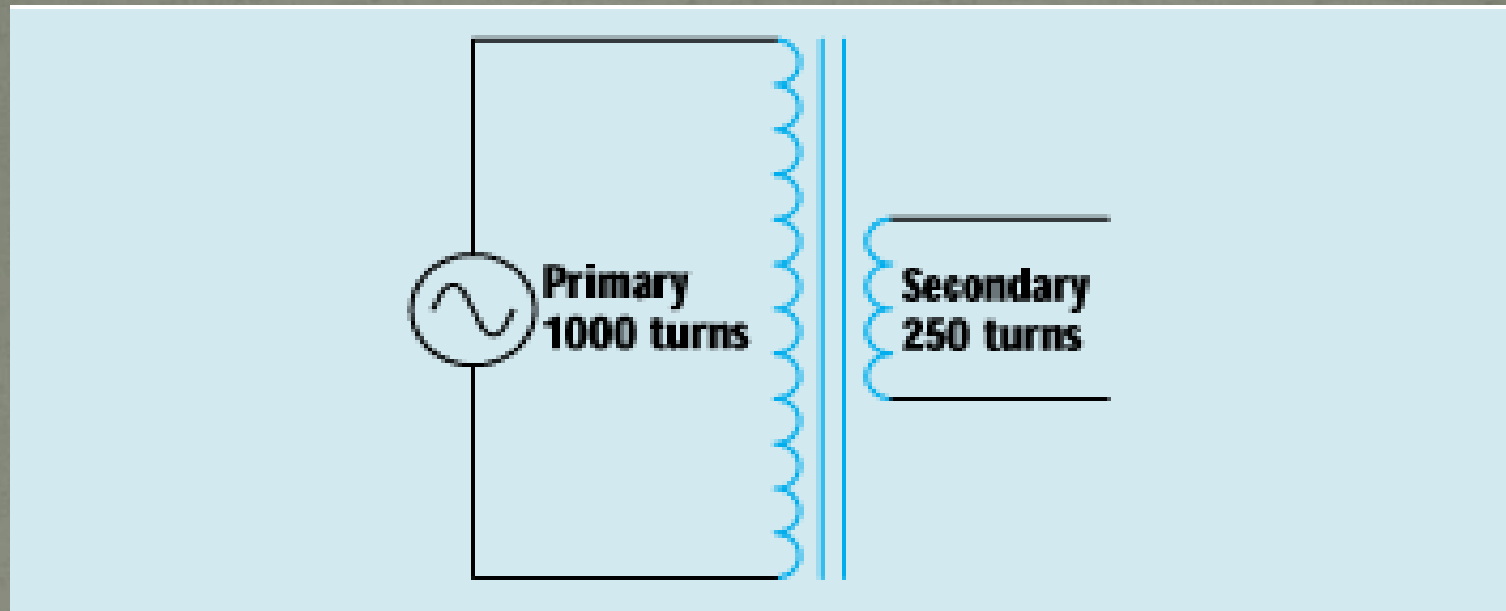


# Single-Phase Transformers

## Objectives:

- Discuss the different types of transformers.
- List transformer symbols and formulas.
- Discuss polarity markings.

# Single-Phase Transformers



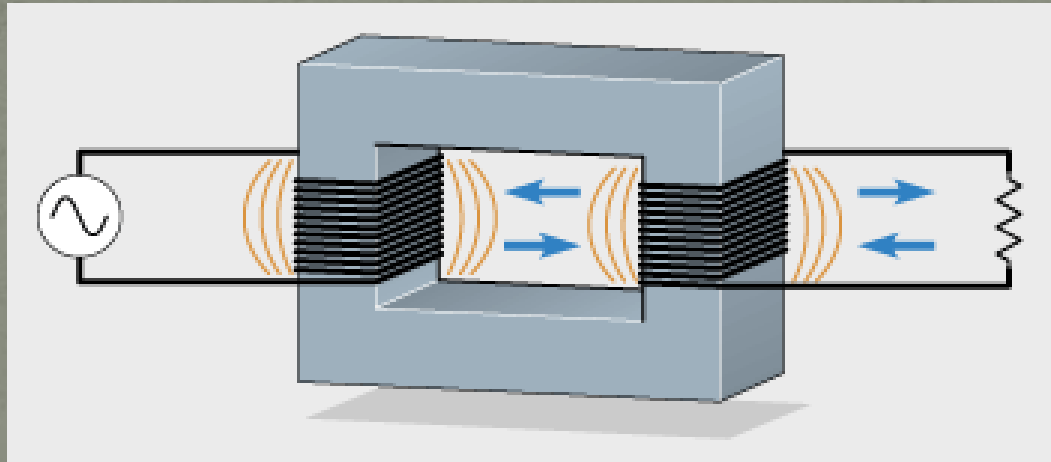
- A transformer is a magnetically operated machine.
- All values of a transformer are proportional to its turns ratio.

# Single-Phase Transformers



- The **primary winding** is connected to the incoming power supply.
- The **secondary winding** is connected to the driven load.

# Single-Phase Transformers



- The two windings of an isolation transformer are linked together by the magnetic field.



# Single-Phase Transformers

- Each set of windings (primary and secondary) is formed from loops of wire wrapped around the core.
- Each loop of wire is called a **turn**.
- The ratio of the primary and secondary voltages is determined by the ratio of the number of turns in the primary and secondary windings.
- The volts-per-turn ratio is the same on both the primary and secondary windings.

# Transformer Formulas

## Transformer Formulas

$$E_P / E_S = N_P / N_S$$

$$E_P \times N_S = E_S \times N_P$$

$$E_P \times I_P = E_S \times I_S$$

$$N_P \times I_P = N_S \times I_S$$

## Transformer Symbols

$N_P$  = number of turns in the primary

$N_S$  = number of turns in the secondary

$E_P$  = voltage of the primary

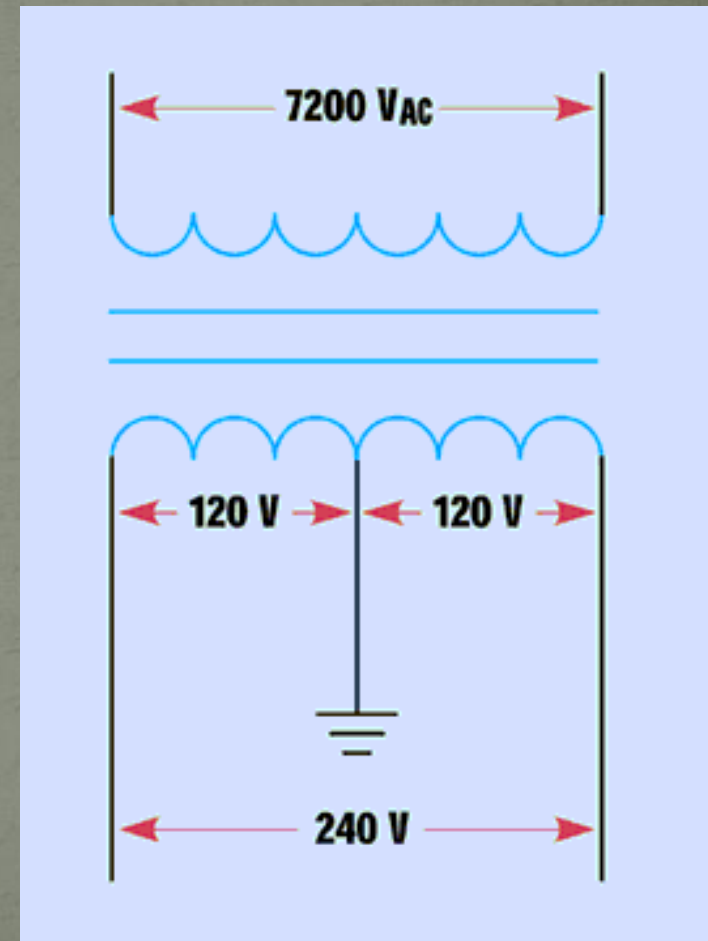
$E_S$  = voltage of the secondary

$I_P$  = current in the primary

$I_S$  = current in the secondary

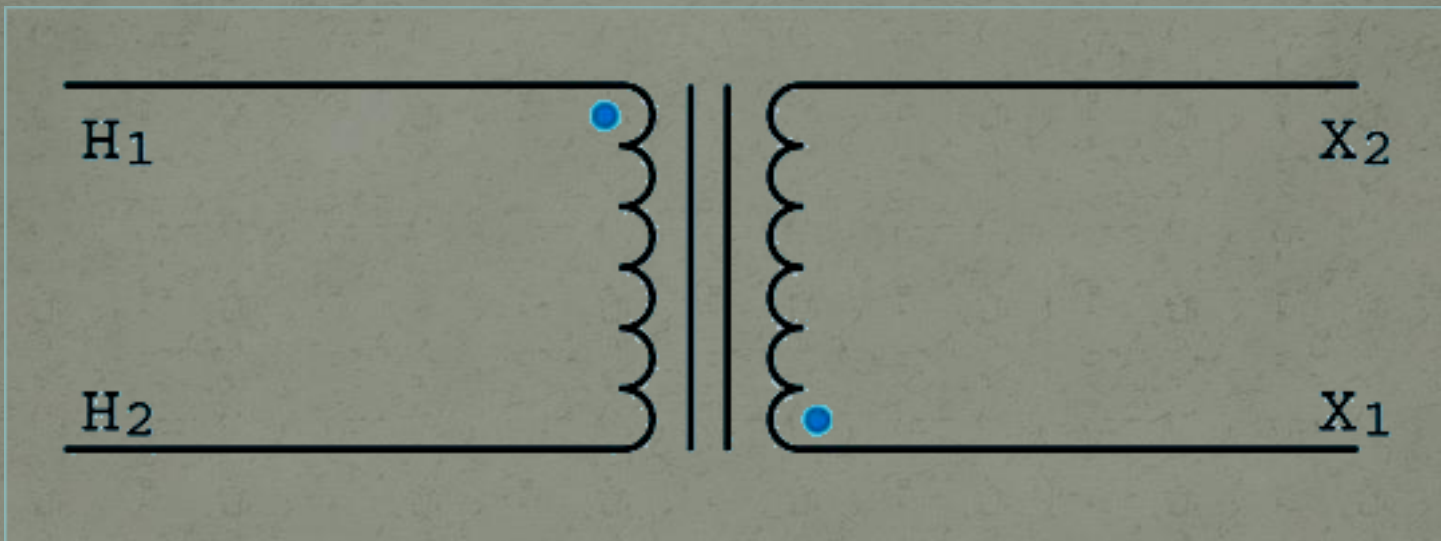
# Single-Phase Transformers

- The distribution transformer is a common type of isolation transformer. This transformer changes the high voltage from the power company to the common 240/120 V.





# Single-Phase Transformers



- Polarity dots are placed on transformer schematics to indicate points that have the same polarity at the same time.



## Review:

1. All values of voltage, current, and impedance in a transformer are proportional to the turns ratio.
2. The primary winding of a transformer is connected to the source voltage.
3. The secondary winding is connected to the load.
4. An isolation transformer has its primary and secondary voltage electrically and mechanically separated.
5. Isolation transformers help filter voltage and current spikes.
6. Polarity dots are often added to schematic diagrams to indicate transformer polarity.

# Single-Phase Transformers

## Review:

4. An isolation transformer has its primary and secondary voltage electrically and mechanically separated.
5. Isolation transformers help filter voltage and current spikes.
6. Polarity dots are often added to schematic diagrams to indicate transformer polarity.

# Principle of Transformer

- The working principle of transformer is very simple. It depends upon Faraday's law of electromagnetic induction. Actually, mutual induction between two or more winding is responsible for transformation action in an electrical transformer. Faraday's Laws of Electromagnetic Induction
- According to these Faraday's laws, "Rate of change of flux linkage with respect to time is directly proportional to the induced EMF in a conductor or coil".