

OPERATING MANUAL

FOR

INDIAN RAILWAYS

GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

सदस्य यातायात, रेलवे बोर्ड और पदेन सचिव,
भारत सरकार
रेल मंत्रालय
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सत्यमेव जयते

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PREFACE

The objective behind the Operating Manual is to provide a ready handbook to officers and staff involved in train operations. The Manual contains a broad framework of guidelines, which cover various aspects of train operations, and an effort has been made to standardise the diverse operating practices over IR.

New areas covered in the Manual include changes in train operations brought about by IT, 'Non-Interlocked working', 'Derailment Investigations' and 'Command Control and Coordination of Emergency Rescue Operations'. It is hoped that the inclusion of the latter shall sensitise staff in matters on which texts are not available. However, instructions and guidelines contained in the Manual do not in any way supersede or replace the G&SR or other instructions at Zonal and Divisional levels.

I am extremely thankful to Shri Govind Ballabh, IRTS (retd.), for his painstaking effort without which this Operating Manual would not have been possible. I am also thankful to Shri Vinay Mittal, COM/CR, Shri V.K.Roy, COM/NR and Shri S. Jayanth, COM/SR for their valuable suggestions.

I hope all officials involved with train operations will find this Manual useful in their day to day working.

(V.N. Mathur)

New Delhi
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WORKING OF STATIONS

Railway Stations, world wide, are located in prime city centres, as railways were started at a time when expansion of cities was yet to start. Railway station continues to be the focal point of central business district in all cities in the world.

All description of rail business is transacted at the station, passengers start journey or complete it, outward parcels are booked and inward parcel consignments received and kept ready for delivery. At stations having attached goods shed, outward and inward freight cargo is handled there.

In their historic evolution, the stations now have catering establishments, resting facilities in retiring rooms or a budget hotel. A world-class station may look *or in fact* be more like a mall with shops and catering establishments with attendant information, ticketing and reservation counters.

Station Master is in overall charge of the station and includes Station Superintendent/ Station Manager.

Duty List of Staff

The duties to be performed by different categories of staff *in* connection with movement of trains are detailed below. These duties must be read in conjunction with the Station Working Rules of the station, General & Subsidiary Rule Book, Chapter II of Operating Manual dealing with "Working of Stations" and Block working Manual as amended from time to time.

I. Responsibility of Station Master (supervisory)/Station Manager

i. Station Master is responsible for the efficient discharge of duties by different members of staff at his Station. (General Rules 5.01)

ii. Ensuring that the general working of the Station is being carried out in strict accordance with the current rules, procedures and instructions.

iii. Providing prompt and courteous service with utmost safety and security of passengers and employees.

iv. Availability, helpfulness and good conduct of station porters

v. He shall be responsible for general up-keep of the station.

vi. He shall be responsible for keeping the safety and operating literature including circulars, pamphlets, gazette etc. up to date and these must be explained to the staff working under him and got noted by them.

vii. He shall be responsible for maintaining Accident register and Accident charts and keeping these up to date.

viii. He shall maintain figures in respect of the stock and get them relayed to the control in time.

ix. He shall investigate all public complaints and send the extracts of the complaint with explanation of the staff and his own remarks to Divisional Office in time. In case of complaints concerning the other department, intimation may be given to the subordinate In-Charge of that department immediately so that action may be taken to avoid recurrence.

x. He shall promptly attend all accidents, assume charge of the site to and assist in relief measures ensuring prompt evacuation of injured & stranded passengers. He shall take note of all the information available and protect the clues/evidence, which may be helpful in the enquiry. He shall intimate the control office at regular interval for current information and ask for the required assistance i.e., Relief Train, Medical van etc. He shall investigate yard accidents, obtain statements of the staff responsible and submit his report with conclusions and joint note to the Divisional office.

xi. He shall ensure that fire fighting equipments at the station such as fire extinguisher, fire buckets etc. are in fine fettle and ready for use.

xii. The Station Master should regularly test and record in the charge book, the working of Points, Signals and Track Circuit to ensure that:

- The Signals are back to 'ON' position when the relevant slide/button/ lever is put back or intended train movement has been completed.
- it is not possible to take 'OFF' conflicting signals at the same time.
- Signals are not taken 'OFF' until all points are correctly set and facing points locked.
- Any other manner of testing prescribed by the Authorised Officer.
- Panel testing: Normal/Abnormal by Station Master.
- At stations provided with continuous track circuits or at stations having solid state interlocking the method of testing shall be prescribed jointly by Signalling and Operating Branch which shall be described in the Station Working Rules to be followed by station masters.

xiii. He must ensure that burners and wicks of the hand signal lamps are daily cleaned, trimmed and oiled properly.

xiv. He must ensure that the essential *Safety* equipments at his station are the same, complete and, if there is any deficiency should be made good without delay.

xv. He shall conduct night and surprise inspections to check the alertness of staff and working of signals, and points and visibility of the signals.

xvi. The Station Master in charge at a station shall inspect his station daily with a view to ensure efficient working of-

- All public facilities including, fans, lights, lifts, escalators,
- All equipments being in efficient working order. Deficiencies must be promptly rectified or recorded in Petty Repairs Book
- Safe and efficient working of trains
- Cabins, Assistant Station Manager's office, yards, goods sheds and level crossing gates under his charge.
- Reservation Enquiry, Public Address system, Public Information Display System, booking offices, Ticket Checking, catering and vending stalls etc.
- Drinking Water availability.

xvii. He shall see that train signal register, station Diary, Inspection Note Book, reference books and other station record is property maintained and preserved for a minimum period as prescribed later in this chapter.

xviii. At the bigger stations Health Inspector is incharge of sanitation the Staion Manager shall conduct daily inspections and bring out deficiencies. He shall conduct daily inspections of waiting rooms, bath rooms, lavatories, refreshment rooms and catering trollies, platforms, tracks and other station premises from sanitation point of view and ensure that arrangements in this regard are adequate and effective. Availability of safe drinking water to passengers & employees is joint responsibility of JE/SE (works) and health department he should check that same is available.

xix. He shall ensure that sufficient stock is available for the requirement of the day. He shall keep in touch with the running of trains so that, in case of late running of connecting train, scratch rake can be turned out, if necessary. He shall also keep a check - on reserved stock available/allotted to his station.

xx. He shall take personal interest in arranging quick clearance of reserved carriages of troops, public, prisoners, treasuries etc.

xxi. Whenever special trains are arranged to run from *his* station, he shall ensure that stock for the same is secured and *certified* placed on the proper line in time.

xxii. He shall fix up responsibility in case of detention to trains outside or at the station and submit full report to DRM office.

xxiii. He shall be responsible to ensure that all the operating staff working under him are relieved in time for their periodical NVT/ Competency/ Safety camp and special

competency programmes. No one, overdue NVT/Competency shall be allowed to perform his normal duties.

II. Deputy Station Master (Outdoor)

i) The Deputy Station Manager shall be responsible for general up-keep and proper working of the station as under-

ii) He shall maintain safety literature, rule books, safety record. He shall counsel staff regarding rules and safety- systems

iii) He shall deal with public complaints and counsel commercial staff for courteous behaviour.

iv) He shall ensure right time placement and removal of terminating/originating trains and keep records in this regard and also keep a watch on Shunting operations.

v) He shall inspect gate, panel, station, regularly during his shift.

vi) He shall maintain close contact and co-ordination with Panel ASM and Log ASM for smooth running of trains and for better planning of operational work and will assist in case of any abnormal working.

vii) He shall promptly attend to any incident or accident and assist in relief measures during his duty. He shall collect all information and inform the Control office for required assistance, i.e., Relief Train, Medical Van etc. He shall also inform the local civil authorities as required and safe guard the clues or evidences which may be helpful in enquiry.

viii) In case of abnormal working, he shall be responsible for *manual operation* (Hand Cranking) of Points and piloting of trains.

ix) He shall ensure that all coaching trains scheduled to stop at the station, start within their allowed time.

x) Whenever Special trains are arranged to run from his station, during his duty, he shall ensure that stock for the same is secured and placed on the proper line in time.

xi) He shall keep close supervision on sanitation. He shall inspect the platforms, waiting halls, waiting rooms & the track and see that the same are cleaned properly by the sanitary staff.

xii) He shall keep close watch on passenger amenities provided at station and their up keep.

xiii) He shall look after any other work assigned to him by Station Manager, from time to time.

xiv) In case of emergency *he* shall also perform duty on Panel/Log.

xv) All instructions received from superiors shall be recorded in an Order Book. Senior officers should confirm these through a control order to avoid ambiguity. All such instructions shall be implemented, provided these do not violate safety rules & procedures.

xvi) He will perform all the duties of SS in his absence.

III. Log ASM/Block ASM

i) He shall handle the block instrument himself when on duty and shall not permit any unauthorized person to manipulate or handle the block panel/block instrument & block telephone.

ii) He shall keep the Station Manager's control keys block instruments in his personal custody whenever, he is required to leave his office even for a short duration.

iii) He shall maintain TSR and other connected record/documents in good shape and ensure that all entries are completed and are upto date.

iv) He shall attend the control and give arrival departure of trains promptly and shall carry out instructions given by superiors provided these do not violate safety rules & procedures.

v) He shall inform the ESM/MSM through a written message, any failure of block working etc. and invariably enter these failures in signal failure register.

vi) In case of any accident, he shall inform promptly the section control Station Manager/Station Master/ Dy. SM immediately. He shall give all the information available with him in regard to the nature, places, cause and assistance etc. in respect of the accident.

vii) He shall communicate reasons for late start of out going trains and late arrival of incoming trains to control.

viii) He shall come on duty after taking complete rest and shall not perform his duty under the influence of liquor, drugs, or intoxicants.

ix) He shall keep his reference books upto date, posted with latest correction slips and shall keep himself fully conversant with the extant rules. He shall keep his books readily available for inspection when asked to do so.

x) He shall not absent himself from duty without prior permission of his superiors. He shall not leave his duty unless properly relieved by his relief and shall not exchange his duty without prior permission from his superiors.

xi) He shall not consider himself relieved of duty unless he has completed transactions of trains for which he has given/obtained line clear till the complete arrival of such trains.

xii) He shall always obey the lawful orders of his superiors so long as they do not contravene any of the extant rules in force.

xiii) In case of any abnormal working, he shall also perform the duties assigned to Panel ASM.

xiv) He shall advise the descriptions of the train to which he had granted line clear or obtained line clear to panel ASM.

IV. Panel ASM

i) When on duty or when *called upon* to do so, in case of emergency, he shall be responsible for obtaining and granting line clear to trains or for shunting movements as per SWR & GR.

ii) He shall handle the control panel himself when on duty and shall not permit any unauthorized person to manipulate panel.

iii) He shall keep the SM's control keys of control panel in his personal custody whenever, he is required to leave his office even for a short duration.

iv) While coming on duty, he shall ensure that all points and signals are in good working order and all the registers, records, pertaining to train passage are completed in all respect before taking over the charge.

v) He shall personally ensure that conditions for taking 'off' the reception signals are fulfilled and the clearance of line is verified as per SWRs before actually pressing the relevant button for taking off the signals.

vi) He shall ensure from indications available in the panel that the signals are burning 'brightly and are giving correct indications.

vii) He shall maintain complete and up to date record of the Engg. Restrictions. He shall be responsible for bringing forward the caution order register every Monday and displaying the restrictions on notice board as well.

viii) He shall be responsible for ensuring delivery of proper caution orders to all trains.

ix) He shall ensure that all Shunting operations are carried out as per extant orders and GR 5.19 and SRs thereof.

x) He shall inform the ESM/MSM in writing or through a written message, any failure of track/signals/ points/keys or panels etc. and shall invariably enter these failures in signal failure register.

xi) He shall allow shunting in between the arrival/departure of trains or during slack period as frequently as possible to the maximum extent.

xii) He shall come on duty after taking complete rest and shall not perform his duty under the influence of drugs, or intoxicants.

xiii) He shall keep his reference books upto date, posted with latest correction slips and shall keep himself fully conversant with the extant rules. He shall keep his books, readily available for inspection when asked to do so.

xiv) He shall not absent himself from duty without prior permission of his superiors. He shall not leave his duty unless properly relieved by his relief and shall not exchange his duty without prior permission from his superiors.

xv) He shall not consider himself relieved of duty unless he has completed transactions of trains for which he has given/obtained line clear till the complete arrival of such trains.

xvi) He shall always obey the lawful orders of his superiors so long as they do not contravene any of the extant rules in force.

xvii) He shall ensure that proper indications of points, signals, track, circuits, crank handle, level crossing gate etc., *are displayed* at their proper places.

xviii) He shall be responsible for issuing required papers to trains entering/leaving the yard under the instructions of log ASM.

xix) He shall issue shunting order for shunting operations as per extant rules.

xx) He shall keep a watch on the working of shunting staff.

xxi) He shall ensure clearance of running lines in case of failure of their track circuits.

xxii) He shall maintain log book regarding train and shunting movement.

xxiii) He shall be responsible for giving complete arrival of all trains to log ASM supported by a private No.

xxiv) In case of abnormal working he shall be responsible for cranking *pad locking* of points and piloting of trains in absence of Deputy Station Manager/out door.

V. **Pointsman/Shuntman**

i) He shall obey all lawful orders of the ASM on duty or official in-charge supervising the shunting during the course of shunting operations including coupling or uncoupling of vehicles of wagons. Fixing rubber washers, closing wagon doors, displaying hand signals etc.

ii) He shall exhibit danger signal to the official supervising the shunting should the crossing be fouled during the shunting operation.

iii) He shall pilot the trains in case of abnormal working and when ordered by the SM on duty.

iv) He shall be in proper neat and clean uniform while on duty.

v) He shall come on duty after taking complete rest and shall not perform duty under the influence of liquor, drugs, or intoxicants.

vi) Neither shall he absent himself from duty nor shall he exchange his duty without prior permission of his superiors.

vii) He shall not leave his duty unless properly relieved or authorized by his superiors.

viii) He shall set the points properly in non-interlocked yard and man them for all shunting movements and shall not interfere with the points while the vehicles are standing and, or passing over them.

ix) He shall be responsible to see that fouling marks are kept clear after completion of shunting.

x) He shall always commence his duty equipped with hand signal lamps during night and flags during day.

xi) He shall verify the correct setting of route before delivering required papers to the loco pilot either through taking 'OFF' the relevant shunt signal or by personal observation.

xii) In case of track failure he shall assist the SM to ascertain the clearance of line.

xiii) He shall be responsible for lighting up of the indicators in the evening and putting out in the morning time fixed by *DRM* office and ensuring that these are *burn* brightly at night.

xiv) He shall be responsible for cleaning and oiling the burners and trimming wicks during day time under the supervision of Station Manger/Deputy Station Manager.

VI. Gateman

i) He shall be responsible for proper operation of the gate as per SWRs for the passage of trains.

ii) He shall ensure that no train suffers any detention on account of late closing of the gate.

iii) He shall keep the channels of check-rails clean and shall clean the road within the railway limits and water the area regularly.

iv) He shall clean the gate lamps and hand signal lamps daily. He shall ensure that the wicks of the burners are trimmed so that these are lighted properly and kept burning continuously from sun set to sunrise.

v) He shall keep the surroundings of his gate lodge clean tidy and neatly planted with shrubs, plants etc.

vi) He shall remain alert on duty till properly relieved. If he is required to lea*ve* the gate in *an* emergency he shall close and lock the gate booms against the road traffic before leaving the gate.

vii) He shall ensure that the equipment at L-xing are complete and in working orders.

viii) He shall produce the public complaint book when required by public for lodging complaint and to the railway officials for inspection.

ix) He shall ensure that road traffic is not unnecessarily held up at the gate.

x) He shall stand in attention near the gate lodge facing the track and be prepared to repeat any signal which the guard may intend to convey to the loco pilot or show

caution or danger signal should anything appear to be wrong with the train itself as it passes.

xi) He shall be polite and courteous in his behaviour towards the public.

xii) He shall report any defect in the gate to the ASM on duty without delay.

xiii) He shall close the gate on sighting a train or when ordered by the ASM on panel duty.

xiv) He shall attract the attention of the loco pilots and guards by shouting and gesticulating instead of showing danger signal in case of tram parting.

xv) He shall obey all lawful orders of the SM on duty.

xvi) In case of any obstruction, accident or damage to the gates, he shall protect the gate/obstruction as per instructions and rules in force.

VII Duty list and hours of duty:

1. Sr. DPO/DPO shall fix the duty hours for the staff at stations in accordance with the (Hours of employment regulations in consultation with Sr.DOM/DOM/ Sr.DCM/DCM). Copies of these duty hours (roaster) must be displayed at each station

2. Station staff shall handover charge at the end of their hours of duty as prescribed at the station only when properly relieved. Such duty hours shall not be exchanged without the permission of the Station Master.

3. **Daily Mustering of Staff:** The Station Master or the person authorised in this behalf shall fill in the attendance of staff at his station in Attendance Register.

SM's responsibility for assurance:

Station Master's responsibility before allowing employees to take independent charge-

1. Station Master must not allow any employee to take independent charge of a post connected with train working without satisfying himself after detailed oral examination about the knowledge of concerned staff .He must satisfy that the employee –

(a) Possesses the requisite Certificate of Competency.

(b) Has understood the working rules of the Station and is fully conversant with the duties he has to perform.

2. Before an employee takes independent charge of a post connected with train working for the first time, the pickup period is generally laid down by the DRM(Safety). However, following guidelines can be observed on first posting or when there is change of system/means of working *of trains* –

(a) Junction stations with marshalling yard and lobby - 10 days

(b) Terminal stations with marshalling yard and lobby - 8 days

(c) Large stations or junction stations - 5 days

(d) Medium stations & Road side station - 3 days

(e) Road side stations - 2 days

If employee fails to give declaration in fixed period, he must be directed for Refresher Training at his expense.

It must cover pickups in all the shifts.

(Minimum one day for each shift.)

He must read station-working rules and must witness the actual performance of these duties for the time specified as 'pick up' time. In emergencies, however and in cases where the duties are of a simple character and similar to those already performed by an employee at stations where he has worked before, this pick up period may be reduced by the Sr.DOM.

Home Address Register:

1. Every Station Master must maintain a Register containing the name and up-to-date address including telephone /mobile phone no. of each member of the staff employed at his station.

2. A separate Register containing list of all shopkeepers, licensed vendors, licensed coolies, contractors coolies or any other persons working at station other than railway employees must be maintained along with their up to date address and telephone nos, blood group if available and office copy of their Photo Identity cards. Entry of such persons into station area will be permitted only after checking the I Card.

Public and Staff notices for exhibition:

The following Notices and Publications, besides those, which may be ordered from time to time, shall be exhibited at each station in conspicuous places.

1. Notice Board showing current running of trains in the waiting hall, or at the entrance.
2. Notices regarding hours of business of goods, luggage and parcels - outside the respective offices.
3. Notices regarding restrictions in Goods Booking.
4. Notices regarding Allotment of Wagons.
5. Rules regarding occupation/use *of* Waiting Rooms - Inside the waiting rooms.
6. Notice regarding date of payment of staff.
7. Duty Rosters and Classification lists of staff employed at stations.
8. Extract of Railways Act (24 of 1989) and payment of wages act.
9. A list of nearest Doctors and Hospitals, with telephone nos.
10. Rules for the occupation of Rest Houses and Rest Rooms.
11. A list of home addresses with telephone nos. of staff in Station Master's office.
12. List of persons with telephone nos. from whom conveyance can be requisitioned in emergency; list of tent houses.
13. List of nearest Fire Stations, Bus depots, Airports, OIL companies etc. with telephone numbers.
14. List of telephone numbers of Civil, Police, Military and Railway officials.
15. Other prescribed notices.
16. The List of Staff qualified in First Aid.
17. Blood groups of staff

The Station Manager must be careful to see that out dated timetables and notices are removed and replaced with current ones. He should also ensure that the telephone nos. are updated from time to time.

Exhibition of public advertisements:

1. Public advertisements in the form of Boards, Posters, Showcases, Models, Neon-signs, or in any other form should not be allowed to be exhibited at any place within the station limit or premises without the written permission of the competent officer of commercial publicity branch etc. The Station Master will maintain a register showing full particulars of each advertisement exhibited at the station in the prescribed form.

2. Station Masters and other railway staff including Guards and Loco pilots of any train must not permit the display of advertisement matters on engines, passenger coaches and other rolling stock, unless the prior permission of the Divisional Railway Manager concerned has been obtained.

Rule Books, Manuals etc. at Stations:

1. The Station Master is personally responsible to see that rules books. are kept up-to-date and are available to staff for reference. (G&SR 2.01, 5.02 and 5.03.)

2. Station Master is also responsible to see that all registers, forms and charts are properly and neatly maintained and that they are not used for purposes other than those for which they are printed and supplied.

3. Station Masters are responsible for general accuracy of all periodical returns and for their submission in time.

4. Destructions of obsolete records shall be recorded in a register

Station Records:

1. Each book/Register, when completed must be stocked in a bundle with a cover showing dates of commencement and completion.

2. Records must be placed on shelves and almirahs in dry and secure places, where they shall be safe from irregular handling or removal by any unauthorised person.

3. Periods for which Station records must be kept at Stations are given at the end of this chapter. Any records pertaining to court cases/enquiries must not be destroyed until the DRM's permission is obtained.

Books and Notices at Level Crossing Gates:

The following books and notices are maintained at a level crossing gate provided with Gate-lodge. Where Gate-lodges are not provided, the books shall be maintained in the Station Master's office.

1. A Book showing the list of equipments.
2. Duty Rosters.
3. A copy of duty list with translation in regional language.
4. Level crossing working instructions, which should appear as separate appendix to SWR.

Hand Book for gateman

1. Extract of the Station Working Rules.
2. Public Complaint Book.
3. Vision test and Competency Certificate of the Gateman.
4. Results of last Traffic Census.
5. Inspection Books.

Filing of Operating Circulars:

1. Every Station must maintain files of circulars etc. subject wise.

2. Each circular must be got noted by members of the staff concerned. In case of Group 'D' moderately literate staff, Station Master must record that circulars etc. have been correctly explained.

Instructions for Guards

Instructions for Guards issued from time to time must be kept in one file at Guards Headquarter stations. Guards must make themselves thoroughly acquainted with these instructions and should sign the circulars and assurance register of safety literature file, while "signing on" for duty.

Correspondence:

1. All official correspondence must be attended to by the Station Master, who must open all covers and see that all letters are replied without delay.

2. All inward letters must be registered in the inward letters register showing the dates & letter no. of reply with a copy placed in a file.

3. Station Masters are responsible for the accuracy of the information contained in all outgoing letters, which they must sign personally.

4. The Station's name must be stamped on all returns and letters and on envelopes in which they are despatched.

5. Every outward letter must be numbered, dated and must also bear reference no. of the subject. This must be adhered to in all subsequent correspondence when replying to correspondence; reference must be made to the letter number under reply.

6. Letters from the public asking for information must be replied to as promptly as possible. If there is any difficulty in supplying the required information, the receipt of the letter must be acknowledged and matter referred to the DRM,

7. SR.DOM shall provide model draft of letters, which are frequently received at stations, using a model draft will ensure that language used is polite, respectful and courteous. It should be written legibly at stations not having computers

8. When forwarding letters or complaints from staff working under them, Station Masters must submit their own remarks, while forwarding such letters.

9. Letters received by the Station Master, pertaining to departments under him e.g. Goods Shed, Booking/Parcel offices etc. may be marked by the Station Master for the In charge concerned, but the Station Master shall be personally responsible for the early compliance of such letters.

Playing of Bands and presentation of Guards of Honour etc. on Station platform:

The playing of bands and presentation of Guard of Honour etc., on the Station Platform is prohibited, except with the prior permission of the DRM.

Prohibition against Photography/Film shooting on railway premises:

Such Photography/Film shooting is strictly prohibited within Station limits and on the railway lines, except with the permission of the officers authorised by railway administration.

Religious Edifices within the railway limits:

Employees are forbidden to occupy any place in station area for praying holding religious functions speeches, discourses etc., to erect religious structures, either permanent or temporary, or to add or alter any existing religious structures on railway land, without the sanction of the General Manager.

Station Masters will keep close watch and promptly report any violation of this instruction.

Normal period for which Station Operating Registers and Records are required to be preserved:

S.No. of the Book/ Form	Description of the Book/Form	Period of preservation from the date of completion
	Train passing registers/Books/Forms	1 year
	Muster Roll	Permanent record
	Caution order register and Caution Order books	1 year
	Wagon Exchange Book/Wagon Exchange Register	3 years
	Sick Wagon and Transhipment Register	3 years
	Guard's Signature Book	3 years
	Wagon Demand/Priority Register	3 years
	Indent and Loading Register	3 years
	Wagon Transfer Register	3 years
	Damaged Stock Register/ Sick Wagon Register	3 years
	Siding Voucher Book/Record of Time Wagon Handing over	3 years
	Control Order Book/Conference Book	3 years
	HQ Leaving Permission Register	1 year
	Uniform Register	Permanent Record

	Record of Station Equipment sent for repairs	Permanent Record
	Register of Inward and Outward Letters	3 years
	Register of Important Circulars	Permanent Record
	Station Order Book	Permanent Record
	Station Inspection Register	Permanent Record
	Transportation Bio-data Register Register of Home Addresses of staff etc	Permanent Record
	Spectacles Register	1 year
	Station Diary and Charge Book	1 year
	Unconnected Wagon Register	3 years
	Load Report Register	3 years
	Register showing Analysis of Late starts To Goods Trains at important Yards	3 years
	Watering Register	3 years
	Summary of Daily receipt and despatch of wagons and Work Done	Local Orders to be issued by DRM
	Special Stock Register	Local Orders to be issued by DRM
	Detention to Wagon at Train Marshalling stations	Local Orders to be issued by DRM
	Register of occupation of reception lines	3 years
	Detention to Trains outside signals and at adjacent stations	3 years
	Marshalling Register for Inward and Outward trains	Local Orders to be issued by DRM
	Register showing detailed Arrival, Placement, Despatch and Detention particulars of PU, Repack wagons, etc.	Local Orders to be issued by DRM
	Register of Long Distance Goods Train run	Local Orders to be issued by DRM
	Guard's and Assistant Guard Arrival Register	3 years
	Register showing Detention to wagons at Break of Gauge Transhipment point`	3 years
	Number Taker Book	3 years
	Yard Wagon Balance Register	1 year
	Guard's Duty Register	3 years
	Guard's Rough Journal	3 years
	Register of Train Advices	6 months
	Form of Train Examination advice	1 year
	Register showing load of Goods Trains and Goods trains run under load	3 years
	Statement of running of Passenger Trains	3 years
	Diary of Yard Supervisor.	Permanent Record
	Unusual Register, other registers and Records maintained in control offices and at specified stations	Local Orders to be issued by DRM

Note: - (i) In calculating the one year or the three years period, the year to which the books and documents relate, and the year in which they are to be destroyed should be excluded.

(ii) Record pertaining to Court Cases, departmental enquiries should not be destroyed till three years from the date the case is decided.

(iii) Record pertaining to public claims etc., or those under reference from Home or other railways, should not be destroyed without permission from DRM concerned.

Most of these registers can be computerised, clubbed & some can be eliminated

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WORKING OF TRAINS

General

No person shall drive a train unless he is in possession of a valid certificate of competency issued by an authorized officer.

No Loco Pilot, Assistant Loco Pilot or loco pilot of any self propelled vehicle shall be booked to work a train or to drive a vehicle until he has learnt the road and shall give a declaration that he is fully acquainted with it.

For this purpose he will be booked to work three round trips on each section including one during night before being put to work the train/vehicle independently.

Examination of Trains

Each train shall be examined by competent person from the rolling stock/electrical maintenance department before being offered for passenger, goods/or any other service.

The purpose of the examination is to ensure that all functions of the train and its constituent carriages/wagons etc are working correctly, particularly safety devices including brake systems, passenger alarm –etc to be listed by competent authority.

The competent staff shall sign a certificate of safety test indicating duration of its validity.

Classification of Trains:

Trains are either scheduled as shown in the Working Time Table or non scheduled trains and are run on the following account: -

Traffic Account:

(a) Mail/ Express/ Passenger Trains
(b) Commuter trains EMU/DMU/for Suburban, regional passengers.
(c) Military Specials including troop trains.
(b) Parcel trains of carriage of coaching traffic only.
(c) Goods trains for movement of conventional freight cargo
(d) Container Trains
(e) Mixed trains carrying both passengers and freight

Other trains to include Exhibition Trains, Mobile Hospital on wheels etc.

Engineering Account

1. Ultrasonic and other track testing trains:
   (a) Material trains.
   (b) Track maintenance trains like Tie Tamping Machines, Rail grinding trains PQRS, BCM, DGS etc.,
   (c) Wiring Special / Tower wagons.

Miscellaneous Account:

(a) Staff shuttles.
(b) Water specials.
(c) Workmen's specials.
(d) Accident Relief Train (ARTs)
(e) Accident Relief Medical Equipment (ARMEs).
(f) Crane Specials.

Train Ordering: Scheduled passenger trains do not require train ordering

Train advice is necessary only when these are required to be cancelled, put back or there is any change in the schedule shown in the Public /Working Time Table.

In case of unscheduled trains, train advice should be issued.

Trains are ordered by CTNL in conjunction with the Power Control and or Lobby Supervisor.

Train Preparation:

The time at which train is required to be in readiness in all respects for departure from the starting station will be laid down by the Divisional Railway Manager/SR.DOM.

In case of passenger trains, the rake duly examined and fit in all respects with full compliment of coaches (at least to meet reservation requirements fully) should be placed on the platform well in time to allow all pre departure functions to be completed.

These include-

- Loading of mails, booked luggage, and parcels
- Loading of linen
- Pantry car provisions
- Watering
- Cooling of AC coaches
- Display of reservation charts
- Deployment of train staff
- Attaching of locomotive

To facilitate passengers boarding, generally an important long distance passenger train should be placed on the platform 30 minutes/15 minutes before its scheduled departure, depending upon the terminal layout.

Every Loco pilot of a train while starting from the starting station must verify adequacy of brake power as certified in train examination document .In addition, he must conduct a “feel test” to ensure that train brakes respond to brake application. In case of failure, he will report to the control and bring his train to a stop as directed by the Control. The train shall move only after the defect has been rectified.

MARSHALLING

Marshalling
Marshalling is attaching of vehicles on a train in a predetermined manner to ensure train safety, provide operational expediency and to maximize customers convenience
Marshalling of Mail/Express/Passenger Trains:

The general principles kept in view while marshalling are

I Position of upper class coaches, ladies compartment, dining car,in respect of easy accessibility Normally the _dining cars or the catering compartments, air-conditioned and upper class coaches, shall be marshalled in the middle of the train or as near to it as possible and ladies compartment will be near Guard's SLR.

Non-passenger carrying stock shall preferably be marshalled next to the engine or in the rear of the train, defining the area for stacking, loading and unloading of parcels packages and mails on platforms.

1. **The Marshalling of SLRs and Anti-Telescopic/Steel- Bodied Coaches on Passenger Carrying Trains:**

(a) *Marshalling of Mail and Express trains:*

(i) In case of SLRs which have passenger portion on one side, luggage-cum-brake portion on the other, the SLR should be marshalled in such a way that the luggage and brake portion is trailing outermost or next to engine.

(ii) In case of new design of SLRs with Passenger portion in the middle, these can be positioned in either way.

(iii) In case, anti-telescopic/steel-bodied SLR is marshalled with passenger portion next to the engine or rear SLR with the passenger portion towards the end of the train" the passenger portion of SLR should be locked.

(iv) In case of shortage of SLRs, any other suitable coaching vehicle or a VPU may be provided, and in case a coaching vehicle is attached its doors should be locked to ensure that passengers can not occupy it.

(v) However on the *M.G.,* if it is not feasible to position the SLR as mentioned in Item (a)(ii) above due to coupler arrangements marshalling, as operationally convenient may be allowed.

(vi) Two anti-telescopic or steel-bodied coaches should be marshalled inside the anti-telescopic or steel-bodied SLRs at both ends.

(vii) After providing anti-telescopic or steel bodied SLRs for Mail/Express trains, all the available anti-telescopic or steel-bodied SLRs should be used on main line passenger trains and after meeting this requirement, the rest should be used on Branch Line Passenger trains. Anti-telescopic or steel-bodied SLRs should be marshalled in the same way as in the case of Mail/Express trains.

(b) Marhsalling of Short Service trains:

The Railway Board has permitted marshalling of three coaches in front and rear of the SLR on short trains, provided they have working brakes and subject to two end coaches at either side are anti-telescopic. An Inspection Carriage may be attached as fourth trailer coach on such trains.

(c) Non-Passenger Coaches:

VPs LRs, WLRRMs and other coaching vehicles, which do not carry passengers may be marshalled as operationally convenient. Inspection carriage, whether anti-telescopic/steel-bodied or not and occupied or being worked empty may be marshalled as operationally convenient.

(d) Reserved Bogies and Saloons Occupied by VIP:

Reserved bogies occupied by passengers and Inspection Carriages/ Saloons occupied by VIPs should be treated as a passenger coach and marshalled accordingly.

If they are anti-telescopic or steel-bodied they can be marshalled anywhere as operationally convenient. If they are wooden-bodied, they should be marshalled inside the required number of anti-telescopic/steel-bodied coaches.

(e) Sectional/Through Service Coaches:

(i) Sectional/through service coaches, if they are anti- telescopic or steel-bodied, may be marshalled as operationally convenient.

(f) POH/Sick coaches returning to Shops:

(i) In the case of POH/sick coaches, which are returned to shops for major repairs and are attached to passenger trains, such coaches should be properly locked and windows secured, so as to prevent entry of any passenger into these coaches. In that case, it is not necessary to attach these coaches according to safety marshalling instructions and can be attached next to the train engine or rearmost as convenient. If for any reason, it is not possible to lock up these coaches, such coaches should be treated like other passenger coaches in the train formation and should, therefore, be marshalled inside the required number of anti-telescopic/steel bodied coaches.

(ii) It is also desired that the above instruction on safety marshalling of passenger carrying trains should be made known to all the staff and officers concerned and these should be followed strictly.

Block Rake Composition:

For block rake composition and marshalling order, 'Normal composition and marshalling order and rake link of passenger trains' are issued by COMs of respective railways from time to time.

Mixed Trains:

Classifying a passenger carrying train as a mixed train needs authorization by COM.
On such a train, coaching and goods stock shall normally, remain in one block (except where a deviation is permitted) and their marshalling will also be laid down by the COM.

Normally goods stock should be attached next to engine and coaching stock inside the rear brake van.
Attaching of Four Wheelers on Passenger, and Mixed Trains:

1. Rules on the subject contained in GR 4.08 and in the current Working Time Table should be followed.
2. On MG and NG the single empty or loaded 4 wheeler must not be marshalled between an engine and bogie vehicle/wagon or between two bogies /wagons.
3. However, on BG the above restrictions do not apply to match trucks along with Break Down trains and whenever under special instructions four-wheeled brake-van is attached next to engine provided that such stock is fitted with center buffer couplers.

Attaching of Vehicles outside the Rear Brakevan :

Vehicles outside the rear Brakevan can be attached in accordance with the provision of the following SRs:

Attaching of vehicles in rear of Brakevan in fully vacuum train
Attaching of power plant bogies
Attaching of damaged vehicles

Marshalling Chart for Passenger/Mixed/Goods Trains:

S.No	Type of Stock	Marshalling order
1	Empty coaching stock, covered motor trucks etc.	As operationally convenient but preferably marshalled as outermost vehicle at either end.
2	Motor car etc. loaded in open wagons covered with wagon sheets.	In the rear of the Train either as a last vehicle or inside the rear brake van
3	Banking Engine	(a) On ascending gradients in rear of train. (b) On descending grades in front. (c) Both gradients in quick succession, if any, then in front.

ATTACHMENT OF DEAD LOCOMOTIVES

(Railway Board's letter: 1. No.. 99/Safety(A&R)/19/10 dated 10.12.2001 and 2 No.2000/M(L)/466/803 dated 1/9th March 2004)

I. **Conditions for attachment of dead locomotive:-**

i) Certificate for 'Fit to run is issued by Section Engineer/Loco Inspector/Power Controller for Passenger/Goods train.

ii) Maximum permissible speed of the train shall not be less than maximum permissible speed of the dead locomotive

iii) Arrangements have been made to ensure that brakes can be applied on dead locomotives in synchronization with working locomotives

i) Running of double/triple headed is permissible on the section over which the dead locomotive is to be hauled.

ii) When a dead electric locomotive has to be moved on a non-electrified section, special check shall be made regarding its infringement to the schedule of maximum moving dimensions. In the case of any infringement, the dead locomotive shall be treated as an ODC.

iii) As a final check, the coupled locos should be run for about 500 meters and the driver shall check for any abnormal rise in the temperature of the wheels of the dead locomotive and shall also check it at subsequent stops during the journey.

iv) In addition to freight/passenger trains, a dead locomotive can also be attached to Mail/Express trains including Superfast trains but excluding Rajdhani and Shatabdi if the locomotive brakes including proportionate brakes are operational and maximum permissible speed of the locomotive is not less than the booked speed of the train in which it is being attached. Locos with inoperative brakes can be attached subject to the brake power of the train being within the permissible limits. Locomotive with defects in undergear equipment can be attached only in freight trains.

II. **Attaching/hauling of dead locomotives by Mail/Express/Super fast/Passenger trains: -**

i) Only one dead locomotive (diesel/electric) can be attached.

ii) Brake power of the train should be 100% excluding dead locomotive

i) As far as possible, brake should work on dead locomotive. However, if it is not possible, then in the case of air-braked train, brake pipe and feed pipe of working locomotive shall be connected to brake pipe and feed pipe of trailing stock and dead locomotive will work as piped vehicle.

In the case of vacuum braked train, vacuum pipe of locomotive shall be connected with vacuum train pipe of trailing stock and the dead locomotive shall be treated as a piped vehicle. If the locomotive is fitted with pure air braked system and vacuum pipe is not provided on locomotive then it should be attached with air braked trains only.

III. **Attaching/Hauling of dead locomotives by goods trains:**

Movement of maximum three locomotives (2 working+1 dead) with load is permissible subject to observations of all restrictions on operation of double/triple headed working locomotives in the section provided that brakes in dead locomotives are operational.

The above instructions should be strictly followed and it is, therefore, advised that these guidelines be supplemented in the respective Subsidiary Rules also.

IV. **Escorting of dead Locomotives:-**

Escorting of locomotives (diesel as well as electric) attached to freight and passenger carrying trains is not necessary if the brakes including proportionate are fully operational and the dead locomotive is attached next to the train engine. The dead locomotive will continue to be escorted if attached in the rear of brake van or has defect in undergear equipment.

Medical Relief Van:

Can be run without brake van (Local SR should be followed for Ghat Section)

Inspection Carriages attached to Light Engine:

Maximum three inspection carriages occupied by the officers can be attached. In case more than 3 Inspection carriages are attached, rules regarding running of goods trains without brake van will apply.

Attaching of Travelling Cranes:

Provisions of G&SR 4.27 should be followed.

FREIGHT OPERATION

Importance of Freight Operation:

The freight business is the major source of revenue for the Indian Railway.

Main activity centres of Freight operation include terminals, yards, control office and stations.

I. Broad Classification of Goods Trains:

1. End to End:

Trains, generally run from the train-originating Terminal to the final destination. This is an express stream of freight trains and does not require any stoppage en route, except for crew change.

Such trains will normally include container trains, air braked block rakes for **single destination**. These trains are planned to run like non stop Rajdhani trains and may have a fixed timetable and guaranteed transit time. This group may include trains of private freight operators.

Other through trains -Are also block rakes or may have two or more destinations on the same or adjacent section. These may have conventional bogie stock

2. Work Trains, Shunting Trains, Pilots etc.:

These train movements are for short distances for clearance of damaged wagons made fit or for supply/removal of rakes to and from the sidings or important terminals served by a yard.

3. Departmental trains:

These include Material Trains, Track maintenance trains, Ballast trains, Relief Trains, Wiring Special, Crane Specials etc. are known as departmental trains.

II. Complexity of Freight operations:

Freight operation is generally more complex than passenger train operations for the following reasons:

1. The changing pattern and fluctuations in demand for rakes/wagons due to changes in the level of production, changes in the pattern of distribution and changed consumption centres.

2. The variety of commodities to be moved, with different characteristics & type of wagons required

3. Preferential traffic schedules, rationalisation scheme& other public policy regulations

   i) Seasonal variations in demand

   ii) Time taken in loading/unloading-whether manual or mechanical

   iii) Train examination Systems

   - End to End/Intensive Examination
   - Premium end to end
   - C.C. rake

This in turn results in -Sick Wagon detachments & attachment of fit wagons for completing the rake composition.

4. Following is the series of operations for empty rakes being offered for loading:-

   - Examination
   - Supply/placement
   - Loading
   - Despatch

5. For inward loaded trains which after placement and release have to be back loaded at the same terminal or at other location, withdrawal from loading points may require an outward examination unless the rake is fit for round trip or for a prescribed distance.

Once the train is fit in all respects and commercial formalities have been complete a set of activities are initiated these include –

- Preparation of train documents

- Train ordering,
- Arranging train crew & locomotive
- Monitoring train movement
- Arrival at the destination

This cyclic operation requires constant monitoring and co-ordination.

III. **Ordering of Goods Train**:

a) Each freight Train is required to be ordered to run under a unique number /name or Train ID for monitoring its movement through intermediate divisions, zones etc as also to facilitate all processes at control offices, yards, C&W depots station and Crew/Guard booking Lobby Power Controller/Traction Loco Controller.

b) The message from Divisional Control that a train is scheduled to leave from a Station or Yard at a certain time. is known as the Train Notice. The message is, in turn further conveyed to all concerned. The availability of suitable (i) Load (ii) Locomotive (iii) Crew/Guard and (iv) Path has to be kept in view for ordering of goods trains.

c) Co-ordination between the Traffic Controller/and the Power Controller (the shed, if fresh power is required) ; the Yard/Station, C&W staff and the Crew/Guard booking lobby is thus required.

d) Regular conference with yards, terminals, and the adjoining Division is held by the Control and for exchange of information regarding forecast of trains in yards; completion of loading/unloading at sidings etc. and interchange with adjoining Divisions. This monitoring should be enforced through FOIS so that time of staff spent on phone is reduced and more productive work is done by better planning.

e) Constant monitoring for expediting loading/unloading at major sidings/goods sheds is also done by Control and the Station Staff for ensuring the availability of load.

IV. **Planning of Locomotives:**

a) **Power Plan:**

The power plan indicates the daily average number of locos required and planned for freight services section wise for each division

This bare requirement of Locos for Traffic use is calculated on the basis of the traffic turn round and average number of trains run on each section

This represents the average number of locos needed on the Division.

b) **Loco Outage and Loco Utilisation:**

Loco Outage means the average number of locos available to traffic use in a day (24 hours). Since the Diesel and Electric Locos have long extended runs and may cover many divisions in a day, the position may be maintained graphically for the entire duration (0 to 24 hours) the loco is on line on the Division. Different colour graphic representation on Bar Chart can represent the time spent by each Loco to serve as a good Management Information System e.g. (a) time taken by running train (b) time taken for Crew Changing (c) time for Fuelling (Diesel Locos) (d) time taken for Loco inspection (e) time for repairs on line (f) time for Light Engine running (g) time taken for Shunting (h) time spent at terminal/ destination (i) en-route detention.

Thus, the total hours for which the various Locos were available for Traffic use divided by 24 (number of hours in a day) would give the Loco outage.

$$\text{Loco outage} = \frac{\text{Engine Hours for traffic use}}{24}$$

Loco outage can be prepared service-wise/shed-wise/railway-wise, traction wise etc. The actual Loco outage should generally be around the target fixed for each Division.

However, it should be appreciated that while the target is based on average, the actual requirement of Locos may fluctuate due to bunching of trains, increase in traffic or due to bottlenecks on account of operational reasons, equipment failure or after effect of interruption to traffic.

c) Control of Operating Department on Loco running:

Electric and Diesel Locos are maintained by the respective Loco Sheds and Locos once turned out of shed are available for utilisation for a number of days till prescribed maintenance/inspection schedule is due in the shed or the locos require out of course repairs. Thus, while the operating staff has the operational control over utilisation of Locos as well as flexibility of using the Locos as per operational requirement, they have to keep in view the maintenance/inspection schedules of the Locos and send the Locos to the Shed well in time. Overdue running of locos should be avoided by suitably planning the train running. Similarly, all out efforts should be made to send the dead locos or locos requiring attention in the home shed. The hauling capacity of the Locos and special restrictions as jointly agreed to by the officers of operations and loco departments should also be adhered to.

While operating department has to optimise the work done by each Loco i.e. moving maximum traffic with the minimum number of Locos by adoption of operational strategies and improving the efficiency, the Shed and the Loco organisation should provide optimum number of Locos in good fettle, keeping in view the traffic needs as shortage of Locos can lead to transport bottlenecks and inability to move the existing and potential traffic.

Along with the availability, reliability, safety and predictability have to be aimed. Loco failures, Loco troubles en-route and ineffective locos should be kept to the bare minimum.

Balancing of Locos is also required to be done i.e. Locos without loads may be sent to other Divisions where they are required.

Reduction in terminal detentions and increasing average speed of goods trains would substantially improve engine utilisation.

d) Availability of Engine Crew and Guard:

Running staff for Goods operations are generally booked on the principle of first in and first out,

Balancing of Crews/Guards by sending staff spare is also required to be done in case the running of trains is not even in both directions on a section.

e) Availability of Path:

Theoretically, on a double line section, a Goods Train can always be run when load, power and crew are available and the next block section is clear.

On single line sections despatching a train out of path, will be counter productive, due to Mail/Express Blocks, Peak timings of Suburban or Commuter traffic. Readiness of the interchange point or the terminal to accept the trains are to be kept in view before pushing a goods train ahead. It is better to have directional flow if possible.

Master Charts incorporating all Passenger carrying trains and realistic goods train paths are prepared in consultation with Operating Officers, Controllers, Yard Staff, Power Controller, Station Masters of important stations etc. in order to:

i) Find out line capacity of the section.

ii) To highlight the set of suitable paths for guidance of Control, which can be used for, goods train ordering also.

Iii To prepare tentative goods train time table for selected express stream of trains.

f) Lobby System:

A Lobby is like a Control Office in the field. It is established with the twin aim of reducing engine detention and crew detention in a Yard or a Crew or engine changing station by realistic ordering of trains and Crew/Guard booking.

It is advantageous to have a combined Crew and Guard booking lobby so that both are available simultaneously. The lobby supervisors/staff can take forecast of a train running from the Deputy Controller/Section Controller along with details regarding the names of Crew, Guard and their signing in time, loco particulars, last C&W examination etc.

They can verify the dates of Loco Schedules from the Chart available with them and keep liaison with the Power Controller/TLC. They also keep watch on “expect” of train formation, examination, readiness etc. and by constant chasing, planning and updating of information, trains are ordered on realistic expect, Trains may be put back or cancelled, if required and Crew booking and engine allocation changed promptly.

Some overlapping Crew/Guard may also be kept in the Lobby to take care of the last minute absenteeism. Shunters may also be kept in the Lobby of big yards/junctions to attach, detach, and run round locos or to pull the Train from Yards upto the Crew changing points, so as to avoid wastage of main line Loco pilots.

The pre-departure detention to the Crew, Crew hours balancing, rescheduling of Locos and Yard detentions to Locos can be thoroughly monitored by the Lobby and remedial measures taken.

V. Role of Various Agencies in Freight Operation:

Large number of agencies play important role in freight operation. Marshalling Yards, Train Examination, Locomotives and Lobbies have been discussed elsewhere in this Manual. Role of a few agencies is discussed below with special reference to freight operations.

i) Control Office:

The main function of the Control Office is planning, execution and review with all the three activities going on simultaneously.

ii) Planning is aimed at forecasting and optimising the following:-

1. Interchange
2. Trains to be run section-wise
3. Supply of rakes/ for bulk loading,.
4. Release of inward loaded rakes placed for Unloading

Information regarding the following items is generally required for this purpose:

(a) Analysis of divisional wagon holding

(b) Power availability

(c) Availability of loads

(d) Disposal of empty rakes

(e) Demands for loading

The plan is made by Control in the early hours of morning and reviewed by Operating Officers. Changes in the plan, as deemed necessary are made at various stages on the basis of updated information received from the activity centres, adjacent divisions and instructions received from the Head Quarters.

iii) Execution:

The goods operation plan is executed on the basis of actual materialisation. of the forecast with suitable adjustments made for short falls /excesses.

Yards, Loco Sheds, Stations, Terminals, Lobbies and TXR depots are actively involved in execution of the plan.

iv) Review:

The trend of the day's position is reviewed by the Chief Controllers and Officers in the afternoon. Detailed review of the previous day's performance is carried out early in the morning by the Operating Officers with the following objectives:

1. Analysing shortfalls of previous day to take remedial measures and pin-point weak spots.
2. Provide data for planning for the current day.

The main features of performance, which can be reviewed, include:

- Interchange failures
- Divisional Wagon Balance (Wagons on Division)
- Train Running
- Disposition of empties
- Loading at important terminals - and in case of shortfall, reason for the same.
- Review of unusual occurrences
- Examination of Control Charts
- Particulars of stabled loads

- Yard performance
- Unloading on Division
- Registrations and Loading
- Power position, utilisation of Locos & Terminal detention
- Sick line working
- Special type of stock
- Clearance of piecemeal wagons (sick or otherwise) from roadside stations.

VI. Head Quarter's Role in Freight Operations:

The Division's Freight Operations generally require close co-ordination and assistance from other Divisions and Railways. While direct contact is also maintained by the Control and Operating Officers of various Divisions, the Zonal Head Quarters play a pivotal role in this respect. Some of the functions performed by the Head Quarters are summarised below:

VII. Management Information System:

1) Important information concerning the position of Freight Operations on various Divisions of Railways is obtained through line and stock report daily telephonically or through FOIS or Teleprinter or FAX to the Head Quarters (Central Control) from Divisional Control. Now more and more zones and Railway Board are shifting to FOIS generated reports.

This includes, loading and stock position, particulars of old outstanding and fresh registration of indents, category wise position of unloading, transhipment, Yard balances, important yards and wagons on Divisions, Train Running on each section, average speed, interchange position, Locomotive position and Locomotive utilization etc.

The position is reviewed and analyzed by the COM/CFTM/ Dy.COM (Goods), STM (Goods) CMPE(R&L) and CELE. The important position pertaining to various Departments is conveyed to the Departments concerned as well as the General Manager. The Head Quarter Office also obtains the Statements at the end of each month or whenever required and the performance is compared with (i) The Targets (ii) The figures of the previous month (iii) The figures of the corresponding month of the previous year and (iv) the best ever record etc.

In addition, the Statistical Branch also provides Data to the General Manager and the Departments concerned with Operations for detailed analysis and review.

2. Head Quarters plays an important part in planning and co-ordinating freight operations. After detailed conference with the Operating Officers, and in terms of Railway Boards current-operating directives Head Quarters issues directions and instructions regarding the following items:

(a) Interchange transactions (category wise)

(b) Loading and Unloading

(c) Traffic insight from other Railways/Divisions This information is now available on FOIS terminal where a pipe line can be seen from end to end and expected arrival of train at destination is also estimated by FOIS system

(d) Conveying priorities for the day and setting quantified objectives to be achieved.

(e) Reviewing the work done at the important activity centres like Yards, Terminals etc.

(f) Train and Traffic regulation in case of accidents etc.

(g) Certain items of Goods Operation are directly controlled by Head Quarters e.g. Co-ordination and directions regarding rake Loading of programmed and committed traffic, movement of special type of stock, movement of over dimensioned consignments, out of turn allotments and allotment despite restrictions etc.

VIII. Railway Board's Control on Freight Operations:

The Railway Board provides Unity of Control and direction for the freight operations. It also has the important role of supervision and co-ordination, which is very much essential for a big network like Indian Railways. The Railway Board's Control Office also remains in contact with the Head Quarter (Central Controls) of the Zonal Head Quarters and watches loading and movement of important streams of traffic, like coal, raw material for steel plants (iron ore), cement, food grains, fertilisers, POL, sugar, export ores, container traffic etc. It also watches loading, interchange, power position, goods train running on important sections etc. to ensure that each Railway fulfils its obligation and

optimises the use of various assets. The items watched are more or less the same as those watched by the Zonal Head Quarters in respect of the Divisions, but the perspective is wider. Railway Board plays an important co-ordinating role between various Railways and other Central Government Departments and vital sectors of Economy connected with Railways. Policy formulation and Planning, which have important bearing on Freight Operations is also the major function of the Railway board.

IX. Role of Some Other Departments:

The Commercial Department plays an important role in canvassing for Traffic, improving marketing, customer relations in general, booking of traffic, expediting loading/unloading of wagons, quick disposal of unconnected wagons and transhipment of Wagon detached out of course for Hot Axles etc. The various other Departments like Mechanical, Electrical, Civil Engineering and S&T provide and maintain various assets and infrastructure (track, wagons, engines, S&T Network etc.). These departments also ensure sufficient availability, reliability, predictability, safety and reduction in equipment failures; promptness in restoration in case of breakdowns and accidents should also be ensured. They also endeavour for the achievements in technology upgradation along with the operating strategies and determine the level of excellence in Railway Operations to a great extent. In nutshell, all the functionaries have to work as a dedicated team.

X. Some Indices of Freight Operation and Efficiency:

The important Operating Statistics, **most of which** are indices of Operating efficiency, have been discussed in detail later in this Manual (Operating Statistics). Some Indices of Freight Operations and efficiency are highlighted below:

XI. Wagon Holding:

For a given amount of originating loading and receipts of loaded wagons from other Railways and making an allowance for percentage of stock out of commission for repairs, etc., there is an optimum number of wagons that a Railway, and separately its constituent divisions, should hold to maintain the fluidity of transport system. More wagons than the optimum number might lead to increase in the repairs and maintenance percentage, heavier detentions to wagons and trains and transport bottlenecks, i.e. more congestion in sidings, yards and sections without a proportionate increase in the tonnes lifted, or in the efficiency of operations. Similarly, excessive shortage of Wagons may lead to loss of traffic. Proper estimation and projection of requirement, proper planning and working at various stages of freight operations is necessary for keeping wagon holding low. “Ineffective Stock” percentage should also be kept minimum.

i) Interchange Balance:

Maintenance of the interchange target is an indication of a Railway’s overall operating performance and its efforts to meet inter railway obligations, hence interchange balance should not be very high, even when maximum trains are interchanged. However, attempts should be made to see that on busy sections, interchange is not only confined to few hours of the day but uniformly distributed.

ii) Load of trains:

A train is a unit of transport. Depending upon the load, suitable loco is provided for its haulage. In order to get the optimum use of motive power and to increase the capacity utilisation and throughput, each Locomotive is given a load approximately to the maximum hauling capacity, unless operating necessity requires utilisation of a loco for lesser load. The stations should also ensure that wagons are loaded to the carrying capacity or the minimum weight prescribed for some commodities.

iii) Loading and Unloading:

To optimise the loading is one of the most important items in freight operations because it is through loading that Railway earns the maximum revenue. Similarly, unloading is necessary so that wagon becomes available for next loading. Reducing the time taken for loading/unloading by technology upgradation and other strategies in co-ordination with the customers has to be endeavored.

Iv) Empty Running:

Ideally it is waste of transport capacity to run a wagon empty or with light load, but much of empty running is inescapable on account of the unbalanced nature and quantity of outward and inward traffic at terminals and necessity of supplying empty wagons. Certain special type of wagons for POL, Steel, Coal, Natural Gas, Ammonia, LPG etc. have to be generally run empty to the loading points. *Operating skill lies in avoiding or reducing the extent of empty haulage and cross movements of similar type of empty stock.*

v) **Despatch in Block Rakes:**

Despatching of wagons in small numbers always means transit delay while a block load can go direct to the farthest destination skipping many yards, thereby eliminating detention that the wagons might have suffered in the intermediate yards. Piecemeal wagons passing through a number of marshalling yards, where they have to be combined with other wagons to form train loads, cause huge amount of work for the staff and result in loss of efficiency, avoidable delay, anxiety and uncertainty regarding their arrival at destination. Unit train movement, i.e. a train load consigned by single consignee to single consignor, is ideal. Consignees can also be motivated to club their Indents to get trainload and block rakes.

Also two points loading on same engine run can improve wagon usage. Close circuit rake movement can also be resorted to between selected pair of stations or rakes. Maintaining the purity of freight rakes has also to be ensured.

vi) **Long Distance Trains:**

It is an age-old principle of operations that full train loads should be formed at the earliest point for the longest possible distance. Long distance trains should have least stoppages like long distance passenger trains. Trains can also be run as "crack trains" or Link Train.

A crack train/Link Train is a train when the same crew (and engine if possible) instead of "Signing off" at the intermediate crew changing point works a train to farther junction. Thus, a train running from Ujjain to Godhra or vice versa without Crew/Guard change at Ratlam can be run as X 'Crack'. The Crew can also be utilised on 'Crack' basis when the same Crew perform a round trip without "Signing off" at the outstation and is promptly provided a load so that Crew returns to its Head Quarters within normal duty hours.

vii) **Wagon Turn Round:**

The interval between two successive loadings calculated from the time a wagon is placed for loading till the time it again becomes available for reloading is the actual turn round. As the calculations for individual wagons in the manner stated above are not practicable, the following statistical formula is generally used:

$$\text{Wagon Turn Round } (T) = \frac{S}{L+R}$$

Where 'S' stand for the effective daily wagon holding or midnight wagon balance of a day (excluding sick, POH wagons in or waiting for shops, like departmental wagons, wagons lent for departmental use, and the wagons used for coaching traffic). 'L' stands for the total number of wagons loaded on the Division/Railways plus the wagons loaded at Transhipment Point, 'R' stands for the total number of loaded wagons received from other Railway/Divisions. Thus, for example, if a Division loads 350 Wagons on BG (including 50 BG Wagons loaded through transhipment of MG Wagons), 150 inward loaded wagons are received from other Divisions and its effective wagon holding at the end of the day (midnight) is 2250 wagons, the Divisional Wagon turn round will be 4.5 days.

$$\text{i.e. } \frac{2250}{350+150} = \frac{2250}{500} = 4.5 \text{ days WTR (Wagon Turn Round)}$$

viii) **Detention to Trains and Wagons:**

(a) Detention to Trains:

A check on the detention to trains (1) outside signals or at stations adjacent to Goods Terminals, (2) in shunting operations at road side stations and (3) enroute detentions for various reasons should be exercised regularly.

(b) Detention to Wagons:

Close watch should be kept on the areas, e.g. Marshalling Yards, Goods Terminals, Stabling Points etc., where wagons are likely to suffer avoidable detention during various phases. Although this is watched through periodical data, special attention should be paid to pockets, where piecemeal Wagons suffer prolonged detention and often remain out of sight.

Ix) **Engine Utilisation:**

Engines being costly resources their utilization have to be carefully monitored. Some of the measures for improving Engine Utilizations are as under:

(a) Running of the Goods Trains on proper path: For this, the Master Charts have to be properly framed and consolidated.

(b) Proper co-ordination between Control and Line Staff.

(c) Reduction in Terminal detention of Locos by proper monitoring co-ordination and working of Yard Staff, C&W Staff etc.

(d) Judicious ordering of Trains and Right time starts of Goods Trains.

(e) Proper controlling, judicious crossings and preferences.

(f) Loop Lines on critical block sections should not be generally blocked.

(g) Stabling and picking up of load should be judicious and properly planned.

(h) Loco pilot should run at maximum permissible speed subject to restrictions.

(i) Light Engines can be coupled or attached to trains in order to save path and energy.

(j) Light Engines (Single or Couple) should run at maximum permissible speed, for which they are fit, subject to speed restrictions

(k) Signals must be taken off promptly at Stations. Distant/Warner Signals must always be taken off promptly.

(l) Tangible authority to proceed should be handed over at the appointed place instead of getting the train slowed down in front of the Station for handing over the Authority from the Platform.

(m) Trains should be run through Main Line (as far as possible) since looping results in extra time on run.

(n) Locomotives should be in good working order and staff should be well versed in Loco operations and trouble shooting.

(o) Hauling capacity of the Locomotives should be properly utilised.

(p) Engineering speed restrictions should be regularly reviewed and reduced by maximising the output of the Engineering staff and machines. Due care and foresight in offering blocks for track maintenance should be exercised.

(q) Regular foot plating by officers and staff involved in operations, motivates train crew and alerts the line staff.

(r) Effective control over traffic yards to reduce other engine hours, detention to locos at important loading/unloading points and industrial sidings.

(s) The factors adversely affecting the Locomotive utilisation, speed of goods train, terminal detention etc. should be got analysed by suitable multi departmental teams and remedial measures taken.

(t) Incentive schemes for motivation of staff connected with Goods Operation, so as to improve Engine utilisation Special watch on Loco pilots loosing time on run and not running on maximum permissible speed.

x) **Average Speed of Goods Trains:**

The average speed of goods trains is calculated by the following formula:-

Average $\frac{\text{No. of Goods Trains X Distance travelled by each train in 24 hrs.}}{\text{Total time taken by all the Goods Trains run.}}$ Speed =

The distance and the time taken are calculated from the Control Charts. Thus all detention to Goods Trains enroute enters into calculation and has the effect of bringing down the average speed.

Almost all the factors affecting engine utilisation play part in the average speed of goods trains, the difference being that in the calculation of average speed of goods trains, the detention at originating point and terminating point as well as the Light Engine Running are not taken into consideration. While computing average speed of freight trains

XII. Staff Supervisions:

Excellence in freight operations requires that the staff offer their willing co-operation. To achieve this proper training for constantly developing the knowledge, skills and commitment is essential.

XIII. Targets and Statistics:

One of the important means to utilise fully and efficiently the existing carrying capacity of a railway is to set measurable and specific targets for the various performances after taking into consideration all the local conditions. Once the targets are laid down, all possible efforts must be made to attain them.

The targets should be set sufficiently high and reviewed constantly with a view to improving the performance further. Details regarding Statistics pertaining to Railway Operations are given in chapter on Operating Statistics where targets are not attained within a reasonable period, the causes must be traced and effective remedial action taken, if necessary, revised targets should be laid down.

PREFERENTIAL SCHEDULE

Movement of wagon load traffic, is regulated by what is known as the Schedule of Preferential Traffic, laid down by the Central Government (Railway Board) under Section 71 OF THE Railways Act ,1989 and is designed to ensure that certain essential commodities and urgent movements are accorded necessary preference at a time when the available transport is not adequate to meet with all the demands. Traffic is classified into 4 categories viz., A, B, C, and D. Commodities registered in the lower categories cannot have preference over those registered in the higher categories although the former may have been registered much earlier.

(a) This Priority Schedule is decided by Traffic Transportation Directorate of Railway Board.

(b) It lists the Sponsoring Authority and Accepting Authority for programmed traffic.

(*Copy of Priority Schedule can be obtained from Indian Railways website*)

Rationalization Order

Under section 71 of Indian Railways Act 1989, Railway Board has been empowered to charge freight over route, which may not be the shortest between alighting point and destination. The Rationalization order indicating the route through which the freight is to be charged is issued by traffic transportation branch, Railway Board.

Revised rule 125 of IRCA Goods Tariff Part I(Volume-I) vide Board's letter nO>ECR 1125/94/3 dated 6/10/94 through which it has been that directed unless there is specific instruction in writing from the center or his authorized agent to the contrary, goods will be despatched by the route optionally feasible and freight charges will be levied by the shortest route. However, charging of freight by shortest route is subject to any instructions issued under rationalities order issued from time to time.

MOVEMENT OF OVER DIMENSIONAL AND OTHER BULKY CONSIGNMENTS

Definition:
Consignments, which when loaded upon a wagon, would infringe the maximum standard moving dimension, at any point, on the entire route, from the booking station to the destination, including via break of gauge is called an Over Dimensional Consignment (ODC).
Therefore, any consignment exceeding the dimension quoted below shall not be registered for booking unless prior sanction for its acceptance has been obtained from the Zonal headquarters.
Maximum Moving Dimensions from rail level (at any point):

Description	Gauge		
	BG (MM)	MG (MM)	NG (762 MM)
Height at Centre	4115	3430	3200
Height at sides	3505	3200	2895
Maximum Width	3050 for Bogie Wagon 3200 for 4 wheeled Wagon	2590	2286

Note: (i) Above mentioned dimensions includes lashing and packing.
(ii) When a dummy truck is used, the maximum weight that may be loaded, in any wagon or truck is distinctly marked on each vehicle and must not be exceeded.

Classification of ODC consignment:

ODCs are divided into 3 classes according to the minimum clearance available between the consignment and minimum fixed structure profile.

Class 'A': Those ODC loads, which has a gross clearance of 22.86 cm (9 inches) and above.

Class 'B': Those ODC loads, which has a gross clearance of 15.24 cm (6 inches) and above, but less than 22.86 cm (9 inches),

Class 'C': Those ODC loads, which has a gross clearance of less than 15.24 cm (6 inches) but not less than 10.16 cm (4 inches).

Class	Sanctioning Authority	Maximum Permissible Sanctioned Speed	Movement During Day or Night	Required to be escorted by
A	**Within Division** : DRM **Inter Division of the same zone** COM **Inter Rly.**: COM of the Zone and COM of concerned Railway.	Sectional speed	Day & Night	--
B	**Local** : DRM **Inter Div/fgn.Rly.**: COM	BG-40 KMPH MG-25 KMPH NG-15 KMPH	Day & Night	TXR
C	CRS	BG-25 KMPH MG-25 KMPH NG-15 KMPH	Day	SE (C&W) SE(P.Way) TI

Net Clearance:
The net clearance shall be worked out as under:
The net clearance between the consignment as loaded in the train and any fixed structure should be calculated after making an allowance of 75 mm (3 inches) for lurch (horizontal) and 7.62 cm (3 inches)

bounce (vertical) on the straight together with following additional factors applicable only when the structure in question is situated on a curve.

1. **Horizontal Clearance:**

(a) Allowance for lean due to super-elevation and over hang due to curvature.
The lean should be calculated for that point on the profile of the load which is likely to have the smallest clearance from fixed structure the formula being :- $\frac{HC}{G}$

where H = height in feet to the point being considered.
C = Super elevation
G = gauge.

For the central overhang due to curvature, the formula will be:- $B2/8R$

where B = distance between bogie centre
R = Radius of curve.

In cases where the overhang at the end of a vehicle may have to be calculated by the formula will be: -

$$\frac{L2-B2}{8R}$$

where L is the length of the vehicle.

(b) Additional lurch on curves may be taken 38 mm.

Vertical clearance:

In case where the top width of the consignment exceeds the gauge of the track the vertical tilt should be added to the height of consignment to work out the vertical clearance from the fixed structure.

Procedure for sanctioning movement of ODC

When ODC consignment is offered at a station for booking SS/SM will verify if the consignment exceeds the maximum moving dimension from originating station to destination station including via. and break of gauge, if involved. He should apply to the Sr.DOM, who will obtain the necessary sanction of the competent authority.

An application must show the length, width, height, and weight of the load accompanied by a sketch in duplicate of the consignment.

In communicating sanction for the movement of ODC, specific route, through which the particular consignment will move, should be indicated, and it will be the responsibility of the SS/SM of the station from which the load originates.

In addition to strictly adhering to the specific route, the restrictions (eg. speed restrictions, night running restrictions, platform restrictions etc.) notified for conveyance of the consignment over the route, must be adhered to, and no relaxation in this regard is permitted.

Loading:

On receipt of the sanction, the consignment should be loaded carefully, lashed and packed properly, so as to avoid any change of shifting enroute.

While examining the wagon loaded, the SE(C&W) must pay attention on the following:
Load is well secured;

Load is within the C.C. of the wagon;

Weight on any pair of wheels does not exceed;
Axle load restriction, if any;

Under gear of the wagon.

After loading the consignment, Sr. SE(C&W) will register the measurement and advise the SS/SM concerned of the various overall dimensions, including the packing and lashing etc., as loaded in truck. SE(C&W) must issue "fit to run" certificate to the effect that the loaded wagon concerned is safe to run via the particular route specified.

SS/SM will inform, then to Sr.DOM/DOM and office of the COM, followed by a confirmation copy, to be sent to COM.

The Operating Branch will arrange to advise the COM of the other Rlys. concerned, with full dimensions of the consignment, as loaded in the truck for issue of necessary final sanction for movement.

Under any circumstance, provisional sanction must not be treated as final sanction and final sanction must invariably be awaited before consignment is despatched.

SS/SM/YS/YM concerned must furnish full particulars of the wagon to the Control, such as Wagon No., Owning Rly., Type of Wagon, Station from and to, route over which it is required to move etc. After this, Control/Divisional office will give necessary permission to the concerned staff to despatch the wagon by a particular train on date advise and obtain their acknowledgement.

A Caution Order will be given to the Guard and Loco pilot of the train carrying ODC to restrict the speed and observe any other speed restriction at any other point or other precautions as laid down.

On Electrified Sections:

a) In addition to the precautions laid down above, the following special precautions must be observed for transport of over- dimensional loads on the electrified section:

b) In all cases, where oversize consignment is moving, it should be remembered by all staff accompanying the ODC, that the overhead electrical equipment is always 'LIVE', except when a particular power block has been obtained from the Traction Power Controller. Even when a power block has been obtained, it should be remembered that all the lines, other than those for which the power block has been granted, are 'LIVE' at 25000 Volts.

c) No person should climb on the roof of carriages of wagons, when those vehicles are located beneath the overhead equipment, except when the equipment is made 'DEAD' and earthed.

d) The following are the prescribed clearance from contact wires for the passage of over-dimensional loads through electrified traction areas and the special restrictions required:

e) Special speed restriction is not required when the gross clearance is at least 390 mm.

f) Speed must be restricted to 15 kmph, when the gross clearance is in between 390 mm to 340 mm.

g) Speed must be restricted to 15 kmph and over head power must be switched off when the gross clearance is less than 340 mm

h) No consignment with less than 100 mm gross clearance from the over head contact wire will be permitted over electrified section.

i) A representative of the Traction Department should also accompany all ODC having clearance as specified in item (b) and (c) of sub para (3) above, over electrified section.

j) A representative of the Traction Department should accompany all ODC loads having width of more than 1981 mm for BG and 1910 mm for MG from the centre line of the track.

k) Section Controllers and Traction Power Controller must co-ordinate, while an ODC moves on electrified area.

l) A list of structures, where the clearances are restricted on the electric traction area and also the clearance available under overbridges should be with the Section Controllers and Traction Power Controllers.

Despatch of ODCs:

1. At the originating station the ODC wagon will be moved when final approval has been obtained from the competent authority.

2. At the originating point the number of wagon/wagons carrying ODC should be entered by the Train Clerk/SM in the vehicle guidance in red ink to be handed over to the Guard of the train.

3. SS/SM should advise the Section Controller on duty, before starting the train and while asking line clear, describe the train number with letter 'X' suffixed on it.

4. It will be the duty of the Dy. Chief Controller to keep adjoining Control Office informed about the movement of such ODC, till such time, it is handed over to the adjoining division by specified train. Also ensure that the consignment is moved strictly by the authorised route.

5. Shunting of train with an ODC should be avoided. Loose and rough shunting of ODC wagon and against such wagon is prohibited.

6. When any ODC wagon is detached from the train at any station, SM and Guard are responsible to ensure safe placement and securing of wagon/load.

7 Facility for accompanying staff for extra wagon/brake van should be provided if so required.

8 When a load is so long that it cannot be accommodated in two trucks (i.e. two 8 wheelers), it must be loaded in three trucks so that the entire weight is carried on the centre vehicle and the end trucks are idlers. The load must be placed on packing in the centre truck, so that it is clear of the floor of the end trucks by not less 152 mm and there must not be less than 304 mm up side clearance in the end trucks between each of load and side of truck.

If the weight of the load is such that it cannot be carried on the centre truck, then the load must be carried as equally as possible on the trucks and the centre vehicle must be an idler.

CONTROL ORGANIZATION

The Control Organization of Indian Railways is the nerve centre of train operations. It controls the asset management of the Railways, in a dynamic situation, round the clock incessantly moving trains on its entire network.

It has come a long way from being an exclusively telephone based system emerging in the form of an Information Technology enabled organization.

This basic structure of Operating Control on Indian Railways exists at the Divisional Level, which has also been extended to Area Control levels. In addition, Central Control Office is situated in the headquarters office and one at Railway Board.

The area spread of a division is divided into control sections, each section having a given number of stations.

The two-way telephone system, also called an omnibus circuit which permits all stations to have direct communication with Section Controller, who is responsible for train regulation in his area. The section Controller can speak to all stations at the same time or to one station selectively, using individual numbers/buttons. Movement of trains is plotted on a time distance graph to record their actual progress, these records, called control charts, can be analyzed later.

To guide and assist the section controller, there are shift Deputy Controllers.

All technical disciplines involved in train movement have a representative in the Control office to provide the required support from his department. These would include-

Motive Power Controller
Traction Power Controller
Signaling and Tele-Communication Controller
Commercial Controller
Security Controller
C& W Control
Engineering Control

The entire organization works round the clock, all days of the year without any interruption to monitor actual movement of trains on the entire rail network.

The detailed organization of the control selected and duties assigned to employees depends on the demands of the transport task appropriate to each grade of employee or to diversity in the transport task. The Chief Controller is the head of Divisional Control Organization.

Basic Functions of Control:

1. **Train Control:** Supervising & regulating movement of trains from station to station on the section to avoid delay to trains and to maximize utilisation of the capacity of the section by: -

(a) Monitoring movement of trains from station to station and recording paths and detention on charts.

(b) Arranging crossing and precedence of trains judiciously.

(c) Arranging working of departmental and material trains.

(d) Giving time signal to all stations on the section daily at appointed time

(e) Fulfilling interchange commitment.

(f) Arranging proper movement of assisting/banking /light engines.

(g) Clearance of sick wagons from Roadside stations.

(h) Arrangement of relief for 10 hrs duty staff.

(i) Incident management on rail network & at station

(j) Arranging Engineering and/or power blocks in such a way as to involve minimum disturbance to train running.

(k) Maintaining fluidity of yards by controlling the flow of stock in and out of yard

(l) Arranging Speedy relief in case of accidents.

2. **Traffic Control** is the general and over-riding control for supervision of the movement of goods and coaching traffic on the section. It is exercised by :

(a) Collecting information from the various stations on the section in respect of –

(i) Registration for wagons outstanding at stations and arrangements for supply of wagons.

(ii) Number of wagons loaded and empty wagons/rakes awaiting despatch.

(b) Arranging running, regulation, putting back and cancellation of trains.(both freight & coaching)

(c) Securing maximum loads for trains.

(d) Collecting stock position from the different stations, marshalling and terminal yards.

(e) Arrangement of Crew & Guard for freight trains

(f) To keep liaison with adjoining Railways and Divisions for interchange commitments

(g) Monitoring and co-ordinating working of yards, goods sheds sidings, loco-shed, TXR depots etc.

(h) Supervising of stock control.

(i) Arranging supply of wagons against pending registration.

j) Securing optimum utilisation of stock, with minimum detention.

k) To ensure optimum utilisation of loco and staff.

l) To arrange ART & Crane from adjoining Railway/Division in case of accidents and other coordination.

3. **Power Control** is responsible for provision of motive power to all trains by maintaining position of locomotives

(a) Requisitioning engines from loco sheds for all operating requirements, i.e. Train working, Shunting and Banking.

(b) Ensuring most economical use of engines by close supervision both in Traffic Yards and sheds.

(c) Ensuring the return of engines to “Home Sheds” at regular intervals for servicing and maintenance.

(d) Ensuring an even balance of engines and crews between running sheds for meeting demands of traffic,

(e) Ensuring that light engine kilometres is kept to the minimum.

(f) Providing guidance to running staff for troubleshooting.

4. **Carriage and Wagon Control** is responsible to assist the train and traffic control and to-

(a) Ensure timely examination and fitness of all trains

(b) To keep a watch over the detachment of sick wagons/coaches and to arrange for their early repair and fitness.

(c) Keeping a watch over availability of vital C&W components, like Air Hoses, Washers, Clamps etc.. and efficient working of equipments &machines in C&W depot to avoid detention to trains.

(d) To keep a watch over placement of wagons/coaches in sick line and their release.

(e) To keep account of detention to trains on C&W account and take remedial action.

(f) To provide guidance to running staff for trouble shooting.

(g) For Electrical Multiple Units, this function is performed by EMU controller.

(h) Monitor the movement of POH due stock to workshops

5. **Commercial Control** assists the Traffic and Train Control.

(a) To expeditiously dispose off unclaimed and unconnected wagons, parcel consignments.

(b) To keep a watch on detention to trains on Commercial account like Alarm Chain Pulling. Carriage watering, Parcel working etc., and take remedial measures.

(c) To ensure quick transhipment of sick wagons by arranging matching stock and labour.

(d) To keep a watch over submission of station returns.

(e) Monitoring of public complaints lodged at the stations.

(f) To ensure proper maintenance of public amenities available at stations.

(g) Any other job entrusted by Sr. DCM/DCM.

6. **Traction Power Control** is provided to assist in Traffic and Train Control for -

(a) Arranging maintenance blocks for OHE

(b) Arranging alternative power supply in case of tripping etc., through remote control.

(c) Monitoring OHE failures and taking remedial action.

(d) Monitoring detention of trains on OHE accounts.

(e) Guiding running/ station staff in trouble shooting.

7. **Engineering Control**

Monitors imposition & cancellation of Engineering Restrictions, Working of track machines & monitoring integrated maintainable blocks.

To co-ordinate works during maintenance blocks

Running of Material trains.

8. **Signal Control** assists Traffic and Train Control and is responsible -

a) To keep a watch over the S&T failures and take remedial action.

b) To ensure efficient working of communication channels

9. **Security Control** is responsible for prevention of theft of property and assists passengers in trains/stations.

10. **Functions of Control:**

The main functions of Traffic Control are:

a) Continuous supervision of the movement of all traffic in the controlled area with a view to achieve the maximum possible operating efficiency.

b) Systematic maintenance of accurate charts of train movements and the arrangements of crossing and precedence to the greatest advantage.

c) Analysis of detentions to trains

d) Planning, ordering and running of goods trains to the best possible paths.

e) Maintaining the fluidity of marshalling yards/freight terminals.

f) Taking remedial action in the event of yard/terminal congestion.

g) Elimination of avoidable detentions to goods stock at loading and unloading points and at transhipment stations.

h) Allotment and distribution of goods stock to stations,

i) Supply of information to adjoining controls, terminals and engine changing stations regarding the movements of trains to enable adequate timely arrangements for their reception and onward despatch.

j) Arranging of engineering and other departments blocks with minimum detention to traffic.

k) Running of material trains and other track machines, tower wagons etc.

l) Arranging relief for engine crews and Guards.

m) Ensuring maximum utilisation of locomotives.

n) Issuing instructions for train working in case of equipment failures and whenever abnormal methods or working have to be resorted to.

o) Speedy arrangements for relief rescue and restoration in the event of accident.

p) To assist in the realistic planning of time tables and punctual running of passenger trains in co-ordination with various departments, other divisions and other railways.

q) To keep a watch over damaged stock at road side stations, yards and sick lines and to ensure that they are promptly attended to

r) To rectify immediately the irregularities on the part of line staff and provide them necessary guidance.

s) To provide operations management information.

t) To ensure smooth functioning of FOIS and other IT applications.

Telecommunication Facilities in Control:

Extensive, efficient and reliable communication network is necessary for the efficient functioning of the Control organisation. The following telecommunication network is available in control offices.

1. **FOIS Network**

2. **Hot lines are provided between:**

   (a) Headquarter and Divisions

   (b) Adjoining Divisions and Railways

   (c) Intercom facility to various Officers and other functionaries concerned with the control is connected with important work centres with STD or Trunk Exchanges.

3. **Deputy Control Lines:**

This circuit is provided between various functionaries in the control office, stations and important work centres like yards, loco sheds, crew booking lobbies.

4. **Section control circuit:**

This circuit is connected to all the stations and the section controller, Chief controller etc.

5. **Traction Power Control circuit:**

This additional telephone circuit is available on the electrified sections; this is connected to T.P.C. in OHE remote control centre, all stations, control-offices and selected work places. The section controller or T.P.C. can also be contacted from the emergency socket provided over the sections of line by means of portable telephone of the control point with indication on the electric mast, direction wise, to the nearest circuit.

6. **Section Control Board:**

The Section Controller of each section is provided with control board with Telecommunication facilities for coaching stations, certain important cabins, big freight terminals, loco shed etc. over a section. For the guidance of section controller, the lay out of all the stations and sidings is painted on a large board.

The station lay out diagram is also provided with details of holding capacity of each of the running & non-running lines, gradients and signals. In electrified area, OHE sectioning diagram is provided. This depicts elementary sections in different colours & other details of sectioning post (SP) and Sub-sectioning post (SSP).

7. **Graphs and Plotting:**

   i) Trains are plotted on control graphs which consist of horizontal and vertical lines representing distance and time respectively. Along side the vertical lines stations are spaced to a uniform scale. Each one hour is first divided into 6 units of 10 minutes each and each unit is further sub-divided into 5 smaller units of 2 minutes each.

   ii) Each control graph at the end of the shift may have the following information on it:

      (a) Name and total distance of the section in Kilometres.

      (b) Distance in Kms. between each station on the section.

      (c) State of weather in each shift.

      (d) Engineering restrictions on the section.

      (e) Code names of each station of the section.

      (f) Time lost by each train on loco, traffic or engineering account at or between stations.

      (g) Section Controller's remarks against item (d).

(h) Time made up by each train on loco, traffic or engineering account.

(i) Guard's record of time lost on loco, traffic or engineering account at or between stations and remarks.

(j) General remarks.

(k) Signal failures

iii) In plotting various types of trains the coloured pencils shall be used as per extant convention. All up trains are plotted from the bottom of the chart upwards and from the left diagonally towards the right; and all down trains are plotted from the top of the chart downwards and also diagonally from the left towards the right.

iv) For judicious crossing and precedence, it is necessary to have plotting of passenger trains at least one hour in advance depending on traffic density in easily erasable lines. Now through computerized charting this is automated. On certain selected controls, this function has been automated.

8. Master Charts:

For every section, Master Charts indicating trains run in 24 hours are prepared which show the running of each Mail, Express or passenger trains over the sections according to its scheduled running. In between the running of trains carrying passengers, paths for goods trains are worked out and plotted. They are helpful in revision of time tables and planning the running of any extra train and guidance of section controllers and should be displayed on the boards to which they refer.

Duties of Control Staff:

1. Duties of controllers:

The main duties of control staff are as under:

These are only guidelines to their day to day working and are not exhaustive.

(a) Chief Controller (In-charge).

The Chief controller is in- overall charge of control office and is responsible for the total transportation of the Division on day to day basis. His duties include-

(i) A review of previous day's performance to confirm that all forecasts made have been fully met. For shortfalls, cogent reasons have to be pinpointed to prevent recurrence

(ii) Prepare current forecast indicating assistance needed from Hedquarters, adjoining Divisions, railways

(iii) These will generally relate to interchange, loading and locomotive utilisation

(iv) Checking control charts and bringing to the notice of the Senior Divisional Operations Manager/Divisional Operations Manger all avoidable detention to trains.

(v) Punctuality performance with particular reference to trains which lost punctuality

(vi) Maintaining statistics regarding the punctuality of passenger trains.

(vii) Scrutiny of stock papers, Monitoring interchange obligations.

(viii) Watching detention to stock at stations and terminals

(ix) Watching the work of marshalling yards/freight terminals.

(x) Maintaining liaison with neighbouring Divisions

(xi) Watching utilisation of loco and their terminal detention.

(xii) Checking duty hours of running staff and balancing of crews.

(xiii) Granting engineering blocks, power blocks etc.,

(xiv) Attending control office in cases of accident

(xv) Establishment work of control office

(b) Chief controller (Movement)/Dy. Chief Controller / Shift duty:

He is responsible for:

(i) Running of goods trains, preparing interchange forecast, and monitoring the same, loco utilisation and passenger and goods train operations in general.

(ii) Allotting empty stock/rakes to loading stations in accordance with current priority regulations along with Dy. Chief Controller (Stock) ,maintaining constant touch with adjacent divisions through regular conference to facilitate the smooth flow of traffic.

(iii) Dealing immediately with significant detentions or transport bottlenecks and other unusuals.

(iv) Keeping constant touch with the working of major terminals & Marshalling yards and taking timely action to deal with congestion.

(v) Giving advice of serious accidents to all concerned, and taking, charge of the affected sections.

(vi) Supervising the running of oversized consignments.

(vii) Maintaining liaison with the Power Controller.

(viii) Co-ordinate the work of various Section Controllers.

(ix) Maintain discipline among control staff in the absence of Chief Controller.

(x) Maintain co-ordination and liaison with various functionaries involved in train running.

(c) Chief Controller (stock) / Dy. Chief Controller:

He is responsible for:

(i) Scrutinising the indent register in details with regard to the oldest date of registration, nature of goods and type of stock required for lifting goods as per the oldest date of registration.

(ii) Checking Divisional stock report and position of empties.

(iii) Checking of different stock reports received from the various points and planning in advance the supply of stock, loading and clearance keeping in view interchange obligation and orders received

(iv) Checking transhipment activity

(v) Chasing movements of stock as per supply order issued on the previous day.

(vi) Keeping a close watch over hot axle, special type and unconnected wagons.

(vii) Cross checking the daily Restriction Bulletin with Restriction Messages received from HQ office and issuing the same.

(viii) Assisting the Sr. DOM/DOM in allotments.

(ix) Keeping a close watch over the movements of seasonal perishable traffic and supply of suitable stock for its clearance.

(x) Watching movements of damaged loaded stock in sick line and yards on their division.

(xi) Informing all major customers about their inward trains' expected arrival based on FOIS pipe line, Optimising loading, unloading, transhipment etc.

Duties of Deputy Chief Controller (Punctuality)

i) Ensuring punctuality of passenger trains in system

ii) Ensuring punctuality at the start of all outgoing passenger train

iii) Maintaining Detention Reports of Coaching trains

iv) Ensure that late running trains make up time

d) Section Controller:

The Section Controller shall be responsible for:

(i) Reporting for duty at the prescribed time and ascertaining the position of the section from his reliever.

(ii) Recording the movement of trains on the 'Control' graph including crossing, connections and shunting reasons for detentions etc.

(iii) Arranging for the supply and clearance of stock as ordered by Dy. Controller.

(iv) Advising stations in advance of the work to be done on trains on move

(v) Informing sheds and stations about the late running of trains to avoid the calling of Crew and Guards earlier than necessary or to put back trains wherever advisable.

(vi) Informing major stations and concerned Section Controller about the current running of trains on the section and their anticipated arrivals well in time

(vii) Keeping in close touch with Engineering-blocks and working of material trains so as to give the maximum possible time with least detention to other traffic.

(viii) Incident management to include adjusting movements of trains in view of the likely impact of the incident, informing all concerned

(ix) Keeping a watch over damaged vehicles detached at road side stations and arranging repairs or transhipment of their contents and proper attention on the part of the train examining staff.

(x) Arrangement of ART & M/Van in case of accident.

(xi) Eliminating all possible detention to train and stock.

(xii) Watching the working of marshalling yards & major terminals.

(xiii) Making timely arrangements for the relief of Guards /loco pilots whose duty hours are likely to exceed enroute.

(xiv) Recording stock report (where stock clerks are not posted)

(e) Power Controller/Traction Loco Controller:

(i) Planning and directing engine movements so as to ensure efficient engine utilization and maintaining the prescribed charts, and regular statistics.

(ii) Co-ordination with sheds and Dy. Chief Controllers (movement) for sending overdue engines and obtaining time of engines coming out of shed.

(iii) Making timely arrangement for the relief of crew whose duty hours are likely to be exceeded enroute

(iv) Taking timely action to balance crew so as to prevent cancellation or putting back of trains on account of shortage of crew.

(v) Arranging relief in case of accidents as per chapter IV to VIII of Accident Manual.

(vi) Maintaining charts indicating engine position/utilisation.

(vii) Rendering advice and assistance to locomotive running staff regarding trouble shooting.

(viii) Carrying out any other duties allotted to him by the Sr.DME/DME or Sr.DEE/DEE from time to time.

(ix) Monitoring day-to-day stock position of diesel fuel at RDIs and watching movement of diesel fuel tank wagons (for power controllers only)

(f) Traction Power Controller

Traction Power Controller shall be responsible for-

i) While taking over shift duty acquaint himself with the prevailing position of the entire section, including the working of the Remote Control equipment position of all transformers, current breaker's interrupters and isolators, sections under power block, position of tower wagons and break down vehicle etc.

ii) Maintaining continuous contact with the Traffic Section Controllers in regard to power supply affecting train movements, imposing power blocks etc.

iii) Taking prompt action for restoration of supply in the event of power supply interruptions or other failures.

iv) Imposing and removing power blocks in consultation with Traffic Section Controller.

v) Advising promptly the concerned officials in case of accidents, OHE breakdown, failure of power supply and keeping them posted with all important developments.

Operating Discipline

i) Line Staff to obey orders of control:

Station staff, Shed staff, Crew and Guards etc must obey orders issued by the Control as long as these orders are consistent with the General and Subsidiary Rules, extant instructions and the instructions contained in this Manual.

ii) 'Control order register':

Important instructions from control will first be recorded in a register maintained in the control office and serially numbered, commencing with number 1 after midnight each day. These will be issued as messages indicating the time of issue

All such orders received by the Station Masters or Running staff and Guards' lobby from Control should be entered in the control order register by the staff. Each entry must be initialled with time.

At the end of each turn of duty the relieved as well as the relieving Station Master or Crew Controller must sign their name in full below the last entry in the register. On days when no orders are received from control, "Nil" entry must be recorded and signed as prescribed above. When a station Master or Crew Controller has received an order from the control and entered it in his register, he may repeat it to the control in order to satisfy himself and the control that he has understood it correctly.

(iii) No Terminal Station should start a goods or unscheduled train or block the section without the permission of the Controller.

(iv) Every Station on the section must report the movement of every train- passenger, goods, special, departmental, light engines, TTMs, Tower Wagons, trollies etc. to the controller.

(v) When the control is in function, Line Clear must be asked from the station ahead for every train unless orders to stop it are given by the Controller.

(vi) The Controller's permission must be obtained before stopping a train that should run through except to avert an accident or dangerous condition.

(vii) No station should allow a train, which has been stopped out of course, to proceed, without first informing the controller that the train has been so stopped and receiving his further orders.

(viii) Station Master must advise the controller of any unauthorised or undue detention to trains at their stations with full explanation.

(ix) Whenever a train, either passenger or goods is detained at a station for longer than the booked halt without the orders of the Controller, on its departure, the Station Master must immediately inform the brief cause of the detention to the Controller.

(x) Whenever any damaged wagon is detached out of course at a station, the Station Master on duty should inform the Controller.

(xi) Station Master must promptly advise the Controller of any defects of signals, points, interlocking apparatus and line clear instruments at their stations. Information should also be given of any defects in any other station machinery such as cranes, wagon weigh bridges, turn tables, water columns, hydrants etc.

(xii) Starting stations to report particulars of outgoing train:

As soon as a train leaves a train starting station, the Station Master must intimate the following particulars to the control office:

Number and description of train, Engine number and class, Loco pilot's name, Guard's name, load of the train (in tonnes and vehicles) particulars of shunting to be done on the journey, time of departure, brief reasons of late start, time of S/O of crew fuel balance etc.

xiii) Intermediate stations to report arrival and departure time of trains:

Station Master of intermediate station must communicate to the Control as early as possible, the following information in regard to every train dealt with:

(a) In case the train has run through, the time it passed the station.

(b) If it is a stopping train, the time or arrival and departure along with the explanation for every detention beyond the scheduled stoppage.

(c) If any shunting has been performed, the number of vehicles attached and detached.

(d) If any extra time has been taken in loading and unloading of packages, the number of such packages and name of the loading station.

xiv) Terminating stations to report the particulars of incoming trains:

Station Masters of terminal and **engine changing station** must, as soon as possible, after the arrival of a train, communicate to the control the time of arrival and the load of the train, particulars of loco detached/attached.

xv) Engine Movements to and from sheds to be reported:

Loco foreman must communicate to control the time at which train engine leave from or returns to the shed 'Bahar line'.

This in no way, relieves the Station Master of the responsibility for issuing necessary all concerned messages regarding engine failures and engine trouble enroute. The Controller, shall record the duration of such defects in his chart, diary and registers.

vi) Time to be checked with control:

Station Master, Crew Controller and Lobbies must check their time with control at appointed hours every day when control gives a general ring for setting their watches/clocks at 16:00 hrs.

Staff must obtain Station Master's permission before speaking to Controller.

xvii Mode of using the control phone :

The Control telephone is to be used for operational purposes. The field staff wanting to talk to control will give their identity and wait for their turn to communicate .As this network is intensively used, the conversation should be brief, meaningful and polite. Discussions, disputes and arguments must be avoided.

a) Station Master and others must not start to speak to control unless they have ascertained by lifting the receiver and listening in, that the line is free. They must then announce the name of the station, shed, lobby or site from where they are speaking and wait for its being repeated by the controller before beginning the conversation.

b) When, however an urgent message has to be conveyed and the line happens to be engaged, the station name must be called indicating **Emergency**. The Controller will immediately attend to the Station having an emergency. Station Masters must attend 'Control Call' promptly.

Co-ordination between Control and Stations:

1. **Asking line clear**: In order to avoid the detention to passenger trains for crossing a less important train, line clear enquiry for the less important train must not be asked until the train is ready to leave and until the Section Controller's permission has been obtained. The Station Master receiving the line clear enquiry must immediately ask the Controller's permission to give line clear before giving the reply. The Station Master on duty is entirely responsible for seeing that the necessary General and Subsidiary rules and Station Working Rules are observed before giving Line Clear.

2. When a Station Master for any reason finds it difficult to carry out Controller's arrangement to receive the train in yard/station due to yard/ station constraints, he must explain his reasons clearly and fully to the Controller.

3. **Work at stations:** The permission of the Controller must be obtained before the performance of any shunting; Controller must be informed of the likely duration of shunting to enable him to arrange crossing and precedence of trains. In the event of Station Master being unable to start a train on receipt of line clear, he must at once report the circumstances to the Controller.

4. **Control order regarding crossings etc.**:

The Section Controller will give definite instruction for crossing or precedence and will not change them except under unavoidable circumstance because last minute change of order will result in confusion and unsafe operation. The Station Master is entirely responsible for seeing that the crossing is effected safely and strictly in accordance with the rules. The Controller must see that sufficient time is available for the necessary operations to be carried out. If the Controller fails to do so, the Station Master should represent that delay may occur, but it does not allow him to disregard any rules in order to avoid such delay.

General Order of Precedence of Trains:

Unless specific orders to the contrary are issued by the COM or by those acting on his behalf, the following general orders of precedence shall be observed by control and stations.

1. ARME, ART proceeding to the site of accident.
2. President's and VVIP's specials (Unless otherwise specified in the Time Table).
3. Suburban train in peak rush direction.
4. Super fast trains like Shatabdi, Rajdhani etc.
5. Mail / Express trains.
6. Military personnel special, if instructed by emergency control/DOM.
7. Fast Passenger train
8. Special engaged by the public. (Precedence order may be revised)
9. Passenger trains.
10. Mixed trains.
11. Military stores special.
12. Express or special goods train.
13. Through goods train.
14. Accident relief train returning from the site of accident (unless otherwise ordered).
15. Shunting and van goods train.
16. Departmental trains.

Note: - The following general principles are mentioned for the guidance of Controllers but it must be distinctly understood that nothing in these instructions modifies the safety precautions laid down in the rules (General and Subsidiary Rules, Station Working Rules etc.).

(i) A Passenger train nearing the end of its run should not normally be detained in preference to a train which has a longer run before it, as the latter train is more likely to make up time and reach its destination punctually than the former.

(ii) A train running to time should not be detained more than 30 minutes to effect crossing on single line. (This should be decided by the Division based on actual condition.)

(iii) A train running late due to defective engine, or defect in rolling stock or any other cause which is likely to continue to operate against it and prevent it from making up time, should generally give way to a train running properly.

Accidents:

Controllers and other staff should thoroughly understand and act on the guidelines contained in G & SR and Accident Manual. Saving of lives and rescue of injured and mitigating hardship to passengers must be given the topmost priority.

Working of Trains when Control is interrupted:

When the control is interrupted and no communication with the Controller is possible, Station Masters will be responsible for the working and regulating of trains, keeping in view the instructions issued by the railway administration.

Books/Documents and basic records to be kept in Control Office:

1. Station Working Rules of all stations.
2. Working facilities available on the transhipment sheds.
3. Schedule of shunting engines in the various yards.
4. Link diagrams of rakes and engines working the passenger services and also of goods trains where laid down.
5. Crew link diagram of the various services, for the running staff.

6. Details of maximum moving dimensions permitted on the various section of the railway.
7. Map showing the maximum permissible axle load on all the railways with which traffic is interchanged.
8. Charts showing line capacity of the various sections.
9. Index sections and plans of the various sections of the jurisdiction and details of train watering, Engine fuelling etc.
10. Master charts depicting all trains indicated in the working time table in force.
11. Charts showing jurisdiction of the various officials details of :
    (a) of the maintenance branch of the post and Telegraph department responsible for maintaining control circuit wires in good condition.
    (b) of the various departments of the railways,
    (c) Zone and telephone numbers of Civil, Police, Military authorities.
    (d) List of various hospitals with Telephone Numbers.
    (e) List of stations Civil, district-wise.
    (f) OHE Sectioning diagram.
12. Diagrams showing the layout of line wires of the Control Circuit.
13. Line patrol chart
14. A calendar of returns
15. Cranes and Wagon weigh bridges.
16. Turn tables and Triangles.
17. List of spare coaches based in the division as well as slip coaches running on and across the division.
18. List of coaching Rakes allotted to the division and those passing over the division.

Registers generally maintained in Control:

1. **By the Section controller:**
    (a) Section controller's diary and charge book.
    (b) Inward message book.
    (c) Sick wagon register.
    (d) Yard report registers.
    (e) In-coming and out-going trains RD (Running Diary) (other than passenger).
    (f) Train Advice (T. A Book).
    (g) Caution Order Register.
    (h) Caution Order Message Book.
    (i) Morning (6.O clock) Position Register
    (j) Engine Book.
    (k) Interchange Register.
    (l) Load Register.
    (m) Incoming and Outgoing passenger Train Running Diary.
    (n) Points and S & T Failure Register.
    (o) Important Yard Balance Register.
    (p) Control Failure Register.
2. **By the Chief Controller (Movement),(Coaching)/Dy. Chief Controller** :
    (a) Yard Running Balance Register.
    (b) Dy. Chief Controller's Diary & Charge Book.
    (c) Train Advise Book.

(d) Forecast and Acceptance Book.
(e) Train Ordering Book.
(f) Punctuality Register.
(g) Accident Register.
(h) HQ's Conference Register.
(i) Goods Train Performance Register.
(j) GM's Unusual Occurrence Register.
(k) CTNL (Movement)/(Coaching)/Dy TNL's Order Book.
(l) ODC Register.
(m) Rajdhani Express (and similar trains) Caution Order Register.
(n) Emergency and General Control Office Message Register (Inward).
(o) Engine Book.
(p) Emergency and General Control Office Message Register (Outward.)
(q) Interchange Register.

3. **By the Power Controller:**

(a) Power Position Book.
(b) Out Station Loco pilot Register.
(c) Power Controller's Diary.
(d) Engine Link.
(e) Crew Link.
(f) Crew Position Register.
(g) Register of Movement and Diversion of departmental/ Diesel/cube oil Fuel Tank Wagons.
(h) Register showing Undue and Abnormal Detention.
(i) Shed Conference Register.
(j) Fuel Balance Register.
(k) Schedule Dates of Locos

Additional Guidelines:

Additional information and guidelines regarding control are given in various other chapters of the Manual, particularly the chapters on goods train and passenger train operation.

COMMAND, CONTROL AND COORDINATION OF EMERGENCY RESCUE OPERATIONS ON THE OPEN LINE

Purpose

i) The purpose of this Standard Operating Procedure (SOP) is to delineate responsibilities and procedures for the control and coordination of all responses to emergency situations on the mainline.

ii) To provide step by step guidance on how to deal with incidents should they happen

iii) Particular note should be taken of the need to provide suitable training to keep staff aware of what needs to be done in the event of a serious incident.

1. Objectives of incident Management Plan

In Order of priority these are:-

i) Save lives and alleviate suffering
ii) Provide help to stranded passengers and arrange their prompt evacuation
iii) Instil a sense of security amongst all concerned by providing accurate information
iv) Protect Railway property
v) Ascertain the cause of accident, preserving clues by cordoning of incident site etc.
vi) Expedite restoration of train operation

There is a difference between a disaster and an accident. All disasters need not be the outcome of train accidents, neither are all accidents classified as disasters.

Accidents are occurrences where safety has been affected

Disasters are those situations, which cause acute distress to passengers, employees and outsiders and may even be caused by external factors and unless promptly managed the distress levels are likely to increase with time.

2. List of serious incidents requiring use of this plan

i) Fire, smoke emission, explosion in railway premises including trains
ii) Derailment of a passenger carrying train
iii) Collision of a train/trains
iv) Security threats/Terrorist attacks, widespread violence, bomb explosion
v) Release of Chemical or biological gas in trains, stations or tunnels
vi) Natural calamities like cyclone, floods and earth quakes.

3. Definitions

In the context of Indian Railways, unusual events are classified as under:

i) Incidents – which cause delay to trains
ii) Accidents – which have the potential or do actually cause loss of life and or injury and damage to property
iii) Emergency/Serious Accidents/Disasters – these may or may not necessarily be the outcome of train accidents but have the potential to cause loss of life and or injury to human beings causing further death/injury and wide spread and prolonged distress to all those involved unless tackled in an effective manner.
iv) Disaster Management Team (A team of Railway officials earmarked to reach incident site by first available means & take over site management) at Zonal, Divisional and area/major station levels.

4. Scope

This SOP is applicable to all IR personnel working on the Open Line.

5 Responsibility

- The Assistant Operations Manager Divisional Control Office, or designated Divisional Control Office Supervisor, is responsible for the overall control and coordination of emergency situations on the mainline.
- The OCS (officer in charge site) is responsible for overall control and coordination of all activities at the incident scene under instructions of Divisional Control.
- Traction, Track and Structure, Signalling, and Telecommunication, fire service & security personnel are responsible for providing technical assistance to Divisional Control Office & OC site.
- Rolling Stock Department is responsible for providing technical assistance to Divisional Control Office and OCS, as required and managing site restoration work.
- Station Operations & Commercial personnel are responsible for making appropriate station announcements, and providing information, rendering first aid, mobilizing medical & fire services & assistance from civil administration, including police and providing all other assistance in alleviating suffering and hardship to passengers and others.
- The Guards in charge &Loco pilot in the area affected by the incident are responsible for:
  - Providing their passengers with up-to-date and timely information regarding the situation's status and/or progress; and
  - Operating their trains in compliance with applicable rules and procedures and Divisional Control Office instructions.
- Government Railway Police and Railway Protection personnel are responsible for securing the incident scene and for performing/directing investigation activities in compliance with existing procedures. (in case of incidents caused by criminal acts)
- The senior Police official at the scene is responsible for controlling and coordinating all police activities at all times. In doing so, this official has final authority to determine when these activities are complete and shall coordinate these activities with the OCS and the senior Fire services official.
- Security personnel will assist Metro Police; Fire services personnel, medical services or station staff as directed by OCS.

6 General

The following is the list of personnel authorized to act as Officer-in-Charge site (OCS). This list also indicates the probable change of command at the scene.

a. Train Superintendent or Guard of the affected train
b. Loco pilot
c. Station Manager/ Station Master
d. Rail Operations Supervisor or Traffic Inspector
e. Any Railway Officer either on duty, off duty or on leave, present at the site of incident
f. Members of Division Disaster Management Team

When none of the above mentioned personnel are present at the scene, DIVISIONAL CONTROL OFFICE shall appoint an OCS as directed by DRM from the personnel available.

Guards in charge, Loco pilot and Station Manager must assume and carry out the responsibilities of the OCS until relieved.

The first Guard in Charge /Loco pilot, on the scene, shall act as the OCS until he/she is relieved by the first senior personnel /Rail Operations Supervisor to arrive.

The Rail Operations Supervisor shall continue acting as the OCS until he/she is relieved by an authorized senior official or released by DIVISIONAL CONTROL OFFICE after another OCS has been designated. However, it is the responsibility of DIVISIONAL CONTROL OFFICE to select the most qualified person, for the type of incident, to act as the OCS.

The mere presence or arrival of an authorized senior official at the scene shall not indicate his/her assumption of command as OCS. Such senior official shall remain in an evaluating capacity unless he/she specifically assumes command.

The method of managing an emergency situation will be in compliance with the applicable Zonal Railway Rules and Procedures contained in Accident Manual, Disaster Management Manual or as directed by DIVISIONAL CONTROL OFFICE during incidents not covered by Rules or Procedures.
The OCS has the authority and the responsibility to command the presence of any personnel and equipment required at the scene and to command the removal of any unnecessary personnel or equipment from the scene. This does not apply to police or Fire Department personnel.

Entry into the incident area by the news media or other visitors must be authorized by the CPRO and shall be coordinated with DIVISIONAL CONTROL OFFICE DIVISIONAL Rail Manager, and OCS and Metro Police.

When it is necessary to notify the Fire Services, and/or to seek medical assistance the following information shall be provided:

a. Identification or caller;
b. Nature of problem (give in plain English,/Hindi e.g., fire, flood, smoke, injuries);
c. Type of assistance requested; be specific
d. Specific location of the problem and the best access points;

7 Procedure

The Chief Controller/Operations Manager of DIVISIONAL CONTROL OFFICE, or designated DIVISIONAL CONTROL OFFICE Supervisor shall:

a. Ensure that ARME & ART is turned out on time
b. Appoint the initial OCS
c. Coordinate all field activities and requests through the OCS.
d. Notify members of Disaster Management Team and all departments and personnel, as required.
e. Coordinate and direct the safe movement of all trains, to include those trains which may be involved in the incident;
f. Request Police /RPF assistance in critical stations for crowd control;
g. Keep Loco pilots and Station Managers informed of system status and instruct them to make appropriate announcements to their passengers;
h. Ensure that system-wide public address announcements are made frequently to provide patrons with up-to-date information concerning Rail System status;
i. Coordinate and assist OCS with restoration activities;
j. Provide and obtain, from OCS frequent updates on events
k. Inform Commissioner Rail Safety and local civil authorities as per procedures in vogue in the event of train accidents like, derailment, Collision fire, terrorist attack etc., of a

passenger carrying train or any other accident relating to train operation resulting in death and/or grievous injury (as per Railway Act provision).

The OCS shall:

b. Ensure that the safety of passengers and personnel at the incident scene is maintained; ascertaining that all injured and stranded passengers have been safely evacuated. Till evacuation is complete necessary succour in the form of drinking water, tea & edibles are made available to stranded passengers.

c. Ensure that all personnel involved, at the scene, work efficiently to restore rail service as quickly and safely as possible;

d. Control and coordinate all field activities with personnel at the scene.

e. Coordinate all police related activities and requirements with the senior police official at the scene.

f. Coordinate activities with the senior Fire Department official at the scene and, when available, provide the Fire Department Command Post with a knowledgeable employee, to act as a communications link to Divisional and Central Control and to the OCS.

g. to the senior official at the scene;

h. and activities at the incident site and keep DIVISIONAL CONTROL OFFICE informed of progress;

i. Establish a command post, at the incident scene Direct all inquiries and/or requests made by jurisdictional police officials Appoint individual (s) to provide public address announcements, at five (5) minute intervals, to passengers of the incident train and/or inside the incident station;

j. Direct all inquiries and/or request made by the news media to the CPRO Office;

k. Maintain a chronological log of all events.

Station Operations/Commercial personnel shall:

- Make appropriate station announcements;
- Assist Police with crowd control; and
- Make every effort to identify and retain knowledgeable witnesses. or to obtain their testimony along with their address.

Guards and Loco pilots shall:

a. Operate their trains in compliance with applicable rules and procedures; and

b. Keep their passengers informed by making frequent announcements regarding system and delay status.

All Rail personnel at the incident scene shall honour the requests of and obey the directions of the OCS.

Emergency Control in the Zonal Office

Emergency Control shall be manned by designated officers as per procedure laid down.
It shall take prompt action to inform concerned officers Plan all assistance to the Division.
Mobilize resources and manpower.

Seek GM/COM's approval to relay the information to Railway Board Regulate traffic on the affected line, on adjoining Divisions and Zonal railways, to include train cancellation, diversion rerouting, road bridging, and air lifting of stranded passengers.

CPRO will continuously brief media to inform passengers of the current status of rail situation.

DUTIES OF COMMERCIAL STAFF IN CASE OF ACCIDENT

1. On receipt of information of accident from the Operating Emergency Control, following Officials of Commercial department at HQ will be informed by the Commercial Control of the headquarter:-(Designations of HODs and Dy HODs may differ from zone to zone.)

a) CCM
b) CCM/G&R
c) CCO
d) CCM/Services & Marketing)
e) Dy. CCM/General
f) Dy. CCM/Catering
g) SCM/General

2. Nominated Commercial officials (para no. 3) on receipt of information of train accident would proceed to the site of accident by the quickest available means.

In case of serious accidents involving passenger trains, CCO (in absence of CCO, CCM (S&M) or CCM/IT will proceed to the site of accident. CCM/G will remain in Commercial Control.

3. **Centers of Activity**:

a) Headquarter
b) Divisional Commercial Control
c) Site of Accident.

a) **Headquarter**

i) Commercial Control will have DOT and railway Telephones, FAX, photocopier machine and a PC with an Internet. The details are as under:-

Telephone Nos. **P&T**
Rly.
Fax

ii) Commercial Control office in Headquarter would be manned by officers round the clock basis. In case of serious accident of passenger carrying trains, CCM/G will immediately come to Control office. In his absence, CCM(IT)/CCM(S&M) and Dy.CCM/G will come to the Control office. If Dy.CCM/G is not available, SCM/G will attend. Thereafter, Control duties will be assigned as per roster for manning the Control office round the clock. Besides regular staff manning commercial control at least one officer and one inspector will remain in the control round the clock. Officer deputed will be responsible for proper functioning of the control.

iii) Headquarter Commercial Control would collect following information:

a) Time and place of accident from Operating Emergency Control.

b) Details of dead/injured Passengers, rescue operations, helps/assistance being rendered at the site of accident, enroute etc. from the divisional Commercial control/control at the site of accident.

c) Details of specials being run to the accident site and officials accompanying from Operating Emergency Control.

d) CCM/IT will get the reservation charts printed and supplied to control. In addition the addresses as per requisition slips shall also be get collected by CCM/IT & supplied to Commercial control, and Divisional Control.

iv) Commercial control at HQ will maintain: -

a) Telephone and FAX numbers of the control at accident site manned by Commercial officer.

b) Names and phone numbers of hospitals where injured are admitted/(i) with names of passengers and (ii) location of dead bodies identified (iii) digital

photographs of all injured and dead transmitted through computer network to be displayed and at sites or telecast & all enquiry offices.

c) Telephone and FAX numbers of enquiry offices that would have been set up at various stations including at other Zonal Railway.

v) Commercial control in the Headquarters office would constantly monitor the information relayed from the divisions and other railways regarding the dead and injured persons and enquiry offices opened at important stations.

vi) Commercial control in the HQ office will monitor/coordinate regarding assistance required by the division from other divisions/other railways in terms of deployment of material, staff and officers.

vii) In case of confirmation of death/injury, the Commercial control will inform the concerned division/railway (Commercial control) to convey the information to the family of affected passengers.

viii) Maintain a log of events.

b) Divisional Control.

i) Control Offices will have DOT/Rly. Telephones, FAX, photocopier machine and a PC with an Internet connection. The details of telephones and faxes of all the divisions should also be kept: -

ii) Commercial Control in Division would be manned by officers on round the clock basis. In case of serious accident of passenger carrying trains, DCM in his absence, DCM/Catering, where available or one of the ACMs will immediately come to the Control. Thereafter, Control duties will be assigned as per roster for manning the Control office. Second senior most commercial officer of the division will work as incharge of the Commercial control.

iii) Divisional Commercial Control would collect the following information from Divisional Emergency Control/accident site:-

a) Time and place of accident from Operating Emergency Control office.

b) Details of causalities - dead/injured and safe passengers from operating emergency control office.

c) Details of specials being run to accident site and officials accompanying from Operating Emergency Control office and monitor their arrangements.

d) Details of rescue operations and assistance being rendered to the affected passengers.

iv) Information collected should be relayed to all concerned including HQ Commercial Control, Enquiry Offices opened at stations through phone, fax, etc. without delay.

v) Commercial Control in Division will maintain:

a) Telephone and FAX numbers of the accident site.

b) Names and phone numbers of hospitals where injured are admitted and dead bodies shifted, and

c) Telephone and FAX numbers of enquiry offices that would be set up at various stations including at other Zonal Railways.

d) Name of Commercial Officer(s) deployed in each hospital.

vi) Divisional control will advise headquarters commercial control, details of assistance required from Headquarter or the adjoining divisions.

vii) Maintain a log of events.

c) Site of Accident

Sr. DCM in his absence, DCM will attend site of accident and work as site in charge of the Commercial department.

I. Setting of Control Office at the site

i) Division would set up a control office at the site with telephone, FAX and Public Announcement System (PAS) to be manned by Commercial, Security and Medical departments.

ii) Announcement would be made for registering the names of injured passengers, and the list would be verified by Doctor to be relayed to the Control offices at the division and headquarters. Separately indicating the extent of injury viz. Trivial, simple & grievous.

iii) Control office at the site will be manned by Assistant Commercial Officers on round the clock basis.

iv) The site control office would maintain a log book. Flow of information both incoming and outgoing would be recorded along with the time and names of the officers / staff who were given information to keep track of chronology of events.

v) Commercial Officers/personnel at site will NOT interact with the press.

vi) All necessary arrangements for refund as per rules should be made.

vii) A manual/guide be made available with train crew like; TTEs, AC Coach Attendants, AC Pantry Car Staff, which will inter-alia to include DOs and DONTs for them in case of accidents.

viii) Commercial Control will ensure that at stations where trains are

- Delayed,
- Diverted, or
- Terminated.

Additional alphabetical list of passengers on board with their current status must be available and displayed at enquiry counters for quicker dissemination of information. It will be ensured by CCM/IT and Divisional Control and divisional Commercial Officers.

II. Rescue

Sr. DCM will ensure the following functions.

i) Sufficient number of TTEs/TCs and licensed porters in uniform would be rushed to the site. The required personnel would be mobilized from the affected division and the neighboring divisions by the quickest available means. For this purpose TTEs from the divisional squad should be utilized. Requirement of staff could be continuously reviewed and augmented depending on the assessment of the officer in charge of site.

ii) Arrangements will be made for speedy dispersal of stranded passengers of the train(s) involved in the accident, as well as of trains regulated or terminated as a result of the accident in association with operating Department. In case of non availability of rail services, adequate arrangements should be made to disperse them by arranging road vehicles etc. This would be done by site in charge.

iii) Depending upon the need, accommodation in hotels/*Dharamshalas* would be hired for accommodating passengers and providing resting facilities to officials working at the site.

iv) Make arrangements to inform the next of kith & kin of the deceased/injured persons involved in accident. It will be done free of cost.

v) TTEs of the affected train will not leave site of accident till ordered by the site in charge.

vi) Train Superintendent or Conductor or senior most Ticket Checking staff till a commercial officer from division reaches to the site of accident, will allot duties to each available ticket Checking/other Commercial staff/volunteers in a manner to ensure maximum help to passengers under the prevalent circumstances. This function will be taken over by a Commercial officer as soon as he reaches to the site of accident.

vii) Duties of ticket checking staff on board will be:

a) Collect Railway staff, Doctors and volunteers on the train or near the accident site for obtaining assistance.

b) Provide assistance to Guard in making quick assessment of assistance required.

c) To carry out the duties assigned to them by Guard/Senior official present at the site of the accident.

d) Take action to save lives and render First Aid and organise relief operations with the available assistance.

viii) In case of involvement of Goods Train, following actions will be taken promptly:

a) Arrangements of adequate labour by mobilising resources available at other stations as well as from the market locally, for unloading of material from the wagons involved in accident.

b) Adequate tarpaulins to cover the contents so that these are saved from rains etc.

c) Arrangements of gunny bags etc. for retrieval of loose materials lying at the site of accident.

d) Consignor/consignee would be informed regarding involvement of their consignments in accident besides intimating forwarding/destination station. The information will be conveyed through the Commercial Control of the division/HQ as the case may be. Also to make arrangements for delivery of the consignments at the site of accident if they desire.

e) Arrangements of road transport for evacuation of the contents from the site of accident.

f) To coordinate with the Operating branch for supply of adequate empty stock for transshipment /disposal of the contents.

g) Till such time, the consignment involved in the accident is not removed/transported; the same shall be made over to RPF Incharge for security purposes.

ix) Staff using their personal mobile phones in connection with the accident will be eligible for a lump sum grant of Rs.200/- without any clerical work to be performed in accidents

x) In case of bodies, which remain unclaimed/unidentified, the division shall get such bodies photographed by hiring a photographer. Each body will be given a number, which can be displayed, on the body of the dead for subsequent identification.

II. **Safety of Passengers/Passengers luggage**

i) Separate tent for packages/bags and belongings of the injured and dead should be arranged and guarded with the help of RPF at site.

ii) A list of each item with distinguishing marks should be made.

iii) Luggage claimed should be handed over on the satisfactory proof of ownership.

iv) Unclaimed items will be safely transferred to one of the stations and for this purpose, if need be, road vehicles will be utilized/hired. Their personal belongings are useful in establishing identify of deceased/missing.

III. **Catering arrangements**

It will be ensured by the site incharge.

i) Sr. DCM will ensure that adequate eatables, water etc. is available at the site of accident in case of involvement of a passenger carrying train in an accident. This arrangement will be made for the passengers free of charge at the site of accident and at roadside station where train involved in the accident is stabled temporarily.

ii) Gas stoves, Gas cylinders, drinking water, provisions for preparation of meals, etc., should be rushed to site for left over stranded passengers and officials involved in rescue operations. This will be augmented later, if necessary. Sufficient cooks and catering staff from departmental catering or catering contractor would be ensured at the site for arranging tea, biscuits, packed meals like *poories* and vegetables to the stranded passengers, and staff engaged in rescue and restoration.

iii) Sr. DCMs would prepare advance section-wise nomination of catering agencies both departmental and private for rushing to site.

iv) To supplement railways catering arrangements, nearby *Dhabas* and hotels should be contacted and arrangements made for opening up stalls at the site.

IV) **Hospitals: -**

i) One assistant officer each in the hospitals will be deputed to look after where injured passengers are admitted or dead passengers are kept. In case of non-availability of assistant officer, one CMI/ inspector/Sr. supervisor will be deputed by Sr. DCM. All dead bodies must be photographed after wiping their faces to establish identify.

ii) The nominated officer will work in close coordination with doctors and render required help.

iii) Officer incharge of the hospital will assist kith and kin of the passengers involved, in disposal of dead bodies, release injured passengers.

iv) Deputed official will obtain details like name, address, etc. of hospitalized/dead passengers. He will also obtain the details of injured, nature of injuries with the help of doctors and convey it to the divisional Commercial control.

V) **Payment of ex-gratia**

i) Payment of ex-gratia at the site as well as in the hospitals will be arranged on the basis of the identification of injuries by the doctors.

ii) Sr.DCM/DCM will ensure availability of sufficient cash for payment of ex.gratia.

iii) CCO will also depute claims officials at the site/hospitals to assist the relatives of the injured/dead passengers regarding filing of claims for compensation.

iv) If some injured passengers/kith & kin of deceased involved in accident have not been paid ex-gratia at the site of accident or in the hospital, arrangements should be made to pay at their residence by deputing officials of the division or seeking help of the other divisions/railway. Such payment will be witnessed by the *Pardhan* or *Sarpanch* or any other responsible official of the area.

6. **Enquiry offices at the important stations enroute.**
This function will be ensured by the incharge available in divisional control.

i) Emergency offices would be opened at important stations as per the route of the train. On the basis of need, enquiry offices would be opened at other important stations also.

ii) All these enquiry offices should have DOT and Railway telephones with STD facility, Fax machine, photocopier and a PC with Internet connection. Identical telephone numbers will be preferred.

iii) These enquiry offices would be manned on round the clock basis by deputing additional staff. It will be supervised by a Commercial officer, where feasible/commercial inspector/CIT.

iv) These control offices should constantly keep in touch with the divisional Commercial Control.

v) Emergency offices would display the list of dead and injured passengers at the notice board at stations.

vi) Officers attending these emergency offices would not interact with the press.

vii) Sr.DCMs will prepare their own contingency plan on similar lines.

viii) Withdrawal of Money from station earnings:

Money withdrawn from station earnings will also be used for relief operations like purchase of items immediately required, hiring of vehicles and other equipments directly.

MARSHALLING YARDS AND FREIGHT TERMINALS

I. Introduction and Definition:

A Yard can be defined by the functions it performs. It is the place or the activity centre on a Railway system, where the trains or rolling stock or group of rolling stocks are received, reformed into trains or loads after marshalling and are despatched to their destinations. A Yard is, thus, a classifying and distributing machine with facilities for receiving, sorting and despatching the wagons to their various destinations, after the prescribed attention. This necessarily involves detention to trains and wagons, but it is inherent in railway working to have Marshalling Yards.

A Yard is a specified area laid out with a network of tracks divided into several grids for receiving sorting, forming and despatching of trains.

II. Necessity and Significance of Marshalling Yards:

Though Yards perform very important functions, yet the work done in a Marshalling Yard is only indirectly productive. Yards are operational necessity and are even considered as necessary evils. The ingenuity of the operating man consists in putting in the minimum number of the wagons into the minimum possible number of Marshalling Yards by forming trains for the farthest common points subject to rules and regulations. If the control is analogous to brain of the operating system, a large Marshalling Yard is a kin to the heart and its working to be planned and monitored with considerable care. Constant vigilance and intelligent and efficient work in day-to-day functions is required as it is one of the important factors governing the capacity and the output of a section. A Marshalling Yard affects not only the traffic it deals with, but also the entire train running on the section, in particular and the working of Railway system in general. The Yard gets easily congested if treated as a holding Yard and if more trains are put in than taken out.

III. Classification of Yards:

Yards can be classified as:

1. Terminal Yard
2. Marshalling Yard.

IV. Terminal Yard: Terminal Yard means the Yard attached to terminal goods sheds where large number of wagons are loaded and/or unloaded. This term is also used for every goods Yard, where a goods train terminates.

V. Marshalling Yard: Yards are nominated as Marshalling Yards on the basis of the work done and wagons dealt with. The Yard which receive and despatch trains without any shunting on them are classified **Transit Yard**. In such Yard generally change of Crew, Engine or C&W examination etc. only take place in addition to formations of a few loads. During the last 50 years such yards have become anachronistic and have given way to modern freight terminals the world over. Therefore, this description has value (1) as a historical document (2) as also as guidelines for efficient working of modern freight terminals, described at the end of this chapter.

i) Objectives of Marshalling Yards:

1. **Quick Transit viz.**
   - (a) Accepting trains without detention at adjacent station outside the Yard.
   - (b) Minimising the detention to wagons in the Yard.
   - (c) Timely supply and placement/removal of wagons to the goods shed, transhipment shed, repacking shed, sidings, carriage and wagons depots etc. served by the Yards.
   - (d) Forming block loads for the farthest destination.
   - (e) Ensuring convenient Marshalling of wagons from the operational efficiency point of view.
   - (f) Ensuring right time start to outgoing trains.
2. **Economy:**
   - (a) Maximising productivity of resources and minimising the detention to Train Engine/Light Engine, Shunting Engine, crew and other connected staff.
   - (b) Optimising the Trailing load of the trains.

(c) Optimising shunting engine utility.

3. **Safety**:

(a) Ensuring minimum damage to wagons and consignments loaded on the wagons during the shunting operations.

(b) Ensuring safe Marshalling and C&W pattern of examination.

(c) Elimination of Yard accidents.

ii) Kinds of Yards:

Marshalling Yard can be classified under three groups on the basis of the method of sorting out trains:-

1. **Flat Yard:** Flat Yards are generally laid on flat or level land where shunting operations are carried out with the help of engine by push and pull method. Such Yard is economical in space but slow in working and wasteful in shunting engine hours.

2. **Hump Yard:** Hump Yards are constructed by providing gradients between reception and the sorting and despatch lines and the grids. The gradients are created by constructing an artificial hump suitable for the purpose. The gradient of the hump is constructed in such a manner that the wagons roll down of their own to specified sorting lines from the summit(apex) of the hump after having been pushed up by the shunting engine. The load is pushed up by engine towards the hump from one side of the hump so that the uncoupled portion of the load rolls away towards another side of the hump in sorting/despatch line. There are generally two humps one for 'Down' and one for 'Up' Yard. These Yards are economical in shunting engine hours as compared to flat Yards.

3. **Gravity Yard:** Gravity Yards are constructed where the natural contour of land permits a suitable falling gradient stretched over a sufficient length. The falling gradient makes it possible to use the Yard to the fullest extent in Marshalling wagons/trains thus minimising the use of engine power. Therefore gravity Yards are more economical than flat Yards but the layout of it dependent on the availability of plenty of land with the required topography which is seldom possible.

iii) Some Terms Concerning Marshalling Yards and its Components:

Some of the components of Marshalling Yards are explained below:

1. **Reception Yard:** Reception Yard comprises of the lines on which the incoming trains are received and stand clear of other running lines while waiting their turn to be dealt with. Incoming trains may be composed of wagons which are to go through after changing of power, Crew and Guard or of wagons requiring sorting and Marshalling. Separate grids may be provided in the reception Yard one for through trains and another for terminating trains. Separate reception Yards may be provided for trains coming from different directions. The grids for through trains bye passes the hump.

2. **Sorting Yards:** It is a Yard in which the trains are broken up on the different sorting lines for various directions or specified destinations, as per Marshalling order so as to form them into trains and prepare them for correct Marshalling.

3. **Marshalling Lines:** The lines in which sorted wagons are separated first, if necessary, according to commodity, type of vehicle, Marshalling order, direction and secondly reformed into trains in special order to meet the requirements of the section ahead or any other special transportation requirement.

4. **Departure Yard:** In which load can be held ready for departing trains. Separate departure Yards for trains for different directions are provided in large Marshalling Yard.

5. **Shunting Neck:** It is a line in a Yard leading to sorting lines on which the actual shunting of the trains maybe done clear of any running lines.

6. **Gathering lines:** It is a line on which the turn outs to other lines are arranged.

7. **Transfer lines:** These lines are meant for transferring wagons, generally from up Yard to down Yard or vice versa, in case of two separate Marshalling or hump Yards.

8. **By pass or avoiding lines:** It is a line, which skirts the hump, and its object is to avoid engine going over the hump. It joins the shunting neck at one end and the main hump line short of the king point at the other. It is also used for vehicles, which cannot be passed over the hump into the sorting Yard due to various reasons.

9. **Engine Run Round Line:** It is the line reserved for movements of incoming and outgoing train engines to and from the Yard or the loco shed, or for independent movement of shunting engines.

10. **Engine Escape Line:** It is the line meant for engine movements to and from the loco shed from and to Yard so that engine returning to loco sheds do not interfere with engines, going out of the loco shed, or with any other movements in the Yard.

11. **King Points:** The first pair of points a wagon meets with after passing over the hump are called 'King Points'. They divide the sorting Yard into two portions.

12. **Queen Points:** The second pair of points a wagon meets with on its way downwards are called Queen Points, which further divide the sorting Yards into four portions.

13. **Jack Points:** The third pair of points a wagon meets are called the jack points and these serve to divert the rolling wagons into the different grids of the sorting Yard. Points beyond jack points called 'Ten points'.

Note: In a hump Yard there are usually a pair of 'king points' two pair of 'Queen points' and four pairs of 'Jack points'.

14. **Retarders:** One of the main problems in the working of a hump Yard is to adjust suitably the speed of the humped wagons rolling down so that they may not cause damage by humping down against wagons already standing on the same line. The speed of the humped wagons varies according to the force of the push given by the engine, the height of the hump, the weight the nature of the axle box (viz. roller bearing or plain bearing) as also on the weather prevailing.

    In mechanised Yards, retarders or rail brakes are installed to reduce and keep the speed of the humped vehicles under control. The retarders may be automatic or manually operated.

15. **Skids:** At Yards, where mechanical retarders are not provided skids are placed on the sorting lines to control the speed of the humped wagons. These skids are placed by skid porters and the skids automatically come out of runways, where provided, or/and are removed after the wagon has come to stop.

16. **Brake van siding:** In this siding, brakevans of incoming terminating trains etc. may be detached for subsequent attachment to originating trains.

17. **Special stock siding:** These are provided for keeping for special type stock, cattle wagons containing commodities like explosives which can not be humped.

18. **Stabling Lines:** In large Yard, ballast, material or POH special, empty military special trains are sometimes required to be stabled. Moreover there are heavy accumulations of certain classes of stock for various reasons. The stabling accommodation in the Yard should, therefore be ample so that the Yard may retain its mobility inspite of any accumulation of wagons or other set backs.

19. **Sick lines:** Normally sick wagons are sorted out in the sorting Yard, then sent in the sick line. As the time taken in placing wagons into and withdrawing them from a sick line is usually several times the time spent in actual repairs. Provisions should be made to carry out whatever repairs are possible in the sorting Yard itself by providing sick lines.

iv) Telecom Equipment of Marshalling Yards:

A Marshalling Yard should necessarily have the best possible telecom facility for proper functioning and efficient supervision of work:

1. **Telecommunication arrangement:** Since a Marshalling Yard covers a considerably big area, the distance between its different points and portions becomes naturally long. Therefore extensive telecom network, through an electronic exchange and intercoms between all-important points in the Yard, is imperative so that instructions to the

supervisory staff can be conveyed quickly over telephone. The Yard should also have direct dialling trunk facilities and Control Telephones, so that instructions to the supervisory staff can be communicated properly and promptly.

2. **Paging and talk-back arrangement:** Major Marshalling Yards are provided with Paging and talk-back sets, through which orders and instructions are issued to the staff concerned, working in different spheres in the Yard, from one central point. Similarly, the staff can also convey any information to the central points. This helps co-ordination between different spheres of the Yard.

3. Loud speakers are also provided at convenient points so that instructions can be conveyed to different staff working in the same area. For example, loudspeakers are provided in the Sorting Yard, so that the incharge of the hump can convey instructions relating to Hump cabin and the skid Porters regarding the line on to which wagons are being shunted. Similarly, arrival and despatch of trains can be monitored.

4. Extensive use of good walkie-talkies will also go a long way in improving the efficiency of the Yards.

v) Yard Organisation:

Yard working is controlled by a Chief Yard Master, though small Yards may be controlled by Yard Master. Bigger Yards may be under the control of Area Officer. The Yard in charge has two organisations under him.

1. **Field staff:** It includes the Chief Yard Masters, who is overall Incharge of the Yard and Yard Masters in each shift are responsible for operational work. In dual yard system, there may be more than one Yard Masters, e.g. one for Down Yard and another for Up Yard, on the other hand, where the traffic is comparatively low, Yard Masters may be replaced by Assistant Yard Masters. The next level of supervision is generally related to the shunting engines. Each shunting engine may have an Assistant Yard Master/Shunting Master, attached to it, who controls the movements of the shunting engine. Shunting Jamadar may be included in the organisation to assist them for dealing with the shunting work allotted to each engine. Where the shunting work is not heavy or comparatively unimportant, the Shunting Jamadar may be incharge instead of Yard Master. Each shunting engine generally has a batch of three or four Pointsmen, whose duties are usually as under:

(a) For Uncoupling the wagons

(b) For Braking of wagons

(c) For Relaying of signals

(d) For operating the points.

The above staff from the organisation for sorting work besides other staff are also required for various auxiliary functions – cabin staff, call boys, box boys (brake or skid porters in hump Yards) etc. apart from the staff of other departments.

2. **Trains Branch:** CTNC or Head TNC, has over all responsibility for the efficient working of the trains branch. Below them, there are Head TNCs/ Sr.TNCs/TNCs, who may be on shift duties or during day duty only, depending on the work load of the Yard. These Trains Clerks are entrusted with comparatively important work in the trains branch like preparation of Marshalling Yard statistics, maintenance of the Yard Balance Register, Daily Stock Taking etc. The TNCs in shift duties take stock of trains in Reception and Despatching Yard. They also maintain Wagon Exchange Registers, Phase-wise Detention Register and stock on line position. The number of TNCs in a Yard will depend on the number of wagons, trains dealt with in a Yard.

3. **Yard Working Instructions:**

For proper and efficient working of each Yard, general directions for working in each shift should be laid down in the Yard Working instructions. The instructions should deal with all important aspects of working in detail other than the procedure for reception and despatch of trains, etc., which are required to be given in the Station Working Rules to be useful for the general guidance of staff working in the Yard as well as to the new and the relieving staff. The Yard Working instructions should be prepared generally under the following heads:-

a. Full description of the Yard including no. of lines with their holding capacity etc.

b. Strength of the Yard Staff in each shift.

c. Quantum of inward, outward and internal traffic required to be dealt with by the Yard and their timings.

d. Marshalling Orders in force.

e. Shunting engines available in each shift and their utilisation, generally.

f. Procedure of work to be carried out, generally in each shift.

g. Directions to Shunting Jamadars and Yard Masters on arrival on duty, in general, in regard to advance planning of the work during their shift.

h. Directions to Shunting Jamadars and Yard Masters in regard to position of the Yard at the time of handing over the charge.

i. Important Safety Precautions

j. Miscellaneous instructions.

4. **Main Works required to be performed by Yards:**

Generally a large Yard is required to perform the following work with due regard to efficiency, reliability, economy and safety:

a. To pass through trains after changing of engine and carriage examination and detaching sick wagons, if any, and adjusting load of the train if necessary.

b. To break up and sort out terminating trains and loads and the local loads originating in the Yard.

c. To form originating through trains for the farthest point possible in accordance with long distance Marshalling orders laid down by the HQ office.

d. To form shunting and van trains for the different sections served by the Yard.

e. To hold back trains and wagons until they are able to go out.

f. To keep wagon detention to the minimum while planning item No. (1) to (5).

g. To move train engines and pilots between the Yard/Loco Shed and sidings.

h. Placement and removal of inward loaded wagons for the goods depots, loco shed, private sidings etc. served by the Marshalling Yard.

i. Placement and removal of wagons from the repacking shed to the Yard.

j. Placement and removal of Sick/Fit wagons from the sick lines.

k. Assessment of room by the nominated shunting trains for roadside stations.

l. Arrangements for supply of stock as per Indent Register and ODR required by the road side station in accordance with the orders received from the CTNL(Stock).

m. Weighment of wagons in certain nominated Yards as and when required.

n. Maintenance of the correct tally of the daily output of the Yard.

o. Maintenance of record of detentions to other kinds of stock such as local loaded, sick wagons, empties and special stock etc.

5. **Some Factors Affecting Working of the Yards :**

a. Lack of proper advance planning and co-ordination between the Control and the Yards, and want of proper co-operation between the Yard staff, loco shed staff and carriage and wagon staff, affects Yard working adversely. For efficient Yard working it is necessary that the Yard staff must plan their work in advance in consultation with control and adjacent Yards, if necessary the different members of the Yard staff should extend co-operation in the efficient working of the Yard as a matter of team sprit.

b. Sometimes, while breaking up the terminating trains, local wagons are not properly collected in specified lines and they remain scattered in the sorting and Marshalling lines or other parts of the Yards thereby causing undue delay in the Yard operations. Endeavour should always be made to collect these wagons in lines specified for the purpose.

c. Late or irregular removal of loads from local areas affecting timely placement of wagons in their appropriate sidings is often a chronic cause of trouble in the working of the Yard. Therefore endeavour must always be made to adhere to the schedules for placement and removal of wagons in the different areas of the Yard in accordance with Yard working instructions.

d. Empty stock should not be allowed to lie scattered all over the Yard. As far as possible empties should be sorted out in the groups in which they are generally required to be worked out, keeping as far as possible special type of stock separately from general wagons. All empties stock so grouped preferably be kept separate in specified lines.

e. Sick wagons and wagons for adjustment of loads and transhipment of contents often lie scattered through out the Yard thus hampering the Yard operations. Even if the number of sick wagons exceeds the repair capacity, these must invariably be kept collected in the specified lines and sick lines placement and removal should be done strictly according to the schedule. Wagons required adjustments of loads and transhipment or contents must always be placed in the appropriate line and attended to with the least possible delay. Where adjustment of loads can possibly be done in the Yard itself, this must be resorted to.

f. Any tendency on the part of shunting engine Loco pilots to waste time on loco requirements should be curbed. Shunting engine must not be allowed more than the specified time for loco requirements at fixed intervals.

g. Higher wagons balance in a Yard affects its mobility. It is therefore very necessary that proper analysis of the highest wagon balance beyond which mobility of the Yard is seriously affected, should be worked out and proper co-ordination between the Yard Master, Assistant Station Master, Control and adjacent Yard should be maintained all the time. To prevent excessive inflow of wagons, which seriously affects mobility of the Yard, an eternal watch should be kept on the Yard Balance and steps taken to keep within the working capacity of the Yard.

h. Efficiency of the Yard shunting engine is one of the most important factors on which the working of the Yard depends. Requirement of a better shunting engine or an additional shunting engine during the busy periods, may therefore be found necessary for better working of a Yard. In big Yards, efficiency and sufficiency of the Yard shunting engines should be periodically examined and if frequent engine trouble is reported, supervisors of loco should be posted temporarily with them until the cause of the trouble is removed.

i. **Yard lay out:** The shunting Jamadar and the Yard Master should carefully watch if any particular feature of the layout, such as wrongly placed cross over, a short shunting neck or isolation of two busy groups of lines is a restrictive factor in the efficient working of the Yard, and if any minor additions and alterations, such as providing an additional crossovers, positioning an existing cross-over correctly, lengthing of a particular line, etc. are likely to improve the working of a Yard, necessary proposals should be forwarded to the DRM(O).

j. Sometimes delay in the release of the wagons by public and departmental consignees cause heavy accumulation of local wagons thus affecting the working of the Yard. Advance intimation given to rake handling parties on the telephone and the departmental supervisors in the local area about the number of wagons awaiting unloading would enable them to make necessary arrangements in time for releasing the wagons.

k. Sometimes identification of any particular traffic, which affects the mobility of the Yard, is required so as to advice to control to restrict the inflow.

l. In case of heavy congestions requiring block back on the neighbouring sections, neighbouring Yard should be called upon or directed by Sr.DOM/CTNL by taking upon them some of the sorting and Marshalling work, the congested Yard would normally have done. If necessary a competent Officer or Inspector should sit in the Yard and a direct operation until the congestions is cleared.

m. In the event of an accident temporarily reducing working capacity, steps should be taken to regulate the inflow of trains into the Yard for a day or two, or such a long

period as may be absolutely necessary until the emergency is over and the Yard has regained its normal working capacity. The work load on the Yard must be suitably reduced to avoid serious repercussions on the Yard itself and on the neighbouring sections. Accidents should preferably be attended to personally by officers, as far as possible so that re-railing/restoration and clearance work may be done in the best possible manner.

n. **Late start of trains from the Yard:** Whatever may be the cause of late start of trains from a Yard, this apart from reducing available capacity of the section, in turn, affects the working of the Yard itself by delaying subsequent formations of trains.

o. **Yard facilities:** Ordinarily a Yard should be adequate enough for its requirements of sorting, handling of local traffic, formation of trains and for holding back stock until it can go out on the sections or to various installations in the local area. If shunting or train movements in one part interferes with similar movement in the other parts, or if simultaneous reception of trains from and despatch to different directions is not possible, or the Yard starting a train from or carrying on shunting in one group of lines while a train is being received in the other group, if prevented, it requires careful attention of Supervisors, Inspectors and Divisional Officers for necessary remodelling. If frequent congestion takes place in a Yard or a Yard show poor performance, the entire working should be thoroughly examined to determine the root cause of congestion. The causes of strained working may be a generally increase in traffic, large increase of traffic from one or two sections or stations, bad working of some installations served by the Yard, small or obsolete shunting engines or their inadequacy etc. all these call for suitable action.

p. Sometimes want of proper working facilities, such as adequate lighting, communication between the different key-points in the Yard and the Yard Master and the Assistant Station Master requiring a number of messenger to run about in the Yard for this purpose, affects the working of the Yard adversely.

6. **Some of the other factors affecting the Yard working:**

(a) Non-rectification of hump gradients.

(b) Hump shunting not useful enough for the loads which require pushing of loads.

(c) Under load running of outward trains.

(d) Trains received mismarshalled.

(e) Congestion/interruption on the section or in the intermediate or terminal Yards.

(f) Heavy receipts of local wagons.

(g) Shortage of engines.

(h) Train Crew shortage.

(i) Heavy shortage of Yard working staff including C&W staff.

7. **Operating Considerations Governing Design of a Yard:**

i) The lay-out of the Yard should be such that as far as possible movements of wagons in their several Marshalling operations would be continuous and progressive in the direction of the destination of the wagons because reverse or zig-zag movements reduce efficiency. The reception lines, sorting lines, shunting necks, Marshalling lines, departure lines should, wherever possible, be arranged with this object in view.

ii) The layout should also satisfy the basic principles of maximum flexibility in movements consistent with safety so that as many as possible of the different types of movements which are required to be performed may be carried out. At one and the same time it should be possible to perform all the different movements which are to take place at the same time.

The following independent movements within one and the same area should be planned as far as possible.

(a) Simultaneous reception of trains from different directions.

(b) Simultaneous despatch of the trains to different directions.

(c) Two or more shunting engines working, not to interference with one another, by provision of separate shunting necks.

(d) Reception of one train not to interfere with the departure of another train and vice-versa.

(e) Reception of trains in one part of the Yard should not interfere with shunting in another part.

(f) In large Yards, there should be separate lines for Reception, Marshalling and Despatch. Bye-Pass Running lines may be provided if possible, when only crew change is required.

(g) There must be adequate facility of light and communication in the different part of Yard. Yard should be so designed as to permit future extensions in each important section, like reception lines, sorting lines/ Marshalling group etc. in the next 25 years though on consideration of economy, requirements of the next five years only may the first instance be provided.

9. **Marshalling Yard Statistics: (Manual of Statistical Instructions Volume-I)**

(Railway Board has decided that statistics shall be maintained in terms of 8-wheeler units. Same be incorporated by the railways)

General Instructions:

a. The Marshalling Yard statistics should be prepared for selected Yards generally dealing with 8000 eight-wheeler wagons and over per month in respect of BG Yards and 5000 eight wheeler wagons and over per month in respect of MG Yards, prior approval of the Railway Board should however, be obtained for addition or deletion of any Yard.

b. Brake vans are to be included.

c. The area of each Marshalling Yard is to be carefully defined and no extra allowance is to be made for any work done within that area. A diagram showing the Marshalling Yard area clearly demarcated should be prepared for the Yards for which statistics are requires to be compiled by the Railway for the Board. This diagram should be readily available at the stations to enable any inspecting officer to obtain a clear indication of the extent of the Marshalling Yard.

d. Sick lines and repacking sheds, transhipment points, goods sheds, departmental sidings and the industrial sidings etc., may as a general rule, be treated as lying outside Marshalling Yards for purpose of calculation of Marshalling Yard statistics.

e. At places, where there are points like the Goods terminal station and/or Brake-of gauge transhipment point etc., continuous to the Marshalling Yard, and the detention statistics for each of these Yards are compiled separately either for submission to the Railway Board or for inclusion in the Railway's own Domestic Statistics. The sum total of detention in each Yard should accord with the total detention from arrival of a wagon till its final despatch from that station. To ensure this, the supervisory staff in-charge should exercise a check, at least once in a month, on a random sampling basis. This check should be broad based covering not only the important categories of wagons e.g. four wheelers, BOX wagons, oil tanks etc. but also the main stream of movement of wagons to and from different directions. This exercise should cover at least 10% of the total number of local wagons dealt with in the Marshalling Yard during the previous month and the records of such checks should be properly maintained to be available for scrutiny by inspecting personnel.

f. In the case of wagons whose detention or despatch particulars are not available, their detention should not be omitted but reckoned on the basis of the average detention during the month for similar type of stock while working out the average detention per wagon. The number of such wagons should be indicated separately under through loaded and all wagons for each Yard in a foot-note to the statement.

g. Yards provided with humps are to be denoted by a star and terminal Yards should be specified by a note to that effect.

h. Except where otherwise stated, all results, are to be worked out correct to one place of decimal, but those which are less than 10 should be worked out correct to two places of decimal.

MARSHALLING YARD STATISTICS **Statement No. 14**

For the month of _____

Item	Name of Marshalling Yards stating broad gauge or metre gauge	Remarks
1	Wagons despatched-	
	1.01	Number of wagons despatched - Despatched by trains during the month
	1.02	Number of wagons placed from Marshalling Yard outside the Yard by pilots in goods sheds, transhipment/repacking sheds, departmental sidings or Yards, military sidings, assisted sidings, etc.
	1.03	No. of wagons dealt with during the month
2	Daily average number of wagons despatched.	
3	Number of trains received	
	3.01	a) Number of by passing trains
		b) Number of terminating trains
		c) Total (a+b)
	3.02	Average detention to by passing trains: Target- Actual -
	3.03	Number of wagons carried by - By passing trains included in items 3.01(a)
4	Number of trains despatched	
	4.1	No. of by passing trains
	4.2	No. of originating trains
	4.3	Total
5	No. of wagons dealt with per shunting engine hour -	
	5.1	No. of pilots working in the station
		(a) Number of pilots
		(b) Number of shifts per day
	5.2	Total shunting engine hours outside Marshalling Yards
	5.3	Total shunting engine hours of regular shunting engines employed for work inside Marshalling Yard
	5.4	Total shunting hours by train engine employed for work in Marshalling Yard.
	5.5	Total time taken for locomotive duties and minor repairs
	5.6	No. of wagons dealt with per shunting engine hour
6	Average detention per wagon (Hours)	
	6.1	All Wagons- Target Actual
	6.2	Through loaded wagons - Target Actual
	6.3	Through empties
	6.4	Outward Local
	6.5	Inward Local
	6.6	Sick wagons

9. **Procedure for Working Out Marshalling Yard Statistics:**

i) **Wagons despatched:**

Item 1.01 and 1.02 are self explanatory. A wagon should be included under item 1.02 as many times as it leaves the Marshalling Yard.

Wagons on 'by passing" trains (i.e. through goods trains, as defined in note under item 1 of statement will not be included under item 1.01).

Item No. 1.03 – Item 1.01 + 1.02

ii) **Daily average number of wagons despatched:**

$$\text{Item 2} = \frac{\text{Item 1.03}}{\text{No. of days in the month}}$$

(iii & iv) **Number of trains received and despatched:**

(a) A train for this purpose is a set of wagons or vehicles worked by locomotive, or any other self-propelled unit, or rail-motor vehicles, empty or conveying traffic when running, under a particular number or a distinct name, from a fixed point of departure to a fixed point of destination.

(b) All trains, both terminating and by-passing (i.e. through goods trains) are to be included. "By passing trains" should be accounted both under the number received and despatched.

v. **Number of wagons dealt with per shunting engine hour:**

$$\text{Item 5.06} = \frac{\text{Item 1.03}}{\text{Items 5.03 + 5.04}}$$

Note: (i) While compiling shunting engine hours under item 5.3 and 5.4 the following instructions should be kept in view.

(a) Shunting engine hours are to include the shunting hours of regular shunting engines and train engines before and after working a train or during its run when employed in shunting goods wagons only in the Marshalling Yard area. The shunting time within the Marshalling Yard area should only be taken into account and not the time spent outside its limits.

(b) Shunting engine hours are to be reckoned from the time of arrival of the shunting engines in the Marshalling Yard upto the time of their departure from the Yard on the basis of shunting vouchers. The time spent on locomotive duties whether in the Yard itself or outside the Yard is to be included. However, any extra time taken over the normal time prescribed for carrying out legitimate locomotive duties should be excluded, the normal time being determined by the individual railway taking into account the local conditions and indicated in the operating manuals.

If shunting engine is required to be repaired in the Yard itself, the extra time beyond 30 minutes spent on such repairs in a shift should also be excluded.

(c) The time spent in the Marshalling Yard for change of crew and/or fuelling, should be accounted for in the same manner as on locomotive duties referred to in Note (1)(b) above.

(d) Since shunting engines shunt both coaching and goods vehicles, the allocation of shunting engine hours to goods and coaching stock may be fixed for each Yard on a percentage basis after an examination of the work done. This percentage is to be rechecked at least once a year and also when any change occurs in the type of traffic passing through that Yard. Where daily records are kept of the working of shunting engines according to hours spent (i) inside the Marshalling Yard (ii) outside the Marshalling Yard and (iii) in shunting coaching vehicles, it will not be necessary to fix a percentage, as the actual hours spent in the Marshalling Yard in shunting goods vehicles will be available. Time taken by shunting engine in placing wagons in such lines is to be included in shunting hours when such lines form the part of the Marshalling Yard area.

Note: (ii) Time spent for locomotive duties recorded separately under item 5.5 will include under 5.3 also. Item 5.5 will include the time taken by shunting locomotive for

locomotives duties and minor repairs upto 30 minutes per shift as per Note (i)(b) under item 5.

vi). **Average detention per wagon:**

(a) The detention time should have reference only to the detention within the Marshalling Yard territory as defined in para (iv) of General Instructions and the incoming and outgoing wagons from and to the local outlying sheds, sidings, etc. should be counted as many times as they enter the Yard. This will include detention to sick wagons in the Marshalling Yard although their detention is separately shown against item 6.6.

(b) The average detention is to be obtained by recording in the wagon exchange register or similar record, the hours of detention to each wagon, that is the interval between its arrival and departure. At the end of the month under different types must be totalled, and both detentions and number of wagons for each type must be multiplied by the factor of equivalence to four wheeler and then consolidated to work out the average detention per wagon, the following example will illustrate the method of calculation of the average detention per wagons.

Example: Suppose Yard A has despatched 100 four wheelers with a total detention of 400 hours, 20 bogie wagons (Equivalent to 40 four wheelers) with a total detention of 200 hours and 10 Box wagons (equivalent to twenty five four-wheelers) with a total detention of 150 hours. Average detention per wagon will be –

$$\frac{400 \times 1 + 200 \times 2 + 150 \times 2.5}{100 \times 1 + 20 \times 2 + 10 \times 2.5} = 7.1 \text{ hours}$$

The detention of wagons arriving in one month and despatched in the next will be shown in the month in which they are despatched, but the time must be reckoned from the date of arrival. Stations which maintain a wagon card index may obtain the figures therefore instead of from the wagon exchange register. The number and detention of Brakevans will be excluded for the purpose of this item.

(c) The 'target' detention hours will be fixed by the Railway Board from time to time having regard to the past performance of each Yard and also materialisation of different streams of traffic, Marshalling commitments and the facilities available. A pointer to the correct level of a target would be the best result achieved in the past one or two years, assuming that there has been no noticeable improvement or deterioration in the operating conditions and methods. The target should be somewhat better than the actual recorded performance so that it may call for better effort on the part of the staff concerned to achieve the margin of improvement remaining between the actual and the target.

Item 6.1 – **All wagons** – The term 'all wagons' includes through loaded, through empty, local loaded, local empty and departmental wagons, wagons on 'through trains' (as defined in item 1.01 & 1.02) sick and damage wagons will be excluded. Sick and damaged wagons will be included wherever the sick lines form part of the Marshalling Yard area.

In respect of the Yards which may as well be depots for holding empties, such empties should not be included for the purpose of this item. These Yards should, however, be denoted by a suitable footnote specifying therein the average daily holding of the depot.

The "exit" and "re-entrance" timings may be fixed on the basis of sample observations made once a year. These fixed timings may be rechecked annually and also when any major change occurs in the working of the Marshalling Yard.

Item 6.2 - **Through loaded wagons** – The term "loaded wagons" mean loaded wagons which neither originate nor terminate at the station, but which are dealt within the Yard and are not on "by-passing" trains (as defined in item 1.01. and 1.02).

Item 6.3 – **Through empty wagons** – The terms "empty wagons" means empty wagons which neither originate nor terminate at the stations, but which are dealt in the Yard and are not on 'by-passing" trains (as defined in items 1.01 and 1.02).

Item 6.4 - **Outward Local –** This item will include detention to local wagons despatched by trains from the Marshalling Yard i.e. from the time of their entry into the Marshalling Yard from the outlying sheds and sidings till their despatch by trains.

Item 6.5 – **Inward Local –** This will include the detention to local wagons from the time of their arrival in the Marshalling Yard till their placement into the local sidings.

Item 6.6 – **Sick Wagons –** Detention to sick wagons in the Marshalling Yard will be included under this item as also under "all wagons". In case the sick lines form part of the Marshalling Yard the detention in the sick lines will also be included under this item. If the sick lines are outside the Yard, such detention will be excluded.

vii) **Present Status and the Road Ahead:**

Closure of conventional marshalling yards was an outcome of –

a) Unit train movement

b) Advent of containers

The container revolution ensured that an universal flat rail car could move all description of traffic of varying cargo size – train load, full container load or less than container load. It can quickly eliminate shunting operations, which was replaced by gantry or road mobile trains; picking up containers and repositioning them – the equivalent of tortous shunting as detailed above. It ensured that freight customer does not have to register a wagon or rake, he has to ask for simply a given number of containers which are sent to his premises for loading/unloading and are brought back to modern freight terminals. The exorbitant cost involved in taking freight consignments to railway goods shed and unloading in inward consignment there and carting them to customers' premises are totally eliminated and inter modal operation ensures door to door service, which till now was the hallmark of road transport, which had captured nearly 80% of making Indian Railways the second largest mode of transit movement.

Rightly enough the era of modern freight terminals has began. These are world class facilities and include:-

i) An ICD for export/import cargo with customs clearance facility

ii) Appointed warehouse to facilitate custom duty being paid as an when the cargo is needed.

iii) Large warehouses where cargo can be stuffed/restuffed/stored and moved as per customers' instruction

iv) Road, rail and air transport connectivity on demand.

v) Cold chain for refrigerated cargo

vi) Banks

vii) Fax, Telex & Telephone Internet connectivity

viii) Continuous cargo tracking globally

Freight terminal operating company and some of the railroad company who have a customer services centre working round the clock to receive customers instructions for change of destinations, rebooking of cargo etc. and this new environment the freight customer may visits the commercial office to execute agreements or long term contracts. The freight terminal is like a factory where the cargo goes and goes out. Process for bringing about this business like cause is already on way with private operators managing their terminals, running their own trains, serving their customers in an entirely business like environment. In this scenario the erstwhile marshalling yard are in the following areas

i. Providing rail substitute to road

ii. Serving large production units like steel plants & refineries

iii. Major customers like thermal powerhouse, fertiliser plants, cement plants, ensuring availability of inputs and clearance of their outward cargo.

iv. Major carriage wagon depots for freight rolling stock

v. Crew and loco changing locations

vi. ICDs of IR's subsidiary CONCOR

The transition from conventional; goods shed and marshalling yards of freight terminals have equipped railway system worldwide to win back high profit yielding, finished production from road to rail cum road system which reduces cost to the economy and the customers, substantially reducing the adverse environment impacts of road transport, paving the way for sustainable transport. The future manifestation of railway yards is likely to be as Logistics Park as railways strives to become a logistics provider rather than a mere transporter.

The future manifestation of railway yards is a logistic park, essential for Railways as it shifts towards being a logistic provider from a mere transporter.

CONTAINER TRAIN OPERATION

With a view to increasing railway's share of container traffic and introducing competition in railway container transport services in India, Ministry of Railways decided to grant eligible parties the right to require the Railway Administration to haul their Container trains on Indian Railway network for movement of both Export and Import Traffic as well as Domestic Traffic subject to various terms and conditions contained in an Agreement. This Agreement sets out in detail their mutual relationship and the terms and conditions, which shall govern the right of the Concessionaires to offer their Container trains for movement to Railway Administration and the obligation of Railway Administration to move the trains.

The salient features of this Agreement as well as of related instructions with respect to train operations are given below. The salient features of the Concession Agreement with Container Train Operators and of other related instructions are indicative in nature and for guidance only. For actual provisions, the Concession Agreement and the Circulars and Railway Board's letters mentioned above should be referred to.

1. Concessionaires have a non-exclusive right to require the Railway Administration to haul the Concessionaire's Trains subject to the Concessionaire establishing/ensuring access to Rail Terminals and acquiring a minimum number of Wagons including brake vans to form a Block Rake for the commencement of operations and for transportation of containers.

2. The term of this Agreement shall be for a period of 20 years starting from the Commercial Operations Date.

3. In the event the Concessionaire fails to operate its Container Trains in accordance with the requirements of this Agreement within three (3) years from the date of award of the In Principle Approval, Railway Administration shall have the right to terminate the Agreement.

4. The rights of the Concessionaire shall include the following:

   i) The right to undertake the business of collecting, storing and loading onto Wagons, consignments of goods from any third party;

   ii) The right to determine, charge, collect, retain and appropriate all the fees that it charges from the consigners;

   iii) The right to obtain access to Rail Terminals and develop, own, operate and maintain Rail Terminals, including inland container depots;

   iv) The right to procure and own/lease Wagons and containers.

5. The concessionaire will be responsible for loading and unloading operations at both the origin and destination Rail Terminals

6. The Railway Administration shall haul the Concessionaire Trains on the payment of prevalent haulage charges as notified from time to time. The present haulage charges are contained in Board's letter no. 2008/TTIII/73/8 dated 1-7-2008.

7. The Central Government (Ministry of Railways) shall have the right to specify certain commodities, which ordinarily move in railway wagons in trainload as notified commodities, which may be subjected to different tariff and conditions for haulage. At present as per Board's letter no. 2008/TTIII/73/8 dated 1-7-2008, carriage of coal, coke, minerals and ores in containers is prohibited.

8. The existing incentives/schemes extended to rail customers or that may be introduced in future shall not ipso facto apply to the Concessionaires. Upon request of the Concessionaire(s), Railway administration may consider extending such schemes to the Concessionaire to the extent possible in a non-discriminatory manner.

9. All commercial rules like that contained in Commercial Manual, as amended from time to time and as applicable to other freight traffic moving on Indian Railways shall apply to the Container traffic, except rules specially covered in this Agreement in a non-discriminatory manner amongst similarly placed entities.

10. It shall be the Concessionaire's sole responsibility to procure the requisite approval/authority for the Concessionaire's Train and/or a Railway Administration locomotive to enter into and utilize the origin and destination Rail Terminal(s).

11. Each concessionaire is required to set up two rail linked inland container terminals within three years of obtaining the license to operate or have access to inland container terminals.

12. Use of Railway freight terminals (Goods sheds) as Container Rail Terminals (CRT) has been permitted by the Railways in terms of Rates Circular 10 of 2008.

13. Each Rail Terminal, other than a Railway owned Terminal, that is used by the Concessionaire shall conform to the following:

(i) Each Rail Terminal shall have rail facilities for handling Concessionaire Trains along with locomotive in conformity with siding rules prescribed by Railway Administration from time to time.

(ii) Be equipped with a RDSO approved in-motion weigh bridge of prescribed standards for weighing of Wagons with and without containers of the Concessionaire's Train.

(iii) Be equipped with TMS and such other facilities as may be required to interface with, and ensure transfer of data online to, FOIS of Railway Administration.

14. The Concessionaire shall declare the weight of each Wagon/container prior to departure of the Concessionaire's Train.

15. The Concessionaire shall procure by way of purchase, lease or hire, Wagons including Brake Vans and Containers required for the purposes of operating the Concessionaire's Trains. However, till such time as the Concessionaire procures the required Brake Vans, Railway Administration may provide its own Brake Vans (provided they are available), on non-discriminatory basis, at a reasonable charge, notified by the Railway Administration from time to time.

16. In the event any of the Wagons of the Concessionaire are lying idle ("Idle Wagons"), the Concessionaire may offer to the Railway Administration or other Concessionaires, use of any such Idle Wagons. However, Railway Administration shall be under no obligation to accept such an offer of the Concessionaire for use of any Idle Wagons and may levy a Stabling Charge as specified.

17. In the event of an Emergency, Railway Administration shall have the right, to temporarily assume control and make use of the Wagons of the Concessionaire. For any such Emergency Use, Railway Administration shall pay to the Concessionaire, a reasonable rent/charge to cover the cost of provisions, maintenance and operation of the Wagon.

18. The Concessionaire shall at all times conform to the maintenance standards specified by the Railway Administration in accordance with Good Industry Practice for the Concessionaire's Containers, rail related equipment and tracks.

19. The Concessionaire's Wagons shall be maintained by the Railway Administration in accordance with the maintenance schedule notified by the Railway Administration. Such maintenance shall, *inter alia*, include intensive examination, routine overhaul ("ROH") and periodic overhaul ("POH"). The Concessionaire will provide and maintain the requisite Wagon examination facilities(as specified by railway Administration) inside the Rail Terminal and bear a one time capital cost for tools and plants as specified by Railway Administration and approved by RDSO.

20. Wagon maintenance charges for maintenance by Railway administration of the Concessionaire's Wagons shall be included in the Haulage Charges. The present Haulage Charges include 5% thereof by way of maintenance charges.

21. Railway Administration shall normally complete the intensive train examination within a period of 6 hours from the time the Concessionaire's Wagons (in empty Rake formation) are handed over by the Concessionaire for such examination. Provided however, that the minimum interval between two successive Rakes offered for intensive train examination shall be at least 6 hours. Alternatively, the Railway Administration may examine the Concessionaire's Wagons at suitable point enroute its destination where the facilities for such examination exists. The time stipulated for maintenance shall not be applicable vis-à-vis such Concessionaire's Wagons that are declared sick during the course of examination and are required to be detached from the Concessionaire's Train for sick line/ workshop attention.

22. In the event of the Railway Administration's inability to conform to the time schedule specified for intensive train examination, it shall pay to the Concessionaire for every 24 hours of delay (inclusive of initial 6 hours) so caused, an amount equal to the Stabling Charges payable for such period of delay.

23. The Concessionaire may undertake maintenance of the Concessionaire's Wagons through any other entity including the Concessionaire on such terms and conditions as specified by the

Railway Administration from time to time provided however, that the maintenance is carried out as per maintenance schedules and various stages of inspection as may be notified by Railway Administration and pre-departure certification of such Wagons shall be issued by the Railway Administration for which the prescribed charges shall be paid by the Concessionaire.

24. The Concessionaire shall hand over empty Concessionaire's Wagons, in rake formation, to Railway Administration for carrying out maintenance as per the schedule specified by the Railway Administration.

25. The haulage charges for moving the Wagons, in rake formation, from a Rail Terminal to the workshop/maintenance depot/train examination point of the Railway Administration and back shall be borne by the Railway Administration, provided however, that the scheduled haulage charges shall be payable by the Concessionaire in the event maintenance is carried out by an entity other than the Railway Administration and inspection is carried out by the Railway Administration at the location of maintenance.

26. In the event wagon maintenance is undertaken by the Concessionaire, or any other party (other than Railway Administration in accordance with the provisions of this Agreement) a proportionate rebate in haulage charges (equivalent to the built in maintenance charges) shall be given to the Concessionaire.

27. Subject to any operational constraints, Railway administration will provide locomotives to haul the Concessionaire's Trains on a non-discriminatory and non exclusive basis vis-à-vis other Concessionaires only.

28. At least four (4) hours prior to the planned departure of Concessionaire's Train, the Concessionaire shall submit an indent ("Indent for Locomotive") for supply of locomotive. The existing incentive schemes if any or incentive schemes that may be introduced in future for supply of locomotives may be extended to the Concessionaire's Trains with suitable modifications such that it is applied in a non discriminatory manner among different concessionaires.

29. The Concessionaire may, anytime prior to arrival of a locomotive cancel its Indent provided however, the Concessionaire shall be liable to pay to Railway Administration indent cancellation charges equivalent to one (1) hour Locomotive Detention Charges. In the event, indent for cancellation of locomotive is received by Railway Administration after the loco is dispatched for the Rail Terminal, the Concessionaire in addition to indent cancellation charges, shall also be liable to pay to Railway Administration such charges as may be prescribed by Railway Administration for the infructuous movement of locomotive both ways. Such charges, however, shall not exceed the charges levied for the movement of the locomotive for the distance from the nearest locomotive shed.

30. If after arrival of the locomotive at the Rail Terminal from where the train is required to depart, or the Rail Terminal where the train is required to terminate, as the case may be, the Concessionaire's Train, for whatsoever reason not attributable to Railway Administration, is not attached or detached and released (as the case may be), prior to expiry of the Free Waiting Time of two hours (entry to exit), the Concessionaire shall be liable to pay to Railway Administration, Locomotive Detention Charges for every hour (or part thereof) for which the locomotive is detained beyond the Free Waiting Time. Provided however, if a locomotive is detained for a period of more than eight (8) hours at any Rail Terminal (either the Rail Terminal of origin or of termination, as the case may be), then, without prejudice to the Concessionaire's liability to pay to Railway Administration the Locomotive Detention Charges, Railway Administration shall have the right, but not the obligation, to withdraw and/remove the locomotive from such Rail Terminal. In case Railway Administration withdraws and/or remove the locomotive from the Rail Terminal after detention of 8 hours, the detention along with movement charges shall be levied without granting any free time. In the event Railway Administration withdraws the locomotive then, the Indent for locomotive shall deemed to have lapsed, with no further effect. These provisions shall also apply to the situation where the locomotive arrives at a Rail Terminal where the train is scheduled to terminate, but is denied entry into such Rail Terminal for reasons attributable to the Concessionaire and /or the Rail Terminal operator.

31. Locomotive Detention Charges payable by the Concessionaire for detention of a locomotive beyond the Free Waiting Time shall be at the rates as prescribed for Diesel/Electric Train Engines by the Railway Administration from time to time. The current Locomotive Detention Charges are contained in Rates Circular No. 18 of 2008.

32. Railway Administration shall, in the event of delayed supply of locomotive beyond 12 hours from the indented schedule time of departure of the Concessionaire's Train, be liable to give to the Concessionaire a one time rebate equal to two (2) percent of the haulage charges payable by the Concessionaire for the Booked Route. This rebate shall, however, not be admissible in contingencies

such as interruption of traffic due to accidents or any other similar unavoidable reasons beyond the control of Railway Administration.

33. Transportation of the Concessionaire's trains shall be in Block Rakes. In the event a Concessionaire's Train operates with lesser number of Wagons/Containers than those prescribed in the Block Rakes ("Non-Block Rake Trains"), the haulage charges for such Non-Block Rake Trains shall be recovered on the basis of the minimum composition of Block Rake as specified by Railway Administration. Provided, however, in the event a Concessionaire's Train has less than half the Wagons required to constitute a Block Rake, the Railway Administration shall have the right to refuse to haul the Concessionaire's train comprising less than half a Block Rake. The Railway Administration may however, at its sole discretion extend the facility of two point rakes for Container Trains during specified periods and on specified routes.

34. The Concessionaire's Trains to be hauled by Railway Administration pursuant to this Agreement shall be booked by the shortest route possible (the "Booked Route") and the haulage charges shall be determined with reference to such Booked Route. Provided however, in case of any accident or other operational exigencies on, or affecting, the Booked Routes, Railway Administration shall, in its sole discretion, be entitled to transport the Concessionaire's Train by an alternative route ("Alternate Route"). The Concessionaire shall be liable to pay haulage charges only for the Booked Route even when Concessionaire's Train is transported by an Alternate Route. Provided that in case the Concessionaire's Trains are carried by a longer route in pursuance of the Rationalisation Scheme of MOR (under section 71 of the Railway Act 1989), the Concessionaire shall be liable to pay charges accordingly.

35. The Concessionaire shall, at least 7 (seven) days prior to any calendar week in which it proposes to operate any Concessionaire's Train, inform ("Weekly Advance Scheduling Notice") Railway Administration of the number of Concessionaire's Trains, it requires to be moved, the proposed routes and the likely departure dates ("Weekly Advance Schedule").

36. Notwithstanding anything to the contrary, the Concessionaire shall, at least twenty four (24) hours prior to the day of programmed loading (excluding the day of loading itself) of a Concessionaire's Train, confirm to Railway Administration the departure schedule of such Concessionaire's Train, provided that such notices shall not in any way be binding and shall be only indicative of the Concessionaire's operations schedule for the following week / day.

37. Railway Administration shall maintain a level playing field among all Concessionaires and shall devise and implement a transparent and non-discriminatory system for dispatch of Concessionaire's Trains on a first come first served basis.

38. Notwithstanding anything to the contrary contained in the Agreement, dispatch of locomotives and Concessionaire's Train(s) shall be subject to any operational exigencies and/or system restrictions.

39. Railway Administration shall make all efforts to ensure minimum enroute detention of the Concessionaire's Trains.

40. Subject to any operational and capacity restrictions of Railway Administration, there shall be no restriction on the number and frequency of Concessionaire's Trains that the Concessionaire may require Railway Administration to haul pursuant to this Agreement.

41. The Concessionaire may request the Railway Administration to accept, at any time after the departure of a Concessionaire's Train, the diversion/re-diversion of such Concessionaire's Train to any other Rail Terminal, in accordance with the various terms and conditions (including but not limited to payment of haulage charges and other charges) and procedures specified by Railway Administration from time to time subject to its operational exigencies and/or for system restrictions. It is clarified that the Railway Administration shall not be under a legal obligation to comply with such request.

42. The Concessionaire shall be liable to pay to Railway Administration Stabling Charges, in the following events :

(i) In case the Concessionaire's Train suffers detention at the serving station for reasons attributable to the Concessionaire or when the Concessionaire either declines to accept Wagons inside the Rail Terminal, scheduled to be the terminating Rail Terminal or is not in a position to receive placement of subsequent Wagons; or

(ii) In case of non acceptance of trains inside any port by the port authority concerned; or

(iii) At any of the stations en route due to any reason attributable to the Concessionaire.

(iv) Provided however that Stabling Charges shall be levied only where the detention of the Concessionaire's Train is for a period in excess of 4 hours.

Stabling Charges shall be payable at the rates notified by Railway Administration from time to time and the Railway Administration shall have the right to revise the Stabling Charges on an annual basis; provided that any increase in charges in any Financial Year during the term of this Agreement, shall not exceed 10% (ten percent) of the charges payable in the preceding year. The current Stabling Charges are contained in Railway Board's letter no. TC-I/98/201/4 dated 17.1.2008.

CUSTOMER INTERFACE AND ROLE OF COMMERCIAL STAFF

The physical movement of both passengers and freight cargo is handled by operating staff but it is the commercial staff, who interacts with our customers.

Passenger

Platform Ticket Checking staff: - (a) Their foremost duty is to enforce rigid access control in station area to prevent ticket less travel and entry of undesirable elements in station premises.

1. **Occupation of waiting rooms and waiting sheds -**

   (a) Except under special orders from the Div. Railway Manager, passengers must not be allowed to use the waiting rooms at stations as rest houses, but passengers arriving at Road side stations at night may be allowed to occupy the waiting rooms or waiting halls between trains or until the morning. At junction stations passengers may use waiting rooms and waiting halls when waiting for connecting trains.

   (b) To ensure that bona fide use of waiting rooms is being made, they shall be checked by a ticket checking staff every eight hours.

2. **Booking staff: -**

   (a) To issue tickets, release and display reservation slips and charts in time to avoid detention of trains in boarding of passengers.

   (b) To advise all commercial figures and occupation report of trains to Divisional office and SM on duty as required.

   (c) Station Master or Parcel Clerk shall ensure:- Parcel, luggage, goods and vendors' trays and barrows shall not be placed on passenger platforms within 3 meters of the edge of the platform. When parcels or luggage are loaded on platform, the barrows must be kept outside this distance at a point opposite where the vehicle, into which they are to be loaded is likely to stop. Packages unloaded from a train must be removed as quickly as possible to the usual place of stacking outside this distance, if they are not taken away into luggage and parcel offices or the goods shed. Under no circumstances should drums and barrels be left on the platform in such a position that they may roll into the track.

3. **Precautions before starting a train carrying passengers:**

   (a) Control of electric lights and fans in coaches: -Switching 'On' and 'OFF' of lights and fans circuits in a rake is effected by operating rotary switches or MCBs in the Junction box provided inside individual coaches. Operation of these circuits is the duty of train-lighting staff deputed at important stations. Individual switches regulators of lights and fans are to be operated by passengers themselves.

   (b) Conductor or TTEs are responsible for ensuring that the electrical equipments and fittings of all coaches are functioning satisfactorily. Where any defect or deficiency is noticed, they should inform the electric staff on duty of AC coaches or advise through control to the next station where electrical staff is provided.

   (c) Conductor or TTE shall, before the train leaves the starting station, request the occupants of those compartments to test if the locking devices on doors and windows are in working order. In case of any defect, they shall arrange to have the defects put right by the TXR staff under advice to SM either at the starting station or at the next train examining station.

   (d) Travelling Ticket Examiners are to note that doors on both sides of carriages on a train carrying passengers shall never remain locked at the same time, except in the

case of compartments reserved for ladies which may be locked at the request of the occupants.

(e) Conductor and TTEs must see that passengers are not getting in and out of carriage when trains are about to start and that no one is travelling on the roofs of carriage.

(f) Segregation of passengers suffering from infections or contagious diseases: - For greater safety of the travelling public, passengers suffering from infections or contagious diseases should be segregated from other passengers by TTE with the help of security forces.

(g) Passengers to be courteously treated.-All passengers, irrespective of the class of tickets they hold, shall be courteously treated and all possible assistance and protection afforded to them while on Railway Premises.

(h) Female passengers particularly when unaccompanied by males, friends or relatives shall be given special attention at all times.

(i) Each member of staff who has to deal with passengers must be acquainted with the time of arrival and departure from their stations of all trains carrying passengers to answer in prompt and civil manner any question put to them by the public.

4. Precautions during journey:-

(a) In cases of long distance through trains coming from or going to other railways, which have yet to journey through the following night, the guard or conductor or TTE shall, at a convenient station some time during the day, approach the occupants of upper class and second class ladies compartments, and request them to check up if the door latches and window catches are in good working order; when the train arrives at a station where the TXR staff is required to attend to the safety catches, the TXR staff should be ready with the necessary material and should themselves check up the locking devices and put right any deficiencies detected by them or reported to them by passengers.

(b) The Conductor or TTE should also make it a point to warn the passengers at convenient stations between 21 and 22 hrs to apply the locking devices, if not already done.

(c) Should it be found that the alarm chain has been pulled mischievously or for an unjustifiable cause or the hose pipe has been disconnected by some miscreants, the Conductor or TTE in charge must ascertain the name of the person who pulled the chain or disconnected the hose pipe. His name and address with those of other occupants must be obtained and the Conductor or TTE should make a report regarding the alarm chain pulling or the hose pipe disconnection incident and hand over the same to SM/ASM of the station at which the incident occurs, if time permits or at the next stopping station, who will take action in lodging the report with the GRP of the station in whose jurisdiction the incident has occurred.

(d) Calling out name of station - Travelling Ticket Examiners where employed and at Ticket Checking stations, the Ticket Examiners are required to give this information to passengers as they go from compartment to compartment checking tickets and at junction stations they shall advise passengers to change, if necessary.

5. Waking up passengers: -

(a) Passenger of all classes occupying reserved accommodation shall not be roused for tickets, to be rechecked between the hours 22 and 6 except when there are reasons to believe that a certain passenger is travelling without a ticket or otherwise irregularly.

(b) TTE,s of Mail Express and passenger trains are to arouse Air Conditioned and First Class Passengers at night at any station when requested by the passengers to do so

and will be assisted by the coach attendant. The Ticket Checking staff to whom such a request is made by a passenger shall enter in the "wake up memo" the name of the passengers the number and the class of the carriage occupied and the name of station at which the passenger is to be called.

(c) The Ticket Checking staff when intimating the arrival of the train at a station where a passenger has been noted to alight shall take care of that other passengers are not unnecessarily disturbed.

(d) Passengers shall not be placed in carriages of a higher class than that for which tickets are held except on payment of additional fares as per extant rules or on automatic upgradation.

6. Ladies travelling alone at night:-

(a) In no case, whatever, shall a male passenger (except a boy under twelve years of age) be allowed to travel in a compartment reserved for Ladies in any train.

(b) A lady travelling alone or with children under 12 years of age at night in a first class compartment reserved for ladies may take with her in the same compartment in which she is travelling, one women attendant holding a second class ticket for that portion of the journey which is performed between the hours 8 p.m. and 6 a.m. This rule may also apply when two or more ladies are travelling in the same compartment with out any objection and any inconvenience.

(c) A lady travelling alone or with children under 12 years of age in a first class compartment may take with her compartment one dog on payment of the dog-box rate, provided that if another lady enters the compartment, the dog shall only be allowed to remain in the compartment with the permission of the other passenger.

7. Medical Aid:-

(a) It will be the duty of the train manning staff or station staff to render first aid to any injured person within Railway premises immediately.

(b) If the case is serious one, the senior most official available on the spot must arrange to summon medical aid from the nearest available source, whether Railway, Civil, Military or private.

8. Murder or serious Assaults -

(a) If a crime of serious nature such as a murder or a serious assault be committed in a Railway carriage on a running train, the following action shall be taken by the staff with a view to helping the Police Officials in their investigation: -

(b) The Conductor or TTE of the train shall have the compartment emptied and locked up after all shutters have been raised from outside immediately the commission of such an Offence is known so that blood stains, marks of struggle, foot prints, finger impressions etc. may remain undisturbed.

9. Passenger trains overshooting Platform:-

When any portion of a passenger train over shoots a platform, or when a platform is too short to accommodate a full train, at night, passengers who are obliged to alight on ballast should be told that they should alight carefully as there is no platform. If a carriage at the end of a train is off the platform, the Guard should also call out a similar caution to the passengers.

10. Duties of Conductor

Attendance

(i) He shall report to the train guard for his appearance and the time of his appearance shall be noted down by the train guard in the Constitution Report. The Conductors shall sign this entry and the train guard shall countersign it.

(ii) See that the window catches and other safety devices fitted in II Class compartments reserved for ladies are in perfect working order and get the deficiencies repaired.

(iii) See that the passenger carriages are thoroughly cleaned and filled with water.

(iv) Look after the safety and comfort of passengers of all classes and more particularly, of women and children, attend to complaints of passengers regarding cleanliness of carriages, water supply in lavatories, lights and fans and any other complaints and have them promptly attended to.

(v) Make it a practice to walk along his train at stations to see if passengers want any assistance or information and keep a careful look out for irregularities of any kind, specially at night.

(vi) Before a train begins a night journey, ensure that the safety bolts provided on the inside of windows and doors of Upper Class carriages and ladies compartment are in working order.

(vii) Arrange for the meals of passengers when requested to

(viii) Wake up upper class passengers alighting at night if requested;

(ix) See, in so far as is possible that there is no irregular or unauthorized travel by trains in contravention of any rules in force. All infringement of rules by passengers should be brought to the notice of the station master on duty.

(x) Note the Coach, which is to be detached short of the destination of the train, must see that such carriages are not occupied by passengers who have tickets for beyond the station to which they are booked. He must arrange that, if any passengers are allowed to ride in such coaches they are warned before starting that they shall have to vacate the coaches on arrival at the station at which they are to be detached.

(xi) Conductor must see that passengers are not getting in and out of carriages when trains are about to start and that no one is travelling on the roof of carriages

Duties and Responsibilities of TTEs

(i) He shall see that all doors, bolts, windows and catches etc. of all the coaches particularly upper class and ladies compartments are in perfect working order and also that all through and sectional coaches are provided with proper destination boards.

(ii) If there are defects in the working of any of the fans and lights, he shall get them rectified by the train lighting staff.

(iii) He shall see that, where arrangements exist, the compartment are properly cleaned, dusted, and watered and shall make necessary enquiries from passengers in this connection.

(iv) He shall see that lights, fans and other fittings, and water in the carriages are not misused.

(v) He shall check Attendant compartments and ensures that only bonafide attendants of upper class passengers occupy them.

(vi) He shall check Vendors and G.R.P/RPF compartments to ensure their correct use.

(vii) He shall receive reservation charts well in time before the departure of the train, see that the same are completed in all respects and that the reservation labels are intact so that there is no hitch in providing berths to passengers.

(viii) He shall look after the safety and comforts of passengers in general and of upper class and women passengers in particulars.

(ix) He shall assist all classes of passengers in securing accommodation either reserved or available for them.

(x) During the course of the journey, he shall keep special watch on compartments occupied by women passengers without causing any annoyance to occupants. He shall, where halt permits; walk on platforms, to see that ladies compartment that everything is well. While inspecting a train in this manner, he should be ready to answer queries and receive complaints from all classes of passengers and complaints of special nature and action taken by him should be recorded.

(xi) During the night, he shall awake upper class passengers who express their desire to be called at a particular station and in the event of his change of duty en route, **ask his reliever to do so**.

(xii) He shall ascertain from Passengers their meal requirements and arrange it either from the Dining Cars running with the train or the next Refreshment Room station.

(xiii) He shall assist Refreshment Room bearers in finding out space for return of empty meals crockery, trays or thalies.

(xiv) He shall see that no suspicious characters attempt to enter upper class compartments and compartments reserved for women.

(xv) He shall not interfere with or annoy passengers by talking, smoking or slamming doors while entering, or leaving compartments.

(xvi) He shall keep an eye on vendors and licensed porters charging passengers excessively and promptly intervene where necessary. All such cases must be reported to the Divisional Commercial Manager concerned under intimation to the Station Master concerned.

(xvii) He shall see that vendors do not shout their wares at station during night.

(xviii) In the event of any passenger being found molested, a passenger's property being stolen or tempered with, he shall, promptly, take action in conjunction with the guard in-charge of the train, or the station master as the case may be and see that police is advised immediately. The passenger's name, address and ticket numbers of those who are allegedly responsible for the trouble and also the same particulars of some respectable witnesses, should be taken and full report submitted to the Divisional Commercial Manager concerned.

(xix) When alarm chain is pulled or hose pipe is disconnected, the disc at the end of the reserved coach should be returned to normal position (thereby closing the Clappet Valve) and FIR to be lodged to GRP under advice to Guard/ Station Master

(xx) Similarly hosepipe disconnected should be reconnected by Asstt. Loco Pilot.

INSPECTIONS

Objects of Inspections:

The Railway network is spread over a vast area. It is estimated that for running a train over a section, co-operation and co-ordination of about (2000) thousand Railway staff is essential. A vast organisation, such as the Indian Railway system functions on the basis of a carefully arranged system of selective Autonomy, Accountability and Responsibility. Rules and instructions lay down the procedure of work and the staff are properly trained and the officials at various levels monitor, supervise and direct the staff from time to time by different means. Inspection is an important function of management, particularly in the field of Railway Operations to ensure efficient working at all levels.

Following objects shall be borne in mind while conducting inspection:

1. Verify whether every Railway employee is fully conversant with rules, instructions and procedures relating to his duties.

2. Ascertain that the staff is performing their duties according to rules, instructions and the procedure in force.

3. Detect undesirable shortcuts, irregularities or unsafe practices being resorted to by the staff taking remedial action which may be:-

   (a) Educative, in case these are resorted to out of ignorance.

   (b) Corrective, if there is something wrong in the working conditions, or there are system deficiencies.

   (c) Punitive, if resorted to wilfully or negligently and persisting even after repeated guidance and counselling.

4. Observe the conditions actually prevailing at the work spots to understand the difficulties experienced by staff including their personal grievances and seeking on the spot redressal.

5. Ensure that full complement of staff and equipment is available and staff have knowledge of its operation.

6. Ascertain that registers, documents and other records are being maintained and preserved according to instructions.

7. monitor the behaviour of staff towards customers, particularly promptness of response and willingness to help.

8. Assess as far as possible that the interest of the public and the Railways are kept in view and safeguarded.

9. Inculcate discipline and build up the morale of the workers.

10. Check the compliance of previous inspection reports.

11. Analyse efficiency targets vis-à-vis performance.

Inspections, thus provide the means to achieve efficiency and effectiveness through spot checks and personal contact with the staff on line. In order to accomplish these objectives, inspections have to be carried out at officer's and Supervisor's level. The inspecting official has to command the respect and obedience of staff, for his inspection to be effective and beneficial and as such his conduct should be exemplary.

Types of Inspections:

The following inspections have to be carried out by operating and safety officials:-

Regular Inspection (six monthly) -

Each station on the division must be inspected in details at least once in every six months i.e. January to June and July to December covering the various aspects of safety, operations and allied matters including staff matters. The inspection shall be carried out by the Sr.DOM/DOM/Sr.DSO/DSO/ AOM /ARM/SS/SM/DTI/TI etc. While minor stations are inspected by the TI concerned, the DRM will nominate important stations (including all such stations which do not fall within the jurisdiction of TI, that is those which have SS/SM in grade equivalent to or higher than those of TI of the section) to be inspected by the nominate officers. Each officers will be allotted at least two such a stations. The officials concern shall also spend the night at the station. Regular inspections have to be comprehensive in nature.

Safety Inspections (monthly) –Safety inspections are basically meant to be preventive by detecting short cut methods and unsafe practices resorted to by train passing, running and maintenance staff. The irregularities noticed must be personally brought to the notice of the Station Master and remedial measures initiated promptly. In case of any serious irregularity, the inspecting officials must at once inform Sr.DSO/DSO or Sr.DOM/DOM concerned personally or telephonically beside making a written report.

Surprise Inspection (Monthly)

Such inspections must have an element of surprise. Officers and Inspectors may inspect a station either while passing through it or during the short time at their disposal or when they want to check some aspect at the station without prior notice. Apart from any special aspect, they intend to check; they must also observe and take note of the irregularities/ deficiencies or good work being done which may come to their notice. They may check as many items as possible as time permits. Minimum 6 such inspections in a month shall be conducted by the sectional TI.
In the automatic signalling territory, besides surprise inspections, ambush checks should also be conducted to check whether the Loco pilots / Motormen are observing the rules regarding passing of automatic signal at 'ON' position etc.

Similarly loco pilots' whistling at whistle boards on apporoach of LC gates also needs to be checked

Night Inspection (fortnightly) –

Night inspection must be carried out by the Officers and Supervisors frequently to appreciate the working conditions as well as to detect the irregularities.
Surprise night inspection may be carried out between 00 hrs. to 4 hrs. because during this period, the staff is likely to be lethargic and negligent in duties. Similarly, instances of staff sleeping on duty, dim signal lamps and indicators, unauthorised absence from duty and many other irregularities, unsafe and undesirable practices may come to notice between 00 hrs. to 4 hrs. Frequent night inspections are a must and SS/SM must conduct surprise night inspections fortnightly of their station between 00 to 4 hrs. and take remedial measures to rectify the irregularities and deficiencies noticed.

Level Crossing Inspections –

Level crossing gates should be inspected in detail with a view to ensure safety of rail and road traffic, availability of safety equipments, knowledge of Gatemen regarding rules pertaining to his duties and loco pilot's whistling while passing the LC gates.

Surprise Inspection by Road –

These inspections have an element of surprise in them. To create a sense of alertness amongst the staff the road inspection should be carried out without informing anybody.

Footplate Inspections –

Footplate Inspections are carried out by travelling on the engine of running trains. These afford an opportunity to the inspecting official to observe and check certain aspect of working on the engine, along the track and at the stations which can not be checked otherwise. To achieve the purpose for which footplate inspections are carried out, it is essential that these are done by day and by night, in clear weather and when the visibility is poor due to thick, foggy or tempestuous weather.

Joint Footplate Inspections –

These are carried out jointly with officials of Mechanical, Electrical (Running), Permanent Way and Signalling branches e.g checking the visibility of the signals, their locations, operations, lighting up, speed restrictions and caution boards rail wheel interaction and loco pilots' and assistant loco pilots' operating behaviour.

Surprise Speed checks –

In order to ensure the maximum permissible speed are not exceeded, permanent and temporary speed restrictions are correctly observed and limits of speed over turnouts and facing points are observed, surprise speed checks should be conducted as per schedule.

Running Rooms Inspections –

During regular, safety, surprise and night inspections opportunity should also be taken to inspect running rooms to ensure that running staff are able to get proper food and resting facilities. Running rooms should also be jointly inspected by the team of officers as nominated and prescribed.

Ambush checks –

It is essential to ensure rigid observation of rules when automatic stop signals are passed in 'ON' position. The inspecting officials should carry out ambush checks with the help of signalling officials who will arrange to put an automatic stop signal to 'ON' position. Such checks should be arranged in consultation with Sr.DOM/DOM.

Running Trains Inspections –

Whenever an operating officer or an inspector is travelling by a train on duty, he must pay special attention in observing the performance of duties by Guards, Loco pilots, Station staff, Gatemen and others.

Loco shed inspections – One loco shed shall be inspected once in 3 months individually as well as jointly.

C & W Depots inspections – Each C & W depot shall be inspected once in 3 months individually as well as jointly.

Accident Relief / Medical Equipment Scale I (ARME) – Each Medical Van shall be inspected once in 3 months (see Accident Manual).

Accident Relief Train (ART) - Each Break down train shall be inspected once in 3 months (see Accident Manual).

Inspection Quotas:

The minimum number of regular, surprise, safety and night inspections will be carried out by officers and inspectors as per quota fixed from time to time. The tentative schedule of inspection is attached.

Schedule of Inspections by Operating/Safety Officers and Transportation Inspectors

S. No.	Type/ Nature of inspections	Sr.DOM/DOM	Area Manager/ Area Officer	AOM(M)	Sr.DSO/DSO	AOM(G)	TIs
1	Regular Inspection - Half yearly	2 important stations as nominated by the DRM	2 important stations as nominated by the DRM	2 important stations as nominated by the DRM	2 important stations as nominated by the DRM	2 important stations as nominated by the DRM	All stations in their jurisdiction once in three months.
2	Safety Inspections	--	--	1 station every month	4 stations every month	6 stations every month	All stations in their jurisdiction once in a month
3	Surprise Inspections	No quota	No quota	Minimum 2 stations per month	As often as possible (minimum 2 every month)	As often as possible (minimum 3 every month)	As often as possible (minimum 6 every month)
4	Night Inspections -- i. Level crossing ii. Station iii. Footplate on goods train	 1 per month 1 per month 1 per month	 1 per month 1 per month 1 per month	 1 per month 1 per month 1 per month	 2 per month 2 per month 2 per month	 2 per month 2 per month 2 per month	 3 per month 3 per month 3 per month
5	Level Crossings during day time	1 per month	1 per month	1 per month	2 per month	2 per month	3 per month
6	Surprise road Inspections	1 per month	1 per month	---	1 per month	1 per month	1 per month
7	Individual footplate inspections	1 section per month by both i. Mail/ Express/Pass. ii. Goods train	1 section per month by both i.Mail/ Express/ Pass. ii. Goods train	1 section per month by both i. Mail/Express / Pass. ii. Goods train	1 section per month by both i. Mail/Express/ Pass ii. 2 Goods train	1 section per month by both i. Mail/ Express/Pass ii. 2 Goods train	1 section per month by both i. Mail/ Express/ Pass ii. 3 Goods train
8	Joint Footplate Inspections	---	---	---	One section every quarter covering the entire division once a year.- Up and Dn separately by day and night.	One section once a month covering the entire division once a year.- Up and Dn separately by day and night.	One section once a month covering entire jurisdiction once in six months including Up/ Dn day/night separately.
9.	Surprise speed checks	No quota	No quota	No quota	3 per month	3 per month	5 per month
10	Running Rooms Regular Inspections	1 major running room as identified by DRM-once a year (alongwith Sr.DEN and Sr.DEE	1 major running room as identifi- ed by DRM-once a year (along-with Sr.DEN and Sr.DEE	All running rooms under Sr./DSOs charge of Mecha-nical & Electrical dept. (alongwith AEN AEE & AME	All running rooms under Sr./ DSOs charge of Mecha-nical & Electrical dept. (alongwith Sr.DEN & Sr.DEE	All running rooms under Sr./ DSOs charge once a year (alongwith with AEN and AEE	Each running room under their jurisdiction once in a month.
11	Ambush Checks in Automatic signalling territories	--	One during day and one during night	One in a month	One during day and one during night in a month.	One during day and one during night in a month.	One during day and one during night in a month.
12	Running Trains Inspections	As often as possible	As often as possible	As often as possible	As often as possible	As often as possible	As often as possible
13	Loco Shed Inspections	--	--	--	1 shed every 3 months	1 shed every 3 months	--
14	Depots Inspections	--	--	--	1 Depots every 3 months	1 Depots every 2 months	--
15	Accident Relief Medical Equip-ment Scale -I (ARMEs)	--	--	--	1 Medical van every quarter.	1 Medical van every quarter.	--
16	Accident Relief Trains-(ARTs)	--	--	--	1 ART every quarter	1 ART every quarter	--

Note: For S.No.10, 11 and 13 - all loco sheds, C&W Depots and Medical Vans are to be covered in a year either by DSO or AOM(G). The quotas had shown indicates the minimum inspections. Inspections in respect of above items and other items should be carried out as frequently as possible.

General Guidelines for Inspecting Official:

1. Before commencing the inspection all inspection books should be called for and the notes made by other inspecting official should be carefully persued to check whether the staff have complied with their instructions. If any of these instructions have not been carried out written explanation of the Station Master should be obtained.

2. It shall not be enough merely to point out the irregularity of the staff; matters must be put right personally while at the station to the extent possible.

3. All books and registers inspected must be initialled and dated.

Technique of Inspections:

It requires both expertise and experience to carry out intelligent inspections. To evolve a sound technique of inspections an inspecting official should:

1. Have a clear understanding of the station lay out its signalling, special features of working and the instructions in regard to reception, despatch, crossing, shunting and running through of trains. For this he should have a good knowledge of not only General & Subsidiary Rules but also of Station Working Rules.

2. Select the feature of working which he intends to check during his inspection and should have a clear conception about them in his mind. For instance he may like to emphasise on the correct reception and despatch of trains and observance of safety rules by the staff or on utilisation of stock, detention to passenger or goods train, knowledge of staff etc.

3. Inspect the aspect of working by thorough inspection of books, registers, forms and equipments used for operations and secondly by means of personal observation of actual operations.

Be selective in choosing:

(a) The time and operations of personal observation.

(b) The documents, registers and forms for checks and cross checks.

(c) The equipments for checking, its availability, adequacy, maintenance and its use.

5. Select specific periods for checking registers books and forms keeping in view the purpose of inspection and time of inspections and time of disposal, should be subjected to concentrated, minute and probing checks and cross checks. It may be worth while to select two or more separate periods. One of these being that immediately preceding the day of inspection. This will help him in not only detecting the irregularities being committed but also whether these have been continuing for the past some time.

6. Discuss the irregularities or lapses noticed during inspection with the staff actually doing the work as well as those supervising their work. Such a discussion will prove to be educative and produce useful results.

7. Discuss, as far as possible, the points common to two or more branches, like the Signalling Interlocking branch or Loco Train Examining, Civil Engineering and Commercial Branches jointly for objectivity and acceptable solutions. This will help in not only arriving at correct conclusions and forming sound views but also in avoiding unnecessary correspondence.

INTERLOCKING

Definition: - Interlocking means an arrangement of signals, points and other appliances, operated from a panel or lever frame, so inter-connected by Mechanical locking or Electrical locking or both that their operation must take place in proper sequence to ensure safety.

1. **Basic Principles: -** The basic principles of interlocking are as follows: -

   v) It shall not be possible to take "off" conflicting signals at one and the same time.

   vi) It shall be possible to take "off" signal for a running line only when:-

      (a) All points on the running line are correctly set and facing points locked

      (b) All points, giving access to the running line from the sidings and goods lines, are set against the running line.

      (c) Level crossing gates if included or controlled by interlocking are closed and locked against the road traffic.

      (d) A signal lever when operated must lock or back lock as necessary the levers operating the points and gate locks referred to above.

      Once signal is taken off it shall not be possible to alter the points, to unlock the gate lever etc until all signals are taken off have been put back.

   vii) When all signals are in the "On" position, all points which would be locked by taking 'off' such signals must be free for shunting purposes/testing etc.

   iv) It must be impossible to take "off" a Warner Signal, until all the *relevant* stop signals in advance have first been taken "off" and when "off" it must back lock all such signals.

a) **Interlocking -**

Points, Signals and other units are usually, operated by means of levers and panels. Interlocking between these levers is accomplished either by mechanical or by electrical or electro-mechanical or electronic means. In the former method, some mechanical contrivance variously designed, controls the relation between one lever and the other.

At less important stations the point, signal and other levers are interlocked by means of keys which are used to lock or release the levers, either in the normal or in the reverse position, as required. At other stations the levers are interlocked by means of tappets inside a box of the lever frame, which is normally kept covered and sealed.

3. **Types of Interlocking:**

   i) Mechanical Interlocking.
   ii) Panel Interlocking (Relay)
   iii) Route Relay Interlocking.
   iv) Solid State Interlocking.

i) Mechanical Interlocking:

The era of interlocking started with mechanical frames. In mechanical signaling, since the functions are operated by levers, the relationship that should exist between the functions can be transferred to exist between the levers. To ensure that the signal can be taken 'OFF' only after the point is correctly set, we can arrange the interlocking between the signal lever and point lever to be such that the signal lever can be reversed only after the point lever is in the correct position, viz. 'Normal' or 'Reverse', as the case may be.

As the size of yards & train movements increased, size of lever frames also increased. These lever frames not only increased in size occupying more space but also required intensive maintenance.

ii) Panel Interlocking:

With the advent of Electro-mechanical relays, lever frames gave way to relay interlocking based installations. This development resulted in relatively faster operation, fail-safe operation and reduced size of buildings required for housing of interlocking installations. With further increase in traffic and expansion of railway network, panel Interlocking installations were commissioned.

iii) Route Relay Interlocking:

Route Relay interlocking is same as Panel Interlocking with Electro Mechanical Relays doing the Interlocking except that it can be employed for big yards. the interlocking is done between one route and another route. Another Important feature in terms of operating point of view is that the SM has to only press two buttons, Signal button & Route Button (entry-exit system). He doesn't have to individually operate the points to the required position.

iv) Solid State Interlocking (SSI):

Computer based interlocking uses thousands of Electro-mechanical relays requiring complex wiring and Inter-connections. The wiring diagrams for such installations run into hundreds of sheets. Individual relays, wiring and interconnections along with thousands of shouldered joints are required to be physically examined and certified. This exercise requires traffic blocks of long durations and large manpower to manage the traffic during blocks.

Even for small yard re-modelling like addition of a loop line, all the above activities are required to be redone. Therefore, the advantages of relay based interlocking installations are being nullified.

The SSI system occupies considerably less space, consumes less power, is more reliable and is easy to install and maintain. Also, initial commissioning & changes due to yard re-modeling can be carried out in negligible time requiring skeleton manpower for traffic management during the blocks.

Unlike PI or RRI, Microprocessors (IC'S) are doing the Interlocking based on pre determined logic circuits.

Advantages of SSI:-

- Increase in section capacity.
- Faster operation.
- User friendly operation.
- Fail safe technique
- Multiple mode operation.

Significance of SSI for operating staff:

- Reduces man power
- Centralised operation
- Multiple mode of operation
- Control cum indication panel
- Video display unit (P.C)
- CTC (Centralised Traffic Control)–permits remote control
- Significant reduction in traffic block time
- Easier & simple operation

Indirect and Direct Interlocking: -

(a) Indirect interlocking means that the points are set and locked from one place and the signals are operated from another place and another lever frame; the interlocking is effected by means of keys carried from one place to the other.

(b) Direct interlocking means that all levers, viz. the point, the point locks and the signal levers are concentrated in one lever frame and worked therefrom; the interlocking is effected by means of rigid connections between levers without the use of keys.

Standards of Signaling and Interlocking: - Interlocking at stations is standardized into four different classes viz. I(R), II(R) ,III(III) and IV(R). The regulations prescribing the four standards have been drawn up primarily to meet the needs of crossing stations on the single line but, with such modifications as may be necessary in regard to the equipment of signals; these are also applicable to other stations both on single and double lines. The standards are as follows: -

Note: - For details see para 170 to 174 of "Indian Railway Signal Engineering Manual".

Two aspect signalling.

(a) Standard I.(R)

(i) Speed - 50 kms. Per hour.
(ii) Isolation - Isolation of the main line is recommended, but is not essential.
(iii) Points - the facing points should be provided with key locks, locking both switches independently and the switches detected independently by relative signals.
(iv) Interlocking - Interlocking between points and signals may be carried out indirectly by means of key locks.
(v) Signals - Outers and Bracketted Home signals shall be provided. The provision of Starter signals is optional. Working Warners may be provided for metre gauge stations where trains run through, if considered necessary, but are not required for other stations signalled to standard I.

(b) Standard II.(R)

(i) Speed - 110 kms. per hour.
(ii) Isolation of the main line is essential.
(iii) Points - the facing points should be provided with plunger type locks, locking both switches independently and the switches and the bolt being detected independently by relative signals.
(iv) Interlocking - The interlocking between points and signals may be direct or indirect. Where indirect interlocking is used, signals shall be worked from a position under the control of the Station Master and key must be provided to enable the Station M<aster to lock up the signal frame.
(v) Signal - Outers, Warners and bracketed Home signals must be provided, and Starters where considered necessary; (ii) Where Starters are not provided the "off" position of the Warner signal shall be dependent upon the receipt of 'Line Clear' on the block instrument.

(c) Standard III.

(i) Speed – 140 km/h Unrestricted speed.

(ii) Isolation - same as for Standard II.

(iii) Interlocking: - the interlocking between points and signals must be direct.

(iv) Signals. - Outers, Warners, Bracketed Home Signals and Starters must be provided and Advanced Starters as may be necessary.

d) Standard-IV(R)

(i) Speed upto 160 km/h
(ii) Isolation – as per Standard III

Multiple aspect signalling.

The Standards, their speeds, requirements of isolation equipments of points and requirements of interlocking between points and signals are the same as in the case of two aspect signalling. The Signalling, however, should be as under: -

(i) Standard I - A Distant and a Home Signal in each direction.
(ii) Standard II - A Distant, a Home and a Starter Signal in each direction.
(iii) Standard III - A Distant, a Home and a Starter signal in each direction.

SL.No.	Item	Std. I ®	Std.II ®	Std.III ®	Std.IV ®
	Allowable speed (kmph)	Upto 50	Upto110	Upto140	Upto160
1.	Isolation	Y*	Y	Y	Y
2.	2 Aspect (2A) Semaphore/Multi Aspect (MA) Signalling	2A/MA	2A/MA	MA	MA
3.	Double distant	N	Y**	Y	Y
4.	Point Operation	Mech	Mech/Elect	Mech/Elect	Elect
5.	Point Locking	Key/FPL/HPL	FPL/Ptm/c	FPL/Pt. m/c	Clamp type direct %
6.	Point Detection	Mech/Elect	Mech/Elect	Mech/Elect	Elect
7.	Lock Detection	N	Y	Y	Y
8.	Interlocking	Key/Mech	Mech/ Elec/ Electronic	Mech/ Elec/ Electronic	Electric/Electronic
9.	Track Circuiting	N	Mech Interlocking: Run Through Lines (Main), Elec/Electronic: All Running Lines	All Running Lines	All Running Lines
10.	Block Working (Min.)	Token	Token/ SGE	# SGE/ TC	# SGE/TC
11.	Preventing signal passing at danger	N	N	N	Y%

*Isolation is not compulsory provided that the conditions laid down in the second paragraph of the general rule 4.11 are complied with “Limits of speed while running through stations-

Double distant on sections where goods trains have a braking distance of more than 1 km.

% Desirable

At station provided with CPI or high density routes, Means for verifying complete arrival of train by suitable means.

Note: The provisions of the new revised Para 7.131 will only apply to future Signalling and Interlocking installations. Wherever existing installations do not fulfill these requirements, existing speed of operation may be permitted to continue.

Painting of Levers: - Levers shall be painted in the following colours:-

(a)Warner signals (two-aspect) lever	Green.
(b)Distant signal (multiple-aspect) lever 45° aspect	(a) Yellow.
(c) Distant signal (multiple-aspect) lever 90° aspect	Green.
(d) Other Signal levers	Red
(e) Slot lever mechanical	Same color as of the lever slotted, with a 6” (150 mm.) wide blue band in the middle.
(f) Slot lever electrical	Same colour as of the lever slotted with a 6” (150 mm.) wide yellow band and in the middle.
(g) Points lever	Black
(h) Facing points lock lever.	Blue.

(i) Economical facing point lock lever	Upper half-black lower half-blue.
(j) Station Master's control lever …	Upper half white lower half-black.
(k) Lever-crossing gate control lever	Chocolate.
(l) Release lock lever	Black, with a 6" (150 mm) wide blue band in the middle.
(m) Setting lever, "List and Morse" signalling …	*Blue with a 6" (150 mm) wide black band in the middle.*
(n)Detector lever (D.W.) …	Red and blue bands 6" (150 mm.) wide alternately.
(o) Route lever.	Upper half red, lower half black.
(p) Siding key control lever	Black.
(q) King lever	Red and white bands 6" (150 mm.) wide alternately.
(r) Spare lever	White

Numbering of levers in frames.

1. All levers, including spares, are numbered consecutively through the frame from left to right. Each lever is provided with a name plate showing its function and the number of the other levers in the order of operation which must precede to release it.

2. The levers are broadly classified into three groups :-

(i) Up signal levers/slotting levers.
(ii) Down signal levers/slotting levers.
(iii) Point, lock, shunt signal and other levers.

3. The group to which the lever connected to the first approach signal, or Warner signal, situated to the left, or the person working the levers, belongs is allotted the first set of consecutive levers, lying to the left of the frame. The second set of consecutive levers is allotted to group (iii), and the third set of levers lying to the right is allotted to the remaining group. All levers, including spares/spaces, of each group are, then numbered consecutively, starting from the first lever on the left. The relative position of the levers of each group, the first lever on the left. The relative position of the levers of each group, generally, corresponds to the relative position of the units they operate.

Isolation: - A line is said to be isolated from the **adjacent line or lines** when no movement on the adjoining lines can foul it. Isolation can be achieved by any of the following methods.

(a) Snag dead end, (b) sand hump, (c) trap points, (d) setting of points (e) permanently locked points, (f) Scotch Block and (g) Hay's Derail. (h) Derailing Switch.

Note:-For the purpose of definition of Isolation (f) scotch block and (g) Hay's derail are not means of Isolation. **Otherwise** Definition of Isolation may be changed as 'isolated from the adjacent line or lines as well as any movement on same line."

(a) Snag Dead End
(i) This is an extended portion of track with an erected obstruction with buffers at the end.
(ii) The length is at least 180 metres.
(iii) This is used to isolate main line from loop line.
(iv) This is an efficient substitute for signal overlap.

(b) Sand Hump

Sand hump is an extended portion of rail embedded in sand. It is total 60 m in length, with increasing gradient of 1 in 60, of which the first 30 m is laid with normal track embedded in sand and remaining 30 m is an earthen lump of uniform 4 m width.

(c) Trap Points

(i) This is a single rail cut.
(ii) This rail cut will be away from the adjacent line.
(iii) To provide isolation, the trap point will be open.
(iv) When it is open and if a vehicle moves the vehicle will derail.
(v) This is provided to isolate running line from non-running line and main line from loop line.

(d) By setting of points:

At interlocked stations, isolation can also be obtained by setting of points.

(e) Permanently locked points

Certain points, including traps are kept permanently locked and

(ii) The keys for these points are kept in on duty station Master custody.
(iii) These points have to remain set and locked in normal position.
(iv) These keys are handed over, when these points are required to be worked.

(f) Scotch Block

(i) A lump of log covered with iron sheets and coloured red.
(ii) This will be connected with a chain tied up on the earth.
(iii) This is a place across the rail and locked to prevent vehicles moving away.
(v) If the vehicle moves the vehicle will derail.
(vi) This is used normally to isolate running line from non-running line.

(g) Hayes Derail

It is a device designed to limit the movement of free rolling, uncontrolled wagons/ vehicles. This is accomplished by grinding the flange of a wheel up and over the railhead, dropping the wheel clear of the rail on outside of the rails. The wheels lodging in the tie cribbing and ballast halt movement of wagons /vehicles.

(h) Derailing Switch

This is an extended portion of track ending with some sand.

- The distance from the points is about 15 feet.
- This is used to isolate main line from loop line.
- This is an efficient substitute for signal overlap under approved special instructions.
- The normal setting of points is for derailing switch.
- If the vehicle moves, the vehicle will derail on the sand at the end of the derailing switch.
- Simultaneous reception is possible with CRS permission.
- This should not be obstructed.

a) Explanation of certain simple terms: -

(i) COUPLED POINTS: - When two or more points are worked by the same lever.

(ii) CROSSINGS: - The appliances provided at the Junctions where two lines cross or join one and other.

(iii) COMPENSATOR: - It is an appliance provided to compensate for difference in length of roddings and wires due to variations in temperature.

(iv) CRANK: - It is an appliance fitted with the rodding to change the direction of the motion given by the lever.

(v) DETECTOR:- It is an electrical or mechanical device which prevents the signals from being taken 'OFF' unless the points are correctly set.

(vi) ECONOMICAL POINT LOCK OR S.L.M. (Switch & Lock Movement):- When the facing points and the facing point lock are worked by the same lever, it is called "Economical Point Lock" or "S.L.M."

(vii) FACING POINT LOCK:- It is a plunger bolt provided at facing points, which ensures that the points are correctly set and locked to prevent them from being moved.

(viii) FACING POINT LOCK BAR: - It is a bar provided at facing points is connected with a facing point lock, which prevents facing point lock being moved while a vehicle is passing or standing over it.

(ix) FOULING BAR:- It is a bar provided at the fouling points between two diverging roads which prevents points being set and locked and signal being taken 'OFF' for one road while a train is standing short of clearance on the other road.

(x) LOCKING: - A lever is said to be locked when in the normal position it cannot be pulled over. A lever is said to be locking another lever when owing to the farmer's remaining or in the normal or reverse position the latter cannot be pulled over.

(xi) RELEASE: - A lever releases another lever, when due to its operation the later can be pulled. If lever No. 2 can only be pulled over when lever No. 1 is pulled then lever No. 1 is said to be de-releasing lever No. 2.

(xii) SLOT: - It is an electrical or mechanical arrangement where by a signal can only be lowered only by the joint operation by two or more persons, but can be put back to 'ON' by any one of them.

(xiii) TONGUE RAILS: - These are rails with tapered movable ends which controls the setting of the route.

(b) PANEL BUTTONS:

1. Signal buttons	GN
2. Route buttons	UN
3. Point buttons	WN
4. Calling on signal buttons	COGN
5. Emergency buttons	EGGN, EUYN,EUUYN, EWN
6. Reminder collors	*XT RES PB+A/C RES KEY, POWER FAIL, ACK, SYS, HL/SL MECR FAILEDFAIL,ACK*
7. Point group buttons	WWN
8. Gate signal buttons	LXN
9. Slot release, slot lock buttons	

S No	Button	Description	Colour	Location
1.	SM KEY	SM KEY		Top Centre of the panel.
2.	PANEL/PC SWITCH	Used during the procedure Transferring control PANEL to PC or VICE VERSA.		NEAR BY TO SM KEY.
3.	GN	(Main) Signal Button	RED	Close to signal and on the first track
2.	SH-GN	Shunt signal button	YELLOW	Close to Signal and on the first track
3.	UN	Route Button	WHITE	Centre of the berthing or last control track circuit
4.	WN	Point Button (used only for point operation)	BLUE	Close to the point demarcation
5.	WWN	Point Button (used for point operation and also for route section release)	BLUE OR BLUE WITH WHITE DOT ON TOP	Top to the PANEL
6.	LXN	Level crossing control release button.	BROWN OR CHOCLATE	Close to the level crossing demarcation
7.	KLYN	(Point) key lock Release Button	BLACK	Close to the slotted point demarcation
8.	COGGN	Calling on Signal control Button (common)	RED	Top of the panel and below COGGN COUNTER
9.	EGRN	Common Button to replace a cleared Signal at 'ON'	RED	Top to the panel below EGRN COUNTER
10.	GBN	Common Slot Release Button (For Gate, Crank handle)	GREEN	Top of the panel
11.	GBRN	Common Slot Return Acknowledgement Button	BLACK	Top of the panel
12.	EWN	Common point button for (emergency operation)	BLUE	Top to the panel and below EWN COUNTER
13.	AGGN	Common Button to introduce Auto working of a Main Signal.	*GREEN*	TOP OF THE PANEL
14.	AGGRN	Common Button to cancel Auto working of a Main Signal	BLACK	TOP OF THE PANEL.
15.	EUYN	Emergency Route Cancellation button	GREY	Top of the panel and below EUYN COUNTER.
16.	EUUYN	Emergency Route Release button	GREY	Top of the panel and below EUUYN COUNTER
17.	OYN	Emergency Overlap Release Button	WHITE	Top of the panel and below OYN COUNTER
18.	E/WHLMEFAIL, WSLMEFAILT	Signal lamp Failure Alarm acknowledge button	WHITE	Top of the panel and below FILAMENT FAIL INDICATIONS
19.	E/WHLMERECT, WSLMERECT	Signal lamp Failure Rectified Alarm acknowledge button	WHITE	Top of the panel and below FILAMENT FAIL INDICATIONS
20.	POWERFAIL ACK	POWER Failure Alarm Acknowledge Button.	RED	TOP OF LEFT SIDE OF THE PANEL
21.	SYSFAIL ACK	SSI system failure acknowledge	WHITE	TOP OF THE PANEL and SYSTEM ON INDICATIONS
22.	G/U/W/GR N ACK	Button hold alarm acknowledge	WHITE	TOP OF THE PANEL
23.	FCORPB	False feed alarm Acknowledge	RED	TOP OF THE PANEL
24.	XY RESPB	loop line axle counter reset button	GREY	BELOW AXLE COUNTER RESET COUNTER
25.	TRAIN ENTRY ACK	Train entering next station block section alarm acknowledge button	BLACK	TOP OF THE ADVANCE STARTER SIGNAL DOMINO.

c) PANEL BUZZERS:

1. Button hold buzzer
2. Signal filament failure buzzer
3. Power fail buzzer
4. System fail buzzer
5. Block release buzzer, train entry buzzer
6. False feed buzzer

d) PANEL COUNTERS:

1. Emergency signal replacement counter (EGRN)
2. Emergency route release counter (EUUYN)
3. Calling on signal counter (COGGN)
4. Emergency route cancellation counter (EUYN)
5. Emergency point operation counter (EWN)
8. Emergency overlap release counter (OYN)

Panel Button Description

Panel Operation Chart

S.No	Gear Type	Buttons to operate	Required Conditions	For Route Release		
				Signal Cancel	Emerg. Route Release	Emerg. Route Cancel
1	Home Signal	GN+UN	Control Tracks overlap tracks up, required point detection including overlap/isolation point detections, gate is locked and concerned CH locked plus concerned MCB's switched on.	GN+ EGGRN	GN+ EUUYN	GN+ EUYN
2	Calling-On Signal	GN+COGGN Release only COGGN keeping GN pressed and press UN	Calling-On Track in front of Signal must be occupied and rear/ replacement track must be high [clear]	GN+ EGRN	GN+ EUUYN	GN+ EUYN
3	Main Line Starters	GN+ Ad.St. UN GN+St.UN	Control Tracks up, required point detections including isolation point(s) and concerned CH locked plus concerned MCB's switched on.	GN+ EGRN	GN+ EUUYN	GN+ EUYN
4	Loop Line Starters	GN+AdSt-UN GN+St.UN	Control Tracks up, required point detections including isolation point(s) and concerned CH locked plus concerned MCB's switched on. Approach clear, Clrars after berthing track is occupied for 48 seconds.	GN+ EGRYN	GN+ EUUYN	GN+ EUYN
5	Shunt Signal	SHGN+UN	Control Tracks up, required point detections including isolation point(s) and concerned CH locked plus concerned MCB's switched on.	SHGN+ EGRN	GN+ EUUYN	GN+ EUYN
6	Auto Signal Set.	GN+AGGN	The Signal should be lowered first	'A' Marker will lit.		
7	Auto Signal Cancel	GN+AGGRN		'A' Marker will not lit.		
8	Loop Line Axle Counter Reset	XT RES PB+A/C RES KEY	Loop line Axle Counter Track failed	Station Master will ensure personally for clearance of line		
10	Power Fail ACK	POWER FAIL ACK		Buzzer will stop on pressing the BUTTON, the RED indication remains till the problem is rectified.		
11	System Fail ACK	SYS. FAIL, ACK	System Fail Buzzer should give sound	Buzzer will stop immediately		
12	HL/SL MECR Failed	HL/SL MECR FAILED	On hearing a Buzzer for MECR(Signal filament failure) along with the indication.	Buzzer will stop immediately		
13	HL/SL MECR Rectified	RECTIFIED	Signal filament rectified.	Buzzer will stop immediately		

STATION WORKING RULES (SWRs) AND TEMPORARY WORKING ORDER.

General Rules 5.06, stipulates

"(1) In addition to General Rules for Indian Railways and Subsidiary Rules of a Railway each station shall be provided with Station Working Rules, applicable to the station, issued under special instructions.

(2) A copy of the Station Working Rules or relevant extract thereof shall be kept at stations, cabins and level crossings concerned. "

SWRs shall be issued in Bi-lingual i.e. in English and Hindi (Devnagri script) form.

1. **Object:**

The object of issuing SWR is to inform all staff concerned with working of trains about the special features of the station to ensure safe train operations at & between stations including level crossings, depending on local conditions.

2. **Authority to issue SWRs:**

i) Under the provisions of GR 5.06, the authority to issue SWRs rests with the Authorised Officer of Railway. The power to issue SWRs has further been delegated to the Sr.DOM/DOM and Sr.DSTE/DSTE jointly for all stations within the Division.

ii) SWRs are issued in conformity with the G&SR and can not, in any way supersede them. In case of any conflict, the provisions of G&SR will prevail.

3. **SWRs requiring sanction of Commissioner of Railway Safety (CRS):**

i) At stations where relaxation has been obtained from provisions of General Rules under approved special instructions, the approval of CRS already obtained shall find place in the SWRs.

ii) Railway administration must obtain sanction of the CRS, when the SWRs are revised as a result of any work listed in para 1302 of the Indian Railway's P.Way Manual.

iii) Works requiring the sanction of Commissioner of Railway Safety and notice thereof (See Appendix B to Ch XV of G&SRs)

iv) SWRs of Special Class Stations

4. **Procedure for Preparation of SWR**

i) The Sr.DSTE/DSTE will prepare/amend the Rule Diagram on the basis of signalling plan/appendices and send the Rule Diagram and also signalling plan/ appendices in case of interlocked station, to the Sr.DOM/DOM for framing Station Working Rules.

ii) Since the Rule Diagram has a vital bearing on the preparation of the SWRs, the Sr.DOM/DOM will scrutinise the Rule Diagram and the Signalling Appendices, if any, and have these checked at the site.

ii) The Sr.DOM/DOM will arrange for preparation of the Draft Working Rules by the Transportation Inspector in the Standard Format, after which these will be checked and approved by the Sr.DOM/DOM personally. In case of interlocked stations the Draft Working Rules shall be checked and approved by Sr.DSTE/DSTE. Sr.DEE/DEE (TRD) shall also be associated in electrified sections.

iii) If there is a 'D' (Flag Station) and 'DK' (station with siding) between two Block Stations, the SWRs of the Block Stations on either side shall contain a reference to such D/DK class Station (in Appendix 'F' of the SWR). In the case of a DK class Station, the special instructions for working the siding shall also be incorporated in the SWRs of the Block Stations situated on either side of the 'DK' class Station. A copy of these special instructions along with the Rule Diagram shall be made available at such DK class Stations.

iv) LC Gates controlled by the Stations and rules for their working shall be incorporated in Appendix A of SWR.

v) The detailed working instructions of Ghat sections shall also be appended on Appendix to the SWRs of adjacent block stations of Ghat section.

5. **Responsibility of the Officers signing the SWRs** :

i) SWRs are the functional rules governing the working of stations,. These need to be prepared with care and attention as any deficiency in these rules can endanger safety ,in which case the officers signing the SWRs shall alsol be held responsible along with other staff for breach of safety rules.

ii) It is obligatory that the rule diagram of the ground conditions are compared at site to confirm accuracy of R.D. In absence of officials signing the SWR having verified it personally, the Transportation Inspector and the SE (Signal) will, after having jointly inspected the site shall certify in writing that the actual layout conforms to what is shown in the Rule Diagram and the number of points and signals quoted therein are correct.

6. **Reviewing of SWRs**:

The SWRs should be reviewed once in every ***five years***. In case the review brings out the necessity of carrying out changes, the SWRs should be re-issued. In the event of ***more than three correction slips*** having to be issued, the SWRs should be reissued without waiting for the periodical review to be conducted every five years as mentioned above.

7. **Method of correcting SWRs:**

Whenever any addition/amendment is required to be made in the said rules, the entire page/pages duly signed by concerned officers on which the provisions requiring addition/amendment appears should be replaced. The method of pasting correction slips by hand in the SWRs is not permitted.

8. **Responsibility of Transportation Inspectors (TI):**

ii) The Transportation Inspector is responsible to see that SWRs of stations on his section are correct and upto date. He will also be responsible to ensure that the station staff viz. Station Supdt., Station Master, Switchman, Cabinman, Pointsman, Gateman and any other staff who are in any way connected with train passing duties, possess correct knowledge of the Rule Diagram and the SWRs and observe them strictly.

iii) Transportation Inspector will also check the SWRs and Rule Diagram and point out irregularities, if any, detected by him. If he finds that certain rules are impracticable thereby forcing the staff to infringe them, he shall immediately bring this matter to the notice of the Sr.DOM/DOM. If he detects any error or omissions which, in any way, affect safe running of trains, he shall take immediate steps at the spot as necessary for safe working of trains and report the matter to the Sr.DOM/DOM concerned for necessary amendment/ modification in the SWRs.

9. **Responsibilities of Station Manger/Station master in charge:**

The Station Superintendent/Station Master on receipt of the SWRs must immediately check to ensure that these conform to the local conditions at their stations. If he finds any discrepancy in the said rules, he shall immediately bring such discrepancies and difficulties to the notice of the Sr.DOM/DOM and Transportation Inspector of the section. The Station Manager in charge shall see that all staff having definite responsibilities in train passing at their stations correctly understand and follow the SWR.

10. **Assurance of staff:**

i) All the staff who are in any way associated with train passing duties, must sign a declaration in the Assurance Register in token of having studied the SWRs, Rule Diagram and other instructions pertaining to their duties and understood the same and that they are in a position to take up duties independently at the Station. In case of illiterate staff, the Station Manager in charge/Yard Master/Assistant Station Master shall personally explain the SWRs, Rule Diagram and their duties and obtain their acknowledgements in the Assurance Register as a token of their having understood the instructions. The SS/YM/SM/ASM shall also certify that the staff concerned has understood the instructions pertaining to their duties.

ii) Fresh assurance shall be obtained in the Assurance Register from the staff concerned when –

(a) He joins at the station as a new member,

(b) There is any change in the Station Working Rules,
(c) He resumes duty at the station after an absence of 15 consecutive days or more.

10. **Distribution of Station Working Rules:**

Copies of SWRs shall be distributed as per current instructions

11. **Standardisation of SWRs:**

To maintain uniformity in the SWRs, the following format shall be used while framing/revising the Station Working Rules for stations. Care may, however, be taken to ensure that -

a) The SWRs framed as per the format are self-contained, brief, precise to the point and written in simple spoken language and

b) General and Subsidiary Rules need not be reproduced in the SWRs. Relevant GR/SR number, may be mentioned in bracket against each para when required.

c) Sr.DOM/DOM and Sr.DSTE/DSTE and Sr.DEE/DEE (TRD) are required to add those special items or features having a bearing on safety in operation at the concerned Station, which is not covered by the format given below (This format has been fixed by RLY Bd) :

.....RAILWAY

No..... .....DIVISION

STATION WORKING RULES OF ---------- (Name of the station)

..... (BG/MG/NG)
Date of issue: ----------
Date brought in force---------

NOTE:

(i) The Station working rules (SWR) must be read in conjunction with General& subsidiary Rules and Block Working Manual. These rules do not in any way supersede any rule in the above books. The language of SWR should be simple, brief and unambiguous applying provision of rules to the specific conditions at the relevant station. These rules must be in simple language intelligible to ordinary railwaymen. However, relevant GR/SR Numbers may be mentioned in the brackets.

(ii) The SWR must be page numbered with the station name code written on each page and signed by the Divisional Operations Manager and Divisional Signal & Telecom Engineer at interlocked stations and at non-interlocked stations by Divisional Operations Manager and Divisional Engineer should sign each page.

(iii) The SWR should be issued afresh after every five years or after issue of three amendment slips and reviewed as and when required.

(iv) Any new innovations introduced to facilitate train operation should be incorporated in SWR.

1. Station working rule diagram :

SWR Diagram No. ---------- based on CSTE/----- Railway and Signal Inter locking Plan No. -------- should show the complete layout of the yard, Points, Signals, gradients and interlocking arrangements of the station including the non-interlocked sidings, exact and actual holding capacity of all the individual lines in metres, actual inter signal (demarcation point) distances, names of adjacent stations and IBH signals, where provided, on either side of the station with their respective distances from the centre line of the station building to the central line of the adjacent stations and any other information necessary in the day to day operation of trains. The particulars of date up to which it is corrected should also be mentioned. SWR diagram should show actual distances and not the minimum prescribed. It should be signed by the Divisional Operations Manager, Divisional Signal & Telecom

Engineer and Divisional Engineer. The detection table, Lever Collar Chart and Pull Sheet may be provided in Appendix 'B'. Pull Sheet should be reproduced on a board brightly painted in the cabins to be placed above the Lever Frames.

2. Description of station

2.1 General (Location)

-------- (Name of the station) is a ------- class station on the ---------- (name of the section) double/single line Electrified/non-electrified (BG/MG/NG) section of -------. Railway on ---------- route. It is situated at KM ------- from-----(a nominated point on the Railway). The number of cabins should be furnished.

2.2 BLOCK STATIONS, IBH, IBS ON EITHER SIDE AND THEIR DISTANCE AND OUTLYING SIDINGS.

------- Station is situated between -------- (Name of adjacent station on one side) in the--------- (North/South/ East/West) side at a distance of ----- km and ---------- (Name of adjacent station on the other side) in the --------(North/South/ East/West) at a distance of ------ km.

In case of IBS signal being provided in the adjacent section the mention of the same need to be made as follows: The section between ------ ------ (name of the section on which the IBS is provided) has been split into two Block sections by providing Track Circuit/Axle Counters and Intermediate Block Stop Signal at Km. -------- and Km. ------ on Up and Dn lines respectively, which are controlled by Track Circuit/Electronic Axle Counter and Double Line Block Instrument.

In case the adjacent section is provided with the automatic signals, necessary mention of the same need to be made in the SWR literature.

In case of outlying sidings/DK station taking off from the section its name and Km in Up/Dn direction should be mentioned. Their detailed working instructions should be given in Appendix 'F'.

2.3. BLOCK SECTION LIMITS ON EITHER SIDE OF THE STATION ON DIFFERENT DIRECTIONS

Points up to which block section in rear terminates and the point from which the block section in advance starts should be indicated in the following tabular format:

Between Stations.	The point from which the "Block Section" commences	The point at which the "Block Section" ends

2.4 GRADIENTS IF ANY

The gradients in the yard and the adjacent block sections should be mentioned with their locations. Any gradient which are steep enough to warrant special precaution in train operation should be mentioned.

2.5 LAY OUT

Under this head, information pertaining to the number of running lines in the main yard, (namely UP Loop, UP Main, DN Main and Common Loop etc.), Goods sheds/siding, Hot Axle siding, passing sidings, engineering sidings, sidings taking off from the yard with the details whether electrified/non-electrified etc. and how they are isolated from the running lines should be mentioned. The information in relation to provision of low/high level platforms on the running lines/goods sidings should be given.

2.5.1 RUNNING LINES, DIRECTION OF MOVEMENT & HOLDING CAPACITY IN CSR.

The direction of movements on all the lines and Clear Standing Room of running lines in terms of metres need to be specified.

2.5.2 NON RUNNING LINES AND THEIR CAPACITY IN CSR

2.5.3 ANY SPECIAL FEATURE IN THE LAYOUT.

Any special feature of the yard such as catch siding, slip siding, non-standard turnouts, curves, spring points etc. having bearing on the operation of trains need to be mentioned.

2.6 LEVEL CROSSINGS:

Detailed working of the gate along with the particulars regarding LC gate No., location, class, normal position, whether interlocked or non-interlocked, whether communication provided or not and whether Train Actuated Warning Device(TAWD) provided or not, how the gate is operated etc, need to be mentioned in Appendix 'A'.

3. SYSTEM AND MEANS OF WORKING

System of working in force - Absolute/Automatic by using Double line/ Single line Token/Tokenless Block Instruments, whether co-operative or non-co-operative, the staff responsible for their operation and custody of keys should be clearly mentioned. Mention should also be made of the availability of block telephone at the station and Telephone provided at IBS posts to establish contact by the Loco pilot with Station Master in rear, in case of any necessity.

4. SYSTEM OF SIGNALLING AND INTERLOCKING

4.1 The Standard of interlocking, type of signalling (MLQ/TALQ/MAUQ/MACLS), method of operating the signals/points from Lever Frames/Control Panel/VDU/CTC, provision of axle counters/track circuits on running lines, Calling-On Signals/IBS, special signalling features such as fixed Warner, stop boards at terminal stations, emergency cross-overs, permanently locked points, motor operated points at an otherwise mechanically worked stations, emergency/crank handle keys and their custody, indications(electric/banner type) of points/trap points/signals/track circuits/axle counters need to be mentioned. The detailed description of the Lever Frame/control panel/Video Display Unit for route setting using point/signal/gate control switches, individual operation of points, operations of gates within the station limits, setting of points using the crank handle and the maintenance of proper records of emergency operation counters provided on the panel need to be mentioned here. Procedure for working of stations provided with Train Protection and Warning System and Anti Collision Device need to be mentioned. The procedure for resetting of the system in case of failure of Axle counter on berthing portion as well as IBS section, emergency operation of points, emergency route cancellation, clearing of block etc also need to be mentioned from operations point of view.

(Details of signalling and interlocking should, however, be given in Appendix 'B' and details of Anti Collision Device, if provided, be given in Appendix 'C').

4.2 CUSTODY OF RELAY ROOM KEY AND PROCEDURE FOR ITS HANDING OVER AND TAKING OVER BETWEEN STATION MASTER AND S&T MAINTENANCE STAFF.

4.3 POWER SUPPLY

The sources of Power supply for Signalling such as Dn AT/Up AT/ Local supply (State Electricity Board)/Diesel Generator/UPS/Integrated Power Supply etc. should be mentioned here. It should be clearly mentioned whether the changeover from one source of supply to the other shall be automatic or manual in case of failure of normal source of supply. The procedure for manual changeover should be described.

5. TELECOMMUNICATION:

The availability of the telecommunication facilities at the station and their operational aspects should be clearly defined:

i) Section Control/Dy. Control/Traction Power Control Telephone, etc.

ii) Auto/DOT Telephones,

iii) Magneto Telephone with the cabins/gates,

iv) IBS Telephone with IBS at Km. -------,

v) Telephone with Axle Counter reset boxes,

vi) Telephone for yard communication,

vii) VHF Sets, and

viii) Mobile Train Radio Communication (MTRC)

The action to be taken in case of failure of communication given above to be clearly spelt out.

(Details of working should be given in appendix 'B')

6. SYSTEM OF TRAIN WORKING:

6.1 DUTIES OF TRAIN WORKING STAFF

The duties of the train working operational staff such as Station Master, Switchman, Cabinman, Leverman, Pointsman, Platform Porter, Gateman for train operation should be mentioned in detail in Appendix 'D' giving specific references to the G&SR of the Railway and the Block Working Manual.

6.1.1 TRAIN WORKING STAFF IN EACH SHIFT

The availability of above operation staff provided at the Station in each shift with their duties for working of trains should be mentioned in Appendix 'D'.

6.1.2 RESPONSIBILITY FOR ASCERTAINING CLEARANCE OF THE LINES AND ZONES OF RESPONSIBILITY.

Responsibility for ascertaining clearance of lines and zones of responsibility of each of the staff on duty should be clearly mentioned here. Mention should be made that Private Number Book should be under the custody of train passing staff who is authorised to use it.

6.1.3 ASSURANCE OF STAFF IN THE ASSURANCE REGISTER

Every train passing staff posted newly at the station or leave reserve staff at the station or regular staff who has resumed his duties after more than 15 days absence must go through Station Working Rules in force and give assurance in the prescribed Assurance Register.

6.2 CONDITIONS FOR GRANTING LINE CLEAR :

Under this head, principles of the System of Working in force on the station should be described briefly and clearly as applicable to the station. Specific points on the track up to which the line is required to be kept clear must be indicated. Mention of outlying sidings, if involved, may also be made.

6.2.1 Any Special Conditions To Be Observed While Receiving Or Despatching A Train

6.2.1.1 Setting of points against block line.

6.2.1.2 Reception of train on blocked line.

6.2.1.3 Reception of train on non-signalled line.

6.2.1.4 Despatch of train from non-signalled line.

6.2.1.5 Despatch of train from line provided with common starter signal.

6.2.1.6 Any other special conditions should be mentioned giving reference to the G&SR.

6.3 Conditions for taking 'off' approach signals:

This needs to be mentioned here giving reference to the relevant provisions of the G&SR.

6.3.1 Responsibility of station master for restoration of signals to 'on'.

Station master should ensure that signal is put back to 'ON' after passage of the train as per GR 3.36.2 (b).

6.4 Simultaneous Reception/Despatch, Crossing And Precedence OF TRAINS :

This should mention the specific setting of points and traps for the purpose of achieving the desired signal overlaps/isolations to Sand Humps/sidings etc. while receiving trains simultaneously, crossing and giving precedence to trains at the station.

6.5 Complete Arrival Of Trains

Responsibility for verification of complete arrival of trains before closing the block section should be made clear. In case Block Proving by Axle Counter (BPAC) installed on the section, the procedure of block working should be mentioned, giving reference to the relevant provisions of G&SR and Block Working Manual.

6.6 Despatch of trains:

Particulars regarding starting of trains from running lines, non-signalled lines, issue of caution orders etc should be mentioned giving reference to the provision of G&SR and Block Working Manual. In case IBS is provided, the procedure for despatch of trains up to the IBS and thereafter to the next station should be clearly defined.

6.7 Trains running through:

The provisions given in G&SR should be mentioned.

6.8 Working in case of failure:

Working in case of failure of track circuits, points, signals, block instruments, axle counters, Axle Counter Block, procedure for working over damaged points, reception of trains on obstructed lines, non-signalled line including failure to read the occupation of line by trolley or light engine etc. should be mentioned in detail here

6.9 Provisions for working of trolleys/motor trolleys/material lorries:

Some of the precautions such as given below should be mentioned:

(i) The section where axle counters are provided in lieu of track circuits, Trolleys, Motor Trolleys, Lorries etc., which are not insulated, shall not be allowed to run except on line clear.

(ii) Motor trolleys/Tower Wagon/Material Lorries are not likely to actuate the Axle counter correctly. When they are to run over the section split by Axle counters, the whole section to be treated as one and next train to be started after the last train has arrived complete.

(iii) In all other respects the working of a light Motor trolley shall conform to the rules laid down for ordinary trolleys while running without block protection and to those laid down for motor trolleys while running under block protection or following another light motor trolley or a motor trolley.

(iv) Any other restriction on movement of trolleys/motor trolleys/material lorries/tower wagons etc.

7. Blocking of line:

The precautions to be taken by the Station Master, when lines are blocked by stabled vehicles or otherwise for maintenance works, to be detailed here.

8. Shunting:

8.1 General precautions
8.2 Shunting in the face of approaching train
8.3 Prohibition of shunting, special features if any.
8.4 Shunting on single line –
Within station section
Between Last Stop Signal and opposite First Stop Signal.
Beyond opposite First Stop Signal
During failure of block instrument on single line.
8.5 Shunting on double line.
Block back
Block forward
Following a train travelling away.
Upto IBS
Beyond IBS
During failure of block instrument on double line.
8.6 Shunting in the siding taking off from station yard/ goods yard.

9. Abnormal conditions

(a) The Rules To Be Observed In The Event Of Abnormal Conditions.

The procedure to be followed in the event of following abnormal conditions should be specifically mentioned.

(i) During partial interruption/ failure of Electrical communication instrument.
(ii) The authority to proceed in the occupied block section in case of obstruction of line or accident etc.
(iii) Trains delayed in block section
(iv) Failure/passing of intermediate block stop signal at 'ON'.
(v) Failure of Axle Counter Block/ BPAC
(vi) Failure of MTRC

(b) Procedure For Emergency Operation Of Points By Crank Handle.

(i) The detailed procedure for emergency crank handle operation of motor operated points at different lines at the station from operation point of view should be mentioned here.

(ii) Procedure for Emergency operation of point with point zone axle counter/ track circuit failure and emergency route release, giving reference to GR 3.39 and GR 3.77 should be mentioned here.

(c) Certification Of Clearance Of Track Before Calling On Signal Operation Is Initiated.

Mention should be made that before taking off Calling-on Signal during failure of track circuit/axle counter, the route and the clearance of the track over which train would pass to be verified by SM/ASM.

(d) Reporting Failure Of Points, Track Circuit/Axle Counter And nterlocking.

i) Mention should be made that whenever there is a failure of points, track circuit/Axle Counter or any other interlocking gear at the station, the failure should be reported by SM/ASM on duty to the concerned Signalling Maintenance Staff on duty responsible for attending to the failure and only after receipt of the written memo from the Signalling Maintainer for rectification of the fault, SM/ASM should restore the normal working..

(ii) The entries in failure register to be done with message to the Section Controller.

9.1 TOTAL FAILURE OF COMMUNICATION

Provision of the SR and instructions laid down in Block Working Manual relating to the working of trains during total failure of communication at the station should be briefly summed up giving the action to be taken and by whom and what precaution to be taken giving reference to the relevant provisions of the G&SR.

9.2 TEMPORARY SINGLE LINE WORKING ON DOUBLE LINE SECTION

9.3 DESPATCH OF TRAIN UNDER AUTHORITY TO PROCEED WITHOUT LINE CLEAR OR TO ASSIST THE CRIPPLED TRAIN.

10. VISIBILITY TEST OBJECT

Position of the Visibility Test Object in each Zone of operation and the officials authorised to check the V.T.O from a nominated place at the station should be mentioned here.

11. ESSENTIAL EQUIPMENTS AT THE STATION

The list of the essential equipment should be given in Appendix-'E'.

12. FOG SIGNAL MEN NOMINATED TO BE CALLED IN CASE OF FOG

In Foggy or tempestuous weather or in dust storm when V.T.O. cannot be seen from the SM's Office, the SM shall send trained men to act as fog signalmen. Instructions regarding their selection from Traffic and Engineering Departments, entry of their names in the Fog Signal Register and taking assurance by the SM to be mentioned clearly.

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LIST OF APPEDICES

APPENDIX 'A' WORKING OF LEVEL CROSSING GATES

APPENDIX 'B' SYSTEM OF SIGNALLING AND INTERLOCKING AND COMMUNICATION ARRANGEMENTS AT THE STATION

APPENDIX 'C' ANTI COLLISION DEVICE (RAKSHA KAVACH)

APPENDIX 'D' DUTIES OF TRAIN PASSING STAFF AND STAFF IN EACH SHIFT.

APPENDIX 'E' LIST OF ESSENTIAL EQUIPMENTS PROVIDED AT THE STATION

APPENDIX 'F' RULES FOR WORKING OF DK STATIONS, HALTS, IBH, IBS, AND OUTLYING SIDINGS

APPENDIX 'G' RULES FOR WORKING OF TRAINS IN ELECTRIFIED SECTIONS.

(To be jointly signed by Divisional Operations Manager and Divisional Electrical Engineer)

TEMPORARY WORKING ORDER

(Details of N.I. Working are given in a later chapter)

Temporary Working order or TWO is an embodiment of detailed instructions issued and circulated by the Sr.DOM/DOM whenever any pre-planned work of signalling, electrical (OHE) or engineering department is to be executed, requiring special safety precautions to be observed by staff.

I. **Circumstances under which 'TWO' is to be issued:**

1. When the nature of work is such, that it will require the imposition of speed restriction for more than one day.
2. In all the cases when addition or alteration in the layout of the yard or to permanent signalling and interlocking arrangements are to be made.
3. Overhauling of the signal and lever frames.
4. The nature of the work involves temporary cessation of working of the trains.
5. For construction of all new installations on or near the track, such as new station, foot over bridge, OHE, renewal of track, providing temporary diversions, etc.

II. **Procedure for preparation of Temporary Working Order/Instructions:**

The draft of TWO is prepared by the supervisor concerned viz. SE(P.Way) for engineering works, by the SE(Signal) for signalling and interlocking work and the SE(Elec.) For electrified sections etc. for electrical works detailing the requirement of the work and precaution to be observed. This pre-planning of the work is known as Draft of TWO.

Draft TWO is submitted by the SE(P.Way)/SE(Signal)/SE(Elec.) to their Divisional Officers i.e Sr.DEN/DEN/ Sr.DSTE/DSTE/Sr.DEE/DEE. After the draft TWO is checked and justified by the divisional officer of department concerned. Sr.DEN/DEN/ Sr.DSTE/DSTE/Sr.DEE/DEE will send the draft TWO to the Sr.DOM/DOM who will include instructions for regulation of Traffic during the execution of work and will issue the TWO with detailed instructions including the safety precautions to be observed during execution of work.

NON – INTERLOCKED WORKING OF STATION

Non Interlocking

i) N.I. Working means temporary disconnection of points, signals, track circuits, axle counters and other signaling gadgets for any designated works. This kind of working is normally resorted to works such as over hauling of lever frames, yard remodeling, introduction of panel/RRI working, cable etc.,

ii) In another sense, at an interlocked station when points and signals become defective, station becomes non-interlocked for the purpose of working.

In both the cases the safeguards ingrained through normal functioning of various signaling equipment are missing and as such responsibility of the part of staff increases manifold. N.I. working puts staff under severe strain and hence prone for lapses. Unflagging attention from every quarter is the need of the hour so that safety is ensured.

Non – Interlocked working entails not only slowing down of train operations; it is also a less safe system as compared to interlocked working. Since it is desirable to avoid NI altogether, both from safety as also customer convenience point of view, attempt must be made at the **project proposal stage itself** to dispense with NI altogether and undertake the work by means of traffic blocks.

Instructions given below are in addition to existing rules for Non – Interlocked working such as issue of Green Notice etc. They must be read together with existing provisions in G&SR, Block Working Manual etc.

A. Requirement of Non – Interlocked Working:

The following guidelines are laid down for a correct assessment of whether NI working is required in the first place or whether it can be dispensed with altogether.

a. NI working should not be resorted to as far as possible, in case of installation of new S&T gears. NI is unavoidable only if modifications are to be made to existing S&T gears.
b. For new S&T gears, there is no need of NI and the work can be managed through well-planned pre-change over works (insertions of point & crossing etc). The final change over to new gears can be carried out under partial or complete traffic block.
c. At the project proposal stage itself, S&T department should make it clear whether the project requires NI or not; and if it does, the duration of such NI. This fact must be mentioned in the check list on the original tracing itself.
d. Sr. DOM & Sr. DCM must quantify the actual impact of such NI, and deduce it to monetary terms, by calculating anticipated losses both on account of passenger and freight traffic. These should include losses on account of cancellation, short termination, diversion, rescheduling, detention to trains and imposition of restriction on booking/movement of freight traffic.
e. Expenses likely to be incurred on account of TA/DA of temporary NI staff, and other administrative costs should also be added to arrive at the traffic cost of proposed NI working.
f. This traffic cost of NI should be communicated to S&T, who will evaluate if new gears can be installed without resorting to NI for less than the expected cost of proposed NI, if necessary by constructing a new building etc. as the case may be.
g. If new gears can be installed in a new building and commissioned under traffic block at a cost that is comparatively less than the overall traffic cost of proposed NI, then the project should be recorded as one to be taken up without NI.
h. This entire exercise must be carried out under the personal supervision of DRM, who will ensure that all estimates are reasonable and no figures are unrealistic both with regard to duration of NI or the anticipated traffic cost.
i. Thus, NI will be undertaken only if found to be unavoidable, and this fact will be recorded on the original tracing, to be signed by branch officers concerned, and the DRM.

Minor and Major Works :

1. Guidelines given below should be followed for deciding whether NI working is required or not. NI working is not required and the work can be managed by traffic block in following cases :
   (i) Replacement of Mechanical lever frame by another Mechanical lever frame.
   (ii) Replacement of Mechanical lever frame by panel.
   (iii) Replacement of Panel by RRI.
   (iv) Replacement of RRI by RRI.
   (v) Commissioning of new SSI/RRI.
   (vi) Amalgamation of newly constructed double line portion into existing conventional double line.
2. NI working is required only for following cases :
   (i) Overhauling of cabins.
   (ii) Replacement of Panel by Panel at road side stations.
   (iii) Meggering of cables.
   (iv) Changes in yard layouts
3. NI working can be divided into 2 distinct categories, namely minor and major works.
   (i) Minor works – Overhauling of cabins at road side stations.
   (ii) Major works – Changes in yard layouts, overhauling of cabins etc. at comparatively bigger terminals and junction stations.

MINOR WORKS

(A) Procedure to be followed for Non – Interlocked Working for Minor Works :
Road side stations on double line having up to 2 lines in each direction, and on single line having up to one main line and 2 loop lines are covered under this heading of Minor Works.

(C1) Duration of NI working for Minor Works :

1. A road side station would normally have about 21 lever in each end cabin (including spare levers).
2. S&T department must suitably augment the strength of their NI gang so that each cabin can be completed in one day.
3. NI working at the 1st cabin should start at 8/- hrs. in the morning and by 18/- hrs. the same must be interlocked and handed back to traffic.
4. The same procedure should be repeated the next day for the 2nd cabin.

(C2) General Instructions for Train Operation :

1. Speed restriction of 15 kmph. shall be imposed over all facing points.
2. No train/wagon should be stabled on any running line of the NI station.
3. The common line should not be used for reception of trains coming from opposite directions.
4. Emergency and other crossovers including sidings taking off from the station should be set for normal position and clamped and padlocked. The keys of all padlocked points must be kept in the personal custody of the overall in-charge of NI working to prevent their being used even by mistake.

(C3) Train Running on double line section during NI working :

1. Twin single line should be suspended during the duration of NI working and section worked as conventional double line only.
2. No temporary single line working should be introduced during NI period, except in case of an accident or blockade of through communication.
3. At road side stations on double line, route must be set for platform line in each direction and clamped and padlocked.
4. In case there is more than one platform in each direction, route must be set for one nominated platform.
5. At all such stations no precedence should be arranged.
6. During the NI period station should basically function as a halt station.

(C4) Train Running on single line section during NI working :

1. Ideally, if possible, only one platform line should be nominated for train running.
2. The route must be set for this platform line in each direction and clamped and padlocked.
3. No precedence or crossing should be arranged at this station.
4. In case it is not possible to nominate only one line, then 2 specific lines should be nominated for Up and Down movement.
5. In that case, while crossings would have to take place, no precedence should be arranged at this station.

(C5) Staff requirement :

1. Sectional TI and SI will be overall in-charge of NI working at the station.
2. Additional staff if required should be managed locally .

MAJOR WORKS

(B) Procedure to be followed for Non – Interlocked Working for Major Works :

Changes in yard layouts, overhauling of cabins etc. at comparatively bigger terminals and junction stations are covered under this heading of Major Works.

(D1) Duration of Non Interlocked Working :

1. NI working must not be simultaneously introduced at more than one station in a Division.
2. NI must be planned during temperate weather, to avoid wrong actions on account of harsh and inclement weather.
3. Period of Non – interlocked working must be kept to the bare minimum as it is a potential safety hazard.
4. Staff of all departments must work round the clock in three shifts so that the work can be completed at the earliest.
5. For NI working of up to 3 days, plans will be finalized in consultation with DRM, Branch Officers and concerned HOD of Construction/RE Organization.
6. For NI working of more than 3 days, plans will be finalized in consultation with CTPM, CPTM and HOD of RE/Construction Organization at Zonal level to assess the duration and arrangements of NI working.
7. For more than 3 days NI, plans should be worked out for cancellation, diversion, rescheduling, short termination or even extension of trains as the case may be.
8. For NI working of more than 7 days personal approval of the General Manager must be obtained.
9. No NI working should last for more than 14 days.

(D2) Sanctions, clearances and preparatory works :

1. Signal Plan must be finalised in Hdqrts. at least 45 days in advance.
2. All plans and clearances including CRS sanctions that are required for NI working must be available at least 1 month before commencement of NI working.
3. Under no circumstances should this period of 1 month be relaxed.
4. NI working must be postponed in order to provide for 1 clear month before start of NI either in case of :
   (i) Delay in receipt of above clearances/sanctions etc.
   (ii) Last minute modifications to Signal Plan.
5. All pre – NI work that can be carried out without non – interlocking must be completed before actual NI working begins. These include changes in yard layout, insertion /removal of points & crossings etc. Changing/installation of new point machines must be done in advance.
6. Preparatory work in connection with OHE work must also be done in advance, including shifting of neutral section, if required.
7. Lessons learnt during previous NIs must be gone through in detail so that shortcomings of earlier occasions are avoided.

(D3) Level of Supervision/Responsibility :

1. Responsibility to ensure availability of proper arrangement for NI working shall be of Construction/RE organization.
2. Though the responsibility to provide necessary arrangement will be of Construction/RE organization, concerned branch officers from open line shall be responsible to ensure its availability and functioning during train operation. For this he shall be the coordinating officer for the department concerned.
3. PERT chart should be made out detailing various activities to be completed on a day-to-day basis.
4. For round the clock working PERT chart should be made out detailing various activities to be completed on a shift to shift basis.
5. Dy. CSTE/Dy. CE/Dy. CEE as applicable shall make themselves available in non-interlocked area where the work is being undertaken.
6. The concerned Project in – charge (XEN, DSTE/Con. etc) shall camp near the non-interlocked area till completion of non-interlocked working.
7. Overall in charge for NI working will be Sr. DOM/DOM as the case may be for both Safety and Operations.

(D4) Green Notice :

1. Construction officials responsible for carrying out the work should send a ‘circular notice’ to the Sr. DOM/Sr. DSO at least two months in advance.
2. They will advise as to when the work will be undertaken with a request to issue special instructions. A copy of the notice shall also to be sent to SS of the station concerned.
3. Sr. DOM/Sr. DSO on receiving such ‘circular notice’ get special instructions prepared for that station. These are then issued to all concerned.
4. Green notice is to be issued by Sr. DOM. It should incorporate the following :

(i) Details of existing yard layout and its various provisions.
(ii) List of all works to be completed by Civil Engg./S&T/Elec. before start of NI.
(iii) List of all works to be undertaken by Civil Engg./S&T/Elec. during NI period.
(iv) Additional facilities to be made available after commissioning of new works.
(v) Existing facilities that are to be dismantled.
(vi) Details of yard layout to be made available after completion of NI.

5. Signalling Plan must indicate permissible routings and simultaneous movement facilities to be made available.
6. Signalling Plan must invariably indicate whether any of existing facilities for train movement are to be (i) either curtailed, (ii) modified or (iii) restricted.

(D5) Time Tabling changes :

For assessing the impact of NI working at a bigger terminal or at a Junction station, a detailed exercise has to be undertaken as indicated below.

1. During the course of NI working changing of points manually after passage of a train and after completing all formalities takes about 10 minutes time.
2. The capacity of the junction station to handle maximum number of trains during a particular time period has to be worked out keeping in mind the above constraints.
3. Every possible train movement of reception and despatch must be clearly documented,
   (i) Along with time of movement.
   (ii) With exact sequence of points, whether in normal or reverse.
4. For time-tabled moves, trains demanding same point either at the same time or within 10 minutes must be identified since this is the time required before an existing setting of points can be changed. In case of conflicting moves, the less important moves have to be cancelled, rescheduled or diverted.
5. Crossing and precedence must be restricted to the bare minimum with few specific routes being selected for most movements.
6. As a thumb rule, only 80% of the reduced capacity as worked out should be utilized since unforeseen failures such as ACP, equipment failures etc. are likely to take up the remaining 20% of the available capacity.
7. In all such planning it is better to keep adequate cushion in train operations and initially cancel, reschedule or divert more number of trains than what may be required. In case NI working progresses smoothly without major detentions and it is felt that some of the cancelled trains can be restored, the same may be done after a week or so.
8. Clear corridor for freight must be charted out, with exact number of moves possible, and extra freight trains that cannot be handled should be planned to be diverted to other routes. In case diversion is not possible then operating restrictions must be imposed.
9. More time must be spent in precise planning of each move during NI period, such that the station is not brought under pressure at any time.
10. Changes in PRS reservation system for cancellation, diversion, rescheduling etc. must be done in advance as per advance period of reservation.

(D6) Advance preparation for Train Running :

Stoppages on Platform :

1. Duration of stoppages of Mail/Express trains must be reduced to the extent feasible.
2. Loading/unloading of parcels should be reduced to the bare minimum. If possible handling of parcels should be suspended giving due publicity in the Press and other media.
3. Running of trains with single SLR must be prohibited.
4. Shunting operations must be restricted to the bare minimum and preferably avoided altogether as far as possible.
5. Booking of through carriages, inspection carriages, etc. to the NI station must be restricted.
6. Quick watering of coaches must be ensured by deputing additional staff as required.
7. Nominated stations for watering of coaches may also be changed if alternate stations are available.
8. Extra TXR staff on platforms for attending to defects in rolling stock and promptly attending to complaints.
9. Extra train lighting staff must also be deputed on platform duty for promptly attending to complaints.
10. Special squads of commercial and RPF staff must be deputed on platform duty for checking ACP etc.
11. All efforts must be made to minimize detentions.

Crew Changing :

1. Loco Supervisor must be kept on round the clock duty on the platform for quick change over of crews.

2. If possible crew changing for through passing trains may be planned at adjoining stations.
3. If necessary, LIs may be deputed to accompany the loco pilot from one station before NI station till one station after NI station.
4. Traffic Supervisor must be kept on round the clock duty on the platform for quick change over of guards.
5. At notice stations, computerized print out of caution orders must be used for saving time.
6. Similarly, extra porters should be deputed for delivering these caution orders to loco pilot and guard.

Locomotives :

1. Engine changing for through trains must be curtailed.
2. Locomotives must be freely extendable beyond territorial jurisdiction.
3. If it is unavoidable, then changing of locos may be done at either side of NI station.
4. For avoiding changing of locos from Diesel to Electric and vice versa, train routings may be changed during the duration of NI working.
5. For traction changing, half shunt of locos may be freely resorted to.
6. Attaching of locos in rear should be resorted to in case of stations where trains reverse.
7. Sending of light engines to sheds must be restricted. For this purpose, an out pit may be opened, if necessary.

Controlling of Trains :

1. In case of major terminal stations, a mini control office may be opened at the station. This mini control will liasion with divisional control office for purposes of train running. The jurisdiction of this mini control office would be the NI station itself, and 2 – 3 stations on either side in each direction.
2. Station under going NI must not be permitted to be brought under any pressure whatsoever at any time during NI working.
3. All relevant notices must be issued in advance.

(D7) Goomty Arrangements :

Location and number of goomties is an extremely important aspect of advance planning for NI. Sr. DOM/Sr. DSO should personally approve final arrangements regarding goomties.

1. Cabins should not be used as goomties.
2. For a group of maximum of three sets of points operated from the ground, one goomty should be made.
3. Ideally, only 2 sets of points should be controlled from a single goomty.
4. Each goomty should be provided close to the group of points that it controls. This will ensure that physical movement of staff is reduced to the bare minimum.
5. A group of 3 – 4 goomties at one end of the yard should be put in one zone.
6. Under no circumstances should 2 ends of the same points/crossings be with different goomties. This must be specially ensured for diamonds with single slips and also with double slips. Each such diamond must be under the same zonal in-charge.
7. Location of each goomty as also number of points that are controlled from it should be tentatively marked out in yard diagram. This should then be physically cross checked at site by visiting the station yard.
8. At site it must be ensured that staff are not required to walk long distances for setting of points.
9. Both ends of each point must be clearly visible from the goomty itself.
10. A goomty must be provided near the first stop signal for prompt issue of OPT forms etc. as required. Another goomty must be provided at the last stop signal to ensure correct dispatch of trains.

(D8) Staff Arrangements :

Staff Requirement :

1. Each goomty should have one ASM and two Pointsman in each shift. These extra ASMs posted in goomties shall be called goomty ASMs. ASM posted with indoor ASM will be termed as co-ordinating ASM.
2. For cabin operated points, extra commensurate staff as required (ASM/cabinman/ pointsman) should be provided. However, cabins should not be used as goomties as far as possible.
3. Goomty ASMs during their duty hours shall be fully in-charge of working of points/levers under their charge. They shall discharge all obligations of the cabinman/pointsman working at the station/cabin. They shall work under the direct supervision and instructions of the co-ordinating ASM on duty.
4. A group of four goomties or more at each end of the station should be put in one zone. Each zone should be under the charge of a TI in each shift. TI will periodically keep moving about amongst the goomties within his zone. He will check up and monitor the working of group of goomties under his charge.

5. For non-interlocking work at major terminal stations, necessary arrangement for additional staff should be made, if necessary, from adjoining divisions, before undertaking NI working.
6. Under no circumstances should NI working be started unless full complement of staff is available at the station as per above norm and adequate training has been imparted to them.
7. Preferably those staff should be drawn from outstation who have
   (i) Adequate knowledge of NI working.
   (ii) Previous experience of the same.
8. Boarding and lodging of outstation staff is an important aspect of NI preparation. Dormitory type arrangement would be ideal, if these can be arranged. At major junctions these can be taken care of by stabling a few coaches at sidings. However, facilities will have to be arranged for electrical charging, watering, cleaning of bathrooms, sanitation etc.
9. On divisions where separate non – interlocking gangs are already in existence their strength may be adjusted accordingly. However, composition of such NI gangs should be periodically changed by inducting fresh faces and with drawing earlier ones.
10. Round the clock engineering gangs with crow-bars and handles should be available to move points in emergency. One gangman should be available with each goomty in each shift for this purpose.
11. At each non-interlocked station one Asst. Scale officer of operating department will be nominated for over all supervision.

(D9) HOER :

1. Under no circumstances HOER violation should be permitted during NI working. As far as possible duty hours of staff should be restricted to 8 hrs. duty per shift in continuous roster.
2. For catering to unexpected casualties such as leave, sickness etc. during the NI period, RG and LR staff must invariably be provided for.
3. RG and LR must be made available shift wise. The standard of RG and LR should be the same as that of regular duty cadre staff for that shift as stipulated.

(D10) Duty Rosters shift wise :

Meticulous detailed planning must be carried out for drawing up roster of staff to be deputed for NI working. While drawing up roster of staff for various shift duties, following guidelines must be followed :

1. Duty rosters must be drawn up as per guidelines given below.
2. These should be drawn up for the entire duration of NI period.
3. Duty rosters drawn up should be openly displayed and given wide publicity.
4. No staff shall be permitted to mutually exchange his duty roster with any other staff, without prior permission of his departmental officer at site.
5. Level 'N + 1' shall be responsible for ensuring that level 'N' has followed all instructions, etc. as laid down above.

Last Night Shift Duty :

1. Regular staff permanently posted at the NI station must be rostered during the last night shift.
2. Second preference should be for staff who have previously worked at that station.
3. Best and most competent supervisors should be deployed for last night shift duty.

First Night Shift Duty :

1. Regular staff permanently posted at the NI station, if still available for deployment after covering last night shift, should be rostered for first night shift duty.
2. Second preference should be for staff who have previously worked at that station.
3. Amongst outstation staff preference should be as follows :
   (i) Senior staff having previous experience of NI working.
   (ii) Staff who are presently posted at major junctions.

Day Shift Duty :

1. Comparatively junior inexperienced staff from outstation should be deputed for day shift working.
2. Teams for different goomties should be so formed as to include at least one staff having previous experience of NI working.
3. For day shift working, more number of staff may be deputed per goomty, if required, to cater for comparatively inexperienced staff.

(D11) Temporary Working Instructions (TWI) :

1. When NI is undertaken, inter – locking provisions stipulated in SWR are no longer available. So the SWR in its existing form becomes invalid.
2. TWI is basically meant to replace some portion of Station Working Rules of the station during the period of NI working. While they need not be as detailed as the original SWR of the station, nevertheless, they must cover all aspects of train operation that are included in the existing SWR.
3. Static information of SWR will continue to be valid. These include :

(i) Inter - station distances.
(ii) Description of yard layout.
(iii) Level crossing gates.

4. TWI is to be read in conjunction with G&SR, Operating Manual, Block Working Manual. It must also be read along with existing SWR of the station.
5. Portions of SWR that will get replaced pertain to :
   (i) Ensuring clearance of running lines.
   (ii) Granting of line clear.
   (iii) Reception/despatch of trains.
   (iv) Working of level crossing gates.
   (v) All checks that are done by means of :
      (a) Slots.
      (b) Lock bars.
      (c) Point locks.
      (d) Signals.

   All these checks have to be taken care of manually.
6. TWI should list out :
   (i) Number of goomties.
   (ii) Portions of yard that each goomty would control.
   (iii) Which goomties are to be involved for reception/departure of a train on/from different lines.
7. TWI should list out different conditions required to be fulfilled for receptiondespatch of train :
   (i) How line clear is to be granted/obtained.
   (ii) How clearance of nominated line is to be ensured.
   (iii) Procedure for closure of level crossing gates, if any.
   (iv) How the route is to be set.
   (v) What are the series of points involved.
   (vi) Which one of them are to be in normal position and which ones in reverse.
   (vii) How signals are to be lowered.
   (viii) Which staff would do what.

(D12) Field level Advance Preparation :

1. Detailed working instructions clearly specifying the zone of responsibility of each and every staff and supervisor along with temporary working instructions must be issued well in advance of the NI working. In any case these should be ready at least 15 days in advance of NI working.
2. Station Superintendent/Traffic Inspector who is overall in-charge should be fully aware of their responsibilities/duties. Temporary working instructions should clearly stipulate these unambiguously.
3. Each Station Masters/Assist. Station Master, Cabin Man and point man deployed on shift duty should be supplied with copies of temporary working instructions. In addition SM/ASM and Cabin Man shall be supplied with yard layout diagrams and pull charts for their guidance.
4. The temporary working instruction shall be supplied to SS/ASM/Cabinman and Pointsman in advance for study by them and for explaining to illiterate staff.
5. The instruction should be prepared in Hindi, English and Vernacular language and assurance to the fact that they have understood shall be obtained.
6. Ready made pull charts indicating normal and reverse position of points for specific routes must be prepared goomty wise. All such pull charts should be prepared at least 15 days in advance.
7. TI should be entrusted with the job of personally checking each and every pull chart. Compliance report must be submitted by TI at least 10 days in advance.
8. These pull charts must be printed, laminated and displayed in goomties as also given to each staff concerned.
9. Draft instructions and pull sheets must be computerized and prepared in advance. Thereafter these should be revised on a day to day basis. Actual revision should take into account the progress of work as per the original time schedule.
10. A checklist of items to be inspected jointly by Traffic, Signal and Permanent Way Inspector should be drawn and controlling officers should monitor that instructions in the checklist are complied with.
11. The exact location on the stock rail where clamps are to be fixed must be marked with white paint and clamps should actually be fitted to check that there are no obstructions. Clamps should be actually fitted to check that there are no obstructions.
12. It may not be possible to fix clamps on motor operated points provided with second leading stretcher bar. In all such cases provision must be made for cotter bolting of points.

13. In any case, cotter bolting of points must always be preferred as compared to clamping and padlocking since it is a much faster method.
14. Normal/reverse position of points should be painted on tongue rail to indicate position of the road.

(D13) Mock Drill and Staff Assurance :

1. Before the SM/ASM/Cabinman/Pointsman and other staff connected with train passing work are allowed independent duty, the Station Superintendent shall obtain their verbal assurance that they have understood the same.
2. With regard to semi – literate and illiterate staff :
   (i) SS/TI should explain detailed working.
   (ii) Test their knowledge.
   (iii) Satisfy himself that they can work independently.
3. Before starting actual non-interlocked working, a "mock drill" or "hands-on" demonstration/training should be given to all staff for at least 1 to 3 days in advance (depending on the size of the station) to familiarize them thoroughly with the type of work they have to handle.
4. This should be carried out in all the 3 shifts to ascertain difficulties, if any, which may be encountered during NI working.
5. Teams already formed for different shifts should be deputed as per roster.
6. "Mock drills" should be carried out without actually disconnecting signal gears, points etc.
7. Whatever deficiencies are noticed during this period should be rectified before introduction of actual NI. This experience should also be used to accurately estimate capacity to be available during N.I. and the number of trains planned to handled should be accordingly revised.
8. Written assurances are required to be obtained before staff connected with train passing duties are allowed to work independently.
9. This written assurance should be taken from the staff only after :
   (i) They have participated in the "mock drill".
   (ii) Worked independently as per their laid down roster.
   (iii) Successfully carried out all responsibilities entrusted to them during the "mock drill".
10. No staff should be deployed unless proper entries are made in the "Assurance Register" and relevant signatures obtained.

(D14) Dissemination of information :

1. All aspects of working during NI, and changes post-NI should be clearly documented and explained at all Loco pilot/Guard lobbies, whose staff pass through that yard.
2. For this purpose loco/traffic inspectors, senior subordinates will be nominated to visit these lobbies, with yard plans and camp at these lobbies.
3. Assurance of each and every running staff regarding these changes should be recorded in respective lobby assurance registers, and complete report submitted to Sr. DOM/Sr. DSO/Sr. DME/Sr. DEE on return.
4. Adjoining divisions/railways including notice stations and inter-change points should also be intimated of the detailed program pertaining to NI working.
5. All control staff including CHC, Dy. CHC, Section controllers, Power controllers, TLCs, TXR control etc. should be appropriately briefed.
6. The section controllers working on control boards must be fully conversant with the proposed changes pre-NI, restricted movement during the course of NI working and post-NI facilities to be made available.
7. Adequate publicity must be given through newspaper advertisements, electronic media, announcements at stations etc. informing the public of the likely repercussions on train running.

(D15) Telecommunication, Lighting and Medical :

1. Absolutely foolproof arrangements must be made regarding communication between the station and two adjoining stations on either side so that under no circumstances should there be a situation of total failure of communication between these stations.
2. Satisfactory arrangements for telephonic communication between station (indoor), Cabins, Goomty and Level Crossings Gates should be made to ensure efficient functioning of telephones provided at various locations.
3. Additional fail safe communication between control office and the NI station must be provided as a backup to existing section control channels.
4. Arrangements for public address system should also be made so that the same can be used for warning the public etc.

5. Loud speakers must be provided on each goomty for making announcements regarding train movement.
6. Walkie – Talkie sets must be provided to all supervisors working at site.
7. Gangmen, Keymen and Patrolmen in 2 block sections on either side of the NI station must be provided with walkie – talkie sets, electronic hand signal lamps etc.
8. Arrangements of staff and recharging facilities should be available for charging of batteries of telecom equipment including walkie – talkies.
9. General lighting in yard should be adequate.
10. Separate lighting should be provided in each point zone. Lighting should be adequate so as to ensure that each point controlled from a goomty is clearly visible to the ASM/Cabinman in charge of that goomty.
11. Adequate generator backup should be provided. Spare bulbs should also be provided at each location.
12. Round-the-clock medical post with doctor and para-medical staff must be provided. They should be equipped for handling first aid and crush injuries. Anti-snake venom (Covalent) should be available. Road ambulance should be permanently stationed for quick transportation if needed.

(D16) Safety Equipment :

1. Safety equipment required for each location such as goomty, cabin, level crossing gate etc. must be spelt out in detail and full complement arranged.
2. Adequate spares must be arranged for safety equipment such as of hand signal flags, detonators, fusees, clamps and pad locks etc.
3. LED based flashing Hand Signal Lamp must be provided to each such location for better visibility.
4. Cotter bolts, cotter pins and clamps & padlocks must be thoroughly tested to be in proper working condition.
5. Spare numbered crank handles must be provided in goomties where point machines are pre-dominantly working.
6. Each goomty must be provided with the following safety equipment :
   (i) Clamps, padlocks, detonators, fusees.
   (ii) Flags, hand signal lamps etc.
   (iii) Relevant pull sheets, yard diagrams etc. duly laminated.
   (iv) Torches, emergency light, in addition to normal lighting.
   (v) Umbrellas, caps, raincoats as required.
   (vi) Cotton Gloves for staff handling points etc.
   (vii) Table, chairs in tent or covered area.
   (viii) Containers and glasses for drinking water.
   (ix) Thermos for tea/coffee and provision of snacks and meals for staff deployed from other station or /headquarters.
   (x) Mosquito/insect repellant creams.
   (xi) Magnetto, and VHF walkie talkies, Public Address Equipment.
   (xii) Private number books, paper, pens.

(D17) Security arrangements :

1. Adequate RPF security staff round the clock must be arranged at following locations :
   (i) ASM's office.
   (ii) Central place at the station.
   (iii) Level crossing gates.
   (iv) Outer most goomties on either end.

(D18) Introduction of NI working :

1. Before permitting introduction of NI working DRM/ADRM will satisfy himself regarding arrangement of staff, safety equipment, lighting, telecommunication and ground position.
2. On the day of commencement of NI working, branch officers concerned from Operating/Safety, Engineering, Signal, Electrical and Mechanical along with DRM/ADRM will visit the place of work. They shall satisfy themselves of availability of necessary arrangement as per standard before permitting introduction of non-interlocking.
3. On the notified day, for introduction of NI working, Signal Inspector concerned shall give a general disconnection memo for gears proposed for NI workinng.

(D19) Train Operation during NI period :

Working of Signals :

1. Speed restriction of 15 kmph. must be in force over all points and crossings. Speed restriction Board of 15 kmph. must be exhibited at the foot of the first stop signal.
2. The following signals should be provided with caution aspect :
   (i) In case of colour light signals, a common NI home signal without route indicator.
   (ii) In case of MAUQ/TALQ, single arm NI home signal.
   (iii) Warner signals, if any are to be put out of commission by putting 2 cross bars.
3. NI Home/Starter signal can be taken off only after ensuring that :
   (i) All points on the route are correctly set, both facing and trailing points clamped and padlocked.
   (ii) In addition to correct setting, clamping and padlocking of facing points, they must also be manned.
   (iii) Level crossing gates on the route have been closed against road traffic.
4. Last stop signal should not be disconnected throughout NI working except at the fag end.
5. Movement of trains to and from the block sections should be controlled by taking off the last stop signal.
6. Normally, no Paper Line Clear should be issued to the loco pilots as authority to proceed in the block section.
7. A traffic block of 2 - 3 hrs. should be taken for disconnecting the last stop signal and block instrument and reconnecting the new last stop signal and new block instrument.

Train Running :

1. Each train movement must be announced well in advance on the loudspeaker:
   (i) Along with the number of the goomty involved.
   (ii) Sequence of points required to be set and locked in normal or reverse condition.
2. Trains must be allowed to enter cautiously at 15 kmph.
3. Loco pilot of an incoming train must not under any circumstances pass the outermost facing points even though signals have been taken off:
   (i) Unless he also sees that the points are manned.
   (ii) A proceed hand signal is exhibited towards him from the points.

(D20) Failures :

1. All indicative accidents during the period of NI working must be immediately reported to the site in charge in order to ensure prompt corrective action and avoidance in future.
2. Details regarding such cases must be promptly intimated to DRM and Sr. DSO.
3. A register must be opened at each goomty in which before handing over charge, staff will enter details of whatever difficulties they have faced during their shift. The person in charge of NI working at that station must scrutinize this register daily.
4. Cases of bursting of NI target should be appropriately dealt with and individual responsibility should be fixed up.

(D21) Revised Station Working Rules :

1. After completion of NI working, new works are to be commissioned.
2. Since the yard layout, facilities etc. have changed, the previous SWR is no longer valid.
3. A new SWR duly approved by CRS is to be brought into effect after completion of NI.
4. Staff assurances for the revised SWR must be taken afresh.

(D22) Completion of NI Working:

1. NI working must not be terminated unless and until each and every item originally scheduled for completion has been successfully complied with.
2. Designated operating officer must visit the NI station and verify the following:
   (i) Completion of work as per program.
   (ii) Correspondence of yard layout as per SWR.
   (iii) Correspondence of movements permitted as per SWR.
3. The installation shall jointly be tested by Traffic, S&T and Engg. officials and for their correct functioning.
   (i) The lever/knobs, signals, points and connections work freely and properly and that the installation fulfils its objective.
   (ii) Signals are properly focussed, the indications on the panel correspond with the signal aspect and point position at site.
   (iii) Engineering officials shall check the proper housing of points gauge level etc.

4. Before issue of Safety certificate and taking over of stations, the Transportation/Safety Officer shall instruct the station staff responsible or working the interlocking installation and test them in their knowledge of the signalling arrangement.

5. Engineering and S&T officers shall give a certificate stating that all works as per the approved plan are completed.

6. Staff concerned shall be notified through Station Order Book, Control Order Book and their acknowledgement obtained. All inspectors and other supervisors shall ensure strict compliance and report any deviation or violation with prompt to notify then and there.

7. On the day of completion of work, branch officers concerned shall visit the work site to ensure completion of work as per program.

(D23) Post NI analysis :

1. Within 7 days of completion of NI, a brain storming session should be held with all the senior supervisors involved for taking stock of lessons learnt.
2. These lessons learnt should be compiled at one place for successive NIs, so that they are available for future reference.
3. A copy of the same may also be sent to other divisions for reference purposes.

OPERATING STATISTICS

Railway Statistics: Essential for planning prioritizing and exceeding activities connected with operation.

The railway statistics are based on four factors -

Quantity
Distance
Duration and
service.

In Railway environment these relate to -

1. **Primary Units**:

   (a) Quantity - Expressed as tonnes and number of passenger carried and earnings derived.

   (b) Distance - Expressed in kilometres.

   (c) Duration- Expressed in minutes, hours & days

   (d) Service performed - Expressed in terms of trains, vehicles, wagons Engines.

2. **Fundamental Units**: Relationship between primary units, expressed in composite terms is called '**Fundamental units'**. The fundamental units express two primary ideas in their relationship to one another viz.

Tonne-kms,
Passenger kilometres,
Train-kilometres,
Wagon-kilometres,
Engine hours,
Wagon days etc.

3. **Derived Units:**

Expresses the relationship that exists between two sets of primary or fundamental units and the results thus arrived is termed '**Derived Units**'. The process by which this relationship is ascertained is as illustrated in the following examples.

(a) Passenger earning (Primary): Passenger carried (Primary = Earning per passenger

(b) Passenger earning (Primary): Passenger kilometres (fundamental) = Earning per passenger kilometre.

(c) Passenger kilometer (fundamental): Number of passenger (Primary) = Average distance travelled by a passenger also called lead of passenger traffic.

(d) Wagon kilometres (fundamental): Wagon days (fundamental) = Wagon kilometres per wagon day.

These 'Derived Units' highlight special features of transportation output and are useful in evolving suitable management strategies

Classification of Railway Statistics:

The principal heads under which the railway statistics are generally grouped are indicated below:

Economic and financial statistics:

Under this head are to be included detailed statistics relating to the advance statement of gross earning and traffic handled i.e.the number of passenger booked and tonnage lifted and wagons loaded for current information and the statistics of revenue and expenditure as booked in monthly and yearly accounts.

Operating statistics:

Operating statistics are broadly be divided into

(i) Traffic (ii) Power.(iii) Rolling Stock

(ii) The traffic statistics include statistics of wagons loaded, wagon mobility, wagon usage, train loads, train mobility, productive and unproductive services, wagon detention, marshalling yard, terminal goods station and punctuality

(iii) The power statistics include engine usage, fuel and energy consumption, and engine failure statistics etc.

(iv) Rolling stock holding & availability, repairs& maintenance % age

Commercial Statistics: Coaching and freight revenue and volumes and earnings by class of passengers, for different commodities, claims paid for compensation of goods and parcels lost or damaged **Rolling stock and workshop repair statistics:**

Under this head are grouped statistics dealing with POH of coaches, wagons, locomotives and other information relating to workshop activity.

Administrative statistics:

These statistics relating the staff matters, numbers, by categories and classes of staff.

Other statistics

Number of stations by

Class, halt stations

Standard of interlocking,

Medical statistics relate to sickness of staff etc

Engineering statistics give details of track and bridges requiring attention – ultra sonic tests done or overdue, track renewals, distress bridges etc.

Compilation of Railway Statistics:

1. Compilation of statistics of Indian Railways falls broadly under two categories, namely (i) the statistics required to be compiled by the railways for submission to the Railway Board in order to keep the Board generally informed about the different activities of the Indian Railways and (ii) further detailed Railway statistics which individual railway may undertake for their own respective domestic requirements.

2. The statistical compilation work on the zonal Railways is in the charge of a Statistical Officer working under Finance deptt. The format and the methods of compilation of the monthly Statistical statements and the Annual Statistics required to be submitted to the Board are detailed in the Manual Statistical Instructions, Volumes I and II respectively.

Operating Statistics:

1. Operating Statistics for the various Indian Railways are issued in the form of various pamphlets published periodically by the Railway Board. Detailed Statistics relating to each division and gauge are contained in various parts of the 'Domestic' statistics issued quarterly (Parts, I, II and II-B & C).

2. Some of the important statistics include.

Operating ratio: The ratio of workings expense (excluding suspense but including appropriation to Depreciation Reserve Fund and Pension Fund) to Gross Earnings.

(Expenditure incurred in connection with Administration, Operation, Maintenance and repairs of line open for traffic)

A - Passenger Train Performance.

Punctuality:

Punctuality is the main criterion for judging passenger train performance, some of the statistics compiled separately for 'Mail and Express trains', 'Other Passenger Trains', and 'Mixed' trains are:

$$\text{Punctuality} = \frac{RT + NLT}{\text{Total no. of Mail/Express trains}} \times 100$$

RT = Trains arriving Right Time

NLT = Trains not loosing time

Vehicle Kilometres per Vehicles Day:

This figure indicates by the vehicle days which are the product of average number of coaching vehicles on line /in use and the number of days in the period under reference.

This figure indicates the extent to which coaching vehicles are kept 'on the move'. The main factors affecting its value are:

(a) The average speed of trains

(b) The average length of train run (average load)

(c) The idle periods provided for in rake links.

3. Since in the short run, train composition is not susceptible to change, it is only by increasing the speeds of trains and tightening up rake links that an improved performance can be achieved.

4. This result is calculated by dividing the coaching vehicles kilometres by the vehicles days which is the product of average number of coaching vehicles on line and the number of days in the period under reference.

$$\text{Vehicle km. Per Vehicle day} = \frac{\text{Coaching Vehicle Km}}{\text{Vehicle day}}$$

Average Speeds:

This figure represents the average time tabled speeds of passenger trains. The higher this figure, the better the service to the passengers

Shunting Kilometres per 100 Train Kilometres (Passenger including proportion of Mixed) :

1. This figure indicates the amount of unproductive service that has to be performed per 100 train kilometres (Passenger including proportion of mixed). Since the amount of shunting to be done on a passenger train depends upon various local factors, the figure will vary from Division to Division and from Railway to Railway, traffic conditions remaining constant, is indicative of wasteful shunting.

2. The figure is arrived at by multiplying by 100 the quotient of shunting kilometres divided by train kilometres (passenger including proportion of mixed). It can be depicted by formula given below:-

$$\frac{\text{Shunting Kms} \times 100}{\text{Train kms.}}$$

B - Wagon Usage

Average Starting Wagon Load :

1. This figure is compiled separately for coal and coke, heavy merchandise and light-merchandise, thus affording an indication of the extent to which wagon space is utilised by stations from which traffic originates. It is extremely important that wagons be given as full a load as possible because this means economy, in wagon usage and hence engine power and less strain on line and yard capacity. Even a slight improvement in the starting wagon load can mean a tremendous saving to the Railway.

2. The result is calculated by dividing the number of tonnes loaded by the number of wagons loaded (in terms of four wheelers), CR and TR vans as also wagons used for live stock and departmental purposes, however, are excluded.

$$\text{Average Starting Wagon Load} = \frac{\text{Tonnes Loaded}}{\text{No. of Wagons Loaded}}$$

Wagon Kilometres per Wagon Day:

1. This figure is a measure of wagon mobility and indicates the average number of kilometres moved by a wagon, on the average, per day, both loaded and empty journeys being included. Delays in marshalling yards, delays at stations when loading or unloading, delays in clearance from roadside stations, decrease in average speed of goods trains, increase in the number of wagons awaiting repairs, and shorter loads of trains are some of the factors normally responsible for poor mobility.

2. This result is obtained by dividing wagon kilometres by wagon days which is the product of daily average number of wagons on line and number of days in period.

$$\text{Wagon Km. Per Wagon day} = \frac{\text{Wagon Kms.}}{\text{Wagon Days}}$$

Net Tonne Kilometres per Wagon Day :

1. This unit is a measure of the revenue earning work done by the wagons and reflects both mobility and loading. A decrease in this figure may be due interalia to any of the causes which effect the figure of wagon kilometres per wagon day. The proportion of loaded to total wagon kilometer age, the average loaded wagon and the relative amount of heavy and light merchandise carried, are some of the other factors which may effect this figure.

2. The numerator in this case is the net tonne kilometres (excluding departmental) and the denominator wagon days.

Net Tonne kms.

$$\text{Net Tonne km. Per wagon day} = \frac{\text{Net Tonne km.}}{\text{Wagon days}}$$

Wagon Turn Round:

This future expresses the ratio between the total number of serviceable wagons on a Railway and the number of wagons required daily for effective use on the railway for its outward, inward and transhipment traffic. Stated in a different way, wagon turn round represents the average period of time in which a particular wagon completes its average loaded trip and after which it again becomes available for loading.

$$\text{Wagon Turn Round} = \frac{\text{No. of effective wagon holding}}{\text{Loaded Wagons + Loaded received wagons}}$$

Average Wagon Load during the Run :

1. This unit is a good index of wagon utilisation as it refers to the average load of all loaded wagons carried. It suffers from the draw back that it does not directly reflect the performance of the division, gauge or railway to which it applies, as only a proportion of the loaded wagons carried is loaded locally and the balance consists of both received traffic and cross traffic.

2. For obtaining this figure net tonne kilometres are divided by loaded wagon kilometres, (the figure relating to departmental trains are excluded).

$$\text{Average Wagon Load during the run} = \frac{\text{Net Tonnes Kms.}}{\text{Loaded Wagon kms.}}$$

Goods Trains Performance

Average Speed of Goods Trains :

1. This result is calculated separately for 'through goods trains' and all goods trains and is arrived at by dividing the total train kilometres by total train engine hours of the concerned service. Detentions to goods trains at roadside stations enter into the calculations and have therefore the effect of bringing down average speeds.

$$\text{Average Speed of Goods Trains} = \frac{\text{Train kms.}}{\text{Train Engine hours.}}$$

2. Some of the factors on which the average speed of goods trains depends are:

(a) The proportion of the density of trains to the sectional capacity. The nearer a section is worked to its sectional capacity, the proper the speeds obtained.

(b) Hauling power of the engines used, quality of coal and quality and adequacy of water supply, standard of maintenance of engines and time taken by loco pilots for loco requirements.

(c) Loads of trains.

(d) Condition of rolling stock, particularly the brake power available.

(e) Standards and maintenance of signalling and interlocking.

(f) Facilities at watering stations, facilities at roadside stations to complete shunting in the minimum time and shorter block sections which will increase the sectional capacity.

(g) Engineering restrictions – permanent and temporary gradients and curves.

Average Net Train Loads (in tonnes) :

This figure refers to the average freight load carried in tonnes, i.e., to that portion of load which earns revenue for the railway.

$$\text{Average Net Train Loads} = \frac{\text{Net Tonne kms.}}{\text{Train kms.}}$$

Average Gross Train Loads (in tonnes) :

This figure represents the average overall load of goods trains i.e. the freight load plus the weight of the rolling stock.

$$\text{Average Gross Train Loads} = \frac{\text{Gross Tonne kms.}}{\quad}$$

Train kms.

The principal factors affecting this figure are:

1. The tractive capacity of engines on goods train services.

2. The gradients on various sections of the line.

3. The nature of goods carried.

Shunting Engine Kilometres per 100 Train Kilometres :

1. This figure indicates the amount of non-revenue earning work done per 100 train kilometres (Goods and proportion of mixed). Its value is affected mainly by the load of goods trains, and the amount of terminal work involved.

$$\text{Shunting Engine kms. per 100 Train kms.} = \frac{\text{Shunting kms.} \times 100}{\text{Train kms.}}$$

2. However, for the same division or/railway, the pattern of traffic remaining the same, rise in this figure is indicative of wasteful shunting.

Net Tonne Kilometres per Engine Hour :

The figure of net tonne kilometres per Engine hour is a very useful index of the efficiency of freight working on a division. Net tonne kilometres indicate the amount of revenue earning work done while engine hour measure the cost of if doing it.

$$\text{Net Tonne Kilometers per Engine Hours} = \frac{\text{Net Tonne kms.}}{\text{Engine hours}}$$

A decrease in net tonne Kilometres per engine hour may be due to factors such as:

1. Shunting engine hours not using cut down in proportion to the decrease in traffic offering.

2. Increase in departmental, assistance required, assisting hot required and light engine running.

3. Decreasing in the average train and or the average speed of goods train.

4. Decrease in the average starting wagon load or in the wagon loads of wagons received from other divisions.

5. Increase in the proportion of unbalanced traffic.

6. The type of traffic carried heavy or light.

Average Detention per Wagon :

1. All wagons

2. Through loaded wagons:

Detention suffered by stock in a yard depends, interalia, on the layout of the yard and on the number of trains per day that can be despatched in various directions. Target figures have been laid down for each yard for detentions to all wagons and through loaded wagons. Such targets take into consideration the condition of work and facilities available in the yard concerned. Detentions in excess of this figure indicate inefficient yard work. Lesser detentions mean lesser cost of handling wagons in yards.

$$\text{Average Detention per Wagon} = \frac{\text{Total Detention Hours}}{\text{No. of Wagons despatched}}$$

Number of Wagons Dealt with per Shunting Engine Hour:

The number of wagons that a given yard can deal with per shunting hour depends, *interalia*, on its lay-out. Accordingly a target figure has been prescribed for each yard to enable the efficiency of yard work to be gauged. As shunting involves cost, the higher this result, greater the efficiency of the yard.

$$\text{No. of wagons dealt with per shunting engine hour} = \frac{\text{No. of Wagons dealt with}}{\text{Shunting Engine hours}}$$

Locomotive Performance

Engine Kilometres per Day per Engine in Use :

This figure is compiled separately for passenger, mixed and goods train services as well as for all services refers to 'engines in use'. This is affected by such factors as:

1. The average run of trains.
2. The average speed of trains.
3. The engine links
4. The location of engine shed with respects to the stations which they serve.

$$\text{Engine kms. per day per engine in use} = \frac{\text{Engine kms.}}{\text{Engine days in use}}$$

Engine Kilometres per Day per Engine on Line:

This figure is also compiled by services and for all services put together. The proportion that this figure bears to the corresponding figure of 'engine kilometres per engine day per engine in use' indicates the proportion of available engines 'on line' that were put to effective use during the period in question.

$$\text{Engine kms. per day per eigine on line} = \frac{\text{Engine kms.}}{\text{Engine days on line}}$$

Quantity of Fuel Consumed per Engine Kilometre by Service:

This figure indicates the fuel consumption in relation to engine kilometres only and does not reflect the tonnes hauled.

$$\text{Quantity of fuel consumed per engine km by service} = \frac{\text{Quantity of Fuel Consumed}}{\text{Engine kms.}}$$

Quantity of Fuel Consumed per 1000 Gross Tonne Kilometres by Services:

This figure indicates the fuel consumption in relation to the work done and is, therefore, a better index of fuel consumption than the quantity of fuel consumed per engine kilometer figure. The main factor that influences this result is the gross load of the train. It is derived by the formula given below:

$$\frac{\text{Quantity of Fuel Consumed} \times 1000}{\text{Gross Tonne kms.}}$$

Traction Energy consumption per engine km and per 1000 gross tonne kms is worked out exactly in the same way, replacing 1000 litres of diesel by kwhs.

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FREIGHT OPERATIONS INFORMATION SYSTEM (FOIS)

I. INTRODUCTION

In keeping with global trend, there has been a long outstanding demand of the industry & trade for transparency in sharing of information to give the customers an up-to date business like environment. Railways in this millennium have decided not only to perform the traditional tasks of carrying passengers and goods efficiently, but also to change the mindset of working as a closed system. The great concern to improve on its market share has prompted Railways to have a multi pronged approach to its freight policy.

Continuous Cargo Visibility has always been a critical component of the Supply Chain Distribution Management System.

To achieve this, out of the stated multi pronged new freight policy, a lot of emphasis has been laid on establishing a computerized FREIGHT OPERATIONS INFORMATIONS SYSTEMS (FOIS). The system indigenously developed is fully functional in the B.G. system of Indian Railways being the first of its kind in South East Asia.

1. Freight Operations Information Systems Mission – FOIS

To give a total transparent system with continuous Cargo visibility and an up-to date business environment to the Customers with instant access to information regarding their consignments in transit for just in time inventory'.
FOIS is an On-line Real-Time system based on absolute current State of Art Technology and efficient Communication system.
A management tool to optimize utilization of costly assets and resources by improving the distribution of Rakes/Wagons & Locos, and also scheduling and Routing Traffic in an optimized cost effective manner.
Provides Continuous Cargo Visibility and enables the Freight customers to have instant access to information regarding the current status of their consignments in transit for just in time inventory.

2. Strategic Advantages Derived From The FOIS System

- Extension of the current business practice from **bulk movement of freight traffic in train load formations** to *piecemeal traffic* by clubbing and moving together similar type of stock in 'Hub & Spoke' arrangement to increase its market share by re diverting high profit yielding piecemeal cargo from road to rail.
- Global tracking of consignments in real time Rakes or individual wagons.
- The insight and pipeline of consignments thus captured on the entire BG network is made available for timely planning and just in time inventory management on a time span cargo movement which may extend to 2 to 5 days from origin to destination...
- Facilitate acceptance (customer's Orders), billing and cash accountal of freight traffic from identified nodal customer centers which may not necessarily be the handling terminals.
- Extension of such facilities to customer's premises and introduction of e-commerce, benefitting both IR and the trade & industry, by eliminating manual transactions which necessarily add to the burden of logistics management.
- Providing requisite Foundation for a total logistics system furnishing real time information of the chain of physical distribution, an essential element in reducing inventory costs.

3. Scope Of FOIS Systems

Presently two subsystems of FOIS are already in use after extensive field trials and validation.

RMS
TMS.

a) Rake Management Systems -RMS
   - Rake based consignment tracking and pipeline
   - Train/Rake operation

- Stock Holding in terms of summary of wagon types
- Train and stock Interchange
- Terminal Handling performance
- Loco holding, outage and power on-line
- Reporting to take care of Train/Load on summary basis
- Invoice based consignment tracking
- Wagon wise Stock Holding
- Reporting of consist Wagon wise
- Invoice based loading originating tonnage and revenues.
- Wagon wise Interchange
- Statement of missing Wagons/wrongly delivered

b) Terminal Management Systems -TMS

- Computerized booking and delivery of consignment
- Station Accounting
- RR generation/Transmission
- Improved Customer Interface

4. Crew Management has been developed & is under implementation. Control charting of trains currently being done manually will also be integrated with FOIS.

The above two sub systems have been fully developed and tested and are ready for implementation.

5. FOIS Design Architecture

FOIS is designed and developed in conformity with the state of art technology which is scaleable, maintainable, with open systems architecture and is based on the Indian Railways organizational hierarchy, its present and future requirements. Based on the business processes that are being adopted, the business model developed in the FOIS - IT architecture is based on the assumptions: -

The current business practice of bulk movement in rake formation is the accepted norm for future also. Around 80 to 85% of traffic already moves in Rake, majority of which comprises similar type of rolling stock.

Global perception is more important, with respect to tracking of consignment and Rakes rather than of individual wagon, locomotive and train. The insight and pipeline of consignment and rakes should be seamlessly available. Railways would like to share information on booking and movement of consignments with individual customers also.

The operations and data capturing, will remain **control centric** for train, rake locomotive and stock management and **terminal centric** for booking, loading, unloading, and delivery. Taking into account the spatial distribution of activities, which need to be captured.

Integrity of Operation and Commercial data is an absolute necessity. RMS and TMS application are conceptualized, to provide the integration with the other subsystems as and when these are developed.

FOIS ultimately expects an event driven integrated reporting in real time, beginning with the tendering of Forwarding note to loading and generation of invoice, followed by load consists, train ordering and departure/arrival of load destination, unloading and delivery. The data thus captured is used for generating associated managerial reports on-line information (MIS). The data will also be used for expanding the scope to cover other functional areas of the remaining modules and can easily integrate with RMS/TMS using appropriate middle ware Technology for sharing information locally. Therefore, a strategic approach has been adopted to computerize IR operations by implementing RMS/TMS systems in a phased manner using modular approach.

6. FOIS System Architecture

Key components of the System Architecture

Intelligent terminals will be placed at the field locations to capture the data from the place of activity namely control offices, yards, goods sheds, C & W depot, Loco sheds etc., and connected to the identified Application Server through reliable communication links for transaction processing.

Application servers are centrally placed at CRIS office. These servers are connected to the Zonal Hd. Qrs., Divisional Control Offices, yards, interchange points, and good sheds etc., with a reliable and integrated network. The servers are networked amongst themselves and to the central server for global level transactions.

The central Server provides management Reports at board level and acts as repository of all the global data and also provides global services to maintain referential integrity of the databases including master files.]

7. Network Topology

In view of the Centralized application architecture, a star based network topology has been designed. However, in order to provide alternate paths (to meet the up time requirement of 99.9%) from reporting locations, a mesh has been created with in each zone so that every location has at least two paths to reach CRIS. Each zonal HQ has been connected to central location (CRIS) on high bandwidth pipes. In addition to this, another zonal location has been connected to CRIS using high capacity link. Hence these two high bandwidth links shall cater to the entire transaction load generated by a zone. Railway telecommunication network, leased lines, DOT, VSAT Technology as communication media has been provided for reliable and fast means of data transfer.

8. Phased Implementation – Approach

h) In case implementation is attempted for events of all the functions to be reported in real time, concurrently from day one, then the reporting sites to be readied, the associated communication requirements and the number of staff to be trained assume enormous proportions. To ensure that the implementation effort is within manageable limits, one way is to take up, one by one, only limited portions of geographical territory for computerization at any given time. On the other hand, if the territory is small, instances of repetitive data entry increase; resulting in redundant expenditure on reporting infrastructure that will have no use as the territory expands. At the same time, if the MIS requirements are to be met in totality, the territorial expansion must ensure that a function is implemented on end to end basis as quickly as possible, otherwise only a truncated picture will be available to various levels of users and the benefits of computerization remain postponed till the entire Indian Railways have been covered.

ii) The FOIS comprises several subsets of functions each meeting a distinct set of objectives. Certain FOIS subsets presuppose others to be operational before they can be implemented. Loco and wagon based functions presuppose load/train/rake functions to be operational. Goods shed functions expect wagon-based functions to be in place before they can be implemented. With these assumptions the FOIS / RMS systems have been designed in a modular structure which could be taken up for implementation in a phased manner.

For example:-

Phase I (PI module)

Provides facility for reporting load summary with only wagon type and number of units.
Phase II (PII module)

Provides facility for reporting the consists with details of wagon numbers.
Phase III (PIII module)

TMS provides facility for good shed functions and generation of RR.

9. Implementation Strategy

Realizing that functional phasing is the only way to keep the implementation effort within manageable limit and yet remain meaningful at every stage, FOIS software has been developed as above in three modules such that functions of global utility are implemented faster from fewer sites. It also takes into

account that the beginning is made from the control offices where computer awareness is of a high order. The implementation can grow on need basis driven by the Railways themselves.

For timely completion of field implementation, the total involvement and commitment of Railways is very essential from day one. Therefore, COM's of Railways have been given the total responsibility and charge of implementation of FOIS, to provide for the following:-

- Railways to get staff identified and train them to work on PCs
- Railways to prepare the sites for installation of hardware including provision of electrical and civil facilities.
- Maintenance of channels & data com equipment has been given to CSR of the zones.
- CRIS would provide specifications for the same.

For facilitating this process the organization of CAO/FOIS has been strengthened and made responsible for coordination, implementation on All - India-basis.

The software implementation and maintenance shall remain the responsibility of CRIS. Pre implementation training of the required number of staff (consisting of Core Implementers and Telecom Inspectors from each of the divisions), in RMS - phase 1 has been completed by CRIS for all the zonal railways and their divisions. However, Railways will be required to make arrangements through the Zonal Training Schools to train the remaining staff of the concerned categories.

10. Benefits

i) Continuous Cargo Visibility

- Rake based consignment tracking and pipeline
- Invoice based loading –Originating Tonnage & Revenue
- Information on trains on the run, the ETA at next point and the work to be performed.
- Vehicle guidance of all trains on run.
- Daily report describing the performance of all through trains operated in a controlled territory for the day.
- Actual/Estimated arrival and departure particulars for a particular train at any or all the reporting points
- Yard or on the run delay information.
- Train & stock Interchange
- Wagon wise Interchange

ii) Optimised Asset Utilisation

- Improved Locomotive Utilization by reduction in Light Engine running and reduced in effectives
- Statement of missing or wrongly delivered wagons and finally its elimination.
- Elimination of unconnected wagons
- Increased Availability of Repair Capacity
- Stock Holding
- Loco Holding

iii) Increased Revenue

Savings in wagon fleet would result in corresponding saving in the recurring cost of maintenance of wagons

- Reduced Locomotive power and Rolling Stock Maintenance Cost
- Savings in Time & Cost of handling in yards, cost of empty haulage
- Ensures optimal crew management and monitors statutory limits for running duty and overtime payments
- Reduction in staff cost per unit of transportation due to improved productivity of the available manpower

iv) Improved Productivity per/man Year

Accuracy of reporting –In the Head &Hand system collecting data on telephones results in sizeable error levels, which need to be reconciled &corrected periodically .FOIS data with built in validation systems has Zero errors .

- Drudgery of manual processes like maintenance of registers etc. is eliminated.
- Particulars of crew on train with hours spent on duty.
- Re-deployment of major portion of staff involved in wagon tracing and accounts checking activities.
- Improved Customer service and satisfaction
- Facilitation of acceptance (customer's Orders), billing and cash accountals from identified nodal customer services centers and not necessarily at the handling terminals
- E-Commerce will facilitate the customers to operate from their premises for the above requirements of billing and cash accountal and thus reduce the burden of logistics management, and in addition drastically bring down the inventory costs. in the entire chain of physical distribution system.
- Quick settlement of Claims
- Just in Time Inventory

v) Goods shed Operations

- Arrival particulars of Wagons
- Placement and Release Particulars
- Information on demands registered and pending Indents
- Preparation of Railway Receipts
- Information on Demurrage and Wharfage
- Loading Particulars
- Goods Shed Earning
- Information on delayed wagons and Wagons awaiting Placement/Release

II. Application/Software

RMS module has been developed with GUI interface which is highly interactive, very user friendly. The software is totally menu driven and navigation is through logically linked tasks. The application and front end forms for reporting events has been developed in Visual Basic and resides in the client machine located at the reporting location . Data is stored in the central server locate at CRIS.

1. General Concepts

A Rake is a very generalized term, which refers to any set of wagons moving together and has been identified in the system as rake. Wagons can be attached/detached to a Rake. A Rake is identified by a uniquely defined ID number, which remains unchanged through various Load/Empty cycles & movements. A Rake, when given a destination, is known as a Load. A Load, when given a loco, is known as a Train. Thus, there can be no Train without a Load & no Load without a Rake (except where a load is mixed and is not identified in the system as a rake). With a clear understanding of these terms, you enter data through clearly defined "tasks".

The RMS software has two identifiable cycles-

Train cycle: It starts the moment a load is identified as a train and the following tasks are used for online reporting: -

Train Ordering: TO/Call between two crew-changing points.
Train Departure: reports departure.
Train Arrival: reports arrival.
Train Run-through: reports through runs
Train rerouting

Yard Cycle: It starts as soon as a terminating load a terminating load arrives at its destination or a train is cancelled. (i.e. the load is sent to load planning)and the following tasks are used for various online reporting:-

Load Related Tasks
Inward Number Taking: destination validates consist.
Load Planning: initial activity, following rake assignment.
Load Stabling: run/ordering termination is reported through this.
Load Diversion/Termination/Extension: reports changes in planned load destinations
Load Yarding: takes a load-to-load planning screen, but will not reflect in stabled position.
Vehicle Guidance Related Tasks
Consist Reporting: originating station reports summary details. (Guidance is also called as Consist).
Rake Related Tasks
Rake Formation Details: form/modify rake consist.
Movement order: facility to give advance assignments to rake
Rake Placement/Release: reporting Load/Empty cycle.
Rake Dissipation: for generating piecemeal out of rake or for doing away with a rake which has no wagons left.
After a load is made ready, loco attached and train ordered
Again the train cycle begins.
Loco Related Tasks
Attachment/Detachment of Locos.
Loco Reporting: reporting shed activities of loco.
Light Engine: reports light engine movements
Given above is the list of tasks that are to be performed on real-time basis i.e. as soon as the event takes place.
Demand:- This function is to be reported at station where the party/consignor registers his Demand for supply of Rake/Piecemeal wagon for loading of goods. The following tasks are used for reporting this activity:-
New demand
Modify demand
Add/delete demand
Fulfilling demand

Forefeiture/Withdrawl of demand

Interchange forecast:- In the system as the trains are planned, a pipeline is generated from Originating Station to destination and the position can be viewed at any point in its route. Forecast can be reported by selecting trains from the pipeline shown at the interchange point. The task used is interchange forecast reporting task.
Given below is a summarized list of entity related tasks :-
Rake Related Tasks
Rake Formation Details: form/modify rake consist.
Movement order : facility to give advance assignments to rake
Rake Placement/Release: reporting Load/Empty cycle.
Rake Merging: moving wagons from one to another rake.
Rake Dissipation: for generating piecemeal out of rake or for doing away with a rake which has no wagons left.
Load Related Tasks
Load Planning: initial activity, following rake assignment.
Load Stabling: run/ordering termination is reported through this.
Inward Number Taking: destination validates consist.
Load Diversion/Termination/Extension: reports changes in planned load destinations
Load Yarding: similar to stabling, but will not reflect in stabled position.
Cut-in by Arrival/Departure: was useful when there were non-computerized territories also.
Train Related Tasks
Train Ordering: TO/Call between two crew-changing points.
Train Departure: reports departure.
Train Arrival: reports arrival.
Train Run-through: reports through runs.
Loco Related Tasks
Attachment/Detachment of Loco: reporting loco failure on run.
Loco Reporting: reporting shed activities of loco.
Light Engine: reports light engine movements.
Roadside/Piecemeal Wagons Related Tasks
Attachment/Detachment of Wagons en route: load & consist are automatically modified in this task.
Piecemeal Placement/Release: reports piecemeal activities.
Piecemeal Sick/Fit Reporting: reports sick/fit.
Clearance of Detached Wagons: clears detached wagons.
Demand: reports indents for a good shed type of loading. Vehicle Guidance Related Tasks
Consist Reporting: originating station reports summary details. (Guidance is also called as Consist)

Detentions Related Tasks
Train Detention en route: reports unscheduled stoppages.
Pre departure Detentions: reports detentions suffered by loads/trains at yards/stations.

Other Tasks
Interchange Forecast: reports daily targets, which should be frozen by noon.
BPC & Crew Details: reports these details.
Modify ETA: changes ETA for a train.
Re-routing: changes path of a train while on run.
As you realize, these are all routine tasks. Besides this the divisions have to carry out some systemic tasks which help in generating MIS reports (name for reports which are not generated on online data) and some time specific reports.

TSS (Terminal Sub-Systems)

TSS (Terminal Sub-Systems) is a generic word used in FOIS to refer to PCs, Printers & UPS. This PC is used for entering (and retrieving) data. Following are the important guidelines for users.

Power Connection:

Please make sure that a data entry PC or a "Reporting Terminal" is always kept in the "ON" condition.

The power feed required is met through a 5A dedicated socket.

Please make sure that all the different PCs & Printers have a separate 5A socket. Don't use multi-plug adapters.

Also check up with the Electrical personnel as to whether your sockets have Earthing arrangement. In absence of the same, your PC may get damaged. The earthing to neutral voltage not be more than 2-3V.

It is also better to have a MCB attached to main power supply point/board.

Your AC connection & PC supply must be on different phases. This saves from fluctuations.

Your PC is not connected to the mains directly. Instead, the Power supply is routed through a UPS (Uninterrupted Power Supply). Please ensure that this is always done. This saves your PC from power fluctuations as well as gives a power from batteries for about 20 minutes, in case of power failure.

There should be a power back up, either through AT (OHE) or through Diesel Generator. The change over switch should be close to you.(care to be taken that earthing is proper)

It is a healthy practice to ensure that various power chords feeding your PC, Printer etc are neatly tied together, rather than strewn all over.

If you locate your UPS very close to your monitor, the display will wobble. Please ensure that UPS & Monitor are separated by at least 24 inches.

When the PC is ON, don't try to change any connection. This applies equally to not only power connectors, but also to various chords connecting different equipments, LAN Cables etc.

When turning the PC ON, (if need arises) follow this sequence

Mains → UPS → Monitor → Printer → CPU.

The reverse is followed when switching off.

Environment:

If an AC is provided, make sure that it is working properly.

AC should be on a phase different from the one feeding your PC.

The room should be kept as clean as possible. Dust, smoke particles & moisture cause maximum damage to your PC. So, don't allow any smoking, eating or drinking at the workstation.

Never clean your PC using an organic solvent (such as Colin). Always use a soft, damp, dirt-free cloth.

When the PC is not in use, keep it covered with "Dust Covers".

Make sure that the Keyboard has been supplied with a "Skin" - a tight-fitting plastic covering for Keyboard, which does not stop usage.

Your PC should not face direct sunlight. Nor should it be placed so close to window where rains can affect it.

CPU (Central Processing Unit) & Monitor should not be placed in such a way that the fans/outlets at the rear of these equipment get blocked by walls/other objects.

Virus Protection:

Viruses come to you PC through pirated softwares of games & utilities that you load. Yet another source is downloading of files from Internet. Once a virus is on a single PC of a network, it spreads on its own to the entire network. Therefore, you must not load pirated software or download wallpapers etc from Internet.

Make sure that Virus protection files are loaded on your PC.

Please enable virus scans on data transfers, floppy drive files & CD files.

Please schedule your Virus software to run every day at a fixed time. To do this, open "My Computer". Double Click on "Scheduled Tasks" Folder. Double Click on "Add Scheduled Task". This will activate "Schedule Task Wizard". Click next & select the name of the Anti-Virus program given to you. Keep following the simple steps to schedule your Anti-Virus to run daily. Once scheduling is done, your PC will automatically run the program everyday at a given time, as specified by you.

There is an arrangement whereby we get updated Anti-Virus files every 3 months. These CDs are available at your Divisional HQ through OCC. You must update your anti-virus programs to enable it to take care of new viruses.

There are tell tale signs of virus on your PC. Please be on lookout for these signs, which are listed below:

- Unexplained disk drive activity light or floppy drive light
- Reduction in RAM Availability
- "File Copied" message appears without copying anything
- Failure of a memory resident program to operate properly
- System behaves slowly or in a chaotic manner

- Bad clusters on the disk
- Increased number of files on disk
- Increase in size of executable programs
- Change in file's date and time stamp, without modification
- Program running slower; taking more time
- Program/Data file corruption/disappearance

Internet Connections:

There should be no Internet connection on your PC. This restriction is applicable to everything related with Internet – email, chat, surfing etc.

Further, your PC should not have access to another network – such as Railnet. This makes the network prone to hackers & Viruses. Since the information available on FOIS is confidential, therefore hackers have to be prevented from entering our network. This is the reason for having separate LAN and Routers for FOIS.

Important Files (Software):

You work with Windows 98 (Second Edition). A quick restore CD is also available with you, along with Anti-Virus software & RMS.

Also windows back up files are normally available in the cab folder.

Please ensure that none of the following files are tampered.

COMMAND.COM
IO.SYS
MSDOS.SYS
Similarly, ensure that RMS file – which resides in Program Folder of your Hard Disk - is never tampered.

Datacom Equipment & Connectivity

In this chapter, we shall deal with some pertinent issues regarding Connectivity. Your PC is connected not only to adjacent PC but also to each & every PC on FOIS. (Each PC on the network, therefore, has a unique identification or Address – known as IP address). This has been achieved by using leased lines, ISDN connections & VSATs for data transfer. This data transfer rate is higher than PRS system. Also, unlike PRS terminal, your terminal is a full-fledged independent machine. The interface is Windows, unlike text type processing in PRS.

Your PC is connected to FOIS through a Router, which is a junction between LAN (Local Area Network – connecting all PCs in your premises) & WAN (Wide Area Network – a bigger network which connects all PCs on the system). A Router does this mostly through Channels – which are connected to it using Modems. (A channel has two ends. One end is connected to Router through a Modem in your premises. The other end is again connected through a Modem to the equipment of Channel Provider, at his premises. This can be S&T or BSNL or any other telephone company). Finally, a Router will have connections with your LAN (through Hub/Switch), Modems (one for each channel), ISDN Connections (directly to Router) & VSAT (directly to Router). All this equipment is collectively referred to as Datacom Equipment.

Routers:

A Router routes the data that you want to send/receive. It is an intelligent device, unlike Hubs & Modems. The data is sent & received in data packets. A LAN works below a Router. Data sharing between various PCs connected on a LAN is automatic & Router has no role. It is only when the data requires being sent/accessed from a remote PC/Server – i.e. accessing WAN terminals - that Router's role assumes significance. Its IP Number specifies each Router – like all intelligent devices on a network -. This IP Number actually identifies its Ethernet port. A Router may have WAN, LAN, & VOICE port. A port is actually a point where a channel (through Modem) or LAN or ISDN or VSAT connection can connect to Router. On Railways, we have two makes of Routers supplied – Cisco & Motorola.

Router has to remain "ON" at all times.

Also ensure that the power feed is having a proper earthing arrangement. The earthing norm of 2-3V to be maintained.

Power supply to Router should be routed through a UPS. Never operate a Router without a UPS. Also, wide fluctuations in input voltage can damage the Router.

There should be a power back up, in addition to Normal Power Supply. This could be through Auxiliary Transformers (AT) in OHE area or through a Diesel Generator Set (DG Set). The change over switch should be accessible easily.

The Router should be kept in a dust, smoke & moisture free environment. Please use Racks provided to house the Router. Since Router is expensive & sensitive equipment – which does not require daily maintenance – therefore, it is better to leave the equipment undisturbed.

Essentially provide Air-conditioning for routers.

A Router, along with Modems should be placed at a location where it is always accessible to the user. You actually don't have to do anything with Router, but just by looking at various displays & reporting the same, you will be participating in troubleshooting. For this reason, you must have Router under your control and not locate it in Test Room.

Some of the Routers have a specialized Port for ISDN. (Not all Routers have it). Unlike all other terminating leads on a Router, ISDN connection gives a higher voltage (≈ 100 V). Therefore, if ISDN lead is connected to any other port, that port will burn down. Be careful.

Firm connections of all chords to Router are to be ensured.
Nothing should be placed on Router.
Router should not be dragged.

Modems:

Modem (Modulator/Demodulator) is the device through which a channel connects to your Router (& through it, to your PCs on LAN). It is a very sturdy & maintenance free device. It also requires a dust & smoke free environment. It is normally housed in a Rack along with Router. A lot of information is available on its front display.

We have two types of Modems on Railway - G703 (at service provider's premises) & V35 (at our premises, with Router).

When the channel connected to a Modem is working properly, you will find both "RD" & "TD" glowing & blinking. If it is not so, then there is some problem with channel.

As always, you have to ensure that Modem is always kept "ON".

Also ensure that the power feed is having a proper earthing arrangement.

Never use a metallic brush to clean the surface. Organic solvents are also not permitted.

Since one end of a channel always resides at the channel provider's premises, therefore you must also know some simple checks to analyse the channel position. Some of these steps you take in tandem with the operator at other end, who is observing his Modem. These steps, which are invoked when the channel is down (i.e. "line protocol" is down), are
Make "LL" (Local Loop) switch "ON". This gives the status of the Modem & Router. If "TD", "RD" blinks, then local equipment is OK. If it doesn't, then the problem is with Modem/Router.
In the next step, we make "RL" (Remote Loop) switch "ON". This checks the local lead condition between Modems. However, to get the response of this action, there should be an observer at the other end. If everything is OK, then at the remote end, "RD" & "TD" will blink. Similarly, remote end can also give a "RL", in which you will get blinking "RD" & "TD" on your Modem, if everything is OK between two Modems.

If both "RL" & "LL" give OK results, then the problem is beyond the Modem at service provider's end. You have to take a docket number after registering the fault with service provider (i.e. S&T or BSNL).
If Modem at the other end is not able to execute "LL" successfully then Modem at that end is defective/improperly connected.

If all loops show positive result & line protocol is still down, try initialising Modem by switching it off & then on.

If everything gives OK & data is still not able to pass through then there may be problem with Router. Inform Divisional Control.

Always ensure that all leads are firmly connected. However, no lead should be checked with power at "ON" position.

Channels:
A Channel refers to a leased line dedicated channel for data transmission. You have two types of channels - Railway & BSNL. However, as a user you don't see a difference. Though technically a Channel refers to a leased line channel, in this section we will also cover ISDN & VSAT in it. A channel connects your system through Modems & Routers. In addition to leased channels, you also have ISDN connections & VSAT (Very Small Aperture Terminal) connections to enhance your Connectivity. Connectivity refers to the immediate links that your PCs on LAN (at a Node) has with neighbouring nodes. It has been planned that ideally each node has a minimum of two links, each giving a different route to your data - so that data transmission can continue even if one link is down. This is technically known as Route Diversity.

Unless a Channel is available, data will not transmit. If your node is connected through two channels & one of them is down, you will not know the difference. However, with one channel down, you are in a very precarious position as data entry will stop as soon as the second channel even flickers. It is therefore important for you to take active interest in knowing the state of a channel. This can be done through "pinging". Pinging is the name given to sending & receiving a test data packet from one computer to another remote PC/Router or to any intelligent device. However, you can ping only if you

know the (IP) address of remote PC or Router. These are listed in Annexure I. You can ping by following command

Start → Run → Ping [IP Address of Remote Router] → OK

Only an entry like “Request Timed Out” or “ttl expired in transit” indicates failure.
VSAT connections can also be pinged. Some other important points for VSATs are as follows
The data is transferred directly to CRIS SERVER . This is a sturdy system, which once stabilized, works trouble-freely.

The earthing resistance should be less than 1 ohm.
Neutral to earth leakage should be 2V.
It should never work without UPS&CVT
Air-conditioning is a must.

The antennae base structure should be firmly fixed and clamped. At the time of installation it should be ensured that ODU is having its protective laminated cover(to protect it from water and dust) OR at least the rubber cap of Radio Frequency (RF) unit is in place.

There should be one ladder for antennae access.

There should be a routine of checking the equipments. It should be ensured that rubber cap of RF unit is in place and the cord going to indoor unit is firmly in place.

Similarly, ISDN connections can directly pass the data, bypassing Router (or more accurately, bypassing Router at that node but connecting to a remote Router). Only in such ISDN connections where Routers are not provided, you will not know the status of channel through pinging.

Please ensure that ISDN connections are always with power “ON”. Also ensure that ISDN connections are not STD barred.

Though it is not possible for you to know as through which particular channel your PC is transferring data, the same is always very accurately known to Router. Depending on the channel availability, it keeps on defining the route dynamically. Thus, if ISDN is available & all other channels are down, Router shall use ISDN to transmit data. (ISDN connection can also be assigned a higher priority by configuring the Router). As soon as any of the other channels becomes stable for a predefined time interval, it again resumes data transfer through that channel, shutting off ISDN. This is what is known as programming of Router.

ISDN is a secondary channel and since its usage is very expensive so it should be used very judiciously.

LAN:

LAN connects all your PCs available at a location. However, it need not be confined to a building. It can be extended to a few kilometers (up to 6 km) also. Such extension is normally through a LAN Extender. Even if PCs are connected through LAN Extender, there is no role of Router in sharing of data among these PCs.
LAN is achieved by using the network card available on your PC. An identical work group is to be defined on each PC on the LAN so that they are “visible” to all other PCs.
While defining Network Properties on your PC, make sure that only one Gateway (i.e. IP address of your Router) is defined. Disable DNS.
A PC may be visible on a LAN. However, other PCs can use only those files, folders, drives etc of that PC which the owner of that PC has decided to “Share”. To share a file, single click on the file name, followed by right click. Select “Properties”, followed by “Sharing” tab. Share to the extent you desire. You can decide to allow other users to even write on your Hard disk. However, you cannot differentiate between your co-users on LAN & other users on WAN!
You can also share some scarce resources – such as Printers – through this scheme.
LAN wiring consists of two parts – first, a CAT5 structured cabling from Router/Hub to I/O box (a 3” x 3” x 2” white box) & second a flexible cable from I/O box to your PC. Please ensure that all PCs at a location are connected on LAN.
Ensure that CAT5 cable is mounted on wall properly & is not hanging loosely.
Ensure that flexible chord is not stretched. Also ensure that I/O box is located close to your PC.

Hubs/Switches are devices for connecting additional PCs to Router's LAN port. Please ensure that these are properly mounted on wall.
Uptime:

It refers to the time when a node or a channel remains available for data entry. As explained earlier, it is of utmost importance to know the status of availability of equipment for user.

You should keep records both of Channel Uptime & Node Uptime. It is easier to maintain record of Node uptime. Simply record in a register the daily position of availability of a node.

(Along with the reasons of failure for doing analysis.) It is very essential to keep check on the health of secondary channel when primary channel is up.

Give summary position of the entire day to your Zonal OCC at odd hours.

For finding the channel uptime, you have to schedule task of pinging, even if your Node is up. Ideally, every 4 hours, you should ping to adjacent Routers & note the result. This, compiled over entire day, will give channel availability of each channel at your Node. Record this also in a register, giving message to Zonal OCC through Messaging Feature of RMS.

There should a fixed regime of reporting of failure to be in place so that in case of a failure trouble shooting is fast.

A list of phone numbers of service provider should be readily available both at div headquarters and zonal headquarters.

You also have to keep tab on the time taken by various service providers to attend to your reports of breakdowns of Routers, Modems, UPS, Printers, PCs etc. This should be in a separate register, which is not to be reported daily to your headquarters

Other Applications:

Do not use your FOIS network for any other regular data transfer programs. This can cause virus threats, slowing down of application, vitiate OCC tasks & mis-programming of Routers.

Within LAN, you can share information occasionally. However, running regular & heavy program may reduce the availability of system for data entry to FOIS. Please don't run any heavy or regular programs on your LAN.

Unless you procure genuine copies of software that you intend to use on a single PC, please don't load it. In any case, this should never be done on a "Reporting Terminal".

Other Networks:

Your PC should not have access to another network – such as Rail net. This makes the network prone to hackers & Viruses. Since the information available on FOIS is confidential, therefore hackers have to be prevented from entering our network. This is the reason for having separate LAN and Routers for FOIS.

Do not allow any Internet connectivity.

Operational Control Center (OCC)

For successful implementation of FOIS over Indian Railways each zone shall have to undertake following responsibilities towards FOIS.

Real time updating of system data

Management of Network

Maintenance of equipment - PCs, Printers, UPS, RAS, LAN extender, Routers, Switches, Hubs and associated accessories

Replacement of manual information system

In service training

To achieve this each zone should deploy personnel to set up an Operational Control Centre (sufficient work charged posts have been provided and adequate staff has been trained by CRIS).
OCC will be the empowered body for prescribing and enforcing working procedures. It will also monitor performance and take appropriate (pre-emptive and remedial) measures to ensure cent percent availability of system.

OCC shall be manned round the clock to operate NMS and to provide proactive support to field reporting units (help desk) in every respect. It will have additional functionaries during day shift for management support for maintenance, analysis of system efficacy, up gradation of procedures, and escalation as may be required.

Real time updating of system data

Procedures, roles and responsibilities should be prescribed to ensure that data is entered into the system as soon as the physical event has occurred but definitely before the next event takes place these delays can be monitored with help of Transaction log

(Query → Operation Control → Exception task → Transaction log)

Procedures should be location specific and further device specific i.e.functionary specific. Specific office orders to be issued covering every possible eventuality on a given territory with the sole objective of not allowing any data element to escape.

Participation of train staff to deliver data though train documents for both normal and abnormal working will be prescribed as local procedures. In case, when abnormal working has been introduced on account of failures, OCC to co-ordinate for proxy reporting and restoration of normal working.

Each division should nominate a Sr. supervisor who shall be responsible for timely update over his division and accountable to OCC. Reporting terminals have been provided at divisional and sub control offices, in yard locations, (terminals are provided at the place where all the information required to be input is available). Control Office will report for non-device locations. The entire gamut of reporting to the system is to be engineered around these terminals, which must be manned round the clock.

Procedures should also be prescribed for reporting in case any failure affects data entry from the nominated device beyond two hours.

Each division shall have a predetermined reporting regime in case of failure. In such cases data should be entered from a pre-defined alternative device at that location/site or from the reporting devices at another location by following the mechanism of proxy reporting. Proxy reporting will be possible through the permission of zonal OCC who will enable the nominated device to report for the failed location/site.

Proxy reporting regime can be devised on the following lines:

a) If at a location, terminal/s have failed, reporting will be donethrough remaining terminals at that location/site.
b) At a location there may be several sites. If a particular site has failed, proxy reporting will be done through a nominated site.
c) In case of failure at yard - Divisional Control or sub control office will report
d) In case of failure at Division - Zonal OCC will report
e) In case of failure of complete Zone – Disaster management will come in use.

Management of Network: –

Having route/media diversity and adequate spare equipment has provided sufficient redundancy. It should always be ensured that redundancies are always in working order. Monitoring the functioning of Network with the help of NMS software installed is also the function of zonal OCC that has to be manned round the clock on a continuous basis. It will include –

Ensuring that primary and secondary data and voice channels are in working condition.

If your node is connected through two channels & one of them is down, you will not know the difference. However, with one channel down, you are in a very precarious position, as data entry will stop as soon as the second channel even flickers. It is therefore important for you to take active interest in knowing the state of a channel. This can be done through "pinging". Pinging is the name given to sending & receiving a test data packet from one computer to another remote PC/Router or to any intelligent device. However, you can ping only if you know the (IP) address of remote PC or Router. List of IP addresses of your zone should be available with OCC. You can ping by following command

Start → Run → Ping [IP Address of Device] → OK

For finding the channel uptime, you have to schedule task of pinging, even if your Node is up. Ideally, every 4 hours, you should ping to adjacent Routers & note the result. This, compiled over entire day, will give channel availability of each channel at your Node.

Registering complaints for channels that are not working and following up for rectification. Liaison with both BSNL and railways for the above.

Routers have been configured to route data on a predetermined priority. Rerouting and load balancing will have to be done through OSPF (Open Shortest Pathfinder) on the NMS and need basis.

Analysis of network failures for identifying problematic links for up gradation.

Monitoring payment processes of rentals of communication channels.

Trouble shooting for other equipment failures in association with central OCC and ordering its replacement from the spares.

Maintenance of equipment:

Regarding maintenance of equipments, OCC shall keep a record of hardware components provided at each locations/sites and their failures at zonal headquarters and its division. Repairs will be through maintenance contracts.

A PC breakdown (either Monitor or CPU or UPS) is crucial as it affects data entry. However, you must first make sure that there is no such problem, which cannot be fixed locally. Please check for power chord, operating system & RMS program. (A step-by-step procedure is given in Annexure – III. If all of these are there & still your PC does not respond, bring it to the knowledge of Divisional HQ. At each site you have one extra PC, complete in all respects, to take care of such eventuality. Replace the defective PC with this stand-by. Finally, report the failure to concerned vendor or as prescribed by the maintenance practice of that div/zone . Addresses of vendors should be readily available.

OCC should prescribe spare maintenance practices on their respective zones.

The following points should be kept in mind before prescribing any spare maintenance practice: -

- Uptime requirement of location
- Accessibility of vendor from a location
- Sourcing of spares may be done from a central point ideally a big city were vendor services are available readily.

In house skills would be confined to troubleshooting and to replacement of equipment out of spares. NMS software also helps in troubleshooting. Vendors with whom AMC has been drawn and entered can then repair defective pieces.

Replacement of manual Information System:

Suspension of parallel manual system will be the biggest challenge. It has to be gradual. First of all it will have to be explained to operations managers that value lies in using application in an interactive mode. Dependence on fixed time reports should be minimized. Fixed time reports should be more in the nature of exception reports to reflect failures.

It would be prudent to prioritize this effort in the following order.

Interchange
Stock and Demand

c) Loco inventory

OCC will in consultation with COM prescribe a schedule for identified manual reports and bring systems stability in terms of data capturing in those areas first.

OCC will also evolve a mechanism to analyze systems usage at every step and match it with expected returns. Returns can be in terms of savings in efforts, accuracy of information, avoidance of disputes, less correspondences and cross references, more time for planning operations, resultant customers satisfaction, enhancement in business achievements and productivity (redeployment achieved, overtime curtailed), reduction in work pressure amongst staff, less diversions etc.

From the analysis of application by OCC, it is expected that items for up gradation of application further will get identified. However before undertaking development OCC will weigh every new requirement for its return justifies it and then only forwards it to agencies responsible for application development.

In service training:

It is very essential that concurrently a programme be made by each railway to disseminate the learning to rest of the cadre. The training should be institutionalized taking the help of zonal training schools. The components of training will comprise exposure to revised ground procedures for data collection and maintenance, reporting tasks of the application and OCC functions.

The participation of all those in the field who are associated with operations taken together will only ensure sustained upkeep and usage of the system. The FOIS training should be made a part of the induction and refreshers courses of TNC, GC, SM, TXR, Trains, Power, C&W and Commercial Controllers, Guards, and Loco pilots.

There will also be an element. This training is essentially for understanding of procedures and application tasks.

In case of those who have to man OCC and perform its functions an extended module will be prescribed in addition to training in procedures and application tasks.

OCC of each railway will nominate trainers from their existing cadre strength who in turn will be trained by CRIS to establish training processes on their railways and train others. OCC will thereafter monitor progress of training on their railways and ensure that regularity is maintained.

Miscellaneous Issues

Printing Reports:

All reports, which are available on display, can also be printed. You should decide as to which reports are most useful & which require printing.
You can print either the view shown (through F7) or you can choose which columns & rows you want (by clicking them) & then print your selection by pressing F11.

For printing, you should have a Dot Matrix Printer attached either to Network or attached to a PC & “Shared”.

You must plan in advance for your requirement of paper & ribbons.
Messaging Feature:

This is a very powerful communication tool that should be used for meaningful works only. Don’t allow it to become a general-purpose e-mail feature. Since the addressee is not a filter, the entire list of messages for a station increases exponentially. However, use it freely & liberally for communicating messages related to freight operations, FOIS messages & emergent non-personal messages.

Passwords:

The RMS package has a concept of passwords. For each user, who enters data, such passwords can be defined. Once a password is given by CRIS, you can change your password on your own by going to Access > Password. As a supervisor, you must also ensure that anyone who is going away from FOIS work (on transfer etc) should be struck off from user list & his password is disabled by CRIS. Assigning passwords gives responsibility to user. This password helps in keeping the security trail i.e. the reporting done carry the id of the user.

Password management task is being passed on the zones so that they can manage password on their own without getting CRIS involved. Besides RMS password there is Windows password, which you use at the time of logging in your PC, if you are using this password then all the users of that device should know it.

Reports available in RMS module :

CONFERENCE SET

Interchange forecast summary: gives desktop summarized view of forecast & interchange of current date. It is updated by I/C forecast and arr. /dep reporting task.

Running interchange: gives detailed view of forecast & interchange and also gives running position of trains forecasted. It is updated by I/C forecast and arr. /dep.reporting task.

Current interchange: gives summary information of interchange with break-up of empties and loaded stock, stock (4w) interchanged. It also provides summary of jumbo and box rakes interchange It is updated by I/C forecast and arr. /dep. reporting task.

Likely shortfall : gives summarized view of interchange along with trains likely to shortfall along with the reasons of their shortfall. It is updated by I/C forecast and arr. /dep. reporting and I/C shortfall reporting task.

Train interchange shortfall: gives shortfall /excess of yesterday interchange along with reason of shortfall in despatch. It is updated by I/C forecast and arr. /dep. report task.

Stream wise pipe line : provides pipeline between two nominated stations and also pipeline for a via. It is updated by Load planning, Train ordering, arrival / departure reporting tasks.

Loads on run : this is an unstructured query for all loads on run in the system. There are different filters available for viewing loads according to users requirements.

It is updated by Load planning, Train ordering, arrival / departure reporting tasks.

Traffic flow :gives information regarding likely traffic flow terchange points upto 3 days in advance.
It is updated by Load planning, Train ordering, arrival / departure reporting tasks.

Outward train railway wise: gives division wise destination railway wise view of all outward trains on a zone. Filters for rake types, commodity are also available.
It is updated by Load planning, arrival / departure reporting tasks.

Terminal position: displays total rakes at the terminals as well as the insight for those terminals. On selecting a cell relevant details rake wise are displayed.

It is updated by arrival/departure reporting, I/w no. taking, Rake placement/rel tasks.

Terminal performance : gives terminal performance for a selected period
It is updated by arrival / departure reporting, I/W no. taking, Rake placement /rel tasks.

Terminal history: gives details of individual rakes handled at the terminal for a selected period .It is updated by arrival / departure reporting,

I/W no. taking, Rake placement /rel tasks.

Terminal performance and running position: gives status of load at terminal along with its insight. It is updated by arrival /departure reporting,

I/W no. asking, rake placement/rel tasks.

ODR wise rake outstanding (details):gives ODR wise outstanding demand details
It is updated by demand reporting task.

Rake performance: gives performance of rakes for the period they were in the division /zone along with total kms ran in the division.

It is updated by arrival / departure reporting, rake Formation/dissipation,

I/W no taking, Rake placement /rel tasks

Rake position: gives break up of rakes over a division/zone Under following heads:U/R,U/L,O/W,I/W and Empty. It is updated by arrival / departure reporting,

I/W no. taking, Rake placement /rel tasks

Rakeintegrity: gives details of all attachment/detachment/sick reporting on a individual rake on the selected zone. The examination & dissipation if done) is also shown. Further details can be seen after selecting a cell and pressing enter.

It is updated by all rake reporting, consist reporting, and TXR examination

Current traffic flow: holding of each railway is shown in terms of I/W,O/W and empties. the flows between the railways are shown by arrows for both loaded & empty rakes.

Details of individual rakes can be seen on selecting the desired cell and pressing enter.
It is updated by all rake & load reporting

Terminal management planning: for a selected group rake type, division wise, outstanding rake demands, rakes on hand and pipeline of terminating loads are displayed.
On selection of cell & pressing enter, details relevant to that cell are displayed.
It is updated by Demand, rake placement/rel and arrival/departure task.
All stock: current rake holding of zone is shown division wise, specifying loaded empties, at terminal, cross traffic (through), originating for foreign railway, local and terminating received from other Railways.

Facility to see details of individual rakes on selecting any cell is also available. other stock icon in the conference set run on the same query BCN,BCX, CRT,BOXN,BOX,SHERPA SHERPA-N,CONTAINER,TANKS)

It is updated by load planning, consist reporting, Placement /release tasks.
Loco position: this query displays all the locos for the selected Division, location wise. A type wise summary is also displayed.

It is updated by loco reporting, arrival/departure, loco attachment/detachment task.

Interchange

Yesterday

Yesterday Interchange: This query displays the information of the trains actually interchanged in terms of the Loads and Light Engines at the divisional interchange point., The shortfall and excess columns display direction wise summary of loads that were short or excess vis a vis the forecast for the previous day. Receipts and dispatches are shown separately for each of the I/C point.
It is updated by the Interchange forecast and Arrival/Departure Reporting tasks.
Current

Interchange monitoring *this query gives view of current I/C, giving the Status of forecasted trains and also the trains, which are not forecasted, but are likely to go in the I/C. It is updated by train forecast, arrival/dep tasks.*

Rake & Terminal Position

Yesterday

24:00 Hrs Terminal Position: gives status of load at terminal alongith its insight at 24 hrs. It is updated by arrival/dep reporting.

I/W no.taking, Rake placement /rel tasks

Current

Optimised movement of rakes This query displays movement of rakes originating from the logged in zone and available in the database till the queried date. It shows empty and loaded runs of the rakes and the kms clocked by them and time taken for a run. It has the facility for displaying the detention details of the rake .Filters are provided to view details of specific commodities and stock types. This information is updated by the arrival/departure, rake formation /dissipation, placements/release-reporting tasks.

CC rakes BPC Position: this query gives running details of close circuit rakes which are running in the system on the logged in date for the logged in Zone/div.or selected BPC station of that zone. Option is available for selecting a rake type also if the rakes of a specific rake type are to be seen

It is updated by BPC details, train arr/drake formation/dissipation tasks.

Movement of a rake It shows empty and loaded runs of the rake on entering the ID of the rake the kms clocked by them and time taken for a run. It has the facility for displaying the detention details of the rake .Filters are provided to view details of specific commodities and stock types.

This information is updated by the arrival/departure, rake formation/dissipation, placements/release-

reporting tasks

Demand & Loading

Yesterday

Commodity wise loading and outstanding This query displays loading information for a Division/zone against particular station in terms of the no. of rakes 4w, piece meal, 4w, and the total tonnage and freight. The user can use options for (a specific consignee or all consignees or excluding a consignee) and for a (specific commodity, or all commodities, or excluding a commodity).These options are mutually exclusive and can be used in any combination
.

Load Planning, Consist Reporting, Loading tasks, updates this query.

Yesterday Loading

Terminal wise loading of rake demand This query gives the terminal wise rake loading performance of a zone/div. along with demand details and handling activity details. views of commodity wise and destination rly wise summary are also available
Option is also available for viewing terminal wise unloading details in term of balances.

Arrival/departure, rake formation /dissipation, placements/release-reporting tasks updates this query.

Loading performance This query displays loading information for a Division/zone against particular station in terms of the no. of rakes 4w, piece meal, 4w, and the total tonnage and freight. The user can use options for (a specific consignee or all consignees or excluding a consignee) and for a (specific commodity, or all commodities, or excluding a commodity).These options are mutually exclusive and can be used in any combination.

In this query there is submenu for O/S loading division wise and commodity wise loading and o/s.

Demand reporting and placement/rel. tasks, update this query.

Current

Type wise stock position this query gives break up of all rake types or selected rake type over the zone (in terms of rake/pm).on selecting a row and pressing enter

Details of the highlighted wagon type are shown.

This query is updated by arrival/departure, rake formation, dissipation, and consist reporting tasks.

Piecemeal outstanding summary: gives destination wise details of piecemeal o/s over a zone with ODR Demand reporting and Piecemeal placement /release tasks update this query.

Loco

Power interchange gives summary of Zonal loco I/C and also a summary of holding of locos type wise over a zone.

Arrival/departure and loco reporting tasks update this query.

Interchange

Yesterday

Train wise interchange This query displays I/C load wise of a division I/C point wise for specified date. View is available for specified I/C point and direction. The details of loads, like load name, L/E, type, loco, unit, I/C date/time for handed over and taken over is listed separately. This information is updated by load planning, arrival/ departure tasks.

Load interchange analysis This query displays I/C load wise of a division I/C point wise for specified period. View is available for specified I/C point and direction. The details of loads, like load name, L/E, type, loco, unit, I/C date/time for handed over and taken over is listed separately . There are filters provided for originating zone/div/station and terminating zone/div/ station so that various analysis can be done on I./C data. This information is updated by the arrival/departure and I/C reporting tasks.

Stock interchange load wise This query displays summarized information of receipts and dispatches of stock at divisional level for a specific type of stock. Loaded stock classified in terms of through and terminating. Empty stock is shown separately. This query displays and distribute output fields like No./units for each classification with total(No./Unit), for both receipts and for every I/C point.

This information is updated by the arrival/departure and I/C reporting tasks.

Current

Stock forecast The query displays summarized information of receipts and dispatches of stock at Divisional level for a specific type of stock. Loaded stock classified in terms of through And terminating. Empty stock is shown separately. This query displays output fields like No./Unit, for both receipts and dispatches for every I/C point. The train I/C forecast reporting task updates this information.

Stock interchange (summary) An online query which gives forecast and actual trains ran till the time of viewing the report, along with stock interchanged in terms of L/E in 4-w units I/C point wise. Summary of I/C is also given rly wise.

I/C forecast and arrival /dep update this query.

LOAD & PIPELINE

Yesterday

Change in load destination The query gives information on the loads for loaded/empty/mixed/All within Zone/Division with revised change of destination and the station where the change was effected with the message No. and the functionary who authorized the change of destination. The reports can be obtained selectively for a specific commodity, for consignee or for a specific destination. This information is updated by the change in Load destination tasks.

Stabled loads at 24.00 hrs. This query gives information on the loads for both loaded/empty stabled with date and time, reason as at odd hrs. This information is updated by load planning arr/dep and train stabling tasks.

Current

Type wise Terminating load in sight The query gives information of terminating loads for a station/division. The loads details along with the current location and status with the expected arr/dep time and date at the I/C station and destination. Are displayed. This query is updated from Load Planning, train ordering, Train Arrival/Departure tasks.

Outgoing loads gives details of loads which have originated from the logged zone/div /station. It also gives the I/C time of that load and also its expected time at its destination. Load planning, placement /release, arrival /dep, tasks update this query.

Running position optimized destination wise This query displays rakes loaded from a zone and are running on that date. It gives loading details and I/C date and time, its current status. filters are provided for stock type commodity and unloading zone. Load planning, placement /release, arrival /dep, tasks update this query.

STOCK

Yesterday

Rake performance: gives performance of rakes for the period they were in the division /zone along with total kms ran in the division.(query picks rake from their date of exit from zone/div) It is updated by arrival / dep reporting, rake Formation/dissipation,I/W no. taking,
Rake placement /rel tasks

Stock holding: The query displays yesterday position of the total holding for the zonefor all Wagon types, loaded and empty, separately for piecemeal, Rakes and DVS Stock. Details of a stock can be seen by selecting that stock type by clicking and pressing enter. This query is updated by Inward No. taking,
departure, consist reporting, rake formation/dissipation,and attachment/ detachment of wagons enroute reporting tasks.

Rakes at 24 hours: The query displays information of rakes at 24 hrs on yesterday. Rakes group type wise or rake type wise for a specific commodity

included, or commodity excluded, or all types and for a specific consignee included, or a specific consignee excluded or all consignees for a zone. This query is updated by Inward No. taking, Arrival/departure, consist reporting, rake formation/dissipation and placement/release tasks *Current*

Rake Position The query displays information of rakes on real-time basis. Rakes group type wise or rake type wise for a specific commodity included, or commodity excluded, or all types and for a specific consignee included, or a

specific consignee excluded or all consignees for a zone. Inward No. taking, Arrival/departure, consist reporting, rake formation/dissipation and placement/release tasks

Destination Rly Wise Outstanding displays demand details of a zone, division wise, clubbed on destination railway basis. Gives details of commodity and no. of units indented .filters are provided for viewing rake/piecemeal wise demands, commodity and consignor can be selected.

This query is updated by demand and placement /release tasks.

I/W traffic shows handling details of inward loads of a specified terminal on current date basis.

Arrival/departure and placement/release tasks update this query.

O/W traffic shows handling details of outward loads of a specified terminal on current date basis. Arrival/departure and placement/release tasks update this query.

MISCELLANEOUS

Load Wise Route This query gives the complete route details for the selected load (selection is made by entering the load name) like load from-to, load direction, load type, units, stn, Arrl/Dep. Date/Time, Inward Dren, Outward Direction of the selected load. This information is updated by the load planning

Train ordering, arrival/departure tasks.

Load Wise Train Details This query gives the details of all the trains ordered for a particular load's journey(selection is made by entering the load name). The load is recalled by giving departure time from the originating station details of each train leg are also available including the Loco details. The train details show all the stations en route and the reporting, if any, made during that run.

This information is updated by the Train ordering and arrival/departure tasks.

Train Schedule This query shows all train schedules in the system between any pair of stations. The details show all the stations in the train schedule, including indicators for zonal, divisional and sectional interchange. This information is updated by static database in the system.

Route display This query shows the default load route between any pair of stations. The inward and outward details are shown against each interchange station on the route. This information is updated by static database in the system.

Invoice details gives details of invoices made generated in a division/station for a period. This query gives RR details and freight and weight of loading done.

This information is updated by demand registration, placement/release and RR reporting tasks.

Station Help This Query provides help regarding station code or name/. In case only part of either station name or station code are known, the system shows all stations in the database having the input name as a part.This information is updated by static database in the system.

Booking profile this query gives the booking profile of the selected station as given in the Alphabetical List **of** IRCA This information is updated by static database in the system.

EXCEPTION TASKS

Transaction log this task is provided to monitor the delay in reporting Taking place. This can be viewed for a date and for a division/station. There are filters to view train and rake reporting tasks separately

Train and rake reporting tasks update this.

Statistical Report (Reports)

INTERCHANGE

I/C Summary gives I/C summary in terms of no. of loads Interchanged vis a vis forecast and shortfall Forecast and arrival /dep tasks update this query

LOAD & PIPELINE

Reason wise stabling gives details of load stabled during a specified period along with load details, reasons of stabling and the time when that load was lifted Stabling, load planning and arrival/dep tasks updates this query.

Diversion register gives diversion details for a specified period Filters available for originating station commodity, i/e Diversion task updates this query

Maintenance procedures for FOIS:

CHECK LIST FOR DAILY MAINTENANCE OF HVNET VSAT PREREQUISITES

1 Minimum 1KVA On line UPS – dedicated to VSAT

2 Dedicated Electronic earth less than 1ohm

3 Earth to neutral Voltage should be less than 2 volts

4 Air -conditioned dust free environment with clearance of at least 8" in front and rear of indoor unit. This provides airflow and prevents overheating.

5 AC input requirements-230v+10%v VAC 47-63 Hz for PES

6 Grounding of VSATs antenna and unit is a must resistance should be less than10ohm

7 AC input voltage to PES must be derived from UPS output only (Live to neutral 230 VAC Live to Earth 230 V Neutral to Earth OV)

8 Do not allow moisture to enter in the RF unit. Plastic tape should be put on all the

Connectors at the ODU. A properly designed rain protection over can also be used to prevent the same.

ON-OFF PROCEDURE

9	1.	Do not put off the power supply. Keep it continuously "on" because Hub is always polling each location for status and control signals must be received at any time from the Hub.
	2.	If PES is switched off and subscriber switches it on, in this case PES will take nearly 40 minutes to get ready for normal working provided it is ON continuously for that period.
	3.	Observation of the LEDs should be recorded during this period and it may be conveyed to HUB if PES does not come to normal position i.e. dots do not flash on all cards of PES.
10	Single phase 230 ohms 50Hz with input circuit breaker of 3amps for protection	

PRECAUTIONS

11	Do not disconnect the IFL cable from DIU without switching power supply off. This may damage equipment.
12	Protect your antenna/FL cable/ODU from tampering by unauthorized person.
13	To prevent damage to the DIU turn power off before connecting/disconnecting any telephone failure to remove power may damage the VDPC card.

14	Do not use rotary telephones with VSATs. Use only Touch tone (DTMF) telephones.
15	Do not place equipment, which produce dust near the DIU (Certain copier of computer primers produce carbon dust, which can cause malfunction.
16	Prevent moisture from getting inside DIU
17	Limit the distance between VSATs DIU to telephone instrument 15 meter for proper operation.
18	For normal operation the VSATs should be displaying, flashing dots in all the cards i.e. IFM, VDPC and MPC. Any other display is an abnormal condition

In case of difficulty contact

HUB numbers: **(To be taken from CRIS)**

Specify the display of all the three PES cards

PES= Power Earth Station

ODU= Out door unit

DIU= Digital Indoor Unit

IFM=Intermediate Frequency Module

VDPC=Voice Data Port Card

MPC=Multiport Port Control

INTEGRATED COACHING MANAGEMENT SYSTEMS - AN OVERVIEW

1. MODULES IN ICMS

i) **Punctuality Module (PAM):**For Post facto analysis of punctuality loss and its causes (not an on-line system), Captures train running at Originating/ Terminating and interchange points and the causes of detention. Data input predominantly at Divisional HQ level. Status: Implemented.

ii) **Coaching Operations Information System (COIS):** Captures events on Coaches/Rakes, Generates Reports for Management of Coaching Stock. Data input predominantly at Station/Coaching Yard level. Status: Implemented.

iii) **COIS Data Entry Module:** Support module of ICMS, to maintain database pertaining to the information of Rake Links, Yard Infrastructure, Coach Master, Train Schedules etc. Data input at Zonal HQ level. Status: Implemented.

iv) **Coaching Maintenance Module:** To capture depot activities related to coaching maintenance operations, Utility tool for managers looking after mechanical and electrical maintenance, Includes module for Material Management and Manpower data (gang strength per shifts etc), Data input at CDO level. Status : Under system study.

i) **Time-tabling Module:** For simulating the suitable timings for running of all kinds of trains, simulating the best available path for planning a train keeping in view all variables, simulating optimum utilization of rake link, generating all time-tabling documents. Data input at Zonal HQ level. Status : Under system study.

2) ICMS-SYSTEM ARCHITECTURE

- User connects through browser interface (like Internet Explorer)
- Separate URL for PAMS ,COIS and DATA modules (for ex: http/…/cois , http…./pam , http/…/data and so on)
- Users have Thin clients at location
- Back-end: RDBMS (Oracle based)

3) ICMS-DATA FEEDING

i) **Master Data:** Common Master database for PAMs and COIS, includes Infrastructure data: (of more permanent nature like List of Stations, Platforms, washing lines) and Other Master Data: (of less permanent nature like Rake Link Data, Time Table data, Coach Master etc)

ii) **Running Data:** Separate and independent running database for PAMS and COIS

a) **PAM:**

- Feeding mostly at divisional level, Interchange owning division controls the data feeding for handing over or taking over, Zonal client does the responsibility fixing(deciding the trains “lost in punctuality”)
- Activities include:
- Originating terminating, interchange timings
- Detention Reports,
- Cause wise logging,
- Fixing Responsibility

b) COIS:

Unlike PAM - no concept of data "feeding" in COIS. Instead working on the system at station/yard level leads to generation of required data (and memos for the operator).This works as input for MIS.

All station/yard activities from arrival to departure of rake are captured:

Yard stock entry	Dispute Resolve
Yard Position	Sick Marking
Rake formation	Sickline PlacementSickline Operation
Modify consist	Shop Marking
Movement	Shop Placement
Movement (Yard to yard)	Remove fit available coaches
Rake Examination	Search Feedbacks
Departure Reporting	Send Feedbacks
En route Attachments/Detachments	Generate memo
Arrival Reporting	

(iii) ICMS-MIS-REPORTS

a) PAM : Reports for Management at Divisional Level, HQ level, Board level like:

- Railway Punctuality Performance for a date for a Division
- Movement of Trains (Division wise) in a Zone
- Punctuality percentage of Mail/Express
- Cause wise/Gauge Wise breakup of Lost Trains between dates
- Division wise analysis of Cause of Lost Trains on Date in a Zone
- Railway Punctuality performance for a date in a Zone
- Cause wise breakup of Trains lost in a period
- Summary of Monitored trains daily Run and Lost
- Section wise/Cause wise analysis for all trains on a date
- Zone wise/Cause wise analysis for all trains on a date, etc

b) COIS: Reports for Management at Station Level, Divisional Level, HQ, RB level like :

- Yard Stock Position (Line position)
- Vehicle Guidance
- Zonal Stock Balance sheet (type wise details of Bare Requirement, allotment, running in service, ineffective etc)
- Coaches on way from/to shop
- Foreign Railway Coaches
- Ineffective Coaches
- Coach History
- Rake Link Information Zonal/Divisional Coaching Stock allotment/availability, etc.

Control Office Application

1. Introduction – General Information

1.1 What is Control Office Application?

Control Office Application (COA) is comprehensive software for the automation *of* Control Charting at a railway divisional control office. COA is intended to replace the tedious manual plotting *of* running trains on a chart. The core functionality of the control charting with ergonomics is intended to provide the Traffic Controllers d good look-and-feel and user-friendly work environment. The benefits of COA II/auld include- better planning and decision-making in train operations and thus contribute to increased operational efficiency.

COA is designed to form the core application to drive the existing allied systems like FOIS. NTES and COIS. The integration with allied systems will be facilitated through a Central Application Server at CRIS. .

The flow *of* data on real time basis to adjoining divisions will mark a significant breakthrough in the train operations without dependency on human interference.

1.2 Scope of COA

COA covers the following core functionalities Control Office Operations. They include: -

- Train Ordering
- Maintain Train Information
- Manage Train Movement (Abnormal Working, Stabling, Banker Movement)
- Report Unusual Occurrences.
- Management of Maintenance Blocks
- Caution Orders
- Plot Graph.
- Advance Plotting _ System / Manual
- Maintain referential data
- MIS Reports
- Yard Management Siding
- Miscellaneous Functions
- View Station Layout

The application will have interfacing capability with Data Logger to capture data pertaining to train movements in the final version of the product. .

1.3 Intended Audience

- Operations Managers
- Train Controllers
- Key functionaries of sister departments.

1.4 Benefits:

- Fully Automated work environment
- As an aid to the controller in terms of efficiency, precision & time management.
- Leverage to Controller's Experience in decision making through manual forecast
- Real time information on train operation without human dependence
- To serve as a backbone system for sharing of data between allied systems

Anti Collision Device

Anti Collision Device (ACD) is a fully integrated Electronic Control System designed to minimize collisions and increase safety on Railway system. It is a non signaling system and provides additional cover of safety in train operations to prevent dangerous train collisions caused due to human errors or limitations and equipment failure. Being the non-signaling and inter locking system it does not replace any existing signaling and interlocking system and does not alter any procedures of train operations in vogue.

ACD is a Network of Anti -Collision Devices (ACDs) comprising of a variety of devices such as on-board (Mobile). ACDs for Locomotives and Guard vans and track-side (Stationery) ACDs, Level OCrossing ACDs, Loco Shed ACDs, Sensor based ACOs and ACO Repeaters. All these work on the principle of distributed control systems. All ACDs along the ACDroute communicate with each other through radio communication when they are within a radial range of at least 3 kms. On board computers use inputs from Global Positioning System (GPS) for determination of train location, speed, course of travel and time. Both mobile and stationary components of ACO system exchange information and take decisions based on train working rules and embedded software to apply brakes automatically without any input from the users. If two ACOs are deemed to be at a risk of collision, the ACD system activates automatic braking operation to prevent collisions. Loco ACO is designed to interface with various types of braking system of locomotives.

System provides audio-visual "Train Approach" warning to road users at level crossings. At Manned LC Gates, when approaching Loco ACD detects "Gate Open" condition, the speed of the train/loco is reduced and kept under a pre-defined speed. Similarly, it can also provide warning and regulate speed in case of movements of land slopes in deep cuttings that are "sensed" through Inclinometer grids, embedded in such slopes. ACD system does not interfere with normal working of train operations.

More than 2,000 Anti Collision Devices have already been installed over 2,700 Route Kms of track on Indian Railway system out of which about 1900 Route Kms are on North east Frontier Railway and balance are on Konkan Railway. Further proliferation of this safety device on the balance BG network of Indian Railways is being planned.

DERAILMENT INVESTIGATIONS

"Accident investigations – a tool to prevent recurrence". In most case on Indian Railways, cause of the accident is not clearly established. This results in repetitive failures. Pinpointing the scientific causes of accidents, therefore, becomes a preventive strategy

Site investigation:

1) Condition of track with special reference to gauge cross level, super elevation. Gauge of the track to be checked under the load and for a distance of 45 meters on either side of point of mount, if cause is indisputably known otherwise for a distance of 90 meters ahead of the point of mount. In case of sabotage or suspected sabotage nothing to be disturbed except to rescue life till ok from police.

2) A rough sketch showing the position of derailed vehicles marks on sleepers should be made. Point of drop/mount to be indicated.

3) Locomotive speed records/graph

4) Condition of rolling stock with special reference to brake power; marshalling of trains and engine details as also breakage of components like brake blocks underframe assemblies having caused obstructions.

5) The position of block instruments, signals, points indicators.

6) At stations with panel interlocking position of switches & indicators to be recorded preferably by two officers or two Sr. Subordinates of different branches and relay room to be sealed;

7) Position of important relays

8) Seize & freeze all records as laid down in accident manual

9) The statement of the concerned staff available at site should be recorded for finding the cause of accident.

10) To give the prima-facie cause of the accident with expected time of restoration

11) Marshalling of the train, with regard to anti-telescopic coaches;

12) Arrange to take photographs from different angles to assist in reconstructing the scene of the accident;

13) The dates as given in the accident reporting form must be recorded for locomotive to produce before the Accident Enquiry Committee. The track and coach/wagon is to be examined jointly and the data and information collected are to be recorded jointly signed by the Sr. Subordinates available at the site.

Following operating features must be checked while investigating into a derailment

- Speed of the train just before the accident
- Uneven load/shifted load/load in all the vehicles must be checked to get an idea of loading and lashing/securing loads.
- Application of brakes
- Brake power of the train and location of vehicles without brake power
- Whether all hand brakes are in released condition.
- How was the train received or dispatched by the stationmaster. Whether station staff adopted any abnormal method of working
- Sudden reversal of points
- S&T failure reported before the accident – how and when was it set right.

It is always useful to look into all aspects connected with the derailment. Sometimes important clues get neglected due to preconceived ideas and it becomes very difficult to properly arrive at the cause of derailment.

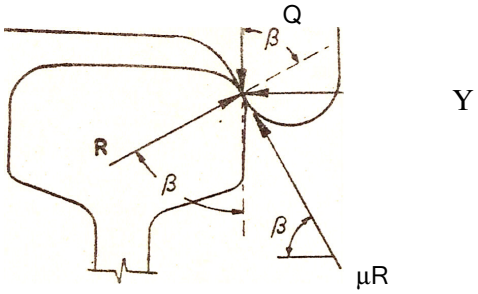
Accidents involving collision, passing signal at danger, rolling back of a train etc. are generally caused by violation of train operation rules and it is not very difficult to trace the irregularities committed. The most difficult accidents, from investigation point of view, are the ones where wheel leaves the rail. Such accidents can be categorized in four types:

1. When one or both of the same wheel-set fall inside the track.
2. When the wheel derail without any mark on the rail table.
3. When the wheel derails with single flange mark on the rail table
4. When a number of wheels derail with multiple flange marks on the rail table.

Type 1: When one or both wheels of the same wheel-set fall inside the track:

In such derailments the cause of accident is very clear, i.e., spread gauge or may be a remote possibility of shifting of wheel disc on the axle or breakage of axle or journal. It is generally seen that in such cases of wheel/wheels falling inside the track, the affected rolling stock is lifted with the help of jacks and the rolling stock can be lowered and moved on the same track.

In the case of spread gauge, special care has to be taken for recording the condition of track fittings. Loose keys, signs of rail-chairs shifting on the sleeper, condition of elastic clamps, tie rod cotters etc. must be carefully examined and recorded. If a wheel starts mounting the rail, its tread lose contact with the rail and entire weight is shifted to this point of contact on the flange. At this particular moment, the arrangement of forces is as follows: -



In the above figure different forces shown are as follow:
Q: Instantaneous wheel load
R: Reaction of rail
Y: Lateral thrust (flange force)
μR: Frictional force between rail and wheel flange (acts upward)
μ: Coefficient of friction
β: Flange angle
From the above simple model, following formula was derived by Nadal in 1908:

$$Y/Q \geq \frac{\tan\beta - \mu}{1 + \mu \tan\beta}$$

The ratio Y/Q is called derailment coefficient.

(While investigating into derailment, all track vehicle defects and features and operational aspects which cause one or more above mentioned factors to occur should be listed as possible contributory factors. The list of such contributory defects and features thus arrived at should be arranged in descending order of their assessed contribution. Thus one can arrive at one or more causes of derailment.)

Type-2 When the wheel derails without any mark on the rail table.

In such type of derailments no flange marks are found on the rail table, In majority of such derailments following reasons may have caused the accident:

- Obstruction in the path of wheel.
- Breaking of vehicle suspension arrangement.
- Jamming of wheel due to roller bearing failure.
- Mishandling of train by loco pilot
- Wrong marshalling of vehicles with no brake power kept together or heavy vehicles in the rear.

For investigation of such derailments the accident site must be carefully inspected for foreign body, which might have caused obstruction to the derailed wheel. Examination of train brake power, position of zero brake power vehicles and heavily loaded vehicles must be critically done. Additionally, loco speedometer chart must be checked for last brake application.

Type-3 When the wheel derails with single flange mark on the rail table.
This is the most interesting category of derailment and requires detailed examination of track, vehicles, loading condition and train operating conditions. First the wheel mount mark itself has to be properly ascertained. The length of flange mark gives a clue to reasons for derailment. The following factors must be considered after seeing the flange mark:

- Long flange mark suggests that the wheel load reduced considerably for a long period.
- Short flange mark suggests that the lateral thrust increased to a considerably high value.
- The weight of the vehicle and speed of the train at the time of accident affect the impression of flange mark on the rail.

In a number of cases an empty derailed wagon had been pulled to a very long distance and the wheel mount mark was found but disputed due to ignorance of the investigating officials. In all the cases, one must ascertain the first wheel drop mark and then trace back the mount mark. After locating the mount mark, next step is to match it with the wheel that derailed first. For this matching of damages on sleepers and position of vehicles after derailment will have to be done.

After identifying the point of mount and drop, detailed examination and recording of track geometry rolling stock parameters, condition of loads in derailed as well as non-derailed vehicles and operating conditions has to be done. This record reveals reasons for the accident. The analysis has to be done with a view to find out reasons for increase in thrust and reduction in instantaneous wheel load.

Type-4 When a number of wheels derail with several flange marks on the rail table.

In this category of derailment the probable reasons for derailment can be as follows:

- Obstructions in the path of wheels.
- Disturbed track (work being done on the track or sabotage)
- Rail failure
- Serious track defect-twist misalignment or formation failure
- Buckling of track

In such cases, if there is no obvious reason like obstructions or rail failure, track parameters are of particular relevance and sufficient care has to be taken in recording them. Readings of track geometry is of great importance in establishing the behaviour of vehicle just before the derailment. In addition to the readings taken after derailments, records of previous maintenance (rail renewal, de-stressing etc.) must be perused to assess the amount of work done in the last few days.

DERAILMENTS AT POINTS AND CROSSINGS:

Points and crossings are meant for changing the road of a train and it has some discontinuities thereby making it a weak link in track structure. In a point there are two tongue rails connected together by stretcher bars and this assembly is called switch. A pull rod from some distance operates this switch. Today, most of the points are operated by motors and they have some interlocking arrangement. The interlocking for motor operated points is done with a lock bar and it has a detection device also to detect proper housing of points.

Tongue rails forming the switch are hinged onto the heel blocks in the rear. The bolts, provided for hinging the tongue rails, are kept loose for easy operation of switch. After the switch arrangement, another important part is the nose of crossing. Here all the wheels traverse the path shown by the switch.

Most of the derailments at points and crossings either initiate at the toe of the tongue rail or near the nose of the crossing. Whenever a derailment takes place on a point the following checks must be done:-

Gauge of point must be checked at four locations:

- 305 mm in advance of nose of tongue rail
- 152 mm inside the tongue rail for straight road and turn out.
- At heel for tongue rail for straight road and turn out.
- At middle of tongue rail for straight road and turn out.

The Gauge must be correct at all places except at the toe where it may be 6 mm slack for housing the tongue rail.

It can be appreciated that conditions created by slack gauge' are not permitted near the switch. IRPWM-1985, Para 237 t' (8) (a) and (b) is reproduced below:

"(8) Gauge and Super-elevation in turnouts-(a) It is a good practice to maintain uniform gauge over turnouts.

(b) If gauge of track adjoining the points and crossings is maintained wider/tighter than the gauge on the points and crossings. the gauge on the adjoining track must be brought to the same gauge as in points and crossings and run out at the rate of l mm in 3 metres to the requisite extent. It should, however, be ensured that the same gauge as applicable to the points and crossings is maintained for at least one rail length on either side of point and crossings."

In case of derailment suspected to have started near the switch of the turnout the following points need to be carefully examined:

- The condition of tongue rail-whether broken, chipped or bent.
- Whether the damage is old or new.
- Height of the tip of the switch from top of stock rail.
- Thickness of the tongue rail
- Any gap between the tongue rail and stock rail
- Any damage to stretcher bar
- In case of interlocked points, the slackness between the locking bar slot and slide should be recorded
- The condition of brackets holding the stock rail
- Whether the switch jumps up when a wheel passes on its heel.

If the derailment is suspected to have started near the crossing the following points must be carefully checked:-

- Condition of nose-wear, breakage, chipped, bent
- Reduction in the level of nost as compared with wing rails.
- Clearance between wing rail and stock rail (near the nose) on both sides.
- Clearance between guard rail and stock rail
- Alignment of turnout to be measured for checking smoothness (with 6 metre chord at 1.5 metre intervals)

IRPWM has specified a check-list for complete examination of points and crossings.

There is one potentially dangerous structure called diamond crossing, which is generally not provided on the main line. A simple diamond crossing has four noses (two acute angle and two obtuse angle), which require a critical watch. Even a slight damage to these noses or disturbance to the clearance between stock rails and guardrails make this diamond crossing unsafe. The problem is further compounded if a diamond crossing has one or two slips also. The curvature of the slip is generally so high that these structure are not fit for speeds above 8 to 10 kmph. It is advisable to avoid use of these structures.

Some Important Defects

(A) Permanent Way

- Spread gauge
- Gaping in points
- Tipping of the toe of switch
- Worn out & broken tongue Rail

- Excessive clearances of check rail opposite to the nose of the crossing
- Loose or slack points connections
- Sharp curves with kinking alignments
- Worn out Rails
- Abrupt introduction of super elevation
- Super elevation not corresponding to speed of the train
- Buckling of track
- Shearing of fish plate bolts
- Subsidence of track
- Uneven Cross level
- Condition of Ballast
- Security fastening deficient/loose

Track defects have a vital role in the accident and therefore it is very essential to check the various parameters of the track. The following parameters must be checked thoroughly to pin point the defects in the track:

(1) Gauge - It is the shortest distance between the two rails of the track.
Rail Gauge
The *standard gauge is* 1676 *mm.*

Permissible Variations

- Straight line 6 mm tight to 6 mm slack ± 6 mm)
- On curve with radius 350 Mtrs or more-6 mm tight to 15 mm slack (-6 to +15)
- On curve with radius less than 350 Mtrs-Slack up to 20 lllll1 (correction slip No. 10 Rly Bd. L.No. 94/CE/II/TSG/I Dt. 20/24-6-96 of P. Way, manual)
- Gauge sleeper to sleeper Variation -- 2 mm
IRPM Para 316(2) (a)

Cross-level of the track is relative level difference between the two rail tables measured perpendicular to the track at the same point. It includes the variation in the super elevation in case of curve cross level to be recorded on every fourth sleeper or 3 mts apart. The cross level reading helps in calculating the TWIST available in the track. TWIST is calculated in mm/meters by using the formula

Algebraic difference of cross level at two points A & B in mm divided by Distance between points A & B in meters,

Ref. IRPWM - Para 316 (2) (C)

Twist should not be more than 3 mm/mt as per Railway Board letter no. 631W6/TK/I0/Dt 10.11.1964.

(3) *Unevenness*

This defect of the track is not reflected in the gauge and cross level reading. Low joints, high joints, loose packing, sleepers and lifting of sleepers cause this defect. Long sags are not taken as unevenness. It is recorded for left and right rail separately. It is measured in terms of difference in longitudinal levels over' a fixed base. Unevenness gives rise to forced oscillations in a vehicle and can cause variations in the values of instantaneous Wheel load and lateral thrust. Para 607 of IRPWM classifies unevenness (measured on 3.6 Mts cord) above 15111m as category D.

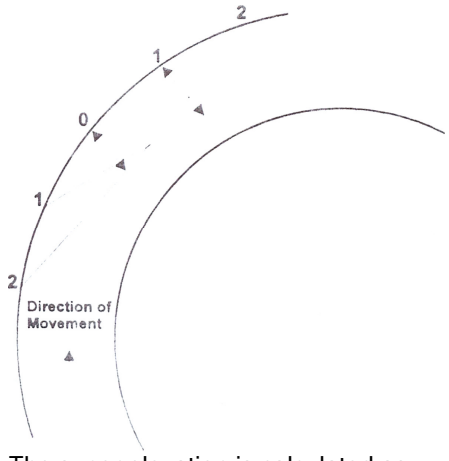
(4) Versine and super elevation

Versine and super elevation are measured for checking correctness of a curve. At the beginning and at the end of the curve, details of the curve are mentioned on the board. Radius of any curve is obtained by dividing 1750 mtrs, by its degree. Versine is calculated as:

$V = 125.C^2/R$

R - Radius in meters
C - Cord length in meters
V - Versine

As per Para 421 (b)(i) of IRPWM, the station to station variation of versines of stations 10 Mts apart should not exceed 15 mm for more than 100 Kmph speed, whereas for speeds 100 Kmph or less than 100 Kmph it should not exceed 20 mm or 200/0 of the average versine of the circular portion whichever is more.



The super elevation is calculated as:

$C = GV^2/127R$

C = *Cant/Super elevation in mm.*
G = *Dynamic gauge in mm*
V= Speed in Kmph

Para 406 (d) of IRPWM specifies a maximum cant of 165 mm. on group A, Band C routes and 140 mm on group D and E routes. The maximum amount of cant deficiency is also specified in para 406(2) as given below :

- For speeds in excess of 100 Kmph on group A and B routes for nominated rolling stock and routes with permission of Chief Engineer - 100 mm
- For broad gauge routes not covered by above - 75

(5) ***Ballast***

It is a very important member in the track structure. It helps in maintaining track Geometry. The ballast resistance is affected by following factors -
Ballast - Size, Material, Shape, State of consolidation, Type of sleeper, Cushion at Formation.

Para 263(2) I RPWM recommends the Minimum depth of ballast below the bottom of the sleeper at rai I seat as under:

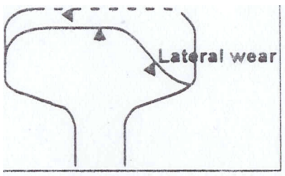
Groups	Recommended Depth
BG Group A	300 mm
BG Group B & C	250 mm
BG Group 0	200 mm
BG Group E	150 mm

(6) Rail

The accident caused by rail fracture does not leave much room for investigation. The fractured rail is to be tested to find out the nature of the failure. The visual inspection can reveal whether the fracture was new or there was some old flow in the rail.

For other derailments, the rail is measured for its wear. The rail wears out mostly on the top surface and gauge face. Rail wear can be vertical, lateral or angular.
Angular wear

Profile of new rail
Vertical Wear



Worn profile

The limits of wear of rail have been laid down in IRPWM Para 302 (b)

Gauge	Rail section	ertical wear
B.G.	60 kg/meter	13mm
	52kg/mctcr	8mm
	90R	5mm

Lateral wear limits have been given in para 302 (b)

Section	Gauge	Category of work	Lateral wear
Curves	B.G.	I Group A & B routes	8 mm
Curves	B.G.	I Group C & D routes	10 mm
Straight	B.G.	Group A & B routes	6 mm
		,Group C & D route	8 mm

(7) *Sleepers*

If sleeper suffer any damage or loss in property, it can cause derailment. While recording the gauge and level readings the condition of each sleeper must be carefully sleepers near point of mount.

(8) *Rail Fasteners*

For different - type of sleepers, the rail fasteners are different Wooden sleepers - Dog spikes, Round head spikes, Steel keys Steel trough sleeper - steel keys

Prestressed concrete sleepers-- elastic clips with liners between the foot of rail and clip.

Condition of all fasteners should be recorded while taking track reading

(9) *Creep*

This is a silent but very dangerous phenomenon of the track. Creep is a longitudinal displacement of track and is caused by

- Temperature variation causing expansion and contraction of the rail.
- The tractive forces of locomotive to push the rail backward.
- Braking forces of train trying to push the rail forward. The effect of the above forces is accelerated if the rail fasteners are not able to hold the rails properly to the sleepers or rail seat on the sleepers is a damaged or bad joint in the track with out proper expansion gap.

Para 242 (6) of IRPWM specifies maximum about of creep permitted as 150mm. In LWR and CWR creep indication point are provided at a distance of 50 meters and 100 meters SEJ(Switch Expansion Joint) on either end of LWR/CWR.

(10) *Buckling*

When a section of track buckles, about one or two rails length of the track leaves its place and moves side way. This also happens due to the rise in temperature and other reasons similar to the

creep. The buckling may be horizontal or vertical. Buckling normally happens in the 2nd half of the day mostly, when the track has absorbed max. heat and also near the bridges, level crossings etc. where the track is firmly held in ground.

(B) Defects ofRolling Stock

- Defects in wheel and Axle Broken & Hanging fittings
- Defects in Bolster and Assemblies
- Defects in spring gear, axle guard and trolley
- Defects in Brake gear
- Excessive Clearance in side bearer, pivot etc.
- Hot box/Roller bearing failure
- Under frame and under frame members out of alignment
- Poor brake power
- Broken or disengaged Baffle plates in the empty/unloaded tank wagons
- Defective Draw gear, CBC gear and Buffing gear, Train parting & subsequent-collision – 'alliance 2' – couplets opening automatically.

Defects of Locomotives are very similar to defects of Rolling Stock

Power Supply

25 kV, ac, 50 Hz single phase power supply for electric traction is derived from the grid system of State Electricity Boards through traction sub-stations located along the route of the electrified sections at distances of 35 to 50 km apart. The distance between adjacent sub-stations may however be even less depending on intensity of traffic and load of trains.

Sectioning of OHE:-

To ensure rapid isolation of faults on the OHE and to facilitate maintenance work the OHE is sectioned at intervals of 10 to 15 km along the route. At each such point a **'switching station interruptors'** usually rated at 600A are provided. The shortest section of the OHE which can be isolated by opening interruptors alone is called a **'sub-sector'.** Each sub-sector is further sub-divided into smaller **'elementary sections'** by provision of off-load type manually operated isolator switches.

At some stations with large yards, alternative feeding arrangements are provided so that the power for feeding and yards may be drawn from alternative routes. Normally the switch is locked in one position, being changed to the other when required after taking necessary precautions.

To meet requirements at electric loco running sheds, **isolator** with an earthing device in the 'off position is provided. At watering stations manually operated interrupters and isolator with earthing heels are provided to enable switching off of the power supply locally and earthing the OHE to enable working on roofs of rolling-stock. There are several types of switching stations as detailed in the following paras.

Feeding Post (FP): It is a supply control post, where the incoming feeder link from grid substation are terminated.
Each feeder supplies the OHE on one side of the feeding post through interrupters controlling supply to the individual lines. Thus, for a two track line, there will be four interrupters at each feeding post.

Sectioning and Paralleling Post (SP)
These posts are situated approximately midway between feeding posts marking the demarcating point of two zones fed from different phases a '*paralleling interrupter'* is provided at each 'SP' to parallel the OHE of the up and down tracks of a double track section, *'bridging interrupters'* are also provided to permit one feeding post to feed beyond the sectioning post upto the next FP if its 25 kV supply is interrupted for some reasons. These bridging interrupters are normally kept open and should only be closed after taking special precautions as detailed in these rules.

Sub-Sectioning and Paralleling Post (SSP)

One or more SSPs are provided between each FP and adjacent SP depending upon the distance between them. In a double track section, normally three interrupters are provided at each SSP i.e. two connecting the adjacent sub-sectors of up and down tracks.

Sub-Sectioning Post (SS)

These are provided only occasionally. They are similar to SSPs with provision for sectioning of the OHE but not paralleling.

Neutral Section: It is a short section of insulated and dead overhead equipment which separates the area fed by adjacent substation or feeding post.

A neutral section is provided to make it impossible for the pantograph of an electric locomotive or EMU train to bridge the different phases of 25 kV supply, while passing from the zone fed from one sub-station to the next one. Since the neutral section remains 'dead', warning boards are provided in advance to warn and remind the Loco pilot of an approaching electric locomotive/EMU to open locomotive circuit breaker (DJ) before approaching the 'neutral section', to coast through it and then switch 'on' on the other side. Special care is taken in fixing the location of neutral sections, on level tangent tracks far away from signals, level crossing gates etc. to ensure that the train coasts through the neutral section at a sufficiently high speed, to obviate the possibility of its stopping and getting stuck within the neutral section.

Other Important Equipment at Switching Stations

Certain equipments are installed at various points to protect the lines, to monitor the availability of power supply and provide other facilities. These are generally as under:

1. **Lightning arresters** are provided to protect every sub-sector against voltage surges.
2. **Auxiliary transformers** are provided at all the posts and also at certain intermediate points to supply ac at 240 V, 50 Hz required for signalling and operationally essential lighting installations. To ensure a fairly steady voltage, automatic voltage regulators are also provided where required.
3. **Potential transformers** are provided at the various switching stations for monitoring supply to each sub-sector.
4. A small masonry cubicle is provided to accommodate remote control equipment, control panel, telephone and batteries and battery chargers required for the control of interruptors and other similar equipments.

OVERHEAD EQUIPMENT

Catenary and Contact Wires

1. The overhead equipment above the tracks comprises of the following: -

    a) A stranded cadmium copper wire of about 65 mm2 section or stranded aluminium alloy wire of about 116 mm2 section for catenary.
    b) A grooved hard drawn copper contact wire of 107 mm2 cross-section (when new) supported from the catenary by means of droppers of 5 mm diameter spaced not more than 9 m apart.

2. The catenary and contact wire together have an equivalent copper section of 157 mm2. The current normally permissible on a single track is 600 A approximately, because of equivalent cross-sectional area of OHE. This current limit is based on the temperature limit of 85°C in contact wire. Certain sections in Waltair-Kirandul section have the catenary and contact wires together having an equivalent copper section of 200 mm2.

3. For loop lines, sidings, yards and spur lines excluding the main running lines and first loop or lines taking off from main running line, tramway type OHE having only grooved hard drawn copper contact wire of 107 mm2 section is provided.

Height of Contact Wire

The normal height of contact wire for regulated OHE is 5.60 m (with 10 cm pre-sag for 72 m span) above rail level. For unregulated OHE in areas with a temperature range of 4°C to 65° C, this figure is 5.75 m and in areas with a temperature range of 15 °C to 65 °C, it is 5.65 m. In certain cases, such as under over-line structures, the height may be as low as 4.65 m on BG and 4.02 m on MG. For passing oversize consignments on such lines, special precautions have to be taken.

Span of Supporting Mast/Structures

The span normally used for supporting the OHE from masts/structure using the cantilever type bracket assembly varies from maximum 72 m on straight track to 27 m on curved track, the spans depending upon the degree of curvature. The catenary system is normally supported on straight tracks at maximum intervals of 72 m (63 m on MG) by cantilever type arms fixed to galvanized broad flange or I section steel masts or fabricated steel structures. On curves the catenary is supported at closer intervals, the spans adopted depending upon the degree of curvature.

Stagger

The contact wire is staggered so that as the pantograph glides along, the contact wire sweeps across the current collecting strips of the pantograph upto a distance of 200 mm on either side of the centre line on straight runs and 300 mm on one side on curves. This ensures a uniform wear of the current collecting strips of the pantographs.

Overlaps: The OHE conductors are terminated at intervals of about 1.5 km with an overlap generally as shown in Fig. 2.02, the conductor height being so adjusted that the pantograph glides from one conductor to the other smoothly.

There are two types of overlap spans as under:-

a) Uninsulated overlap spans where the distance of separation between two contact wires is 200 mm and the two conductors are permanently connected together electrically by suitable jumpers.

b) Insulated overlaps, where the two OHE systems are kept apart at a distance of 500 mm. Normally the electrical discontinuity at insulated overlaps is bridged by interrupters or isolator except at neutral sections.

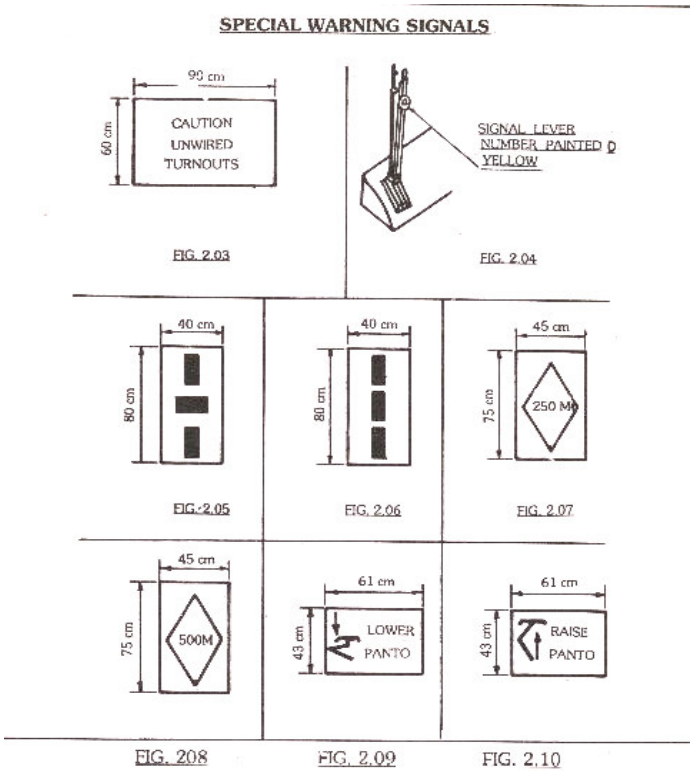
Regulated and Unregulated OHE

OHE with automatic tensioning called 'regulated OHE' is generally provided for all main lines, but for large isolated yard and unimportant lines, automatic tensioning is dispensed with in the interest of economy and only unregulated OHE is used.

Section Insulator Assembly

Section insulators are provided to insulate the OHE of one elementary section from the OHE of the adjacent elementary section such as at cross-overs. When the pantograph of a locomotive passes from one track to another along a cross-over/turnout, current collection changes from one OHE to other and therefore the runners of the section insulators overlap with contact wire so that there is no arcing.

On double line sections with runners trailing, the section insulator assembly using porcelain insulators are fit for speeds upto 120 km/h provided it is installed between the first one-tenth and one - third of the span. In case the runners of the section insulator assembly are in the facing direction or it is not installed within the first one third of the span, the speed should be restricted to 80 km/h.



Classification of Electric Rolling Stock

Locomotives and Multiple Unit stocks are classified by means of a three/four letter code followed by a number to indicate the individual class and a series of the same.

The code letters used for AC locos and EMUs are given below:

The first letter denotes the Gauge: 'W for BG and 'Y' for MG.

The second (middle) letters 'A' denotes the system of power supply for which it is suitable - A for AC & C for DC, CA for DC & AC.

The third letter for locos indicates the class of service -

'M' for mixed traffic locos suitable for both passenger and freight services,
'G' for Freight (Goods) service locos,
'P' for Passenger services locos, and
'S' for Shunting locos.

Multiple Unit Stock is denoted by the letter 'U'.

The various classes of ac locos and EMUs at present in service on Indian Railway are as under:-

(a) AC Locos– WAG1, WAG2. WAG3, WAG4, WAG5, WAG6, WAG7, WAG9WAG9M
(b) WAP1, WAP2, WAP3, WAM1, WAM2, WAM3, WAM4, WAP4, WAP 5, YAM1
(c) (b) AC/DC Locos– WCAM1,
(d) (c) AC EMUs– WAU1, WAU2, WAU3, WAU4, YAU.

In addition two types of BG DC EMUs converted for AC working are in use on the Eastern Railway.

Important Equipment of Electric Loco/EMU

Pantograph

For collecting power from 25 kV ac contact wire pantographs are mounted on the roof of the traction vehicles. AM 12 pantograph of Faively design has been adopted by Indian Railways for 25 kV ac electric locomotives and EMUs. These pantographs are provided with steel strips for current collection. The raising and lowering of the pantograph is by means of a pneumatically operated servo motor. This pantograph is a single pan design having two o-springs mounted on it. For keeping the pantograph in the lowered condition, main springs have been used. The suspension of pan is on plungers.

This pantograph is suitable for operation upto 140 km/h. For increasing the speed potential, improved pantograph with lower dynamic mass and independent pan heads have been used. Further, in order to improve the life of the contact wire, use of carbon strips has also been tried. Use of carbon strips for current collection has already been adopted in European countries.

Use of carbon strips necessitates change in the design of the pantograph; the pan head which is more or less rigid in case of steel strip pantograph needs to be made more flexible in the vertical, horizontal and transverse movement for carbon strip pantographs. This is achieved by improved suspension of the pan head. The speed potential of such a pantograph is of the order of 250 km/h.

2. *Circuit Breaker*

-- Air Blast Circuit breaker
-- Vacuum Circuit breaker

These breakers are designed for isolation of power to the traction vehicle in the event of faults.

Vacuum Circuit Breakers were introduced on electric locomotives on Indian Rlys. in the year 1985. The VCB is a simplified design with fewer number of parts (260 Nos.), have a simplified control block and self - contained interrupting medium that is vacuum. Due to these features, the life of the main contact achievable is as high as 1 lakh electrical operations as against 20,000 operations for air blast circuit breakers. As a result, the periodicity of replacement of main contact is second POH for VCB and IOH for Air Blast Circuit Breakers. Besides, these factors, VCB also offers the advantages of reduced size, reduced weight and reduced maintenance cost as compared to these for air blast circuit breakers. The total trip-time for VCB is less than 60 milli-seconds while the same is of the order of 100 milli-seconds for air blast circuit breakers. The air blast circuit breaker is only capable of breaking the fault current with breaking capacity of 250 MVA. The VCB, besides having breaking capacity is also designed for making capacity of the same rating, i.e. 250 MVA and can handle the same level of fault current during closing also.

3. *Transformer*

Power to the traction vehicles is available at 25 kV ac single phase from the contact wire. In order to step down the voltage as well as to control the same for feeding to the traction motors, the traction power transformers are provided on the traction vehicles.

These transformers generally have a primary winding, a regulating winding, traction secondary windings and auxiliary windings. The regulating winding is designed for choosing appropriate voltage for the traction motors. The auxiliary winding is required for feeding the auxiliary motors on the locomotive.

In order to increase the h.p. of the locomotives, the traction transformers have been uprated from time to time keeping the overall dimensions unchanged on account of space constraint. The upratings have been achieved by using increased copper section of the conductor used, improved insulation scheme and in certain cases adoption of aluminium foil wound construction for minimizing the losses.

With the introduction of thyristorised converters, the design of the traction transformer has undergone simplification with the deletion of regulating winding. The transformer for thyristorised converter becomes a two limb construction and traction secondary winding split into 4 windings for two step sequence control.

The traction transformer necessarily has to have forced oil circulation and forced air cooling. For this purpose oil pump, oil cooler and blower form an integral part of the traction transformer.

Tap Changer

Tap changer is provided on 25 kV (HT) regulating winding of locomotive transformer for controlling the voltage input to main transformer.

Traction Motor

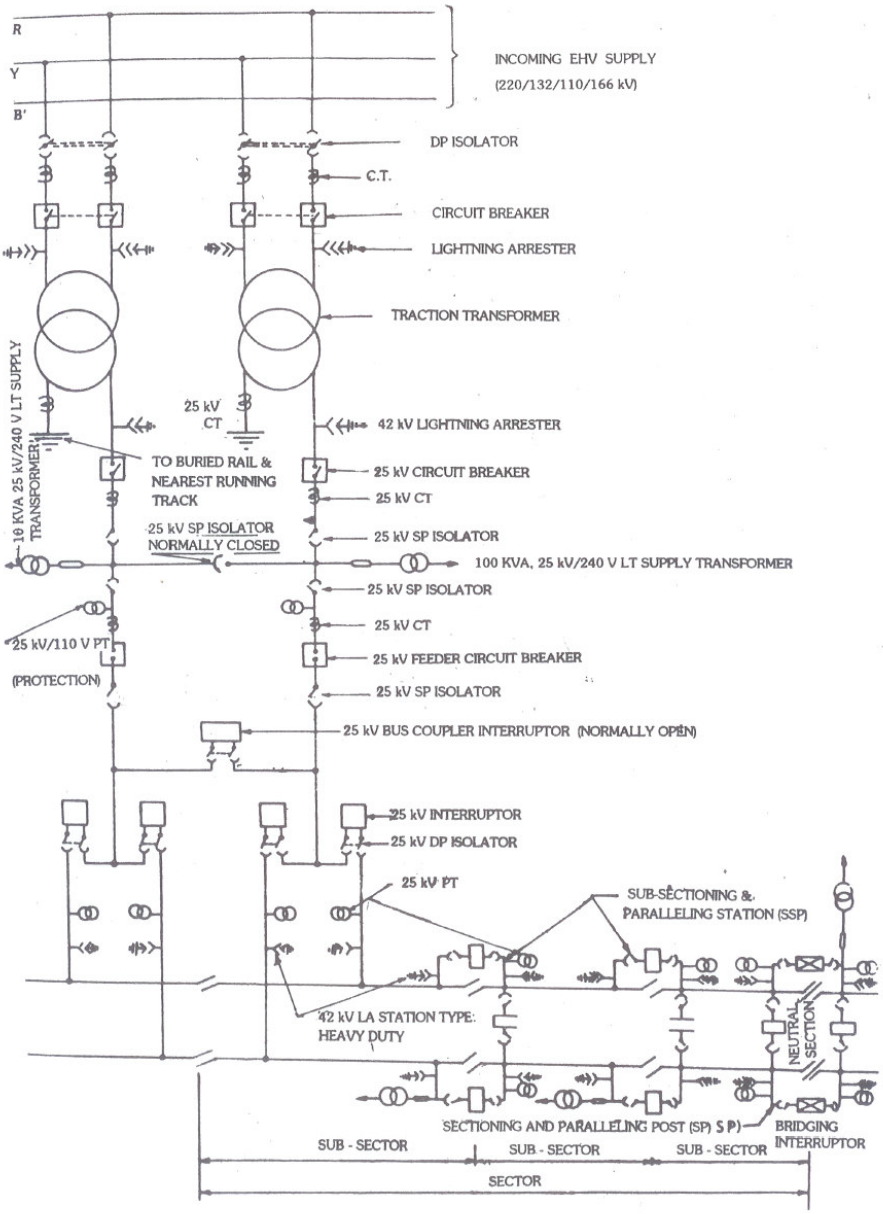
In case of traction motor great emphasis is being given on improving power to weight ratio, keeping in view the limited space available on locomotive for mounting the same. There is continuous effort to improve the performance of traction motor by making them lighter/compact, at the same time more reliable. Indian Railways have been adopting the latest technology available for design and manufacture of traction motor. Over a period of years the traction motors have become now 2.5 times lighter specially for EMU application.

Arno Converter

Arno Converter is a special duty machine for conversion of single phase in-coming supply into 3 phase out- put supply. 3 phase supply is essentially required on most of the electrical locomotives for driving certain auxiliary equipment like blowers and compressors. The function of Amo Converter is to supply 3 phase power required for these auxiliaries.

TYPICAL OF TRACTION POWER SUPPLY FEEDING ARRANGEMENT

FIG. 1.01
(PARA 20100)



CREW LINKS, LOCO LINKS AND POWER PLAN

PROCEDURE FOR CALCULATING CREW REQUIREMENT OF A DIVISION

1. Running staff review should be carried out after every six months i.e. on 15t Jan. and 1st July by STA (Senoir technical assistant) of the division.

2. Before preparing review, loco pilot's links of all the sheds should be got prepared and vetted by personnel branch.

3. Statement of avg. hours on road and no. of goods

4. Trains ran during last six months for each section should be ready duly approved by Sr. DOM/DOM. A list of shunting' points and DMTs running to be prepared and signed by Sr. DOM/DOM.

5. Mail/Express/Passenger Loco pilots requirement to be worked on the basis of loco pilots/crew links.

6. For goods crews_ the requirement should be worked out as per power plan signed by Sr DME(P) and Sr. DOM. 7.67 Crews are to be demanded for one freight POL. Separate crews to be demanded for the activities which cannot been covered in power plan e.g., Light engine and Empty coaching rakes running etc.

7. 30% leave reserve and 10 % trainee reserve should be demanded for this additional requirement.

8. Shunters should be demanded @ 1 against 8 hrs. point. Also rest giver @ 1 for 6 shunters to be demanded. Leave reserve and trainee post to be demanded separately.

9. Requirement of DSL assistants should be same as that of loco pilots (Excluding motormen where no assistant loco pilot is required).

10. Running staff review duly signed by Sr. DME/Sr DEE should be put up to Sr. DAO for vetting.

11. After accounts vetting sanction of DRM be taken and Sr. DPO will issue circulars of revised sanction.

+ Running supervisors review should also be made with staff review @ 1 loco Inspector against 25 loco pilots or 50 shunters. No rest giver allowed. Leave reserve 12.5%.

POINTS TO BE KEPT IN VIEW WHILE PREPARING LOCO PILOT'S LINKS

1. Loco pilot/Crew links are prepared by CPRC/CTLC and got verified from Personnel Branch. Objective of crew links is to ensure optimum utilization of crews.

2. Train timings to be checked from the latest timetable.

3. Links to be prepared before promulgation of new time table.

4. Max. duty hours in anyone trip should not exceed 10 hours.

5. Avg. duty hours in a fortnight should not exceed 104 hours.

6. Min. no. of rests in a month should be 5 of 22 hrs. or 4 of 30 hours including night in bed from 22 hrs. to 6 hrs. from sign off to sign on.

7. Efforts should be made to include all the sections in the link to avoid giving learning road again and again.

8. Min. out of station rest in case less than 8 hrs. duty in the previous trip should be 6 hrs from sign off to sign on. In case duty is 8 hrs or more than 8 hrs, then 8 hrs. rest to be given. In case of short trips of less than or equal to 5 hours then duty performed plus 1 hrs. will be sufficient.

9. Min. home station rest should be

(a) If duty performed in the last trip is less than 8 hrs., then 12 hrs.

(b) If duty is 8 hrs. or more. then 16 hrs.

(c) If staff is required to work train less then stipulated rest then breach of rest allowance is payable to running staff.

10. Link having the maximum earning kilometerage should be worked by senior most loco pilots and so on.

11. Separate links should be prepared for superfast trains such as Rajdhani/Shatabdi Exp. Chronic late running trains should be kept in view to avoid link failures.

POINTS TO BE KEPT IN VIEW WHILE PREPARING LOCOMOTIVE LINKS

1. Loco/Power links are prepared by HQ.'s office and circulated to the divisions. The objective of power links is to ensure optimum utilization of powers.

2. Train timings should be checked from latest time table.

3. Links to be prepared before commencement of new time table.

4. Efforts should be made to send the loco to home shed for servicing within the stipulated schedule time

5. Minimum possible out station halt should be provided.

6. Ensure loco is permitted to run on the sections at the max. permissible speed of the train.

POWER REQUIREMENT (POWER PLAN)

(A)

1. To be prepared once in six months.

2. Avg. No. of trains run on each section per day and Avg. hours on road for last six months duly signed by Sr.DME(P) and Sr.DOM to be prepared.

3. Formula: Section wise average freight POL for the last six months to be calculated as under:

Bare POL = PDD + HOR + PAD

(POL=Power on line ; PDD = Pre departure detention; HOR=Hours on road; PAD=Post arrival detention)

4. 3.5 % further growth and 10% Bunching allowance to be demanded on Bare POL

5. Loco's requirement. for DMT. ART. and other loco' s which remain in outage but not added in POL for the purpose of calculation of average kilometers to be added in the bare requirement.

6. To arrive total POL. last six month average POL of shunting loco link WDS-4, WDS-5 pilots and Mail lie over to be added in the POL calculated above.

7. Mail/Exp./Pass. Loco requirement to be worked out on the basis of loco link. Add 10% for major repair allowance.

8. For shunting services, work out number of points for 8 hours shunting, demand 0.33 POL. Add 1 loco as overlap against 06 loco. Add 10% for major repairs.

9. Kms formula: Total kms earned on the Avg. per day during last six months divided by average loco utilization.

LOCO MAINTENANCE SCHEDULE

(I) & (II) Conventional Locos

Coaching Locos (Railway Board Letter No.92/Elect (TRS)/138/5 Pt. I, dated 18.01.2001 & Railway Board Letter No.9/Elect (TRS)/138/5 Pt.II, dated 21.12.001)

Maintenance schedule	Periodicity	Duration
Trip Inspection(TI)	After 3000 kms or one trip, whichever is later	2 hrs
IA	40 ± 3days.	4hrs
IB	80 ± 3days	6 hrs
IC	120 ± 3days	8 hrs
AOH	12 months ± 15 days	6 days
IOH	36 months ± 1 month or 4(6 lakh for wAP-1/4 loco) lakh kms. whichever is earlier .	9 days
POH	6 years± 3 months or 8 lakh kms. (12 lakh for WP-1/4 loco) whichever is earlier.	28 days

Freight Locos

Railway Board Letter No.92/Elect (TRS)/138/5 Pt. I, dated 18.01.2001)

Maintenance schedule	Periodicity	Duration
Trip Inspection(TI)	15 days (Fitted with TAO TMs) (20 days (fitted with Hitachi TMs)	2 hrs
IA	45± 3 days	4 hrs
IB	90± 3 days	6 hrs
IC	135± 3 days	8 hrs
AOH	18 months ± 10 days	6 working days
IOH	54 months ± 1 monthy or 6 lakh kms whichever is earlier	9 working days
POH	9 years ± 3 months or 12 lakh kms whichever earlier	28 working days

(iii) 3-Ph.ABB Locomotives

(Railway Board Letter No.97/Elect (TRS)/440/18/44 (3Ph, dated 23.02.07)

Coaching Locos (WAP5/WAP7 Locos)

Maintenance schedule	Periodicity	Duration
Trip Inspection	3000 kms or one trip, whichever is later	2 hrs
IA	90 days.	6 hrs
IB	180 days	6 hrs
IC	270 days	8 hrs
MOH	18 months	6 working days
IOH	4.5 years ± 6 months or 12 lakh kms. whichever is earlier	11 working days
POH	9 years± 6 months or 24 lakh kms. whichever is earlier.	28 working days

Freight Locos (WAG9/WAG9H Locos)

Maintenance Schedule	Periodicity	Duration
Trip Inspection	45 days	4 hrs
IA	90 days	6 hrs
IB	180 days	6 hrs
IC	270 days	8 hrs
MOH	18 months	2nd MOH
IOH	6 years ± 6 months or 12 lakh kms. whichever is earlier.	11 working days
POH	12 years ± 6 months or 24 lakh kms. whichever is earlier	28 working days

DIESEL LOCO SCHEDULE & DURATION

Schedule	WDM2	WDM3A/B/C/D	WDM3A/B/C/D (30 days)	WDG3A	WDG3A (30 days)	WDP1/3A	Duration
T-1	15 days	20 days	Trip - 30 days	20 days	Trip-30 days	As per link	4 hrs.
T-2	30 days	40 days		40 days		30 days	6 hrs
M-2	2 Months	2 Months	2 Months	2 Months	2 Months	2 Months	8 hrs
M-4	4 Months	4 Months	4 Months	4 Months	4 Months	4 Months	16 hrs
M-12	12 Months	12 Months	12 Months	12 Months	12 Months	12 Months	4 days
M-24 MOH)	24 Months	24Months	24 Months	24 Months	24 Months	24 Months	16 days
M-48 (IOH)	48 Months	48 Months	48 Months	48 Months	48 Months	48 Months	21 days
M-96 (POH)	96 Months	96 Months	96 Months	96 Months	96 Months	96 Months	30 days

ELECTRIC LOCOMOTIVE FEATURES

S.No.	Description	WAM4	WAP1	WAP4	WAP5	WAP6	WAP7	WAG5 A/B	WAG5 HA/HB	WAG6	WAG7	WAG9	WAG9 H	WCAM1	WCAM2	WCAM3	WCAG1	WCM5	WCG2
1	Supply System-AC(kV)	25	25	25	25	25	25	25	25	25	25	25	25	25/1.5 DC	25/1.5 DC	25/1.5 DC	25/1.5 DC	1.5 DC	1.5 DC
2	Continuous HP	3640	3800	5000	5440	5060	6120	3850	3850	6000	5000	6120	6120	3640/ 2930	4715/ 2916	5000/ 4600	5000/ 4600	4600	4200
3	Max. Speed (kmph)	120	130	140	160	160	130	80	80	120	100	100	90	120	120	105	100	105	80
4	Starting Tractive Effort (Tonnes)	33.8	22.4	32.4	26.29	30.8	32.88	33.5	33.5	46	44	46.89	52	33.84/ 23.2	33.5/ 26.0	40.2/ 26.8	43.5/ 30.0	39.6	35.6
5	Continuous Tractive Effort (Tonnes)	56	13.8	18.8	22.42	19	23.23	20.6	20.6	32	27	33.12	46	16.8/ 22.6	23.8/ 24.6	26.8	31/30	27	30
6	Total Weight	112.8	108.3	112.8	78	113.2	123	118.8	118.8	123	123	123	123	112.8	117	121	128	120	132
7	Braking	D	D	A	A,R	A	A,R	D	D	A	A	A,R	A,R	D	D	D	D	D	D
8	Bogies Arrangment	Co-Co	Co-Co	Co-Co	Bo-Bo	Co-Co	Co-Co	Co-Co	Co-Co	Bo-Bo-Bo	Co-Co	Co-Co	Co-Co	Co-Co	Co-Co	Co-Co	Co-Co	Co-Co	Co-Co
9	Bogies Type	Cast	Cast	Flexi	Fab.	Flexi	Cast	Cast	Cast	Flexi.	Fab.	Fab.	Fab.	Cast	Fab.	Fab.	Fab.	Cast	Cast
10	Gear Ratio	15.62	21.58	23.59	17:35:67	23.58	20.72	17.77/15.62	18.64	16.63/20.75	16.65	15.77/21.107	21.107	16.61/ 21.58	15.62/ 21.58	18.64	16.65	18.64	18.74
11	No. of Traction Motors	6	6	6	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6
12	Traction Motor	TAO659	TAO659	TAO659	6FXA-7059	HS-15250A	6FRA-6068	TAO-659	HS-15250A	ASEA-L3M450-2	HS-15250A	6FRA-6068	6FRA-6068 HT	TAO-659	TAO-659	TAO-659	HS-15250A	HS-15250A	TM 4939 A2
13	Axle Load	18.8	18.05	18.8	19.5	18.9	20.5	19.8	19.8	20.5	20.5	20.5	20.5	18.8	19.5	20.2	21.3	20	22

DETAILS OF BRAKE POWER CERTIFICATE

S.No	Type of train	Validity	Brake Power%		Conditions for invalid BPC & Other instructions
			Originating station	En-route station	
1	Ordinary End to End Rakes Vacuum brake rake, Air braker rake other than Premium	Examination-Loading-Unloading-Examination, ie., one time loading	85-Vacuum brake stock 90-Air brake stock	75	The BPC will become invalid, if - i) No destination mentioned on the BPC of Loaded train ii) Empty rake does not reach loading point within 04 days (for Vacuum brake stock) iii) Train composition is changed by 10FWUs or Four 8 wheeled wagons or more iv) Train is stabled more than 24 hours in examination yard.
2	Premium Air brake Rakes VOXN, BCN, BRN, BOBRN, etc.	12 days for multiple loading, i.e., loading to be done within 12 days +3 days grace period in loaded condition.	Minimum 95	Not mentioned	The BPC will become invalid, if - i) Rake integrity is disturbed by more than Four 8 - wheeled wagons ii) Train is stabled more than 24 hours in examination yard Instructions for Premium End to End rakes: i) After lapse of 12 days, rake to be offered for examination at the first nominated intensive examination point in the direction of movement. ii) After lapse of 15 days, rake either empty or loaded shall be offered for examination at the first exam point in the direction of movement iii) Premium BPC shall be issued from the nominated "A" category depot. iv) Normal End to End BPC shall be issued if the rake is not offered for examination in empty condition or at nominated "A" category exam point. v) After each loading/unloading, the rake shall be subjected to GDR check
3	Close circuit rakes only Air brake stock	Premium CC rake - 7500 kms/35 days whichever is earlier Or 6000 kms/30 days' whichever is earlier (Some railways have CC rakes of 6000 kms/30 days whichever is earlier. C..Rly. does not have such rakes	100	90	The BPC will become invalid, if - i) Rake is not running in nominated circuit. ii) Rake is stabled more than 4 hrs at examination station. iii) Rake has completed either stipulated Kms or days iv) More than 4 wagons are replaed between two Periodical Maintenance Examination ie., PME Instructions for Premium CC rakes: i) Rake shall be offered at its Nominated "A" category base depot ii) Rake shall be formed off POH/ROH wagons only iii) After each loading/unloading, the rake shall be subjected to GDR check iv) BPC shall be revalidated by C&W staff wherever TXR staff is provided v) Wagons to be attached shall be good examined wagons.
4	Container rakes BLCA+BLCB	6000 kms/0 days Circuits - TKD - JNPT-DADRI/TKD-JNPT/TKD/AQ depot run on fre4e circuit basis	100	90	The BPC will become invalid, if - i) Rake has completed either Stipulated Kms or days. ii) Rake is not running in nominated circuit Instructions for Container rakes: i) Rake integrity is to be maintained ii) Revalidation of BPC by TXR staff after every unloading/loading iii) Rake shall be formed from New wagons or Off POH/ROH wagons iv) Utilization of wagons in 6000 kms. Rake - New wagons up to 12 months/Off POH/ROH wagons up to 09 months.

Various Machines used for Track Maintenance

S. No	Type of Track Machines	Purpose of Deployment	Deliverables	Minimum Stipulated Block Period				Maximum Stipulated	
				To & fro time (in*)	Setting & winding up time (in*)	Working time	Total	Output/ Effective hour (new m/c)	Minimum Ty. Speed Restriction, if any.
1	09-3X	Plain Track Tamping	It corrects track geometry i.e. alignment, twist, cross level, longitudinal level and pack ballast under sleepers. This machine can pack three sleepers at a time.	15	10	3:35	4:00	1.6Km	Nil, except in summer with 50 kmph, if not followed by DTS
2	CSM	Plain Track Tamping	DO. But can pack two sleepers at a time.	15	10	3:35	4:00	1.2 Km	do
3	UNO	Plain Track Tamping	DO. Generally deployed at work site. But can pack one sleeper at a time.	15	10	3:35	4:00	0.5km	do
4	DUO (0)	Plain Track Tamping	DO. Generally deployed at work site. But can pack two sleepers at a time	15	10	3:35	4:00	0.8km	do
5	WST	Plain Track Tamping		15	10	3:35	4:00	0.8 km	do
6	BCM	Ballast screening of Plain & Turnout Track	It screens track ballast by removing muck, thus, improve drainage & elasticity of track for safe & comfortable running	30 as 3 m/c go in block	40	2:50	4:00	0.2km	20kmph or 40kmph if DTS+ TTM deployed behind it & stipulated safety instructions followed.
7	FRM	Shoulder Ballast Cleaning	It is used to carry out cleaning of shoulder ballast by removing muck, drainage of track and elasticity improving of ballast bed.	30	30	3:00	4:00	0.4km	Nil, ecxept in summer with 50 kmph if not followed by DTS
8	UNI	Turnout packing	It corrects turnout track geometry i.e. alignment, twist, cross level, 1ongitudinal level and pack ballast under sleepers	15	10	3:35	4:00	1 T/Out	Nil
9	DGS	Consolidation of newly tamped track	It build up lateral resistance & consolidation of track faster and helps to relax speed restriction early	15	10	3:35	4:00	1 km	Nil
10	TRT	Laying of Track	It is a fully mechanized system of complete Track Renewal	40	50	2:30	4:00	O.36km	30kmph or 40 kmph if DGS deployed and ballasting, rail joints are done as per IRPWM
11	PQRS	Laying of Track	It is a semi mechanised system of track renewal wherein pre fabricated rail panels are laid and existing panels removed with minimum labour	25	20	3:15	4:00	0.24km	20kmph
12	T-28	Turnout Replacement Machine	It is a fully mechanised system of complete turnout with minimum manual labour	10	10	2:40	4:00	1Turnout per 4 hour	20 Kmph
13	UIV	Utility Vehicle	It is a mechanized system of transporting heavy material like rail, sleepers, etc, from one station to another in traffic block.	15	10	2:45	4:00	50 rails per hour in one BFR	Nil
14	BRM	Ballast Regulating Machine	It is a mechanized system of track ballast equalization, regulatation and profiling,	20	20	3:20	4:00	2km	Nil

*As per Board's Joint Ciruclar.