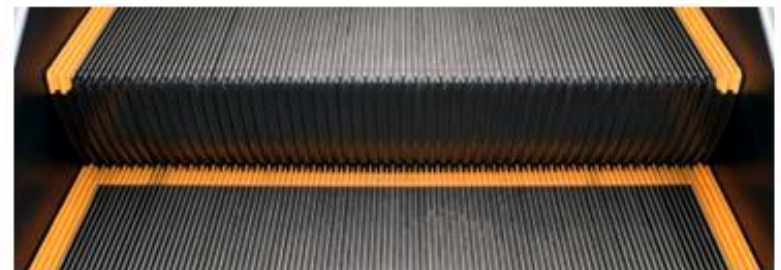


# Instructor/Participant Guide



## 212: Escalator-Inspection & Basic Maintenance

### *Module 6: Safety Devices*



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## Icons Used in This Guide

Throughout the Instructor's Guide, the following icons indicate the type of content presented.



**Refer To**



**PowerPoint**



**Multimedia**



**Web based  
Training**



**Write**



**Ask**



**Individual Activity**



**Small Group  
Activity**



**Classroom  
Activity**



**Duration**

## Agenda

Topic No.	Topic Title	Duration
1	Introduction	5 minutes
2	Safety Circuits	40 minutes
3	Safety Devices	15 minutes
4	Combs and Comb Impact	10 minutes
5	Mechanical Locks	10 minutes
6	Safety Lighting	15 minutes
7	Safety Side Brushes	40 minutes
8	Summary	5 minutes
<b>Total Time:</b>		<b>2.5 hours</b>



### Overview

#### Purpose

The purpose of this module is to:

- Introduce participants to the types and styles of safety devices within transit escalators commonly found in U.S. transit systems.

#### Objectives

At the end of this chapter, the learner will be able to:

- Complete a visual inspection and demonstrate ability to correctly test all safety devices.
- Verify the settings for the comb impact device and record results.
- Perform needed adjustments, repairs or replacements.

#### Materials

Make sure you have the following:

- Laptop (one for leader)
- Participant Guides
- PowerPoint slide deck
- LCD projector
- A17.1 Safety Code for Elevators and Escalators
- A17.2 Guide for Inspection of Elevators, Escalators and Moving Sidewalks
- A17.3 Safety Code for Existing Elevators and Escalators
- Heavy Duty Transportation System Escalator Design Guidelines (APTA RT-RP-FS 007-02)

#### Preparation

- Field Employees' Safety Handbook
  - Transit Agency Handbook
- PREPARE** flip charts with the following title:
- Class Expectations



## Instructor's Notes

**Safety Devices**

**Safety Devices**

**Skirt Switches:**

- Wedge a 3/16 inch straight edge between the skirt switch and step.
  - Key start the escalator in both directions.
  - Escalator should not start.

**Missing Step Detector:**

- Remove one step and position hole at the lower end.
- Disconnect the plug in the portable control station from lower pit.
  - Key start the escalator upward.
  - The proximity sensors are designed to shut down the escalator if a step is missing.

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**Safety Devices**

**Safety Devices**

**Step Lift Switch:**

- Switch should activate when step lift track is lifted 3/16 inch and should reset when step lift track is released.

**Step Sag Switch:**

- Check operation, trip lever activates limit switch if a step rises or lowers more than 5mm.

**Step Level Detector:**

- Inspect step riser to switch wand for 1/8 inch clearance.

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Slide 6

Slide 9



**REVIEW** slides 6 thru 9 and discuss safety devices.

**CONTENT:** Direct participants to describe in their own words the basics of safety devices

**APPLICATION FEEDBACK:** Now that we have discussed a little about safety devices, have the participants answer the following questions.



**ASK** participants to describe the inspection procedure for the following terms.

## Safety Devices

*Describe the inspection procedure for the following terms:*

**Skirt Switches:**

**Missing Step Detector:**

**Emergency Stop Button:**

**Step Upthrust Safety Switch:**

**Step Level Switch:**

**Missing Step Device:**

**Step Lift Switch:**





### Instructor's Notes

Safety Devices

#### Come Along Device Method

##### Preliminary Preparation for Accurate Testing

- Remove the newel balustrade panel to access the adjusting jack bolt and step inlet monitoring device switches.
- Verify the horizontal guide strips on both sides lightly touch the sides of the steps.
- Measure the penetration gap between the bottom of the step groove and the bottom of the comb segment.
  - The gap must not be greater than 4mm.

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#### Slide 13

#### Slide 14

**REVIEW** slides 13 and 14 and discuss preliminary preparation for accurate testing.

**ASK:** What is the maximum allotted measurement for the gap?

Safety Devices

#### Come Along Device Method

##### Preliminary Preparation for Accurate Testing

- Check comb segments for damaged or broken teeth.
- Remove screws, mounting cover strips to comb segment, and clean the area around each comb segment's mounting screws.
- Check the tips of comb segment teeth for equal clearance between comb tread and step tread on both sides from step tread grooves.

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### Preliminary Prep for Accurate Testing

*What is the maximum allotted measurement for the gap?*

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### Instructor's Notes

Safety Devices

#### Come Along Device Method

##### Horizontal Side and Center Actuating Force Test

- Remove the floor plate and four steps.
  - Run the opening under the combplate.
- Remove the two outside comb segments and one comb segment from middle of the combplate.
- Hook the come-along chain to the front LH side of the combplate.
  - Attach the end of the come-along to the dynamometer.
  - Attach the other end of the dynamometer firmly to a fixed point in the pit.

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Slide 16

Slide 17



**REVIEW** slides 16 and 17 and discuss the horizontal side and center actuating force test.



**ASK** participants to describe the maximum force required to trip the left and right comb impact switches.

Safety Devices

#### Come Along Device Method

##### Horizontal Side and Center Actuating Force Test

- Increase a horizontal force slowly on one side of the combplate near the skirt panel until the comb impact switch trips.
  - Must be 300-400 lbs.
- Hook the come-along chain to the center of the combplate to perform the horizontal center pull.
  - Verify the force required to trip both left and right comb impact switches is less than 800 lbs.

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### Horizontal/Center Actuating Force Test

*What is the maximum force required to trip the left and right comb impact switches?*

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### Instructor's Notes

Safety Devices

#### Come Along Device Method

##### Setting Springs and Switches

- Adjust switches so the switch button sits directly against the bracket or upon the back bolt head.
  - Confirm that all switches are still in the position to be activated with 0.06" – 0.12" of combplate movement.
- Inspect springs and replace all damaged springs.
  - Spring length for vertical switch should be about 2 3/4".
  - Spring length for horizontal switch should be about 2 5/8".

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#### Slide 22



**REVIEW** slide 22 and discuss setting springs and switches.



**ASK** participants to describe what the spring length for the listed switches are.

### Setting Springs and Switches

*What is the spring length for the following switches?*

#### Vertical Switch:

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#### Horizontal Switch

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### Instructor's Notes

Safety Devices

#### Come Along Device Method

##### Test the Opposite Landing and Prepare Unit for Service

- Repeat Steps on the opposite landing of the escalator.
- Re-install all of the following:
  - Comb segments
  - Missing steps
  - Newel balustrade panel
  - Inner skirt panels
- Remove all testing equipment after the procedure is completed.
- Run the escalator and ensure it is operating properly before removing the barricades.

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#### Slide 26



**REVIEW** slide 26 and discuss testing the opposite landing and preparing the unit for service.

**CONTENT:** Direct participants to describe in their own words the basics of standard test instruments.

**APPLICATION FEEDBACK:** Now that we have discussed a little about standard test instruments, have the participants answer the following questions.



**ASK** participants what should be done prior to removing the barricades?

### Prepare Unit for Service

*What should be done prior to removing the barricades?*

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### Instructor's Notes

#### Safety Devices

##### Complate Lights

- Located at the top and bottom landings on either side of the combplates to provide safe illumination for riders.
- Under step lights are located within the truss near the top and bottom of the step band just prior to the combplate.

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Slide 29

#### Safety Devices

##### Traffic Lights

- Located within the newels at the upper and lower landings and indicate the direction of travel.
- Ensure all lights properly illuminate and replace as necessary.



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Slide 31



**REVIEW** slides 29 to 31 and discuss safety lighting.

**CONTENT:** Direct participants to describe in their own words the basics of safety lighting.

**APPLICATION FEEDBACK:** Now that we have discussed a little about safety lighting, have the participants answer the following questions.



**ASK** participants to describe where each of the lighting systems are located.

### Safety Lighting

*Describe where each of the following safety lighting systems are located.*

**Complate Lights:**

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**Balustrade Lights:**

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**Traffic Lights:**

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### Instructor's Notes

### Summary

#### Summary

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#### Slide 33



**REVIEW** slide 33 and summarize the module.

**EVALUATION AND CLOSURE:** Recap the main points of the module before moving on to the next topic within this course.



**ASK** the participants if they have any outstanding questions on what was presented.