

# Instructor Guide



## 102: Introduction and Overview to Switches and Derails



**Table of Contents**

Overview.....4

Basic Terminology.....26

Switch Configurations.....43

Rods and Switch Types.....58

Derails.....91

Electrical Workings.....102

Summary.....112





For Signals Training  
Consortium Use Only





# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



### Icons Used In This Guide

-  **REVIEW** slides
-  **ASK**
-  **CLASSROOM ACTIVITY**
-  **SMALL GROUP ACTIVITY**

-  **INDIVIDUAL ACTIVITY**
-  **WRITE**
-  **Multimedia**
-  **REFER** participants to

### Agenda

Topic #	Topic Title	Duration
1	Overview	60 Minutes
2	Basic Terminology	30 Minutes
3	Switch Configurations	20 Minutes
4	Field Trip	90 Minutes
5	Rods and Switch Types	90 Minutes
6	Derails	20 Minutes
7	Electrical Workings	20 Minutes
8	Field Trip	90 Minutes
9	Summary	30 Minutes
	<b>Total Time:</b>	450 Minutes

# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



### Overview

**Purpose** The purpose of this module is to provide the participant with an introduction to the basic operation and functioning of switches and the various types that exist on railroads.

### Objectives

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

- Describe theory of operation and purpose of switches
- Identify related components of switches
- Differentiate between facing and trailing
- Identify switch symbols recommended by American Railway Engineering and Maintenance-of-way Association (AREMA)
- Differentiate between right handed and left handed switch layouts
- Determine normal and reverse position of the switch
- Describe properties of the switch layout as to be able to communicate with the track department
- Given a switch print, be able to identify installation standards
- Describe various types of switch layouts and their main features

- Differentiate between different types of switches
- Identify normal and reverse configuration on the circuit controller
- Identify the different types of motor control voltage
- Describe purpose and components of point detection
- Identify and describe different types of derails
- Describe the operation and purpose of derails

### 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 or downloaded videos
- Lab, simulator or out of service elevator

# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



Module Length: 450 min    Time remaining: 450 min    This section: 60 min ( 24 slides)    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

### DO

### SAY

### Materials Needed



**REVIEW** introduction slides

#### In your own words:

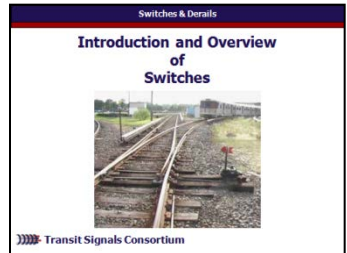
Welcome to the course on the Introduction and Overview to Switches and Derails/.

#### Advance

Riders depend on us.  
Here is a video to begin to help us think about switches and their related components.  
**Click on the video camera for a short video showing a derailment. The video is approximately 6 minutes long.**

#### Advance

✓ PPT slides 1, 2



✓ Internet connection or downloaded Course 102 Instructors Video 1

### Instructor's Notes

---

---

---

---

---

---

# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



Module Length: 450 min

Time remaining: 450 min

This section: 60 min ( 24 slides) Section start time: \_\_\_\_\_

Section End Time: \_\_\_\_\_

### DO

### SAY

### Materials Needed



**REVIEW** slides

#### In your own words:

It is important to note that the two points are always the same distance apart. Proper point opening allows for clearance of the train wheel between the stock rail and open point. This is insured by proper adjustment of the **head rod** also known as the # 1 rod which runs between the two points. The movement of the switch is caused by the mechanisms housed inside the **switch machine**. The switch machine is fixed to the **head blocks** or **head sticks** also known as # 1 and # 2 ties. Proper rail gauge is maintained by way of **gauge plates**-metal plates attached to the top of the ties.

**Advance**

✓ PPT slide 14



### Instructor's Notes

---



---



---



---



---



---

# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



Module Length: 450 min      Time remaining: 450 min      This section: 60 min ( 24 slides)      Section start time: \_\_\_\_\_      Section End Time: \_\_\_\_\_

DO	SAY	Materials Needed
----	-----	------------------

- ASK**
- SMALL GROUP ACTIVITY**
- WRITE**

**Instructor's Notes**

---



---



---



---



---



---

**In your own words:**

Lets see what we have learned so far:  
***Read each question to the participants.***

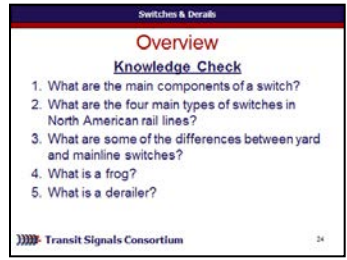
1. What are the main components of a switch?
2. What are the four main types of switches in North American rail lines?
3. What are some of the differences between yard and mainline switches?
4. What is a frog?
5. What is a derailer?

***Instruct participants to reflect on each question, use course book if needed, and write answers in note form on a sheet of paper.***

***Allow participants to discuss with a Partner their ideas and answers.***

***Continued***

✓ PPT slide 24



- ✓ Chalkboard or flip chart
- ✓ Note paper
- ✓ Pencils

# Signals – Introduction & Overview to Switches and Derails

## Instructor's Guide



Module Length: 450 min    Time remaining: 140 min    This section: 20 min (7 slides)    Section start time: \_\_\_\_\_    Section End Time: \_\_\_\_\_

**DO**

**SAY**

**Materials Needed**



**REVIEW** slide

**In your own words:**

The dotted lines are field equipment and the solid lines represent electrical connections. Information and power comes in from the control wire from the junction box (which originated at the CIL). Contact pairs 1/8 and 2/7 are motor contacts. The motor control contact is made up through contact 8. After this, power goes into motor and switch is thrown over. After the switch is completely thrown, contact 7 is closed.

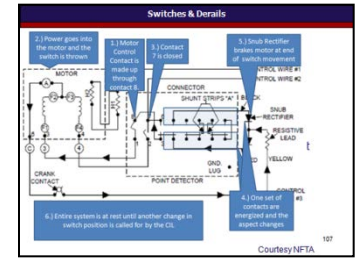
**Advance**

And here is the print.

**Review the print with participants.**

**Advance**

✓ PPT slide 94



## Instructor's Notes

---

---

---

---

---

---