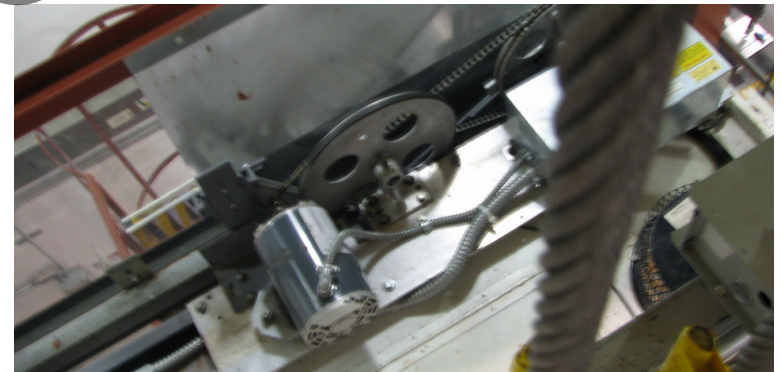
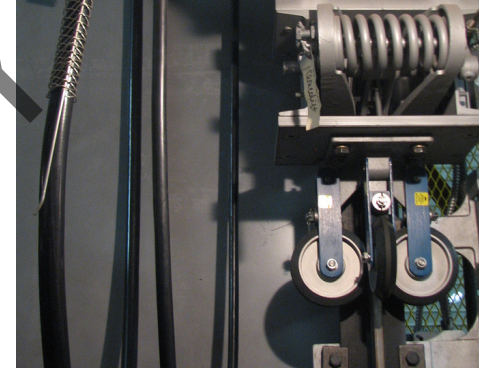


# Instructor Guide



## 216: Elevator: Principles of Door Operation & Maintenance Module 4: Door Inspection and Troubleshooting



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PREVIEW ONLY

# Elevator – Door Inspection and Troubleshooting

*Instructor's Guide*



## Icons Used In This Guide



**REVIEW** slides



**ASK**



**CLASSROOM ACTIVITY**



**SMALL GROUP ACTIVITY**



**INDIVIDUAL ACTIVITY**



**WRITE**



**Multimedia**



**REFER** participants to

## Agenda

To	Topic Title	Duration
1	Overview	10 minutes
2	Gen. Troubleshooting Strategies	30 minutes
3	Sensory Inspection	10 minutes
4	Operational Inspection	40 Minutes
5	Common Faults	80 Minutes
6	Field trip	90 Minutes
7	Summary	10 Minutes
	<b>Total Time:</b>	270 Mins

PREVIEW ONLY

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



### Overview

**Purpose** The purpose of this module is to:

- Provide an overview to the inspection and troubleshooting of elevators doors.

### **Objectives**

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

- Identify troubleshooting procedures.
- Explain sensory inspections.
- Explain operational inspections.
- Identify the components that require inspection.
- Identify the measurement procedures.
- Determine the types of tools required.
- Discuss typical faults that would require repair and/or replacement.

### **Materials**

**Mandatory** Make sure you have the following

- PowerPoint Presentation
- Coursebook
- Quizzes
- Pencils
- Internet Connection
- A17.1 – 2010
- A17.2 – 2007
- Elevator Maintenance

### **Optional**

You may also want the following for optional activities:

- Chalk board with chalk, large paper with marker, etc.
- Lab, simulator or out of service elevator
- G.A.L. Installation Procedures CD
- photocopies of the table in section 5-5 of coursebook 216

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 270 minutes    This section: 10 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

DO	SAY	Materials Needed
<div data-bbox="19 478 125 578" data-label="Image"> </div> <p data-bbox="144 499 618 549"><b>REVIEW</b> module objectives</p> <p data-bbox="19 792 444 835"><b>Instructor's Notes</b></p> <hr data-bbox="28 892 608 906"/> <hr data-bbox="28 978 608 992"/> <hr data-bbox="28 1078 608 1092"/> <hr data-bbox="28 1163 608 1178"/> <hr data-bbox="28 1235 608 1249"/>	<p data-bbox="666 421 1023 464"><b>In your own words:</b></p> <p data-bbox="666 485 1294 571">Today we will look at elevator door troubleshooting. In doing so, we will...</p> <p data-bbox="666 571 1159 614"><b>Advance for each objective.</b></p> <p data-bbox="666 614 1246 656">Identify troubleshooting procedures</p> <p data-bbox="666 699 1130 742">Explain sensory inspections</p> <p data-bbox="666 785 1178 828">Explain operational inspections</p> <p data-bbox="666 871 1429 913">Identify the components that require inspection</p> <p data-bbox="666 956 1284 999">Identify the measurement procedures</p> <p data-bbox="666 1042 1275 1085">Determine the types of tools required</p> <p data-bbox="666 1128 1420 1213">Discuss typical faults that would require repair and/or replacement</p> <p data-bbox="666 1256 840 1299"><b>Advance.</b></p>	<p data-bbox="1487 471 1729 514">✓ PPT slide 3</p> <div data-bbox="1497 535 1825 771" data-label="Image"> </div>

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 270 minutes    This section: 10 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO



**REVIEW** key terms

### Instructor's Notes

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### SAY

**In your own words:**

Lets take a look at some of the key words we will be defining as move through this module:

Clearance Parameters, Closing Force , Kinetic Closing Energy, Measurements, Nudging, Obstruction, Operational, Inspection, Physical Senses, Pressure Gauge, Preventive Maintenance  
**Advance.**

And Probable Cause, Process Of Elimination, Root Cause, Sensory Inspection, Service Call, Speed, Symptom, Troubleshooting  
**Advance.**

### Materials Needed

✓PPT slide 4



# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 270 minutes    This section: 10 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

**DO**

**SAY**

**Materials Needed**



**REVIEW** slide

**In your own words:**

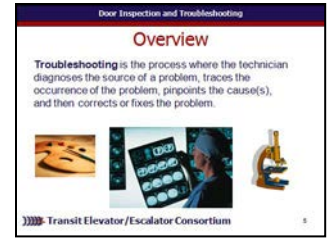
The science in troubleshooting is the technician knowing the correct solution to a problem.

**Advance.**

And much like a doctor, technicians who are troubleshooting are looking at all the angles and finding the best possible solution.

**Advance.**

✓ PPT slide 5



**Instructor's Notes**

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# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 270 minutes    This section: 10 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO



**ASK** participants what they remember about troubleshooting



### CLASSROOM ACTIVITY

### Instructor's Notes

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### SAY

#### In your own words:

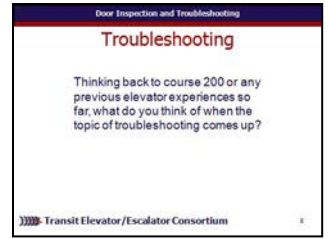
Thinking back to course 200 or any previous elevator experiences so far, what do you think of when the topic of troubleshooting comes up?

*[Discuss participant responses, if list them on a chalk board or similar.]*

*Advance.*

### Materials Needed

✓ PPT slides 8



✓ **Optional:** chalk board/chalk or white paper/marker





# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 min    Time remaining: 260 min    This section: 30 min (10 slides)    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO



**REVIEW** slides

### Instructor's Notes

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### SAY

**In your own words:**

Always test, and again this is part of the science of the process. Discovering the **root cause** is the final step in troubleshooting. After all, fixing the problem will only have to be done over again if the cause of the problem is not corrected.

**NOTE:** The final step is not replacing the blown fuse but identifying what caused the fuse to trip.

**Advance.**

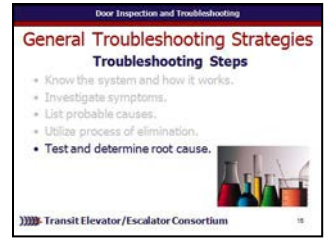
**Warning: Safety Precautions!**

Always remember to wear proper PPE including safety vest, gloves, and glasses.

**Advance.**

### Materials Needed

✓ PPT slides 15, 16



# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 min    Time remaining: 260 min    This section: 30 min (10 slides)    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

**DO**

**SAY**

**Materials Needed**



**ASK**

**In your own words:**

Lets see what we have learned so far:  
Order the 5 steps for general troubleshooting include:

- a. Know the system and how it works.
- b. Investigate symptoms.
- c. List probable causes.
- d. Utilize process of elimination.
- e. Test and determine root cause.

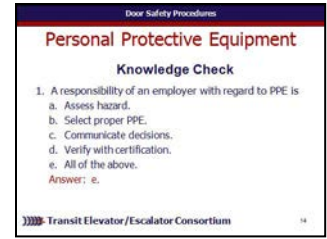
**Call on participants for answer.**

**Advance for correct answer.**

**Answer: a., b., c., d., e.**

**Advance.**

✓PPT slide 18



**Instructor's Notes**

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# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 220 minutes    This section: 40 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO



**REVIEW** slides

### Instructor's Notes

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### SAY

**In your own words:**

Smooth and quiet operation means just that: check for door operation that is smooth and quiet. Wear and tear on the system can be reduced by careful adjustment of zone and speed while engaging and disengaging the hoistway interlock rollers.

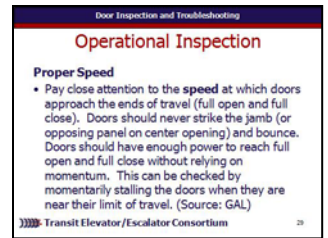
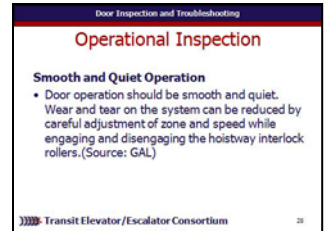
**Advance.**

Pay close attention to the **speed** at which doors approach the ends of travel (full open and full close). Doors should never strike the jamb (or opposing panel on center opening) and bounce. Doors should have enough power to reach full open and full close without relying on momentum. This can be checked by momentarily stalling the doors when they are near their limit of travel.

**Advance.**

### Materials Needed

✓ PPT slides 28, 29



# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 220 minutes    This section: 40 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564" data-label="Image"> </div> <p data-bbox="164 492 434 535"><b>REVIEW</b> slides</p> <div data-bbox="28 792 454 842" data-label="Section-Header"> <h3>Instructor's Notes</h3> </div> <hr/> <hr/> <hr/> <hr/> <hr/>	<p data-bbox="666 428 1033 471"><b>In your own words:</b></p> <p data-bbox="666 492 1429 578">For linkages, check for cleanliness and loose hardware.</p> <p data-bbox="666 578 850 621"><b>Advance.</b></p> <p data-bbox="666 664 1449 792">And lastly, check the door operator for smooth operation, cleanliness, and any loose hardware.</p> <p data-bbox="666 799 850 842"><b>Advance.</b></p>	<p data-bbox="1497 471 1835 514">✓ PPT slides 37, 38</p> <div data-bbox="1516 535 1845 763" data-label="Image"> </div> <div data-bbox="1516 778 1845 1006" data-label="Image"> </div>

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 220 minutes    This section: 40 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564" data-label="Image"> </div> <p data-bbox="170 492 396 535"><b>Review slide</b></p>          <p data-bbox="28 792 444 835"><b>Instructor's Notes</b></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>	<p data-bbox="672 428 1023 464"><b>In your own words:</b></p> <p data-bbox="672 492 1371 614">As always, follow your authority's specific requirements on preventive maintenance inspections.</p> <p data-bbox="672 621 1391 706">Make sure that the belts and chains on the operator are taut.</p> <p data-bbox="672 714 1420 792">In addition, follow measurement as per code and as stated here:</p> <p data-bbox="672 799 1110 835"><b>Measurements</b> per code:</p> <ul data-bbox="672 842 1439 1278" style="list-style-type: none"> <li>• <u>Clearance parameters</u> - simply use a ruler to make sure that all spaces are within code specifications as per A17.1 - 2010 Section 2.11.</li> <li>• <u>Closing Force</u> – use a pressure gauge on edge of hoistway door, sensor will detect obstruction if measured on inside of car door, consult manufacturer specifications.</li> <li>• <u>Kinetic Energy Closing Force</u> – depends on door type.</li> </ul> <p data-bbox="672 1285 850 1320"><b>Advance.</b></p>	<p data-bbox="1497 471 1748 506">✓ PPT slide 40</p> <div data-bbox="1516 535 1845 771" data-label="Image"> </div>

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 220 minutes    This section: 40 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

DO	SAY	Materials Needed
<div data-bbox="34 464 144 564" data-label="Image"> </div> <p data-bbox="170 492 386 528"><b>Review slide</b></p> <div data-bbox="34 585 144 692" data-label="Image"> </div> <p data-bbox="170 614 560 649"><b>CLASSROOM ACTIVITY</b></p> <p data-bbox="28 792 444 835"><b>Instructor's Notes</b></p> <hr data-bbox="28 899 608 906"/> <hr data-bbox="28 978 608 985"/> <hr data-bbox="28 1078 608 1085"/> <hr data-bbox="28 1156 608 1163"/> <hr data-bbox="28 1235 608 1242"/>	<p data-bbox="676 428 1023 464"><b>In your own words:</b></p> <p data-bbox="676 492 1449 749">Measuring Alignment of belt to the drive pulley is much more straight forward. Simply perform a <b>straight edge</b> alignment test using a straight edge. If they are misaligned, the belt will ride off of the pulleys during operation.</p> <p data-bbox="676 799 1371 885"><i>[If possible, demonstrate straight edge alignment test.]</i></p> <p data-bbox="676 935 850 971"><b>Advance.</b></p>	<p data-bbox="1497 471 1748 506">✓ PPT slide 42</p> <div data-bbox="1516 535 1845 771" data-label="Image"> </div>

# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 220 minutes    This section: 40 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

**DO**

**SAY**

**Materials Needed**



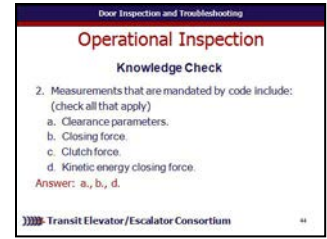
**ASK**

**In your own words:**

Measurements that are mandated by code include: (check all that apply)

- a. Clearance parameters.
- b. Closing force.
- c. Clutch force.
- d. Kinetic energy closing force.

✓PPT slide 44



**Instructor's Notes**

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**Call on participants for answer.  
Advance for correct answer.**

Answer: a., b., d.

**Advance.**



# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 180 minutes    This section: 80 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

**DO**

**SAY**

**Materials Needed**



**CLASSROOM  
ACTIVITY**

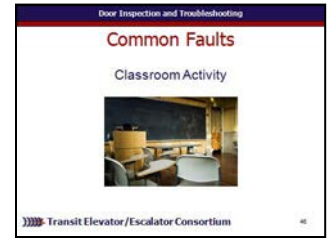
**In your own words:**

Lets take a look at some of these faults with a worksheet and particularly note what our authority specific applications.

**Advance.**

*[Use course books section 216 5-5 or handouts copied from course books to review common faults. Have participants write in the appropriate place any authority specific applications.]*

- ✓ PPT slide 46
- ✓ 216 Coursebook



- ✓ **Optional:** photocopies of the table in section 5-5 of coursebook 216

**Instructor's Notes**

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# Elevator – Door Inspection and Troubleshooting

## Instructor's Guide



Module Length: 270 minutes    Time remaining: 10 minutes    This section: 10 minutes    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO



**REVIEW** slides



**ASK**

### Instructor's Notes

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### SAY

In your own words:  
**Read slide.**  
*[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.**

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.**

**Administer quiz.**

### Materials Needed

✓ PPT slides 48, 49, 50

