Instructor/Participant Guide

209: Escalator: Electrical Systems

Module 2: Escalator Electrical Power Systems

Transit Elevator/Escalator Consortium

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Figure 1: Internal View of Breaker 5

Icons Used in This Guide

Throughout the Instructor's Guide, the following icons indicate the type of content presented.

- **Refer To**
- **PowerPoint**
- **Multimedia**
- **Web based Training**
- **Write**
- **Ask**
- **Individual Activity**
- **Small Group Activity**
- **Classroom Activity**
- **Duration**

Agenda

Topic No.	Topic Title	Duration
1	Introduction	5 minutes
2	Main Power Distribution	20 minutes
3	Auxiliary Power Distribution	20 minutes
4	Wiring Configurations	40 minutes
5	System Power Supplies	40 minutes
6	Electrical Measurement Techniques	30 minutes
7	Summary	5 minutes
	Total Time:	**2.5 hours**

Overview

Purpose

The purpose of this module is to:

- Provide the participants with a basic knowledge of the electrical power distribution systems within a modern escalator.

Objectives

At the end of this chapter, the learner will be able to:

- Discuss escalator-specific power distribution systems
- Identify the different types of single phase transformers
- Identify the different connection methods of three-phase transformers
- Identify the major sections of a typical DC power supply
- Discuss the basic function of a power supply
- Utilize a schematic diagram, locate and discuss specific components in a system power supply
- Utilize a schematic diagram, identify and take measurements at specific circuit locations in a power supply using various types of electrical test equipment

Materials

Make sure you have the following:

- Laptop (one for leader)
- Participant Guides
- PowerPoint slide deck
- LCD projector

- A17.1 Safety Code for Elevators and Escalators
- A17.2 Guide for Inspection of Elevators, Escalators and Moving Sidewalks
- A17.3 Safety Code for Existing Elevators and Escalators
- Heavy Duty Transportation System Elevator Design Guidelines (APTA RT-RP-FS 008-03)
- Heavy Duty Transportation System Escalator Design Guidelines (APTA RT-RP-FS 007-02)
- Field Employees' Safety Handbook

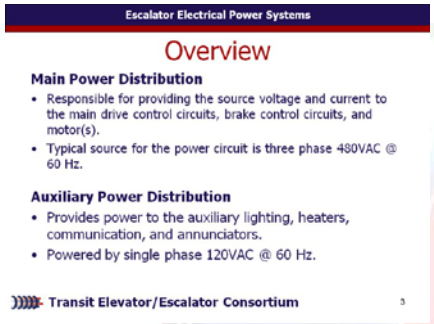
Transit Agency Handbook

Preparation

PREPARE flip charts with the following title:

- Class Expectations

Instructor's Notes



Slide 3

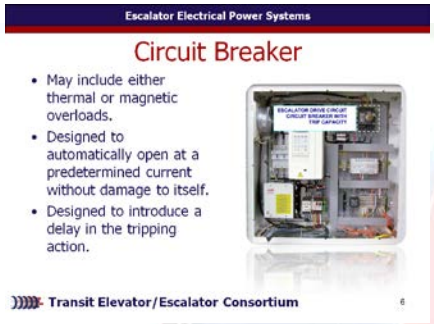
REVIEW the overview of electrical power systems.

ASK the participants what the typical power source for the power circuit is.

Overview

What is the typical source for the power circuit?

Instructor's Notes



Slide 6

REVIEW slide 6 and discuss the details on circuit breakers.

CONTENT: Direct participants to describe in their own words the details of the main power distribution.

APPLICATION FEEDBACK: Now that we have discussed a little about the main power distribution, have the participants answer the following questions.

ASK participants to describe how wire numbers are determined.

Circuit Breaker

How are wire numbers determined?

Instructor's Notes

Slide 8

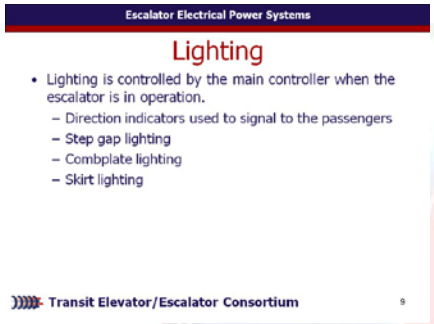
REVIEW slide 8 and review the methods of operating heaters.

ASK: How are heaters controlled?

Heaters: Mode of Operation

How are these heaters controlled?

Instructor's Notes



Slide 9

REVIEW slide 9 and review the main types of lighting systems.

ASK the participants to describe the lighting system listed.

Lighting

Describe the following:

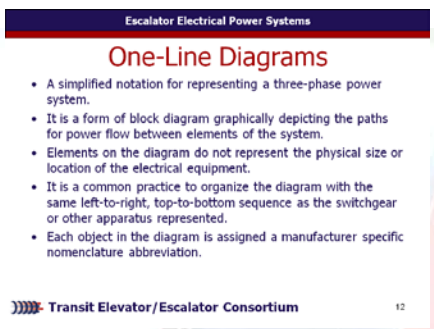
Direction Indicators:

Step Gap Lighting:

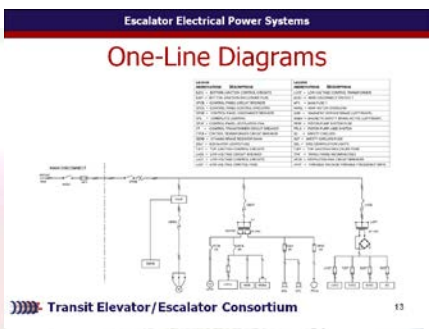
Combplate Lighting:

Skirt Lighting:

Instructor's Notes



Slide 12



Slide 13

REVIEW slides 12 and 13 to discuss the traits of the one-line diagram.

ASK the participants to list another name for the one-line diagram.

One-Line Diagram

What is another name for the one-line diagram?

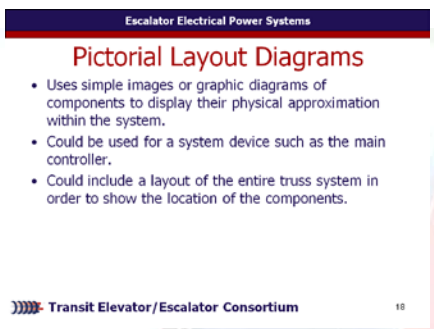
_____

_____

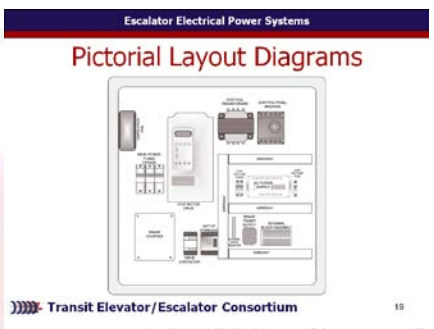
_____

_____

Instructor's Notes



Slide 18



Slide 19

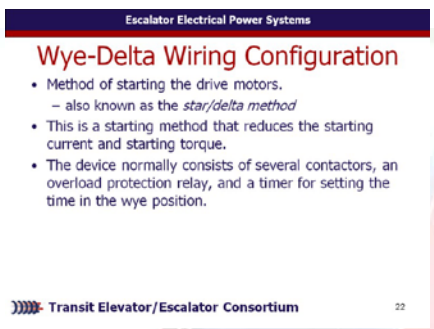
REVIEW slides 18 and 19 and discuss pictorial layout diagrams.

ASK the participants to describe what system devices the pictorial layout diagrams depict.

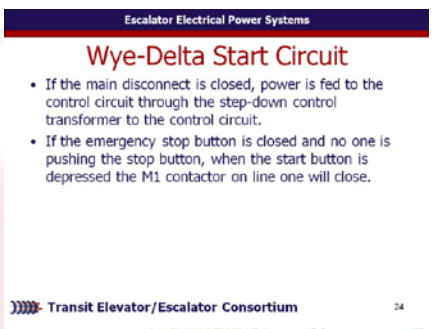
Pictorial Layout Diagrams

What common system devices do these layouts typically depict?

Instructor's Notes



Slide 22



Slide 24

REVIEW slides 22 to 24 and discuss the wye-delta configurations.

CONTENT: Direct participants to describe in their own words the differences between wiring configurations.

APPLICATION FEEDBACK: Now that we have discussed a little about wiring configurations, have the participants answer the following questions.

ASK the participants to describe the differences between the listed methods.

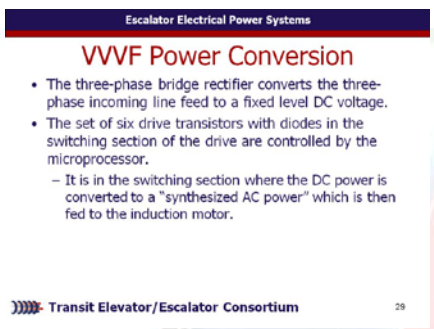
Wye-Delta Configurations

Describe the differences between the following methods:

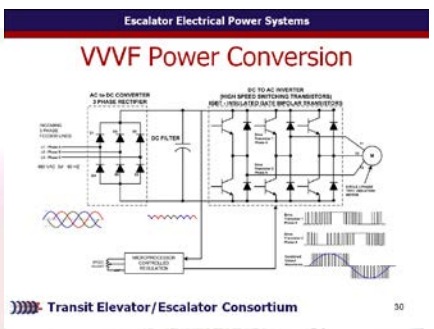
Wye-Delta Wiring Configuration:

Wye-Delta Winding Configuration:

Instructor's Notes



Slide 29



Slide 30

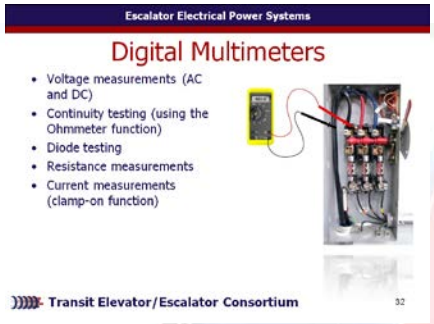
REVIEW slides 20 thru 30 and discuss VVVF Power Conversion.

ASK the participants to describe what insulated gate bi-polar transistors are.

VVVF Power Conversion

What are insulated gate bi-polar transistors?

Instructor's Notes



Slide 32

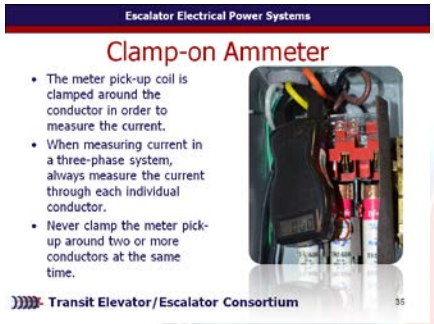
REVIEW slide 32 and discuss the details using the digital multimeter.

ASK the participants to describe why PPE is required when using a DMM.

Digital Multimeters

What type of PPE is required when using the DMM?

Instructor's Notes



Slide 35

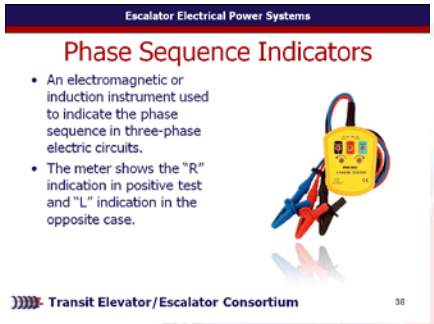
REVIEW slide 35 and discuss the details of the clamp-on ammeter.

ASK the participants to describe why you should never clamp the meter pick-up around two or more conductors.

Clamp-on Ammeter

Why should you never clamp the meter pick-up around two or more conductors?

Instructor's Notes



Slide 38

REVIEW slide 38 and discuss the details of phase sequence indicators.

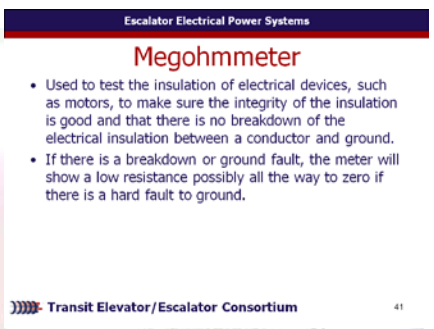
ASK the participants to describe what indicates a positive or negative test on the meter.

Phase Sequence Indicators

What indicates a positive or negative test on the meter?

Instructor's Notes

Slide 40



Slide 41

REVIEW slides 40 and 41 and discuss the use of a megohmmeter.

CONTENT: Direct participants to describe in their own words the different electrical measurement techniques.

APPLICATION FEEDBACK: Now that we have discussed a little about electrical measurement techniques, have the participants answer the following questions.

ASK the participants to describe what the purpose of this device is.

Megohmeter

What is the purpose of this device?