Instructor Guide



300: Input Output Control Equipment Module 2: Elevator Input/Output Control Equipment

JUME TRANSIT ELEVATOR/ESCALATOR CONSORTIUM

Elevator-Escalator – Elevator Input/Output Control Equipment	
Instructor's Guide	
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Elevator-Escalator – Elevator Input/Output Control Equipment

Instructor's Guide

Overview

Purpose The purpose of this module is to: Provide the participant with an in depth look at how input and output control devices in transit elevators work by using a schematic from a common elevator.

Objectives

At the end of this lesson, the transit elevator/escalator trainee will be able to:

- Identify and describe the function of variable control devices in an elevator system
- Identify and describe the function of sensors in an elevator system
- Identify and describe the function of switches in an elevator system
- Identify and describe the function of indicators in an elevator system

Materials Mandatory

Optional

- Make sure you have the following
 - **PowerPoint Presentation**
 - Coursebook
 - Quizzes
 - Pencils
- You may also want the following for optional activities:
 - Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator

ontrol Equipment	
This section: 40 min (12 slides) Section start time:	Section End Time:
SAY	Materials Needed
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Elevator-Escalator – Elevator Input/Ou	utput Control Equipment	STATUTE AND
Instructor's Guide		
Module Length: 300 minTime remaining: 300	min This section: 40 min (12 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
REVIEW module objectives	 In your own words: Today we will Identify and describe the function of variable control devices in an elevator system Identify and describe the function of 	PPT slide 3 Identify and describe the function of switches in an elevator system Identify and describe the function of switches in an elevator system Identify and describe the function of switches in an elevator system Identify and describe the function of indicators in an elevator system
Instructor's Notes	 Identify and describe the function of sensors in an elevator system Identify and describe the function of switches in an elevator system Identify and describe the function of indicators in an elevator system Advance 	3000- Transit Elevator/Escalator Consortium 3

Elevator-Escalator – Elevator Input/Output Control Equipment		
Instructor's Guide	min This section: 40 min (12 slides) Section start time:	Section End Time:
Nodule Length. Soo min Time remaining. Soo		
DO	SAY	Materials Needed
REVIEW slide Review slide	In your own words: Variable control devices can be manually adjusted by elevator/escalator technicians to shut off and turn on at different thresholds. ASK: What might be some examples of variable control devices? Allow participants to share possible answers. Advance for correct answers.	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>

Elevator-Escalator – Elevator Input/Ou	utput Control Equipment	NUMBER OF THE OWNER
Instructor's Guide		
Module Length: 300 min Time remaining: 300	min This section: 40 min (12 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
ASK Instructor's Notes	 In your own words: Lets see what we have learned so far: Tom would like to know about the differences between variable and non-variable control devices. What would you tell Tom? Call on participants for answer Advance once given the correct answer Answer: Non-variable control devices are devices with parameters set by the manufacturer and can not be adjusted by technicians. An example would be a governor switch. A variable control device can be manually adjusted at different thresholds and an example would be a door timer. Advance 	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>

Elevator-Escalator – Elevator Input/Ou Instructor's Guide	Itput Control Equipment	
Module Length: 300 min Time remaining: 300	min This section: 40 min (12 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
ASK	In your own words: are examples of variable control devices. (check all that apply) a. Load weighing sensor b. Door safety curtain c. Door lock d. Door timer e. Thermal probe Call on participants for answer Advance once given the correct answer Answer, a., d., e. Advance	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>

Instructor's Guide Module Length: 300 min Time remaining: 260 min This section: 40 min (22 slides) Section start time: Section End Time: DO DO SAY Materials Needee In your own words: In your own words: The problem with accidental phase reversal must be evolded to protect the proseeneers on Metricule time: Metricule timetrime: Metricule timetricule		Itput Control Equipment	Elevator-Escalator – Elevator Input/Ou
Module Length: 300 min Time remaining: 260 min This section: 40 min (22 slides) Section start time: Section End Time: DO SAY Materials Neede In your own words: In your own words: ✓ PPT slides 14, 15 The problem with accidental phase reversal ✓ PPT slides 14, 15 must be availed to protect the propagation or Interviewent the protect the propagation or			Instructor's Guide
DO SAY Materials Needed In your own words: In your own words: ✓ PPT slides 14, 15 The problem with accidental phase reversal ✓ PPT slides 14, 15	tion End Time:	min I his section: 40 min (22 slides) Section start time:	Module Length: 300 min Time remaining: 260
In your own words: Image: REVIEW slides The problem with accidental phase reversal must be availed to protect the programmer on	rials Needed	SAY	DO
Instructor's Notes Instructor's Notes Reverse and the power outage. Advance Another name for reverse phase monitor sensor is reversal protection on all equipment transporting people, such as escalators or elevators. Advance Advance	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>	In your own words: The problem with accidental phase reversal must be avoided to protect the passengers on either of these transportation systems. Phase reversal can occur when maintenance is performed on motor-driven machinery, when modifications are made to the power distribution system, or when power restoration results in a different phase sequence than before the power outage. <i>Advance</i> Another name for reverse phase monitor sensor is reverse phase monitor, and The National Electric Code (NEC) requires phase reversal protection on all equipment transporting people, such as escalators or elevators. <i>Advance</i>	REVIEW slides

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DO	SAY	Materials Needed	
REVIEW slide	In your own words: Note that there will not always be an error in the passenger experience during a phase reversal - as there are a total of six combinations of the phase orderings (much like in a boxed number for the daily lottery). Of these six combinations, three will operate the meter electronics and 2 will run the meter	✓ PPT slide 17 Newt/output Control Equipments: Environ Reverse Phase Sensor Sis Combinations of Phase Ordering Liting Doctware Ritation Liting Control-Coloniane Ritation Liting Doctware Ritation Liting Control-Coloniane Ritation	
Instructor's Notes	counterclockwise - meaning that there is a 50% chance that the user experience will be correct even if a phase reversal has occurred. <i>Advance</i>		

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Module Length: 300 min Time remaining: 260	min This section: 40 min (22 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
REVIEW slides REFER participants	In your own words: REFER participants to their course books for a closer view of the diagram. The three power lines are connected to the input terminals of the Reverse Phase Sensor (RPS) through fuses FL1, FL2 and	✓ PPT slides 20, 21 www.execution.com/slides/slid
Instructor's Notes	FL3. <i>Advance</i> Line 1 is connected to terminal 3, Line 2 is connected to terminal 4 and Line 3 is connected to Terminal 5. Since the three phase inputs of the RPS are wired directly to the incoming lines in the proper	Digit Transit Elevator/Lecalator Consortium Image: Constraint Constraint Image: Constra
	sequence, if any two of these lines are reversed prior to entering the terminals for this system the RPS sensing relay will detect the change. <i>Advance</i>	

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Module Length: 300 min Time remaining: 260	min This section: 40 min (22 slides) Section start time:	Section End Time:	
DO	SAY	Materials Needed	
REVIEW slides	 In your own words: Here is a MCE computer panel board layout illustrating "Safety On" light. Advance Further investigation will be necessary as the power shut down could have been initiated at one of several places including the other switches represented on the next schematic: Final limit switch Pit switch Counterweight Safety Safety Clamp Emergency Car Switch Gate Switch Here is a computer panel board layout illustrating "Safety On" Light - ©MCE Advance 	<section-header><section-header><section-header><text><section-header><section-header><section-header><section-header><section-header><section-header><section-header><text><text><text><text><section-header><section-header><section-header></section-header></section-header></section-header></text></text></text></text></section-header></section-header></section-header></section-header></section-header></section-header></section-header></text></section-header></section-header></section-header>	

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Module Length: 300 min Time remaining: 260	min This section: 40 min (22 slides) Section start til	me: Section End Time:
DO	SAY	Materials Needed
ASK Instructor's Notes	In your own words: allows the car to be electrically stopped before brake sets. a. Latency Timer b. Late Timer c. Late Brake d. Latency Brake e. Car Timer Call on participants for answer Advance once given the correct answ Answer: a. Latency Timer Advance	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>



Elevator-Escalator – Elevator Input/Output Control Equipment			
Instructor's Guide			
Module Length: 300 min I ime remainin	g: 220 min	This section: 40 min (14 slides) Section start time:	Section End Time:
DO		SAY	Materials Needed
REVIEW slide	In ye Whe the o inpu #16) sign strin safe more This whic the F each Whe com Adv	our own words: an the governor switch is tripped and circuit is broken - this information is tted into the control terminal (terminal). In this case the SAF coil will drop out ifying that there is an error in the safety g in general. In new systems, each ty device is polled separately, providing e specific information on the failure. is the case in the print in Figure 11 ch shows that terminal #16 connects to PSS (Pit stop switch) coil. Note that n safety switch activates its own coil. en the corresponding coil drops out, it municates a fault to the controller. Fance	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>

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Module Length: 300 min Time remaining: 220	min This section: 40 min (14 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
ASK Instructor's Notes	In your own words: Explain what is taking place in blue box. Call on participants for answer Advance once given the correct answer Answer: The brake on traction elevators is released under normal operation and closes/brakes when power is cut off. Advance	Image: Contract Contract Image: Contract Contract Image: Contract Contract

Elevator-Escalator – Elevator Input/Output Control Equipment				
Module Length: 300 min Time remaining: 180	min This section: 40 min (11 slides) Section start time:	Section End Time:		
DO	SAY	Materials Needed		
REVIEW slides REFER participant	In your own words: <i>REFER participants to their course</i> <i>books for a closer view of the diagram</i> Power comes in from the mainline disconnect <i>Advance</i> and connects to the fire safety circuit through 2F fuse from the control feed of the transformer. <i>Advance</i>	<complex-block></complex-block>		

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Module Length: 300 min Time remaining: 180	min This section: 40 min (11 slides) Section start time:	Section End Time:
DO	SAY	Materials Needed
REVIEW slides REFER participant	In your own words: So, a problem is communicated to the PLC. This reading is then sent back to the PLC via board 3 (on next slide). This information is then passed onto the PLC where the system is put into fire service phase 1. Advance REFER participants to their course books for a closer view of the diagram. Here you can see board 3 which connects the Fire Bypass and Detectors to the PLC. Note that FRBYP is represented on this card as Spare 1. Advance	<section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header><section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header></section-header>
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