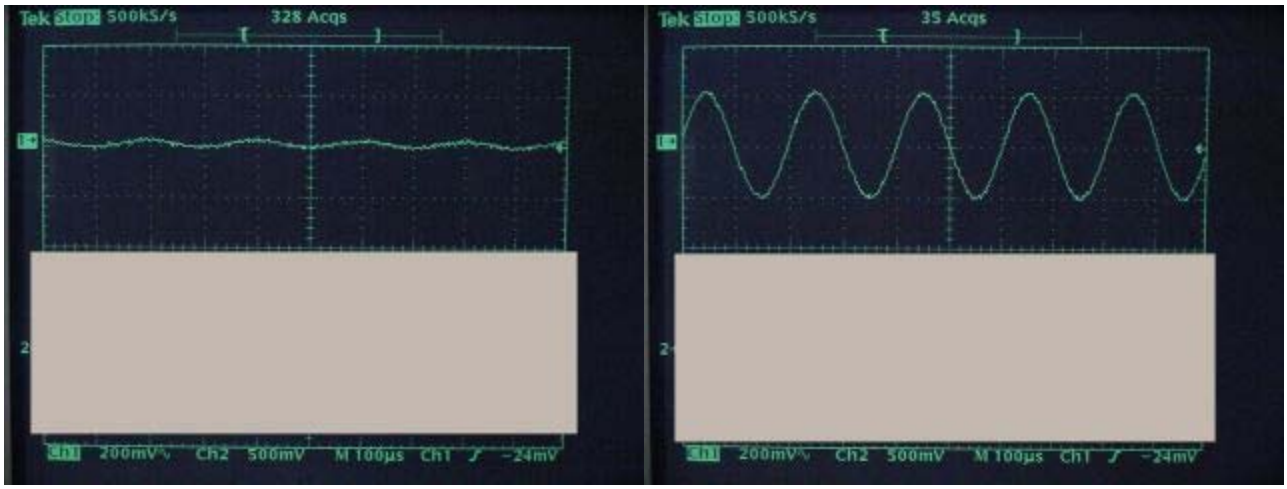
The photograph at the left below shows an experiment to study the electromagnetic induction between two coils: a round coil on the top and a square coil on the bottom of the photograph at the center below. An electrical current, the amplitude of which is seen on the top trace of the oscilloscope in the photograph at the left and in the photograph of the oscilloscope screen at the right, is produced in the round coil using the wave generator, also seen in the photograph. This creates a magnetic field in the region of the two coils. The square coil, below the round coil in the photograph at the left and center below, senses the changing magnetic field, inducing an electrical potential (voltage) that is seen on the lower trace of the oscilloscope in the photograph at the left and the detail at the right. Note that the voltage induced in the lower coil (bottom trace) leads the current in the upper coil (upper trace) by 90^{o} in phase.







Now suppose that the coils are reversed: that is, an identical current will be produced in the square coil (shown on the upper trace below) and we will look at the voltage induced in the round coil (shown on the lower trace below). After the leads were reversed, the oscilloscope picture is shown at the left below, except that the lower trace has been covered up. We then adjust the amplitude of the current in the square coil so that it is the same as the current originally in the round coil. The round coil now will serve to sense the changing magnetic field and induce the voltage. This is seen in the photograph the right below, except again the lower trace has again been covered up so that you cannot see how much voltage is induced.



With the current in the square coil primary set equal the same as that in the round coil when it acted as the primary, the voltage induced in the round coil secondary will be:

- (a) greater than the voltage induced in the square coil.
- (b) less than the voltage induced in the square coil.
- (c) the same as the voltage induced in the square coil.

Click here for Answer #270 after January 22, 2007.

Question of the Week

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For questions and comments regarding the *Question of the Week* contact Dr. Richard E. Berg by e-mail or using phone number or regular mail address given on the Lecture-Demonstration Home Page.