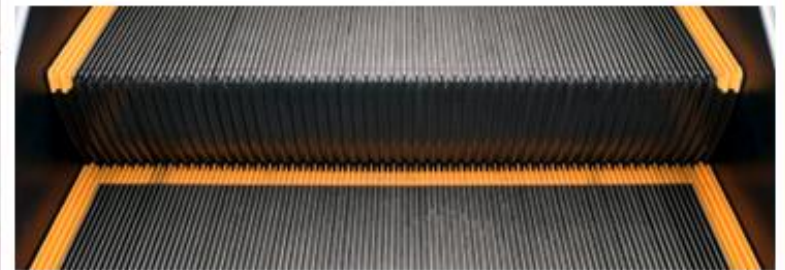


Instructor/Participant Guide



212: Escalator-Inspection & Basic Maintenance

Module 7: Control Systems



Table of Contents:

Introduction.....	2
Programmable Logic Controllers.....	3
Electrical Enclosure Preventative Maint.	4
Interlocks	5
Fuses/Overloads.....	6
Wiring Terminations	7
PLC Self Test.....	8
PLC Standby.....	9
Key Switch Start	10
Normal Operation.....	11
Contract Speed.....	12
Normal Stop.....	13
Escalator Controller	14
Annunciator Panel.....	15
Soft Start.....	16
VFD/VVFD	17
Summary	18

PREVIEW ONLY



Icons Used in This Guide

Throughout the Instructor’s Guide, the following icons indicate the type of content being 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	Programmable Logic Controllers <ul style="list-style-type: none"> • Electrical Enclosure Preventive Maintenance • Interlocks • Fuses/Overloads • Wiring Terminations • PLC Self Test • PLC Standby 	35 minutes
3	Operational Test <ul style="list-style-type: none"> • Key Switch Start • Normal Operation • Contract Speed • Normal Stop • Escalator Controller • Annunciator Panel • Soft Start 	35 minutes
4	VFD/VVFD	10 minutes
5	Summary	5 minutes
Total Time:		1.5 hours




Instructor's Notes

Introduction

Control Systems

Control Systems



Transit Elevator/Escalator Consortium


Outline

- Identify areas and associated components of the controller system which require inspection.
- State typical problems which would require repair and/or replacement.
- Perform proper main-line disconnect operation.
- Perform operational test on the escalator drive.


Transit Elevator/Escalator Consortium

Slide 1

GAIN audience attention by introducing yourself.




WELCOME the participants to the control systems module.



ASK the participants to list some items that they already know about Programmable Logic Controllers.

DIRECT participants to the objectives on slide 2.



REVIEW the objectives on Slide 2.

Welcome to the Control Systems Module.

What do you know about PLCs?



Instructor's Notes

Control Systems

Electrical Enclosure Preventative Maintenance

Cleaning:

- When performing any maintenance on the unit to follow your local Transit Authority Procedures.
- Electrical shock is always a danger when working on, or in, the enclosure.
- Performing a proper lockout/tagout as required would make the process safer
- While performing a wipe down, take your time and do a thorough visual inspection

Transit Elevator/ Escalator Consortium

5

Slide 5



REVIEW slide 5 walk participants through a detailed instruction on electrical enclosure preventative maintenance.

CONTENT: Direct participants to describe in their own words the benefits of proper preventative maintenance.



ASK: participants to describe the proper cleaning process and precautions during electrical enclosure preventative maintenance.

Electrical Enclosure Preventative Maint.

Describe the proper cleaning process and precautions during Electrical Enclosure Preventative Maintenance.



Instructor's Notes

Control Systems

Wiring Terminations

- The combination of vibration and extreme conditions can lead to deterioration of electrical components.
- Correctly, secured and covered wiring is less susceptible to vibration and moisture.



Transit Elevator/ Escalator Consortium 8

Control Systems

Wiring Terminations

- Inspect wiring bundles and make sure the wire ties are tight and secured.
- Check raceways and all wiring covers to ensure they are tight and cover the wires and connections as designed.
- Check electrical fasteners.
- Check ground connections to ensure they are tight, and adequately torque.
- Check for corrosion or signs of excess heat.

Transit Elevator/ Escalator Consortium 9

Slide 8



REVIEW slide 8 and 9, and discuss what to look for during your inspection of an electrical systems wiring.



ASK: participants to describe how to check and electrical systems wiring connections.

APPLICATION FEEDBACK: now that we have discussed a little about Electrical Enclosure Preventative Maintenance, have the participants summarize a few key points of Interlocks, fuses, and wire termination.

Slide 9

Wiring Terminations

Describe how to check an electrical system's wiring connections.




Instructor's Notes

Control Systems

Key Switch Start

- Follow the basic safety procedures of insuring the unit is barricaded on both ends and that there are no passengers on the escalator.
- Started by inserting the key into the keyway and turning the key to the desired direction of travel.
- Release the pressure on the key and the switch returns to the center position and the key is then removed.



Transit Elevator/Escalator Consortium 12

Control Systems

Push Button Start

- Start pushbutton that is depressed and held while the key is inserted into the keyway and turned to the desired direction of travel.
- The start button and the key are held in the described position until an audible alarm is heard.
 - Once the alarm sounds, turn the key back to its original position.

Transit Elevator/Escalator Consortium 13

Slide 12

Slide 13



REVIEW slides 12 and 13 and review the proper procedure for using the Key Switch and the push button start.



ASK why the key switch and push button be used at the same time?

Key Switch Start

Why must the Key Switch and push button be used at the same time?



Instructor's Notes

Control Systems

Contract Speed

- Done in a very similar manner as the motor speed check.
- Reconnect the motor speed sensor and run the machine.
- Next, stop the machine and disconnect one of the handrail speed sensors from the controller.
- Start the machine and verify that the unit shuts down within a few seconds.

Transit Elevator/ Escalator Consortium 15

Slide 15



REVIEW slides 15 and review how to inspect the contract speed.



ASK the participants to describe how to check contract speed.

Contract Speed

Describe how to check contract speed



Instructor's Notes


Control Systems


Annunciator Panel

- Verify the function of the Annunciator Panel.
- Located in various locations including the pit, machine room, and mounted on the newel.
- Some store codes tell the technician what components have failed.
- Perform a function test on all annunciator circuits.
- As each fault is tested, you must make sure you reset the fault before proceeding to the next.

Transit Elevator/ Escalator Consortium 18

Slide 18

 **REVIEW** slide 18 and describe in detail the Annunciator Panel and its functions.

 **ASK** what the purpose of the stored codes within the Annunciator Panel is.

Annunciator Panel

What is the purpose of the stored codes within the Annunciator Panel?

PREVIEW ONLY



Instructor's Notes


Summary

Control Systems


Summary

Transit Elevator/Escalator Consortium 21

Slide 21

 **REVIEW** slide 21 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.

PREVIEW ONLY