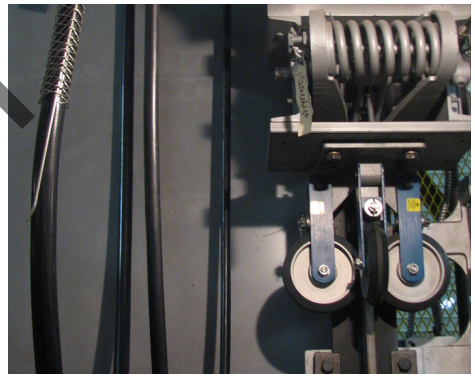
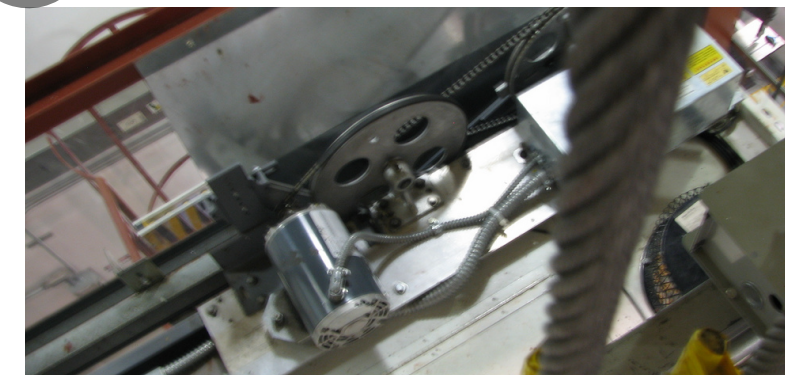
Instructor Guide





216: Elevator: Principles of Door Operation & Maintenance
Module 2: Introduction to Elevator Doors

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	20 minutes
2	Field Trip	50 minutes
3	Door Components – Header	30 minutes
4	Door Components – Door Panel	40 Minutes
5	Door Components – Sill	20 Minutes
6	Field Trip	70 Minutes
7	Activity	60 Minutes
8	Door Operation	30 Minutes
9	Door Operation and Schematics	20 Minutes
10	Summary	20 Minutes
	Total Time:	360 Minutes

Overview

Purpose The purpose of this module is to:

- Provide the participant with a general knowledge and understanding of the components of transit elevator doors and how they relate to the method of operations of multiple elevator door configurations.

Objectives

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

- Identify the various components on each door configuration.
- Describe the method of operation for different door configurations.
- Using an MCE schematic, explain the sequence of operation for elevator car doors.

Materials

Mandatory Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Handouts
- Colored Pencils

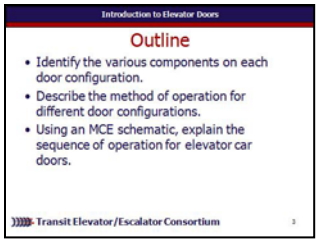
Optional You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Internet connection
- Lab, simulator or out of service elevator
- Retractable Key Ring
- Spring or Spring Closer
- Laser Pointer

Elevator – Introduction to Elevator Doors

Instructor's Guide

Module Length: 360 min Time remaining: 360 min This section: 20 min (10 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** In all seriousness...Today we will be building on your previous knowledge on elevator doors by identifying *all* components –including the automatic re-opening device, describing the methods of operation of elevators more in depth – making special references variances among different configurations - and using an MCE schematic to explain the sequence of operation for an elevator door. ***Advance.***	✓PPT slide 3 

Elevator – Introduction to Elevator Doors

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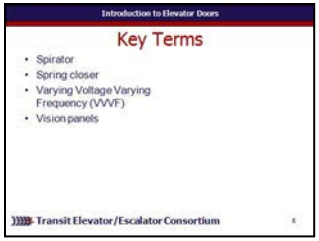
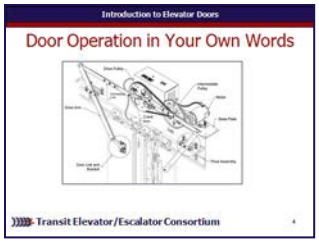
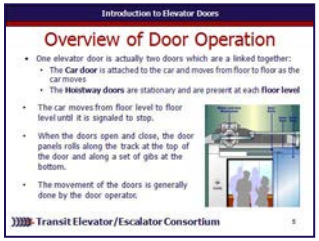
Module Length: 360 min Time remaining: 360 min This section: 20 min (10 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW key terms **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** As well as: Hanger roller, High Speed Close (HSC), High Speed Open (HSO), Hoistway Door, Interlock, Leading Edge, "Made up", Master Operator (MO), Medium Speed Open (MSO) ***Advance*** Operator, Pick-up roller, Relating cables, Release Roller, Return Column, Retractable safety edge, Safety curtain, Slow door connecting link, Soft Start Open (SSO) ***Advance.*** And lastly Spirator, Spring closer, Varying Voltage Varying Frequency (VVVF), Vision panels ***Advance.***	✓PPT slides 5, 6  

Elevator – Introduction to Elevator Doors

Instructor's Guide

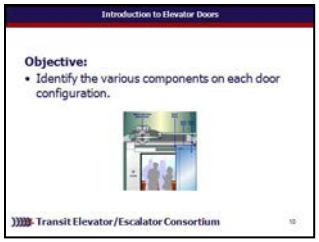
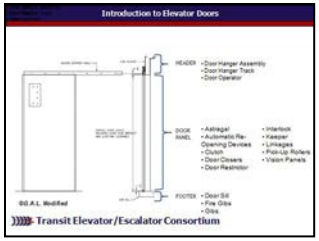
Module Length: 360 min Time remaining: 360 min This section: 20 min (10 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
ASK participants to explain how elevator doors operate **CLASSROOM ACTIVITY** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** In Course 213 module 5, you also learned the main principles of elevator doors. Who can tell me in their own words how it is that doors on elevators operate? ***[Call on one volunteer for an answer and ask others to build on this until you come up with a general description like the one on slide 7] Advance.*** ***[Read the description. If you wish, click the image and show the animation. If you show the animation say sometime like the following]*** Remember this is a simplified version of an elevator, the systems we'll be learning about are much more complicated	✓PPT slides 9, 10  

Elevator – Introduction to Elevator Doors

Instructor's Guide

Module Length: 360 min Time remaining: 290 min This section: 50 min (8 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets move on to look at the different components for each door configuration. ***Advance.*** Lets first take a look at an over view of the door areas and associated components, and then we will look at these individually throughout the module. Lets look at the door areas again – we have a header, door panel, and sill. ***Advance.*** ***[Read the names of the components for the header area of the door.]*** ***Advance.*** ***[Read the names of the components for the door panel area of the door.]*** ***Advance.*** ***[Read the names of the components for the sill area of the door.]*** ***Advance.***	✓PPT slides 12, 13  

Elevator – Introduction to Elevator Doors

Instructor's Guide

Module Length: 360 min Time remaining: 290 min This section: 50 min (8 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Now we'll cover door operation more in depth by looking at how the specific components work together. ***Advance.*** Starting at the top of the door panel - is the door hanger track which is the rail on which the door hanger assembly rides when the door opens or closes. ***Advance.*** The hanger roller assembly has three main components. The hanger roller rides on the track. The eccentric keeps the assembly (and therefore the door) from being able to be lifted off of the track. The fire gib is the back up to the eccentric in case of fire. ***Advance.***	✓ PPT slides 14, 15  

Elevator – Introduction to Elevator Doors

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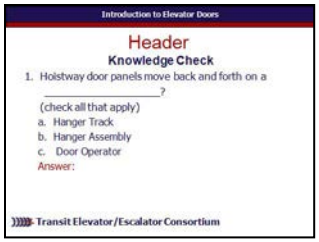
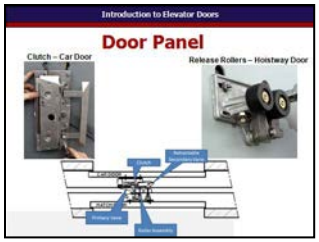
Module Length: 360 min Time remaining: 290 min This section: 50 min (8 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
ASK **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets see what we have learned so far: Hoistway door panels move back and forth on a _____? (check all that apply) a. Hanger Track b. Hanger Assembly c. Door Operator Answer: ***Call on participants for answer.*** ***Advance for correct answer.*** Answer: ***Advance.***	✓PPT slide 18 

Elevator – Introduction to Elevator Doors

Instructor's Guide

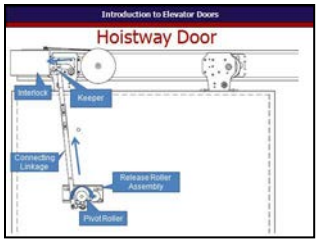
Module Length: 360 min Time remaining: 260 min This section: 40 min (11 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** The door panel area is where the majority of components are. As we discussed before, what looks like one door panel is actually composed of two panels – a hoistway and a car door with a clutch and master operator release roller assembly. Note that in the case of center-opening doors, there may be two clutches present. The clutch and release rollers do not interact until the elevator stops at the determined landing – at which point the release roller enters the door clutch. This starts a whole series of interactions in the door panel. ***Advance.***	✓ PPT slide 20 

Elevator – Introduction to Elevator Doors

Instructor's Guide

Module Length: 360 min Time remaining: 260 min This section: 40 min (11 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** The fixed vane in the clutch contacts the release roller, turning the pivot roller clockwise. ***Advance.*** As the pivot roller turns, it lifts the connecting linkage. ***Advance.*** And in turn pivots the keeper. ***Advance.*** This action allows the interlock to unlock - allowing the joined hoistway and car doors to open. ***Advance.***	✓ PPT slide 21 

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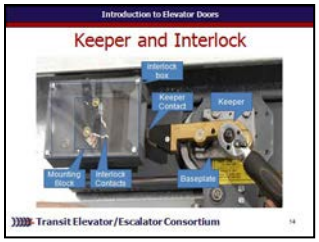
DO	SAY	Materials Needed
REVIEW slide	**In your own words:** Here is a better picture showing how the keeper and interlock interact. Interlocks make sure that the doors do not open when the car is not at a floor level. The circuit is "made up" during normal operation, keeping the door closed and "broken" by the keeper when at a landing. ***Advance.***	✓ PPT slide 22 

Instructor's Notes

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Elevator – Introduction to Elevator Doors

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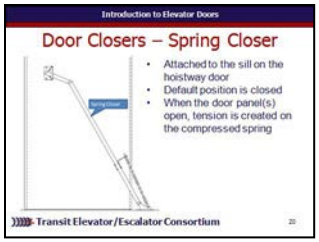
Module Length: 360 min Time remaining: 260 min This section: 40 min (11 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Again, the default position for a spring closer is for the door to be closed. The spring closer on the other hand is attached to the sill and connects to the hoistway door. When the door opens, the spring compresses creating pressure. In cases of system failure the pressure of the compressed spring will push the door shut. ***[You may want to use a compressed spring (or spring closer) as an example to show and hand around]*** Note that on multi-speed doors a slow door link must be attached to the drive arm of the spring closer. ***Advance.***	✓PPT slide 27  Optional: spring, or spring closer

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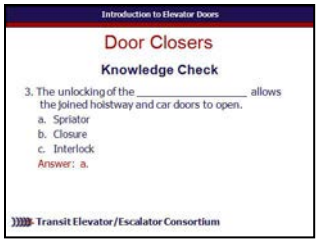
Module Length: 360 min Time remaining: 260 min This section: 40 min (11 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
ASK **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Lets see what we have learned so far: The unlocking of the _____ allows the joined hoistway and car doors to open. a. Spriator b. Closure c. Interlock ***Call on participants for answer.*** ***Advance for correct answer.*** Answer: a. ***Advance.***	✓PPT slide 29 

Elevator – Introduction to Elevator Doors

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Module Length: 360 min Time remaining: 220 min This section: 20 min (4 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slide **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** We've worked our way down to the bottom of the door – where the gib rides along the door sill to keep the door from swinging outwards at the bottom. The majority of the gib which rides in the track is actually made of nylon – so that it moves smoothly, without excessive friction, when the door opens and closes. But in case of emergency, this nylon may melt. That is why gibs also have fire tabs which are bent to be parallel with the nylon runner and also ride in the sill. ***[you may want to hand a gib around for the participant to see.]*** ***Advance.***	✓ PPT slide 31  Optional: gib

Elevator – Introduction to Elevator Doors

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Module Length: 360 minutes Time remaining: 200 minutes This section: 70 minutes *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
CLASSROOM ACTIVITY **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** Okay, now it's time to see how this works in the real world. Please get your stuff together for a trip to the lab. ***[When you get to the lab/simulator/out-of-order elevator, look at door components. Ask for participant assistance in identifiying where the various components are located for each area of the door.]*** ***Advance.***	✓PPT slides 35 

Elevator – Introduction to Elevator Doors

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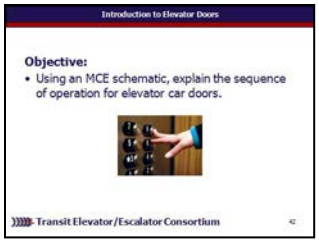
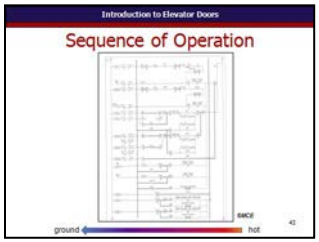
Module Length: 360 min Time remaining: 40 min This section: 20 min (5 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slides	**In your own words:** Moving on, the last objective we want to cover is how to use an MCE schematic to explain the sequence of operation for doors. ***Advance.*** On the screen is an elevator door specific example of a schematic diagram from MCE. Keep in mind that MCE prints should be read from right (hot) to left (ground). ***Advance.*** ***Advance.***	✓PPT slides 42, 43

Instructor's Notes





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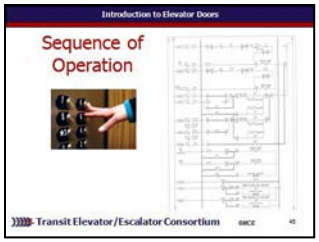
Module Length: 360 min Time remaining: 40 min This section: 20 min (5 slides) *Section start time: _____* *Section End Time: _____*

DO	SAY	Materials Needed
REVIEW slides **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** As per GAL the door operator will not allow the doors to close at a speed higher than 30Hz. When the door reaches its fully closed limit the contacts on the Door Close Limit (DCL) switch close - energizing the DCL relay which signals a DCL input to the controller, stopping the doors. ***Advance.***	✓PPT slide 45 

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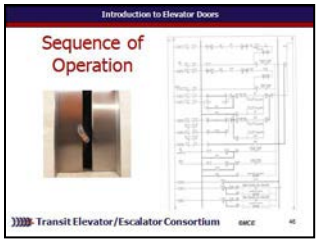
DO	SAY	Materials Needed
REVIEW slide	**In your own words:** The Door Close Function Output (DCF) microcomputer output is now latched which will keep the DC relay energized through the elevators travel. ***Advance.***	✓PPT slide 46



Instructor's Notes

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DO	SAY	Materials Needed
REVIEW slides **ASK** **Instructor's Notes** _____ _____ _____ _____ _____	**In your own words:** ***Administer quiz.***	✓PPT slide 51