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सत्यमेव जयते

GOVERNMENT OF INDIA - MINISTRY OF RAILWAYS
भारत सरकार – रेल मंत्रालय



INDUCTION COURSE FOR TRACK MAINTAINER

ट्रैक मेंटेनर के लिए प्रवेश पाठ्यक्रम



हस्त पुस्तिका भाग-12/ Booklet Part 12

संकेतों की बुनियादी जानकारी एवं रेलपथ की सुरक्षा
Basics of Signalling and protection of Track

DECEMBER 2025



CAMTECH/2025/C/Induction Course Track Maintainer part - 12- Basics of Signalling and protection of Track /1.0

An ISO 9001:2015 Certified Organisation

EXCELLENCE IN MAINTENANCE

INDIAN RAILWAYS

Centre for Advanced Maintenance Technology (CAMTECH)
MAHARAJPURA, GWALIOR - 474005

4544176/2025/O/o PR.ED/CAMTECH/GWALIOR

ट्रैक मेंटेनर के लिए इंडक्शन कोर्स

हस्त पुस्तिका

भाग 12: संकेतों की बुनियादी जानकारी एवं रेलपथ की सुरक्षा

Induction course for Track Maintainer

Booklet

Part 12: Basics of Signalling and protection of Track

FOREWORD

Indian Railway holds the major chunk of civil engineering assets in the country in the form of structure and railway track. Tracks were maintained by Permanent way staff by the track maintainers under the guidance of SSE/JE(P.Way). Safety of track is the prime responsibility of such track maintainer.

CAMTECH has made a nice attempt to provide all the information about the “Basics of Signalling and protection of track” to the Track Maintainer, who has joined in the railway as initial posting as per revised training module approved by Railway board vide RBE 03/2024 letter No. E(MPP)2019/3/46 dated 09.01.2024.

Efforts have been made to fulfil the requirement of induction course of track maintainer (T-9) Part 12: Basics of Signalling and protection of track.

I hope this handbook will certainly prove to be a valuable source of technical knowledge and will be quite helpful for Track maintainer woring in engineering department in Indian Railway.

CAMTECH/Gwalior ***(AdarshKhare)***
Date: December, 2025 ***Principal Executive Director***

PREFACE

It is impossible to deal safe running of trains without signalingarrangement.Signaling is a method of conveying information. In the Railway system, the route for a train at a station is set by the station staff and the Loco pilot has no control over the route. Hence for the safety of train movement, the Loco pilot need to be advised regarding the route set for him, whether he is required to slow down or go at maximum permitted speed. Such procedure is carried out by means of Signaling.

Railway Board vide RBE 03/2024 letterNo. E(MPP)2019/3/46 dated 09.01.2024 has approved the revised training modules for induction training course of Track Maintainers (T-9)of Indian Railway. This booklet has been prepared to fulfil the requirement of Part 12: “Basics of Signalling and protection of Track” of induction course of track maintainer(T-9).

Every effort has been made to make this booklet useful to track maintainer working in engineering department as per the training module for non gazetted employee of civil engineering department approved by Railway Board, T-9 induction course for track maintainer

This booklet does not supersede any existing information on subject issued by Railway Board, RDSO, IRPWM and Indian standards available on the subject. This book is not statutory& contents are for the purpose of guidance only. Most of the data, sketch and information mentioned here are available in some form or the other in various books or printed matter.

This booklet is the result of sincere efforts of ShriD.K.Shrivastava, SSE/CAMTECH, who collected and compiled information, data, etc. from different sources, and went through the complete text.

We welcome valuable suggestions from our readers for further improvements.

CAMTECH/Gwalior **(Deepak Mehra)**
Date: December, 2025 **Director/Civil**

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संशोधन पर्चियों का प्रकाशन

ISSUE OF CORRECTION SLIPS

इस हस्तपुस्तिका के लिए भविष्य में प्रकाशित होने वाली संशोधन पर्चियों को निम्नानुसार संख्यांकित किया जाएगा :

The correction slips to be issued in future for this handbook will be numbered as follows:

केमटेक/2025/सि/ट्रैक मेंटेनर के लिए प्रवेश पाठ्यक्रम भाग-12 बी.एस.&टी.पी./1.0/सीएस/XX
दिनांक_

CAMTECH/2025/C/Induction Course Track Maintainer Part -12/BS&TP/CS/# XX
date_____

जहाँ XX संबन्धित संशोधन पर्ची की क्रम संख्या है (01 से प्रारम्भ होकर आगे की ओर)

Where "XX" is the serial number of the concerned correction slip (starting from 01 onwards).

प्रकाशित संशोधन पर्चियाँ

CORRECTION SLIPS ISSUED

क्र.सं./ Sr. No.	प्रकाशन दिनांक/Date of issue	संशोधित पृष्ठ संख्या तथा मद संख्या/ Page No. and Item No. modified	टिप्पणी/ Remarks

1.0 INTRODUCTION

Safety is the first & foremost criteria in Indian railway. It is impossible to deal safe running of trains without signalingarrangement.Signaling is a method of conveying information. In the Railway system, the route for a train at a station is set by the station staff and the Loco pilot has no control over the route. Hence for the safety of train movement, the Loco pilot need to be advised regarding the route set for him, whether he is required to slow down or go at maximum permitted speed. Such procedure is carried out by means of Signaling.

For safety of train working, the Railways follow a system of an interval between trains. This can either be a time interval, or a space interval. Indian Railways follow the system of space interval between two trains. The tracks are divided into sections. When a train is in a section, it is treated as blocked or occupied and no other train is allowed till the train has cleared the section. The system of working of trains in these sections is called block working. In Indian Railways, Absolute Block system and Automatic block system are in use.

There are instances when during repair and maintenance activity over a certain length of track, the train is required to stop at the site of work or train can pass over the work spot at restricted speed, this information is conveyed to the loco pilot through the protection of work site through the exhibition of Engineering signals/ indicators.

1.1 SIGNALS IN INDIAN RAILWAYS

A "Signal", therefore, is a means to convey a particular pre-determined meaning in non verbal form. Various methods are used to convey the meaning by "Signals" in a non-verbal form as are used by Scouts, Policemen, road signs, Navy and Air Traffic Control, etc., which convey a definite information. The chart below gives the various forms that are being adopted.

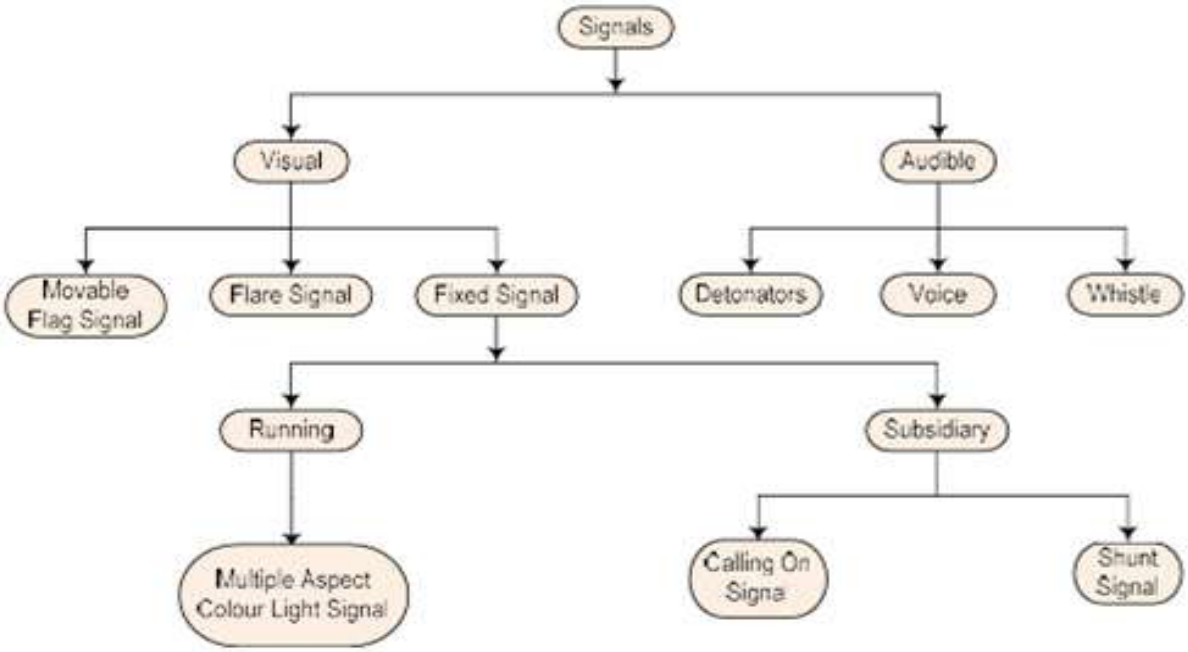


Figure-1/1

Railway signaling is a system used to direct railway traffic and keep trains clear of each other at all times. Trains move on fixed rails, making them uniquely susceptible to collision. This susceptibility is further increased by the enormous weight and inertia of a train, which makes it difficult to quickly stop when encountering an obstacle.

2.0 NEED FOR SIGNALLING IN RAILWAYS

Signaling in railways has evolved for the following:

(a) Running trains safely by securing it`s intended path.
(b) Handle more trains effectively.
(c) Unambiguous & Timely Communication to Loco Pilot for regulating speed of train.

The Train Loco Pilot is very much dependent on the aspect of the signal for controlling the speed of train. Various Equipments or Systems are used for achieving above objectives. These equipments are getting modernized over time with added benefits. We are aware that at Railway Stations, there are more lines (tracks) in the stations. These stations are designed to receive, stop & dispatch trains in accordance with a schedule / program by prioritizing movement of some trains over other trains. This is enabled by signaling system which ensures safety at stations as well as between stations.

2.1 RAILWAY SIGNALING CONVEYS THE FOLLOWING

(a) Timely information to Loco Pilot for regulating speed of his train.
    (i) Information is conveyed by a signal showing various aspects.
    (ii) Many signals are interlinked for giving advance information.
(b) A signal ensures
    (i) Physical clearance of intended path.
    (ii) Securing various points in the path.
    (iii) Closure of Level crossing gates.
    (iv) No other train is moving in this path.
(c) As the demand for Train Traffic (both for Passengers & Goods) continue to increase over a period of time, Signaling system has also been developed to handle increasing Train traffic.

Thus Signals play a very vital role in safe Train Operations.

2.2 TYPES OF SIGNALS*(Ref: Para 3.02 of Indian Railways (Open Lines) General Rules, 1976)*

The signals to be used for controlling the movement of trains shall be

a) Fixed,
b) Hand signal
c) Detonators and
d) Flare signal.

3.0 FIXED SIGNALS

The definition of "Fixed Signals" as given in the General Rules is "a signal of fixed location indicating a condition affecting the movement of a train and includes a semaphore arm or disc or fixed light for use by day and a fixed light for use by night".

Fixed signals are the most commonly used signals and are provided at fixed locations by the side of the track. These signals are used for receiving or dispatching a train or for shunting at stations. Signals are provided to keep a safe distance between two trains. Based on the type of movement they control, fixed signals are classified as Main or Running Signals and Subsidiary Signals. Signals are further classified by their type as:

- Semaphore signals
- Colour light signals

Main signals govern the movement of running trains while shunt signals are one of the subsidiary signal govern the movement of trains while shunting (attachment or detachment of locomotives coaches or wagons at station).Main signals can be of two types:

- Permissive signals
- Stop Signals

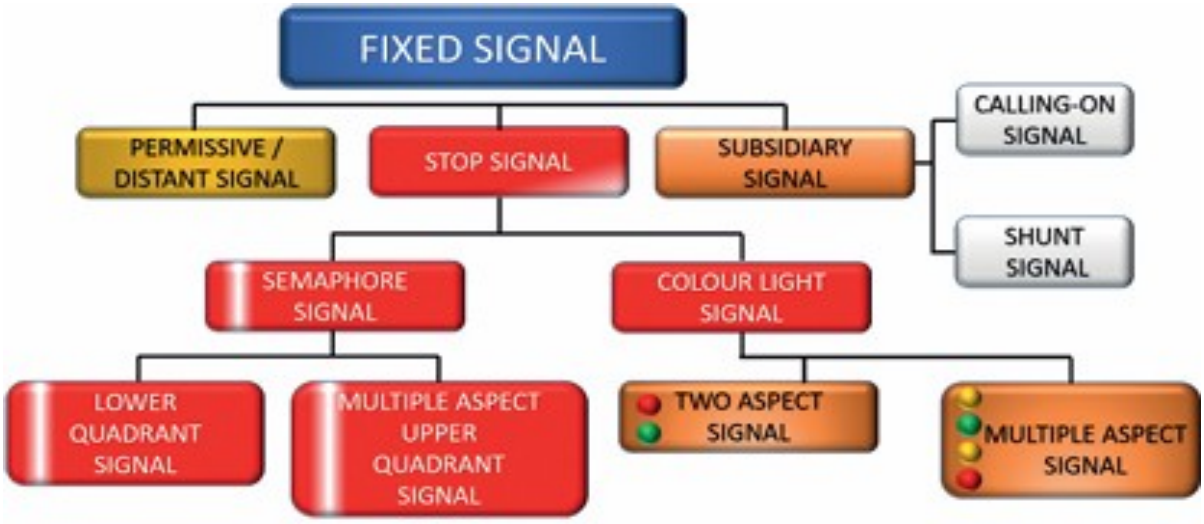


Figure-3/1 Fixed Signals

Permissive /Distant Signals may be passed even in the "Normal" position, though at restricted speed and after observing precautions.

Stop Signals when "ON" must not be passed by the Loco Pilot without a written authority. However, in case of certain Stop signals, Loco Pilot can pass following Signals at danger (ON) after observing prescribed precaution, are:

(a) Gate Stop Signal
(b) Automatic Signals
(c) Intermediate Block Signal

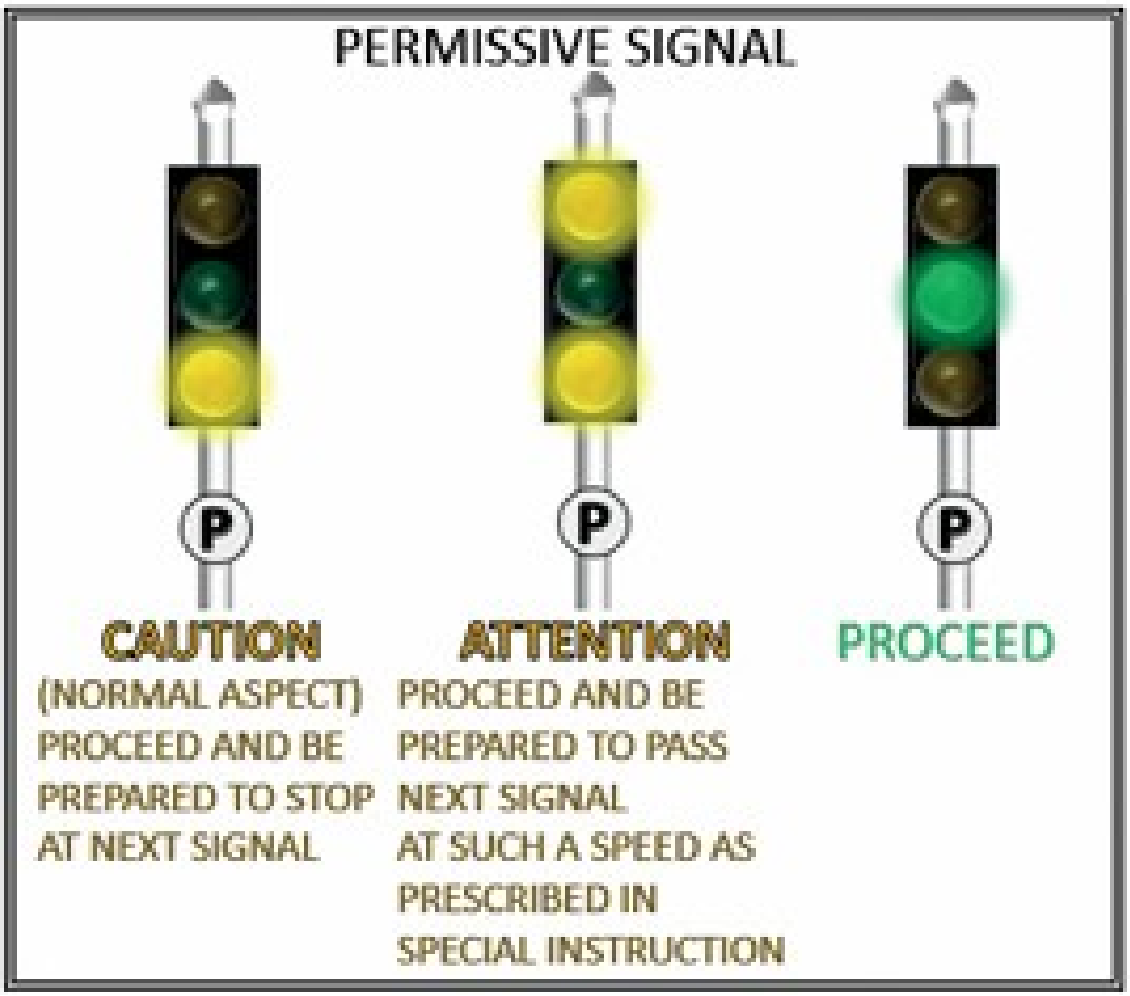


Figure-3/2 Permissible Signal

3.1 MAIN SIGNALS

3.1.1 SEMAPHORE MAIN SIGNAL

Semaphore signals used on the Railways are in the form of a rectangular or fish tailed arm fixed to a vertical post. The arm is kept horizontal to the post to be easily distinguishable. By this arrangement the arm can be seen from a long distance on a clear day. Whenever the signal is required to convey some information:-

Semaphore type Fixed Signals can operate in Indian railways either the "lower quadrant" or “Upper quadrant" in the left hand side of the track.

Lower quadrant signal have two aspects and upper quadrant signal have three aspects. Different main signal and their aspect in semaphore signaling are illustrated below.

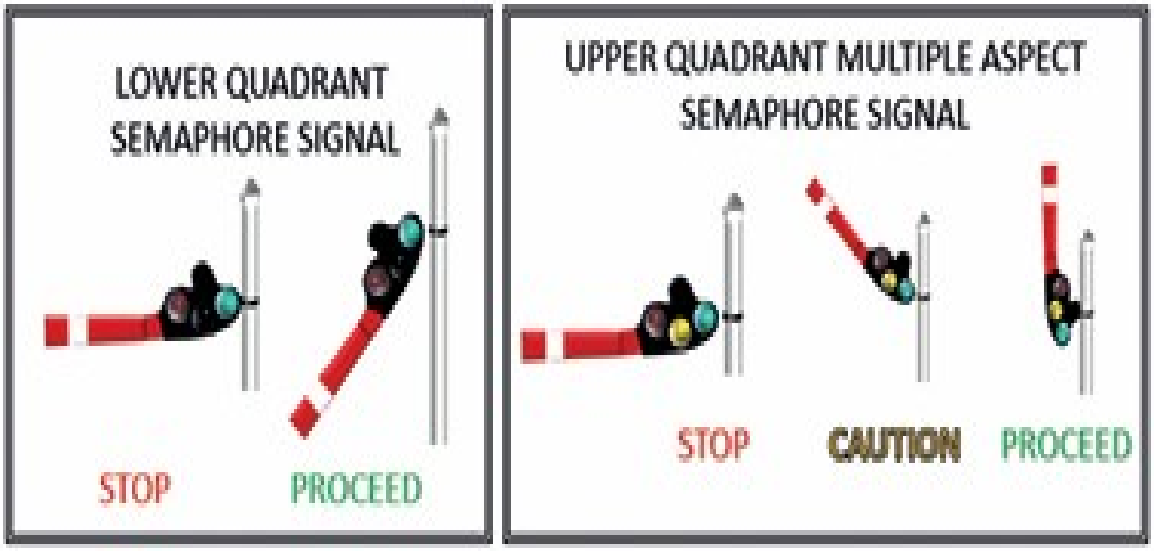


Figure-3/3 Stop Signal

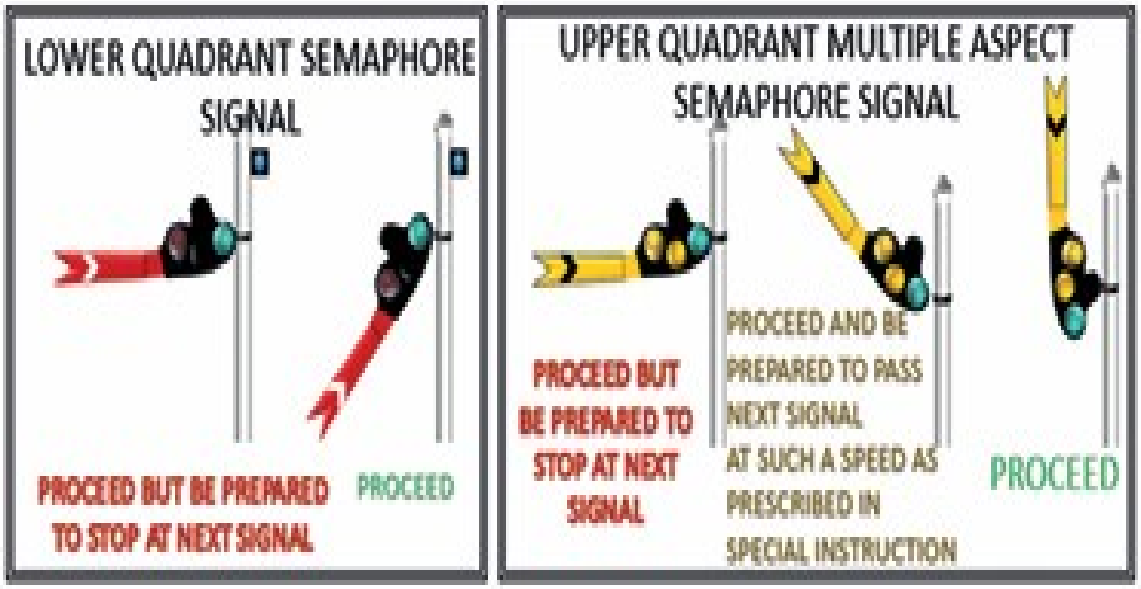


Figure-3/4 Permissive signals

3.1.2 COLOUR LIGHT SIGNAL (CLS)

Colour Light Signals consist of two or more different colour light mounted vertically, one over the other. Each consists basically of a bulb, and a focusing lens arrangement. The lens focuses the light into a powerful beam, to give good visibility during day as well as night. One bulb is provided for each aspect of the signal. Thus by choosing appropriate colors, two, three, or more aspects can be provided. In India presently 2, 3 and 4 aspect signals have been provided. The colors used are red, yellow and green. The fourth aspect used is "double yellow" when two yellow lights are displayed. Now a days LED signals are introduced in lieu of conventional lamps.

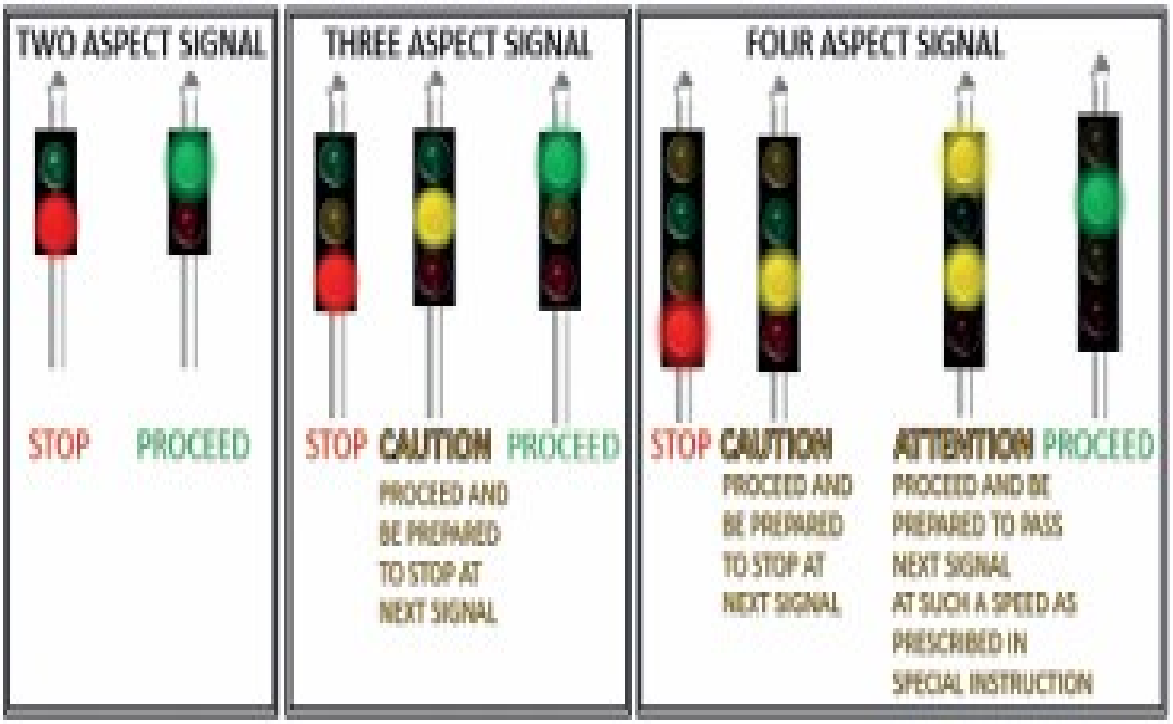


Figure-3/5Colour Light Signal (CLS)

3.1.3 ASPECT AND INDICATION

The aspect of a signal means its physical appearance. For example, a semaphore lower quadrant signal has two aspects – "ON" when the signal arm is horizontal, and "OFF" when the arm is lowered (45 deg.). It means that the aspect conveys its indication. In this case, "ON" indicates Stop, while "OFF" indicates Proceed.

3.1.3.1 SEMAPHORE SIGNALS

A semaphore Multiple Aspect Upper Quadrant (MAUQ) signal can have three aspects. Such stop signals have an "ON" aspect indicating Stop, a caution aspect with the arm raised by 45 deg. indicating Proceed cautiously and be prepared to stop at the next signal and a clear aspect it the arm raised to 90 deg. indicating Proceed at The Maximum Permissible Speed.

3.1.3.2 TWO ASPECT & MULTIPLE ASPECT COLOUR LIGHT SIGNAL

A signal must have at least two aspects to convey any meaning to the Loco Pilot. A two aspect stop signal can indicate to the Loco Pilot to either proceed or stop. As may be seen, in such a system, the Loco Pilot can only be given information about that particular signal. It is advisable to give advance warning to the Loco Pilot about the aspect of the next signal. This needs a third aspect, which can be provided with MAUQ or MACL signaling. Multiple Aspect signaling enables advance warning being given to the Loco Pilot of the aspect of the next stop signal. A Loco Pilot is fore-warned and thus can able to control train more confidently leading to improved safety. When 3 or 4 aspects colour light signaling is used, it is collectively called Multiple Aspect Color Light Signals (MACLS).

3.2 SUBSIDIARY SIGNALS

In addition to the running signals, subsidiary signals are used for inter-yard movements such as attaching or detaching of wagons/engines, marshaling in which speed of the movement are low and confined to a small area and the line on which the movement is to be done may invariably be occupied by vehicles and as such the Loco Pilot has to exercise more caution. Moreover, as the movement is done in a smaller area, the visibility of the signal is not critical and low visibility is adequate. Also no pre-warning is necessary. Since visibility required is less, smaller types of signals can be used compared to running signals.

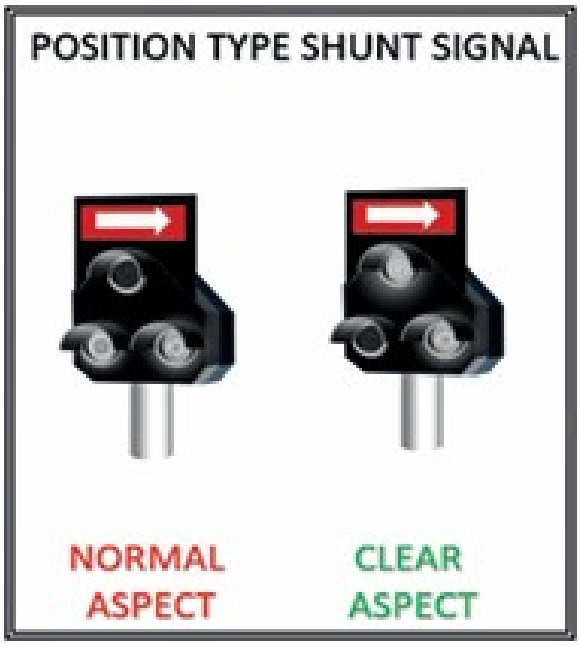
Subsidiary signal may be of the following type.

- Shunt Signal
- Calling On signal

3.2.1 SHUNT SIGNALS

A shunt signal is placed either on a post by itself, or below a main signal on the same post. A shunt signal below a stop signal does not exhibit any light in the “ON” (Normal) position.

A position light shunt signal is used in colour light signaling territories and exhibits two horizontal white lights in the “ON” position, and two inclined white lights in the “OFF” (Clear Aspect) position. No light is shown in the “ON” position, when placed below a stop signal.



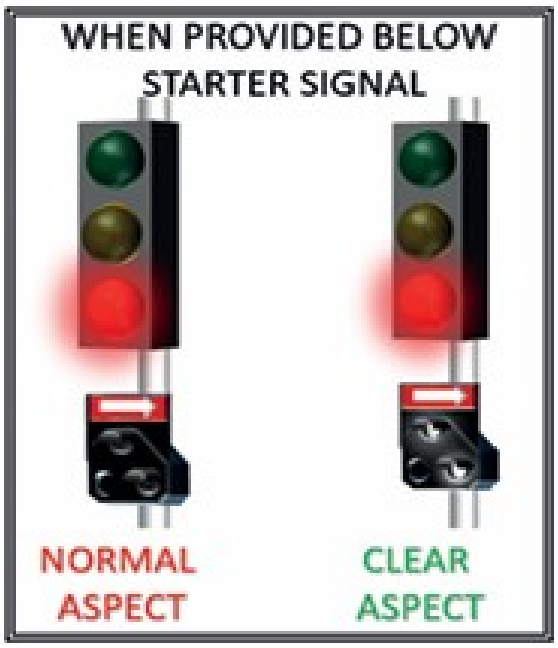
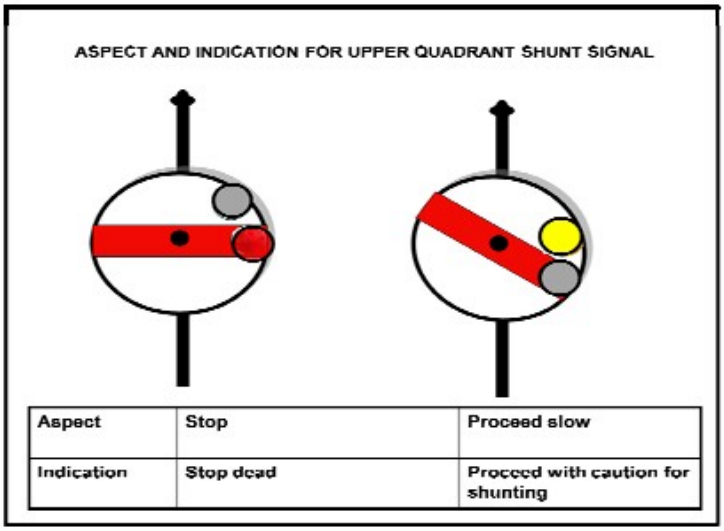


Figure-3/6 Position Type shunt signalFigure-3/7 Shunt signals when provided below starter signal

3.2.1.1 SEMAPHORE SIGNALS DISC TYPE SHUNT SIGNAL



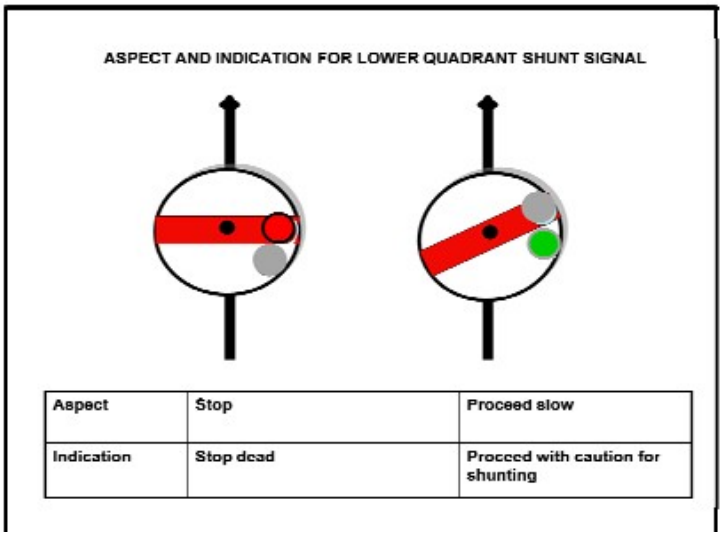


Figure-3/8 Disc type shunt signals in multiple aspects&LQ signalling

3.2.1.2 MINIATURE TYPE SEMAPHORE SHUNT SIGNALS

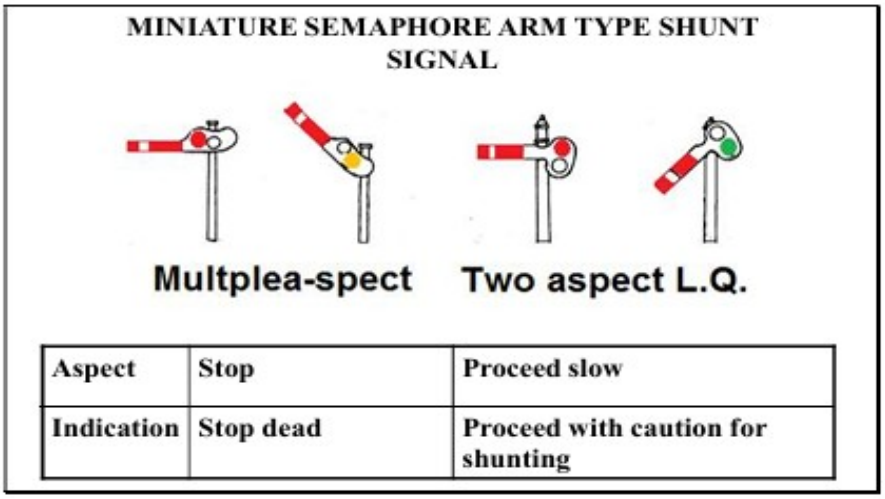


Figure-3/9 Miniature semaphore arm shunt signal

3.2.2 REPEATING SIGNALS

When the distance at which a signal can be sighted is inadequate, another signal is provided at a location in rear of the main signal to repeat the aspect of the main signal. This is called a repeating signal. A repeating signal is provided with an "R" marker, and is treated as permissive signal.

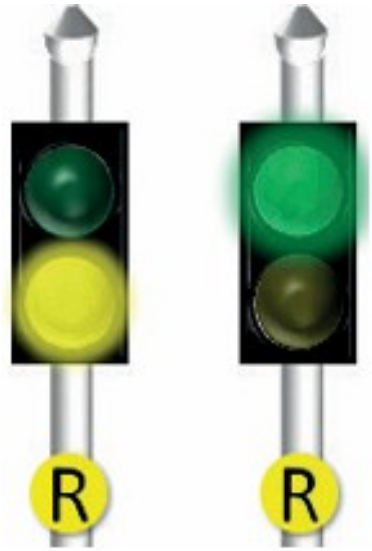


Figure-3/10 Repeating signal

3.2.3 CALLING – ON SIGNALS

A calling-on signal is a subsidiary signal and is provided below a stop signal (except Advanced Starter Signal). The loco pilot has to pull his train up to the foot of the concerned stop signal and halt completely. When the calling on signal taken "OFF", it permits a Loco Pilot to draw and pass the concerned stop signal at "ON". The Loco Pilot is required to proceed with caution, and be prepared to stop short of any obstruction. Calling on signals are generally provided at important stations where track circuiting is provided, to draw a train ahead in obstructed route or when failure of the track circuit results in failure of the main signal, though the route has been correctly set. A calling - on signal does not show any light in the "ON" position.

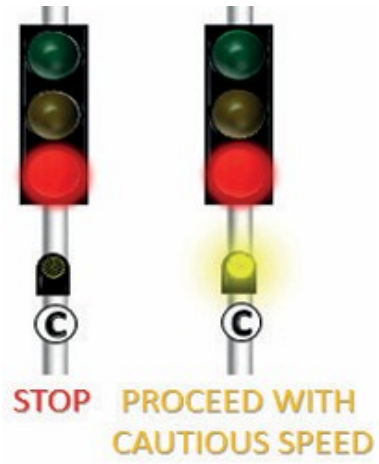


Figure-3/11 Calling on signal

In the case of semaphore "Calling on" signal, it shall be miniature square ended arm painted white with red bar in the front and painted white with black bar in the back. The bars are parallel to the end of the arm. The Painting of a calling on signal with white is to distinguish it from a shunt signal miniature arm.

By day the arm must be

(a) Horizontal in the 'ON' position; ‘
(b) Inclined downwards to the horizontal in the 'OFF' position in the 2-aspect signalling territory and
(c) Inclined upwards to the horizontal in the OFF position in the multiple aspect signalling territory.

By night the signal will display

(a) No light in the ON position;
(b) A miniature yellow light in the OFF position for 2-aspect lower quadrant; and
(c) A miniature yellow light in the OFF position for multiple aspect territory [(*Refer Fig.3/12 and 3/13*].

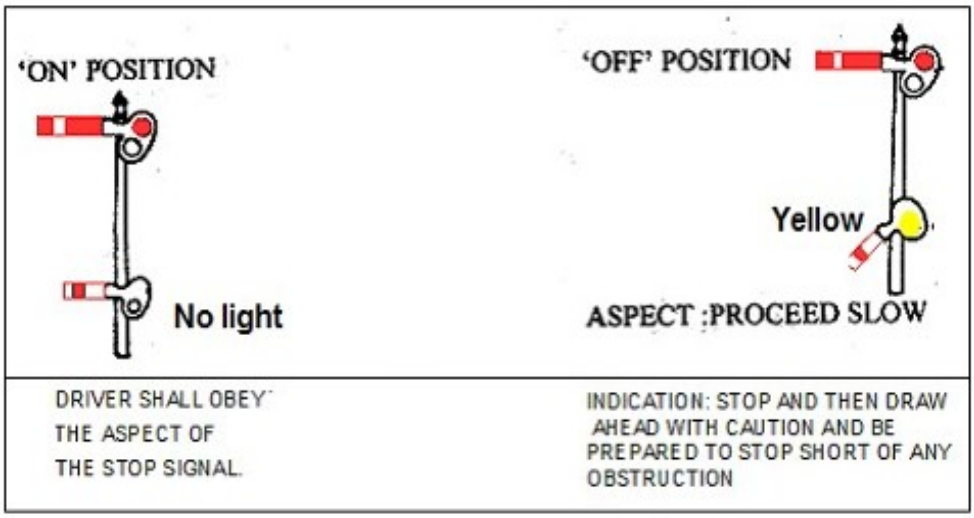


Figure-3/12 Miniature semaphore type calling on signal in two aspects signalling

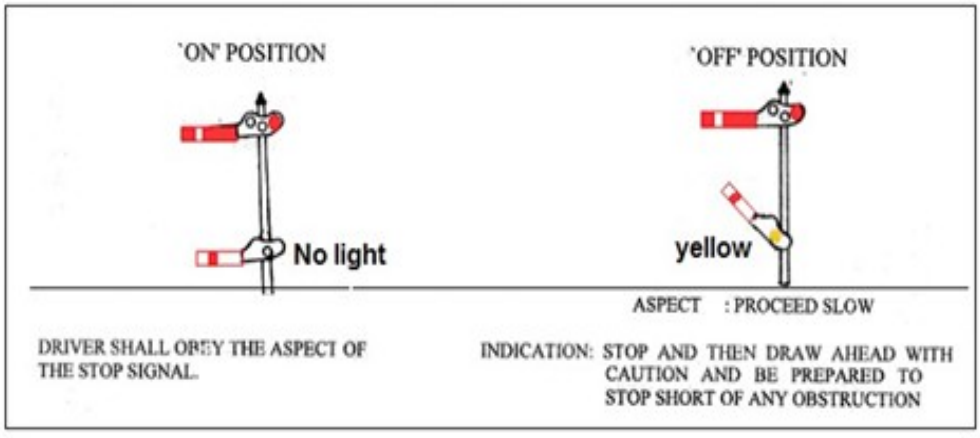


Figure-3/13 Miniature semaphore type calling on signal in multiple aspects signalling

3.2.4 GATE SIGNALS

Gate signals are provided to protect level crossing gates. These signals are provided at an adequate distance from the gate, and are provided with "G" marker plate. The marker consists of the letter "G" on a yellow circular disc.



Figure-3/14 Gate signal

3.2.5 AUTOMATIC SIGNALS

Automatic signals operate automatically by the passage of trains. The track needs to be provided with continuous track circuiting, or axle counters. As the train proceeds, the occupation and clearance of the track is detected and causes the signal aspects to changes automatically. Automatic signals are provided with "A" marker plate. Automatic signals are provided under Automatic Block system working.



Figure-3/15 Automatic signals **Figure-3/16 Intermediate Block Signals**

3.2.6 INTERMEDIATE BLOCK SIGNALS

In Absolute block system, to split a lengthy block section into two parts, Intermediate Block (IB) Signals are provided. (Fig 3/16)

4.0 HAND SIGNALS

All hand signals shall be exhibited by day by showing a flag (Hand Signal Flag). As the name suggests, it is used to give signals to the train driver and instruct to act in various situation in day time. Hand signal lamps are used to give signals to the train driver and instruct to act in various situations in night time. Nowadays, Tri color LED torch is also used to give signals to the train driver and instruct to act in various situations in night time.





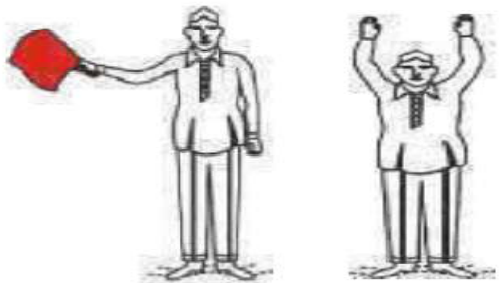
Figure 4/1 Hand signals (flag,lamp and LED torch)

4.1 EXHIBITION OF HAND SIGNALS*(Ref: Para 3.52 of Indian Railways (Open Lines) General Rules, 1976)*

All hand signals shall be exhibited by day by showing a flag or hand and by night by showing a light as prescribed in these rules. During day a flag or flags shall normally be used as hand signals. Hands shall be used in emergencies only when flags are not available. During night a hand signal shall normally be given by showing a red or green light. A white light waved violently shall be used as a Stop signal only when the red light is not available.
"Red or green light shall be either a static or flashing type".

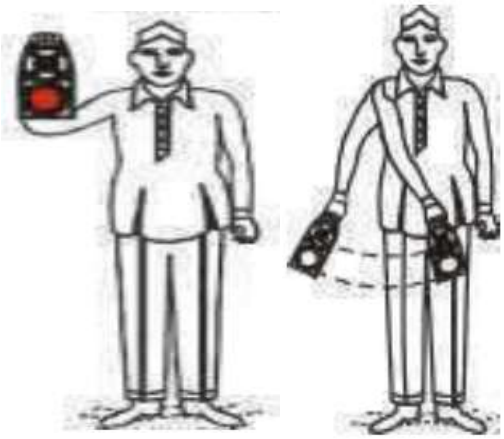
4.2 STOP HAND SIGNAL*(Ref: Para 3.53 of Indian Railways (Open Lines) General Rules, 1976)*

Indication:Stop dead



How given by day:
By showing a red flag or by raising both arms with hands above the head as illustrated in figure 4/2(a).

Figure-4/2(a) Stop hand signal in day time

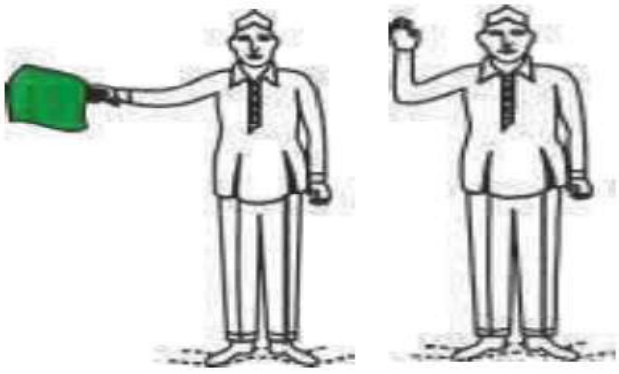


How given by night:
By showing a red light or by violently waving a white light or horizontally across the body of the person showing the signal as illustrated in figure 4/2 (b).

Figure-4/2(b) Stop hand signal at night

4.3 PROCEED HAND SIGNAL*(Ref: Para 3.54 of Indian Railways (Open Lines) General Rules, 1976)*

Indication: Proceed



How given by day:
By holding a green flag or by holding one arm steadily as illustratedin figure 4/3 (a).

Figure-4/3(a) Proceed Hand Signal in day time

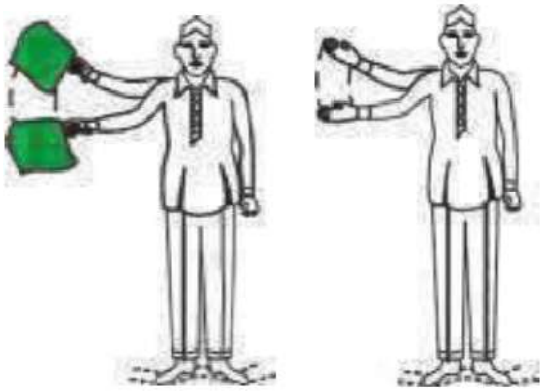


How given by night:
By holding a green light steadily as illustrated in figure 4/3 (b).

Figure-4/3(b) Proceed Hand Signal at night

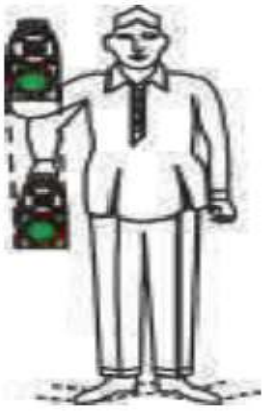
4.4 PROCEED WITH CAUTION HAND SIGNAL *(Ref: Para 3.55 of Indian Railways (Open Lines) General Rules, 1976)*

Indication: Proceed slowly reducing speed further if the signal is given at a progressively slower rate.



How given by day:
By waving a green flag vertically up and down as illustrated in figure 4/4(a)

Figure-4/4(a) Proceed with caution Hand Signal in day time



How given by night:
By waving a green light vertically up and down as illustratedin figure 4/4 (b).

Figure-4/4(b) Proceed with caution Hand Signal at night

Note: - When the speed is to be reduced further, this signal shall be given at a slower and slower rate and when a stop is desired, the Stop hand signal shall be shown

4.5 BANNER FLAGS *(Ref: Para 3.57 of Indian Railways (Open Lines) General Rules, 1976)*

A banner flag is a temporary fixed danger signal, consisting ofa red cloth supported at each end on a post and stretched across theline to which it refers.



Figure-4/5 Banner flag

4.6 KNOWLEDGE AND POSSESSION OF HAND SIGNALS *(Ref: Para 3.58(1) & (3) of Indian Railways (Open Lines) General Rules, 1976)*

Every railway servant connected with the movement of trains, shunting oparations, maintenance of installations and works of any nature affecting safety of trains shall have

a. A correct knowledge of hand signals.
b. The requisite hands signals with him while on duty and keep them in good working order and ready for immediate use.

A red flag and a green flag by day or a lamp, which is capable of showing red, green and white lights by night, shall constitute the requisite equipment for hand signalling.

5.0 DETONATORSIGNAL *(Ref: Para 816 of IRPWM 2024 & Para 3.59 of Indian Railways (Open Lines) General Rules, 1976)*

5.1 DESCRIPTION OF DETONATING SIGNAL*(Ref: Para 3.59 of Indian Railways (Open Lines) General Rules, 1976)*

Detonating signals, otherwise known as detonators or fog signals, are appliances which are fixed on the rails and when an engine, a vehicle passes over them, they explode with a loud report so as to attract the attention of the Loco Pilot.

5.2 USE OF DETONATORS *(Ref: Para 816(3) of IRPWM 2024)*

The staff in possession of detonators shall not make any improper use of them. All Engineers are responsible to ensure that the staff working under them know how and when to use detonators.

5.3 METHOD OF USING DETONATORS*(Ref: Para 816(3) of IRPWM 2024 & Para 3.60 of Indian Railways (Open Lines) General Rules, 1976)*

A detonator when required to be used shall be placed on the rail with the label or brand facing upwards and shall be fixed to the rail by bending the clasps around the head of the rail.
Detonators should not be placed on the rail joint and sleeper spacing, but put on the rail where there is a sleeper at the bottom.

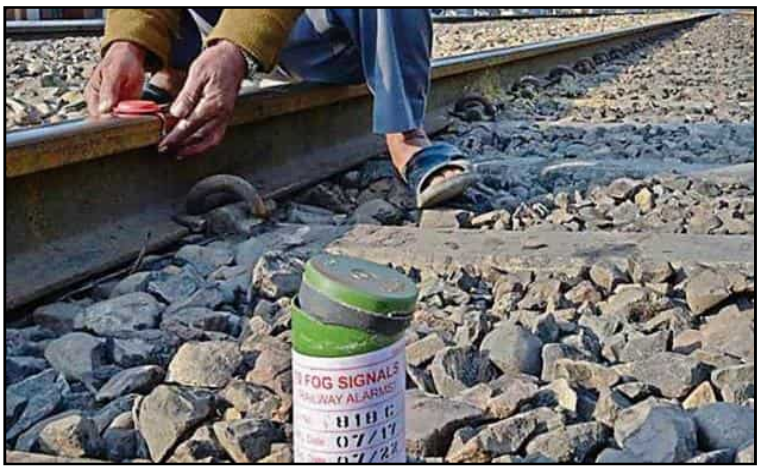


Figure-5/1 Detonator

5.4 PLACING OF DETONATORS IN CASE OF OBSTRUCTION*(Ref: Para 3.62 of Indian Railways (Open Lines) General Rules, 1976)*

Whenever in consequence of an obstruction of a line, it is necessary for a railway servant to stop approaching trains, he shall proceed, plainly showing his Stop hand signal, to a point 600 metres from the obstruction and place on the line one detonator and then proceed to a point 1200 metres from the obstruction and place on the line three detonators, about 10 metres apart from each other.

If the said railway servant is recalled before the obstruction is removed, he shall leave down three detonators and, on his way back, pick up the intermediate detonator.

5.5 REPLACEMENT OF DETONATORS ON THE LINE*(Ref: Para 3.63 of Indian Railways (Open Lines) General Rules, 1976)*

Every railway servant placing detonators on the line shall see that they are, when necessary, replaced immediately after a train has passed over them.

5.6 LIFE OF DETONATORS*(Ref: Para 816(5) of IRPWM-2024)*

The normal life of detonators is five years.

5.7 SAFETY RANGE FROM DETONATORS *(Ref: Para 816(7) of IRPWM-2024)*

No person should be allowed within a radius of 45 metres from the detonators to be exploded; the engine crew shall remain well within the cab. In practice, splinters from detonators when

exploded seldom fly in a direction to the rear of the wheel, which detonates them. Staff should therefore, when observing the safety radius, place themselves, as far as possible on the rear side.

When a railway servant has placed one or more detonators on the line, he mustwithdraw beyond the safety radius of **45 meter** from the detonator or detonatorsbefore they are exploded by an approaching engine or train.

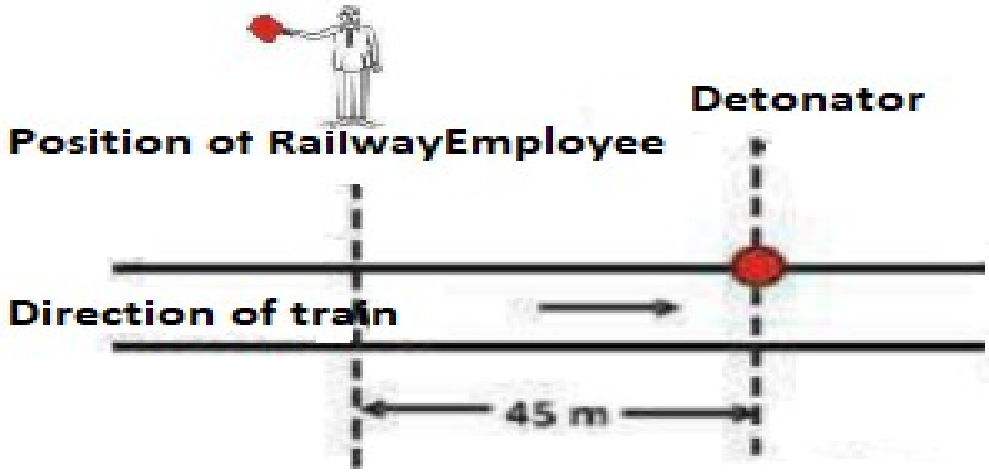


Figure-5/2 Safety range of Detonators

5.8 CARE AND CUSTODY OF DETONATORS *(Ref: Para 816(1) of IRPWM-2024)*

1. **Protection from Moisture**
   - Detonators must be kept free from dampness.
   - They should be stored in **tin cases lined with paper**, with **a layer of waste cotton placed at both the bottom and top** to prevent contact with metal surfaces.

2. **Storage Limit**
   - **Not more than 10 detonators shall be stored in one tin case.**

3. **Storage Conditions**
   - Tin cases should be placed inside **wooden boxes** and stored in **dry, well-ventilated locations**.
   - They must not be kept in contact with **brick walls, damp wood, chloride of lime, or disinfectants**, and must be protected from **steam, vapours, and humidity**.

4. **Handling of Unexploded Detonators**
   - As far as possible, **unexploded detonators should not be sent as a consignment** through transportation channels.
   - They should be **carried personally by the responsible staff or a messenger**, ensuring safe and direct handling.

6.0 FLARE SIGNAL

Flare signals (also known as fusees) are used as a warning to approaching trains, especially in situations like track defects or obstructions. Three flare signals are used on double/multiple lines, ghat sections, and in automatic block territories, while one is used on single-line sections. These signals are crucial for ensuring the safety of train operations by alerting drivers to potential hazards.

They are primarily used in situations where visibility is impaired, like in ghat sections, tunnels, or during bad weather conditions.

During the night, a red lamp is placed prominently, and during the day, a red flag is used in the same manner as a flare signal.

7.0 SYSTEM OF WORKING IN INDIAN RAILWAYS

For safety of train working, an interval is kept between two trains. Either a time interval or space interval is to be kept between two trains following each other on the same line.

The system followed by Indian Railways uses a space interval between trains. The entire stretch of a Railway line is divided into sections, and when a train enters a section, it is "blocked" for all other trains. Another train is allowed to enter this section only after the first train has cleared the section. These sections are called Block sections, and the system of working is called Block working.
Trains are permitted to enter the block section, after receiving permission to do so. Stations are provided at the two ends of a section and are called Block Stations. These are provided with signals to control entry into the block sections. In automatic working, entry to such sections is controlled by signals which operate automatically by passage of trains.

To control movement of trains between two block stations, special instruments are provided between the block stations to grant permission for a train to proceed from one station to the other. These instruments are called Block Instruments.

7.1 SYSTEMS OF BLOCK WORKING

The following systems of block working are as per General Rules.

- The absolute Block System
- The automatic Block System
- The Following Train System
- The Pilot Guard System
- The Train-staff and Ticket System
- The One Train Only System

In Indian Railways only the Absolute Block system and the Automatic Block System are in use. Before going into the details of these two systems, the station limit and block section should be discussed.

7.2 STATION LIMIT

Station limits means the portion of a railway which is under the control of a Station Master and is situated between the outermost signals of the station or as may be specified by special instructions.

7.3 BLOCK SECTION

Block section means that portion of the running line between two block stations on to which no running train may enter until Line Clear has been received from the block station at the other end of the block section.

7.4 ABSOLUTE BLOCK SYSTEM*(Ref: Para 8.01 of Indian Railways (Open Lines) General Rules, 1976)*

In the Absolute Block System, the line is divided into sections, with stations at each end of the section. The stations are called block stations. The portion of the line between the two block stations is called the "block section." Line Clear" refers to the permission given from a station to the station at other end for a train to leave the rear station and approach the advance station.

In the Absolute Block System no train is allowed to leave a block station, unless

a) Line clear has been received from the station in advance, and
b) On double lines, route shall be cleared, not only up to the first stop signal, at the receiving station but also for an adequate distance beyond it;
c) On single lines, route is clear of trains running in the same direction, not only up to the first stop signal at the receiving station, but also for an adequate distance beyond it, and is clear of trains running in the direction towards the block station to which such line clear is given.

The adequate distances referred to in paras above, shall not be less than

(i) 400 meters in the case of two aspect signaling, and
(ii) 180 meters in the case of multiple-aspect signalling.

7.5 AUTOMATIC BLOCK SYSTEM*(Ref: Para 9.01 of Indian Railways (Open Lines) General Rules, 1976)*

In the Automatic Block System, signals are actuated automatically by the passage of trains control entry into the sections which are termed as automatic sections. At a station, movement of trains are so controlled by signals that a safe distance is always kept between two trains.

On Double Line Sections –

(a) The line is required to be provided with continuous track circuiting or axle counters,

(b) The line between two block stations is divided into a series of automatic block signaling sections, the entry to which is governed by a stop signal,
(c) The track circuit or axle counter so control the stop signals governing entry into an automatic block section that the signal does not assume an "OFF" aspect unless the line is clear not only up to the next stop signal but also for an adequate distance beyond it.
(d) The track circuit/ axle counter must place the signal to "ON" as soon as the train passes the signal. This adequate distance, normally, must not be less than 120 meters.

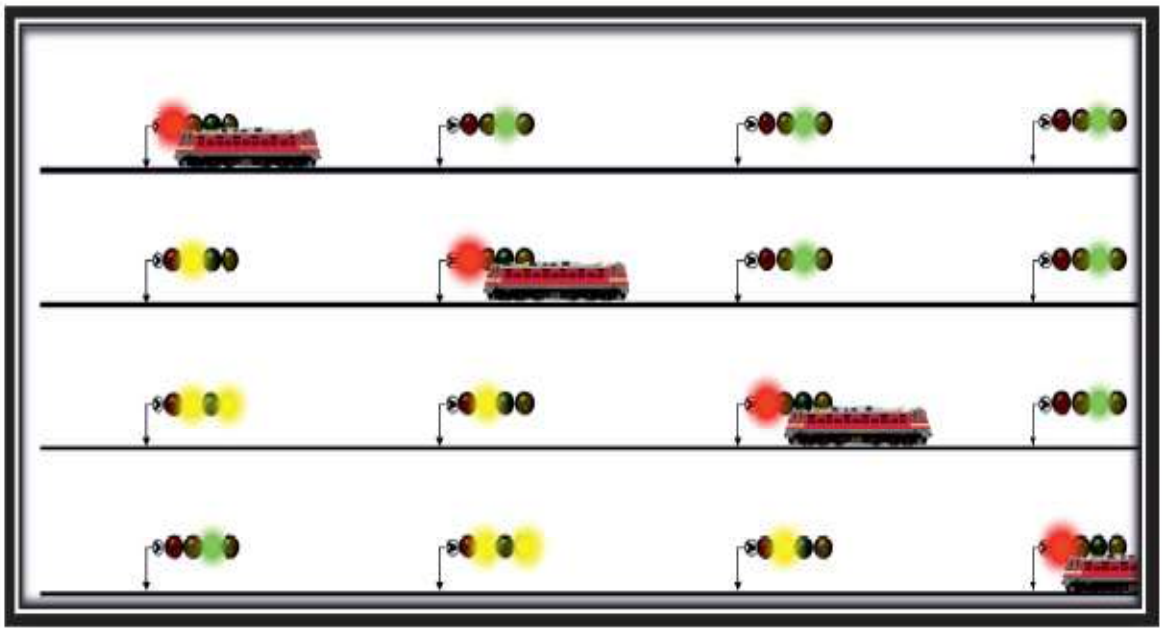


Figure-7/1 Automatic Block System

On Single Line Sections –

(a) The line is required to be provided with continuous track circuiting, or axle counters,
(b) The line between two block stations is divided into two or more automatic block sections, by providing Stop Signals,
(c) The direction of movement is established by obtaining line clear from the station in advance,
(d) it shall not be possible to obtain line clear unless the line is clear, at the block station granting line clear, not only up to the first stop signal, but for an adequate distance beyond it.
(e) Trains are started from one block station to another, only after the direction of movement is established,
(f) After the direction of movement is established, the movement of trains, into and out of an automaticblock section, is controlled by the concernedautomatic stop signal, which shall not assume an"OFF" aspect, unless the line is clear up to the nextautomatic stop signal. Where the next stop single isa manual signal, the line is required to be clear upto an adequate distance beyond the manual signal.
(g) All stop signals against the direction of movement must be at "ON".
(h) The adequate distance is required to be not less than 180 meters.

8.0 ENGINEERING WORKS ON RUNNING LINES *(Ref: Para 805 of IRPWM - 2024)*

Engineering works can be broadly divided into three categories –

Category 1:Works of Routine Maintenance, requiring no speed restriction, not necessitating exhibition of hand signals and involving no danger to trains or traffic. These include works of routine maintenance such as through packing, picking up slacks and overhauling of track etc.

Category 2:Works of short duration

(a) Works such as casual renewals of rails and sleepers, adjustment of creep and lubrication of rail joints which are completed by sunset of the day of commencement and no restriction of speed thereafter is required, are termed "works of short duration".
(b) Hand-signal and banner flags and fog-signals shall be used at specified distances to protect the trains.

Category 3:Works of Long Duration

(a) Works such as relaying and deep screening of track, bridge construction, diversions which extend over a few days or weeks during which period a continuous restriction of speed is to be in force, are termed as "works of long duration".
(b) Temporary engineering fixed signals shall be used at specified distances to protect the trains. These works should be carried out to a programme, about which all concerned will be advised in advance.

9.0 PROTECTION DURING SHORT DURATION WORKS *(Ref: Para 806 of IRPWM –2024)*

9.1 Protection in block section and procedure for passing of trains

Before commencing any work of such category the JE/SSE/P.Way or authorised Railway servant should issue a notice to the Station Master/Block-hut in-charge at each end of the Block section and obtain their acknowledgment. Depending as to whether the train is to be passed through the work site after stopping or at a restricted speed, the line should be protected in the following manner.

9.1.1 When the train is required to stop at the site of work (in Block section)

- Post a flagman with hand signals at a distance of 30 metres in rear of the place of obstruction, to show stop hand signals.
- Post a flagman with hand signals and place a banner flag across the track at a distance of 600 metres in rear of the work. The flagman will show stop hand signals.
- Post a flagman with hand signals and detonators at a distance of 1200 metres in rear of the work. The flagman shall fix three detonators on the line 10 metres apart and stand at a place not less than 45 metres from the three detonators, from where he can obtain a clear view of the approaching train.He will show stop hand signals.

- The man at the site of obstruction shall give proceed hand signal to indicate to the Driver, when he may resume normal speed after the train has been hand signalled past the obstruction.

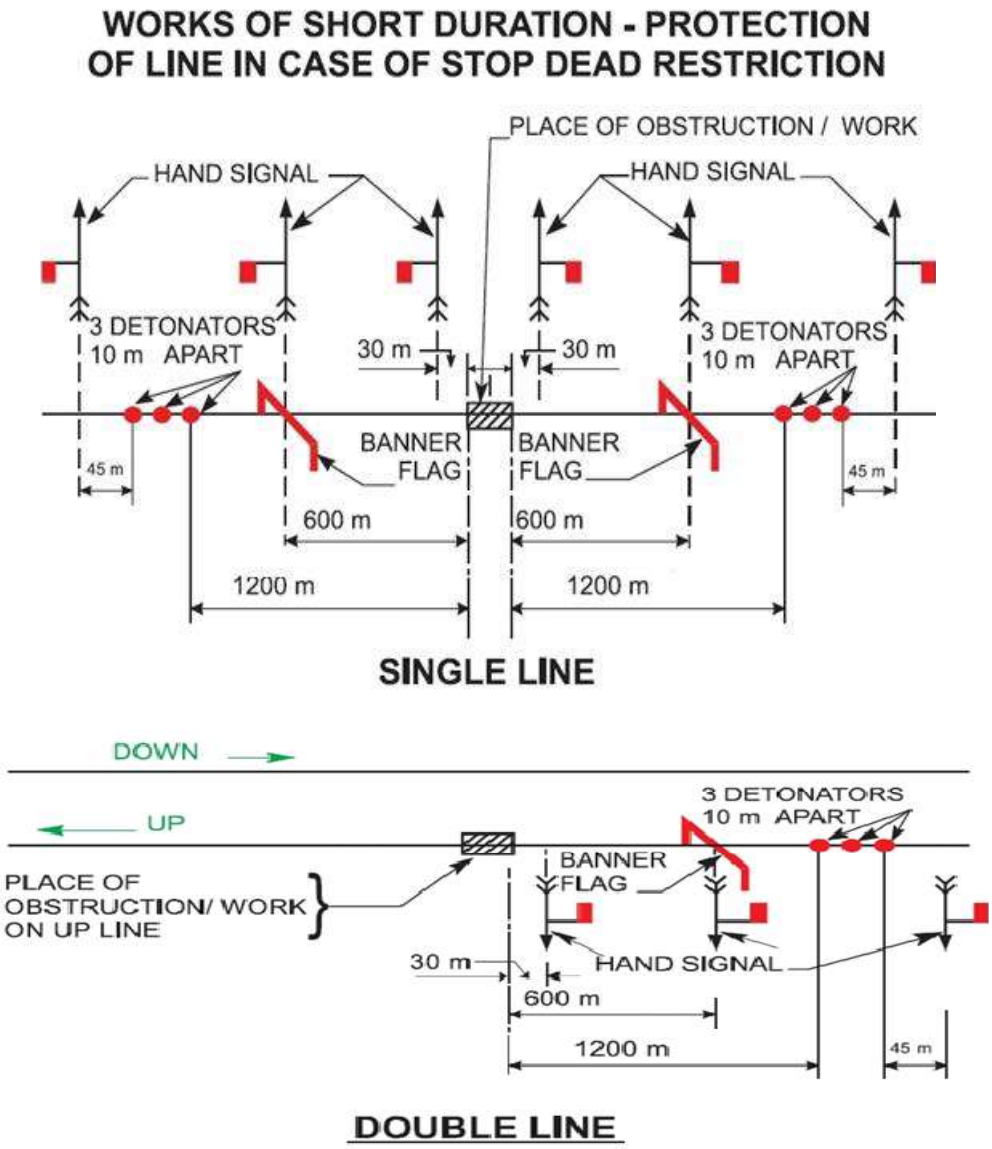


Figure-9/1*(Ref: Annexure - 8/1 of IRPWM 2024)*

9.1.2 When the train can pass over the work spot at restricted speed in block section

The following protections should be adopted in the above cases –

- Post a flagman exhibiting caution hand signals at a distance of 30 metres from the place of obstruction.
- Post a flagman exhibiting caution hand signals at a distance of 1200 metres for Broad Gauge from the place of obstruction.
- Post an intermediate flagman with hand signals at a distance of 600 metres for Broad Gauge from the place of obstruction. He will also place a banner flag across the track.

- The intermediate banner flag must be kept across the line until the speed of the train has been reduced, after which the banner flag shall be removed and the train hand signalled forward.
- The railway servant at the site of work should give proceed hand signals to indicate to the Driver, that he may resume normal speed after the train has been hand signalled past the site of work.

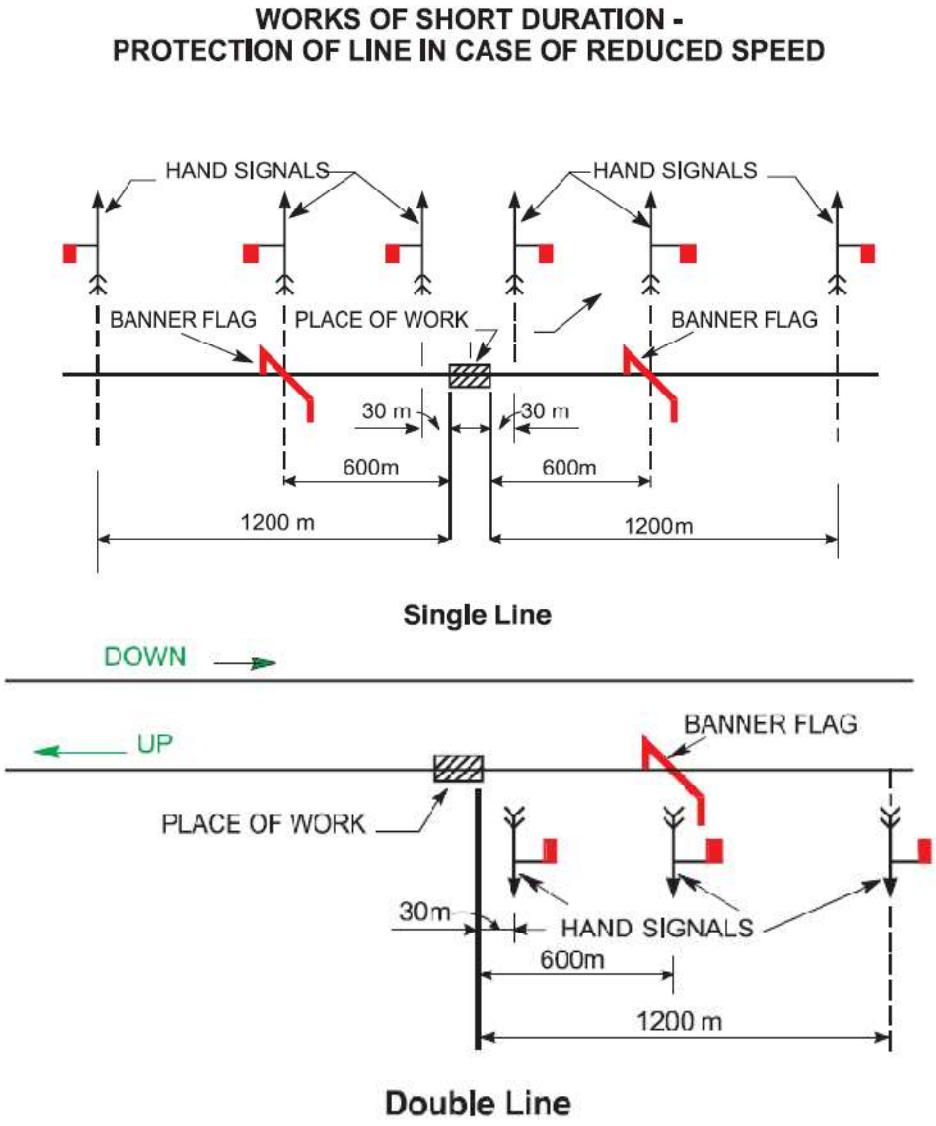


Figure-9/2*(Ref: Annexure - 8/2 of IRPWM 2024)*

The following points should be kept in view, while protecting the track in the cases mentioned in Para 9.1.1 and 9.1.2 above:

- On single line, the line must be so protected on both sides of the work.
- At places where there are curves or falling gradients and at times of poor visibility the distances laid down in para 9.1.1 and 9.1.2 above may be suitably increased wherever necessary and intermediate flagman posted to relay hand signals.

- The location of the banner flag, detonators and hand signals should be so selected as to avoid stopping of trains, as far as possible, on continuous steep rising gradients.
- If in an emergency, it becomes necessary to carry out such works at night, the provisions for protection of line as detailed in para 9.1.1 and 9.1.2 above must be complied with except that red light must be exhibited in the direction of approaching trains in place of red hand signalling flags and banner flags.

9.1.3 Works to be carried out in station limits

- No work should be commenced on running line at a station without the written permission of the Station Master and until the relevant signals have been placed at 'ON'.
- Before commencing a work on a line which can be isolated from the other running lines, the JE/SSE/P.Way should ensure that the line has been isolated and retain the keys of locking device in his possession. Where isolation is effected by the setting of points, they must be locked by means of clamps or bolts and cotters.
- Before commencing work on a line which cannot be isolated from other running lines as provided for above, the JE/SSE/P.Way should provide the prescribed hand signals, detonators and banner flags as detailed in para 9.1.1 and 9.1.2 above.

9.1.4 Works in Automatic Territory*(Ref: Para 15.09 (3) (a) of Indian Railways (Open Lines) General Rules, 1976)*

In automatic territory, if the distance from the place of works/obstruction to the automatic signal controlling entry of a train into the signalling section is less than 1200 metres and the automatic signal is secured at 'ON' the banner flag and three detonators may be provided at 90 and 180 metres respectively.

10.0 PROTECTION DURING LONG DURATION WORKS *(Ref: Para 807 of IRPWM –2024)*

Following protection of line should be taken. Only relevant details from referenced para of IRPWM have been given.

10.1 Protection of line in block section

10.1.1 In case where stop dead restriction is to be imposed

In case where stop dead restriction is to be imposed when restriction is to last for more than a day, the following temporary engineering indicators should be exhibited at the appropriate distance.

i) Caution indicator
ii) Stop indicator.
iii) Termination indicators.

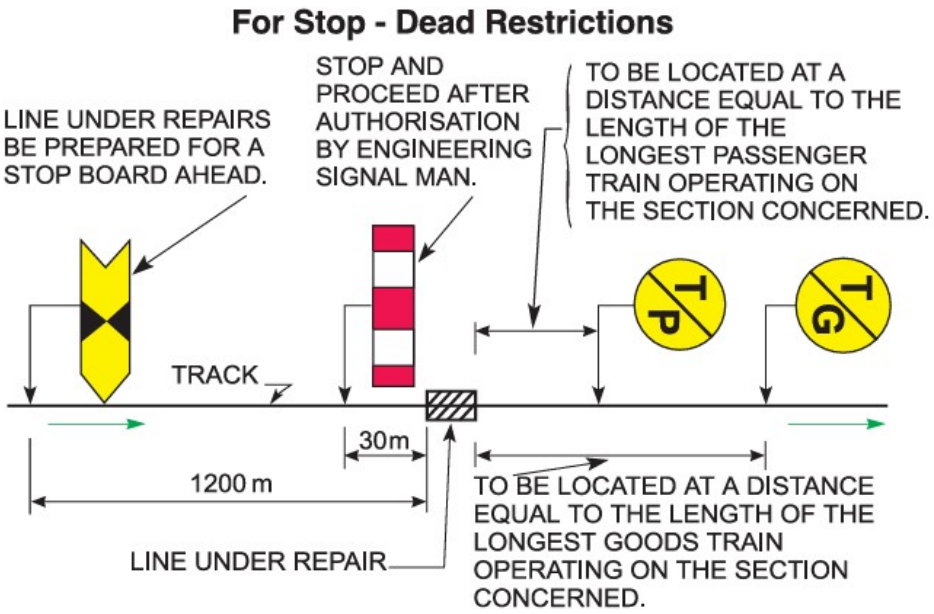


Figure-10/1 For Stop Dead restriction

10.1.2 In case where the train is not required to stop

In case where the train is not required to stop (non-stop restriction) and the restriction is likely to last for more than a day, the following temporary Engineering indicators should be exhibited at the appropriate distances.

i) Caution indicator.
ii) Speed indicator.
iii) Termination indicators.

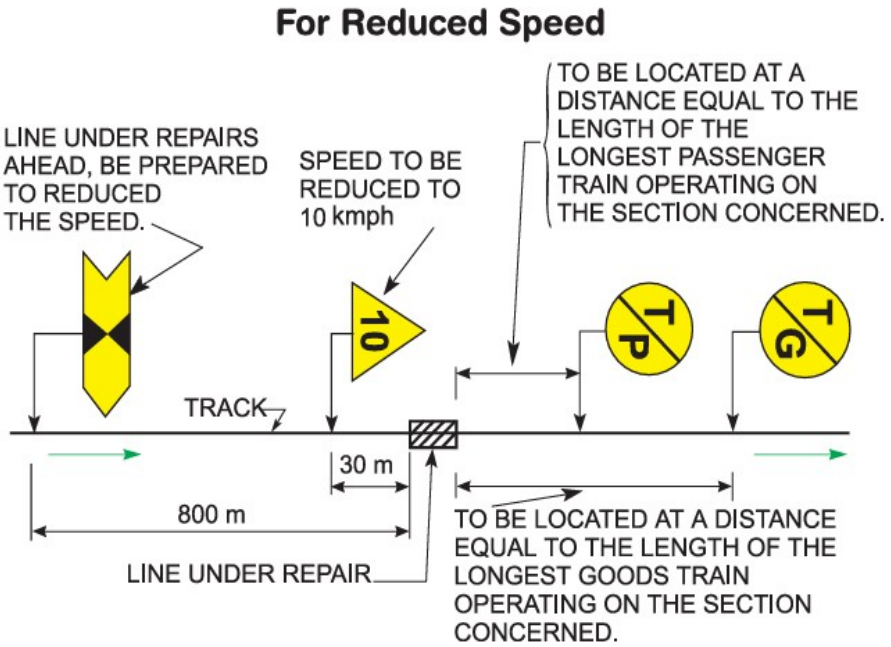


Figure-10/2 For reduced speed

10.2 Protection of line in station *limits* *(Ref: Para 15.09(2) of Indian Railway General Rules 1976)*

Protection of the line as prescribed for block section may be dispensed with if the affected line has been isolated by setting and securing of points or by securing at "ON" the necessary manually controlled signal or signals and approach signal shall not be taken 'OFF' for a train unless the train has been brought to a stop at the first stop signal, except in cases where the loco pilot has been issued with caution order at the station in rear, informing him of the obstruction and the details thereof.

11.0 ENGINEERING INDICATOR BOARDS (TEMPORARY ENGINEERING FIXED SIGNALS) *(Ref. Para 808 of IRPWM 2024)*

These consists of

i) Caution indicator
ii) Speed indicator.
iii) Stop indicator.
iv) Termination indicators.

11.1 CAUTION INDICATOR

Details of caution order board is illustrated in fig below. Height of caution order should be 2000mm (2M) above the rail level. *(Ref: handbook on Trackside Indicator Boards &Signages issued by Northern Railway construction organization June 2020)*



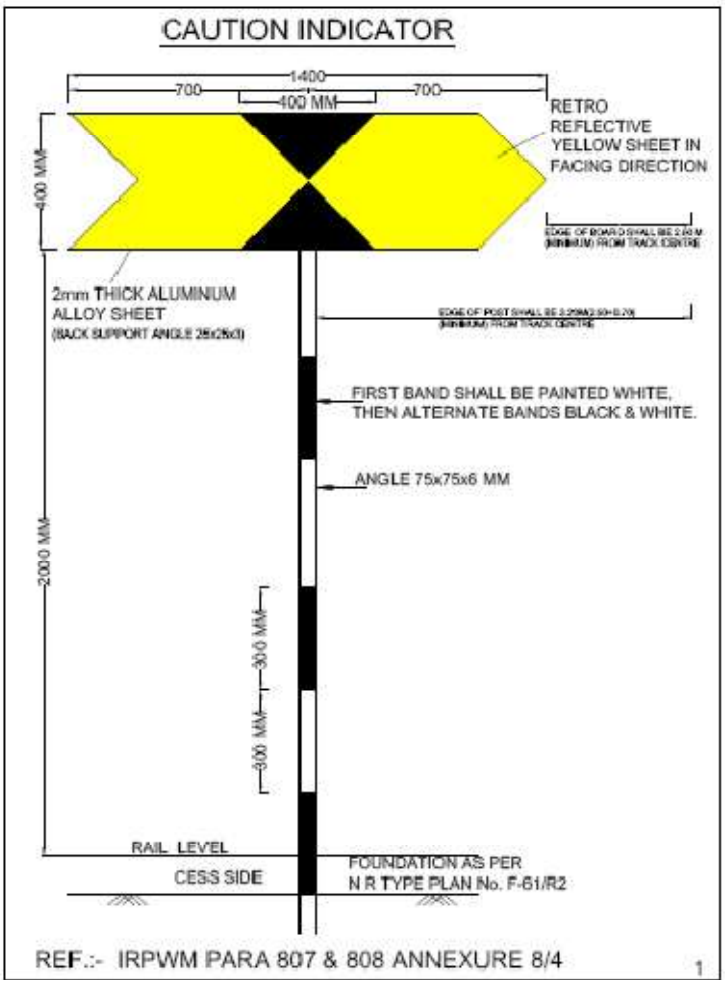


Figure-11/1 Caution Indicator

11.2 SPEED INDICATOR

The detail of speed indicator board is illustrated in fig below. Height of the speed indicator board should be 2000 mm (2M) above the rail level. *(Ref: handbook on Trackside Indicator Boards & Signage issued by Northen Railway construction organization June 2020)*



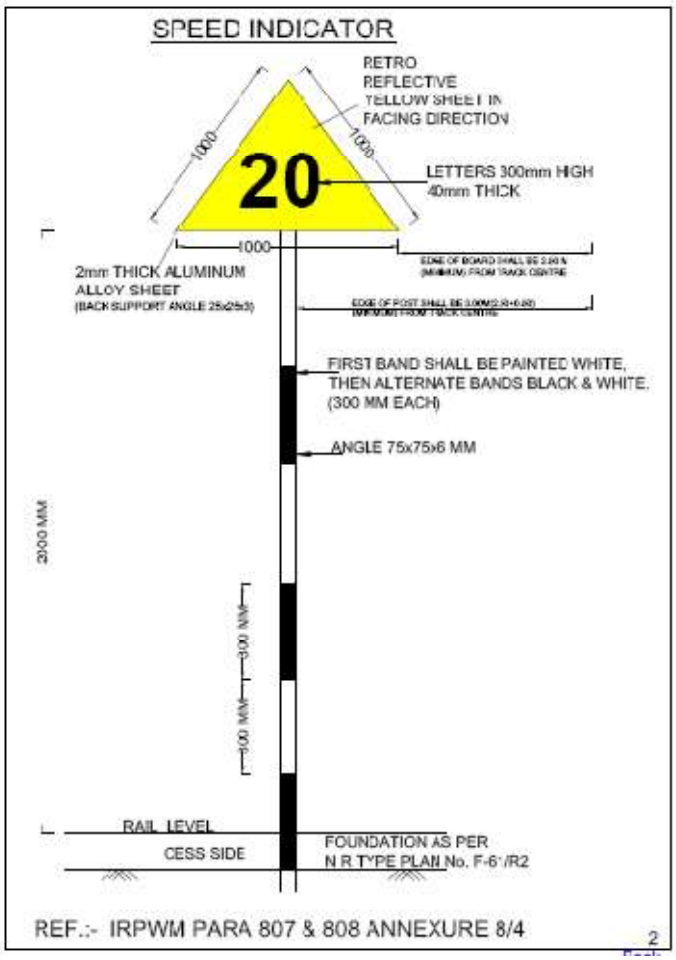
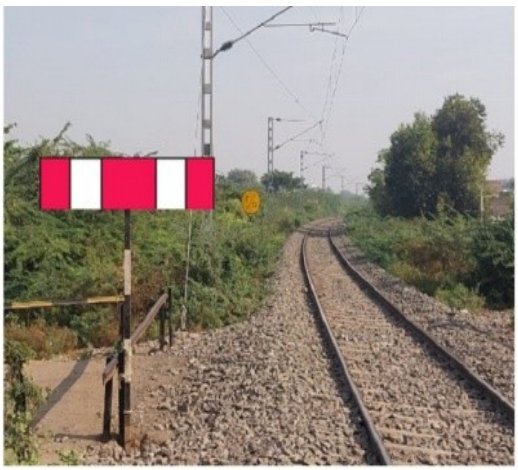


Figure-11/2 Speed Indicator

11.3 STOP INDICATOR

A detail of Stop indicator board is illustrated in fig below. Height of the stop indicator board should be 2000 mm (2M) above the rail level. *(Ref: handbook on Trackside Indicator Boards &Signages issued by Northen Railway construction organization June 2020)*



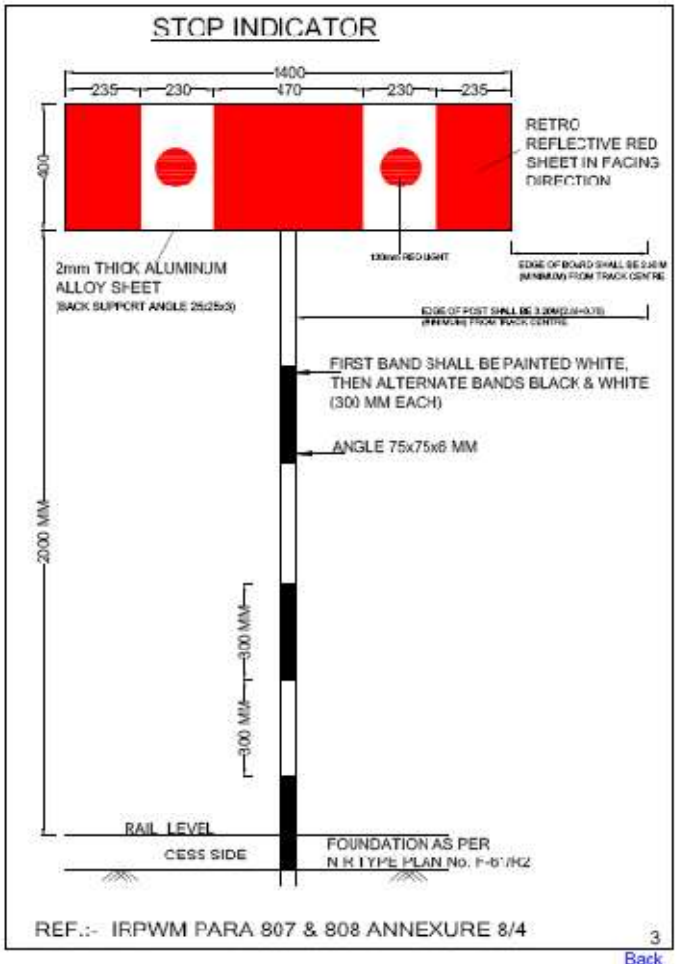
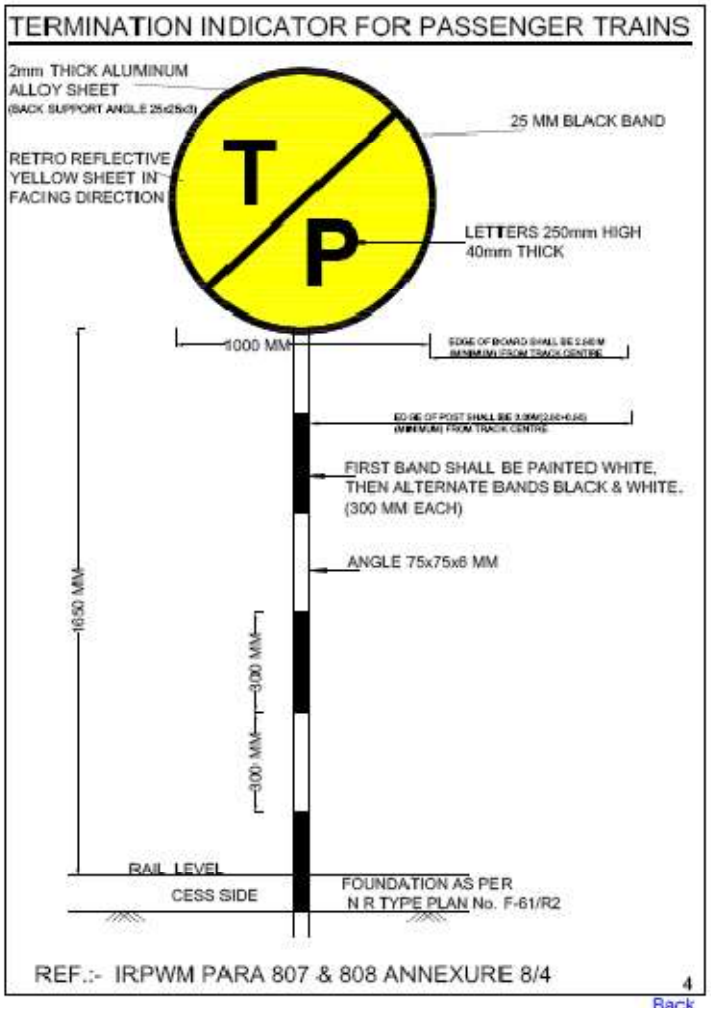


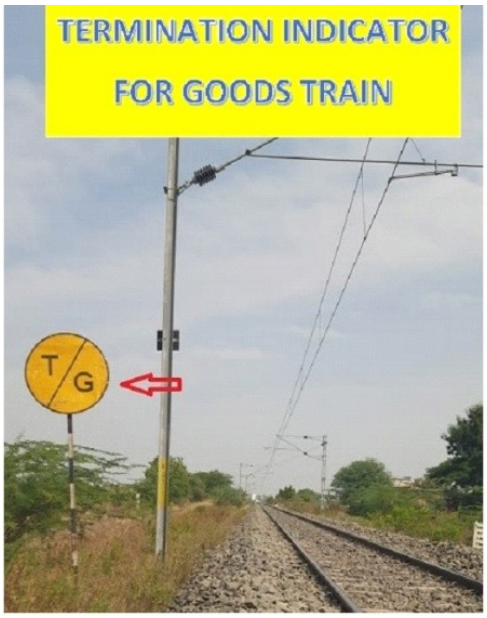
Figure-11/3 Stop Indicator

11.4 TERMINATION INDICATORS (T/P & T/G)

Details of Termination indicator board for passanger train and for goods train is illustrated in figures below. Height of the termination indicator board should be 1650 mm (1.65M) above the rail level. *(Ref: handbook on Trackside Indicator Boards &Signages issued by Northen Railway construction organization June 2020).*




TERMINATION INDICATOR FOR PASSENGER TRAINS
2mm THICK ALUMINUM ALLOY SHEET
(BACK SUPPORT ANGLE 25x25x3)
RETRO REFLECTIVE YELLOW SHEET IN FACING DIRECTION
T
P
25 MM BLACK BAND
LETTERS 250mm HIGH 40mm THICK
1000 MM
FIRST BAND SHALL BE PAINTED WHITE, THEN ALTERNATE BANDS BLACK & WHITE. (300 MM EACH)
ANGLE 75x75x6 MM
1650 MM
300 MM
300 MM
RAIL LEVEL
CESS SIDE
FOUNDATION AS PER N R TYPE PLAN No. F-61/R2
REF:- IRPWM PARA 807 & 808 ANNEXURE 8/4
4


TERMINATION INDICATOR
FOR GOODS TRAIN
T
G

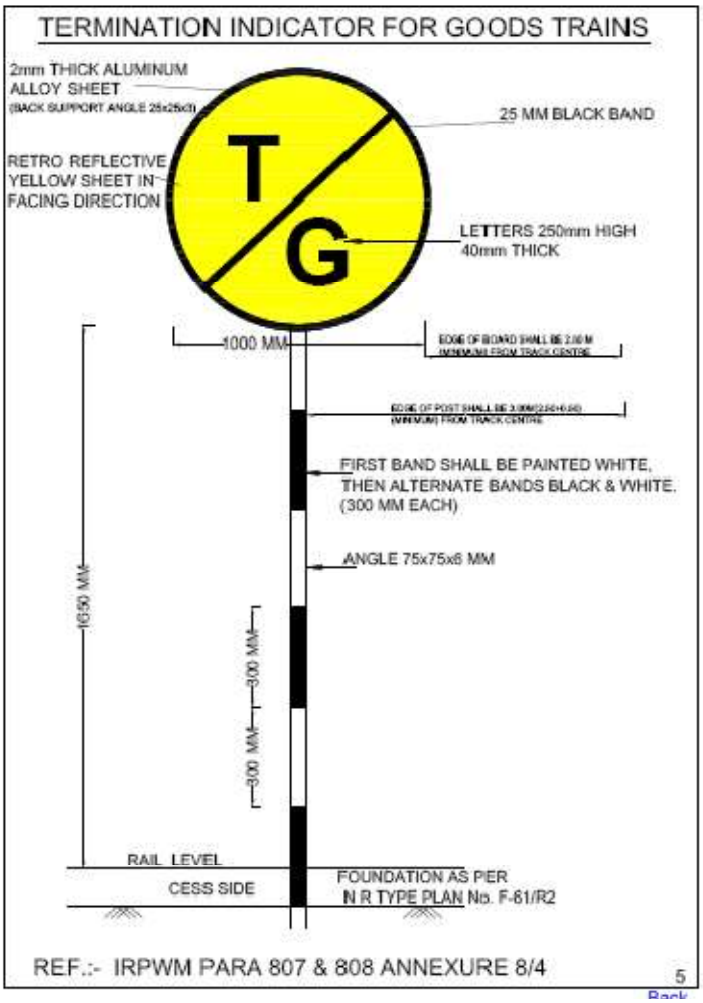
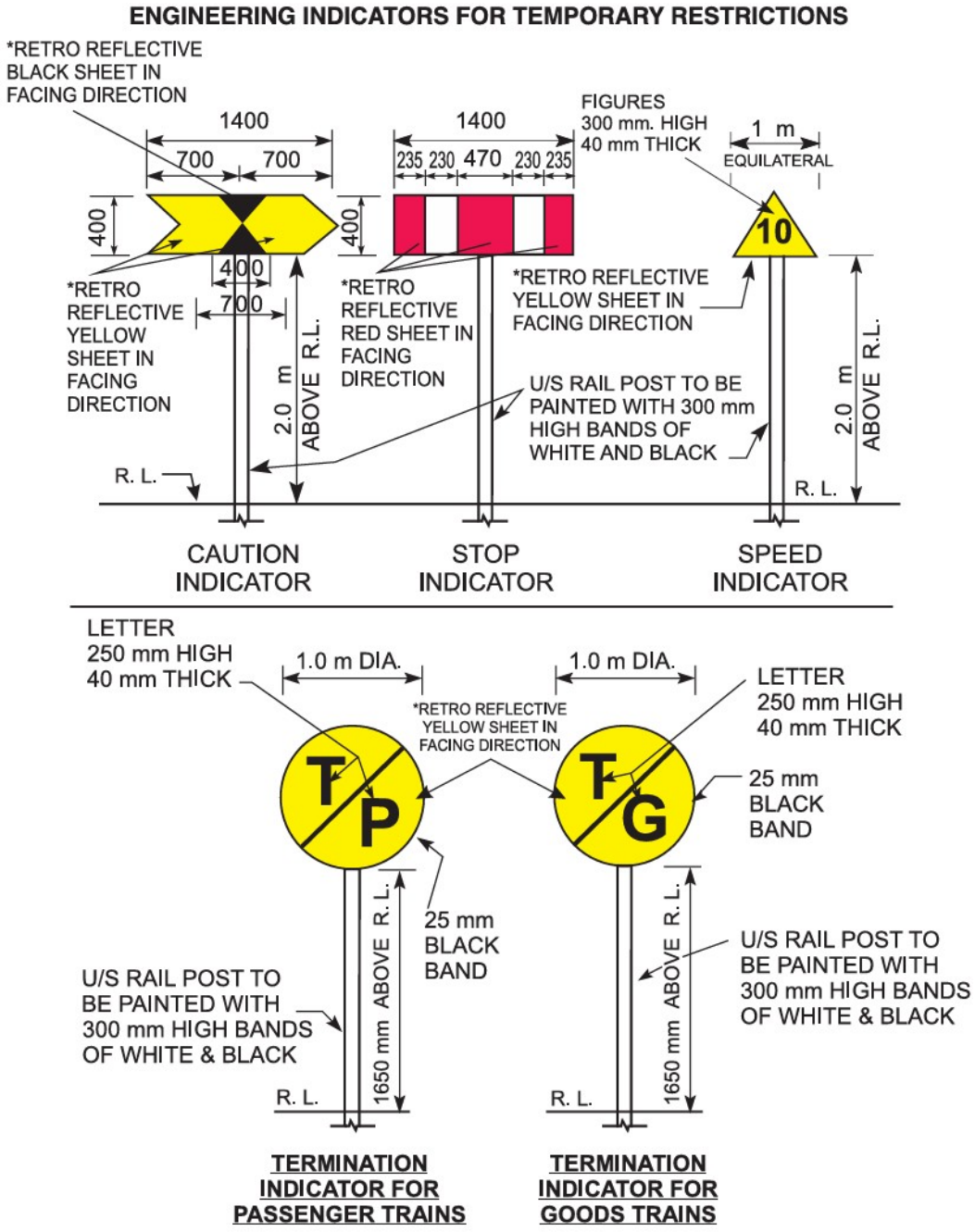


Figure-11/4 Termination Indicator for passangerandGoods train

11.5 POSITION OF FIXING OF TEMPORARY ENGINEERING FIXED SIGNALS

All indicators should be placed on the left hand side as seen by the Drivers except on Centralised Traffic Control (CTC) sections (single line) where they should be placed on Right hand side. *(Ref: handbook on Trackside Indicator Boards &Signages issued by Northen Railway construction organization June 2020).*



** Note - All engineering indicators should be of retro reflective type as per RDSO provisional specification for Retro reflective Indicators, May 2011*

Figure-11/5 Engineering indicators for temporary restrictions

12.0 DISASTER MANAGEMENT *(Ref:* IRISET book on Disaster Management (G-9)

12.1 DEFINITION OF A DISASTER ON RAILWAYS

Based on the definition of the Disaster Management Act 2005, Ministry of Railways has adopted the following definition of Railway Disaster:

"Railway Disaster is a serious train accident or an untoward event of grave nature, either on railway premises or arising out of railway activity, due to natural or man-made causes, that may lead to loss of many lives and/or grievous injuries to a large number of people, and/or severe disruption of traffic etc, necessitating large scale help from other Government/Non-government and Private Organizations."

12.2 TYPES OF DISASTERS

Disaster in the Railway context is traditionally a serious train accident, caused by human/equipment failure, which may affect normal movement of train services with loss of human life or property or both. This is now extended to include natural and other man made disasters. Different types of disasters are described along with a few examples, below:

(a) ***Natural Disaster***:- Earthquakes, Floods, Cyclones, Land Slides, Tsunami etc.
(b) ***Train Accident related Disaster***:- Collisions (with a huge number of casualties), Train marooned (flash floods), derailments at a bridge over a river and coaches falling down; train washed away in cyclone, derailment of a train carrying explosives or highly inflammable material, tunnel collapse on a train, fire or explosion in trains, other miscellaneous cases etc.
(c) ***Man made Disasters***:- Acts of Terrorism and Sabotage, i.e. causing deliberate loss of life and/or damage to property, which includes, Setting fire to a Train, Railway installations etc., bomb blast at Railway Station/Train, Chemical (Terrorism) Disaster, Biological and Nuclear Disaster.

12.3 PHASES OF DIASATER MANAGEMENT

There are five phase of diasaster management namely

i) Phase-I (Golden Hour)
ii) Phase-II (Arrival of Crack Team)
iii) Phase-III (Arrival of Relief Train)
iv) Phase-IV (Handling injured passengers)
v) Phase-V (Restoration of Traffic) Concept of Controlling Station

Here we described the importance of Phase-I (Golden Hour) only. The first phase, which is of shortest duration, lasts for about an hour. It is an amateurish, poorly equipped effort; but is nevertheless the most important phase. Inmost cases, this is the only help available for a major part of the "GOLDEN HOUR". Other phases are more or less planned. Only Phase I(Golden Hour) has been discussed.

1. In the period immediately after the accident where grievous injuries to passengers, loss of property etc. takes place, action has to be taken on war footing by Railway Officials/ officers-on-board to render definite medical care which gives relief to affected persons and also helps them to overcome the trauma.
2. If a critical trauma patient is not given definite medical care within one hour from the time of accident, chances of his ultimate recovery reduces drastically, even with the best of Medical attention thereafter.

This first one hour period is known as the Golden Hour FOR A CRITICAL TRAUMA PATIENT:-

During this Golden Hour period, following efforts should be made:

i) Guard, Driver, Conductor and TTEs. etc. must pass on the information quickly to the nearest station or to control, about the accident. Being trained in first-aid, they should simultaneously render every possible medical aid to the injured.
ii) Senior-most officer traveling by the affected train, whether on duty or on leave, shall take charge as Site Manager.
iii) All Railway officers and staff available on train must report to the Guard and work as per the directions of the Site Manager.
iv) Station masters of the adjoining stations must inform Control about the happenings and the nature of assistance required.
v) Persons under shock should be relieved of shock immediately.
vi) Transport causalities to the nearest hospital so as to reach within this Golden Hour period.

12.4 DUTIES OF FIRST RESPONDERS (RAILWAY STAFF)

A) GANG STAFF:

i) On double/multiple line section stop any other train approaching the accident area by showing hand danger signal.
ii) Ensure that track alignments or lines are not disturbed.
iii) Report to Officer In-charge of the site and assist in rescue and relief work.
iv) Assist in extricating injured passengers from coaches.
v) Assist in transporting them to nearest hospitals.

B) GATE MEN:

i) Keep gate closed if the train has not cleared the gate.
ii) On double/multiple line section, stop any other train approaching the accident area by showing hand danger signal.
iii) Arrange to inform Station master immediately.
iv) Don’t meddle with Interlocking.
v) Avail services of road vehicles waiting or passing through LC Gate.
vi) Send message to nearby village, informing them regarding the accident.
vii) Collect men and material available nearby and direct them to site.

***

Annexure-1

RBE No. 03/2024

भारत सरकार Government of India
रेल मंत्रालय Ministry of Railways
(रेलवे बोर्ड) (Railway Board)

No. E (MPP)/2019/03/46 **New Delhi, dated: 09.01.2024**

The General Manager,
All Zonal Railways/PUs
Metro Railway, Kolkata
CORE, Allahabad
DG/RDSO/Lucknow
CAO/DMW/ Patiala
CAO/COFMOW/New Delhi
ED/CAMTECH/Gwalior

DG/NAIR/Vadodara
DG/IRITM/Lucknow
DG/IRIEEN/Nasik
DG/IRICEN/Pune
DG/IRISET/Secunderabad
DG/IRIMEE/Jamalpur
DG/ IRIFM/ Secunderabad
DG/ JRRPF/ Lucknow

Sub: Revised Training Modules of Non- Gazetted Staff of Civil Engineering Department.

Vide Board's letter no. E (MPP) 2019/03/46 dt. 24.12.2021 (RBE no. 94/2021), revised training module of non- gazetted staff of civil engineering department was circulated to all Zonal Railways/ PUs and uploaded on railnet under heading **MPP Training Circulars**.

2. IRICEN has now submitted the revised training module for Induction & Refresher training course of Track Maintainers, which has been reviewed in Board's office and the same has been approved by Board (Member/Infrastructure).

3. Accordingly, the revised training modules for Induction & Refresher training of Track Maintainers, have been scanned and uploaded under **MPP Training Circulars** and can be viewed or downloaded from **Railnet/Indian Railways website.**

4. This disposes of NR's letter no.1-WO/Training of Non-Gazetted P Way Staff dated 05.09.2022

5. Kindly acknowledge receipt.

Encl. : (Revised Training Modules – 05 pages)

3/1/25

(Amit Singh Mehra)
Director/Man Power Planning

No. E (MPP)/2019/03/46 **New Delhi, dated: 09.01.2024**

Copy to:

1) The General Secretary, NFIR, 3 Chelmsford Road, New Delhi for information (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

2) The General Secretary, AIRF, 4 State Entry Road, New Delhi for information (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

3) The Secretary General, FROA, R.No.256-A, Rail Bhavan, New Delhi for information (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

4) The Secretary General, IRPOF, R.No.268, Rail Bhavan, New Delhi for information (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

5) All Members, Department Council & Secretary Staff side National Council 13-C, Ferozeshah Road, New Delhi (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

6) The Secretary General, AIRPF Association, Room No.256-D, Rail Bhavan, New Delhi (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

7) General Secretary, All India SC & ST Railway Employees Association, 171/B-3, Basant Lane Railway Colony, New Delhi (Copy may be downloaded from E(MPP) Training Circulars/Railnet/Internet).

For Principal Executive Director (IR) /Railway Board

No. E (MPP)/2019/3/46 **New Delhi, dated: 09.01.2024**

Copy to:

i) PS & ED(PG) to MR, MoSR (D) & MoSR (J)

ii) PSO/Sr.PPS to CRB, MF, M(Infra.), M(TRS), M(O&BD), DG(HR), DG(RHS) & DG(RPF)

iii) Sr.PPS/PPS/PS to AM(Budget), AM(CE), AM(C&IS), AM(Comml.), AM(Traction), AM(Fin), AM(Mech.), AM(Plg.), AM(Project), AM(PU), AM(Sig.), AM(Staff), AM(RS), AM(T&C), AM(Tele), AM(TT), AM(Works), PED(Vig.), PED(Safety), PED(Coaching) LA,

iv) ED(Plg.), ED(Accts.), EDCE(B&S), EDCE(G), EDCE(Plg.), ED(CHG), ED(CC), ED(C&IS), ED(E&R), EDEE(Dev), EDEE(G), EDE, ED(RRB), EDE(N), EDE(Res), EDF, EDF(B), EDF(X)I, EDF(X)II, ED(H), JS(C), EDME(Chg.), EDME(Fr.), ED(PC)I, ED(PC)II, EDRE, ED(Safety), ED(Safety)-II, IG./RPF(Hqs), ED(Sig.), ED(SP), EDRS(G), EDRS(S), ED(TD), EDTC(R), EDCE(P), ED(PM), ED(FM), EDPG, EDTT(F), EDTT(S), EDV(E), EDV(Elect), EDV(T), EDVE(S), ED(W).

v) Chief Commissioner of Railway Safety, Lucknow.
vi) E(Trg.), E(NG)I, E(NG)II, E(G), F(E)I, F(E)II, F(E)III, E(SCT)I, E(SCT)II branches of Railway Board.

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Room No. 27A, Ground Floor, Rail Bhawan, New Delhi-110001

TRAINING MODULE FOR INDUCTION COURSE (T-9) (Revised)

CATEGORY: TRACK MAINTAINER DURATION: 30 DAYS (240 PERIODS)

TOPIC	TOPIC DETAILS	Periods	
		Existing	Revised
	PART – I INTRODUCTION	**6**	**6**
1.1	Railway's Organizational Structure, Role of Track-maintainer in Railways.	2	2
1.2	Classification of Routes.	1	1
1.3	Duties & Responsibilities of Track-maintainer (IRPWM Para 149). Duties of Trackman as per para 2.11 of GR.	3	3
	PART – II PERSONAL SAFETY	**21**	**29**
1.1	Precaution during work on running lines, **including Double / Multiple lines, vicinity of LCs, important major yards, shunting / marshalling lines etc.**	1	**2**
1.2	Precaution during routine maintenance activity, handling/ transporting materials **including while working in Block, Speed Restriction etc**	1	**2**
1.3	Precaution during Track machine working **including pre, post and during tamping, BCM working, sharp look out on adjoining lines etc**	2	**4**
1.4	Precaution during working on sharp Curves/Curves with poor visibility. Precaution during working at accident spots, congested locations like bridge, tunnel, in High speed locations, **Use of Rakshak and other such warning systems**	1	**3**
1.5	Precautions in track circuited areas, electrified areas, **including working with Cranes, JCBs, earth moving equipment etc.**	2	**3**
1.6	Precaution while working during heavy rain, Safety against Snake/Insect Bite Precautions during night working **at Monsoon Patrolling / Hot / Cold weather Patrolling etc**	1	**2**
1.7	Safety during working in Ghat sections. Personal safety- Dos & Don'ts	1	1
1.8	**Hands on**: Repairs to Trolley Refuges/ Man refuges	4	4
1.9	**Hands on**: Exchange of hand signals. Fixing detonators	4	4
1.1	**Field visit** for demonstration of various safety drills.	4	4
	PART – III RAILS, SLEEPERS, FASTENINGS & BALLAST	**23**	**23**
1.1	Types of rails, Fish plates, Fish bolts.	1	1
1.2	PSC sleepers for main line and other locations viz. level crossing, SEJ, bridge and its approach, turnout, sharp curves, etc.	2	2
1.3	Elastic Fastenings: Types of ERC – ERC mark III, ERC mark V, zero toe load, GJ clip. Rubber pads: Different types. Liners : Different types, GFN liners, metal liners, combination liners Modern elastic fastenings viz. Vossloh, Nabla etc.	2	2
1.4	Glued joints, Block Joint, SEJs, Points & Crossing.	2	2
1.5	**Model room** showing different types of rails, sleepers, elastic fastenings, SEJ, Glued joint, block joint, points and crossing.	2	2
1.6	**Field visit** for showing items mentioned at 1.5 above.	8	8
1.7	Ballast profile at different location, Steps to prevent Pedestrian/ Cattle Crossing	2	2
1.8	**Hands on** Ballast Handling, adjustment of ballast in profile, measurement of ballast cushion	4	4
	PART – IV LUBRICATION OF RAIL JOINTS	**14**	**14**
1.1	Lubrication of Rail Joints (IRPWM Para 241)	1	1
1.2	**Hands on**: Lubrication of Rail Joints	4	4
1.3	Greasing of ERCs, sealing of liners.	1	1
1.4	Painting of Rails and Welds.	1	1
1.5	Lubrication of gauge face of outer rail on curves, turnouts, SEJ etc.	1	1
1.6	**Hands on**: Lubrication of ERC, Curves, Turnouts, SEJ.	6	6
	PART – V TRACK MAINTENANCE ACTIVITIES	**57**	**57**
1.1	Through Packing (IRPWM Para 224), Slack Picking (IRPWM Para 229).	2	2
1.2	**Hands on**: Manual through packing.	8	8
1.3	Systematic Overhauling of Track(IRPWM Para227)	1	1
1.4	**Hands on**: Systematic Overhauling	4	4
1.5	Mobile Maintenance Units (IRPWM Para228)	1	1
1.6	Introduction to Small Track Machines. Safe operation of Small Track Machines available on Indian Railways on running track.	2	2
1.7	Basic knowledge regarding consumables being used in Small Track Machines.	1	1
1.8	**Hands on**: Repair & maintenance of Small Track machines, troubleshooting of Small Track machines.	4	4

TRAINING MODULE FOR INDUCTION COURSE (T-9) (Revised)

CATEGORY: TRACK MAINTAINER **DURATION: 30 DAYS (240 PERIODS)**

TOPIC	TOPIC DETAILS	Periods	
		Existing	Revised
1.9	**Hands on** training for operation of small Track Machines including weld trimmer, grinder, rail cutting, hole drilling, chamfering, etc.	4	4
1.1	Works involved in the maintenance of Points &Crossings. Curves, Level crossings and Bridges.	2	2
1.11	**CREEP**: Creep and its effect, pulling back of creep, fixing of anchors, recoupment of missing fittings, renewal of ineffective fittings.	1	1
1.12	Attention to SEJ, Glued Joints, insulated block joints.	1	1
1.13	Observance of Sleepers under passage of Traffic(IRPWM Para 230)	1	1
1.14	Observance of train for seized bearings/hot axles, hanging parts of rolling stock.		
1.15	**Technical films/ video clips/ photographs** showing various Track Maintenance activities.	1	1
1.16	**Hands on**: Casual rail renewal	4	4
1.17	**Hands on**: Casual sleeper renewal	4	4
1.18	**Hands on**: Measurement of Gauge, Cross level, Check-Rail Clearance, Versine, Cant.	2	2
1.19	**Hands on**: Change of Crossing and Switches in yards.	4	4
1.2	Welding of Rails.	2	2
1.21	**Hands on**: Assisting in welding of rail joint.	4	4
1.22	**Technical films/ video clips/ photographs** on use of weld trimmers &Grinders, Rail cutting machine, Rail drilling Machine, Chamfering machine, Impact Winch for bolt tightening, Toe load measurements.	2	2
1.23	**Hands on**: Maintenance in Electrified territories: precautions involved during maintenance of Track-Circuited sections, Felling/ Cutting/ Pruning of trees close to OHE	2	2
	PART – VI LONG AND SHORT WELDED RAILS (LWR/SWR)	**24**	**24**
1.1	Introduction to LWR/SWR track.	1	1
1.2	Rail temperature-types of Rail Thermometers, measurement of temperature and working range.	1	1
1.3	**Hands on**: Measurement of Rail temperature	1	1
1.4	Competency to carry out various Maintenance and Repair works in LWR.	1	1
1.5	Do's and Don'ts for LWR and SWR track.	2	2
1.6	Hot and Cold Weather Patrolling	1	1
1.7	Action to be taken in case of rail/weld failures.	1	1
1.8	**Hands on** : for attending emergency repair of rail/weld fracture	4	4
1.9	Action to be taken in case of buckling	1	1
1.1	De-stressing of LWR.	2	2
1.11	Different types of SEJ – Inspection and Maintenance	1	1
1.12	**Hands on**: Cold / Hot Weather Patrolling, Monsoon Patrolling.	8	8
	PART – VII RAIL FRACTURES AND WELD FAILURES	**7**	**7**
1.1	Introduction to Rail/ weld failures.	1	1
1.2	Marking of USFD Flaws, Action for protection / removal of defective welds/rails	2	2
1.3	**Hands on**: Attention to various types of USFD Flaws	4	4
	PART – VIII TRACK RENEWALS	**21**	**21**
1.1	Scope, activities involved & method for execution of Through Rail Renewal, Through Sleeper Renewal, Through Bridge Timber Renewal, Through Fittings Renewal, Through Turnout renewal	3	3
1.2	Deep Screening (IRPWM Para 238), Lifting/Lowering of track, **Working of Track machine such as BCM, SBCM, DTS, Unimat, T-28**	3	3
1.3	Working of Ballast Train / DMT working	2	2
1.4	**Hands on**: Ballast train/ EUR unloading.	8	8
1.5	**Technical films/ video clips/ photographs** of various types of Track machine on Railway	1	1
1.6	**Hands on**: Pre & Post tamping activities, Attention during Track-Machine tamping	4	4
	PART – IX LEVEL CROSSINGS	**10**	**10**
1.1	Classification of Level Crossing, Equipment at LC.	2	2
1.2	Visibility at LC, Speed breakers, Road sign boards and W/L boards at level crossings, Location of various LC Boards	1	1
1.3	Introduction to working of gateman, competency, Refresher & medical Examination.	1	1
1.4	Action during Gate failures, Height Gauge damage, Breakdown of vehicle at LC	1	1

TRAINING MODULE FOR INDUCTION COURSE (T-9) (Revised)

CATEGORY: TRACK MAINTAINER **DURATION: 30 DAYS (240 PERIODS)**

TOPIC	TOPIC DETAILS	Periods	
		Existing	Revised
1.5	**Technical films/ video clips/ photographs** showing operation of Level Crossing and its components.	1	1
1.6	**Hands on**. Visit to nearest level crossing	4	4
	PART – X PATROLLING OF TRACK (Ch-X of IRPWM)	16	12
1.1	Types of Patrolling	2	2
1.2	Duties of Patrolman, Equipment of patrolman. Reporting of unusual. Understanding of patrol chart and diary.	2	2
1.3	Action to be taken during emergency by Patrolman	1	1
1.4	Duties of Stationary watchman at vulnerable location	1	1
1.5	**Hands on:** rainfall reading with rain gauge	2	2
1.6	**Hands on:** Patrolling Duty	8	4
	PART – XI Rail Dolly/Trolley/Dip Lorry Working	15	11
1.1	Working of Trolley, Lorry and Rail dolly.	2	2
1.2	**Technical films/ video clips/ photographs** on working of Rail Dolly/Dip Lorry.	1	1
1.3	**Hands on**: working of Trolley, Lorry, Rail dolly and Protection	4	4
1.4	**Tutorial on** preparation on various memo viz. track unsafe memo, caution order, track safe memo with caution order, etc.	8	4
	PART – XII BASICS OF SIGNALLING & PROTECTION OF TRACK	13	13
1.1	Various types of Signals& Their Aspects	2	2
1.2	Station limit, block sections, different types of territory (absolute/automatic).	1	1
1.3	Various method of protections: HS Flags, banner flags, HS lamp, detonator, tri-color torches, hooters etc.	1	1
1.4	Protection during short duration/long duration works.	2	2
1.5	Engineering Indicator boards for various speed restriction/ stop dead, Location of boards at work site.	2	2
1.6	**Hands on** for Fixing of Indicator Boards at Work site	4	4
1.7	Training on disaster management including fire safety.	1	1
	PART – XIII ESTABLISHMENT MATTER	5	5
1.1	Leave & Pass Rules	1	1
1.2	DAR	1	1
1.3	HOER	1	1
1.4	Avenues of career progression in Railways	1	1
1.5	Introduction to Civil defense organization in Railways	1	1
	PART – XIV FIRSTAID	4	4
1.1	Knowledge on medicines provided in first aid box. Training and demonstration on first aid to be given to injured having bone fractured/ dislocation, precaution while carrying injured staff in absence of stretcher.	4	4
	PART – XV MISCELLANEOUS	4	4
1	Exam, Viva-Voce, Reporting/Relieving etc.	4	4
2	**Self-development (physical & emotional)**		
2.1	Jogging/ yoga exercise one hour daily in morning session (7am to 8am).		
2.2	Breathing exercise, meditation, relaxation daily one hour in evening session (5.30pm to 6.30pm).		
	Grand Total	240	240
	NOTE: 30 days= 30 x 8 pds = 240 pds of 45mins each		

SUMMARY

A	CLASSROOM LECTURES	95	103
B	TECHNICAL FILMS/ VIDEO CLIPS/ PHOTOGRAPHS	6	6
C	FIELD VISITS	12	12
D	HANDS ON	113	109
E	MODEL ROOM	2	2
F	TUTORIAL	8	4
G	MISCELLANEOUS	4	4
	GRAND TOTAL	240	240

Note: *The aspect of personal safety is covered in Part-II- of both (Induction and Refresher) course modules, however to cover more safety aspects some additional topics are also added in the existing module like, working in Double / Multiple lines, safety during machine working, use of Rakshak and other such warning systems, safety during patrolling, safety while transporting materials and working with Cranes, JCBs, earth moving equipment etc For which the time period for personal safety in Induction Course has been increased from 21 periods to 29 periods (each duration 45 minutes) by suitably modifying the time allotted to other topics keeping total training duration unchanged as 30 days.*

It is also recommended that after completion of 30 days institutional training, newly recruited track maintainers, should also be given a 3 days practical safety training by the concerned JE/SSE P.Way supervisor before allowing them for field work. The same should be advised by divisions to SSE (P.Way) incharge.

REFERENCES

S. No.	Description
1.	Indian Railways Permanent Way manual (IRPWM)-2024
2.	Indian Railways (Open Lines) General Rules, 1976
3.	IRISET book for Basics of Indian railway Signalling (S1)
4.	IRICEN book for Signalling for Track engineers Nov-2022
5.	Track side indicators boards &Signages booklet by Northen Railway Construction organisation June 2020
6.	IRISET book on Disaster Management (G-9)
7.	Literature available on IRICEN website

NOTES

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CAMTECH is continuing its efforts in the documentation and up-gradation of information on maintenance practices of civil engineering assets. Over the years a large number of publications on civil engineering have been prepared in the form of handbooks, pockets books, pamphlets and video films, etc. These publications have been uploaded on the internet as well as rail net.

Link for downloading CAMTECH publications:

On internet visit: https://indianrailways.gov.in/

Or

On Railnet visit Railway Board website at http://10.1.2.21/

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Link for directly download the Publications:

https://indianrailways.gov.in/railwayboard/view_section.jsp?lang=0&id=0,1,304,366,538,2713,2718,2722

Disclaimer

The contents of this handbook are for guidance only & are not statutory. It also does not supersede any instructions from Railway Board, RDSO, and Zonal Railways & the provisions of IRWM, BIS Codes/Reports on the subject.

If at any point contradiction is observed, then Indian Standards, regulations issued by Government bodies, Railway Board/RDSO guidelines shall be referred.

हमारा उद्देश्य

अनुरक्षण प्रौद्योगिकी और कार्यप्रणाली को उन्नयन करना तथा उत्पादकता और रेल्वे की परिसंपत्ति एवं जनशक्ति के निष्पादन में सुधार करना जिससे अन्तर्विषयों में विश्वसनीयता, उपयोगिता और दक्षता प्राप्त की जा सके।

यदि आप इस संदर्भ में कोई विचार और सुझाव देना चाहते हों तो कृपया हमें इस पते पर लिखें।

संपर्क सूत्र :निदेशक / सिविल

पत्राचार का पता : भारतीय रेल उच्च अनुरक्षण प्रौद्योगिकी केन्द्र
महाराजपुर, ग्वालियर (म. प्र.) पिनकोड - 474005

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Our Objective

To upgrade Maintenance Technologies and Methodologies and achieve improvement in productivity and performance of all Railway assets and manpower which inter-alia would cover Reliability, Availability, and Utilisation.

If you have any suggestion & comments, please write to us:

Contact person : **Director (Civil)**

Postal Address : **Indian Railway Centre for Advanced Maintenance Technology, Maharajpur, Gwalior (M.P.)**
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