

Transportation Engineering

Course Code –CE-422

Contact Hours -3+3

Dr Hassan Mujtaba

Signaling and Interlocking

- To err is human



- To safeguard against accidents, **signaling and interlocking** is done.

How to know train location

- There was no system to **track the location of train**.
- Once the **train went out of sight** there was no method to check its location.

Signaling

- The primary objective of signaling and interlocking is to control and regulate the movement of trains, including shunting operation safely and efficiently.
- Signaling enables the trains to be controlled in such a way that the existing track is utilized to the maximum.

Interlocking

- Mechanical connections established between various levers operating the signals and points in such a way that the working of signal mechanism may not go contrary to the desired purpose.
- Interlocking prevents setting of conflicting switches and signals.

Objective of Signaling

- To regulate the **movement of trains** so that they can run safely at **maximum permissible speed**.
- To maintain distance between the trains that are **running on the same line in the same direction**
- To maintain the safety of the two trains that have to **cross or approach each other**.
- Provide facilities for **safe and efficient shunting**
- To regulate **arrival and departure** of trains from the station yards.

Objective of Signaling

- During **repair and maintenance operation**, to run trains at restricted speed
- To ensure the safety of the train when it comes in contact with **road traffic at level crossing**.

History of Signaling

- Policemen would provide **signals to the trains**
- **Flags** were used during day
- Lights were used at night

Railway signaling was first introduced in **England** in **1842** and in **America** in **1863**



Interlocking was initially developed in **1856** and **1867**

History of Signaling (cont'd)

- 1825-First railway line was opened between **Darlington to Stockton (UK)**
 - Uniformed men on horses guided the train
- 1830-First **passenger train** between **Liverpool and Manchester**
 - Policemen were posted at fixed intervals

Area where signaling can prevent accidents

- Accident at **stations**, **block section** and level crossing

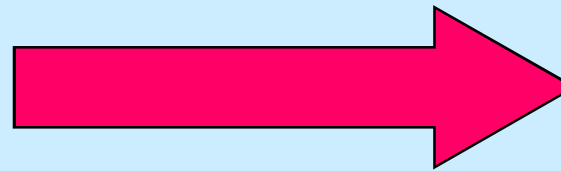
Interlocking Principle

CHECK

- Complete route for reception of train is unoccupied
- All points are correctly set & locked
- All Conflicting signals are at Danger

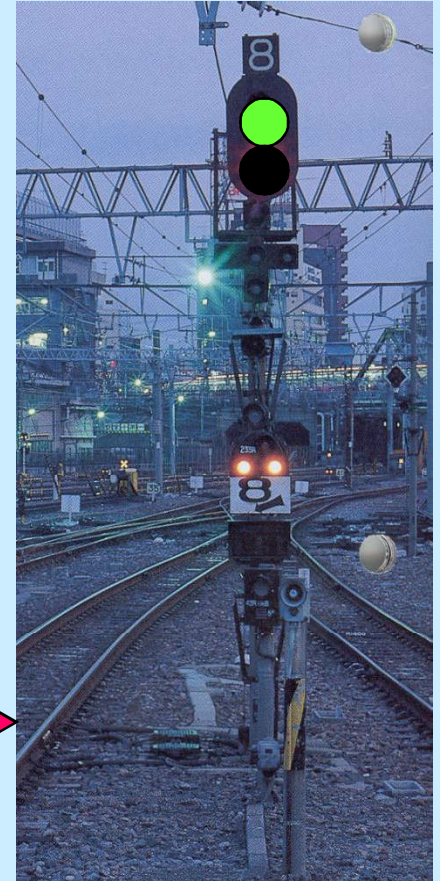
Position(RED)

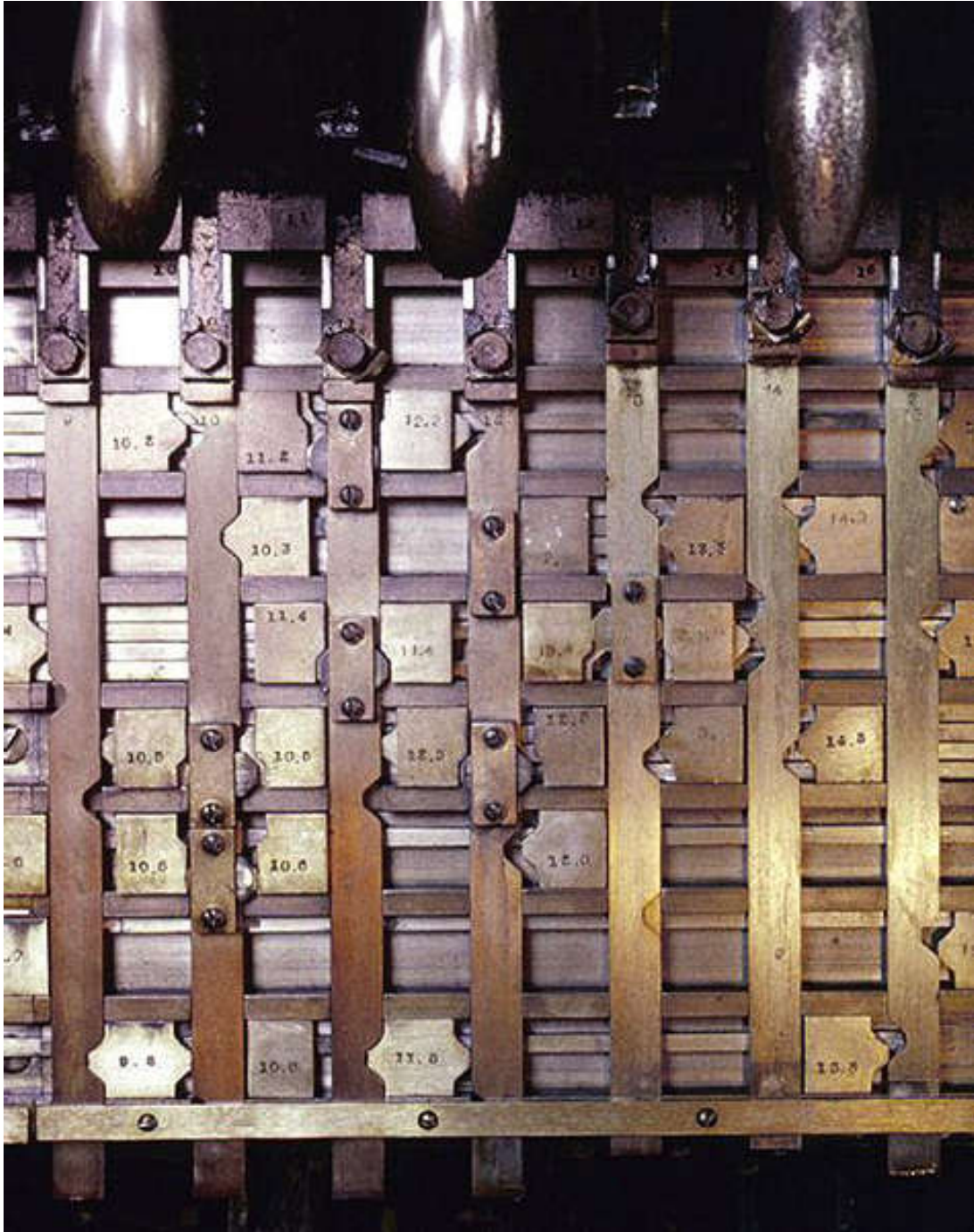
- Level Crossing gates (if any) are closed



Till Then

All above are True





Old Interlocking

Electric Point



Classification of Signals

- Visible
 - Hand Signals
 - Fixed Signals
 - Caution Indicators
 - Stops Signals
- Audible

Audible Signals

- Audible signals such as **detonators** and **fog signals** are used in **cloudy and foggy weather**. Their sound can immediately **attract the attention of the driver**. Detonators contain **explosive material** and are fixed to rails by means of clips. In thick foggy weather, **detonators are kept about 90 m ahead of signals** to indicate the presence of signals to the driver. Once train passes, **they explode and driver become alert**.

Visible Signals

- Hand signals- in the form of flags
- Caution indicators
- Stop signals

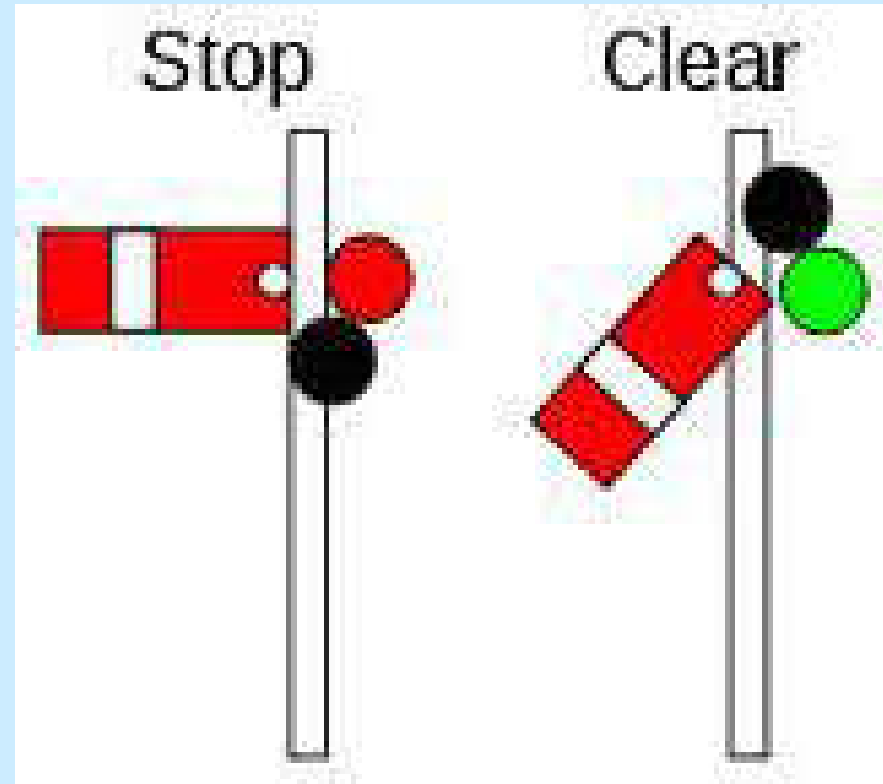
Fixed Signal



Disc and Cross Bar

Semaphore Signals

- Use a **signal arm** which could be positioned at different angles.



Point Lock

- A point lock is provided to ensure that each point is set correctly. It is provided near the tongue rail and near the toe of switch assembly. The point lock consist of plunger, plunger rod. Plunger rod is connected with the signal. Additionally there are set of stretcher blades and each blade is connected to one of the tongue rails.