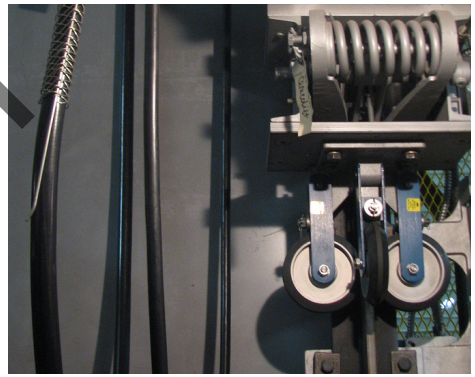
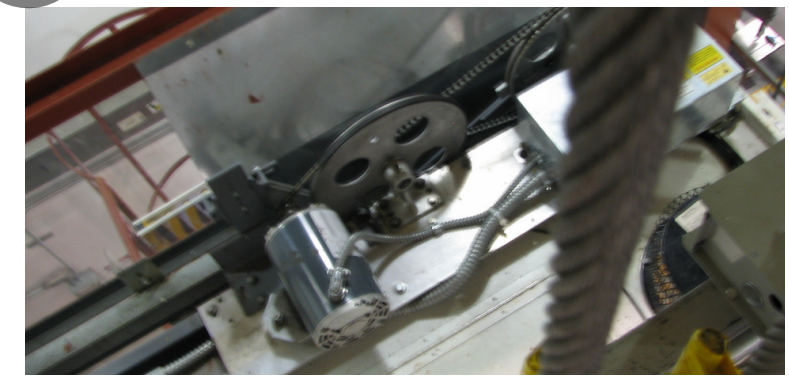
Instructor Guide





214: Elevator: Electrical Systems
Module 6: Control Circuits

TRANSIT ELEVATOR/ESCALATOR CONSORTIUM

Table of Contents

Icons Used In This Guide

- **REVIEW** slides
- **INDIVIDUAL ACTIVITY**
- **ASK**
- **WRITE**
- **CLASSROOM ACTIVITY**
- Multimedia
- **SMALL GROUP ACTIVITY**
- **REFER** participants to

Agenda

Topic #	Topic Title	Duration
1	Overview	45 Minutes
2	Elevator Control Systems	60 Minutes
3	Control Device Locations	90 Minutes
4	Field Trip	120 Minutes
5	Hydraulic Control Circuits	120 Minutes
6	Traction Control Circuits	120 Minutes
7	Field Trip	120 Minutes
8	Summary	45 Minutes
	Total Time:	720 Minutes

Overview

Purpose The purpose of this module is to:

Provide the participant with an overview of the basics of the elevator control systems and the electrical control diagrams found in transit agencies.

Objectives

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

- Discuss the different types of control systems encountered in transit elevator systems
- Describe the control circuits to perform the functions of starting, controlling speed, direction, and stopping the motor a transit hydraulic elevator
- Describe the control circuits to perform the functions of starting, controlling speed, direction, braking, and stopping the motor on a transit traction elevator
- Trace and identify various controls, switches, and systems in a working transit hydraulic elevator system using an electrical diagram
- Trace and identify various controls, switches, and systems in a working transit traction elevator systems

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils
- Handouts: Nomenclature Review, Sequence of Operation Activity 1(cut and ready for distribution), Sequence of Operation Activity 2 (cut and ready for distribution)

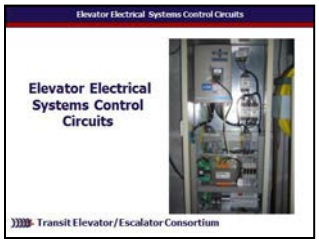
Optional You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator
- Prize for Sequence of Operation Activity 2

Elevator – Control Circuits

Instructor's Guide

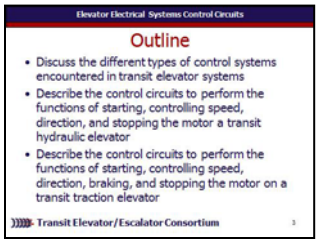
Module Length: 720 min Time remaining: 720 min This section: 45 min (6 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW introduction slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Welcome to the course on Elevator Electrical Systems Control Circuits. ***Advance*** Elevator controls vary in the field. Some are new, some are older, and all vary according to the needs of the building or facility. ***Advance through photographs of a variety of controllers.*** But one thing all control systems do have in common: they are brains of the elevator system. ***Advance***	✓PPT slides 1, 2  

Elevator – Control Circuits

Instructor's Guide

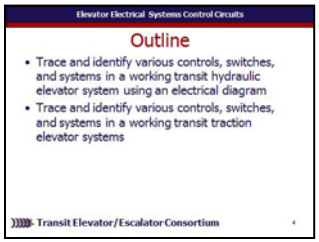
Module Length: 720 min Time remaining: 720 min This section: 45 min (6 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW module objectives **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Today we will • Discuss the different types of control systems encountered in transit elevator systems • Describe the control circuits to perform the functions of starting, controlling speed, direction, and stopping the motor a transit hydraulic elevator • Describe the control circuits to perform the functions of starting, controlling speed, direction, braking, and stopping the motor on a transit traction elevator ***Advance***	✓PPT slide 3 

Elevator – Control Circuits

Instructor's Guide

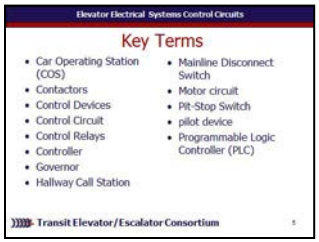
Module Length: 720 min Time remaining: 720 min This section: 45 min (6 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW module objectives **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** • Trace and identify various controls, switches, and systems in a working transit hydraulic elevator system using an electrical diagram • Trace and identify various controls, switches, and systems in a working transit traction elevator systems ***Advance***	✓PPT slide 4 

Elevator – Control Circuits

Instructor's Guide

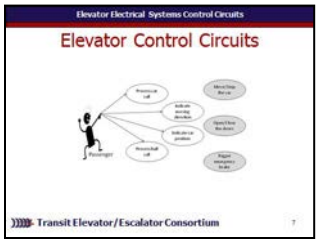
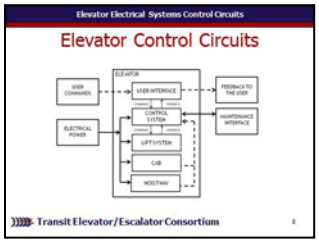
Module Length: 720 min Time remaining: 720 min This section: 45 min (6 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW key terms **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets take a look at some of the key words we will be defining as move through this module: • Car Operating Station (COS) • Contactors • Control Devices • Control Circuit • Control Relays • Controller • Governor • Hallway Call Station ***Advance*** • Mainline Disconnect Switch • Motor circuit • Pit-Stop Switch • pilot device • Programmable Logic Controller (PLC) ***Advance***	✓PPT slide 5 

Elevator – Control Circuits

Instructor's Guide

Module Length: 720 min Time remaining: 675 min This section: 60 min (14 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** You may recall from earlier courses this diagram, which basically explains the passenger initiates all of the controls for the elevator. ***Advance*** And, you may recall from earlier courses this diagram, which further explains what happens after the passenger initiates all of the controls for the elevator. ***Discuss diagram with participants.*** Electrical power is supplied to the system: the control system, the lift system, the cab, and the hoistway. User commands are sent to the control system via the user interface. ***Do Not Advance***	✓PPT slides 7, 8  

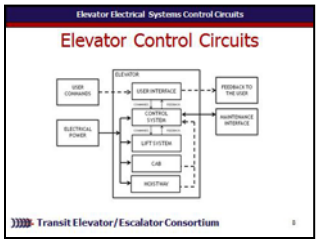
Elevator – Control Circuits

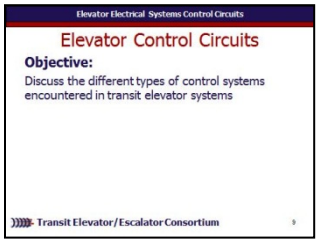
Instructor's Guide

Module Length: 720 min Time remaining: 675 min This section: 60 min (14 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW slides	**In your own words:** These commands are distributed to the lift system for operation, and feedback is sent back to the control system from the cab and hoistway and eventually back to the user to alert the use of the position and movement of the elevator. ***Advance*** Lets start this module off by taking a look at the different types of control systems encountered in elevator systems. ***Advance***	✓PPT slides 8, 9

Instructor's Notes

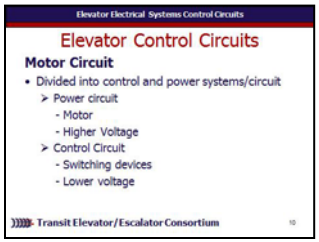


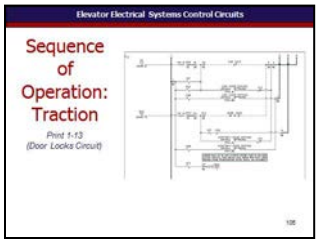


Elevator – Control Circuits

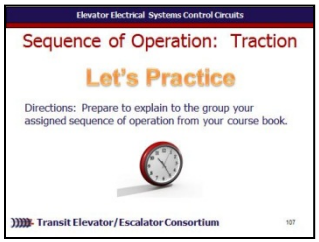
Instructor's Guide

Module Length: 720 min Time remaining: 675 min This section: 60 min (14 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Control circuits for elevator systems are vital to the proper performance and protection of modern equipment. A complete **motor circuit** is usually divided into control and power systems. ***Advance*** The power circuit includes the motor and therefore operates under higher voltage. ***Advance*** On the other hand, the control part mostly contains the switching devices and typically operates under lower voltage. ***Advance***	✓PPT slide 10 

DO	SAY	Materials Needed
REVIEW slides **REFER** participants to Course Book **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** 9. The car's inner and outer (gate) doors are closed. The 120 voltage (AC) passes from the 4 bus to board 56 connection 4 to Screw Connection 4 on board 56. Through closed Car Gate contact. Through Gate Switch Screw connection, Through Gate Switch on Board 56, Through SP9 on Board 37, Through 47K 1 watt resistor and out to Gate Switch Input. ***Advance***	✓PPT slide 106 

Module Length: 720 min Time remaining: 285 min This section: 120 min (21 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
ASK participants **SMALL GROUP ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets practice a little more with thinking about sequence of operations. In the back of your course book, there are a several generic sequence of operations illustrating various elevator operations. ***DIRECTIONS:*** With a partner, you will be given a set of cards illustrating the steps for one of these sequence of operations. Your task is to put the cards in the correct order. You may use your course book for assistance, and you will share your sequence with the group when finished. If possible, provide a prize for the pair who finishes first. ***Allow participants approximately 10 minutes to complete. Then, assign pairs to rotate and evaluate another group's sequence. Advance***	✓PPT slide 107 

Module Length: 720 min Time remaining: 165 min This section: 120 min *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
ASK **CLASSROOM ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** ***At instructor's discretion, take time to visit the field and look for examples of additional electrical prints.*** ***Suggested Activities:*** ***Using an additional print and allowing participants to work in pairs:*** ***1) Participants can compare two prints to look for similarities, differences, and to explain which print they prefer or think is better and why.*** ***2) Given nomenclature and additional supporting materials needed, participants can analyze and write a sequence of events or explain what is occurring in a particular electrical print.*** ***Advance***	✓PPT slide 108 

Elevator – Control Circuits

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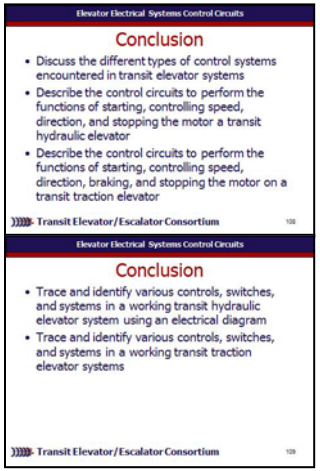
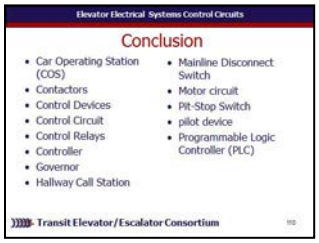
Module Length: 720 min Time remaining: 45 min This section: 45 min (4 slides) *Section start time:* _____ *Section End Time:* _____

DO	SAY	Materials Needed
CLASSROOM ACTIVITY **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** ***For each objective, briefly review what was learned in this module or ask participants to share what they have learned for each learning objective and briefly discuss as a class.*** ***Advance*** ***For each objective, briefly review what was learned in this module or ask participants to share what they have learned for each learning objective and briefly discuss as a class.*** Lets take a look at some of the key words we have defined as moved through this module. ***Read slide. Discuss definitions as a group.*** ***Advance.*** ***Read slide. Discuss definitions as a group. Advance.***	✓PPT slides 109, 110, 111  

Elevator – Control Circuits

Instructor's Guide

Module Length: 720 min Time remaining: 45 min This section: 45 min (4 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
CLASSROOM ACTIVITY **INDIVIDUAL ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** ***Administer quizzes.***	✓PPT slide 112 ✓Quizzes ✓ Pencils