# Elevator – Lighting

*Instructor’s Guide*

## Icons Used In This Guide

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

## Agenda

<table>
<thead>
<tr>
<th>Topic #</th>
<th>Topic Title</th>
<th>Duration</th>
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<tr>
<td>1</td>
<td>Overview</td>
<td>30 Minutes</td>
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<tr>
<td>2</td>
<td>Inspection and Maintenance</td>
<td>20 Minutes</td>
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<tr>
<td>3</td>
<td>Replacement</td>
<td>40 Minutes</td>
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<tr>
<td>4</td>
<td>Field Trip</td>
<td>120 Minutes</td>
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<tr>
<td>5</td>
<td>Summary</td>
<td>30 Minutes</td>
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**Total Time:** 240 Minutes
Elevator – Lighting
Instructor’s Guide

Overview

Purpose
The purpose of this module is to:

Provide the participant with an overview on how to inspect, maintain and replace lighting components on transit elevators.

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

• List Maintenance Procedures for Lighting
• Describe normal Operation of Lighting in Transit Elevators
• Identify Faults in lighting systems that would require replacement
• Identify procedures for replacement of lighting related components

Materials

Mandatory
Make sure you have the following

• PowerPoint Presentation
• Coursebook
• Quizzes
• 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
Welcome to the course on the inspection and maintenance of lighting for elevator systems. 

Without lighting in an elevator system, passenger comfort as well as safety during inspection and maintenance would be greatly diminished to say the least. 

(This photo is from Elevator Bob and is of lighting in an antique elevator in the Casa Batllo in Spain, built between 1905 – 1907.) 

In your own words:
Elevator – Lighting
Instructor’s Guide

Module Length: 240 min  Time remaining: 240 min  This section: 30 min (7 slides)  
Section start time: ________  Section End Time: ________

**DO**  |  **SAY**  |  **Materials Needed**
---|---|---

**REVIEW** module objectives

In your own words:

Today we will

- List Maintenance Procedures for Lighting
- Describe normal Operation of Lighting in Transit Elevators
- Identify Faults in lighting systems that would require replacement
- Identify procedures for replacement of lighting related components

**Advance**

✓ PPT slide 3
In your own words:

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

- Fluorescent
- Incandescent
- LED
- Light switch
- Socket
- Vapor resistance
- Waterproofing

Advance
In your own words:

Thinking back to other courses or just in general, what do we already know about the maintenance of lighting in elevator systems?

Allow participants to think for a minute and perhaps discuss with a partner ideas as well as write down any ideas. Discuss participant responses and if possible list them on a chalk board or similar.

Advance

Materials Needed

✓ PPT slide 5
**Elevator – Lighting**  
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<tbody>
<tr>
<td>REVIEW slides</td>
<td>In your own words: It is important that all lighting function properly in a transit elevator as it is a safety concern when visibility is not at its height. <strong>Advance</strong></td>
<td>✓ PPT slides 6, 7</td>
</tr>
</tbody>
</table>

**Instructor’s Notes**

- There are generally three types of lights used in transit elevator systems:  
  - **Incandescent**  
  - **Fluorescent** also known as compact fluorescent lamp (CFL)  
  - **LED (Light-Emitting Diode)**

- There are maintenance procedures related to all three types of lighting as well as steps to visually inspect them. This module covers maintenance, inspection and replacement of lighting components in transit elevators. **Advance**
### ADVANCE

When inspecting lights in transit elevator systems it is important to check the condition of the bulb itself, its associated switch and the bulb covering, be it a lens and/or a cage.

**Advance**

### Instructor’s Notes

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<tr>
<td>REVIEW slides</td>
<td>In your own words:</td>
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</table>
| ASK | **Ask**
When inspecting lighting, what types of conditions will you be looking for?
**Discuss possible answers with participants.**
Advance | ✓ PPT slides 8, 9 |

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### Materials Needed

- ✓ PPT slides 8, 9
**In your own words:**

First inspect the cover. If the cover is cracked, missing or dirty, then clean or replace the cover.

**Advance**

Next test the associated **light switch** to make sure that flicking/toggling the switch both turns the light on and off. If the light does not respond the right way, the bulb may be burnt out. As this is the easiest thing to test and/or fix start by trying a new bulb that is known to work in the socket.

**Advance**
In your own words:

If the lighting fixtures and switches have special characteristics such as **waterproofing, vapor resistance**, or other safety features, these features should be inspected and verified per Authority procedure.

**Advance** When the light is on, visually observe its **brightness**, that it is **steady** and that it is projecting the right color. For example if a light bulb is supposed to be projecting a white light, but it is instead yellow in tone there may be problems with the bulb or its covering. In cases where the problem is not the covering or the light is dull or flickers, replace the bulb.

**Advance**
### Elevator – Lighting
**Instructor’s Guide**

Module Length: 240 min  
Time remaining: 210 min  
This section: 20 min (9 slides)  
Section start time: __________  
Section End Time: __________

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</table>
| REVIEW slide | In your own words:  
*Have participants turn to pages in their course book. Review those pages together and use the tables to review and answer questions on the following slides.*  
Advance | ✓ PPT slide 12  
Course book |

**Instructor’s Notes**

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**In your own words:**  
*Using the tables in the course book*

You have a flickering problem with an LED light. What are two reasons for this problem?  
**Call on participants for answer**  
**Advance once given the correct answer**

Answer:

- Improper voltage
- Defective unit

**Advance**
## Elevator – Lighting
### Instructor’s Guide

**Module Length:** 240 min  
**Time remaining:** 210 min  
**This section:** 20 min (9 slides)  
**Section start time:** ________  
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</table>
| ![Question Icon] | **In your own words:** Using the tables in the course book  
Yes or No. Bobby may need to check wiring connections if a fluorescent lamp will not operate. Call on participants for answer  
Advance once given the correct answer  
Answer: Yes  
Advance | ✓PPT slide 14 |

**Instructor’s Notes**

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In your own words:
*Using the tables in the course book*

Yes or No. Yvonne has noticed a fuse trips when she screws an incandescent bulb into the socket. This means the light bulb is not working and should be replaced.

**Call on participants for answer**

**Advance once given the correct answer**

**Answer:**
No, but the plug or light socket may be defective.

**Advance**
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<tr>
<td>ASK</td>
<td>In your own words: <em>Using the tables in the course book</em>&lt;br&gt;Yes or No. A blinking incandescent light may mean high ambient temperature. <em>Call on participants for answer</em>&lt;br&gt;Advance once given the correct answer&lt;br&gt;Answer: Yes</td>
<td>✓ PPT slide 16</td>
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Instructor’s Notes

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In your own words:

As described in module 1 there are three different types of maintenance: preventive, reactive, and predictive. Preventive maintenance is what we just reviewed: checking to make sure that conditions are such that the life of the bulb can be as long as possible. Reactive maintenance in this case could consist of replacing a bulb (or related component) because it is no longer functioning. In many cases, replacement of light bulbs in transit elevator systems is predictive.

Ask

What is predictive maintenance?

Allow participants to discuss ideas.

Advance
### Material Needed

- PPT slide 17

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**In your own words:**

The average life cycle of a light under certain conditions is usually predetermined by either the authority or light manufacturer. Replacement may be included in PM checklists - done on a yearly cycle for example. The OEM may also offer advice on how often bulbs should be replaced to function at their ideal state.

**Advance**
Elevator – Lighting

Instructor’s Guide

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<tr>
<td>REVIEW</td>
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<tr>
<td>ASK</td>
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**In your own words:**

**Ask**

Again, what is reactive maintenance?

*Allow participants to discuss ideas.*

**Advance**

There are times when replacement of lighting components is reactive. Some common reasons for replacing lighting components outside of their normal predictive replacement schedule include:

- Lighting is dim
- Lighting is flickering
- Lighting is not producing the intended color
- Bulb, or other components, are warm to the touch or show evidence of burning

**Advance**

- ✓ PPT slide 18

**Instructor’s Notes**

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Transit Elevator/Escalator Consortium
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<tr>
<td>RE</td>
<td><strong>In your own words:</strong></td>
<td>✓ PPT slides 19, 20</td>
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<tr>
<td>EV</td>
<td>Whenever replacing a lighting component, follow all precautions related to locking out the elevator before beginning the process of lamp replacement.</td>
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<td></td>
<td>When replacing the lamp(s), insure that the correct size, type, and wattage is used.</td>
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<td><strong>Advance</strong></td>
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<td></td>
<td>Remember that the lighting circuits and the operational circuits may not be the same and removing power from the operation of the elevator does not necessarily mean that the lighting circuit will be disabled.</td>
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<td></td>
<td><strong>Advance</strong></td>
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</table>
In your own words:

You are all familiar with fluorescent lighting like the one in this photo found in a control room in South Eastern PA Transportation Authority.

Ask

How often do you encounter these types of lights in your transit authority?

Allow participants to discuss ideas.

This type of light can be unique and has some special considerations.

Advance
### Materials Needed

- PPT slides 22, 23

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### Instructor's Notes

- In your own words:
  One unique feature of fluorescent bulbs is their containment of mercury. The photo on your right shows “A pound coin (density ~7.6 g/cm³) floating in mercury due to the combination of the buoyant force and surface tension.” Mercury can be toxic.

**Advance**

The fill pressure inside the fluorescent light tube is only about 1/750 that of atmospheric pressure. This low pressure creates a vacuum inside which creates an impressive implosion when they break. Since all fluorescent bulbs contain mercury, breaking the bulbs should be avoided.

**Advance**
### In your own words:

In the case of a broken fluorescent bulb, make sure to **ventilate** the area and leave the area for at least fifteen minutes. Additionally, shut off any central air systems so this air does not circulate through the system.

**Advance** For hard surfaces, carefully brush up the glass shards and powder with a disposable piece of stiff paper or cardboard. Place all shards, powder and paper used in a secure sealable container designed for that purpose. Collect all remnant glass and powder with sticky tape and then a damp paper towel. Make sure to dispose of these correctly.

**Advance**
In your own words:

Any clothing worn in the presence of an explosion of a fluorescent tube will have to be disposed of as washing will allow any mercury to be dispersed into the water supply. Shoes can be wiped with a damp rag. Properly dispose of the rag.

Check with your local or state government about disposal requirements in your specific area. Some states prohibit such trash disposal and require that broken and unbroken mercury-containing bulbs be taken to a local recycling center. The Occupational Safety and Health Administration (OSHA,) publishes a QuickCard™ with procedures on how to avoid mercury exposure from fluorescent bulbs.

Do Not Advance
## Elevator – Lighting

### Instructor’s Guide

| Module Length: 240 min | Time remaining: 190 min | This section: 40 min (21 slides) | Section start time: ________ | Section End Time: ________ |

### DO

- REVIEW slide
- REFER participants to Course book

### SAY

In your own words: **Have participants turn to pages in their course book. Review those pages together.**

Advance

### Instructor’s Notes

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### Materials Needed

- ✓ PPT slide 25
- ✓ Course book
**Elevator – Lighting**

*Instructor’s Guide*

Module Length: 240 min  Time remaining: 190 min  This section: 40 min (21 slides)  Section start time: ________  Section End Time: ________

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| REVIEW slide | **In your own words:**  
Remember: Fluorescent light tubes contain mercury and broken lighting should be handled in accordance with your Authority’s procedures for biohazard materials.  
*Advance* | ✓ PPT slide 26 |

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**Instructor’s Notes**

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In your own words:

Unlike incandescent bulbs, fluorescent lights cannot be directly connected to electric lines. They use what is called a **ballast** to regulate both the starting and sustaining voltage going to the fluorescent light.

**Advance** First, you need to make sure you match the type of bulb to the type of ballast as there are different kinds of bulbs and ballasts, depending on how rapidly the bulb will start. If you use an ordinary fluorescent bulb in w

**Advance** The ballast may need to be replaced in instances such as strobing, excessive noise, or complete non-operation of the light.

**Advance** As with bulbs, make sure to replace existing ballasts with the correct type per the manufacturer’s recommendations.

**Advance**
## Elevator – Lighting

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Section start time:  
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|    | In your own words:  
Here is an example ballast by Elliot Electric.  
**Advance**  
Once the correct ballast type has been secured, follow these steps to install:  
1. Remove power from the system  
2. Remove the bulb  
3. Remove old ballast  
4. Replace the new ballast  
5. Replace the bulb  
6. Return power to the system.  
7. Test the system afterwards to make sure the issue is resolved.  
With a rapid start ballast, the bulb will have a short life. Use rapid start bulbs with rapid start ballasts.  
**Advance** | ✓ PPT slides 28, 29 |
### Elevator – Lighting

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<tr>
<td>In your own words:</td>
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<tr>
<td>Fluorescent lighting systems also contain a <strong>socket</strong> also known as a <em>tombstone</em>. The purpose of the socket is to hold the bulb and contacts for pins that supply power to the bulb. <strong>Advance</strong></td>
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<td>✓ PPT slides 30, 31</td>
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### Lighting Replacement

- **Fluorescent Lighting - Socket**
  - Also known as Tombstone
  - Hold bulb and contact for power supply pins

- **Incandescent Lighting Replacement**
  - Remove protective covering
  - Unscrew faulty bulb
  - Wrap bulb in newspaper sheet
  - Place bulb in sealable bag & then in trash can
  - Replace bulb with same wattage

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**Elevator – Lighting**

**Instructor’s Guide**

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| REVIEW slides | **In your own words:**

Here is an example of replacing an incandescent light bulb. **Advance**

If the light bulb has just burned out, wait until it has cooled before removing it from the light fixture. **Advance**

Replacing incandescent light bulbs is a lot more straight-forward than replacing fluorescent lights. Simply remove any protective covering over the faulty light, unscrew the faulty bulb. Wrap it in a sheet of newspaper. Place it in a sealable plastic bag and place it in the trash can. Take care to replace the bulb with a bulb of the same wattage. **Advance**

✓ PPT slides 32, 33, 34
**Elevator – Lighting**

**Instructor’s Guide**

Module Length: 240 min  
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This section: 40 min (21 slides)  
Section start time:  
Section End Time:  

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| REVIEW slides | **In your own words:**  
Here is an example of an LED bulb one may find in transit.  
*Advance* | ✓ PPT slides 35 |

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**Instructor’s Notes**

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### Elevator – Lighting

**Instructor’s Guide**

Module Length: 240 min  
Time remaining: 190 min  
This section: 40 min (21 slides)  
Section start time: ____  
Section End Time: ____

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| **ASK** | **In your own words:**  Let's see what we have learned so far: Yes or No. You have a bulb that has just burned out and must wait a few minutes for the bulb to cool before replacing.  
**Call on participants for answer**  
**Advance once given the correct answer**  
Answer: Yes  
**Advance.** |

**Materials Needed**

- ✓ PPT slide 36

**Instructor’s Notes**

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### Elevator – Lighting

#### Instructor’s Guide

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<td>❓</td>
<td><strong>In your own words:</strong> Yes or No. Incandescent light tubes contain mercury and broken lighting should be handled in accordance with your Authority’s procedures for biohazard materials.</td>
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<td><strong>Call on participants for answer</strong></td>
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<td></td>
<td><strong>Advance once given the correct answer</strong></td>
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<td></td>
<td><strong>Answer:</strong> No – fluorescent bulbs contain mercury.</td>
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<td><strong>Advance</strong></td>
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#### Instructor’s Notes

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#### Materials Needed

- ✔️ PPT slide 37

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**Instructor’s Guide**

- **Module Length:** 240 min
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### Elevator – Lighting

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**This section:** 120 min  

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**Section End Time:** ________

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#### Instructor’s Notes

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**In your own words:**

*Take time to visit the field to provide an example demonstration and opportunities for participants to perform the following tests:*

- Identify Faults in lighting systems that would require replacement
- Identify procedures for replacement of lighting related components

**Advance**

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**Materials Needed**

- ✓ PPT slide 38
**DO**

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<tbody>
<tr>
<td>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</td>
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<tr>
<td>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</td>
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<tr>
<td>Read slide. Discuss definitions as a group. Advance</td>
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<tr>
<td>✓ PPT slides 39, 40</td>
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Instructor’s Guide

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This section: 30 min (3 slides)  
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**CLASSROOM ACTIVITY**

**Instructor’s Notes**
## Elevator – Lighting

### Instructor’s Guide

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<td>In your own words:</td>
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<td>Administer quizzes.</td>
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