

ELT 101: Basic Electricity: AC/DC

Lab 12-1: Transformers

A transformer is a special form of a coupled circuit where the coupling mechanism is the mutual inductances between two coils. The common magnetic flux path is provided by an iron core. A transformer can be represented as shown in Figure 1a. A physical implementation is given in Figure 1b. In this experiment we'll verify transformer operation.



Figure 1 (a) An iron core transformer showing magnetic paths.

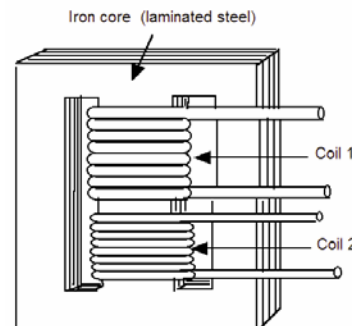
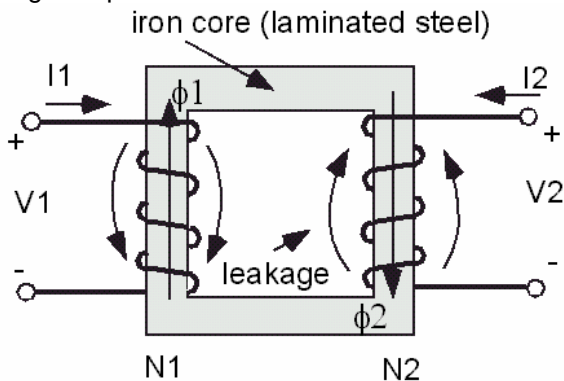


Figure 1 (b) Construction of an iron core transformer. For clarity the coils are shown separated. Physically, one coil is usually wound around the second coil to maximize the magnetic coupling

Objectives

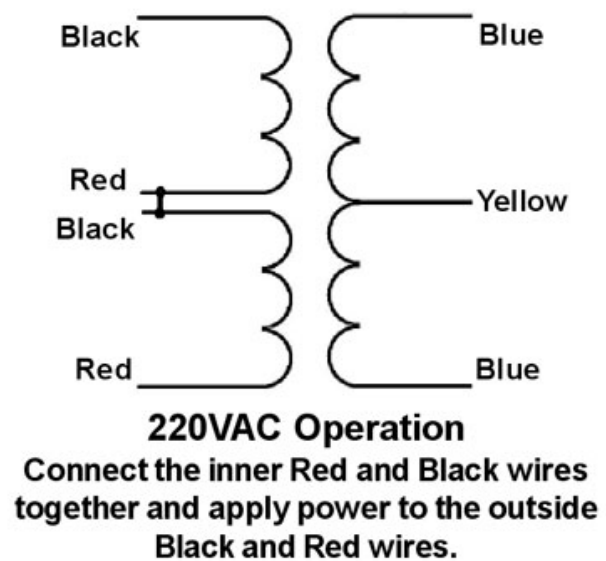
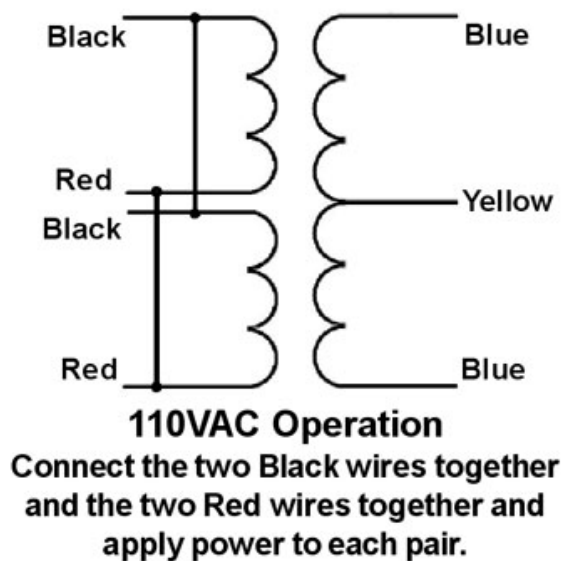
- 1) Build an operational transformer circuit utilizing the electrical trainer.
- 2) Verify transformer operation by injecting signals and measuring circuit values.

Equipment and materials

- 1) Safety glasses
- 2) Fluke 179 DMM
- 3) Electrical trainer
- 4) Jumper leads

Procedure 1: Build the transformer circuit

- 1) The schematic for the electrical trainer's transformer is below.
- 2) 120VAC power is already hardwired to the red and black wires.
- 3) As soon as you turn on trainer power, the transformer is hot.
- 4) However, current will not flow in the secondary until a load is connected to the secondary creating a complete circuit.
- 5) To do this, use jumper leads to connect the 220 ohm resistor to the full secondary (the two outer jacks located below the transformer. The middle jack is the center tap and offers $\frac{1}{2}$ the full secondary voltage.

**Procedure 2: Verify transformer operation by measuring circuit values**

- 1) With your Fluke DMM set to measure AC voltage, connect it to the secondary of the transformer and record your measurement below.

V1 (primary) = 120VAC

V2 (secondary) = _____

2) Now you can calculate the turns ratio.

TURNS RATIO = _____

3) Is this a step-up or a step-down transformer?

****** end of lab 12-1 ******