# Voltage Regulator Operation & Safety



Mid South Electric Meter School - 2019

# **Voltage Regulator Function**

# Why do electric utility companies install voltage regulators?

Electric utility companies are required to provide power to their customers within a specific range of voltages by their respective state public service regulatory agencies.

Voltage regulators are installed to compensate for line losses or voltage drop on a long line.

# **Voltage Regulator Function**

What is the function of a voltage regulator?

The basic function of a voltage regulator is to monitor voltage and maintain it within a preset range.

### **Voltage Regulator Function**

# What is the range of a distribution voltage regulator?

Generally, distribution voltage regulators are designed to raise or lower voltage up to 10 percent.

Some voltage regulators are equipped with limit switches to limit the raise or lower voltage of the regulator (taps usually include 5, 6.25, 7.5, 8.75, and 10%).

## **Voltage Regulator Function**

For example: A voltage regulator designed for a 7200 volts line to ground distribution system can buck or boost the line voltage by up to 720 volts.

7200 X .10 = 720

On a 16 step voltage regulator, with a source voltage of 7200 volts, each step will be 45 volts.

720 / 16 = 45



# Voltage Regulator Components









# Voltage Regulator Safety ALWAYS CHECK GROUNDS!





# **Voltage Regulator Safety**

# At what position is a voltage regulator designed to be bypassed?

### **Only the NEUTRAL position!!!**

*Warning:* Bypassing regulators while not in the neutral position can result in catastrophic failure. The greatest circulating current is one step off neutral. If you are not sure of the regulator operation or position, consult your supervisor.



# Catastrophic Regulator Failure





# Was bypassed off neutral



# Determining Voltage Regulator Neutral Position

Approved Methods (Two Required)

Mechanical Indication: Position indicator



# **Voltage Regulator Neutral Position**

#### **Approved Methods (Two Required)**

Mechanical Indication: Position indicator



# **Voltage Regulator Neutral Position**

### **Approved Methods (Two Required)**

**Electrical Indication: Neutral light** 



# Voltage Regulator Neutral Position

**Approved Methods (Two Required)** 

**RND:** Regulator neutral detector device



Voltage Regulator Neutral Position Counting steps: 16 raise to 16 lower NO LONGER APPROVED at most utilities!



# **Voltage Regulator Neutral Position**



The Digital Position "Counter" in a Software Defined Control is subject to error with contact aging within the tank and should NOT be used to determine Neutral



# **Voltage Regulator Neutral Position**

When must a regulator be de-energized before bypassing?

• The regulator is "locked down" and cannot be returned to the neutral position.

The regulator cannot be insured to be in the neutral position by utilizing at least two of the approved methods.

# **Regulator Controls**

- It is imperative that a voltage regulator be in the neutral position in order to "bypass" it.
- A Line/Service technician must know how to operate the controls in order to maneuver the regulator into the neutral position.

## **Field Inspections**

• Although voltage Regulators are designed to require a minimum of maintenance, they should be inspected periodically to make sure that they are in good condition and operating properly.

# Thank You!

Phil Shewmaker Shewmaker Electronics, Inc. Helping You Stay In Control! Louisville, KY

800-330-5409 Shew@ShewmakerElectronics.com