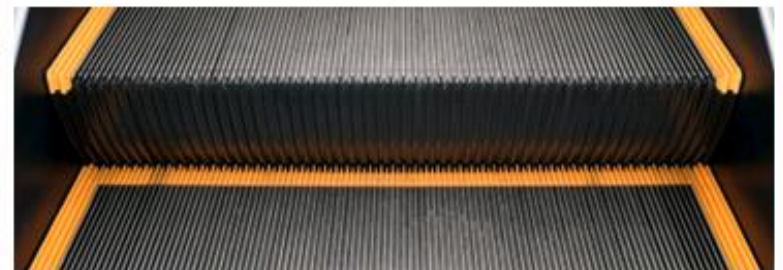


Instructor/Participant Guide



209: Escalator-Specific: Electrical Systems

Module 6: Description of Operation

Description of Operation



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PREVIEW ONLY



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	Schematic Diagrams	15 minutes
3	Line and Ladder Diagrams	15 minutes
4	Flow Charts	15 minutes
5	Block Diagrams	15 minutes
6	Pictorial Layout	15 minutes
7	Start-Up Sequence	30 minutes
8	Stop Sequence	20 minutes
9	Summary	5 minutes
Total Time:		2.25 hours



Overview

Purpose

The purpose of this module is to:

- Provide the participants with a basic knowledge of the startup sequence of a transit escalator.

Objectives

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

- Describe what a Schematic Diagram is and its usage
- Describe what a Line or Ladder Diagram is and its usage
- Describe what a Block Diagram is and its usage
- Describe what a Pictorial Layout is and its usage
- Describe the Start up Sequence of an escalator using a Schematic Diagram

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

Preparation

- 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
- PREPARE** flip charts with the following title:
- Class Expectations



Instructor's Notes

Description of Operation

Schematic Diagrams

- Shows all circuit components in the form of electrical symbols.
- Shows how they are wired together electrically without consideration of their actual physical relationships.
- Shows how they interact with each other to produce the desired end result.

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Slide 3



REVIEW the details of schematic diagrams.

CONTENT: Direct participants to describe in their own words a few details on schematic diagrams.

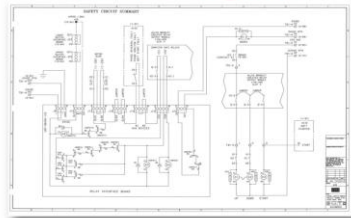
APPLICATION FEEDBACK: Now that we have discussed a little about schematic diagrams, have the participants answer the following questions.



ASK participants to describe the main benefit to using a schematic diagram.

Description of Operation

Schematic Diagrams



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Slide 4

Schematic Diagrams

What is the main benefit to using a schematic diagram?

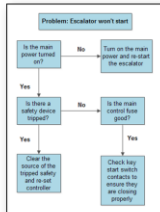


Instructor's Notes

Description of Operation

Flow Charts

- Commonly used as visual aids for troubleshooting an escalator.
- Most useful when diagnosing complex networks of electrical and electronic circuits.



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Slide 6



REVIEW slide 6 and discuss the purpose and details of flow charts.

CONTENT: Direct participants to describe in their own words the details of flow charts.

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



ASK: In what situations are flow charts most useful?

Flow Charts

In what situations are flow charts most useful?



Instructor's Notes

Description of Operation

Pictorial Layout

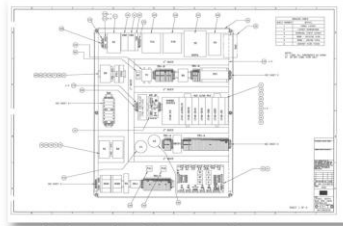
- Shows circuit components as they physically exist in real time.
- Display the actual location of circuit devices and components in their actual format.
- Useful when a conceptual view of an actual layout is needed.

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Description of Operation

Pictorial Layout



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Slide 9

Slide 10



REVIEW slides 9 and 10 and discuss pictorial layout.

CONTENT: Direct participants to describe in their own words the uses of pictorial layouts.

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



ASK participants to describe when a pictorial layout is particularly useful.

Pictorial Layout

When are these views particularly useful?



Instructor's Notes

Description of Operation

Drive Bypass

- When the step band reaches the contract speed-5%, the drive is turned off by turning off the "HSPD" and the "UPR" outputs.
- The motor is disconnected from the drive by turning off the DRC output.
- After an adjustable time period, the "UPO" output is energized.
 - Picks the "DIR" contactor.
 - Connects the motors directly to the line.

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Slide 12



REVIEW slide 12 and discuss drive bypass during normal operation.



ASK how the motor is disconnected from the drive.

Drive Bypass

How is the motor disconnected from the drive?



Instructor's Notes

Description of Operation

Down Direction - Run

- The PLC drive contactor control output "DRC" is turned on.
- The PLC "DNR" output is turned on.
- The drive relay output #2 is energized.
- The PLC brake output "BRAKE" is energized.
- The PLC "ONRLY" output is turned on.
- The PLC turns on the "HSPD" output.
- The drive controller ramps up the voltage and frequency output.
- The PLC monitors the step band speed.

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Slide 14



REVIEW slide 14.



ASK: What controller ramps up the voltage and frequency output to the motor(s)?

Down Direction - Run

What controller ramps up the voltage and frequency output to the motor(s)?



Instructor's Notes

Description of Operation

Drive Bypass

- When the step band reaches the contract speed-5%, the drive is turned off by turning off the "HSPD" and the "DNR" outputs.
- The motor is disconnected from the drive by turning off the DRC output.
- After an adjustable time period, the "BYP" output is energized, which picks the "BYP" contactor, which connects the motors directly to the line.

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Slide 15



REVIEW slide 15 and discuss drive bypass during down operation.



ASK the participants to describe how the motor is disconnected from the drive.

Drive Bypass

Describe how the motor is disconnected from the drive.



Instructor's Notes

Description of Operation

Low Speed Inspection

- The PLC drive contactor control output "DRC" is turned on.
- The PLC "DNRL" output is turned on.
- The drive relay output #2 is energized.
- The drive "ON" input tells the PLC that the drive is energized.
- The PLC brake output "BRAKE" is energized.
- The PLC "ONRLY" output is turned on.
- The PLC turns on the "ISPD" output.
- The drive controller ramps up the voltage and frequency.
- The escalator step band will reach the predetermined speed.

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Slide 16



REVIEW slide 16 and discuss the low speed inspection process.

CONTENT: Direct participants to describe in their own words the low speed inspection process.

APPLICATION FEEDBACK: Now that we have discussed a little about start-up sequence, have the participants answer the following questions.



ASK the participants to describe what questions must be answered before the low speed inspection sequence begins.

Low Speed Inspection

What questions must be answered before the PLC start sequence begins?



Instructor's Notes

Summary

Description of Operation

Summary

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Slide 20



REVIEW slide 20 and summarize the module.

EVALUATION AND CLOSURE: Recap the main points of the module before moving on to the next topic within this course.



ASK the participants if they have any outstanding questions on what was presented.