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OPERATING MANUAL

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CENTRAL RAILWAY

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महाप्रबंधक
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GENERAL MANAGER



मध्य रेल,
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CENTRAL RAILWAY,
CHHATRAPATI SHIVAJI TERMINUS,
MUMBAI - 400 001.

No. GM/Msg/2010

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MESSAGE

I am pleased to know that Central Railway is going to publish Operating Manual for the first time. The book contains vast information on various aspects of train operation and will provide constant guidelines to the staff concerned.

I am confident that this book will be extremely useful to Sr. Supervisors who have to manage stations/terminals as well as train operation staff as it contains exhaustive information pertaining to train movement.

The basic objective of publishing this Operating Manual is to provide guidance for organizing movement of trains and handling stations/yards, whereas other books and manuals are purely meant for running of trains which is statutory obligations. It is highly recommended as ready reference for the staff in their day to day working.

(B.B. Modgil)
General Manager

सत्यमेव जयते

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PREFACE

This is the latest issue of Operating Manual of the Central Railway. A book of this kind is indispensable for the staff of the Operating Department. I would, therefore, recommend it to all those concerned with the running of trains and hope that this volume will prove as their constant guide, friend and philosopher.

The objective behind the Operating Manual is to provide a ready handbook to officers and staff involved in train operations. The manual contains broad framework of guidelines, which covers various aspects of train operations. Effort has been made to standardize the diverse operating practices over Central Railway.

This manual does not supersede or alter in any way the rules contained in the General & Subsidiary Rule book or other instructions at zonal and divisional levels.

I am extremely thankful to ***Shri R.D.Sindikar***, ex-Principal, ZRTI, BSL (PO, RCT, NGP), ***Shri A.S.Bokade***, ATM (Rules), ***Shri J.D.Wani***, AOM (G) NGP and Transportation Inspectors of HQ & Divisions and Traffic Instructors of ZRTI BSL who have greatly contributed in preparing this manual under the guidance of Shri Mukul Marwah the then CTPM. I am also thankful to ***Shri Kamal Jain***, DyCOM (FOIS) for compiling and giving final shape to this Manual.

Central Railway due to its geographical position acts as a bridge between east & west and north & south of the country. Mainstream of freight traffic running on CR includes Container Traffic to & fro North India and JN Port, Coal for Thermal Power Stations from WCL, SECL & MCL to Power Stations located in Gujrat & Maharashtra, food grain traffic from North India to South India, POL from refinery locations to retailed distribution depots & finished industrial products like Cement, Iron & Steel etc. On the passenger side Central Railway runs one of the largest suburban networks in the world in Mumbai area and also prestigious long distance trains to & fro all parts of the country. Central Railway uses both Diesel & Electric traction and the operations are rendered quite complex due to presence of ghat sections.

I hope all the officials involved with train operations will find this manual useful in day to day working. Suggestions for improving the contents of this Manual are welcome and should be addressed to the 'Chief Operations Manager' or mail to **atmrules@crrailnet.gov.in**

(Satya Prakash)
Chief Operations Manager

May, 2010

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Chapter 1

GENERAL INTRODUCTION TO TRANSPORTATION AND RAILWAY OPERATIONS

Scope of Railway Operations:

The main objective of the Railway Operations is to provide (1) safe (2) efficient (3) speedy and (4) economic transport in general, the word OPERATIONS brings together all the activities required to be undertaken for the working of the Railways. Operations in the stricter sense used on the Indian Railways means (a) Planning, Organizing, Co-ordination ,Directing, Monitoring, Controlling and Supervising the activities connected with the movement and usage of all the rolling stock, viz the engines, coaches, wagons and other vehicles that can be placed on the track and (b) handling the problems, which arise in the course of the movement of the stock and utilization thereof as per the objectives, goals and priorities laid down from time to time. Railway Operations, therefore calls for utmost devotion to duty, management skills and efficiency. Various assets viz. P.Way, S&T facilities etc Traction and Rolling Stock are planned and maintained and replaced by the Technical departments in co-ordination with the Operating Department.

Functions of Operating Department:

Operating Department has an important role to play in Railway Operations through various other departments to provide infrastructure to a great extent in railway transportation. Various assets of the railway are available to operating department for optimum utilization. Operating Department, thus, harnesses the efforts of all departments and optimizes the usage of operational assets. The functions of Operating Department can be categorized as under:-

Planning of Transport service on short term and long term basis.

Running of trains.

Safety in Train Operations.

Economy and Efficiency.

General Principles of Railway Operations:

1. Continuity:

Railway Operations and Transportation should be continuous both in time and space i.e. these should be round the clock in all seasons on an interconnected network, as justified by the transportation need.

The pattern of traffic should be so regulated that the operations do not lead to excessive bottlenecks and congestion due to concentration of work at one restricted time and / or place.

2. Unity of control:

Command and direction should be given by a Central Authority. Since a good transport system is designed to operate continuously as a whole. It can not function efficiently if worked independently in each station or section or zone.

The general directions, priorities and objectives for which the railway system is working should be clear as far as possible. A Central Authority is required to control, direct and co-ordinate the operations on a Division, Railway and between the Railways. On the Indian Railways, the authority is vested in Railway Board. At Zonal level, this authority is exercised by COM on behalf of GM and at Divisional level, it is exercised by Sr. DOM/DOM on behalf of Divisional Railway Manager.

3. Full and efficient utilisation of existing resources:

The optimum utilisation of available resources and carrying capacity is an important aspect of railway operations. Therefore, it is essential to move the maximum volume of traffic with minimum increase in capital expenditure. This is monitored and constantly kept in view while taking short term and long term operating decisions.

The Operating indices are measured, identified and constant endeavor is made to sustain high level of rolling stock utilisation, engine utilisation, staff utilisation, punctuality of trains etc with reference to the targets and trends of past performance and potential.

4. Planned provision of adequate capacity:

Since the pattern of traffic changes due to various reasons, transport bottlenecks are likely to develop. Transport bottlenecks refer to permanent features at some stations, yards, transshipments points, big freight terminals and saturated critical sections of railway. Such bottlenecks prevent efficient carriage and handling of the available and potential traffic offering, even after fully and efficiently utilizing the existing capacity in the normal course. The availability and requirement of additional resources and capacity should be constantly reviewed and planned, provision of adequate capacity of terminals, rolling, stock, repair and maintenance centers and control etc. should be constantly done.

Scope of the Operating Manual:

This Operating Manual attempts to provide basic understanding of the various aspects of Railway Operations and guidelines for safe, efficient and reliable Rail Transport System. Railway Operations being inherently complex and dynamic, no manual on operations can take into account all the situations and requirements of operational efficiency. Therefore, directions given by the Authorised officer of the Head quarters or Divisions or Area or a Station etc. should be carried out. The Manual also does not, in any way, supersede or modify the General and Subsidiary rules, Accident Manual or any other Act, Code or Traffic Book. In case of any conflict in the interpretation of applicability of any aspect the provisions of the Act, G&SR, Accident Manual, Codes, etc, shall prevail.

Chapter 2

WORKING OF STATIONS

Railway Stations, world wide, are located in prime city centers, 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 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 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 Authorized 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 Signaling 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 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, 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, escalator.
- All equipments are in efficient working order. Deficiencies must be promptly rectified or recorded in Petty Repairs Book.
- Safe and efficient working of trains.
- Cabins, Assistant Station Manger's Office, Yards, Goods shed 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 properly maintained and preserved for a minimum period as prescribed later in this chapter.

xviii. At the bigger stations, Health Inspector is in charge of sanitation. The Station Manger shall conduct daily inspections and bring out the deficiencies. He shall conduct daily inspections of waiting rooms, bath rooms, lavatories, refreshment rooms and catering trolleys, 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, spare 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, treasures etc.

xxi. Whenever special trains are arranged to run from his station, he shall ensure that stock of 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 is relieved in time for their Periodical Medical Examination/Competency/Safety camp and special competency programme. No one, overdue PME/Competency shall be allowed to perform his normal duties.

II. Deputy Station Manager (Outdoor)

i. The Deputy Station Manager shall be responsible for general up-keeping 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 informations 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 the 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 of 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 Manger, 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 SM in his absence.

III. Cabin ASM

i. He shall handle the block instrument himself when on duty and shall not permit any unauthorised person to manipulate or handle the block panel/block instrument & block telephone.
ii. He shall keep the Station Manager's control keys of 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 up to 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 and procedures.
v. He shall inform the ESM/MSM through a written message, any failure of S&T gears 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 up to 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 /obtained line clear to Panel ASM.

IV. Panel ASM / Panel Operator

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 unauthorised 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 trains 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 Engineering 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 compete rest and shall not perform his duty under the influence of drugs or intoxicants.
xiii. He shall keep his reference books up to 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 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 number.
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 / Shunting master

i. He shall obey all lawful orders of the ASM on duty or official in-change 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 shunting if vehicles are 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 interlock 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 SM to ascertain the clearance of line.

xiii. He shall be responsible for lighting up 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 clearing and oiling the burners and trimming wicks during day time under the supervision of Station Manager/Deputy Station Manager.

VI. Gateman

1. He shall be responsible for proper operation of the gate as per SWRs for the passage of trains.
2. He shall ensure that no train suffers any detention on account of late closing of the gate.
3. He shall keep the channels of check-rails clean and shall clean the road within the railway limits and water the area regularly.
4. 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 lighted properly and kept burning continuously from sunset to sunrise.
5. He shall keep the surroundings of his gate lodge clean, tidy and neatly planted with shrubs, plants etc.
6. He shall remain alert on duty till properly relieved. If he is required to leave the gate in an emergency, he shall close and lock the gate booms against the road traffic before leaving the gate.
7. He shall ensure that the equipment at the level crossing are complete and in working orders.
8. He shall produce the public complaint book when required by public for lodging complaint and to the railway officials for inspection.
9. He shall ensure that road traffic is not necessarily held up at the gate.
10. 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.
11. He shall be polite and courteous in his behavior towards the public.
12. He shall report any defect in the gate to the ASM on duty without delay.
13. He shall close the gate on sighting a train or when ordered by the ASM on panel duty.
14. He shall attract the attention of the Loco pilots and Guards by shouting and gesticulating instead of showing danger signal in case of train parting.
15. He shall obey all lawful orders of the SM on duty.
16. In case of an 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 (Roster) must be displayed at each station.

2. The staff shall handover charge at the end of the hours of duty as prescribed at the station/yard only when properly relieved. Such duty hours shall not be exchanged without the permission of Station Master.
3. **Daily mustering of staff**: The Station Master or the person authorized 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. Possess 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 pick up period is generally laid down by the DRM . However, the following guidelines can be observed on the first posting or when there is a 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 and Road side stations ('B' Class) - 3 days
   e. Road side stations ('C' Class) - 2 days

   If employee fails to give declaration in fixed period, he must be directed for refresher training at his expenses.

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, the pickup 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 number of each member of the staff employee at his station.
2. A separate register containing list of all shop keepers, licensed vendors, licensed coolies, licensed contractors coolies or any other persons working at station other than railway employees must be maintained along with the up to date address and telephone numbers, 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 identify 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 list of staff employed at station.
8. Extract of Railways Act (24 of 1989) and Payment of Wages Act.
9. A list of nearest Doctors and Hospitals with telephone numbers.
10. Rules for the occupations of Rest houses and Rest rooms.
11. A list of home addresses with telephone numbers of staff in Station Masters' Office.
12. List of persons with telephone numbers 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 group of staff.

The Station Manager must be careful to see that outdated time tables and notices are removed and replaced with current ones. He should also ensure that the telephone numbers are updated from time to time.

Exhibition of Public Advertisements

1. Public advertisements in the form of Boards, Posters, Show cases, 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 advertisements exhibited at the station in the prescribed form.
2. The 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 Division Railway Manager concerned has been obtained.

Rule Books, Manuals etc at Stations

1. The Station Master is personally responsible to see that the Rule books are kept up to date and are available to station staff for reference (G&SR 2.01, 5.02 & 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 purposed other than those for which they are printed and supplied.

3. Station Masters are responsible for general accuracy of all periodical returns and for the 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 unauthorized 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.

Operating registers maintained at stations are as follows:

1. SWR Register
2. Bio-Data Register
3. Counseling Register
4. Officer's Inspection Register
5. Inspector's Inspection Register
6. Weather Warning Register
7. S&T Failure Register
8. Caution Order Register-Up And Down
9. S&T Failure Message Book
10. Fog Signal Register
11. Accident Register
12. K-Oil Register
13. Caution Order Message Book
14. Safety Meeting Register
15. Disconnection And Reconnection Register
16. X'over Road Utilisation Register
17. X'over Road Testing Register
18. S.N.I. Register
19. Relay room/Double Locking Register
20. Joint Point Xing Register
21. Abnormal Working Register
22. Stable Load And Clearing Register
23. Wagon Exchange Register
24. Skid Register
25. Sick Wagon Register

Books and Notices at level crossing gate

The following books and notices are maintained at level crossing gate provided with gated lodge. Where gate lodges are not provided the book shall be maintained at 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 Compliant Book.
3. Vision Test and Competency Certificate of the Gateman. (See SR 16.01 – 1)
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 the members of the staff concerned. In case of group 'D' moderately literate staff, the Station Master must record that circular etc have been correctly explained.

Instructions for Guards

Instructions for Guards issued from time to time must be kept in one file at Guard's 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 letter Register showing the dates and letter number of reply with a copy placed in a file.
3. Station Masters are responsible for the accuracy of the information contained in all out going 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 dispatched.
5. Every outward letter must be numbered, dated and must also bear reference number 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 the 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 there 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.

10. SM is responsible for correspondence pertaining to the station working, staff matters and other subjects with the Division / HQ office. He is also responsible to maintain necessary files department-wise for inward / outward correspondence.
11. He is responsible to send the Traffic and commercial returns to the office concerned within the stipulated period which is decided by the competent authority.
12. ASM / Dy. SM must assist the in-charge in this regard.
13. Record of station correspondence shall be preserved for the period as fixed by DRM.
14. The competent authority will fix the train number by which letter, returns, other documents which will be sent from station to Division / HQ office or vice-versa.
15. The Guard of the train / courier (if any) who is deputed for this purpose is responsible to collect the letters, documents, returns and handover to the agency which is decided by DRM.

Playing of Bands and Presentation of Guards of Honour etc on Station Platform.

Playing of Bands and Presentation of Guards of Honour etc on 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 authorized by the 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 Master 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.	Description of Book/Form	Period of Preservation from the date of completion
1	Train passing Registers/Books/Forms	1 Year
2	Muster Roll	Permanent Record
3	Caution Order Register & Caution Order Books	1Year
4	Wagon Exchange Book/Wagon Exchange Register	3Year
5	Sick Wagon & Transshipment Register	3Year
6	Guards Signature Book	3Year
7	Wagon Demand/Priority Register	3Year
8	Indent and Loading Register	3Year
9	Wagon Transfer Register	3Year
10	Damaged Stock Register/Sick Wagon Register	3Year

S. No.	Description of Book/Form	Period of Preservation from the date of completion
11	Siding Voucher Book/Record of Time Wagon Handling over	3Year
12	Control Order book/Conference book	3Year
13	Headquarter Leaving Permission Register	1Year
14	Uniform Register	Permanent Record
15	Record of Station Equipment sent for repairs	Permanent Record
16	Register of outward and inward letters	3 Years
17	Register of important Circulars	Permanent Record
18	Station Order Book	Permanent Record
19	Station Inspection Register	Permanent Record
20	Transportation Bio-data Register of Home Addresses of staff etc.	Permanent Record
21	Spectacles Register	1 year
22	Station Diary and charge Book	1 year
23	Unconnected Wagon Register	3 year
24	Load Report Register	3 year
25	Register showing Analysis of late starts to Goods Trains at important yards	3 years
26	Watering Register	3 years
27	Summary of Daily receipt and dispatch of wagons and work done	Local orders to be issued by DRM
28	Special Stock Register	Local orders to be issued by DRM
29	Determination to Wagon at Train Marshalling stations	Local orders to be issued by DRM
30	Register of occupation of reception lines	3 years
31	Detention to trains outside signals and at adjacent stations	3 years
32	Marshalling Register for inward and Outward trains	Local orders to be issued by DRM
33	Register showing detained Arrival, Placement, Dispatch and Detention particulars of PU, Repack wagons, etc.	Local orders to be issued by DRM
34	Register of Long Distance Goods train run.	Local orders to be issued by DRM
35	Guard's and Assistant Guard Arrival Register	3 years
36	Register showing detention to wagons at Break of gauge Transshipment point.	3 years
37	Number Taker Book	3 years
38	Yard wagon Balance Register	1 years
39	Guard's Duty Register	3 years
40	Guard's Rough Journal	3 years
41	Register of Train Advices	6 months
42	Form of Train Examination Advices	1 years
43	Register showing load of Goods trains and Goods trains run under load.	3 years
44	Statement of running of Passenger Trains.	3 years
45	Diary of Yard Supervisors.	Permanent Record
46	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 and some can be eliminated.

Testing of Crank Handle by SM/ASMs:

In order to ensure that the Crank Handle operation of electrical point machine can be resorted to in case of emergency, periodical drill of extraction of the Crank Handle from the interlocked key box and its operation should be regularly undertaken.
The following instructions should be noted for immediate compliance.

1) The station staff should be fully conversant with the Station Working Rules regarding the method of extraction of the Crank Handle from the interlocked key box.
2) Crank Handle testing must be carried out by each and every SM/ASM once a month along with S&T staff and Pointsman during day shift regularly, so that they are used to operate the same in case of emergency.
   A proper record of such tests should be maintained at stations.
3) Surprise checks by supervisors of Operating and Signaling departments should be carried out to ensure that the testing of Crank Handle is done regularly.

   (Ref: CSTE & CTPM's joint instructions issued vide letter No. TR/Policy/136 dated 15.03.2005)

Testing of Emergency Cross Over:

In order to ensure that the emergency cross-overs work satisfactorily, when needed, it is essential that the working of each cross-overs is regularly tested.
The following instructions should be noted for immediate comply.

1) (a) Emergency cross-over should be tested by station staff by operating them once a day during daytime in presence of S&T staff unless they are available at station.
   (b) Emergency cross-over should be tested by station staff by operating them once a day during daytime seeing the position of train running where S&T staff are not available.
   (c) Private numbers must be exchanged where points are operated by end cabin, while testing the Emergency cross-over.
2) If any defect is noticed while testing, Maintenance S&T staff should be advised immediately for its rectification.
3) The Maintenance S&T staff should jointly test the Emergency cross-over with station staff during their maintenance round.
4) Proper record should be kept in a separate register regarding the testing of Emergency cross over.

Surprise checks by supervisors of Operating and Signaling departments should be carried out to ensure that the testing of Emergency Cross Over is done regularly.
(Ref: CSTE & CTPM's joint instructions issued vide letter No. TR/Policy/136 dated 10.03.2005)

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Chapter 3

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 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 authority shall sign a certificate of safety test including duration of its validity.

Classification of trains:

Trains are either scheduled as shown 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.
(d) Parcel trains of carriage of coaching traffic only.
(e) Goods trains for movement of conventional freight cargo.
(f) Container trains.
(g) Mixed trains carrying both passenger and freight.
(h) 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 special
(d) Accident Relief Trains (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 Controller in conjunction with the Power Control 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 requirement 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 brake respond to brake application. In case of a failure, he will report to the control and bring his train to a stop as directed by the Control. The train should move only after the defect has been rectified.

Road Learning for Guards

Need for re-acquainting himself with the working in a section by a Guard:–
Guard shall acquaint himself by undertaking following number of trips as road learning in case he has not worked in the section for periods shown against each –

No. of trips of Road learning

During Day	During Night	Period of absence
2	1	over 1 year
1	1	over 3 months

Note: In case of Ghat sections and sections with automatic signaling, Guard may request for a maximum of three trips more than stipulated.

A Guard shall acquaint himself with the system of working, location of signals and other local conditions affecting the running of trains on a section or sections of the railway over which he is to work and if he is not so acquainted with any portion of the railway over which he is to work, obtain the services of a qualified railway servant who is conversant with it to assist him.

Working of trains during thick and foggy weather:

With the Onset of winter season, the following instructions are issued for strict compliance:-

1) All concerned staff should be counseled on precaution in thick and foggy weather.
2) Adequacy of trained staff and detonators should be ensured.
3) Proper focusing and lighting of signals should be done.
4) Availability of visibility test object should be ensured as per SWR.
5) Repainting of Engineering, S&T, OHE, indicators, VTO & boards should be done to improve visibility.
6) Cold weather patrolling on LWR / CWR / should be closely Monitored.
7) Line marking across the track at sighting boards should be done.
8) Precaution should be taken for prevention of Rail / Weld failure.

Duties of Station Master:-

i. If visibility is impaired, treat (B) class station as (A) class & grant line clear as per provision of SR 8.03-1.
ii. Place detonators to warn the driver of an approaching train as per provisions of G&SR rule No. 3.61.
iii. No shunting should be carried out; on non isolated lines in yard, after granting line clear.
iv. The train waiting for line clear should not be drawn ahead beyond starter signal as laid down in GR 5.18
v. Advise SM of station at advance and SCOR to stop the train if train passed without tail lamp / tail board.
vi. The block section in rear should not be clear back till the assurance of intact train not received.

vii. Fixed signal should be put back to ON position to stop the train from opposite direction.
viii. Caution Order should be issued to the driver and Guard of train to proceed cautiously and stop short of any obstruction.

Note: - In case of tail lamp extinguished, but the lamp is clearly visible to station staff; block section will be cleared back.

Duties of fog signal man:-

i. Fog signal man with sufficient number of detonators will proceed at the distance of 275 Meters beyond outer most signal and will place two detonators about 10 meters about.
ii. Fog signal man with lighted hand signal lamp will stay at a distance about 45 meters beyond the second detonators placed in the direction of approaching train.
iii. After the passage of each train over the detonating signals, the fog signal man shall immediately replace them by two fresh detonators.
iv. The fog signal man must see that the signal taken 'OFF' for the passage of train have been put back to 'ON'. If after 5 minutes, the signal have not returned to normal position, fog signal man must leave two detonators already placed on the rail and will inform the cabin staff or ASM concerned if there is no cabin.

Duties of Driver and Guard:-

i. Ensured maximum speed restriction of 60 KMPH in Absolute Block System & 30 KMPH in Automatic Block System, depending on severity of fog.
ii. Ensure proper focusing of flasher light, headlight and marker light of locomotive.
iii. Ensure prescribed personal store and loco equipment are available.
iv. Take appropriate action when a flasher light of an approaching train is seen. Make use of flasher light as and when required.
v. Use the whistle frequently while approaching level crossing, curve, cutting, tunnel and engineering work site.
vi. Ensure protection of train as and when required.
vii. Observe all Caution Order strictly.

Working of Trains on lines, not opened for traffic

Whenever new lines are opened for traffic or any existing line has to undergo for major changes viz. yard remodeling in connection with engineering or / and S&T works etc. the said works are being put up to CRS for his prior approval and opened for traffic only when it is commissioned by CRS after his inspection if he desires so or otherwise.

All the train operations on the open line are subject to the provisions laid down in G&SR, BWM and other instructions issued by the competent authority.

It is obvious that during change over period or during the progress of construction work of new lines, G.C.Work, doubling work, change of train working system etc. the engineering, S&T and even electrical departments have to enter into the section under construction by train or by means of locomotive, Track Machines, Material trains, PQRS machines, Motor trollies etc. for their day to day activities. It is also of much importance that the CRS special and other inspection carriages were also required to run in these sections prior to its opening for the public carriage.

As the G&SR is not specifically explaining the train working procedure in such cases and is for "all open lines of Railways", the following guide lines are issued to staff at ground level to ensure the safe working of trains during the movement of trains/vehicles/machines/ trollies from & to the station opened for traffic to the line under construction.

A. General instructions:

1) No train/ vehicle/ machine/ motor trolly will enter into that block section/section without the prior permission of the Station Master concerned.
2) Official in-charge of the work, will give a request well in advance to the SM on duty to accord permission to work/enter in to the section. The requisition will include the following:
   - i) Place, date, time the request put up
   - ii) Place, date, time the request accepted
   - iii) Place, date, time the request permitted
   - iv) Expected time of return to the station.
   - v) Private No. exchanged between SM/SMs, SCOR, PWI/CSI etc.
   - vi) Points coming en-route in the train movement.
   - vii) Location of the level crossing gates in the section.
   - viii) Location of the tunnels, cuttings, bridges, ROBs, RUBs etc. in the section.
   - ix) Locations of the flag stations, block stations, IBH/IBS etc. in the section.
   - x) Location where mass labour work is in progress which require cautious driving.
   - xi) Locations where road vehicles are plying near to the track.
   - xii) Any other information which required to be brought into the notice of station staff as well as train crew.
3) Official in-charge shall also issue the following along with the requisition:
   - i) Track safe certificate for the section from / to Kilometers with S.R. if any
   - ii) Clearance certificate for the section for the confirmation that no vehicles/ obstruction is occurring in the section.
   - iii) Maximum permissible speed of the section.
   - iv) Confirmation to the proper setting of points in the required position with clamps and padlocks.

v) Details of cautious driving required.
vi) Any other information if found necessary.

B. Dispatch of trains:

1) On compliance of the above, SM on duty will:
   i) Obtain the permission of SCOR on duty.
   ii) Arrange to set the points in the required position, clamp and padlock the same, if required.
   iii) Issue the following to the driver of the train-
      a) Manually prepared authority to pass the L.S.S. in ON position with ref. to official in-charge's message number, SCOR's message No., P.No. received from the SM at the other end of the section with place, date and time of issue.
      b) Caution order in detail including the MPS.
      c) Assurance for the setting of points in the section (if any).
      d) Location of L.C. gates (manned & unmanned).
      e) Other locations which require special attention.
      f) Expected time of return.

All the above information shall be issued to the driver under receipt of acknowledgment. Proper record of train movements will be maintained in the Train Signal Register for record purposes.

2) SM on duty ensures that:
   i) Block Working will not be adhered to.
   ii) Last Stop Signal will not be taken off, however Starter signals, Home signals & Calling on signals can be taken off (if operative).
   iii) Private numbers will not be utilized for train passing duties.
   iv) No train passing authorities will be issued to train crew.

C) Reception of the train:

1) After completion of the work, when the train returns to the station, driver of the train will bring his train to a stop at the foot of the Home signal or at the outer most facing point whichever comes first and will whistle continuously to alert the SM on duty
2) After noticing that the train has come to a stop at the home signal/ outer most facing point, SM on duty will:-
   i) Advise the SCOR on duty and with his prior permission, arrange to receive the train on the nominated line on proper signals if operative.
   ii) If the signals are not operative, he will depute a points man at the foot of the Home signal and required number of Points man at frequent intervals to exchange alright signals with each other.
   iii) Arrange to set the points to the nominated line in required position, set, clamp and padlock and depute a points man at the first facing point to exchange alright signal with the train crew and points man at the foot of the home signal.

iv) On receipt of the alright signal from the Points man at the foot of the home signal, driver of the train will proceed to the station at a speed not exceeding 15 KMPH.

v) All the authorities issued to the driver of the train will be returned to the SM on duty and will be kept in a separate register maintained for the purpose.

vi) Arrival of the train will be recorded in the Train Signal Register for record purposes.

Note: If the work is to be continued for a prolonged period or if the movements are to be carried out for a number of trains, necessary action should be taken to issue 'Temporary Working Instructions' or 'Special Instructions' approved by COM or 'Approved Special Instructions'

Working of trains in Ghat sections

On Central Railway, Mumbai division has ghat section between KSRA-IGP & KJT-LNL with ruling gradient of 1 in 37 and Nagpur division between DHQ-MJY(gradient 1 in 60) & TEO-CCD (gradient of 1 in 70).

The detailed instructions on train operation will be incorporated in the SWR of the concerned stations and also in the working time table.

Following precautions to be taken while working trains in the ghat sections:-

1. The marshalling of the trains running in the ghat section must be as per rules.
2. On goods train the loaded wagon should be attached next to engine and empty behind it.
3. Trains running on ghat section should not exceed the authorized load.
4. Only ghat trained drivers should work in ghat section.
5. Drivers should test the efficiency of brake power before entering the ghat section.
6. Trains should be fully on automatic brake (vacuum/air pressure) system.
7. Trains should not exceed the prescribed speed mentioned in the working time table as permanent speed.
8. In the event of stopping of train in ghat section for more than 10 minutes or failure of automatic brake the train must be brought to a stop and secured applying hand brakes and wooden wedges.
9. On the ghat sections, locomotives must not be detached from trains between stations.
10. Lorries are not permitted to work in ghat sections.

Catch sidings are provided in the ghat sections where it is mandatory to stop every train to prevent from rolling down and unusual. Slip sidings are also provided to protect the block section in rear in the event of rolling down / unusual of trains / vehicles.

To avoid stopping of trains at catch sidings, speed sensing devices are provided at Khandala on BB division and at Dharakhoh, Ghudankhapa & Teegaon on NGP division.

Dedicated banking engines and trained ghat drivers are also provided at Karjat & Kasara on BB division and at Dharakhoh and Teegaon on NGP division.

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Chapter 4

COACHING OPERATIONS

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 marshaled in the middle of the train or as near to it as possible and ladies compartment will be near Guard's SLR.

ii) Non-passenger carrying stock shall preferably be marshaled 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.

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 SLR should be marshalled in the same way as in the case of Mail/ Express trains.

(b) Marshalling 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. (Also refer SR 4.23 – 4)

(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 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 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:

1. Sectional / through service coaches, if they are anti-telescopic or steel-bodied, may be marshaled as operationally convenient. However, wherever feasible, they should be marshaled inside the SLR, LR, and VP etc.
2. Sectional / through service coaches, other than anti-telescopic/steel-bodied, should be treated like other passenger coaches in the train formation and should, therefore, be marshaled inside the required number of anti telescopic/steel bodied coaches.
3. While determining the position of marshalling of sectional through service coaches, the fact that these coaches will be attached/detached en route, leaving the train service coaches exposed as outermost, should be borne in mind and therefore, the marshalling order of sectional / through service coaches and train service coaches decided in accordance with the instructions contained in Para (a) to (e) above.

(g) 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 authorisation 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 Brake van:
Vehicles outside the rear Brake van can be attached in accordance with the provision of the following SRs:
Attaching of vehicles in rear of Brake van in fully vacuum train.
Attaching of power plant bogies.
Attaching of damaged vehicles.

Marshalling Chart for Passenger/Mixed/Goods Trains:

S. N.	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 &
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 under-gear equipment can be attached only in freight trains.

II. Attaching/hauling of dead locomotives by Mall/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
iii) 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 under-gear 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.

Rake Link:

The overall high-level plan for rake movements is described in a rake link booklet issued for official use only by a Zonal railway, which has details of the planned rake links, composition, marshalling order, permissible loads and accommodation in Mail / Express & Passenger trains handled by the Zone.

The schedule of the train is drawn by the respective Zonal Railway so as to run to the maximum before taken for the regular maintenance. This is published through a booklet by COM and CPTM. The rake link is drawn up keeping in mind asset utilization and maintenance schedules for the stock. The day-to-day operational schedules are then drawn up with this as the basis and used by the operational staff / marshalling yard staff. The rake link is also used by the reservation staff to determine the sizes and distribution of reserved accommodation quotas.

At each station based on the train schedules, a platform and siding occupancy chart is drawn up. This provides, for each day of the week, an indication of which platforms and sidings are occupied by which trains at what times. Introducing a new train at a station (originating or passing through) involves finding an appropriate slot in this chart.

The overall scheduling, traffic planning, and operational aspects of a division are under the control of the Sr. DOM of a division who is ultimately responsible for the performance of the division in terms of punctuality, efficiency etc.

FOIS and COIS help manage the movements, schedules and punctuality of freight and coaching stock respectively in a better way. The FOIS and COIS networks include many 'ARCs' (Activity Reporting Centre) such as goods sheds, sidings, transshipment points, interchange points, wagon repair workshops, C&W locomotive sheds, fuel stations, crew

change locations, stations, and locomotive workshops. Data from all of these ARCs is incorporated into the system

Rake sharing:

Almost all trains, except special short distance trains, share rakes, for better utilization of the rolling stock, and also to reduce the pressure on stabling sheds which may not have facilities to stable or store many rakes for very long. Two-way rake sharing is very common, where a rake is used for one train and then immediately used for another train going back towards the rake's point of origin, so that the same rake is later available for first train's service on another day.

Sometimes rakes are shared between a pair of trains that do not have the same two endpoints. Often the station that is the point of origin or termination of a train owns the rake for that train, but it is not always so. A rake may also work a service outside its owning railway's jurisdiction.

Trains which are not very frequent (weekly or bi-weekly) will often not share their rakes with any other trains. Trains that cover more than about 2000 km usually have dedicated rakes, because primary maintenance on coaching stock is usually done after every 2500 km.

Rake link has the details of which trains share rakes with which other trains, how and when rakes need to be formed or split up, and many other details as under:

- Composition
- Marshalling order
- Vacuum or air brake
- Permissible load
- Train watering
- Postal accommodation
- Sanction runs
- Locomotive allotment
- Maintenance stations
- Lie-over periods
- Distance in Km. earned in a round trip

Instructions for sending sick / defective coaches / coaches due for POH to shops

Advantages of Rake Links:

1. More service to the required/needy area.
2. Idling hours of coaches reduced before or after the maintenance schedule.
3. Coaching yard congestion is reduced
4. Utilisation of coaches increases.
5. More Passenger throughput thereby more revenue to railways.
6. More availability of platforms, pit lines and maintenance lines.

Factors to be taken into account while chalking out the rake links:

a) Schedule of Train.
b) Time and station where primary and secondary maintenance of rakes are undertaken.
c) Time for shunting placements and removal of coaches at various checking points.
d) Optimum utilisation of coaching stock.

Number of rakes required for a link = The turn round of the link in days.

General Instructions:

1. In order to provide the allotted accommodation on various trains, it is imperative that the different types of coaches earmarked to run on set rakes operating on Mail, Express and Passenger trains are invariably kept intact.
2. Should it become absolutely necessary to detach a coach from a set rake due to sick marking or any other valid operational reason, it should be ensured that the same is replaced on the relevant set rake on the next trip.
3. All concerned will ensure that the authorised composition of all trains is constantly watched and deviation should be rectified at the earliest opportunity. Supervisory officials will also concentrate on proper upkeep of coaches by checking up fittings, equipment, etc frequently.

TIME TABLES – INTRODUCTION:

Time table is a schedule in a table form, showing details of arrivals and departures at every station of all trains carrying passengers. These time tables are issued by every zonal railway, generally every six months. However, with effect from 1st July 1991, new time table is issued once a year in July only. On Indian Railways there is another time table, "Trains at a Glance", which is issued by the Railway Board and carries stoppages of important trains at important stations only all over the Indian Railways, as against the Zonal Time Table which indicates stoppages of all scheduled trains at every station on the railways. The objectives of passenger time table are as under:

1. information for intending passengers regarding
    i. schedules of arrivals and departures;
    ii. through sectional and suburban trains;
    iii. connections at various stations;
    iv. and the amenities and facilities available to the passengers at stations;
2. a guide to the railway staff
    i. in arranging trains crossings, precedence,
    ii. receipt and dispatch at terminals, and
    iii. provision of motive power, crew, maintenance and other facilities;
3. a guide to postal services for transmission of mail;
4. a data base for calculating the requirements of rolling stock; locomotives and running staff;
5. To satisfy statutory requirements. Section 65 of the Indian Railway Act lays down that railways must exhibit time tables for the guidance of the public.

The origin of Railway time table is very interesting. Railways in Great Britain, where the railways started first, were hesitant to issue time tables and advertised fixed schedules of trains they were running. With the teething problems galore, they were not sure whether they would be able to live up the commitments after they tell the public fixed schedules of their trains. At that time, one Mr. Bradshaw used to sell maps. In order to increase his sales of maps, he also started publishing schedules of the trains which could take people to the places of which he used to sell maps. Railway companies consented to his publishing the time tables as it did not involve any commitment on their part. Soon, however, they realised the usefulness of advertisements of the fixed timings as their clientele went up and the companies started issuing the time tables themselves. With the passage of time, teething problems were also taken care of. Today, there is statutory obligation in some of the countries, for the Railway companies to publish their schedules. Indian Railways are required to do so under Section 49 of Indian Railways Act, 1989.

TYPES OF TIME TABLES: Time Tables can be divided into two categories:

(1) For passengers

(a) **Zonal Time Table and Guide** - This time table is published annually by each of the zonal railways. In addition to the train timings, there is additional information which is useful for the passengers. This mainly relates to rules regarding reservation, refunds, and cancellations of confirmed booking, fare tables and other facilities which Railway administrations provide for the convenience of passengers. Copies of these time tables are available for sale at the booking offices and book stalls.

(b) **Trains at a Glance** - This is an abstract form of time table for all Indian Railways. Important trains are shown with time of arrivals and departures at important stations right from the originating station to the terminating station in one table only. Users have, therefore, not to refer to a number of tables to find out the schedule of a particular train. Main points of information for passengers are also given.

(c) **Military Time Table** - This time table is not made available for general public. Defence is one of very big users of rail infrastructure and a number of special trains for Defence are run by Railways. In order that these trains can be run at short notice, we have detailed timings of such trains worked out, which are also revised along with revision in the public time tables from time to time. These timings are kept secret.

(2) For Railway staff

(a) **Staff copy of public time table** - Train timings portion of zonal time table, without the additional pages for guidance of passengers and advertisements, is bound and copies given to staff dealing with passengers for their guidance.

(b) **Working Time Table** - Large amount of information is required to be conveyed to the railway staff connected with running of trains and maintenance of the infrastructure on the railways. They must not only know the timings of the trains but also a lot of information about the track, signals and other facilities and this information is conveyed to the staff through the working time tables. These time tables are printed division wise, separately for passenger and goods trains. It is desirable for all railway officers to familiarize themselves with these time tables.

(c) **Graphic Time Tables** - These time tables are in the graph form and are prepared for the guidance of the Control staff. These time tables are prepared section wise, indicating over a graph not only Mail, Express and Passenger trains, but also Goods trains that can be run during 24 hours. These are also called 'Master Charts'. These are generally displayed in the front of the Section Controllers in their cabins, so that they can constantly relate actual running of trains to the fixed schedules laid down in the time tables.

FACTORS INFLUENCING FRAMING OF TIME TABLES: As seen earlier, time tables are for the benefit of users as well as railways. Factors that influence framing of a time table can also be broadly classified into two categories:

(1) Users Requirement

(a) **Departure and arrivals** - Train journeys in India are generally long and take a lot of time. It is convenient to the passengers to leave originating station in the evening and arrive at the destination in the morning so that they are able to perform the journey without wasting any working time during the day. No wonder, most of the trains from the major cities leave in the evening and arrive in the morning. Passengers performing journeys to and from important stations enroute also like the trains to arrive at convenient timings and not in the middle of the night. All this is always not possible to accommodate, but efforts are made by Railways to adjust timings in such a manner that this requirement of passengers is kept in mind. With the increase in the number of trains, staggering of departures and arrivals become unavoidable, otherwise a lot of additional capacity would be required at the terminals and sections to deal with large number of trains in the evenings and mornings. This would also lead to idling of assets for bulk of the time as no trains would be scheduled to leave or arrive around mid day or mid night. Trains should touch important cities and junctions at convenient time.

(b) **Connections at junctions** - Railway trains run between selected pair of stations. Large numbers of passengers travel to stations which are not served by direct trains. They have, therefore, to change trains at junction stations. It is, therefore, the requirement of the passengers that the connecting trains should leave the connecting junction station as soon after the arrival of the first train as possible, so that they are not required to waste a lot of time waiting for the next train. It is also necessary that such connections are not so very tight that the passengers miss the previous train. Railways have, therefore, to design their time tables in such a manner that passengers are reasonably assured to connection within about an hour or two of the arrival of the previous train. At certain junctions, staff are authorised to detain connecting trains up to a limit if an earlier train is running late.

(c) **Halts for meals, etc**. - Since railway passengers have to travel long distances and all trains are not equipped with catering facilities, halts at meal timings are provided at stations having facilities for meals, refreshments. These halts are long enough to buy their requirements from the platform.

(d) **Overall speed** - Whatever the requirement of passengers' enroute, every long distance passenger desires to complete his journey as early as possible. There is, therefore, need to provide fast, long distance trains to cut down journey time of bulk of

the passengers. Railways have, therefore, introduced a large number of super fast trains during the last decade or so.

(e) **Range of travel distance** - From the view point of travel distance, railway passengers can be classified into three categories:

i. **Short distance** - This category of passengers travel between major industrial commercial centres or capital/district cities and town or villages around such major cities. This group of passengers generally live in surrounding town and villages and commute to the city centre/industrial centres for employment regularly. The travel distance is generally up to about 80 kilometers. In very rare cases, people travel on regular basis for more than 80 kilometers also. These passengers like to reach the cities in the morning hours to be able to attend offices/factories and want to go back as early as possible after the office is closed so as to arrive at their residence in the evening. These passengers generally travel in groups as they belong to the same place and travel together regularly. Their livelihood is dependent on punctual running of trains. They are very vociferous and do not tolerate changes which do not suit them. At locations where industries work in shifts, there is traffic around such locations both ways. It is, therefore, essential for the Railways to provide stoppages for passenger trains for the category of passengers at convenient timings. At a few places, even long distance trains are provided halts to enable these passengers to reach their work centres in time.

ii. **Medium distance** - In this group are included passengers whose range of travel falls between 80 to 300 kilometers. Some of these passengers travel between two important cities and prefer to have over night trains. Alternatively, they use long distance trains which are fast, but finding accommodation on such long distance trains may be a bit difficult. A large number of passengers in this group are those who work in major cities and have roots in places where they are not able to go back every day. They stay at the place of their work and visit their native place frequently, say once or twice a month. Another section of this group are those passengers who travel mainly on social or business occasion from one village/town to another. They require at least one train a day in each direction so that they can travel conveniently.

iii. **Long distance** - These passengers prefer fast trains with increased level of comfort. They require trains which do not have many stops enroute and are able to cover the entire journey in as short a time as possible.

(2) Operator's Requirement

This has to be kept in mind that the trains are run for the use of passengers and their basic requirements are supreme. Railways make efforts to ensure that they are able to cater to all reasonable requirements of the users. There are, however, certain departmental requirements which influence framing of time table. These can broadly be classified into the following categories:

(a) Infra structural requirements - While continuous exercises to augment infra structural facilities available for running of trains continue, these do act as a constraint to introduction of more number of trains as well as timings when trains can be scheduled. Terminal facilities like platforms, stabling lines, examination lines and repair facilities at

the passenger terminals influence not only introduction of additional trains, but also timings of the trains. As there is only a certain number of trains which can be attended to during a given time, departures and arrivals of the trains have to be so spaced as to permit handling at the terminals depending upon the layout at the terminals. Simultaneous departure of one train and reception of another train may also not be possible. While framing time table, therefore, an interval between the two operations would be required.
Availability of coaches and locomotives is another factor which influences scheduling of trains. Since these are costly assets, proper use of them has to be maintained.
Railway line also has a capacity which is provided based on certain requirements. This limits the number of trains that can run and the timing at which those trains can be run. It may be convenient for the passengers to travel at a given time but lack of adequate line capacity may force railways to run the trains at time which may not be suitable to the passengers.
These infra structural constraints can be overcome but this is very costly proposition. Even when adequate funds are available, there is long gestation period between planning and installation of facilities. This problem is particularly acute in developing countries.

(b) Maintenance requirements - The infrastructure required to run the trains also need maintenance periodically. The train services are so time tabled so as to enable the maintenance of rakes and locomotives at terminals as well as at intermediate points. Most of the routine maintenance of coaches and locomotives is attended to at one of the terminals, which is considered as the base and is responsible for proper mechanical condition of the equipment. This is also called 'Primary Maintenance'. Maintenance at the terminal at the other end is called 'Secondary Maintenance'. In addition, routine examination is carried out at important intermediate stations also.
Another requirement of coaches enroute is cleaning, watering and that of locomotives, watering and fuelling for which time also has to be provided. In addition to the rolling stock, fixed installations like track, platforms, signals and electrical overhead equipment (OHE) also need repairs. Time tables provide a suitable block of time during day light hours for this maintenance. Efforts are made to ensure that no passenger train is scheduled during this block of time so that equipment can be maintained in proper fettle.

(c) Operational requirement - In the running of trains, there are a number of operational factors which have to be provided in the time table. There are some trains which run faster than others. Slower trains have, therefore, to be stopped to give precedence to fast trains. In addition, on a single line section, only one train can run at a time in a block section. We generally do not have facilities on such sections where two trains running in the opposite direction to each other can cross without one of them being stopped. Generally less important train is scheduled to stop for crossing of fast train. Similarly, number of platforms at terminals as well as at important junction stations may be limited and a train may be delayed for reception till an earlier train vacates the platform.
There are a number of slip coaches which are required to be attached or detached at junction stations. Additional halt is required to be provided for performing shunting for this purpose. This also necessarily slows down the trains. Indian Railways have, therefore, taken a conscious decision to reduce the number of slip coaches wherever

possible and it is not very inconvenient to passengers to change trains. A large number of slip coaches have already been discontinued and trains accelerated.

(d) Change of locomotives - Locomotives required to be changed either at places where traction changes or at stations where loco shed is located and locomotives are required to go to the shed as per the loco link.

(e) Loading/unloading of parcels/luggage - Stations having lot of luggage of passengers and parcels are also required to be provided additional time to permit loading/unloading.

(f) Staff requirement - There is a limited time up to which railway staff is expected to perform their duties. They have, therefore, to take over and made over their charge at fixed locations. A bit of additional time is provided for the staff to examine the equipment and documents etc., being taken over.

(g) Unforeseen circumstances - There are a number of circumstances like signal failure, alarm chain pulling, occasional failures for which provision has to be kept. If no provision for such eventualities is kept, it is likely that the trains may run late frequently. This is generally up to the maximum of 3% of the total running time and is called 'traffic recovery time' and is provided short of big junctions, divisional/zonal interchange points. It may, however, be noted that in actual practice on most of the railways very little traffic recovery time is available.

IMPORTANT CONNOTATIONS USED IN CONNECTION WITH TIME TABLE:

1. Maximum Permissible Speed (MPS) -
This is the speed which a driver cannot exceed. This is also called technical speed and is dependent upon the technical condition of the track, signalling and rolling stock in use. It is generally different for different sections and trains. Most of the express trains on Indian Railways have MPS of 100 kmph. In order to increase this speed limit, signalling and track need to be carried out and Commissioner of Railway Safety has to satisfy himself before he permits this limit to be enhanced. Very few super fast trains have MPS higher than 100 kmph. Our fastest train so far was Rajdhani Express between Howrah and New Delhi (130 kmph). But with the introduction of Shatabdi Express between NDLS - JHS, the fastest booked speed is now 140 kmph between NDLS - AGC, and 130 kmph between AGC - JHS.

2. Booked Speed -
This is the speed which determines the normal running time of the trains and on the basis of which time table is prepared. This is generally 10% less than the maximum permissible speed.

3. Average Running Speed -
This is the average speed of the train on run. For calculating this, total time consumed in halts is deducted from the total time taken by a train between originating and termination stations.

4. Commercial Speed / Overall Speed -

This is the average time taken by the train per hour from its start to termination. Long distance passengers are concerned with this. They are not interested how fast a train runs between the stations. What they are concerned about is how fast it can reach its destination.

5. Speed Restriction -

Maximum permissible speed and booked speed relate to the particular section of the railway engine. Actual condition of the track bridges, curves and nature of signalling at certain stations may require the trains to be run at speeds which should be lower than the booked speed of a particular train. For this, special speed restrictions are imposed, which are of two types:

a. **Permanent Speed Restrictions** - These speed restrictions are the ones which are supposed to be for sufficiently long duration and are mentioned in the Working Time Table. Since copies of the Working Time Table are available with the train crew, no other intimation is required to be given to them on day to day basis. The time which the trains are expected to lose in observing its restrictions is built into the running time and is time tabled accordingly. These restrictions last the currency of a time table and are reviewed at the time of revision in the time table.
b. **Temporary Speed Restrictions** - A number of speed restrictions may have to be imposed for a short duration either on account of defects in track and related equipment or to facilitate repairs to the track and OHE and signalling installations. Requirement of time for such repairs is assessed well in time before a new time table is introduced and this time is separately provided for in the time table and is called 'Engineering Allowance' (EA). This time is also provided in the time table short of junction stations or at the divisional/zonal interchange points. If there are repair works elsewhere on the section, trains would run late and this would be adjusted before the junction interchange points.

6. Minimum Running Time

This is the time which a train should take between two stations when running at maximum permissible speed. This is calculated taking into consideration the permanent speed restrictions that may be in force from time to time in the concerned sections. This would be different for different trains and the driver is in no case permitted to take less than the minimum running time relevant to his train. Guards of the trains and Section Controller keep a watch on this aspect so that in case of over-speeding by the drivers, they may take steps to check them.

7. Normal Running Time

This time is based on the booked speed of the train and is generally about 10% more than the minimum running time. The driver is expected to run faster to the minimum running time when running late and is expected to make up time.

8. Calculation of Running Time

Calculation of running time is based on a number of factors, viz.:

a. Distance between the two stations
b. Hauling power of the locomotive
c. Load of the train
d. Permissible speeds
e. Permanent speed restrictions
f. Gradients and curves
g. Time required for acceleration and deceleration.

This time is calculated with the help of computer by RDSO and is further validated through trials.

9. Authorised Detentions

This is a time for which a train can be detained at a junction station to wait for another train running late in order to facilitate passengers to maintain connections at the junction stations, some trains can be detained for a specific period, after this detention the train can give connection to another nominated train so that undue hardship to the passengers is not caused. These are, however, the outer limits and connecting train cannot be detained, if it is not likely to connect the trains to be connected within the prescribed limit. This is given in the Working Time Table.

Working & Public Time Table:

A Working Time Table is published simultaneously for each division, for the exclusive use of Railway Staff. The difference between Public Time Table and Working Time Table mentioned below:

PUBLIC TIME TABLE:

1. Issue on payment
2. Information is applicable to all the stations in zone.
3. These are of various types:
   a) Detailed time Table - Zone wise
   b) Abstract Time Table
   c) Sheet Time Table
   d) Trains at a glance
4. Map on Zonal Railway, Indian Railways is provided.
5. Facilities to passengers like retiring room, Information about tourist spots are mentioned.
6. Timings of daily, non daily passengers, Mail/Exp. trains Arr. And Dep. are mentioned.
7. It contains information about reservations, refunds

WORKINGTIME TABLE:

1. Issued free of cost to the staff of the division
2. Information/Instructions applicable to only to a particular division.
3. Only one is issued
4. Divisional map is provided.
5. Operational requirements are mentioned.
6. Timings on Arr. / Dep, Run through of all trains running in the division is mentioned.
7. It contains rules and regulations with regard to

a. Marshalling
b. Movement of ODC
c. Location of MRT/ART and their target time etc.,

Punctuality:

As far as the passenger train operation is concerned the sole and core factor that gauges its efficiency is 'punctuality'. It is monitored at various levels of Railway Operation and management. It is an all-important index which decides the overall working of passenger operation. It is undeniable and understandable facts that image of Railways solely depend on this factor. Any deviation or dilution of punctuality will lead to doom and gloom on the part of everyone. Considering the essence of punctual running it is the endeavor of every railway man to strain every nerve to achieve this and no stone shall be left unturned.

Concept of punctuality:

Punctuality on its own cannot be defined like any scientific item. It differs with perception of persons. What is punctuality in the eyes of a passenger may not be the same from what railways perceive. Both are striking a different note.

Passenger's perspective:

As far as a passenger is concerned, he is more guided and governed by timings mentioned in public timetable. Accordingly he wants and wishes the train shall and must arrive and depart as per these published timings. The 'comings' and 'goings' shall not only applicable to originating destination stations, but he expects punctuality at intermediate station also. A passenger views any variation as unpunctual. He will be upset and will be in a downbeat mood one the train has not adhered to the published timings.

Indian Railway's perspective:

Indian Railways concept of punctuality is not the same as that of a passenger. Train working is inherited with certain innate qualities. As such train being 'track bound' the freedom of movement is possessed with certain limitations. In the case of railways a train is said to be punctual when it reaches its destination as per the arrival time given in PTT. It might not have arrived/departed from intermediate stations according to mentioned timings. Railways also wish passengers perception of punctuality to be fulfilled, but in actual working and in practice. It may not be possible due to its uniqueness in working.

Not loosing time (NLT) concept:

In Indian Railways trains are running from one end of a country to another covering a network of more than 63000 route kms traversing through sixteen zonal railways and many divisions. Separate administrative set up is available for each zone/division and efficiency in working is judged through such unit-wise. A late running of a train in one railway/division due to any reason cannot be accounted in another ones performance. The receiving railway/division cannot be railroaded to accept the responsibility for late reception. The reasons for unpunctual running may be genuine or in genuine. It is unwise and undemocratic to blame another railway/division for delayed running of the train over another one. Under these circumstances, a concept of not losing time is evolved.

This means, if a train is taken over by a railway/division form another railway/division with a late arrival of say 15 minutes and if its continues to run with the same late and handed over to another railway/division with same 15 minutes or may be earlier also, then as far as this railway/division is concerned the train has not lost any time further and said to be punctual. This concept is known as 'NOT LOSING TIME'. In case if the train is handed over by 20 minutes late, then it is derived that the train has lost punctuality only by 5 minutes.

Calculation of punctuality:

Punctuality is calculated for train wise (Mail, Express, passenger, suburban) and gauge-wise. The formula is expressed in percentage. Targets are fixed for Zonal railways. Punctuality statistics are maintained for trains reaching destinations at right time. Punctuality statistics on Division / Railway is also maintained, so that trains are not late over a particular Division / Railway.

Formula:

$$\text{Punctuality} = \frac{\text{No. of Trains running RT+ No. of trains NLT X 100}}{\text{Total No. of passenger Trains.}}$$

Factors affecting punctuality:

1. Operating Department:
   - Faulty time tabling.
   - Bad controlling.
   - Late placement of rakes on platform.
   - Extra time in shunting, loading & unloading.
   - Signals are not taken off in time. (Received & Despatched)
   - Delay by Station staff in asking, giving & handing over the Authority to proceed to LP.
   - Missing token / table.
   - To maintain connection with the trains arriving late.
   - Late start of trains on account of Guard / Asstt. Guard.
   - Defective rake links.
   - Extra time at road side station for shunting

- Improper planning at terminal facilities.
- Wrong Marshalling.
- Defective Loco pilot / Guard links

2. Mechanical / ACT (RS):
   - Failure of Passenger / Goods loco.
   - Engine defects.
   - Coach failure.
   - Hot Axle / Flat tyre.
   - Late turning out of train engine from shed.
   - Air pressure / vacuum trouble, brake binding etc.
   - Time lost on the run.
3. S&T:
   - Failure of Points, track, signalling or interlocking.
   - Failure of means of line clear working i.e. Block Instrument / Block Telephone etc.
   - Failure of Control telephones.
   - Non availability of signal maintainer. (ESM, MSM, TCM)
4. Engineering:
   - Excessive Engineering speed restriction. (Over and above the Engineering Allowance)
   - Engineering block being burst.
   - Stopping of trains on banner flags or by showing danger signals.
   - Rail breakage, lurch felt by loco pilot.
   - Improper track patrolling.
5. Electrical:
   - Defective lights and fans in trains resulting ACP by the passengers.
   - Tripping / failure of OHE.
   - Failure of electrical water pump.
   - Failure of Head light of the engine or bad focusing.
   - Bursting of Power Blocks & Power +Traffic Blocks.
   - Train lighting and Air conditioning problems.
6. Commercial:
   - Inadequate labour for the work of loading and unloading work.
   - Dispute due to duplicate reservations.
   - Insufficient halt for loading and unloading of packages.
   - Alarm chain pulling.
   - Overcrowding.

7. Miscellaneous:
   - Storm.
   - Heavy rain.
   - Floods.
   - Cattle run over.
   - Accident.
   - Public agitation.
   - Poor visibility due to thick & fog, dust.

Remedial measures to improve punctuality - Efforts by Railways:

Drivers to run at MPS – Now a day, drivers have been instructed to run a MPS always. Earlier drivers used to run at booked speed and in case of late running only, to make up time they are authorized to run at MPS. This has been dispensed with now. This will very much reduce the pressure on drivers. In case of late running pressure is mounting on drivers and they will under tremendous stress to make up time. To avoid this extra strain at the time of starting itself, drivers are advised to run at MPS.

Starting a train before allowed time when arrived late – At every station a specified time is given for stopping / starting. If a train arrived after the published departure in PTT, it may be started before the allowed time after ensuring all transactions are over. These will some extent help in minimizing the late running. It is the responsibility of all those concerned to cooperate and ensure that the business connected with the train is completed and carried out at the earliest and train started soon. This will mainly applicable to parcels loading / unloading, any attaching/detaching of coaches and subsequent examination, preparing and handing over train related documents in time etc.

Punctuality drives – To enhance and enlighten the efficiency of punctuality, at various levels punctuality drives are conducted periodically. Recurring reasons for late running are identified and instructions are issued for corrective action. Staff are counseled and if need to be pulled up and punished. Awards are given for fine performances. These drive help in detecting any system defects such as poor visibility of signals, poor engineman ship, inadequate sighting distance of signals etc. Reports are made out at the appropriate levels and follow-up action is initiated.

Punctuality meeting—Punctuality meetings are conducted at Zonal/divisional levels at the highest level. Reasons are analyzed and directions are issued then and there. Punctuality position from divisions is reported to Zonal headquarters and in turn to 'Railway Board daily.

Monitoring of specified trains at specified level - Punctuality of some important trains is closely monitored at higher levels. Punctuality for such trains is watched at the level of Minister/Board officials/Zonal Railway officials. This helps in creating awareness among the staff on punctuality. By this way punctuality consciousness is developed in the minds of railway men.

Efficiency of Railway men - Train running may be put up in the following way and efficiency can be very well judged -

Originating Station.	**Destination Station**
1. Leaving right time	1. Arriving right time
2. Leaving right time	2. Arriving late time
3. Leaving late	3. Arriving right
4. Leaving late	4. Arriving late

Railway men's efforts will be appreciated and applauded once item No 1 is taken care of. It will also be a laudable feature if the train arrived in time due to any late start (item No 3) of uncontrollable reasons.

Conclusion: Punctual running of trains is not one man's affair. It reflects the concept of teamwork. All factors should work in tandem to achieve punctuality. A train might have traveled 500 Km punctually and only 5 Km may be left to reach the destination. A failure on the part of man or material at this stage may force the train to reach the destination late. All good efforts put up by many quarters so far for 500 Km will go waste due to failure of somebody or something. All parameters shall go hand in hand so that punctuality can be maintained always. Concerted efforts and cohesiveness in working is the need of the hour. In a world of competitiveness punctuality plays a prominent role in passenger train operation. Once railway man makes punctuality as a way of life, then the commons will be in cloud nine and Railways will be in the seventh heaven.

Movement Advice:

1. Movement advice is an advice given by the divisional control office through Central Control to the Owning Railway of the wagon / vehicle regarding their movement on the users' railway.
2. The control office advises the Central Control of the concerned Railway.
3. The Central Control conveys the message to the Central Control of the Owning Railway.
4. The movement particulars of the special kind of stock should be advised to the STM (Goods) in the HQ's office on the telephone.
5. The advice is conveyed at 10:00 hours in the morning daily.
6. The message should be included in the daily statement of special stock submitted to the HQ's office.
7. The movement advice helps in tracing of the wagons / vehicles and plan accordingly.
8. In the event of interruption of through communication, such advice shall be given to the Owning Railway within 48 hours.

9. The movement advice must contain all the detailed particulars of the wagon / vehicle along with contents there in.
10. Timely movement advice helps in smooth and safe movement of traffic.

PPM (Passenger Profile Management):

1. Maximization of earnings from passenger traffic by maximizing the occupation and earnings of each train.
2. CRIS has created a website www.trainenquiry.com.
3. Zonal Railway will create a PPM center under CCM/PM of each zonal railway.
4. PPM center must have a good PC with internet.
5. The zonal PPM center will be linked to the Railway board PPM center.
6. Zonal PPM center will carry out analysis of all its primary ownership coaching trains which will include all reasoned accommodations available on these trains.
7. The zonal railway will analyze the data ware housing report options.
8. Zonal PPM centers will use the various reports to identify poorly occupied and poorly earnings trains.

a. The reason for poor occupation of each train will have to be analyzed and indicated with proposed course of action on a daily basis
b. Zonal railway will send the details on a daily basis in an Excel sheet format enclosed herewith as an E-mail attachment to the Railway board PPM center.

9. A comprehensive review of utilization of various quota at trains sources and different remote location of Central railway train has been done under PPM.
10. Quota at various remote locations have been scrutinized and redistributed on the basis of utilization report and wherever found suitable.

COACHING VEHICLE CENSUS:

Coaching Vehicle census is conducted as and when, the directives are received from Railway Board. Prior to conducting a coaching vehicle census, CPTM holds a meeting and instructs the census officials. The month, date time of census is notified to all the staff involving in census. Unlike, goods wagon census, coaching vehicles census is not laborious, as the vehicles are generally run in rakes and they are keenly monitored daily. A Cardex system in the coaching cabinet was a method to monitor the movement of individual coaches. After full implementation of COIS, the monitoring of the movement of coaches will be further made easy.

All the staff involved in the census duties is to be briefed about their responsibilities. A mock census has to be conducted on the nominated day prior to the official census. The lacunae in the mock drill are to be identified and corrected. During the enumeration each

vehicle should be stenciled by a census symbol of equilateral of six inches each side in white colour at extreme left of the vehicles on both sides. A representative of mechanical branch also involved to identify the mechanical code of the wagons. Each railway should update the list of the condemned vehicles after the last census was held, with necessary details, well before the census. The census timings are to be followed strictly.

Advantages in coaching vehicle census:

a) To know the location of loading vehicles and their status.
b) To identify and take them to the maintenance depot in case the coaches have become due for POH and other repairs.
c) To identify the area where excessive holding exist, which leads to coaching yard congestion.
d) To compare the requirements with that of allotment and to suggest better supply.
e) To compile the utilisation statistics and to see the viability for future utilisation.
f) For introduction of new coaching trains.

Rules for booking Special Coaches & Special Trains on FTR:

1. Reservation of special coaches / trains: Application for reservation of carriage must be made through the SM of originating station to the CPTM, giving details of the journey such as destination, route to be followed, halts enroute, and the specific train to which the coach is to be attached at least 30 days in advance and not more than 6 months prior to the commencement of journey.
2. In case any party wishes to requisition a special coach at a short notice of less than 30 days, specific permission must be obtained from CPTM.
3. It will be the sole discretion of the Railway Administration to allot a coach / train and programme its movement depending on the availability of coaches, path and other operational considerations.
4. Security deposit cum registration charge:

   a) An amount as prescribed from time to time which at present is Rs.10,000/- per coach as Registration Charge-cum-Security Deposit will be payable at the station from where the proposed journey will commence, of this half will be retained as Security Deposit & the balance amount would be adjusted against the fare payable at the time of booking. The security deposit will be refunded by the Station Manager of the originating station on completion of the tour after adjusting any other amount of extra detention etc.

   b) The deposit charges for allotment of reserved coaches for journeys performed by railway employees and their families on privilege pass& passes/PTOs would be an amount as prescribed from time to time, which at present is Rs.10,000/- per coach.

   Note:-

   Tourists are exempted from paying the Deposit for reserved carriage provided:-

   iii) They apply through recognized Tourist Agents who should give a guarantee to the Railways.

   ii) Their journeys are sponsored or recommended by Indian Embassies abroad.
5. Reserved coaches are not guaranteed – Railway Administration do not guarantee reserved Carriages / Coaches by any particular train and will admit no claim for

compensation for inconvenience, loss or extra expenses due to such accommodation not being provided or attached to trains by which asked for.

6. Parties requiring such accommodation need not be members of the same family.
7. The reservation of coach / special train will be on priority of date of registration i.e. application along with Security Deposit receipt duly forwarded by Station Manager / Station Master of originating station endorsing the M.R. No. and date of the Security Deposit.
8. Charges for Special Coaches / Special Trains will be computed point to point on the basis of full adult Mail / Express fare of the concerned class for the actual number of passengers traveling or the marked carrying capacity of the coach which ever is more + Security Deposit Charges + Services Charges + Empty Haulage Charges + Detention Charges @ prescribed from time to time.
9. The charges must be paid in full 48 hours in advance of the departure of the train to which Special Coach are to be attached failing which it will be deemed that the running of Special Coach has been countermanded by the organizers. The entire registration cum Security Deposit will be forfeited in this case. Same Rule is also applicable in the case of Special Train.
10. As prescribed from time to time the minimum Composition of Special Train at present is 15 coaches and minimum chargeable distance is 500 Kms for Mail / Express trains both for coach as well as special train.
11. No concession will be allowed for booking of Special Coaches. Charges will be recovered in full for children, students, Sr. Citizens etc.

Coaching codes

Vehicle codes for Coaching stock:- The following code letters must be used to designate the various designations of coaching stock in use:

Nature of stock	Transportation Codes
1. Bogie first class	F
2. Bogie first class with servants compartment	FQ
3. Bogie first class with coupe compartment	FC
4. Bogie first class with coupe and attendant compartment	FCQ
5. Bogie second class (self generating)	GS
6. Four wheeled first and second class	EFS
7. Four wheeled first class	EF
8. Bogie first and second class	FS
9. Bogie first and second class with attendant compartment	FSQ
10. Bogie first with coupe and second-class with attendant comp.	FCSQ
11. Bogie first class AC and First class luggage and Brake comp.	ACFLQ
12. Bogie first with coupe AC and FC and attendant compartment	ACFQ
13. Bogie first class air conditioned	FAC
14. Bogie fully air conditioned	WAC
15. – do – with coupe and second	FCSC
16. Bogie first and second class	FS
17. Bogie first with coupe second luggage and brake	FCSLR

18. Bogie first with coupe second		FCS
19. – do – attendant compartment, luggage and brake		FCSQLR
20. Four wheeled second class		ES
21. Bogie second class 3 tier sleeping car (vestibule)		WGSCN
22. Bogie second class		S
23. – do – with permanent ladies compartment		GSY
24. Bogie prison van		VJ
25. Bogie lower class day cum sleeping car		WGSCG
FREIGHT AND BRAKE VANS		
26. Four wheeled freight van of 4 wheeler luggage van		EL
27. Bogie freight van or luggage van		L
28. Four wheeled brake van with luggage compartment		ELR
29. Bogie parcel van		VP
30. Four wheeled parcel van		EVP
31. Four wheeled fruit van		EVF
32. Bogie luggage and brake van		LR
33. Bogies second class luggage and brake van		SLR
POSTAL VANS		
34. Bogie second and full postal van		SPP
35. Bogie second class and 2/3rd postal van		PPE
36. Bogie full postal van		PP
37. Bogie second class and ¾th postal van		PPI
38. Bogie luggage brake and full postal van		LRPP
39. Bogie second and ¼th postal van	PPQ	
40. Bogie second and ½nd postal van	PPH	
VANS		
41. Four wheeled prison van		EVJ
42. Four wheeled refrigerator van		EVR
CARS		
43. Bogie dining car		CD
44. Bogie kitchen car		CK
45. Bogie inspection car		CE
46. Bogie tourist car first class		CT
47. Bogie tourist car second class		CTT
48. Bogie state saloon for ministers or VIPs		CR
RAILWAY SERVICES		
49. Bogie inspection car (administrative)		RA
50. Bogie inspection car (Jr. administrative)		RB
51. Bogie subordinate carriage		RD
52. Four / Six wheeled inspection car (Sr. Assistants)		ERB
53. Four wheeled inspection car (Jr. Assistants)		ERC

54. Four wheeled subordinate inspection car	ERD
55. Bogie cinema cum exhibition car	RPCB
56. Four wheeled mobile TXR van	ERW
57. Four wheeled store van	ERS
58. Bogie store van	RS
59. Bogie accident tool or relief van	RT
60. Four wheeled accident tool or relief van	ERT
61. Four wheeled traveling charging or dynamo van	ERM
62. Bogie traveling charging or dynamo van	RM
63. Four wheeled crew rest van	ERR
64. Bogie medical van or mobile dispensary van	RH
65. Four wheeled medical van	ERH
OTHER STOCK	
66. Four wheeled horse box (double)	EHH
67. Mobile library van	ERL
68. Four wheeled motor van	EVK
69. Rail motor car, first class	ZZF
MILITARY CARS	
70. Bogie military car vestibule	WM
71. Bogie ward cum dining car air conditioned	WACMRD
72. Bogie kitchen car	MK
73. Bogie kitchen car Indian troops vestibule	WML
74. Bogie dispensary car vestibule	WMHRA
75. Bogie generator car vestibule	WMRM
76. Bogie officers car	MF
77. Bogie family car	MR
78. Bogie air conditioned sick officers car	WACMRA

Note: -

1. "Y" Suffixed to indicate permanent ladies compartment.
   "Y" Prefixed to indicate suburban stock
   "A" Prefixed to indicate articulated vehicle
   "W" Prefixed to indicate vestibule vehicle
   "G" Prefixed to indicate self generating equipment
2. In case two or three letters out of "Y" "A" "W" are to be used, they will be shown in the above order when prefixing or suffixing to codes.
3. The code letters of each description of coaching vehicle are placed at each end of the vehicle on the left bottom end panel at diagonally opposite corners. The staff must refer to these code letters in case of doubt.
4. All coaching stock is vacuum brake.

SUBURBAN SERVICES.

The Metropolis of Mumbai is the commercial, financial and industrial capital of India, Suburban Railway system is its lifeline. Central Railway has one of the biggest Suburban Network in the world running 1490 Services per day & carrying more than 3.5 million commuters daily over 76 Stations.

PROFILE

The Main line Suburban Section of Mumbai Division of Central Railway extends from Chhatrapati Shivaji Terminus to Kalyan (54 Kms). At Kalyan, it bifurcates into two directions – one to Kasara (121 Kms) and the other to Khopoli (114 Kms). Chhatrapati Shivaji Terminus – Kalyan section has quadruple line, two exclusively for Suburban and the other two for mixed traffic (Mail/Express, Freight and Suburban Services). The Section beyond Kalyan is double line.

The Harbour line corridor of the Mumbai Division of Central Railway extends from Chhatrapati Shivaji Terminus to Vadala Road. At Vadala Road, it bifurcates into two directions – one joining the Western Railway at Mahim (12.47 Kms) and runs up to Andheri (21.3 Kms) and other going to Kurla and beyond to New Mumbai, terminating to Panvel (50 Kms).

The Trans Harbour corridor of the Mumbai Division of Central Railway extends from Thane to Turbhe. At Turbhe, it bifurcates into two directions – one towards Vashi (18.60 Kms) and other towards Nerul (19.93 Kms). Extending over 76 Stations, the Suburban system operates Electric Multiple Unit (EMU) Services on the following sections.

Section	Extended Length (Kms)
Chhatrapati Shivaji Terminus – Kalyan (Quadruple Line)	53.21
Kalyan – Kasara (Double Line)	67.35
Kalyan – Karjat (Double Line)	46.51
Karjat – Khopoli (Single Line)	14.52
Chhatrapati Shivaji Terminus – Panvel (Double Line)	48.94
Vadala Road – Andheri (Double Line)	12.19
Thane – Vashi (Double Line)	18.60
Turbhe – Nerul (Double Line)	04.68

MAIN PARAMETERS OF SUBURBAN SERVICES AS ON 01/05/2010

Item	Quantum
Route Kilometers (Kms)	310
Corridors	04
Stations	76
Terminals	22
Rakes in Service	113 {63 (9 Car) & 50 (12 Car) }
Main line Fast/Semi Fast Services	207 (207)
Main line Slow Services	575 (370)
Harbour line Services	542
Trans Harbour (Thane – Vashi / Nerul / Panvel)	164
Total Central Railway Services	1488(577)
Western Railway Services	6
Total Services	1494(577)
Total train Kilometers	63862.63
Average Rake Kms	565.16 Kms

Note: Figures in brackets show 12-Car Services.

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Chapter 5

FREIGHT OPERATION

Importance of Freight Operation:
The freight business is the major source of revenue for the Indian Railway. Main activity centers 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, and 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:

a. 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 centers.
b. The variety of commodities to be moved, with different characteristics & type of wagons required
c. Preferential traffic schedules, rationalization schemes 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
- Dispatch

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:

i. 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.

ii. 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.

iii. 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.

iv. 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.

v. 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 Loco as well ass flexibility of using 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 department should also be adhered to.

While operating department has to optimise the work done by each 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 loco organisation should provide optimum number of locos in good fettle, keeping in view the traffic needs as shortage of locos can dead 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 of 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 Chart:

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.

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, it required and crew booking and engine allocation changed promptly.

Some overlapping crew/guard may also be kept in lobby to take care the last minute absenteeism. Shunters may also be kept in the lobby big yards / junctions to attach,

detach and run round locos or to pull the train yard up to 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 loco and yard detentions to loco can be thoroughly monitor 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, loco motives and lobbies have been discussed else were in this manual. Role of few agencies is discussed below the special reference to freight operations.

Control Office:

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

a. **Planning**:

Planning is aimed at forecasting and optimising the following:

1. Interchange
2. Trains to be run section wise
3. Supply of rake/for bulk loading
4. Release of inward loaded rake placed for unloading.

Information regarding the following items is generally required for these purposes

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 yearly 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 centers, adjacent divisions and instructions received from the Head Quarters

b. **Execution:**

The goods operation plan is executed on the basis of actual materialisation of the forecast with suitable adjustment made for short falls/excesses Yards loco sheds stations terminals lobbies & **TXR** depots are actively involved in execution of the plan.

c) Review:

The trend of the day's position is reviewed by the CHC 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 short falls of previous days to take remedial measures and pin point weak spots
2. Provide data for planning for the current day

The main features of performances which can be reviewed include:

- interchange failures
- divisional wagon balance (wagons on divisions)
- train running

- disposition of empties
- loading at important terminals – and in the case of short falls reason for the same
- reviews of unusual occurrence
- examination of control chart
- particulars of stable loads
- yard performance
- unloading on divisions
- registration &loading
- power position, utilisation of locos and terminal detentions
- sick line working
- spl type of stock
- clearance of piecemeal wagons(sick or otherwise) from road side stations

VI. HEADQUARTERS ROLE IN FRIEGHT OPERATIONS

The divisions freight operations generally required close co-ordination and assistance from other divisions & railways. While direct contact are also maintained by the control & 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 summarized below

VII. MANAGEMENT INFORMATION SYSTEM

1. Important information concerning the position freight operations on various divisions of railways in obtained through line and stock report daily telephonically and or through FOIS or tele-printer or FAX to the head quarters (central control) from divisional control, now more & more zones & Railway Board are sitting to FOIS generated reports.

   This includes, loading and stock position particulars of old out standing and fresh registrations of indents , categories wise position of unloading , transshipment, yard balance of important yards and wagons on divisions , train running on each section, average speed, interchange position, loco motive position and loco motive utilization etc.

   The position is reviewed and analyzed by the COM/CFTM/DY.COM GOODS/STM GOODS/CMPE(R&L) & CELE. The important position pertain to various department is conveyed to the department concerned as well as to G.M. The head quarters office also obtained the statement at the and of each month or whenever required and the performance is compared with (i) the targets, (ii) the figures of the previous months (iii) the figures of the corresponding months of the previous years and (iv) the best ever record etc.

   In addition, the statistical branch also provides the data to the general manager and the department concerned with operation for detail analysis and review.

2. Head quarters and important part in planning and coordination fright operations after detailed conference with the operation officers and in terms of Railway Board current operating directives, head quarters issue directions and instructions the regarding the following items

a) Interchange tractions(categories wise)

b) Loading & unloading
c) Traffics in sight from other Railway/division this information is now available on FOIS terminal where a pipe line can be seen from end to end and expected arrival of trains at destination is also estimated by FOIS system.
d) Convey priority for the day & set quantified objectives to be achieved
e) Reviewing the work done at the important activity centre by yard terminals etc
f) Train in traffic regulation in case of accident etc
g) Certain items of goods operations are directly controlled by Head Quarters e.g. Coordination & directions regarding rake loading of programmed and committed traffic movement of special type of stock movement of O.D.C.s, out of turn allotments and allotment despite restrictions etc.

VIII. RLY BOARD CONTROL ON FRIGHT OPERATIONS

The Railway Board provides unity of control & direction of the freight operations. It also has the important role of supervisions and coordination which is very much essential for a big network like Indian Railways. the Railway Boards Control office also remains in contact with the head quarters (central control) of the zonal head quarters and watches loading and movement of important extremes of traffics , like coal, raw material for steel plant (iron ore), food grains, cement, fertilizers, POL, sugar export ores, contained traffic etc it also watches loading interchange power position, goods train running important section etc to ensure that each Railway fulfills its obligation and optimises the use of various assets , the items watched are or lays the same as those watched by the zonal h.q. in respect of the divisions, but the prospective is wider. Railway Board placed and important coordinating role in various Railway and others central government department and vital sectors of economy connected with Railway, policy formulation and planning which have important bearing on fright operation is also on 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 transshipment of wagons detached out of course for hot axle etc. The various 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 endeavor for the achievements in technology up-gradation 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 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 high lighted below.

i. Wagon holding:

For a given amount of originating loading and receipts of loaded wagons from other railways and making an allowance for percentage of staff 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 bottle necks that is more congestion in siding s yards and section without a proportionate increase in the tons 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 operation is necessary for keeping wagon holding low " ineffective stock" percentage should also be kept minimum.

ii. Interchange balance :

Maintenance of the interchanged target is an indication of railways overall operating performance and its effort to meet inter railway obligations hence interchanged balanced should be very high, even when maximum trains are inter changed. However, attempts should be made to see that on busy sections, inter change is not only confined to few hours of the day but uniformly distributed.

iii. Load of trains:

A train is a unit of transport. Depending upon the load a suitable loco is provided for its haulage in order to get the optimum use of motive power and to increase the capacity utilization and throughput, each locomotive is given a load approximately to the maximum hauling capacity, unless operating necessity requires utilization 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

iv. Loading and unloading:

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

v. 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.

vi. Dispatch 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 the 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 indents to get train load 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.

vii. Long distance trains:

It is an age – old principle of operation 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 trains".

A crack train / link train is a train when the same crew (and engine if possible) instead of 'signing of' 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 utilized on 'crack' basis when the same crew perform a round trip without 'signing of' at the outstation and is promptly provided a load so that crew returns to its head quarters within normal duty hours.

viii. 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 loading 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 Transshipment Point, 'R' stands for the total number of loaded wagons received from other Railway / Divisions. Thus, for example, if a Division load 350 Wagons on BG (including 50 BG wagons loaded through transshipment 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.

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

ix. 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.

x. Engine Utilisation:
Engines being costly resources their utilization have to be carefully monitored. Some of the measures for improving engine utilization 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 of promptly at Stations. Distant/Warner Signals must always be taken of 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.

xi) Average speed of goods trains:

If we want to determine the average speed of various goods trains running over a section during a particular period. There are two methods of calculating the speed of goods trains. For day to day review the speed of goods train is calculated from the control charts. It is generally calculated section wise and for up and down directions separately. It may be calculated for each train, the total time taken by all the trains in the section is added up, and the distance of the section multiplied by the number of trains divided by the total time taken will give the average speed for all trains on the section.

Statistical Method:-

$$\text{Average speed of goods trains} = \frac{\text{Total Train Kilometers}}{\text{Total Train Engine hours}}$$

Following factors affect the speed of goods trains:

i. Bad planning
ii. Improper ordering of trains
iii. Late start from yards / stations
iv. Improper crossing and precedence of trains by SCOR

Measures for improving average speed of good trains could broadly be classified into the following two categories:-

a) Long term measures.
b) Organisational Measures

a) Long term measures for increasing speeds as follows-

1. Improvements in Locomotives.
2. Improvements in Wagons
3. Improvements in Track
4. Improvements in Signalling and interlocking
5. Increase in section capacity

b) Organisational measures to improve average speed of goods trains-

1. Time table improvements.
2. Review of running times
3. Bunching of trains with similar speeds.
4. Reducing dissimilarity in speeds to minimum
5. Running of Link, Crack and Jet trains.
6. Improving staff efficiency-such as controllers, station staff, drivers and guards.
7. Proper working of Yards and terminals
8. Proper planning of remodeling works.
9. Simplification of rules for trains working.
10. Monitoring of goods trains by officers and inspectors.

Average speed of goods train as an index of operating efficiency:

Average speed of goods trains has a marked influence on the turn round of engine and crews and also on the utilization of section capacities. Lower average speeds of goods trains generally result in congestions of sections which are saturated which further reduces the speeds. Thus, a very harmful cycle is created leading to lower availability of powers and crews, lesser clearance from yards and further congestions. Many times the only way to break the harmful cycle is to impose restrictions, regulate traffic and thus cause loss to railway revenues.

XI. 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.

XII. 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.

"Dedicated Freight Corridor Corporation of India Limited (DFCC)":

"**Dedicated Freight Corridor Corporation of India Limited (DFCC)**" is a special purpose vehicle created to undertake planning & development, mobilization of financial resources and construction, maintenance and operation of the Dedicated Freight Corridors. DFCC has been registered as a company under the Companies Act 1956 on 30th October 2006

Need for Dedicated Freight Corridor Project:

The Indian Railways' quadrilateral linking the four metropolitan cities of Delhi, Mumbai, Chennai and Howrah, commonly known as the Golden Quadrilateral; and its two diagonals (Delhi-Chennai and Mumbai-Howrah), adding up to a total route length of 10,122 km carries more than 55% of revenue earning freight traffic of IR. The existing trunk routes of Howrah-Delhi on the Eastern Corridor and Mumbai-Delhi on the Western Corridor are highly saturated, line capacity utilization varying between115% to 150%. The surging power needs requiring heavy coal movement, booming infrastructure construction and growing international trade has led to the conception of the Dedicated Freight Corridors along the Eastern and Western Routes.

Historical Perspective:

Accordingly, the seeds for the project were sown as early as in April, 2005, wherein, Hon'ble Prime Ministers of India and Japan made a joint declaration for feasibility and possible funding of the dedicated rail freight corridors. Hon'ble Minister for Railways, almost at the same time, announced in the Parliament the need and planning for the project. Immediately thereafter, RITES was entrusted with the feasibility study of both eastern and western corridors.

In May 2005, Committee on Infrastructure (COI) constituted a Task Force, chaired by Shri Anwarul Huda, Member Planning Commission to prepare a concept paper on Delhi-Mumbai (Western) and Delhi-Howrah (Eastern) dedicated freight corridor projects, and to suggest a new organizational structure for planning, financing, construction and operation of these corridors. RITES, in January 2006, submitted the Feasibility Study Report of both the corridors to Ministry of Railways. Almost simultaneously, the Cabinet approved the report of the Task Force of the COI, which directed that a SPV should be set up to construct and operate the DFC. Cabinet Committee on Economic Affairs (CCEA) gave "in principle" approval to the Feasibility Study report asking the MOR to go ahead with Preliminary Engineering cum Traffic Survey (PETS) for the two corridors, firm up the cost of the project and work out the financing options.

In consonance with the recommendation of the Task Force of COI, a SPV, named "Dedicated Freight Corridor Corporation of India Limited (DFCCIL)" was incorporated

under Companies Act in October 2006. Subsequently, RITES submitted the PETS Report based on which the project was approved at a cost of Rs. 28,181 Crores.

Objectives of the DFC:

The Dedicated Freight Corridor project has been conceptualized with the following broad objectives:

1. Reduction in the unit cost of transportation by speeding up freight train operations and achieving higher productivity through better utilization of railway assets, reduction in inventory costs and achieving greater customer satisfaction.
2. Creating rail infrastructure capability to move a substantially higher level of freight traffic, adequate to meet the requirements for the next 30 years or more.
3. Of-loading the existing rail corridor of a substantial part of the present freight traffic, thereby releasing capacity for augmenting passenger services, decongesting busy terminals and junction stations and resulting in improved safety in passenger train operations.
4. Introduction of high end technology in freight operations, resulting in higher axle loads, higher maximum moving dimensions (MMD), higher schedule of dimensions (SOD) and track loading density (TLD), improved pay load/tare weight ratio and substantially improved traffic throughput by way of introduction of heavy/long haul freight services and double-stack container trains.
5. Introduction of time-tabled freight services and guaranteed transit times.
6. Improving the railways' share in the total land transportation of goods in the country and enhancing customer satisfaction.

The salient features of the project have been, broadly, firmed up:

1. A dedicated freight corridor exclusively for running freight trains at a maximum permissible speed of 100 Km/h
2. Primarily Double Line corridor (except where Single Line is justified on traffic considerations) running parallel to the existing corridors, so as to maximize the usage of available railway land; and transfer trains from the existing corridor to the DFC and vice versa through predetermined Junction arrangement, equipped with grade separators to facilitate smooth transfer of trains between the two networks
3. The track sub structure like formation, bridges etc are to be fit for 32.5-ton axle load but the track super structure like track, sleepers, ballast etc are to be fit for 25-ton axle load
4. The loop length on the proposed corridor to be 1500 meters long to facilitate running of long haul trains
5. Provision of grade separators, i.e., ROB/RUBs at important Level Crossing Gates to avoid any detention to either road or rail traffic
6. Crossing stations on the Double Line to be provided at an average distance of 40 Km and 10 Km on the Single Line stretch
7. Higher Schedule of Dimensions (SODs) and Maximum Moving Dimensions (MMDs) in order to run wider stock, double stack containers and newly designed wagons so as to have improved payload to tare ratio
8. Infrastructure provided should be fit for heavy/long haul operation up to trailing load of 15000 tonnes
9. Advanced Signaling System facilitating better and efficient operation of trains

PPP (Public Private Partnership):-

1. PPP offers significant advantages in terms of attracting private capital in creation of public infrastructure as well as in improving efficiency in the provision of services to users.
2. They enable Government to transfer construction and commercial risks to the Private sector which is best suited to manage them.
3. PPP is still in a nascent concept in India and expertise at the level of Project authorities both at the central and state levels is limited.
4. The key to marketing acceptable PPP is to create an environment where PPP is seen to be a way of attracting private money in to public project, not putting public resources into private.
5. In Railways, PPP options will be explored with the aim of modernization of Metro and Mini Metro stations with world class passengers' amenities, development of agro retail outlets and supply chains, construction of multimodal logistic parks, warehouses and expansion of network and increase in production capacity.
6. A PPP cell has been constituted which will develop the policy framework to provide non discriminatory level playing fields to investors to prepare the bankable documents and setup the procedure for awarding partnerships through tendering system.
7. In the past Indian Railways had made several attempts to rope in Private participation in areas such as catering, wagon ownership and leasing and joint ventures for Rail infrastructure projects.
8. The current strategy is to leverage Private capital through PPP to improve efficiency and control costs to begin with.
9. The following projects have been identified to be implemented on PPP route. Various projects of PPP-
    a. The Joint Venture formed between MOR and GPPL for gauge conversion as a BOT project.
    b. Viramgam- Mehsana gauge conversion.
    c. Construction of DFC with a large component of PPP.

ROLL ON - ROLL OF:

The Ro - Ro scheme was first introduced in Konkan Railway in 1999. This enables carrying the loaded trucks directly on the railway wagons, thus reducing the expenditure on diesel, wear and tear of tares and maintenance of trucks for truck operators.

This is providing faster turn round and higher profits to the transporters. This service ensures timely and safe delivery free of any risk factor and without multiple handling of consignments.

This is a regular service between Mangalore to Bombay on Western Ghats cutting down nearly 10 hours transit time. On finding the success, arrangements are made to run such trains between Bombay and Howrah on nominated days.

Advantages :

i) Less transit time
ii) Reduction in multiple handling.
iii) door to Door delivery
iv) Wear and tear of Road vehicles reduced.
v) Less Pollution.
vi) Savings in Patrol / Diesel Costs.
vii) More revenue to Railways.
viii) Improved wagon utilisation.

Development of rail-side warehouses:

With a view to provide seamless door to door transportation, IR and Central Warehousing Corporation (CWC) initiated a pilot project at Whitefield Satellite Goods Terminal at Bangalore.

Under this project, CWC built a state of the art godown with a capacity of 15000 tonnes, along the railway track in a goods yard. It also provides ancillary facilities in the integrated goods shed complex.

A road has also been provided on the other side of the track for unloading of consignment from the wagon directly into the trucks.

The unloading of goods is the responsibility of the CWC who are also providing facilities for delivery of goods at the doorstep of the consignees. The value addition in freight services has resulted in additional traffic to Railways.

Encouraged by the customers' response to the facilities at the Whitefield terminal, IR has entered into a MOU with CWC as its strategic partner for the development of similar rail-side warehouse complexes at many other locations in the country. The facility has already become functional at some locations.

The above concept is also being launched through PPP (Public Private Partnership) model. Under the scheme, private entrepreneurs will be encouraged to develop rail-side warehousing complex / logistic park / ICDs (Inland Container Depot)/ Agri-chains with modern loading and unloading and customer facilities on Railway land on a revenue sharing basis.

This will facilitate a single window service in providing value added service to the customer in the form of distribution, handling warehousing and road-bridging. It will also aggregate piece-meal (wagon-load) traffic to train load traffic and help IR in improving its market share.

TRANSPORT PRODUCTS: These are various transportation options differentiated primarily by the volume of traffic and include following services:-

(a) Block Rake:-It is a train carrying wagons for a single destination. Composition of Block rakes composed of different types of wagons are notified by Railway board will be booked at Train Load rate.

(b) Mini Rake:-This is a short rake with a composition shorter than the specified number of wagons required for a block rake. Mini rake can be loaded at TLR under the following conditions:

1. It will have a minimum composition of 20 wagons.
2. It can be booked to or from any notified full rake or half rake terminal.
3. Free time for loading/unloading will be 5 hours.
4. It can be loaded only up to 400 kms.
5. Permitted only in covered wagons

(c) Two Point Rake:-It is a train carrying wagons for two terminals. Two point Rake can be loaded at Train Load Rate under the following conditions:-

(a) Originating terminal should be notified full or half rake terminal.

(ii) Destination terminal should not be more than 200 kms. Apart in busy season 400 kms apart in lean season.

(iii) Minimum 10 wagons should be loaded for each destination.

(d) Multi Point Rake: - This is a train carrying wagons for more than two destinations Multi point rake can be booked at TLR under the following conditions:

(i) Originating terminal and each destination terminal should be notified full rake or half Terminal.

(ii) No two destination terminals can be more than 200 kms apart.

(iii) Minimum 10 wagons should be loaded for each destination.

(e) Two and Multi Point Rake: - (Other than covered wagons) such type of rake can be loaded at LR under the following conditions:

(i) Both the station should be notified full rake/half rake terminals.

(ii) Minimum 10 wagons should be loaded for each station.

(f) Rakes from Two Origination Terminals (covered wagons):- Rakes from two originating terminals Covered wagons can be loaded at TLR under the following conditions:

(i)Two point combinations from which loading is permitted, will be notified by the Zonal Railway.

(ii)Each notified terminal should be a notified full/half rake terminals.

(iii)Destination terminal should be notified full/half rake terminals.

(iv)Two loading terminals must be less than 200 kms. Apart.

(v) Minimum 10 wagons should be loaded from each terminal.

(g) Rakes from two Originating Terminals (Other than covered wagons): Booking at TLR will be allowed under the following conditions:-

(i)Each terminal should be notified full/half rake terminal.

(ii)Destination terminal should also be open for full/half rake.

(iii)Minimum 10 wagons should be loaded from each terminal.

(iv)Indent should be for complete Block rake.

(h) Multi Commodity Block Rake:- Block Rake of multi commodity will be booked according to following conditions:-

1. Both the originating and destination should be notified full rake/half rake points.
2. The total number of wagons indented and loaded should be according to the number of Block Rake.
3. Each wagon will contain one commodity. But different wagons can contain different commodities.
4. The customer will have to pay season surcharge or congestion surcharge also.

FREIGHT INCENTIVE SCHEMES:-

Following schemes are included in this category:-

1) Incentive scheme for incremental scheme.
2) Long term Special Incentive Scheme.
3) Incentive Scheme for Traditional Empty Flow Direction.
4) Incentive scheme for Freight forwarders
5) Incentive scheme for Freight forwarders in Traditional Empty Flow Directions.
6) Incentive scheme for Two-leg Traffic
7) Incentive scheme for Loading Bagged Consignment in BOXN
8) Incentive scheme for lump sum special Rates and SLA
9) Incentive scheme for Green field projects
10) Incentive scheme for Traffic on MG and NG system
11) Incentive scheme for Private Investment in Wagons
12) Incentive scheme for Underutilized Routes

Wagon Pool:

Wagon pool is an arrangement by which all wagons, except exempted by DWI, shall be made available for loading to any station. Individual railways own wagons in IR and thus wagon pool require pooling of wagons of all the Zonal Railways. The utilization of wagons involves inter-railway movement and hence utilisations of wagon pool is controlled and supervised by the DWI.

POOLED AND NON-POOLED WAGONS:

As various railway companies had evolved their own wagon designs, a wagon of lone railway system might not be considered safe or up to the standard by another railway company. To get over this difficulty, the IRCA evolved a system of examination of

wagons at inter-change points by its own train examination staff, which system came to be known as "**neutral train examination**". Such wagons as conformed to a standard design and were considered fit to move freely between one railway and another were taken into the common "**wagon pool**". Special types of wagon meant to carry special cargo on a particular railway or wagons not conforming to the standard design were called "**non pooled**" and when loaded to an adjacent railway, were required to be returned immediately to the owning railway by the shortest route. Gradually the vast majority of wagons came to be "**pooled**". There is another category of wagons which might be of low capacity or of very old construction and maintenance. There was yet another category of wagons which might be of low capacity or of very old construction and maintenance not up to accepted standard which could only be used for specific internal movement within each railway and were known as "**local traffic wagons**". Such wagons were not acceptable in interchange.

The exchange of wagons at terminal junctions between one railway and another thus enables free movement of goods through to destination irrespective of the jurisdiction on which the originating and terminating stations might lie. With the nationalisation of railways, the coordinating role of the IRCA has gradually been taken over by the Railway Board.

The working of the wagon pool may be compared to a bank advancing capital to a business. Each Railway contributes its own wagons to the pool which might be considered as equivalent to depositors keeping their money in bank accounts. In turn, each railway is authorised to draw out of the pool up to a certain number of wagons, depending upon its loading targets and the '**turn round time**'; somewhat like the limit up to which a bank may allow an advance to a business firm. For this reason, as with the business firm's advance from the bank, the receipt of additional wagons from other railways through interchange, which adds to the wagon balance of the railways, is considered an additional loan from the pool and is accounted as a debit transaction, while the handing over or making over of wagons to another railway, which reduces the wagon balance, is considered as return of loan to the pool and is a credit transaction. Wagon holding beyond the target may be considered as so much not borrowing of wagons from the pool, and the objective must, therefore, be to achieve the targeted loading with as little borrowing as possible.

The Railway Board, by watching the wagon balance and the movement of broad streams of traffic through important interchange points can readily feel the pulse of operation and regulate it as necessary. That is why the fulfillment of interchange quotas between Railways is considered one of the most important operating performance indices. In a similar manner, interchange targets and wagon balance targets are set and monitored for each division.

Pooled target is set for the distribution of wagon resources among the railways on the basis of the level of loading, WTR and the requirement. Relative requirement and urgency of existing traffic also considered for distribution of wagon resources. Debit target is fixed if requirement of wagons is more and Credit target is fixed if excess wagons are owned called as Pooled Wagon Target.

WAGON CENSUS ON BROAD GAUGE:

There are nearly 2, 25,000 wagons exist in the Indian Railways spread over 16 zones duly allotted to various divisions according to their requirements. It becomes very difficult to ascertain the performance of them if we don't monitor their movements. Monitoring the movement of wagons is done by stations and control offices and through the FOIS net work. These exercises are done on a daily basis and periodically also. Due to adjustments in loading in interchanges of trains, powers, empties and loads the link in constantly maintaining the physical availability of rolling stock becomes inaccurate. Hence an exercise called WAGON CENSUS is conducted every year for coaching and goods stock. It is separately conducted for coaching and goods, separately for BG and MG.

Broad Gauge Census:

1. BG census generally conducted on 31st October at 12 Hrs.
2. The division is divided into Blocks, Circles, and Districts.
3. A block may be a roadside station or a part of a large yard, a siding or a running train
4. In each block a maximum of 50 vehicles to be enumerated. In any case it should not exceed 99 vehicles.
5. A circle is a collection of Blocks.
6. A District is a collection of circles.
7. Numerical codes have been given for every division for identification.

A census meeting will be held prior to the official census day. CFTM holds the census meeting for goods wagon, which will be attended by the divisional officers and inspectors. Census in charge is nominated and their names and instructions are published. Generally CTNCs, SMs, GDs, CYMs are nominated for looking after the proper enumeration of wagons.

Tally sheets are supplied to the required extent. Three copies of tally sheets have to be carefully filled in, the third copy "TRIPLICATE" should be retained in the District office. Duplicate and Triplicate copies should be copies from the original and compared for correctness of the entries by 'Checked with the original and found correct. Circle summary and district summaries are to be prepared by the district officers in duplicate marking original and duplicate on the top of each front page. A final summary has to be prepared in a proforma summarising the information contained in the district summaries. It is essential that all duplicate copies are carefully checked with originals in all cases before submission to the office.

The following particulars should be enumerated while conducting Census on the nominated day.

1. Running trains of all descriptions
2. Wagons standing or stabled on any line including sidings or yards.
3. Wagons on ballast and on construction, work trains
4. Wagons in shops and in sick lines.

5. Vehicles employed temporarily for housing staff
6. In case a damaged loaded vehicle is being loaded upon another vehicle both vehicle numbers are to be enumerated.
7. Vehicle already condemned has to be entered in a separate tally sheet.
8. Port trust railway wagons should be recorded separately.
9. Wagons kept of the track on account of accident are accounted for
10. The outlying sidings, sheds, private siding, colliery, port areas etc, are specially checked for any vehicle.

All the staff involved in the census duties are to be briefed about their responsibilities. A mock census has to be conducted on the nominated day prior to the official census. The lacunae in the mock drill are to be identified and corrected. During the enumeration each vehicle should be stenciled by a census symbol of equilateral of six inches each side in white colour at extreme left of the vehicles on both sides. A representative of mechanical branch also involved to identify the mechanical code of the wagons. Each railway should update the list of the condemned vehicles after the last census was held, with necessary details, well before the census. The census timings are to be followed strictly. Shunting movements in the yard has to be stopped before the commencement of census.

Wagon codes

Vehicle codes for goods stock: - The following code letters must be used to designate the various designations of goods stock in use:

Definition of stock	Transportation Codes
OPENS	
1. Four wheeled, low sided truck	KL
2. Bogie low sided truck	BKL
3. Four wheeled, low sided truck with falling ends	KF
4. Bogie low sided with falling ends	BKF
5. Four wheeled high sided truck	KC
6. Bogie high sided truck	BKC
7. Four wheeled high sided truck	KCA
8. Bogie high sided truck	BKCA
9. Four wheeled, platform truck	KU
10. – do – high sided special for coal	KCC
11. – do – open truck, Military	KM
12. – do – weight bridge testing	KV
13. – do – – do – ballast wagons	KW
14. Bogie – do – hopper wagons	KH
15. Bogie truck hopper	BKH
16. Four wheeled, open truck, sugarcane	KK
17. Four wheeled, open truck for fire wood and timber traffic	KKF

COVEREDS

18. Bogie open wagon	BOX
19. Bogie hopper wagon	BOB
20. Four wheeled, covered wagon	C
21. – do – for jute	CJ
22. Bogie covered wagon	BC
23. Four wheeled wagon for live stock	CA
24. Bogie wagon for live stock	BCA
25. – do – explosive van	X
26. – do – goods brake van	V
27. Brake cum rest van 4 wheeler	VB
28. Four wheeled heavy brake van (ghat) goods brake van	VH
29. Bogie covered wagon	BCXT
30. 27 tonnes covered four wheeler wagon	CRT
31. Six wheeled creosote oil tank	TC
32. Four wheeled kerosene oil tank	TK
33. Bogie kerosene oil tank	BTK
34. Four wheeled liquid fuel oil tank i.e. heavy oil	TL
35. – do – Molasses tank	TM
36. – do – Petrol oil tank	TP
37. Bogie petrol tank	BTP
38. Four wheeled vegetable oil tanks	TV
39. Bogie vegetable oil tank	BTV
40. Four wheeled lubricating oil tank	TZ
41. – do – Turpentine oil tank	TT
42. – do – Water tank	TW
43. Bogie water tank	BTW
44. Four wheeled water tank converted from engine	TW(L)
45. Tank acid 4 wheeler	TA
FLATS	
46. Four wheeled dummy or relief truck	FD
47. Bogie dummy or relief truck	BFD
48. Bogie well wagon	BFU
49. – do – well wagon (for military use)	MBFU
50. Four wheeled rail and timber truck	FR
51. Ramp wagon 4 wheeler (Military use)	MFR
52. Bogie rail and timber truck	BFR
53. Traveling cranes	Crane

Note: - (i) The code initials of each description of goods stock are marked on the right hand top corner of the vehicle. The staff must refer to these initials in case of doubt.

(ii) If vacuum fitted goods stock is required this must be specially mentioned in the stock order the exception of some departmental vehicles, all goods stock is either fitted with train pipe or vacuum brake.

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Chapter 6

PREFERENTIAL ORDER

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.

1. This Priority Schedule is decided by Traffic Transportation Directorate of Railway Board.
2. It lists the Sponsoring Authority and Accepting Authority for programmed traffic.

Section 71 of the Railways Act, 1989 the Central Government hereby directs that all Railway Administrations shall give special facilities for or preference to the transport of goods/class of goods at a station/siding as per priority/preference in the following order:

Priority 'A'- Military traffic, when sponsored by MILRAIL and approved by Railway Board.
Priority 'B'- a) Goods for emergency work for victims of natural calamities, like floods, drought, earthquake etc. b) Programmed traffic like food grains and levy sugar for public distribution system.
Priority 'C'- All Programmed traffic, commodities when sponsored and accepted by authority.
Priority 'D'- All traffic not included in priority 'A' to 'C'.

GENERAL INSTRUCTIONS:

1. Traffic will have preference over other traffic within the same class of priority in the following order:
   a) Traffic covered by contractual obligations and/or guaranteed under specific schemes like Wagon Investment Scheme, Freight Forwarder Scheme, Terminal Incentive –cum-Engine-On-Load scheme (TIELS) etc.
   b) Traffic in rakes loaded from a Siding/Good shed having round the clock working.
   c) Traffic in rakes a full rake handling siding having mechanized system of loading.
2. Traffic offered for distance of more than 800 kms will have preference over other traffic within the same classification and priority.
3. Traffic offered in block rakes, including clubbed indents constituting a block rake will be given preference over traffic in piecemeal irrespective of the class of priority and date of registration.

4. Traffic offered in single point block rakes will be given preference over two point/multi-points block rakes and mini rakes within the same class of priority.

5. Any traffic can be accorded preferential loading and movement under a higher priority under special orders issued by the Ministry of Railways, Railway Board/Zonal Railways.

6. Two days in a week shall be reserved and notified for allotment of rakes as per the date of registration irrespective of the class of priority.

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 l(Volume-l) 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.

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Chapter 7

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 (1676MM)	MG (1000MM)	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-15KMPH	Day & Night	TXR
C	CRS	BG-25 KMPH MG-25 KMPH NG-15KMPH	Day	SE (C&W) SE(P.Way) Tl

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 S3/SM of the station from which the load originates. In addition to strictly adhering to the specific route, the restrictions (e.g. 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 advice the COM of other Railways 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 must invariably be awaited before consignment is dispatched. 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 led down.

On Electrified Sections:

a) In addition to the precautions laid down above, the following special precautions be observed for transport of over dimensional loads on the electrified sections.

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.

- Special speed restriction is not required when the gross clearance is at least 390 mm.
- Speed must be restricted to 15 km/h, when the gross clearance is in between 390mm to 340 mm.
- Speed must be restricted to 15 km/h and over head power must be switched of when the gross clearance is less than 340 mm.
- No consignment with less than 100 mm gross clearance from the overhead Contact wire will be permitted over electrified section.

7. A representative of the traction departments should also accompany all ODC having clearance as specified in item (b) and (c) of sub Para (3) above, over Electrified section.

8. 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.
9. Section controllers and Traction power controller must co-ordinate, while an ODC moves on electrified area.
10. A list of structures, where the clearances are restricted on the electrical traction area and also the clearance available under over bridges should be with the Section controllers and Traction power controllers.

Dispatch 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 advice 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 authorized 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 304mm 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 idle.

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Chapter 8

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.

Objectives of the control organization:

1. To ensure Punctuality of the mail / express and passenger trains.
2. To ensure maximum utilization of the rolling stock
3. To ensure maximum utilization of the section capacity
4. To increase the speed of goods trains.
5. Maximum utilization of the train crew.

Control organization at RB level

CRB

MT

Additional member (T)		Additional member (C)
ED (Freight services)	ED (Cog)	ED (Safety)
Director (Freight marketing)	Director (P)	Director (Cog) Director
JD	JD	JD
DD (F/Cell)	DD	DD
AD	AD	AD
CHC	CHC (P.Cell)	CHC (Safety Cell)
Dy. CHC	Dy. CHC	Dy. CHC

Control organization at Zonal level

GM
AGM
COM

CFTM CPTM CTPM CTM (POL) CMPE

Further:

Dy. COM (Goods)	Dy. COM (FOIS)	Dy. COM (CNM)
ATM (Goods)	STM (FOIS)	ATM (Central Control)
MI / TI		CHC
TNCs	TNCs	Dy. CHC
		TNCs
CPTM	CTPM	CTM (Pol) CMPE
Dy. COM (Cog)	Dy. COM (Pl)	CTW controller Dy. CME/Dy. CEE
STM (Cog)	Dy. COM (Rules)	TW controller AME/AEE
ATM (Cog)	ATM (Rules & Pl)	TNCs
Emergency control	MI / TI – C.Pl.I	
CHC	Pl. I	
Dy. CHC		
TNCs		

CFTM: Chief Freight Transportation Manager,
CPTM: Chief Passenger Transportation Manager,
CTPM: Chief Transport Planning Manager,
CTM: Chief Transportation Manager (POL – Petroleum, Oil and Lubricants),
CNM: Chief Network Manager;
STM: Senior Transportation Manager.]

Traffic control is divided into two units at the HQ level for easing up its objectives:

a. Central control, and
b. Emergency control

Responsibility of traffic operation through out the zonal Railway lies with COM assisted by CPTM, CFTM. The COM advices all divisions regarding traffic and ensure that the objectives are fulfilled as per policy guidelines and planning.

A. **Central Control**: Chief controller is the head of the central control. All the functions are done on his direct supervision. He is responsible to the COM. Dy. CHC (Coaching, Goods, and Stock) assists the Chief Controller.

The following are the functions performed by the central control:

1. Maintain punctuality of all passengers, M/E trains run in CR.
2. Inform the running position of trains to foreign Railway along with late running and also the description of late running trains and departure time of trains.
3. Observe loss of punctuality percentage, its causes, and position of coaching stock, current situation of wagons, parcel vans etc and collection of data.
4. Wagons available in divisions, received and forwarding wagons, yard balance at ZERO hour and figures of wagons at 24:00 hours i.e. clearance.
5. Collection of figures of received tank wagons in excess, and for transshipment.
6. Collection of figures of stabled wagons with description of vehicle / train.
7. Analysis of detention to trains.
8. Running of goods trains to their best possible paths.
9. Elimination of avoidable detention to goods stock at loading and unloading and TP sheds.
10. Allotment and distribution of goods stock to the Stations.
11. Arrangement of line blocks and to provide maximum time possible for the working of material trains.
12. Arrange relief for crew.
13. Ensure optimum utilization of the locomotives.
14. Issue proper instructions for train working during abnormal working.
15. Arrange speedy relief in case of accident.
16. Help connecting the unconnected wagons.
17. Ensure correct marshalling of trains.
18. Assist in the preparation of timetable in coordination with neighboring divisions, and Railways.
19. Advice stations and permanent way staff regarding weather warning to take necessary precautions.
20. Arrange periodic census.

B. Emergency Control:

1. The Chief of Emergency Control Office is CHC assisted by Dy. CHC in shifts.
2. Dy. CHC prepares figures of passenger trains run shift wise and as per the directives of CHC.
3. In each emergency control, advance diary is prepared in which special instructions are mentioned. This diary is made data wise in different pages.
4. Record of operation of special trains, bogies is kept in this office.
5. Concerned divisions are informed of passenger trains and other coaching trains.
6. Data is made is case of accident and concerned department's officer is informed.
7. Keeps a close watch on the relief trains.
8. All the data regarding coaching such as Fair Special, Summer Special, Relief Special etc is collected.

Control organization at the Divisional level

DRM

ADRM

Sr. DOM

DOM

AOM (Goods) Area Officer AOM (Coaching)

CHC

CHC (P) CHC (G) CHC (S) PCOR, TLC, TPC, S&T, Engg., Comml., Security.
Dy. CHC (P) Dy. CHC (G) CTNC
SCOR SCOR
TNC TNC

The Control Organisation is one of the Principal Means by which the essential Co-ordination is obtained in Railway Operation. It is from where, the planning activities of day to day working are done and the orders are issued to the stations and yards for execution.

It can be compared to the brain of human. Normally the Divisional Control Office is located in the Divisional Head Quarters and connected to the station and yards through various communication systems. If the size of the division is large and controlling becomes difficult a sub control office may also be provided at a convenient location.

The area spread of a division is divided into control sections having a given number of stations. A section is generally of the range of 150 to 200 km stretch and the trains are controlled in the section by the Section Controller. 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 train is plotted on time distance graph to record their actual progress, these records, called control charts, can be analyzed later.

Sr.DOM has the administrative control of the Divisional Control Office. CHC is the head of the control organisation. For easy and effective controlling, the entire division is divided into various sections and a well knit communication is provided for monitoring minute to minute activities at stations and yards. CHC (In-charge) is assisted by –

Dy. Chief Controller Goods / Mainline
Dy. Chief Controller Coaching
Dy. Chief Controller Stock
Section Controllers
Chief Trains Clerk
Head Trains Clerk
Trains Clerks

The Chief controller being the head of the control organisation is assisted by Dy. Chief controller in Freight and Passenger train operations. Dy. CHC looks after the Traffic Control who will guide and assist the SCORs.
All technical disciplines involved in train movement have are representative in the control office to provide the required support from his department. These would include-

Chief Diesel Power Controller
Chief Traction Loco Controller
Chief Traction Power Controller
T X R Controller
Commercial Controller
Engineering Controller
Signal & Telecommunication Controller
Security Controller
Crew Controller
ETL Controller
Safety Controller
F O I S In-charge

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 Function of control:
1. Train Control:
a) This job is done by SCOR.
b) Each SCOR is provided with the master chart of that section.
c) In the master chart the path of M/E and Passenger trains are charted in different colors.
d) This master chart helps in making advance planning by SCOR.
e) With the help of master chart, SCOR guides the SM and Yard Master relating to the movement of trains.

f) SCOR gets advices regarding train operation and optimum use of wagons and engines from the CHC and Dy. CHC.
g) Supervising & regulating movement of trains from station to station on the section to avoid delay to trains and to maximize utilization of the capacity of the section by :-
    1. Monitoring movement of trains from station to station and recording paths and detention on charts.
    2. Arranging crossing and precedence of trains judiciously.
    3. Arranging working of departmental and material trains.
    4. Giving time signal to all stations on the section daily at appointed time.
    5. Fulfilling interchange commitment.
    6. Arranging proper movement of assisting/banking/light engines.
    7. Clearance of sick wagons from Roadside stations.
    8. Arrangement of relief for 10 hours duty staff.
    9. Incident management on rail network & at station.
    10. Arranging Engineering and/or power blocks in such a way as to involve minimum disturbance to train running.
    11. Maintaining fluidity of yards by controlling the flow of stock in and out of yard.
    12. Arranging Speedy relief in case of accidents.

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

a) Traffic Control means controlling and regulating the movement and distribution of coaching and goods stock and directing it's loading, unloading, dispatch and arranges passage through yards.
b) The aim of traffic control is to maximize unloading and loading in the division, fulfill the interchanging of trains and effective utilization of the available resources such as engines, wagons and bankers etc.
c) This job is performed by Dy. CHC in the division such as ordering the movement of goods train, allotting the wagons to goods shed and station for loading, giving special attention to block rakes, giving inward traffic for loading, advise regarding running of loaded or empty wagon rakes.
d) Granting of blocks to engineering, OHE and S&T departments.
e) Look out for speed restrictions and running of material train and give blocks for repairs and maintenance in such a manner so that it would not affect train movement.
f) To admit trains in yard in such a way so that working capacity of the yard is not affected.
g) Collecting information from the various section in respect of -
    a. Registration of wagons outstanding at stations and arrangements for supply of wagons.
    b. Number of wagons loaded and empty wagons/rakes awaiting dispatch.
h) Arranging running, regulation, putting back and cancellation of trains. (both freight & coaching) and to ensure optimum utilization of loco and staff to derive maximum benefit..
i) Collecting stock position from the different stations, marshalling and terminal yards, arranging supply of wagons against pending registration and ensure optimum utilization of stock by securing maximum loads for trains with minimum detention

j) Arrangement of crew & Guard for freight trains.
k) Monitoring and coordinating working of yards, goods shed sidings, loco-shed, TXR depots etc and to keep liaison with adjoining Railways and Division for interchange commitments.
l) Keep strict vigil on the wagons, which are unable to move and make arrangement for quick repair of them.
m) In case of accident inform all the concerned officials and the other staff.
n) To make arrangement of men for speedy availability of assistance at accident site including ART/MRV, crane etc and ensure quick dispatch of the break down in case of accidents and other coordination.

3. **Power control** is responsible for provision of motive power to all trains by maintaining position of locomotive
(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 kilometers is kept to the minimum.
(f) Provided 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 equipment & 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 control.**
(a) To expeditiously dispose of 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 transshipment 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., though remote control.
c) Monitoring OHE failure 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, co- ordinates works during maintenance blocks and 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. **Crew Control:**
a) Crew control ensures availability of Train crew (Driver).
b) He has got the details of all kinds of loco pilot available in the division like Goods & passenger.
c) Issue instruction to all depot/Lobbies regarding movement of crew so that crew may be available for the traffic in all directions as per forecast.
d) Maintain the balance of crew with all adjoining divisions.
e) Arrange relief for loco pilot and avoid bursting of 10 Hour rule.

11. Safety Control:
a) To provide valuable assistance to the Sr. DSO /DSO.
b) Report any accidents / unusual occurrences to the officers concerned.
c) Co-ordinate relief and restoration operations including monitoring of prompt dispatch of ART/MRV.
d) Keep in touch with station regarding failure of safety equipment and Supply safety store.
e) Monitoring implementation of 10 Hrs. rules for running staff.

12. ETL Control:
Issues instructions to ETL staff if complained regarding fan, light, Battery and dynamo in train.

13. **Function 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. Correct ordering of trains and use of locomotives so as to reduce to a minimum the productive time of power and personnel, and losses on account of wasted haulage capacity on trains and thus to keep the "turn round" as low as possible;
c. Systematic maintenance of accurate charts of train movement and the arrangement of crossing and precedence to the greatest advantage.
d. Analysis of detentions to trains
e. Planning, ordering and running of goods trains to the best possible paths.
f. Maintaining the fluidity of marshalling yards/freight terminals.
g. Taking remedial action in the event of yard/terminal congestion.
h. To allot and distribute coaching and goods stock and direct its loading, dispatch, and movement, particularly through intermediate marshalling yards, and to so direct its placement and quick release so as to attain the quickest possible "turn round" and ensure elimination of avoidable detentions to goods stock at loading and unloading points and at transshipment stations.
i. To keep in the closest touch with the operation of continuous sections and divisions so as to avoid congestion and lack of fluidity;
j. Supply of information to adjoining controls, terminals and engine changing stations regarding the movement of trains to enable adequate timely arrangements for their reception and onward dispatch.
k. Arranging of engineering and other department blocks with minimum detention to traffic.
l. Running of material trains and other track machines, tower wagons etc.
m. Arranging relief for engine crew and Guard.
n. Ensuring maximum utilization of locomotive.
o. Issuing instructions for train working in case of equipment failures and whenever abnormal method or working has to be resorted to.
p. Speedy arrangements for relief rescue and restoration in the event of accident.
q. 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.
r. To keep a watch over damaged stock at road side stations, yards and sick lines and to ensure that they are promptly attended to.
s. To rectify immediately the irregularities on the part of line staff and provide them necessary guidance.
t. To provide operations management information.
u. To ensure smooth functioning of FOIS and other IT applications.
v. To provide an impulse of human energy and brain power throughout the section and by coordination and direction ensure the free movement of traffic and thereby obtain the maximum output from each unit involved at the minimum cost to the administration.

The functions of the Control organisation may, for the purpose of understanding be conveniently classified under the heads of planning, execution and review, though in practice, of course, all three activities would be going on simultaneously.

PLANNING

1. forecast of interchange;
2. forecast of trains to be run section wise;
3. forecast of supply of empties for bulk loading transshipment, etc.;
4. forecast of unloading;
5. planning for engineering blocks and special moves.

Information required for this purpose:

1. power availability
2. availability of loads
3. disposition of empties and planning for loading
4. analysis of midnight divisional wagon balance

The plan is made by CHC daily at 0800 hrs. and reviewed by Sr.DOM and HQ is informed by 1000 hrs. both immediate and antecedent, for taking remedial action to prevent their recurrence.

EXECUTION

The day's plan is to be executed by yards, loco sheds, TXR depots, transhipment supervisors, area controls, SMs and must, therefore, be communicated to them as soon as it is finalised.

Instructions are given in the course of the morning conference, modified as necessary after conference with the HQ. The performance is reviewed once at 1600 hrs. and briefly at night.

REVIEW: OBJECTIVES

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

The following are the main features of the previous day's performance which are reviewed:

interchange
divisional wagon balance
train running
disposition of empties
particulars of stabled loads
yard balances
unloading on division
registrations and loading
transshipment performance
punctuality
power utilisation
sick line working
accidents, unusual occurrence
special type stock
crane wagons (heavy lift)

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. Mobile Train Radio Communication (MTRC)
3. Dual Phone Modulation Frequency (DPMF)
4. 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 with STD or Trunk exchanges.
3. Deputy Control lines:
   This circuit is provided between various functionaries in the control office, stations and important work centers 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 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 connected 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 element section in different colours & other details of sectioning post (SP) and Sub-sectioning post (SSP).

7. **Graphs and Plotting:**

1. Trains are plotted on control graphs which consist of horizontal and vertical lines representing distance and time respectively. Along side vertical lines stations are each and each unit is further sub-divided into 5 smaller units of 2 minutes each.
2. 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 Kilometers.
   b. Distance in Kms between each station on the section.
   c. State 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 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.

3. 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 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.
4. 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 computerised 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 section according to its scheduled running. In between the running of the trains carrying passenger, paths for goods trains are worked out and plotted. They are helpful in revision of Time tables and planning the running of any extra trains and guidance of SCORs and should be displayed on the board to which they refer.

Preparation of Master Charts:

Trace out the paths of Passenger/Mail/Express Trains keeping in mind the timings necessary at divisional and zonal interchange points.

The following points are to be kept in mind while preparing Master Charts:

(a) The Capacity of originating yard in forming trains and starting them.
(b) The capacity at the terminals to receive the trains (Availability of platform lines, Pit line, TXR lines etc)
(c) Facilities at enroute for crossing or precedence.
(d) Spreading out evenly occupation of Block Section to avoid bottlenecks, if trains run late.
(e) On Double Line grouping of trains of uniform speed, so that detention and precedence becomes minimum.
(f) On single line sections, if the paths of Up and Dn direction trains can be traced at different periods the number of crossings can be reduced.
(g) Running time of Trains suiting to 10 Hours duty of running staff i.e. total running time (Yard departure to yard arrival) should not be exceeding to 8 hours of Goods trains (as minimum 1 hour has been provided for signing 'ON' & 'OFF' duty and average 1 hour pre-departure detention).
(h) Keeping in mind the time for crew changing, fueling, watering the coaches, passenger lunch/dinner.

Integrated Blocks:

In order to ensure safety and reliability of the system the maintenance and repairs to the track points and crossings, Bridges, Signals and Overhead equipments etc. is inevitable. To make best use of available time integrated blocks are planned in co-ordination with different departments to undertake the maintenance works simultaneously instead of piecemeal blocks taken by different departments separately. Duration of the integrated blocks is determined on the basis of margins available in the Master charts and passenger operations. The details of integrated blocks are notified in the working timetables separately for each division indicating the section up and down lines, duration of block period and their implications, if any. These blocks are subject to minor adjustments depending upon running of trains. However, all out efforts should be made to ensure that the blocks are permitted as prescribed in the working time tables. The running of trains particularly goods trains should be adjusted by the Sr.DOM and Chief Train Controllers of respective divisions to avoid detentions during the block on account of temporary single line working and precedence being given to passenger carrying trains. Except for the works given in the TWOs, no other maintenance block shall be given to any department. All works shall be allowed within the Engineering allowance provided for each division.

Principal Chief Engineer, who shall co-ordinate the operation of blocks and maintenance works by all other departments, nominates one of the Sr.DEN of the division. The works to be executed shall be planned in advance in block meetings attended by officers of concerned department with all preparatory arrangements made well in advance for the smooth and timely execution of blocks without causing undue detention of traffic and inconvenience to passengers.

All concerned should ensure that blocks are not burst as to avoid adverse effect on running of trains and inconvenience to traveling public.

Traffic Corridor Block:

1. It is the time interval between two successive scheduled Mail Express trains in the particular section on the Division available for maintenance work done by various departments.
2. It is mentioned in the Working Time Table of concerned division.
3. The corridor block is shown in the master chart of the concerned division.
4. This period of corridor block may also be used for running goods trains.
5. Maintenance schedules on the divisions are to be managed as per the corridor blocks.

C H A R T I N G:

It is nothing but plotting all the train movements in a time and distance chart by section controller. Master Chart is prepared and kept before him as a guide for plotting Passenger / Mail / Express movements. After tracing the paths for all Passenger Carrying Trains the paths of Goods Train can be traced and they are classified in to 3 kinds.

1) Goods Path - Requiring minimum running time.

2) Auxiliary Path- Suitable for short distances
3) Bad Path - Shall not be used except in case of emergency because it occupies maximum time.

For the purpose of Section Capacity the paths of scheduled trains and goods paths are only taken into consideration and the number arrived at, shall not be less than the number obtained by Scott's Formula. If so, it is considered as lead charting and requires revision.

Method of Charting:

Every chart is printed for 8 Hours which shall by charted neatly and legibly in the following manner:

1. Station names are printed in vertical rows, as far as possible in proportion of main distances with required details like Kilometer, inter-station distance etc., in the left and station codes on the right.
2. The station name from Top to bottom refers down direction and bottom to top - Up direction.
3. In the horizontal row, broad lines refer to hours and these are further divided in to by thin lines in 6 parts. Every line is referring to 10 minutes each of which in further sub divided into 5 parts, by dots each dot referring to 2 minutes.
4. The timings of trains are marked by dots above the line for Up trains and below the line for Down trains usually.
5. The progress of Up trains is indicated by a line from bottom left to top right and progress of Dn train is indicated by a line from top left to bottom right.
6. Trains being received from other stations from other sections or going to other sections from a section or starting from a station in the same section or terminating in a station in a same section are to be shown by a line in the same Up and Down inclination either with vertical line or dissimilated inclination starting or ending.
7. Blocking of running line is indicated by drawing a continuous horizontal red line either below or above the line, as per its direction, from the time it is blocked till it is cleared.
8. Time loss or gain in a section is shown as plus or minus with minutes.
9. Temporary speed restrictions are indicated in the form of a small red triangle with prescribed speed restriction, on the right side between two station codes.
10. Attaching of loco is indicated by a semi circle up or down depending upon the actual direction.
11. Train parting / dividing is indicated by showing detention in mid-section by drawing a horizontal line, the plotting movement of the first portion to the next station. The second portion is indicated by a dotted line in red. Arrival of engine, attaching and clearing second portion is plotted normally.
12. When scheduled trains lose time, in section, the schedule passage is shown in dotted line and actual passage is plotted.
13. Detentions to trains are to be serially written in remarks column.
14. Usually the following colours are used for plotting:
    (a) Mail/Express Trains and other trains to time – Red
    (b) For other passenger carrying trains - Blue

(c) Goods trains (Electric Traction) - Green
(d) Goods Train (Diesel Traction) - Lilac
(e) Other Goods Trains, Ballast Trains - Ordinary Pencil

Checking of Control Charts:

Control Charts have to be checked regularly to take up all cases of detentions that have taken place and also other irregularities. Chief controller to scrutinize the charts, AOM looks and gets a picture of it and DOM does test checks.

Chart reading brings out the following:

Late Starts; Wrong crossings and precedence; Wrong stabling of goods trains; Cross working of light engines etc.,

Duties of Control Staff: The main duties of control staff which are only guidelines to their day to day working and are not exhaustive are as under.

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 conform 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 headquarters, adjoining Division, Railways.
iii. These will generally relate to interchange, loading and locomotive utilisation.
iv. Checking control chart and bringing to the notice of the Senior Divisional Operations Manager/Divisional Operational 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 obligation
viii. Watching detention to stock at stations and terminals.
ix. Watching the work of Marshalling yards/Freight terminals.
x. Maintaining liaison with neighbouring Division.
xi. Watching utilisation of loco and their terminal detention.
xii. Checking duty hours of running staff and balancing of crews.
xiii. Granting engineering, 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 train, 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 Deputy Chief Controller (Stock), maintaining constant touch with adjacent Division through regular conference to facilitate the smooth flow of traffic.
iii. Dealing immediately with significant detention or transport bottleneck and other unusual.
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 accident to all concerned, and taking, charge of the affected sections.
vi. Supervising the running of oversized consignments.
vii. Maintaining liaison with Power controller.
viii. Coordinate the work of various section controllers.
ix. Maintain discipline among control staff in the absence of Chief controller.
x. Maintain coordination and liaison with various functionaries involved in train running.

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

He is responsible for:

i. Scruitnising 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 transshipment 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 lines and yard on their Division.
xi. Informing all major customers about their inward trains' expected arrival based on FOIS pipe line, Optimising loading, unloading, transshipment etc.

d) Duties of Dy. Chief Controller (Punctuality):

i. Ensuring punctuality of passenger trains in system.
ii. Ensuring punctuality at the start of the all outgoing passenger trains.
iii. Maintaining Detention Reports of Coaching trains.
iv. Ensure that late running trains make up time.

e) Section Controller:

The Section controller shall be responsible for:

i. Reporting for the 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 detention 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 the trains to avoid the calling of Crew and Guards earlier than necessary or to put back train 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 movement of the trains in view of the likely impact of the incident, informing all concern.
ix. Keeping a watch over damaged vehicles detached at road side stations and arranging repair or transshipment of their contents and proper 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)

f) 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 SRDEE/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)

g) 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, section 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, imposition power blocks etc.

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

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

v. Advising promptly the concerned officials in case of accident, 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 Guard's lobby from Control should be entered in the control order register by the staff. Each entry must be initialed with time. At the end of each turn of duty the relieved as well as the relieving SM 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 to satisfy 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 controllers.

iv. Every station on the section must report the movement of every train-passenger, goods, special, departmental, light engines, TTMs, Tower wagons, trolleys etc. to the controller.

v. When the control 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 station 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 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 master of terminal and engine4 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 movement 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 chare, diary and registers.

xvi) 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 operation 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 indication Emergency. The controller will immediately attend to the Station having an emergency; Stat5ion 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 Controllers permission has been obtained. The Station M aster receiving the line clear enquiry must immediately ask the controller 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 Controllers 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 Station: 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 his to arrange crossing and precedence of trains. In the event of Station Master being unable to start a train ton 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 affected 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. Presidents and VVIPs 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 instruction 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 mitigate hardship to passengers must be giver 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 instruction issued by the railway administration.

Items checked by Sr. DOM daily / at regular intervals:

(i) Interchange of Trains:

Three checks a day (at 08.15 Hrs, 17.00 Hrs, and 22.00 Hrs.)

(ii) Train Running and Train Ordering:

A study will be done at 08.15 Hrs, 17.00 Hrs and at 22.00 Hrs. This position should be prepared in proforma and given.

(iii) Analysis of DWB:

This should be done in the morning when the forecast being scrutinized.

(iv) Yard Balance:

This should be checked once in morning secondly at 17.00 Hrs. This information also should be given in a proforma.

(v) Unloading:

Previous day's unloading and left over for unloading is assessed. Planning for the day's unloading should be checked. Placement of wagons done for the day also should be checked. In the evening the position has to be ascertained by Sr. DOM once again.

(vi) Loading:

One check in the morning is sufficient. But, if loading is more an additional check may be done in the evening.

(vii) Transshipment:

The position of Transshipment points should come to Sr. DOM on prescribed proforma twice a day.

(viii) Performance of Sectional Trains:

Every day, Sr. DOM should verify from the prescribed registers.

(ix) Power Position:

The position of Electric Loco, Diesel Locos should be checked thrice a day. Utilisation may be checked once in a day. Dy. CHC should bring the abnormal delays to the notice of Sr.DOM as and when required.

(x) Average Speed of Goods Trains:

Daily once the position is given to Sr. DOM. If it comes down in a section below the target, Sr.DOM will check up the control chart and suggest corrective measures.

The following items may be checked periodically once in every 10 days:

- Analysis of performance of section trains.
- Analysis of running link and crack trains.
- Percentage of RT start of trains from yard.
- Analysis of Detention to trains for reception in yard.

The following are analysed in detail monthly:

- Average speed of goods trains.
- Wagon utilization, Engine utilization; and Marshalling yard statistics
- Performance of major goods sheds and transship shed.

- Average detentions to sick and special type of wagons.
- Loading performance on special commodities and Staff strength.

Review of Freight Operations by Divisional Control Organisation: (objectives)

a) Analysis on shortfalls during the previous day performance and to take remedial measures.

b) Pin pointing areas which need special attention.

c) Providing basic data for planning (forecasting) for the current day.

The items of review may vary appreciably from division to division depending on local conditions and pattern of traffic. Some of the common aspects for review are mentioned below.

(a) Interchange: Prepared in a proforma with details of previous day's performance, which includes Made over, Taken over. The differences in handing over and taking over and divisional wagon balance shall be mentioned in a proforma.

(b) Trains Running: Number of Trains run section wise, stock cleared (Throughput), and the balance left over is another important aspect to be reviewed.

(c) Analysis of DWB: The analysis should pin point streams and regions which have excessive balances and which need special attention.

(d) Deposition of Empties: It is necessary for mopping up empties for proper planning loading and to hand over at the interchange points.

(e) Particulars of Stabled Loads: Though some times, it is inevitable to stable the load at enroute stations, efforts to clear them early are to be reviewed.

(f) Yard Balance: Detailed study on the position of individual yards is to be analysed.

(g) Loading / Unloading: The loading and unloading performances are recorded in the proforma wagon wise, Commodity wise and reviewed. For any short fall corrective measures are suggested.

(h) Power Utilisation: At least 8 Hourly position should account for Diesel / Electric loco holding in the division and their deployment. Average detention is to be compared with the target. If any rise in detention, the area detention is to be identified and remedial action to be taken.

(i) Sick Line Position: Sick Line placement is to be watched. Review whether the full capacity is used or not and releases from sick line is optimum.

(j) Accidents and Unusual Occurrences: This is reviewed daily by the DOM. The area of slack working / Unsafe working are to be identified and action has to be initiated.

Books / documents and basic records to be kept in control office.

1. Station working rules of all station.
2. Working facilities available on the transshipment sheds.
3. Schedule of shunting engines in the various yards.

4. Link diagrams of rakes and engine 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 sections 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 fueling etc.
10. Master charts depicting all trains indicated in the working time table in force.
11. charts showing jurisdiction of the various official 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 department 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 divisions 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. Sections controller's diary and charge book.
    b. Inward message book.
    c. Outward message book
    d. Working order register
    e. Weather warning and acknowledgement register
    f. Sick wagon register.
    g. Yard report register.
    h. Stock report register
    i. In-coming and out-going trains RD (Running Diary) (other than passenger)
    j. Train Advice (T.A. Book)
    k. Caution order register.
    l. Caution order message book.
    m. Morning (6'O clock) position registers.
    n. Engine book.
    o. Interchange Register.
    p. Load register.

q. Incoming and Outgoing passenger Train Running Diary.
r. Points and S&T Failure Register.
s. Important Yard balance Register.
t. Control failure Register
u. Safety circular register
v. Road map register
w. Night order book

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. Bans and Restrictions register
   e. Forecast and Acceptance Book.
   f. Train Ordering Book.
   g. Punctuality Register.
   h. Without brakevan movement register
   i. Accident Register.
   j. HQ's Conference Register.
   k. Central control register
   l. Emergency control register
   m. Goods Train Performance Register
   n. FATO register
   o. GM's Unusual Occurrence Register.
   p. CTNL (Movement) / (Coaching) / Dy. CTNL's Order Book.
   q. ODC Register.
   r. Rajdhani Express (and similar trains) Caution Order Register.
   s. Emergency and General Control Office Message Register (Outward)
   t. Engine Book.
   u. Emergency and General Control Office Message Register (Outward)
   v. 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.

Periodical Performance Reporting and analysis of Operating Performance along with compilation of statistical data.

Periodical performance is reported confidentially every month by DRM of each division to GM. It is called Periodical Confidential Demi Official Report (PCDO / MCDO). It is prepared separately by individual departments of division and submitted to respective HODs. Apart from this a consolidated PCDO / MCDO is also sent to GM by DRM. Following are the contents of PCDO / MCDO:

General –

(a) Observing 'No complaint work' when ordered;
(b) Conservation of petroleum products;
(c) Shut down of diesel loco detention exceeding 01 hour;
(d) Lub-oil consumption;
(e) Servo 57 oil;
(f) Massive ticket checking.

BG and NG loading;

Safety and safety drive;

Commercial-

(a) Number of tones loaded;
(b) Percentage;
(c) Reasons for deterioration

Engineering;

Mechanical –

Punctuality;
Engine failure;
Stabling cases;
Outage of diesel goods;
Inspection by officers and inspectors;
Staff PME;
Staff over due for refresher;
DAR cases on account of punctuality;
Overtime allowance;
Vacancy position;
Staff position;
Stock items;
Safety;
Special additional information;
Training programme for running staff

Other departmental matters requiring the attention of GM;

Matters requiring the attention of Railway Board

Comparative study of outstanding figures, ticket checking, and other earnings, ambush checks and unconnected wagons.

Operating department fixes the target for revenue earning traffic to achieve economy and maximum utilization of the available resources, cut down the working expenses and improve the efficiency and for quick and safe movement of passenger and freight traffic to analyse the operating performance by GM, AGM and COM assisted by other officers.

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.

Chapter 9

COMMAND, CONTROL AND COORDINATION OF EMERGENCY RESCUE OPERATRION 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:
   a. Save lives and alleviate suffering
   b. Provide help to stranded passengers and arrange their prompt evacuation.
   c. Instill a sense of security amongst all concerned by providing accurate information.
   d. Protect Railway property.
   e. Ascertain the cause of accident, preserving clues by cordoning of incident site etc.
   f. Expedite restoration of train operation.

   There is a different between a disaster and an accident. All disaster need not be the 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:**
   a) Fire, smoke emission, explosion in railway premises including train.
   b) Derailment of a passenger carrying train.
   c) Collision of a train/ trains.
   d) Security threats / Terrorist attacks, widespread violence, bomb explosion.
   e) Release of Chemical or biological gas in trains, stations or tunnel.
   f) Natural calamities like cyclone, floods and earth quakes.

3. **Definitions :** In the context of India Railways, unusual events are classified as under:
   a) Incidents: which cause delay to trains.
   b) Accidents – which have the potential or do actually cause loss of life and or injury and damage to property.
   c) Emergency / Serious Accidents / Disaster – 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.
   d) 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 :

a) 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.
b) The OCS (officer in charge site) is responsible for overall control and coordination of all activities at the incident scene under instruction of Divisional Control.
c) Traction, Track and Structure, Signalling and Telecommunication, fire service security personnel are responsible for providing technical assistance to divisional control office & OC site.
d) Rolling Stock Department is responsible for providing technical assistance to Divisional Control Office and OCS who are managing site restoration work.
e) Station operations and Commercial personnel are responsible for making appropriate station announcements, and providing information, rendering first aid, mobile medical & fire services & assistance from civil administration, including police providing all other assistance in alleviating suffering and hardship to passengers and others.
f) The Guards in charge & Loco pilot in the area affected by the incident are respondent for :
    i. Providing their passengers with up to date and timely information regarding the situation's status and / or progress : and
    ii. Operating their trains in compliance with applicable rules and procedures as per Divisional Control Office instructions.
g) Government Railway Police and Railway Protection personnel are responsible for securing the incident scene and for performing / directing investigation activities compliance with existing procedures. (In case of incidents caused by criminal activities.)
h) 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.
i) Security Personnel will assist Civil / Railway 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 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. Member 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.
Guard 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 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 assume 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 unnecessarily personnel or equipment from the scene. This does not apply to police or Fire Department personnel. Entry in to 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. Co ordinate 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 of 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:

a. 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 succor in the form of drinking water, tea & edibles are made available to stranded passengers.
b. Ensure that all personnel involved at the scene work efficiently to restore rail service as quickly and safely as possible.
c. Control and coordinate all field activities with personnel at the scene.
d. Coordinate all police related activities and requirements with the senior police official at the scene.
e. Coordinate activities with the senior Fire Department official at the scent and, when available, provide the Fire Department Command Post with a knowledgeable employee, to act as a communications link to Divisional and Central control.
f. Coordinate activities at the incident site and keep DIVISIONAL CONTROL OFFICE informed of progress.
g. Establish a command post at the incident scene direct all inquiries and / or requests made by jurisdictional police official.
h. 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.
i. Direct all inquiries and / or request made by the news media to the CPRO Office.
j. Maintain a chronological log of all events.

Station Operations / commercial Personnel shall:

- Make appropriate station announcements
- Assist Police for 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 Operation Emergency control following Officials to commercial departments at HQ will be informed by the Commercial Control of the headquarter : (Designation of HODs may differ from zone to zone)

- **a.** CCM
- **b.** CCM /FM
- **c.** CCO
- **d.** CCM / Services and 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 trains CCO (in absence of CCO, CCM (FM) or CCM / PM will proceed to the site of accident. CCM/PS will remain in commercial control)
3. Centers of Activity :
   a. Headquarter
   b. Divisional Commercial Control
   c. Site of Accident

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: Railway and 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/PS

will immediately come to Control office. In his absence CCM (PM) / CCM (FM) and Dy. CCM / PS will come to the Control office. If Dy. CCM/PS 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 require 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 Operation Emergency Control.
   b. Details of dead / injured passengers, rescue operation, helps/ assistance being rendered at the site of accident, enroot operations, helps/ assistance being rendered at the site of accident, enroute etc. from the divisional Commercial control at the site of accident.
   c. Details of specials being run to the accident site and official accompanying from Operation 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 bet 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 at sites or telecast & to 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 Headquarters office will monitor and 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.

Divisional Control:

i. Control offices will have DOT/RLY Telephones, FAX, photo copier machine and a PC with an internet connection. The details of telephones and faxes of all the divisions should be clear.

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 and in his absence, DCM/Catering, if available or one of the ACMs will immediately come

to the Control office. Second senior most officer of the division will work as an in-charge 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 special trains being run to accident site and official 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 hospital 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 Officers 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 the events.

b) **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 Do's and DON'T s 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 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 speed 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/Dharmashalas 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. The 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 organize 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 mobilizing 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 transhipment / 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 in-charge 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.

III. 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.

IV. Catering arrangements:

It will be ensured by the site in charge.

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 stable 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.

V. Hospitals:

i) One assistant officer each in the hospital 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 identity.

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

iii) Officer in charge 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 names, 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 controller.

VI. 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 filling of claims for compensation.

iv) If some injured passengers/kith and 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 Pradhan or Sarpanch or any other responsible official of the area.

VII. Enquiry offices at the important stations enroute.

This function will be ensured by the in charge 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 telephone with STD facility, FAX machine, photocopier and a PC with internet connection. Identical 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/CTI.

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.

High Level Committee's Report on Disaster Management:

Indian Railways do have a well-established system for disaster response, which has been fine-tuned over a century and a half of its existence. The system delivers what it has been designed to do. But increasing traffic density, longer length of trains with lot more passengers per train and higher operational speeds drive the need to change the system.
The Ministry of Railways have constituted a high level committee to review the disaster management system of IR and give recommendations for strengthening and streamlining the same.

The committee consists of the following:

1. Member Mechanical	Convener
2. Member Traffic	Member
3. Director General (RHS)	Member
4. Director General (RPF)	Member
5. Additional Member (Budget)	Member
6. Executive Director (Safety)	Secretary

The terms of reference of the committee are:

a. To review the existing disaster management system over IR related to train accidents and natural calamities and to suggest improvements.
b. To identify the technological and managerial inputs in order to quicken the pace of relief and rescue operations.
c. To institute a standing arrangement with other central ministries, state governments and armed forces to enable quick and smooth restoration operations without any legal or procedural hurdles.

In India, Railways have been historically handling rescue and relief operations in railway accidents, and therefore IR has to rise to the expectations of the public. Significant technological advancements have taken place in the area of post disaster relief and rescue operations. Consequently, a number of state of the art relief and rescue equipment, tools and plants and innovative techniques have emerged for quickening the pace of rescue and relief operations.

It is natural and logical that in most of railway accidents / disasters, the relief in the form of response arrives quickly in urban / vicinity of urban areas. However, in case of remote area accident / disasters, factors such as lack of communication, lack of immediate accessibility, covering of distance gap to reach the site of accident and conveyance of equipment and trained manpower create serious problems for carrying out rescue and relief.

The committee believes that IR's first responsibility in case of accidents is to reach and extricate accident victims and organize effective trauma care. The basic principle of trauma management is speed & expediency – **"Most trauma patients die of shock, which comes from sluggish or non-existent circulation and the resulting chemical changes in the body."**

Thus the first hour after the accident is termed as "**The Golden Hour"** as

- Most trauma patients can be **saved** if bleeding is effectively stopped and blood pressure restored **within an hour**.
- It is likely that patients, who have experienced shock and remain in the state of shock for long duration, will die. Surgical intervention within that first one hour is, therefore, crucial for increasing the patient's chances of survival.

- This hour, called **"The Golden Hour",** begins the moment the injury occurs.

Therefore, the basic steps for quick and effective rescue and relief operations are following:

a. Rapid access to the site of accident
b. Quick extrication of victims and effective on-site medical management.
c. Stabilization of condition
d. Expeditious extraction and shifting to rescue vehicle(s)
e. Speedy transportation to hospital.

The committee believes that in case of major accidents involving hundreds of lives, there is a need for better managerial and technological inputs for the Disaster Management System to function satisfactorily.

Being the multi-departmental emergency function, needing a high degree of precision, speed & coordination, the post accident management leaves some deficiencies and lacunae occasionally. These are corrected and updated periodically.

To ensure that IR's organized disaster management system is designed such that the victims are retrieved within the "Golden Hour", it would require ARMVs/ ARTs to be based at each and every station.

The concept of Golden Hour is an ideal one, which cannot be achieved in any disaster / accident unless it occurs in the vicinity of the railway disaster management infrastructure / city / civil / armed forces establishments with adequate medical infrastructure. Therefore, a paradigm shift is now called for. The total approach to the concept of disaster management and the investment decisions thereof need a revamp. The strategy for setting up an effective disaster management system on the railways has be based upon the twin plank of a stronger and appropriate infrastructure, backed by a well – trained team and disciplined and dedicated manpower.

The committee notes that a National Disaster Management Authority (NDMA) is being constituted by the Government of India. This authority is expected to coordinate disaster management activities among various departments / ministries. NDMA will work under the over all supervision of Home Secretary. Ministry of Railways has nominated Addl. Member (Mech. Engg.) as its representative in NDMA.

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Chapter 10

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 dispatched to their destinations. A yard is, thus, a classifying and distributing machine with facilities for receiving, sorting and dispatching 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 dispatching 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 dispatch trains without any shunting on them are classified Transit yard. In such yards 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, transshipment 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 minimizing 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 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 dispatch lines and the grids. The gradients are created by construction an artificial hump suitable for the purpose. The gradient of the hump is constructed in such a manner that the wagons roll down on their own to specified sorting line.
3. Specified sorting lines forms 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 or the hump in sorting/dispatching line. There are generally two humps one for 'Down' one for 'Up' yard. These yards are economical in shunting engine hours as compared to flat yards.
4. 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 minimizing 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. Blocking of lines in the reception yard leads to section congestion. So SCOR shall keep a continuous watch over this component.
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. The capacity of the lines in the sorting yard is much more than the reception yard.
3. Marshaling 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 yards.
5. Shunting neck: It is a line in a yard leading to sorting lines on which the actual shunting of the trains may be 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 mean for transferring wagons, generally from up yard to down yard or vice versa, in case of two separate marshaling or hump yards. In practice, this is also called as 'X' load.
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 pairs 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 mechanized 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, brake-van 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, ODC, Crane, Escort, Containers and Wagons containing commodities like Explosives which cannot be humped.
18. Stabling lines: In large yards, 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 in-spite of any accumulation of wagons or other set backs.
19. Sick lines: Normally sick wagons are sorted out in the sorting yard, and 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.
20. Transshipment lines: On this line, transshipment of consignments is done either for Commercial or for C & W purposes. Repacking, re-sealing and untraced, unconnected wagons also kept on these lines.
21. Weighment line: On this line, wagons are weighed for finding out the actual capacity.

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 dialing 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 coordination 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 in charge of the hump can convey instructions relating to the Hump cabin and the skid porters regarding the line on to which wagons are being shunted. Similarly, arrival and dispatch of trains can be monitored.

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

5. Bell is also provided in the cabin of yard to quickly stop the ongoing movement.

v) Signals in Yard: Apart from the signals that are regularly used, special hump signals are provided in the hump yard. These signals show Red to stop, Yellow to go slowly, Blinking yellow to go upward, and Green for go down with normal speed.

vi) Yard organization:
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.

Yard Structure of a Big Marshalling Yard:

Area Manager
Chief Yard Master
Area Controller
Movement Inspector
Deputy Chief Yard Master

Reception and dispatch of trains	Operations		Despatching yard	Documentation / Statistics	
Cabin ASM	Reception yard	Marshalling / Classification Yard	AYM	OPTG	Comml
Leverman / Cabinman	AYM	AYM	Shunting Jamadar / Mukaddam	CTNC	CGSR
Pointsman	Shunting Jamadar / Mukaddam	Shunting Jamadar / Mukaddam	Train starter	HTNC	GSR
	Pointsman	Pointsman / Skid Porter	Pointsman	Sr. TNC TNC	Sr. Goods clerk Goods clerk Porter

The Yard in-charge has two organizations under him.

1. Field staff: It includes the Chief Yard Master, who is over all in charge of the yard and Yard Masters in each shift are responsible for operation 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 in charge instead of Yard Master. Each shunting engine generally has a batch of three or four Points men, 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
e. For engine 'Mukadam'

The above staff from the organisation for sorting work besides other staff is also required for various auxiliary functions – cabin staff, call boys, box boys (brake or skid porters in hump yards) etc. apart form 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 sock of trains in Reception and Despatching Yard. They also maintain Wagon Exchange Registers, Phase-wise Detention Register i.e. 72 hours detention register, Floating Balance 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 dispatch of trains, etc., which are required to be given in the Station Working Rules o 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 number 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 utilization, 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 wok 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 deports, 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 form 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 spirit.

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 endeavor must always be to adhere to the schedules for placement and removal of wagons in the different areas of the Yard in accordance with Yard working instruction.

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 is kept separate in specified lines.

e. Sick wagons and wagons for adjustment of loads and transshipment 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 can possible 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 of 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, lengthening 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 neighboring sections, neighboring 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 train 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 train.

o. Bans and restrictions imposed from time to time.

p. Yard facilities: Ordinarily a Yard should be adequate enough for its requirements of sorting, handing of local traffic, and formation of train and for holding back stock unit it can go out on the sections or to various installation 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 train from and dispatch to different direction 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 Supervisor Inspectors and Divisional Officers for necessary remodeling. 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 of obsolete shunting engines or their inadequacy etc. all these call for suitable action.

q. Sometime want of proper working facilities, such as adequate lighting , communication between the different key-points in the Yard and 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 train.
(d) Trains received mis-marshalled.
(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.
(j) Mixing of loads with CBC and ordinary couplings.
(k) Non-transfer of X-loads regularly.

7 Operation 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 movement reduces 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 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 movement which is 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 train from different directions.
(b) There should be separate Up and Down yards like Bhusawal Yard.

(c) Simultaneous dispatch of the trains to different directions
(d) Two or more shunting engines working not to interference with one another, by provision of separate shunting necks.
(e) Reception of one train not to interfere with the departure of another train and vice-versa.
(f) Reception of train in one part of the Yard should not interfere with shunting in another part.
(g) In large Yards, there should be separate lines for Reception Marshalling and Dispatch. Bye-Pass Running lines may be provided if possible, when only crew change is required.
(h) 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, requirement of the next 5 years only may the first instance be provided.

8 Marshalling Yard Statistics (Manual of Statistical Instructions Volume-1) (Railway Board has decided that statistics shall be maintained in the terms of 8-wheeler units. Same be incorporated by the railway.)

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 which that area. A diagram showing the Marshalling Yard area clearly demarcated should be prepared for the Yard which statistics are requires to be complied 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, transshipment points, goods shed, 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 Break –of gauge transshipment points etc., continuous to the Marshalling Yard , and the detention statistics of each of these Yard 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

detection from arrival of a wagon till its final dispatch from that station. To ensure this the Supervisory staff in charge should exercise a check, at list 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 direction . This exercise should cover at least 10 % of the total no. of local wagons dealt with in the Marshalling Yard during the previous month and the records of such check should be properly maintained to be available for scrutiny by inspecting personnel.

f. In the case of wagon whose detention or dispatch particulars are not available their detention should not 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 wagon 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 the 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 yard stating broad gauge or metre gauge	Remarks
1	1.01	Number- of wagons dispatched – Despatched by train during the month
	1.02	Number of wagons placed from Marshalling Yards outside the Yard by pilots in goods sheds, transshipment/repacking sheds, department sidings or Yards, military siding assisted sidings, etc.,
	1.03	No. of wagons dealt with during the month
2	Daily average No. of wagons despatched	
3	No. of trains received	
	3.01	a) No. of by passing trains b) No. of terminating trains c) Total (a+b)

Item	Name of marshalling yard stating broad gauge or metre gauge	Remarks
	3.02	Average detention to by passing trains: Target- Actual-
	3.03	No. of wagons carried by- Bt passing trains included in items 3.01(a)
4	No. 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) No. of pilots (b) No. 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 Yards.
	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 dispatched:
Items 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 – item1.01 + 1.02

ii) Daily average number of wagons dispatched:
Item2 = Item1.03
No. of days in the month

(iii & iv) No. of trains received and dispatched:
(a) A trains 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 dispatched.

v) Number of wagons dealt with per shunting engine hour:
Item 5.06 = item 1.03
Items 5.03+5.04

Note (i) while compiling shunting engine hours under item 5.3 and5.4 the following instruction 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 up to the time of their departure from the yard on the basic 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 manual.
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 account 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 don. 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 dept 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 kin 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 items 5.5 will include under 5.3 also Item 5.5 will include the time taken by shunting locomotive for locomotive duties and minor repairs upto30 minutes per shift as per Note (i) (b) under item 5.

vii) 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 totaled, 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 dispatched d100 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 dispatched but the time must be reckoned from the date of arrival. Station which maintains a wagon card index may obtain the figures therefore instead of from the wagon exchange register. The number and detention of Brake vans 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 materialization 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 1.02 & 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 term 'empty wagons' means empty 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 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 dispatch 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.

viii) 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 tortuous shunting as detailed above. It ensured that freight customer does not have to register wagons 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 are 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 and when the cargo is needed.
iii) Large warehouses where cargo can be stuffed / re-stuffed/ stored and moved as per customers' instructions.
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 companies 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 ling 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 pants & refineries
iii) Major customers like thermal powerhouse, fertilizer 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 railway strives to become a logistics provider rather than a mere transporter.

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Chapter 11

CONTAINER TRAIN OPERATION

With a view to increase railways 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 relation ship and the terms and conditions which shall govern the right of the concessionaries 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 given below. The salient features of this agreement as well as of related instruction are indicative in nature and for guidance only .for actual provision the concession agreement and the circular and railway boards letters mentioned above should be referred to.

1. Concessionaires have a non exclusive right required the Railway administration to haul concessionaires trains subject to the concessionaire establishing/insuring access to Railway terminals and acquiring minimum number of wagons including brake vans to form block rake for the commencement of operation and for transportation of containers.
2. That term of this agreement shall be for 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 required of this agreement with in (3) years from the date of award of the in principal approval, Railway administration shall have the right to terminate the agreement.
4. The rights of the concessionaire shall including the following:
   i) The right to undertake the business of collecting, storing and loading on to wagons, consignments of goods any third party.
   ii) The right to determine, charge, collect, retains and appropriates 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 container.
5. The concessionaire will be responsible for loading and unloading operations at both the origin and destination Rain 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 1-7-0-2008, 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 Concessionaire to the extent possible in 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 shall have rail facilities for handling Concessionaire shall conform to the following:
    i) Each Rail Terminals shall have rail facilities for 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 date 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, tease or hire, Wagons including Brake Vans and Containers required for the purposes of operating the Concessionaire 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 be offer to the Railway Administration of 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 in 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 be 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 be 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 tolls and plants as specified by Railway Administration and approved be 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% there of 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 schedule specified for intensive train examination, it shall pay to the Concessionaire for every 24 hours of delay (inclusive of initial of 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 the concessionaire on such terms and conditions as specified by the Railway Administration from time to time approved however, that the maintenance is carried out as per maintenance schedules and various stages of inspection as may be modified by Railway Administration and pre-departure certification of such Wagons shall be issued by the Railway Administration for which the prescribe 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 the Rail Terminal to the workshop/maintenances 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 the 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 concessionaire 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 introduce in future for supply of locomotives may be extended of 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 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 the Railway Administration for the in fructuous 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) fir 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 shall be levied without granting any free time. In the event Railway Administration withdraws and / or remove the locomotive from such 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 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 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 indent 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 charge 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 unavoidable reasons beyond the control of Railway Administration.
33. Transportation of the concessionaire's trains shall be in Block Rake. 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 does Train comprise 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 train 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, entitled to transport concessionaire's Train by an alternative route ("Alternative Route"). The concessionaire shall be liable to pay haulage charges only for the Booked Route even when concessionaire's Train is

transported by any Alternate Route. Provided that in case the concessionaire's Trains are carried by a longer route in pursuance of the Rationalization 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 Advanced Scheduling Noticed") Railway Administration of the number of Concessionaire's Trains, it requires to be moved, the proposed routes and the likely departure dates ("Weekly Advanced Schedule ").
36. Notwithstanding anything to the contrary, the Concessionaire shall, at least twenty four (24) hours prior to the day f programmed loading (excluding the day of loading itself) of a Concessionaire's Train provided that such notices shall not 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 dispatched of Concessionaire's Train on a first come first served basis.
38. Notwithstanding anything to the contrary contained in the Agreement, dispatched 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 Train.
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 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 subjected 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 attributed 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 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 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.

CONTAINER CORPORATION OF INDIA LTD (CONCOR)

Container Corporation of India (CONCOR), a Mini Ratna (category) company, was set up in 1989 with prime objective of developing multimodal transport and logistics infrastructure to support the country's growing international trade as well as for transportation of domestic traffic in ISO containers by adopting latest technology and practices. It provides responsive, cost effective, efficient and reliable logistics solution to its customer through CONCOR has been rated as "Excellent" in its MOU since 1992-93.

The Mainstay of CONCOR's business in setting up and managing a network of rail linked and road based Inland Container Depots/ CFS in the country for handling export import domestic Cargo and Transportation of Export –Import domestic containers by rail and road.

CONCOR has also been a pioneer in the field of PPP initiatives by setting up joint venture in Port terminal operations. The Company is also running CONRAJ and CONTRACK train services at 100 kmph therefore transit time from Delhi to Mumbai reduced for 4 days to 2 days.

The company is growing in its business and profitability based on expertise and experience as also through Joint Ventures/Associates/Agreements/Memoranda of Understanding. The company has also extended its operations abroad by managing the only rail based inland Clearance Depot in Nepal.

Advantages of Containerization:

a) Door to Door service (from consignor to consignee)
b) Single window operation. Hence no rigorous documentation and formation.
c) Packing the commodity is not essential; commodity can be loaded in bulk.
d) Mechanised handling. Hence handling losses and damages are minimum.
e) The goods are less liable to thefts and damages.
f) Merchants can keep the track of movement of containers, as on line information is available.

g) Faster transit of goods and terminal detentions are minimum. (Movement of CONTRACK TRAINS, CONRAJ TRAINS)
h) Space in cellular ships are well utilised.
i) Assured traffic on nominated days.
j) Pricing depends on the demand (Regional Manager is vested with powers)

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Chapter 12

Section Capacity and Throughput

Section capacity:

Definition: Line capacity is also known as section capacity. Section capacity is defined as the "Number of train which can be run on the section in 24 hours". This could be expressed in three different ways:

a. Maximum line capacity
b. Practical line capacity
c. Economic line capacity

a. Maximum line capacity: this is represented by the maximum number of trains that can be entered in the master chart so that it is impossible to introduce even a single more train on the section concerned.
b. Practical line capacity: the practical line capacity is represented by the practical number of trains per day which is obtained from the above mentioned maximum line capacity making allowance for such factors as time required for maintenance of permanent way, time margin for scheduling and other operational irregularities. In actual practice the train scheduling is based upon this capacity. When we speak of line capacity in general, we mean practical line capacity also known as effective line capacity.
c. Economic line capacity: When line capacity is under utilized, increase in train services follow the pattern of law of increasing returns due to more intensive utilization of fixed assets. However, as the number of trains to be operated on a section grows larger and larger and the section starts getting saturated, it becomes more and more difficult to increase the train services without increasing the time loss in train operation.

   As a result, the utilization efficiency of the rolling stock and the train crew decreases and maintenance cost of the track increases. This leads to gradual increase of the transportation cost per train kilometer. The optimum number of trains which can be run on the section economically is the economic line capacity.

Calculation of section capacity: Though various formulae are there, CR follows the Scott's formula which is as under:

$$\mathbf{C = \frac{1440}{T + t} X e}$$

Where C = Line capacity
T = Running time of the slowest train over critical block section
t = Time for block operation
e = Efficiency factor

Measures with incurring expenditure:

1. To reduce the block section
2. To improve the speed of trains
3. To provide the automatic signals
4. To provide extra corridor
5. Increase use of modern signaling system
6. Provision of Train describer
7. CTC on double line
8. Improving speed of goods train
9. Use of EMU and DMU for stopping train
10. Provision of AWS
11. Provision of ACD
12. Provision of PI / RRI / Electronic interlocking / SSI
13. By increasing CSL / CSR of all the running lines at all stations and yards.

Measures without incurring expenditure:

1. Proper planning
2. Proper controlling
3. Proper efficiency
4. Time tabling
5. Proper maintenance of instruments
6. To reduce the time in block operation
7. To reduce the crossing and precedence
8. By implementing Management information system
9. By introducing new software through development of IT
10. By using new techniques in the infrastructure
11. By not using separate traction for different sections
12. To run heavy-haul goods trains

Order of priority for increasing line capacity works:

As section capacity works involve huge investments and long gestation periods, planning for such works has to be done with meticulous care to avoid traffic bottlenecks on one hand and uncalled for expenditure on the other hand. So it is necessary to follow the sequence below for considering increase in section capacity-

(a) Organisational and operating measures to ensure optimum utilization of the existing operating assets as follows:

i. Time table improvements.
ii. Reducing disparity in inter-sectional running times.
iii. Review of sectional running times.
iv. Improving efficiency of staff.
v. Efficient operation of yards, station and terminals.
vi. Improved maintenance of equipment.
vii. Monitoring of trains by Officers and Inspectors.

(b) Technical measures:

i. Signaling and Interlocking improvements.
ii. Motive power improvements
iii. Civil Engineering improvements will include following:
   (a) Opening additional crossing stations.
   (b) Strengthening the permanent way and bridges.
   (c) Improvements in alignment, eliminating surface road crossing, removing speed restrictions, providing 1 in 16 turnouts to permit higher speeds on loop lines.
   (d) Easing of gradients.
   (e) Patch doubling (Doubling of a section is not undertaken in one stage but in phases, the
   (f) Work being called phase doubling or patch doubling)
   (g) Doubling / Triple line / Quadruple line.

Throughput:

The Throughput of a section is the total quantum of Traffic which can be transported over the section in a period of 24 hours.

The traffic moved includes Passenger Traffic and Freight also. The Passenger Throughput is calculated basing on the number of passengers traveled and the distance they traveled. Passenger Throughput is calculated in terms of Passenger Kilometer (PKM)

Passenger Throughput = No. of Passengers Traveled X Distance they traveled in Kms

The Goods Throughput may be expressed in terms of:
(a) Number of wagons moved or
(b) Gross Tonne Kilometers or
(c) Net Tonne Kilometers carried over a section.

Generally, 'Throughput' in Railways refers to Goods Throughput for day to day Operation & is expressed in terms of number of wagons. But for Commercial Transactions it is expressed in terms of 'Net Tonne Kilometers'. Because NTKM indicates the ultimate productive work done by Railways, a keen observation and effort required to improve NTKM.

Advantages of higher throughput:

(1) Wagon Utilisation Increases
(2) Increase in Railways Revenue.
(3) Yard / Sectional Congestions Eased.

(4) Reliability Increases.
(5) Customer is satisfied and repose confidence on Railways.
(6) Cost of Transport of Freight Reduces.
(7) Interchange commitments with adjoining railways fulfilled.

Steps to improve throughput:

(A) Running more number of Trains:

a) Utilise the Section Capacity fully by running trains with CC loads
b) Discourage Light Engine Movements by ensuring that every engine carries sufficient Load.
c) Adopt vigorous marketing strategies
d) Timely ordering of trains.
e) Keeping targets periodically and monitoring.
f) Offer of incentives to efficient staff (Running Crack Specials, Special Trains)
g) Switching over traction from diesel to AC.
h) To utilize more HP locos to run trains with high speed

(B) Increasing load per Train:

a) Increasing loop capacities.
b) Provision of High Capacity Wagons.
c) Improvement in Track.
d) Multiple Loco Operation or Providing more powerful locomotives.
e) High capacity bearing track shall be used
f) To reduce tare-weight
g) Using locator technology
h) Platform low level bogie containers

In order to improve the **throughput,** apart from measures taken for augmentation of line capacity, trailing load has to be increased to improve throughput by-

a) Inducting High Capacity Diesel and Electrical Locomotives and Multiple Operations of Locomotives.
b) Improved Rolling Stock with CBC coupling and draw bar capacity of 80 tones or more.
c) Improved roller bearing on Rolling stock
d) Increasing carrying capacity of rolling stock without much increase in length or tare weight.
e) Improved Braking System (Air Brake and Disc Brake System) to maintain desirable 'Braking Distance'.
f) Increasing Permissible Axle Load and permissible moving dimensions by Civil Engineering Works.
g) Increasing Loop Capacity and Strengthening the Loop Lines.
h) Improved system of Communication between Engine crew, Train Staff, Station Master and Controller.
i) Adequate Terminal Capacity and facility to deal with Heavy Haul Operations.

j) Re-scheduling and Curtailing running of slow stopping passenger trains on heavy haul routes or on dedicated tracks.
k) Integrated 'Mega Blocks' to prevent frequent departmental maintenance block.
l) Up gradation and modernization of techniques and methods of attending to trouble shooting and break downs.
m) Up gradation in the Skill and Knowledge of 'Train Running' and 'Train Passing'.

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Chapter 13

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 –
   b. Except under special orders from the Div. Railway Manager, passengers must not 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 halls when waiting for connecting trains.
   c. To ensure the 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, foods and vendors trays and barrows shall not be placed on passenger platforms within 3 meters of the edge of the platform. When parcels of 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 ‘ OF’ 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 trains lighting staff deputed at important stations. Individual switches regulators of lights and fans are to be operated by passengers themselves.

b) Conductors or TTEs are responsible for ensuring that the electric equipment 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 occupant 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 the TXR staff under advice to SM either at the starting station or at the next train examining station.

d) Traveling 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) Conductors and TTEs must see that passengers are not getting in and out of carriage when trains are about to start land that no one is traveling on the roofs of carriage.

f) Segregation of passengers suffering from infections and contagious disease:- for greater safety of the traveling public, passengers suffering from infections of 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 safety catches, the TXR staff should be ready with the necessary materials 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 to 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 train 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 – Traveling 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 junctions stations they shall advise passengers to change, if necessary.

5. Waking up passengers:-
   a. Passenger of all classes occupying reserved accommodation shall not be aroused for tickets, be rechecked between the hours 22 and 06 except when there are reasons to believe that a certain passenger is traveling without a ticket or otherwise irregularly.
   b. TTEs if 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 up-gradation.

6. Ladies traveling 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 traveling 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 traveling, 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 p.m. This rule may also apply when two or more ladies are traveling in the same compartment without any objection and any inconvenience.

c) A lady traveling 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 investigations.

b) The Conductor or TTE of the train shall have the compartment emptied and locked up after all shutters nave 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 to 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 if of the platform, the Guard should also callout a similar caution to the passengers.

10. Duties of Conductor:-

i) He shall report to the train guard for his appearance and the time of his appearance shall be noted down by the 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 compartment 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 if 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, especially at night.

vi) Before a train begins a night journey, ensure that the safety bolts provided on the inside 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 train 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 traveling on the roof of carriages.

Duties and Responsibilities of TTEs

i) He shall see that all doors, bolts, window 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 provide 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 the 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 GRP/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 particular.

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 trains 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 and 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 passengers property being stole 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 Asst. Loco Pilot.

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Chapter 14

INSPECTIONS

Objects of Inspections:-

The 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 organization 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 staffs 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 the mind while conduction inspection:

1. Verify whether every Railway employee is fully conversant with rules, instructions procedure relating to his duties.
2. Ascertain that the staff is performing their duties according to rules, instructions and procedures in force.
3. Detect undesirable shortcuts, irregularities of 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 willfully or negligently and persisting even after repeated guidance and counseling.
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 has 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-a-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 carries 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 allies 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 nominated officers. Each officers will be allotted at least two such 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 besides making
a written report.

Surprise Inspections (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 chick 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 dong 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 Loco Pilots/Motormen are observing the rules regarding passing of automatic signal at 'ON' position etc.

Night Inspections (Fortnightly) –
Night Inspections must be carried out by the Officer's and Supervisor's frequently to Appreciate the working conditions as well as to detect the irregularities.
Surprise night inspections may be carried out between 00 hrs to 04hrs 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, unauthorized absence from duty and many other irregularities, unsafe and undesirable practices may come to notice between 00hrs to 04hrs. Frequent night inspections are a must and SS/SM must conduct surprise night inspections fortnightly of their station between 00hrs to 04hrs 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 traveling 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 and 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 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 and 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 Check:-
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 signaling 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 traveling by a train on duty, he must pay special attention in observing the performance of duties by Guard, Loco Pilots, Station staff Gateman and others.
Loco shed inspections – One loco shed shall be inspected once in 03 months individually as well as jointly.
C & W Depots Inspections- Each C & W depot shall be inspected once in 03 months individually as well as jointly.

Accident Relief/ Medical Equipment Scale I (ARME) – Each Medical Van shall be inspected once in 03 months (see Accident Manual).

Accident Relief Train (ART) - Each Break Down train shall be inspected once in 03 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

Sl. No.	Type/Nature of Inspections	Sr.DOM/ DOM	Area Manager/ Area Officer	AOM(M)	Sr DSO/DSO	AOM (G)	TI's
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 station In their Jurisdiction Every month

Sl. No.	Type/Nature of Inspections	Sr.DOM/ DOM	Area Manager/ Area Officer	AOM(M)	Sr DSO/DSO	AOM (G)	TI's
2	Safety inspection	--	--	1 station Every month	4stations Every month	6 stations Every month	All station In their Jurisdiction Every month
3	Surprise Inspection	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- 1.Level Crossing 2.Station 3.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 Xing 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 Foot plate Inspections	1 section per Month by both 1.Mail Express II.Goods Train	1 section per Month by both 1.Mail Express II.Goods Train	1 section per Month by both 1.Mail Express II.Goods Train	1 section per Month by both 1.Mail Express II.Goods Train	1 section per Month by both 1.Mail Express II.2Goods Train	1 section per Month by both 1.Mail Express II.3Goods Train
8	Joint Foot Plate Inspection	----------	----------	----------	One section Every quarter Covering the Entire division Once a year. Up and down Separately by Day and Night	One section Once a month Covering the Entire division Once a year. Up and down Separately by Day and Night	One section Once a month Covering the Entire division Once in6 months Up and down Separately

Sl. No.	Type/Nature of Inspections	Sr.DOM/ DOM	Area Manager/ Area Officer	AOM(M)	Sr DSO/DSO	AOM (G)	TI's
							by Day and Night
9	Surprise Speed checks	No quota	No quota	No quota	3 per month	3 per month	5 per month
10	Running Room Inspections	1 major running Room as Identified by DRM-once (alongwith Sr.DEN and Sr. DEE	1 major running Room as Identified by DRM-once (alongwith Sr.DEN and Sr. DEE	All running Rooms Under Sr./DSOs Charge of Mechanical &Electrical Dept along With AEN,AEE& AME	All running Rooms Under Sr./DSOs Charge of Mechanical &Electrical Dept along with SrDEN, & Sr DEE	All running Rooms Under Sr./ DSOs along With AEN&AEE	Each Running Room under their jurisdic-tion once a month.
11	Ambush checks in Automatic Signaling Territories	---------	One during day And One during Night	Once in a month	One during day And One during Night	One during day And One during Night	One during day And One during Night
12.	Loco shed Inspections	----------	----------	----------	1 shed every 3 months	1 shed every 3 months	-------
13.	Depot Inspection	----------	----------	----------	1depot every 3 months	1 depot every 2 months	----------
14.	Accident Relief Equipment Scal-1 ARME	----------	_____	_____	1 medical van Every Quarter	1 medical van Every Quarter	_____
15.	Accident Relief Trains(ARTs)	_____	_____	_____	1 ART every quarter	1 ART every quarter	_____

Note: For Sr No 10, 11, 13—all loco sheds C&W Depots and Medical Vans are to covered in a year either by DSO or AOM (G). The quota shown indicates the minimum inspections, in respect of above items and other items should be carries out as frequently as possible.

General Guidelines for Inspecting Official:

1. Before commencing the inspection, all inspection books should be called for and the note made by other inspecting official should be carefully pursued to check whether the staff has 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 initiated and dated.

Techniques of Inspections:

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 and Subsidiary Rules but also of Station Working Rules.
2. Select features 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 dispatch of trains and observance of safety rules by the staff or on utilisisation 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.
4. Be selective in choosing:
   (a) The time and operations of personal observation.
   (b) The documents, registers and forms for check and cross checks.
   (c) The equipments for checking its availability, adequacy, maintenance and its use.

6. 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 concentrated, minutes 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 irregularities being committed but also whether these have been continuing for the past some times.
7. 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.
8. 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 objectively and acceptable solutions. This will help in not only arriving at correct conclusions and forming sound views but also in avoiding unnecessary correspondence.

CATEGORISATION OF OPERATING STAFF

(Ref: Rly. Bd's letter no. 2002/Safety-I/18/2 dated 21.2.2002)

Failures of train passing staff cause resulting serious accident and bring down the reputation of Railways. In this connection a proper system of maintaining and up-gradation of staff involved in train passing duties is instituted.

In view of "Human Element" being important tool in safe train operation, categorization of Operating staff is required to be done into A, B, C & D category. The detailed guidelines issued by Railway Board are as under-

I. OBJECTIVE-

- "Better and effective monitoring" of specially inefficient/identified staff.
- Creating awareness of his own safety category for necessary improvement.
- To closely monitor and initiate necessary action particularly in case of C & D category staff for up-gradation.

A) Method of Categorization-

1. Categorization will be based on performance for the last six months. The important parameters to be taken into account while analyzing the performance of the employee alongwith weightage of each is given below.

100 marks allotted to judge overall performance is as under-

- Knowledge of rules - 25 marks
- Alertness and observance of rules - 25 marks
- Safety record - 15marks
- Leadership & Management - 15 marks
- Discipline - 10 marks
- Appearance & neatness - 10 marks

2. Staff shall be graded on the basis of total marks obtained as under –

- Category 'A' - 80 and above
- Category 'B' - 50 to 79
- Category 'C' - 49 to 26
- Category 'D' - 25 & below

Note- Alcoholic staff must be categorized under 'D' category irrespective of marks obtained by them in other aspect of working.

B) System of Gradation will be as under-

SSs/SMs will grade - All group 'D' (Pointsmen/Gatemen)

Supervisory SSs/TIs will grade - All class III staff including ASMs, AYMs, Shunting Masters, Switchmen, Cabinmen, Levermen.

AOM(G) will grade - Supervisory SSs

To ensure that, the system is fair and objective all classifications, categorization done will be checked and countersigned by next higher authority within six months.

C) System of Monitoring-

1. Categorisation –

i) A register shall be maintained at the station indicating category given based on marks obtained and duly acknowledged by concerned staff.

ii) Top sheet should be kept in register indicating staff wise and category wise chart.

iii) Separate pages shall be allotted for the 'C' & 'D' category staff.

iv) Record details regarding appointment, grade, categorization, review of categorization and steps taken regarding counseling/training/refresher/safety camp and DAR action etc. for up-gradation.

v) All out efforts shall be made for up-gradation of staff by initiating all possible steps, record of which must be available in the register.

vi) List of 'C' & 'D' category staff shall be kept under close watch by all Inspecting officials and action taken recorded in the register.

vii) Performance of the employee shall be recorded after every six months and checked by next higher authority once a year.

viii) All lapses brought out during the inspection shall be recorded in the register by SMs/SSs, obtaining acknowledgement of staff.

Staff classified as 'D' category shall be monitored on a monthly basis.

Staff classified as 'C' category shall be monitored on quarterly basis.

D) System of Up-gradation-

- Input knowledge, counseling, monitoring shall be done by next higher authority.
- Safety Counsellors must make special efforts for up-grading category 'C' & 'D'.
- Attempt shall be made for up-gradation by giving suitable action plan by next higher authority.
- 'C' & 'D' staff must invariably be deputed for safety camp/crash training and Safety Supervisors shall personally ensure this aspect.
- Inputs given in six months shall be indicated in tabular form in the register and reviewed by DSO every year.
- Awareness and lapses of 'C' & 'D' category staff are as of weaken shall be discussed in each meeting with necessary steps taken for up-gradation.

- ❖ 'D' category staff may be directed for refresher at frequent intervals with permission from DSO, based on the competence and knowledge seen during the time of analysis.

E) Inspections- During inspections Supervisors/Officers shall comment on the categorization of staff.

F) Advice to Staff- Details of A, B,.C & D classification/categorization/review of staff must be notified to the concerned staff under acknowledgement. A register shall be kept in the personal custody of SS being maintained and handed by SS personally.

G) Awards & Objectives –

1. C & D category staff improving to the level of 'A' category within six months may be issued with appreciation letter.
2. Staff who have constantly maintained themselves in category 'A' should generally be considered for annual safety award.
3. Categorisation of staff needs to be considered while filling up annual confidential report.
4. Staff not improving despite adequate attempts need be viewed seriously and may be considered for retirement as per rules.

General Instructions-

1. Responsibility of Supervisor/Depot In-charge:
   - ❖ It will be the personal responsibility of Depot In-charge , Supervisor/TIs to ensure that, the categorization is done strictly on merits/demerits as per procedure in each case with the view have realistic assessment of the performance.
   - ❖ Categorisation shall be primarily based on field performance and observation of proper procedure.
   - ❖ They will also be responsible for incorrect or unrealistic categorization.
   - ❖ In case, staff under 'C' & 'D' category cannot be up-graded inspite of necessary inputs/steps taken, a detailed report must be submitted for suitable action, indicating steps taken for up-gradation.
2. Staff should be motivated for up-gradation.
3. Categorisation of staff may be considered during transfer, promotion, DAR action/Registration for transfer etc.
4. Staff must be aware of his present categorization. Supervisors/SSs/TIs to ensure this aspect.

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Chapter 15

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:-
   i. It shall not be possible to take 'off' conflicting signals at one and the same time.
   ii. 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.
      e. 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.
   iii. When all signals are in the "On" position, all points which would be locked by taking of 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.

2. 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, failsafe 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- modeling 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

DATA LOGGER

- This is MP based digital storing system.
- Main function of store change in status of various field & panel functions (Relay contacts) along with exact time.
- It should have battery backed memory.
- Stored data can be printed out at any time upon a request through the front panel key pad.
- Data can also be stored & printed through remote terminal (PC)
- Data logger is compulsory for SSI.
- RDSO specification RDSO/SPN/90-98.
- Useful for failure analysis, repetitive discrepancies & accident investigation.
- For local mode operation if serial communication is more than 50 meteres, then Line driver shall be used up to 3 Kms.
- For remote operation: Modem- 4 wire type shall be used beyond 3 Kms.

Data logger is also known as event logger. It is microprocessor based equipment which logs the events occurring in the signaling functions of a yard chronologically with date and time.

Applications of data-logger:

1. Data logger helps in monitoring the typical failures such as frequent right auto failures.
2. It helps in analyzing the cause of accidents.
3. It helps in detecting the human failure / errors such as Drivers passing signal at danger, operational mistakes done by panel operator.
4. It helps as a tool in preventive maintenance of signaling gears.

5. Data loggers can be connected with networks/
6. Failure reports can be generated remotely with the help of data-logger network.
7. On-line and Of-line track simulation possible.
8. Speed of the train on point-zones can be calculated.

AWS - Auxiliary Warning System

To avoid accidents mainly due to the Human error this constitutes 80% of the train accidents. AWS has been provided on the Mumbai suburban section. It provides following facilities or aides to the motorman:-

- Instantaneous visual indication on the cab panel of the signal just passed.
- An audible indication on the cab panel of the signal just passed which is other than Green and double yellow.
- Compulsory acknowledge within 4 seconds, or else penalty brakes will apply. (Penalty brakes will be initiated by AWS, when vigilance button is not pressed within 4 seconds on hearing hooter sound after passing signal or Motorman passes a signal at danger without observing rules).
- If the Motorman does not control speed to 38 KM/ph before 290m of approaching the next signal, first service and then emergency brakes stops the train.
- If the Motorman passes a signal at danger, the AWS system applies emergency brakes to stop the train immediately.
  It continuously monitors the authorised speed and alerts the motorman through an audible alarm when ever the permissible speed is exceeded by motorman
- In case of over speeding by 1 to 5 kmph Intermittent warning hooter sounds without braking.
- Exceeding speed limits by 5 to10 kmph EP brakes with red lamp flashing & hooter sounds till speed is reduced to prescribed limits.
- If speed is exceeding more than 10 kmph emergency brakes are applied with Red Lamp steady and continuous hooter sound till speed is reduced to the prescribed limit.

AWS system broadly consists of the following parts:-

Track equipments –

Consists of track magnet fixed at rail level on right side of track, coupled with signal aspects through an 'Opto-Coupler' card.

Cab Equipment:-

Consists of an indication panel mounted in front of motorman and consists of various audio - visual indications for guidance of motorman in addition to this digital speed indicator Vigilance & Reset button and counter are also provided on this panel. The Central processing unit receives inputs from interacted engine magnet & Tacho generator which are evaluated by AWS system and accordingly provides Audio-Visual indications on the panel in front of the Motorman. This also monitors the responsive actions of Motormen and generates commands for brake applications as required. In case of equipment become defective it can be isolated by means of isolating unit to prevent malfunctioning.

Instruction in the event of malfunctioning of AWS:-

- If the AWS malfunctions, the motorman makes entry on the relevant card and isolates it.
- The rake moves to the destination with AWS isolated.
- On the return trip the Motor Cab will become the brake cab. However, when this cab again becomes Motorman's cab, the Motorman will reactivate the AWS. If it malfunctions more than 3 times in a day, it shall be closed till it is attended by the car shed staff.

DOUBLE LOCKING OF RELAY ROOMS/CABIN BASEMENT/BLOCK INSTRUMENTS

With respect to double locking of Relay rooms/Cabin basement the following guidelines should be followed:-

1. At all stations the Relay rooms/ Cabin basement/ Block instruments should be provided with double locking arrangements. Key of one lock shall be with SM on duty and key of other lock key with S&T Maintenance staff of the station.
2. Whenever Relay room/ Cabin basement/ Block instruments is required to be opened by S&T staff,
   The key from SM/CASM shall be obtained and transaction properly recorded in the Relay rooms/ Cabin basement/Block instruments key register maintain at the station/ cabin duly signed by SM/CASM and concerned S&T staff.
3. The SM's key shall not be given unless the S&T staff on duty enters the date and time and purpose of taking the key in the register maintained for this purpose at station/ cabin. He will enter correct date and time when he takes the key and also when he returns the key to the SM/CASM.
4. The key should not be taken frequently and as far as possible the key should be taken only to carry out schedule maintenance or attending to a failure pertaining to indoor relay equipments or far the inspections of higher officials. Normally relay room of PI/EI or Cabin basement will not be opened more than once a week, and for RRI once in a day for maintenance purpose that is cleaning of Relay room and other equipments placed in Relay room, taking parameter as regard to voltages, track voltages etc. or in case of failure if required. However, in the monsoon season key of PI/EI may be taken once during the day for adjustments of voltages of track circuits. The monsoon period is reckoned from 1st June to 15th October every year.
5. The locking and sealing of the equipments such as Block instruments etc. to be ensured once the seal is opened/ broken for whatever the reason it should be sealed again properly with concern Supervisors seal.
6. During the period of Signal/Point's defects/failure and key for attending the defect has been given to authorize signaling staff, the ASM/CASM will follow the procedure laid down for working the trains when the signal/point is defective without

waiting for S&T staff to set right the defect. There should be no hesitation, reluctance or inertia on the part of operating staff to proceed to the site for crank handling and clamping the point and passing the train on proper authority.

7. The opening of the Relay room shall be monitored through Data loggers at all the station wherever data loggers have been provided. Wherever data loggers are not available, the opening of Relay room door should be monitored through using Veeder counter.
   (HQ's Joint circular No. 660/S/Sig.circular/dated-25.01.08)

Indirect and Direct Interlocking:-

(a) Indirect interlocking means that the points are set and locked from one place and the signals are operated form 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 there from; the interlocking is effected by means of rigid connections between levers without the use of keys.
   Standards of Signalling and Interlocking: - Interlocking at stations is standardized into four different classes viz. I(R), II(R), III (R) 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 signaling

(a) Standard I(R)
   i. Speed- 50kms 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 Bracketed 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 switched 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 Master 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 "of" position of the Warner signal shall be dependent upon the receipt of 'Line Clear' on the block instrument.

(c) Standard III (R)

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 up to 160 km/h
(II) Isolation – as per standard III

Multiple aspect signaling.

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 signaling. 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. N0.	Item	Std I ®	Std II®	Std III®	Std(IV) ®
	Allowable speed (km/h)	Up to 50	Up to 110	Up to 140	Up to 160
1.	Isolation	Y*	Y	Y	Y
2.	2 Aspect (2A) Semaphore/Multi Aspect	2A/MA	2A/MA	MA	MA
3.	Double distant	N	Y**	Y	Y
4.	Point Operation	Mechanical	Mech. /Electrical	Mech. /Electrical	Electrical
5.	Point Locking	Key/FPL/HPL	FPL/Pt. m/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. /Electrical	Mech. /Electrical	Electric/Electronic

SL. N0.	Item	Std I ®	Std II®	Std III®	Std(IV) ®
			/Electronic	/Electronic	
9.	Track circuiting	N	Mech. Interlocking: Run Through Lines (main) , Electrical/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 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 degree aspect	Yellow.
© Distant signal (multiple-aspect) lever 90 degree 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 color as of the lever slotted, with a 6" (150 mm) wide yellow band 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
(i) Release lock lever	Black, with a 6" (150mm) wide blue band in the middle.
(m) Setting lever, "List and Morse" signaling	Blue, with a 6" (150mm) wide black band in the middle.
(n) Detector lever (D.W.)	Red and blue bands 6" (d150mm) 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" (150mm) wide alternately.
® 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, and 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 scotch block and 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 60m in length, with increasing gradient of 1 in 60, of which the front 30 m is laid with normal track embedded in sand and remaining 30m is an earthen lump of uniform 4m 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

i. 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.
iv. If the vehicle moves the vehicle will derail.
v. 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.

i. This is an extended portion of track ending with some sand.
ii. The distance from the points is about 15 feet.
iii. This is used to isolate main line from loop line.
iv. This is an efficient substitute for signal overlap under approved special instructions.
v. The normal setting of points is for derailing switch.
vi. If the vehicle moves, the vehicle will derail on the sand at the end of the derailing switch
vii. Simultaneous reception is possible with CRS permission.

Explanation of certain simple terms:-

(1) Coupled Points: When two or more points are worked by the same lever.
(2) Crossings: The appliances provided at the junctions where two lines cross or join one and other.

(3) Compensator: It is an appliance provided to compensate for difference in length of roddings and wires due to variations in temperature.
(4) Crank: It is an appliance fitted with the rodding to change the direction of the motion given by the lever.
(5) Detector: It is an electrical or mechanical device which prevents the signals from being taken 'of' unless the points are correctly set.
(6) 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.'.
(7) 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.
(8) 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.
(9) Lock Retaining Bar: It is a bar provided at such a place where the distance between the signal and the concerned facing point is more than the normal, to curb manipulation of point.
(10) 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 'OF' for one road while a train is standing short of clearance on the other road.
(11) 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.
(12) Release: A lever releases another lever, when due to its operation the later can be pulled. If lever No. 2d can only be pulled over when lever No. 1 is pulled then lever No 1 is said to be de-releasing lever No.2.
(13) 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.
(14) 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 collars	XT RES PB+A/C RES KEY, POWER FAIL, ACK,SYS,HL/SL MECR FAILED FAIL,ACK
7.Point group buttons	WWN
8. Gate signal buttons	LXN
9.Slot release, slot lock buttons	YYN / YRN

Sl.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
4.	SH-GN	Shunt signal button	YELLOW	Close to signal and on the first track
5.	UN	Route Button	WHITE	Centre of the berthing or last control track circuit
6.	WN	Point Button (used only for point operation)	BLUE	Close to the point demarcation
7.	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
8.	LXN	Level crossing control release button.	BROWN OR CHOCLATE	Close to the level crossing demarcation
9.	KLYN	(Point) key lock Release Button	BLACK	Close to the slotted point demarcation
10.	COGGN	Calling on Signal control Button (common)	RED	Top of the panel and below COGGN COUNTER
11.	EGRN	Common button to replace a cleared signal at 'ON'	RED	Top to the panel below EGRN counter
12.	GBN	Common slot Release button (For Gate, rank handle)	GREEN	Top of the panel
13.	GBRN	Common slot Return Acknowledgement button	BLACK	Top of the panel
14.	EWN	Sealed Common point button for (emergency operation)	BLUE	Top to the panel and below EWN counter
15.	AGGN	Common button to introduce Auto working of a Main Signal	GREEN	Top of the panel
16.	AGGRN	Common button to cancel auto working of a main signal	BLACK	Top of the panel
17.	EUYN	Emergency Route cancellation button	GREY	Top of the panel and below EUYNcounter
18.	EUUYN	Emergency Route Release button	GREY	Top of the panel and below EUUYNcounter

Sl.No.	Button	Description	Colour	Location
19.	OYN	Emergency overlap release button	WHITE	Top of the panel and below OYN counter
20.	E/WHLMEF AIL WSLMEFAILT	Signal lamp failure alarm acknowledge button	WHITE	Top of the panel and below filament fail indications
21.	E/WHLMER ECT, WSLMERECT	Signal lamp failure rectified alarm acknowledge button	WHITE	Top of the panel and below filament fail indications
22.	POWERFAIL ACK	Power failure alarm acknowledge button	RED	Top of left side of the panel
23.	SYSFAIL ACK	SSI system failure acknowledge	WHITE	Top of the panel and system on indications
24.	G/U/W/GRN ACK	Button hold alarm acknowledge	WHITE	Top of the panel
25.	FCORPB	False feed alarm acknowledge	RED	Top of the panel
26.	ZY RESPB	Loop line axle counter reset button	GREY	Below Axle counter reset counter
27.	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
7. Point failure 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)
6. Emergency overlap release counter (OYN)

e) PANEL REGISTERS:-

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)
6. Emergency overlap release counter (OYN)
7. Crank handle use register
8. Crank handle testing register
9. Disconnection and reconnection register
10. Point failure register
11. Miscellaneous failure register
12. Emergency crank handle register
13. Relay room use register
14. S & T failure register
15. Caution order register
16. Caution order message book.

Panel Button Description - Panel Operation Chart

Sr. 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+EU UYN	GN+EU YN
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+EU UYN	GN+EU YN
3	Main line starters	GN+Ad.St.UNG N+St.UN	Control Tracks up, required point detections including isolation points and concerned CH locked plus concerned MCB's switched on.	GN+EGRN	GN+EU UYN	GN+EU YN
4	Loop Line Starters	GN+Ad.St.UNG N+St.UN	Control Tracks up, required point detections including isolation points and concerned CH locked plus concerned MCB's switched on. Approach clear, clears after berthing track is occupied for 48 seconds	GN+EGRYN	GN+EU UYN	GN+EU YN
5	Shunt Signal	SHGN+UN	Control Tracks up, required point detections including isolation points and concerned CH locked plus concerned MCB's switched on.	SHGN+EGRN	GN+EU UYN	
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		
9	Power fail ACK	Power fail ACK		Buzzer will stop on pressing the button the red indication remains till the problem is rectified.		
10	System fail ACK	SYS.FAIL. ACK	System Fail Buzzer should give sound	Buzzer will stop immediately		

Sr. No.	Gear Type	Buttons to operate	Required conditions	For Route Release		
				Signal cancel	Emerg. Route Release	Emerg. Route cancel
11	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		
12	HL/SL MECR Rectified	Rectified	Signal filament rectified.	Buzzer will stop immediately		

MODIFIED STANDARD OF INTERLOCKING

Division	Section	Maximum Speed in kmph	Standard of Interlocking
Mumbai	CSTM-KYN (except CSTM & LTT)	105	Std III (R)
	KYN-TLA	105	Std III (R)
	TLA-KSRA	105	Std II (R)
	KSRA-IGP	60	Std II (R)
	KYN-KJT	105	Std III (R)
	KJT-LNL	60	Std II (R)
	Diva-Pen	100	Std II (R)
	Pen-Roha	90	Std II (R)
	Diva-Dombivali-Vasai	90	Std II (R)
	TNA-Turbhe-Vashi	80	Std II (R)
	CSTM-PNVL-Mahim (Harbour line)	80	Std II (R)
	Note - CSTM & LTT are classified as Std. I (R)		
Bhusawal	IGP-BSL	110	Std II (R)
	BSL-BD (except Akola)	110	Std II (R)
	BSL-KNW	110	Std III (R)
	Note- Akola is classified as Std. I (R)		
Nagpur	BD-WR	110	Std II (R)
	WR-NGP	110	Std II (R)
	NGP-AMF (except Ghudankhapa)	120 (Rajdhani) 110	Std II (R)
	AMF-ET (except Dharakhoh)	120 (Rajdhani) 110	Std II (R)
	MJRI-WUN	30	Std II (R)
	WUN-PMKT	50	Std II (R)
	Note - 1. Ghudakhapa is classified as Std. I (R) in down & Std. II (R) in up direction 2. Dharakhoh is classified as Std. I (R) 3.Run through of Rajdhani shall continue to be 120 kmph while running through stations		
Pune	LNL-PA	105	Std II (R)
	PA-DD	105	Std II (R)
	PA-STR	100	Std II (R)
	STR-KOP (except Miraj & Kolhapur)	100	Std II (R)
	Note - Miraj and Kolhapur are classified as Std. I (R)		

Division	Section	Maximum Speed in kmph	Standard of Interlocking
Sholapur	DD-SUR	105	Std II (R)
	SUR-WD (except Gulberga)	105	Std II (R)
	DD-MMR	105	Std II (R)
	Latur-Latur Rd.	90	Std II (R)
	Latur-Usmanabad	75	Std II (R)
	Pandharpur-Kurdwadi (except Pandharapur)	90	Std II (R)
	Note - 1. Gulberga is classified as Std. I (R) in up & Std. II (R) in down direction 2. Pandharpur is classified as Std. I (R)		

Ref: Joint Traffic & S&T Circular no. N.645/S/Sig. Policy/Rly.Bd. dated 10.10.08

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Chapter 16

Station Working Rules (SWRs) and Temporary Working Order

General Rule 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 Autorised 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 cannot, 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:-

a. 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.
b. 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.
c. Works requiring the sanction of Commissioner of Railway Safety and notice thereof. (See Appendix B to Ch XV of G&SR).
d. SWRs of special class stations.

4. **Procedure for preparation of SWR**

a. The Sr. DSTE/DSTE will prepare / amend the rule Diagram on the basis of signalling plan and send Rule Diagram and also signaling plan / appendices in case of interlocked station, to the Sr.DOM / DOM for framing Station working Rules.

b. Since the rule diagram has a vital bearing on the preparation of the SWRs, the Sr.DOM/DOM will scrutinize the Rule Diagram and the Signalling Appendices, if any, and have these checked at the site.

c. 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. Incase of interlocked stations the Draft Working rules shall be checked and approved by the Sr.DOM / DOM and the Sr. DSTE /DSTE jointly Sr. DEE/DEE(TRD) shall also be associated in electrified sections.

d. 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 stations (in Appendix 'F' of the SWR). In case of a DK class station, the special instructions for working a 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.

e. LC Gates controlled by the Stations and rules for their working shall be incorporated in Appendix A of SWR.

f. The detailed working instructions of Ghat sections shall also be appended on 'Appendix' to the SWRs of the adjacent block stations of Ghat section.

5. Responsibility of the Officers signing the SWRs:-

1. SWRs are the functional rules governing the working of stations. These need to be prepared with care as any deficiency in these rules can endanger safety, in which case the officers signing the SWRs shall also be held responsible along with other staff for breach of safety rules.
2. It is obligatory that the rule diagram of the ground conditions is compared at site to confirm accuracy of SWRD. 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 lay out confirms correctly 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 the 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 Inspector (TI)**:-

1.The Transportation Inspector is responsible to see that SWRs of stations on his section are correct and up to date. He will also be responsible to ensure that the station staff viz Station Supdt., Station Master, Switch, Cabin man, Points man, Gateman, and any other staff who are in any way connected with train passing duties, posses correct knowledge of the Rule Diagram and observe them strictly.

2.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 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 Manager/Station Master in charge**:
The Station Manager/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 SWRs.

10. **Assurance of Staff**:-

1.All the staff that is 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 understand 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 pertaining to their duties. The

SS/YM/SM/ASM shall also certify that the staff concerned has understood the instructions pertaining to their duties.

2.'Fresh Assurance' shall be obtained in the Assurance Register from the staff concerned when -

a. He joins at the station as 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.

11. Distribution of Station working rules:

Copies of SWRs shall be distributed as per current instructions.

12. 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.):

Format of SWR:-

Central Railway ----------Division No. --------
STATION WORKING RULES OF ---------- ---------- (Name of the Station) _____(BG/MG/NG)
Date of issue---------- Date brought in force ----------
Note: -

(1) The Station Working Rules (SWR) must be read in conjunction with the General & Subsidiary Rules and Block Working Manual. These rules do not 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 railway men. However, relevant GR/SR Numbers may be mentioned in the brackets.

(2) 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 & Telecommunication Engineer at interlocked stations and at non interlocked stations by Divisional Operations Manager and Divisional Engineer should sign each page.

(3) The SWR should be issued afresh after five years or after issue of three amendment slips and reviewed as and when required.

1. STATION WORKING RULE DIAGRAM:-

SWR Diagram No. ----------based on CSTE/Central Railway and Signal Interlocking Plan No.---------- should show the complete layout of the Yard Points, Signals ,gradients and the interlocking arrangements of the Station including the non-interlocking siding , exact and actual holding capacity of all the individual lines in metres , actual inter signal distance(Demarcation Point) , names of the adjacent stations and IBS signals , where provided , on either side of the station with their respective distances from 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 distance and not the minimum prescribed. It should be signed by the DOM, DSTE and DEN. The detection table, lever collar Chart and Pull Chart should be provided in the **appendix 'B'**. **Pull sheet** should be reproduced on aboard, brightly painted in the cabins to be placed above the **Lever Frames**.

2. **Description of Station**:-

2.1 **General (Location)**:-

---------- (Name of Station) is a -------- class station on the --------- (Name of the section) double /single line Electrified /non electrified (BG/MG/NG) section of Central Railway on the ---------- route. It is situated at KM---------- from ---------- (a nominated point on the Railway).The number of the cabins should be furnished.

2.2 **Block Stations IBH, IBS on either side and their distance and outlying sidings**:-

---------- Station is situated between (Names of adjacent station on one side) in the ---------- (North /South /East /West) side at a distance of----------KM and ---------- (Name of the adjacent station on either side) in the ---------- (North /South /East /West) at a distance of ----------Km.

Incase of an IBS signal being provided in the adjacent section the mention of the same need to be made as follows.

The section between ---------- (on which the IBS is provided) has been split into two Block sections by providing Track Circuiting /Axle Counters and Intermediate Block Stop Signal at KM--------and KM on Up and Down line respectively, which are controlled by Track Circuit /Electronic Axle Counter and Double Line Block Instrument.

Incase 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 out lying siding /DK station taking of 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 Station on different directions:

Points up to which block section in rear terminates and the point from which block section in advance starts should be indicated in the following tabular format.

Between Stations	The points 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 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 and Common Loop etc.).Goods Sheds / Siding. Hot Axle Siding, passing sidings, Engineering Sidings, Sidings taking of 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, Directions of movement and 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 features 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 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 / token-less Block Instruments, whether cooperative or non-cooperative, 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 the 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 signaling, 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 signaling features such as fixed Warner, top boards at terminals, emergency cross-overs, permanently locked points, motor operated points at terminals at an otherwise mechanically worked stations, emergency /Crank handle keys and their custody, indications of Points /trap points , signals /tack circuits / axle counters need to be mentioned.
The detailed description of the Lever Frame / Control Panel VDU for route setting, using point/signal/gate control switches ,individual operation of points, operation of the gates within the station limits, setting of points using the crank handles and the maintenance of proper records of emergency operation counters provided on the panel needs to be mentioned here. Procedure for working of the 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 Counters on berthing portion as well as IBS Section , emergency operation of points , emergency route cancellations, clearing of block etc. also need to be mentioned from operational point of view.

(Details of signaling 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 handling over and taking over between Station Master and S&T maintenance staff:

4.3 POWER SUPPLY:-

The source of Power Supply for signaling such as Dn AT/UP AT/ Local supply (State Electricity Board) / Diesel Generator / UPS/ Integrated Power Supply etc. should be mentioned. 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 changeover should be described.

5. TELECOMMUNICATION:-

The availability of the telecommunication facilities at the station and their operational aspects should be clearly defined.

a. Section Control / Dy. Control /Traction Power Control telephone, etc.
b. Auto DOT telephones
c. Magneto Telephones
d. IBS telephone with IBS at Km.....
e. Telephone with axle counter reset boxes.
f. Telephone for Yard Communication.
g. VHF sets ,and
h. Mobile Train Radio Communication (MTRC)

The action to be taken in case of failure of communication given above to be clearly spelt out.

6. SYSTEM OF TRAIN WORKING:-

6.1 Duties of train working staff:-

Duties of train working operational staff such as Stationmaster, Switch man, Cabin man Lever man, Points man , Platform porter, Gateman for train operation should be mentioned in detail in appendix 'D' giving specific reference to the G&SR of the Central Railway and the Block Working Manual.

6.1.1 TRAIN WORKING STAFF IN EACH SHIFT:-

The availability of above operational staff provided at the station in each shift with their duties from working of trains should be mentioned in appendix 'D'.

6.1.2 Responsibility for ascertaining clearance of the lines and zones of responsibility:-

Responsibility of ascertaining clearance of lines and zones of responsibility of each staff on duty should be clearly mentioned here. Mention should be made that Private Number Book Should under the custody of train passing staff who is authorized to use it.

6.1.3 Assurance of staff in the staff assurance register:-

Every train passing staff posted newly at station or leave reserve staff at the station or a regular staff who has returned to his duties after more than 15 days absence must go through SWR in force and give assurance in the prescribed Absence Register.

6.2 Conditions for granting line clear:-

Under this head, principles of the system of working in force at 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 dispatching 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 Dispatch of train from non-signalled line
6.2.1.5 Dispatch 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 the passage of the train as per G&SR 3.36-2(b)

6.4 Simultaneous reception / dispatch, 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 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 '**B**lock **P**roving by **A**xle **C**ounter'- (BPAC) installed on the section, the procedure of Block working should be mentioned giving relevant reference to the provisions of G & SR and **B**lock **W**orking **M**anual.

6.6 Dispatch 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 provisions of G&SR and Block Working Manual. In case IBS is provided; the procedure for dispatch of trains up to 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 as given below should be mentioned:-

1. The Station 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.
2. Motor Trolleys, Tower Wagons / 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.

3. In all other respects the working of a Motor trolley shall confirm 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 motor trolley.
4. Any other restriction on movement of trolleys/motor trolleys / material Lorries (dip-lorries)/ tower wagons etc.

7. Blocking of line:

The precaution 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 an approaching train.

8.3 Prohibition of shunting, any special feature if any

8.4 Shunting on single line:-

a) Within Station Section -
b) Between Last Stop Signal and Opposite First Strop Signal
c) Beyond opposite first stop signal.
d) During failure of Block Instrument on single line:

8.5 Shunting on double line:

a. Block back.
b. Block forward.
c. Following a train traveling away from station.
d. Up to I.B.S.
e. Beyond I.B.S.
f. During failure of Block Instrument on Double line.

8.6 Shunting in the siding taking off from station yard/goods shed.

9. Abnormal conditions:-

a. The rules to be observed in the event of abnormal conditions:

Procedure to be followed in the event of the following abnormal conditions should be specifically mentioned.

a) During partial interruption/failure of electrical communication instrument.
b) The authority to proceed in the occupied block section in case of obstruction of line or accident etc.
c) Trains delayed in block section
d) Failure/passing of intermediate block stop signal at 'ON'
e) Failure of axle counters Block/BPAC.
f) 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 operational 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 interlocking:

(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 signaling maintenance staff on duty responsible for attending to the failures and only after receipt of the written memo from the signaling maintainer about 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 BWM 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 precautions 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 Dispatch of train under authority to proceed without line clear or to assist the crippled train.

10. Visibility Test Object:

Position of Visibility test object in each zone of operation and the officials authorized to check the V.T.O. from a nominated place at the station should be mentioned here.

11. Essential equipment at the station:

The list of essential equipment should be given in Appendix E.

12. Fog signal men nominated to be called in case of fog:

The foggy or tempestuous weather or in dust storm when V.T.O. cannot be seen from the SMs office, the SM shall send trained men to act as fog signalman. 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.

List of Appendices

Appendix 'A'	Working of level crossing gates
Appendix 'B'	System of signaling 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)
Appendix 'H'	Station history, giving details of- (i) opening of station (ii) salient features (iii) subsequent up gradients (iv) special instructions (v)Approved special instructions (vi) Condonation issued by CRS/Railway Board etc.

Traffic Working Order
(Details of N.I. working are given in a later chapter)

Traffic Working Order or TWO is an embodiment of detailed instructions issued and circulated by the Sr. DOM / DOM whenever any pre-planned work of signaling, electrical (OHE) or engineering department is to be executed, requiring special safety precautions to be observed by staff.

a. **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 signaling 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 diversion etc.

Policy guidelines regarding signing of the SWR, Station Working Diagram and other suitable checks in connection with the execution of S&T works: [No. TR/Policy/136 dated 15.05.2008]

As per the extant guidelines for extant guidelines for execution and commissioning of signalling works, following important documents are required to be signed by the divisions:

(a) SWR including correction slips thereof.
(b) Station Working Rule Diagram

As per extant practice on C. Rly, SWR contains the following appendices along with main SWR portion.

i. Appendix 'A' – Working of level crossing gates signed by Sr. DEN / DEN, Sr. DSO / DSO and Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works) in case of interlocked level crossing gate.
ii. Appendix 'B' – System of signalling and interlocking and communication arrangements at the station signed by Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).
iii. Appendix 'C' – Anti-Collision Device (Raksha Kavach) signed by Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).
iv. Appendix 'D' – Duties of train passing staff and staff in each shift signed by Sr. DSO / DSO and Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).
v. Appendix 'E' – List of essential equipments provided at the station signed by Sr. DSO / DSO and Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).
vi. Appendix 'F' – Rules for working of DK stations, Halts, IBH/IBS and outlying sidings signed by Sr. DSO / DSO and Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).
vii. Appendix 'G' – Rules for working of trains in Electrified sections signed by Sr. DSO / DSO and Sr. DEE / DEE (Traction).

The main SWR portion is signed jointly by Sr. DSO / DSO and Executive in-charge of the work from S&T dept. i.e. Dy. CSTE(C) / DSTE (C)/ Sr. DSTE (Works) / DSTE (Works).

Thus practically there is no involvement of Sr. DOM and Sr. DSTE of the divisions in signing these documents.

Policy directives, as under, are therefore issued for implementation with immediate effect:

1. (a) Sr. DSO / DSO will prepare the SWR on submission of Appendix 'B' & 'C' by the Executive in-charge of the work as is being done at present.
   (b) Sr. DSTE of the division will also sign Appendix 'B' & 'C' of SWR, in addition to the Executive in-charge of the work.
   (c) Sr. DOM, Sr. DSTE and Sr. DSO will sign SWR along with Appendix 'A', 'B', 'C, 'D', 'F' and other documents pertaining to SWR as necessary.
   (d) The SWR diagram will also be signed by Sr. DSTE and Sr. DOM in addition to other officers signing it at present.
2. Station history must be maintained as an Annexure – 'H' to the SWR giving details of -
   i. Opening of the station,
   ii. Salient features,
   iii. Subsequent up-gradations
   iv. Special Instructions
   v. Approved Special Instructions
   vi. Condonation issued by CRS / Railway Board etc.
3. To avoid curtailment of the existing facilities at stations, consequent to execution of any signalling work executed at the stations, following precautions must be ensured:
   i. The field Executive in-charge of the work shall prepare a list of simultaneous movements, which are not being permitted as a result of the execution of the signalling wok and forward the same to Sr. DOM and Sr. DSTE for scrutiny.
   ii. Sr. DOM / Sr. DSTE shall prepare the summarized statement of such movements jointly and sign the same confirming the acceptance of the simultaneous movements being so restricted.
   iii. Reasons for essential simultaneous movements considered necessary for train operations should be analysed and recorded indicating proposed solutions, if any for permitting these movements. These documents should form a part of the papers pertaining to the Non-interlocking of the station which are either finalized at divisional level or submitted to HQs for approval.
   iv. If solutions for permitting such movements can be found and situation rectified at the divisional level, then 'No Objection Certificate' be issued by the division for permitting NI working and commission of the work. If solutions cannot be found, the documents, with observations of Sr. DOM / Sr. DSTE, should be submitted to HQs for scrutiny and decision.
4. The above procedure shall be revised when Railway Board's instructions issued vide letter No. 98/Safety – I/27/1 dated 20.10.2004 for bifurcation of duties between Safety and Operating Officials are implemented at the divisional level.
5. DRMs will ensure observance of the above instructions in all cases prior to permitting of Non-interlocking.

Sd/-	Sd/-	Sd/-
C. O. M.	C. S. T. E	C. S. O.

Chapter 17

NON-INTERLOCKED WORKING OF STATION

Non-Interlocking.

I. N.I. working means temporary disconnection of points, signals, track circuits axle counter and other 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 pane/RRI working, cable meggering etc.

II. In another sense, at an interlocked station when point and signals become defective, station becomes non-interlocked for the purpose of working.

In both these cases these safeguards ingrained through normal functioning of various signaling equipment are missing and as such responsibility on the part of staff increases manifold. N.I. working putts 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 operation: it is also 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 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 and SR , Block Working Manual etc.

A. Requirement of Non-Interlocked Working:

B. The following guidelines are laid down for a correct assessment of whether NI working is required 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 and T gears. NI is unavoidable only if modifications are to be made to existing S and T gears.

b) For new S and T gears, there is no need of NI and these works can be managed through well planned pre change-over works (insertions of point and 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 and T department should make it clear whether these projects 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 and Sr. DCM must quantify the actual impact of such NI, and reduce 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 for temporary NI, and other administrative costs should also added to arrive at these traffic cost of proposed NI working.

f) This traffic cost of NI should be communicated to S and T , who will evaluate if new gears can be installed without resorting to NI for less than 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 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 the proposal supervision of DRM, who will ensure that all estimates are reasonable and to no figures are unrealistic both with regarded 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 DRM.

Minor and Major Works:

1. Guidelines given below should be followed for deciding whether NI working is required or not.
   i. Replacement of Mechanical lever frame by panel.
   ii. Replacement of Panel by RRI
   iii. Replacement of RRI by RRI
   iv. Commissioning of new SSI/RRI
   v. 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 station
   ii. Major works - Changes in yard layouts, overhauling of cabins etc. at comparatively bigger terminals and junctions stations.

MINOR WORKS

(A) Procedure to be followed for Non – Interlocked Working for 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 and 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 next day for the 2nd cabin.

(C2) General Instructions for train Operation.

1. Speed restrictions of 15 km/h. shall be imposed over all facing points.
2. No train/wagon should be stabled on any running line of these NI station.
3. The common line should not be used for reception of trains coming from opposite directions.
4. Emergency and other crossovers including siding 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.
3. At road side station 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 the nominated 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 SSE(Signal) 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 junctions 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 up to 3 days, plans will be finalized in consultation with DRM, Branch officers and concerned HOD of construction / RE organisation.
6. For NI working of more than 3 days , plans will be finalized in consultation with CPTM, CPTM and HOD of RE/ Construction Organization at Zonal level to asses the duration and arrangement of NI working.
7. For more than 3 days NI, plans should be worked out for cancellation, 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 Manger must be obtained.
9. No NI working should last for more than 14 days.

(D2) Sanctions, clearances and preparatory works:

1. Signaling Plan must be finalized in Head Quarters. At least 45 days in advance.
2. All plans and clearances including CRS sanctions that are require 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 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 Signaling Plans.
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 layouts, insertion/removal of points and crossings etc. Changing/Installation of new point machines must be done in advance.

(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 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 basis.
5. Dy. CSTE / Dy. CE / Dy.CEE as applicable shall make themselves camp near the non-interlocked area where the work of non-interlocked working.
6. 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. Constructions officials responsible for carrying out the work should send a "circular notice" to the Sr. DOM at least two months in advance.
2. They will advise as to when these works will be undertaken with a request to issue special instructions. A copy of the notice shall also to be sent to SM of the station concerned.
3. So. DOM on receiving such "circular notice" get special instructions prepared for that station. These 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/Elect. before start of NI.
   iii. List of works to be completed 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. Signaling Plan must indicate permissible routings and simultaneous movement facilities to be made available.
6. Signaling 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 Table 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 junctions 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 dispatch 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 diverted.
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 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 resorted, 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, re-scheduling, etc must be done in advance as per advance period of reservation.

(D6) Advance preparation for Train Running:

Stoppages on platform:

1. Duration of stoppage 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, inspections 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 be changed if alternate stations are available.
8. Extra train lighting staff must be deputed on platform duty for promptly attending to complaints.
9. Special squads of commercial and RPF staff must be deputed on platform duty for checking ACP etc.
10. 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 station, 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 my 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 liaison with divisional control office for purpose of train running. The jurisdiction of this mini control office would be the NI station itself, and 2- 3 stations on the 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 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/crossing 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 is 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 authority 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 Points man in each shift. These extra ASMs posted in goomties shall be called goomty ASMs. ASM posted with indoor ASM will be termed as coordinating ASM or coordinator.

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 cobiman/pointaman working at the station/cabin. They shall work under the direct supervision and instructions of the co-coordinating 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. 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 and with drawing earlier ones.
10. Round the clock engineering gangs with crow-bars and handles should be available to move point in emergency. One gang man 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 violations should be permitted during NI working. As far as possible duty hours of staff should be restricted to 8 hrs duty shift in continuous roster.
2. For catering to unexpected causalities 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 level: following guideline 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 staff, without prior permission of his department 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 resorted during the last night shift.
2. Second preference should be for a staff who has 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 resorted for first night shift duty.
2. Second preferences should be for staff who has previously worked at that station.
3. Amongst outstation staff preference should as follows :
   (i) Senior staff having previous experience of NI working.
   (ii) Day shift 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 inv valid.
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 the aspects of trains operation that are included in the existing SWR.
3. Static information of SWR will continue to be valid .These include :
   (i) Inter-station distance.
   (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 /dispatch of trains.

iv) Working of level crossing gates.

v) All checks that are done by means of :

a) Slots.

b) Lock bars

c) Point lock.

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 reception dispatch 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 is to be in normal position and which ones in reverse.

(vii) How signals are to be lowered.

(viii) Which staff would do what?

(D12) <u>Field level Advance Preparation</u>:

1. Detailed working instruction 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. <u>In any case these should be ready at least 15 days in advance of NI working.</u>
2. Station Manager / Traffic Inspector who is overall in charge should be fully aware of their responsibilities / duties. Temporary working instruction should clearly stipulate these unambiguously.
3. Each Station Master / Asstt. Station Master, Cabin Man and point man deployed on shift duty should be supplied with copies of temporary working instructions. In addition SM / ASM / Cabin man shall be supplied with yard layout diagrams and pull charts for their guidance.
4. The temporary working instruction shall be supplied to SM /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. Readymade 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 instruction 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 instruction 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 is no obstruction.
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 Manager shall obtain their verbal assurance that they have understood the same.
2. with regard to semi-illiterate staff :
   a. SM/TI should explain detailed working
   b. Test their knowledge.
   c. Satisfy him self 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 handle should be accordingly revised.
8. Written assurances are required to be obtained before staff connected with train passing duties is allowed to work independently.
9. This written assurance should be taken from the staff only after :
   a. They have participated in the 'mock drill'
   b. Worked independently as per their laid down roster.

c. 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 passes 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. 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 station 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 telephone 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. Arrangement of staff and recharging facilities should be available for charging of batteries of telecom equipment including walkie-talkie.
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.

(D 16) 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 hand signal flags, detonators, clamps and pad lock 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 predominantly working.
6. Each goomty must be provided with the following safety equipment :
   a. Clamps, padlocks, detonators.
   b. Flags, hand signal lamps etc.
   c. Relevant pull sheets, yard diagrams etc. duly laminated.
   d. Torches, emergency light, in addition to normal lighting.
   e. Umbrellas, caps, raincoats as required.
   f. Cotton gloves for staff handling points etc.
   g. Table, chairs in tent or covered area.
   h. Containers and glasses for drinking water.
   i. Thermos for tea / coffee and provision of snacks and meals for staff deployed from other station or / headquarters.
   j. Mosquito / insect repellant creams.
   k. Magneto, and VHF walkie talkies, public address equipment.
   l. Private number books, paper pens.

(D17) Security arrangements:

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 working.

(D19) Train Operation during NI period:

Working of signals:

1. Speed restriction of 15 km/h must be in force over all points and crossings. Speed restriction Board of 15 km/h must be exhibited at the foot of the first stop signal.
2. The following signals should be provided with caution aspect:
   a. In case of colour light signals, a common NI home signal without rout indicator
   b. In case of MAUQ / TALQ signal arm NI home signal.
   c. 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:
   a. All points on the route are correctly set, both facing and trailing points clamped and padlocked.
   b. In addition to correct setting, clamping and padlocking of facing points, they must also be manned.
   c. 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 section should be controlled by taking of 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 :
   a. Along with the number of the goomty involved
   b. Sequence of points required to be set and locked in normal or reverse condition.
2. Trains must be allowed to enter cautiously at 15 km/h
3. Loco pilot of an incoming train must not under any circumstances pass the outermost facing points even though signals have been taken off.
   a. Unless he also sees that the points are manned.
   b. A proceed hand signal is exhibited towards him from the points.

(D 20) 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 focused; 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 signaling 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.

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Chapter 18

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 derived- Expressed as tones and number of passengers carried and earnings

(b) Distance- Expressed in kilometers.

(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 kilometers,
Train-kilometers,
Wagon-kilometers,
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 kilometers (fundamental) = Earning per passenger kilometer.
(c)	Passenger kilometer (fundamental); Number of passenger (Primary) = Average distance traveled by a passenger also called lead of passenger traffic.
(d)	Wagon kilometers (fundamental): wagon days (fundamental) = Wagon kilometers 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 statistic:
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 statistic of revenue and expenditure as booked in monthly and yearly accounts.

Operating statistics:
Common terms used in operating statistics:

1. **Route Kilometer:** Distance of each gauge owned by a Railway including its worked lines, treated as a single line kms of double, triple etc. Tracks crossings at stations and sidings as also the track from the centre of terminal station to the end of the main line buffer stop are to be excluded. If any section of the line is worked entirely by another Railway or by electric power, or is opened for goods traffic, but not for passenger traffic or vice-versa the kilometerage of that section is included.
2. **Running track kilometer:** In addition to the route kilometerage the extra distance of multiple tracks, i.e. double, triple etc tracks shall be treated as two or three or more tracks, but shall exclude the tracks in sidings, yard and crossings at stations.
3. **Track Kilometer:** Distance of each gauge owned by a Railway, including its worked lines treated as a single line and extra distance due to double, triple etc. tracks, as also the length of sidings, crossings at stations etc.
4. **Mean route kilometer:** The length of the Railway calculated according to the definition of route kilometerage allowing for changes in the kilometerage during the period covered. Thus, the mean kilometerage worked during the year, which has had an addition / closing during the year will be as follows:
   Route kilometerage at commencement of a year plus / minus number of days the new section / section closed was in use during the year multiplied by the length of the new section / section closed divided by the number of days in the year.
5. **Equated track kilometerage:** The kilometerage of track equated to a standard unit by giving weightage for factors of traffic density, gradient, formation of soil, curvature, rainfall etc. This is worked out by the following formula:
   $C = L \times U (1 + A + B + C)$
   Where C = Equated track kilometers
   L = Running track kilometers
   U = Traffic Density

A = Soil factor
B = Curvature
C = Rainfall factor

The figures of equated track kilometers are worked out section-wise and gauge-wise. This formation is utilized by the engineering department for the employment of gangman for the maintenance of track. The number of men required depended mainly on the number of trains run over the section. More wear & tear of the track; more will be the number of men required for maintenance.

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 percentage

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 of 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 related 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 Railway 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 & 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:

$$\text{Punctuality} = \frac{\text{RT + NLT}}{\text{Total no. of Mail/Express trains}} \times 100$$

RT = Trains arriving Right Time
NLT = Trains not loosing time

Vehicle kilometers 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 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 kilometers 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.

$$\text{Vehicle km. per Vehicle day} = \frac{\text{Coaching Vehicle Km}}{\text{Vehicle day}} \times 100$$

Average Speeds:

This figure represents the average time tabled speeds of passenger trains. The higher is this figure, the better the service to the passengers is.

Shunting kilometers per 100 Train Kilometers (Passenger including proportion of mixed):

1. This figure indicates the amount of unproductive service that has to be performed per 100 train kilometers (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 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 kilometers divided by train kilometers (passenger including proportion of mixed). It can be depicted by formula given below:-

$$\frac{\text{Shunting Kms} \times 100}{\text{Trains kms.}}$$

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 utilized 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 tones 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.

$$\text{Average Starting Wagon load} = \frac{\text{Tonnes Loaded}}{\text{No. of Wagons Loaded}} \times 100$$

Wagon Kilometers per Wagon Day:

1. This figure is a measure of wagon mobility and indicates the average number of kilometers moved by a wagon, on the average, per day, both loaded and empty journeys been 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 kilometers by wagon days which is the product of daily average number of wagons on line and number of days in period.

$$\text{Wagon Km. Per wagon day} = \frac{\text{Wagon Kms}}{\text{Wagons Days}}$$

Net Tonne Kilometers 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 kilometers 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 kilometers (excluding departmental) and the denominator wagon days.

$$\text{Net Tonne km per wagon day} = \frac{\text{Net Tonne Kms}}{\text{Wagon days}}$$

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 transshipment traffic. Stated in 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 utilization 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 kilometers are divided by loaded wagon kilometers, (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 kilometers 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 tones):
This figure refers to the average freight load carried in tones, i.e., to that portion of load which earns revenue for the railway.

$$\text{Average Net Train Loads} = \frac{\text{Net Tonne kms.}}{\text{Trains Kms.}}$$

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.

$$\text{Average Gross Train Loads} = \frac{\text{Gross Tonne kms.}}{\text{Train kms.}}$$

The principal factors affecting this figure are:
1. The tractive capacity of engine on goods train services.
2. The gradients on various sections of the line.
3. The nature of goods carried.

$$\text{Shunting Engine Kms. Per 100 Train Kms.} = \frac{\text{Shunting Kms. x 100}}{\text{Train Kms.}}$$

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 kilometers per Engine Hour:
The figure of net tonne kilometers per Engine hour is a very useful index of the efficiency of freight working on a division. Net tonne kilometers indicate the amount of revenue earning work done while engine hour measure the cost of doing it.

$$\text{Net Tonne Kilometers per Engine Hours} = \frac{\text{Net Tonne kms.}}{\text{Engine hours}}$$

A decrease in net tonne kilometers 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 not required and light engine running.
3. Decrease 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, inter-alia, on the layout of the yard and on the number of trains per day that can be dispatched in various directions. Target figures have be 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.

$$\text{Average Detention per Wagon} = \frac{\text{Total Detention Hours}}{\text{No. of Wagons dispatched}}$$

Number of Wagons Dealt with per Shunting Engine Hour:

The number of wagons that a yard can deal with per shunting hour depends, interalia, on its layout. 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 Kilometers 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 kilometers 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.

$$\text{Engine Kms per day per engine on line} = \frac{\text{Engine Kms.}}{\text{Engine days on line}}$$

Quantity of Fuel Consumed per 1000 Gross Tonne Kilometers 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.

OPERATING RATIO:

Operating Ratio is the ratio of the total working expenses excluding suspense but including appropriations to DRF and Pension fund, bear to its gross earnings. In other words, it represents the percentage of Working Expenses to Total Earnings.

$$\textbf{Operating Ratio} = \frac{\text{Gross Working Expenses} \times 100}{\text{Gross Revenue Receipts}}$$

Operating Ratio has been regarded as one of the most important financial statistics and has frequently been used as an index of the operating efficiency of a Railway. This ratio continues to be worked out from year to year and is reflected in the accounting system. In comparing the ratio of one year with another of the same Railways, great care must be taken to see that the terms "Working expenses" and "Gross earnings" are clearly defined and that the figures have been compiled on the same basis. The object of a Railway Administration is to keep this ratio as low as possible consistent with efficient working and good maintenance; it will tend to fall with efficient working, increase of traffic and fall in expenditure.

Steps to reduce the working expenses:

1. Downsize the staff (closure of unproductive units, multi skilled labour, computerization etc).
2. Achieving efficiency in fuel usage (reducing detention to trains, avoiding wastage of fuel efficiency in train running, detention to a Diesel train for 1 hour incurs nearly Rs. 3000 extra expenditure)
3. Privatization.
4. Leasing out the sidings to Private operators.
5. Introduction of 'Wagon Investment Scheme'
6. Phasing out Vacuum Braked rolling stock.
7. Reducing the incidents of claims.
8. Setting up 'Power Station' for Railways in coordination with NTPC.

Steps to Increase the Earnings in Railways:

I. Freight:

1. Keep the targets for increased freight movement and achieve it. (MR has identified year 2005 - 2006 as 'Mission 700 Million tonnes' in freight)
2. Vigorous marketing strategy
3. Multi Modal Transport
4. Recapture the lost piecemeal traffic
5. Decentralization of powers
6. Incentive offers to the loaders.

II. Coaching:

1. Good customer care
2. Run coaching trains with increased capacity
3. Run special trains like summer specials, pilgrimage specials, mela specials etc.
4. Palace on wheels, village on wheels improved tourism activities.
5. Introduce EMU, DMU rakes for medium distance travel.
6. MMTS, Metro Rail, etc., to cater to the needs of suburban dwellers.
7. Full computerization
8. E-Ticketing and full-fledged operation of IRCTCL
9. Leasing out SLRs
10. Reducing the incidents of accident

SUNDRY EARNINGS

Leasing out the railway land, Technology transfer through RITES, IRCON to other countries like Malaysia, Bangladesh, Mexico etc., Leasing out Telecom lines through Rail-tel Corporation. Consultancy and maintenance service for procurement/maintenance in 'own your wagon scheme' Supply of quality food and water (Rail Neer) through IRCTCL. Display of private advertisements in Railway area, coaches, etc.

OCCUPATION RATIO

This is the Ratio which the Volume of passenger traffic bears to the carrying capacity of the train or Carriages of a particular class and is expressed as-

$$\frac{\text{Passenger KM x100}}{\text{Seat KM}}$$

It is an Index which gives the incidence of overcrowding in trains:

a) It gives the trend of passenger traffic class wise and the extent of overcrowding over the different sections of the line or the line as a whole.

b) It helps the commercial and operating officers to regulate the passenger train service by providing required stock, particularly in these days when the public demands more facilities whereas the Railway has to utilize its stock efficiently and economically. The Commercial Department arranges special trains on fairs and melas.

c) This information when obtained section wise helps to increase or decrease the load of the train at particular stations by attaching/detaching passenger carriages.

STATISTICAL FORMS (STATEMENTS):

Statement 1-A	:	Passenger Train Performance (Punctuality statistics)
Statement 1-B	:	Passenger Train Performance
Statement 2	:	Goods Train Performance
Statement 3-A	:	Passenger and Goods Train Performance
Statement 3-B	:	Goods Train Performance
Statement 4-A	:	Rolling Stock Performance (Locomotive)
Statement 4-B	:	Rolling Stock Performance (C&W)
Statement 5-A	:	Fuel and power Statistics
Statement 5-B	:	Lubricating Oil Statistics
Statement 6-A	:	Passenger Revenue Statistics
Statement 6-B	:	Parcel Traffic Statistics
Statement 7	:	Ordinary Working Expenses
Statement 7-A	:	Goods Revenue Statistics (Advance Information)
Statement 7-B	:	Goods Revenue Statistics (On Originating basis)
Statement 7-C	:	Commodity Statistics

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Chapter 19

FREIGHT OPERATIONS INFORMATION SYSTEM (FOIS)

I. INTRODUCTION

In keeping with global trend, there has been a long outstanding demand of the industry and 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, benefiting both IR and 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 85% 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. Railway 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 even 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 Headquarters, Divisional Control Offices, Yards, interchange points and goods 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 within 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 communication media has been provided for reliable and fast means of data transfer.

8. Phased Implementation – Approach

i) 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 on 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 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 and revenues
- 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 and stock interchange
- Wagon wise interchange

ii) Optimised asset utilization

- Improved locomotive utilization by reduction in light engine running and reduced ineffective Locomotives.
- Statement of missing or wrongly delivered wagons and finally its elimination
- Elimination of un connected 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 and 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 and hand system collecting data on telephones results in sizeable error levels, which need to be reconciled and 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 (customers order) billing and cash accountals from identified nodal customer services centres and not necessarily at the handling terminals
- E-Commerce will facilitate the customers to operate from their premises for the above requirement of the above billing and cash accountal and thus reduced the burden of logistic 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. Date is stored in the central server located 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 unique 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/consigner 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

Forfeiture /Withdrawal 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 po0wer 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 of.

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 your PC through pirated software's 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 everyday at a fixed time. To do this opens "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 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 Rail net. This makes the network phone 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 outer (& through it, to your PCs on LAN). It is a very sturdy and 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 – G 703 (at service provider's premises) & V 35 (at our premises, with Router).

When the channel connected to a modem is working properly, you will find both "RD" & "TD" glowing and 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, there you must also know some simple checks to analyse the channel position. Some of these steps you take in tandem with the operator at the 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 and router. If "TD", "RD" blinks, then local equipment is OK. If it does not then the problem is with Modem/Router.

In the next step, we make "RL" (Remote Loop) switch "ON". This checks the local lead conditions 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 the service provider (i.e., S & T or BSNL). If modem at the other end is not available to execute "LL" successfully, then Modem at that end is defective/improperly connected.

If all loops show positive results and line protocol is still down, try initialising modem by switching it OF and then ON.

If everything gives OK, and 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 least line dedicated channel for data transmission. You have two types of channels – Railway and 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 and VSAT in it. A channel connects your system through Modem and Routers. In addition to these channels, you also have ISDN connection and 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 neighboring Nodes. It has 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 though two channels and one of them is down, you will not know the difference. However, with

one channel down, you are in a very precarious position and 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 and receiving a test data packet from one computer 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 VSAT are as follows. The data is transferred directly to CRIS Server. This is sturdy system, which one stabilized, works trouble freely.

The earthing resistance should be less than 1 ohm.

Neutral to earth leakage should be 2 V.

It should never work without UPS and CVT.

Air-conditioning is a must.

The antennae base structure should be firmly fixed and clamped. At the time of installation it should ensured that ODU is shaving 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, by passing Router (or more accurately, by passing Router at that node but connecting to remote Router) Only in such ISDN connection where Routers are not provided, you will not know the status of channels 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 though 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 and all the other channels are down, Router shall use ISDN to transmit data (ISDN connections can also be assigned for higher priority by configuring router). As soon as any of the other channels becomes stable for a predefined time interval, it again resumes data transfer though that channel, shutting of ISDN. This is what is known as

programming of router. ISDN is a secondary channel and since it's 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 though LAN extender, there is no role of router in sharing 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 gate way (i.e. IP address of your Router) is defined. Disable DMS.

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 extend you desire. You can decide to allow other users to even right on your hard disc. However, you cannot differentiate between you co-users on LAN and 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) and 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 and not handing 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 routers 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 important to know the status of availability of equipment for user.

You should keep records of both Channel Uptime and 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 four hours, you should Ping to adjacent routers and note the result. This compiled over entire day will give channel availability of each channel at your node. Record this in a register giving message to Zonal OCC through messaging feature of RMS.

There should be a fixed regime of reporting of failure to be in place; So that in case of a failure, trouble shooting is fast. List of phone numbers of service providers should be readily available both at Divisional Headquarters and Zonal Headquarters.

You also have to keep tab on the time taken by various service providers to attend to your reports of break downs of Routers, Modems, UPS, Printers, and 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 data transfer programmes. This can cause virus threats, slowing down of application, vitiate OCC tasks and mis-programming of Routers. Within LAN you can share information occasionally. However, running regular and heavy programmes may reduce the availability of system for data entry to FOIS. Please do not run any heavy or regular programmes on your LAN.

Unless you procure genuine copies of software that you intend to use on a single PC, please do not 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 and 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.

SYSTEM ADMINISTRATION

Operational Control Center (OCC)

For successful implementation of FOIS over Indian Railways, each Zone shall have to undertake following responsibilities to wards 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 Personal to setup 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 (Preventive and Remedial) measures to ensure cent percent availability of system.

OCC shall be manned round the clock to operate NMS and provide Pro-active support to feel 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 Physical event has occurred but definitely before the next event takes place. These delays can be monitored with the help of Transaction logs

(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 data element to escape.

Participation of train staff to deliver data through 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 in the place where all the information required to be in put 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 also be prescribed for reporting in case any failure affects data entry from the nominated device beyond two hours.

Each division shall have predetermined reporting regime in case of failure, in such cases data should be entered from a pre-defined alternative device that the 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 has failed, reporting will be done through remaining terminals at that location/site.
b) At a location there may be several sites, if a particular site have 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 at he second channels even flickers. It is therefore important for you to take active interest in knowing the state of 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 on 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 up time you have schedule task of Pinging, even if your node is up. Ideally, every four hours, you should Ping to adjacent routers and 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 & Railways for the above. Routers have been configured to route data on pre-determined priority. Re-routing and load balancing will have to be done through OSPF (Open Shortest Path Finder) 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 OCC and ordering its replacement from the spares.

Maintenance of Equipments

Regarding maintenance of equipments, OCC shall keep a record of Hardware components provided at each locations/sites and the failures at Zonal recorders and its division. Repairs will be through maintenance contracts.

A PC break down (Monitor, CPU or UPS) is crucial as it affects data entry. However, you must first make sure that there is no such problem, which can not be fixed lawfully. Please check for power chord, Operating system and RMS programme. (A step by step procedure is given in Annexure III). If all of these are there and still your PC does not response, bring it to the knowledge of Division HQ. At each site, you have one extra PC complete in all respect 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 Div/Zone. Address of venders 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 centre point ideally a big city where vendor services are available readily.

In house skills would be confined to trouble shooting and to replacement of equipment out of spares. NMS software also helps in trouble shooting. Venders from whom AMC has been drawn and entered can then repair defective pieces.

Replacement of manual information system.

Replacement of parallel manual system is challengeable. It has to be gradually. First of all it will have to be explained to operation managers that value lies in using application in an interactive mode. Dependence on fixed time reports would be minimized. Fixed time reports should be more in the nature of exception reports to reflect failures.

It will be prudent to prioritize this effort in the following order.

1. Interchange
2. Stock and Demand
3. Loco Inventory

OCC will in consultation with COM prescribe a schedule for identified manual reports and baring 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 saving in efforts, accuracy of information, avoidance of disputes, less correspondences and cross references and cross references, more time for planning operations resultant customers satisfactions, 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 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 opt 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 filed 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 and W And commercial Controllers , Guards and Loco Pilots.,

There will also be an element. This training is essential 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 applications tasks.

OCC of each railway will nominate trainers form their existing cadre strength who in turn will be trained by CRIS to established training processes on their railways and trains others. OCC will thereafter monitor progress of training of 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 and which require printing.

You can print either the view shown through (F7) or you can choose which columns and rows you want (by clicking them) and them printing your selection by pressing F11.

For printing, you should have a Dot Matrix Printer attached either to Network or attached to a PC and "Shared". You must plan in advance for your requirement of paper and 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 filter, the entire list of messages for a station increases exponentially. However, use it freely and liberally for communicating messages related to freight operations. FOIS messages and 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 passwords 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 and his password is disabled by CRIS. Assigning passwords gives responsibility to user. This passwords helps in keeping the security trail i.e./ the reporting done carry the id of the user.

Password management, empty task is being passed on the zones so that they can manage password on their own without getting CRIS involved. Besides RMS passwords 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 & arrival departure reporting task.

Running 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 arrival/departure reporting task.

Current interchange: gives summarized view of interchange with break up of empties and loaded stock, stock (4w) interchanged. It also provided summary of jumbo and box rakes interchanged. It is updated by I/C forecast and arrival departure 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 arrival departure reporting and I/C shortfall reporting task.

Train Interchange shortfall: gives shortfall/excess of yesterday interchange along with reason of shortfall in dispatch. It is updated by I/C forecast and arrival/ departure report task.

Stream wise pipeline: 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, and arrival/departure reporting tasks.

Traffic flow: gives information regarding likely traffic flow interchange points up to 3 days in advance. It is updated by load planning, train ordering, and arrival/departure reporting tasks.

Outward train railway wise: gives division wise destination railway wise view of all outward trains on your 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 inside 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/released tasks.

Terminal Performance: gives terminals performance for a selected period. It is updated by arrival/departure reporting, I/W no. taking, rake placement/released tasks.

Terminal History: gives details of individual rakes handle at the terminal for a selected period. It is updated by arrival/departure reporting,

I/W no. taking, rake placement/release 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/release 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/release 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 placements/release tasks.

Rake Integrity: gives details of all attachment/detachment/sick reporting on a individual rake on the selected zone. The examination and 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 and empty rakes. Details of individual rakes can be seen on selecting the desired cell and pressing enter. It is updated by all rake and loading reporting.

Terminal Management Planning: for a selected group rake type, division wise, outstanding rake demands, rake on hand and pipeline of terminating loads are displayed.

On selection of cell and pressing enter, details relevant to that cell are displayed.

It is updated by demand, rake placement/released and arrival/departure task.

All stocks: current rake holding of zone is shown division wise, specified 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, SHEPRA-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, and loco attachment/detachment task.

MANAGERIAL REPORT

Interchange

Yesterday:

Yesterday interchange: this query displays the information of the trains actually interchange in terms of loads and light engines at the divisional interchange point. The shortfall and excess columns displays direction wise summary of loads 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 , given the status of forecasted trains and also the trains, which are not forecasted , but are likely to in the I/C . It is updated by train forecast, arrival/departure tasks.

Rake and Terminal position

Yesterday

24:00 hours terminal position: gives status of load at terminal along with its insight at 24 hrs. It is updated by arrival/departure reporting.

I/w no. taking, rake placement/release task

Current:

Optimized movement of rakes: this query displays movements 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 the 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/rake 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, 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 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 Railway 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 update 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 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/release. tasks, update this query.

Current

Type wise stock position this query gives break up of all rake types or selected 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 consists

reporting tasks. Piecemeal and 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.

OPERATIONS CONTROL

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 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, I/C date/time for handed over and taken over is listed separately. There are fitters provided for originating zone/division/station and terminating zone/division so that various analysis can be done on I/C data. This information is updated by arrival/departure and I/c reporting tasks.

Stock interchange load wise: This query displays summarised information of Receipts and dispatches of stock at divisional level for specific types of stock. Loaded stock classified in terms of through and terminating. Empty stock is shown separately. This query displays and distributes 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 specific type of stock. Loaded stock classified in the 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): On line query which gives forecast and actual Trains ran till the time of viewing the report, along with stock interchanged in the terms of L/E in 4-W units I/C point wise. Summary of I/C is also given Railway wise. I/C forecast and arrival/ departure update this query.

LOAD AND 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 changed was affected with the message No. and the functionary who authorised the change of destination. The reports can be obtained selectively for specific commodity, for consignee or for specific stabled loads at 24.00hrs. 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 arrl/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 arrival/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. These queries 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 Rake placement/release tasks.

Stock holding: The query displays yesterday position of the total holding for the zone for all wagon types, loaded, and empty, separately for piecemeal, Rake 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 en-route reporting tasks.

Rakes at 24 hours: The query displays information of rake 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/dep, 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/dep, 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, station, arrl/dep, date/time, inward direction, 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 is also available including the Loco details. The train details show all the stations enroute 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 provide help regarding station code or name. In case only parts 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 on no. of loads interchanged vis a vis Forecast and shortfall forecast and arrival/departure 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 load was lifted, stabling, Load planning and arrival/departure tasks updates this query.

Diversion register gives diversion details for a specified period. Filters available for originating station commodity, i/e diversion tasks updates this query.

Procedures for FOIS:

CHECK LIST FOR DIALY MAINTENANCE OF HVNET VSAT PREREQUISITES:

1. Minimum 1KVA on line UPS-dedicated to VSAT
2. Dedicated Electronic earth less than 10hm
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-230+10% v VAC 47-63 Hz for PES
6. Grounding of VSATs antenna and unit is a must resistance should be less than 10 ohm
7. AC input voltage to PES must be derived from UPS output only (Live to neutral 230 V AC 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 cover can also be used to prevent the same.

ON-OFF PROCEDURE

9 1. Do not put of the power supply. Keep it continuously "on" because hub is always polling each location for status and control signal must be received at any time from the hub.
2. If PES is switched of 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 50 Hz with input circuit breaker of 3 amps 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 unauthorised person.

13 To prevent damage to the DIU turn power of 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 phone (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 metres 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 = Multi Port Control

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Chapter 20

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.

1)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 RAM - 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	Sick line Placement, Sick line Operation
Modify consist	Shop Marking
Movement	Shop Placement
Movement (Yard to yard)	Remove fit available coaches
Rake Examination	Search Feedbacks
Departure Reporting	Send Feedbacks
Enroute 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.

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Chapter 21

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 good look-and-feel and user-friendly work environment. The benefits of COA 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.

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Chapter 22

Anti Collision Device

Anti Collision Device (Raksha Kavach)

Definition –
Raksha Kavach is a Network of 'self-acting', computer based communication devices called 'Anti-Collision Devices' (ACDs) which 'AUTOMATICALLY' apply BRAKES to Trains, thereby protecting the Traveling Public as well as Road Users at Level Crossing Gates from 'Collision' related Accidents.

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 board (Mobile). ACDs for Locomotives and Guard vans and track-side (Stationery) ACDs, Level Crossing ACDs, Loco Shed ACDs, Sensor based ACDs and ACD Repeaters. All these work on the principle of distributed control systems. All ACDs along the ACD route 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 ACD 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 ACDs are deemed to be at a risk of collision, the ACD system activates automatic braking operation to prevent collisions. Loco ACD is designed to interface with various types of braking system of locomotives.

Purpose of ACD System
Works as 'Companion' of the Driver

- ✓ To Alert Driver on Station Approach
- ✓ To prevent 'high' speed collisions in 'Mid-Section'
- ✓ To prevent 'high' speed collisions in 'Station Area'

RAKSHA-KAVACH (ACD System) is a non-signaling network of anti-collision devices to prevent collisions between trains and between trains and vehicles in Indian Railways.

The ACD system includes a variety of ACDs such as on-board (mobile) ACDs present in Locomotives and Guard vans and track-side (stationary) ACDs such as Station ACDs, Manned Level Crossing Gate ACDs, Un-Manned LC ACDs, and ACD Repeaters.
All ACD Units within the ACD system communicate with each other via radio when they are within a radius of up to 3000m. Onboard ACD units use inputs from Global Positioning System (GPS) for determination of train location, speed, course angle of travel and time.
If two ACD units are within a predefined distance and deemed to be at a risk of collision, the ACD system activates automatic braking operation to prevent collisions. ACD system provides audiovisual warning to the road users at level crossings when train is approaching. In non interlocked manned LC Gates, when approaching Loco ACD detects 'Gate Open' condition, the speed of the train / loco is regulated.

The ACD system provides capability to perform the following:

- Detection and Prevention of Head-on Collisions
- Detection and Prevention of Rear-end Collisions
- Detection and Prevention of Side Collision in block sections in both directions.
- Detection and Prevention of Collision due to fouling.
- Detection of Train Parting / Jumbling and alerting approaching trains
- Station approach warning for driver
- Speed Limit Imposition.
- Approach Warning for Road Users
- SOS Functionality

Kinds of ACD

1. LOCO' ACD
2. 'GUARD' ACD
3. 'STATION' ACD
4. 'MANNED' Level Crossing Gate ACD
5. 'UN-MANNED' Level Crossing Gate ACD
6. ACD 'REPEATER'

1. LOCO' ACD

Loco ACD is part of the network of ACDs called RAKSHA KAVACH which provides a safety shield to prevent or minimize collisions between trains and between trains and road vehicles in Indian railways.
Loco ACD is installed in the Locomotive of the train. Loco ACD in conjunction with ABU(Auto Braking Unit) applies brakes automatically using Intelligent Braking Logic when it perceives a collision type situation.

Components of Loco ACD

ABU (Auto Braking Unit)

The Automatic Braking Unit is connected to the Loco ACD Unit as well as Locomotive's existing braking system. The ABU receives signals from Loco ACD and aids in braking and regulating the train speed. Its working is detailed in subsequent pages.

Driver's Console

Each locomotive consists of two Driver's Consoles which connect to the Loco ACD. It contains Audio-Visual warnings to indicate the occurrence of various events and push buttons for user acknowledgement. It also consists of a VFD (Vacuum Florescent Display) which displays text messages based on the events. The unit is explained in detail in subsequent pages.

ABU is the Automatic Braking Unit, which is connected to the existing Loco's Braking system. ABU applies either emergency or normal brakes to the Loco based on the commands send by the Loco ACD and depending on the situations occurred. ABU acts as an interface between the Loco ACD and the Loco's Braking System. ABU mainly consists of two handles and a lock. One of the handles is used for Emergency brakes and the other one is used for Normal brakes. The lock is provided for Emergency brake. If the driver perceives an emergency situation and would like to stop his train as well as other trains within a radial range of 3000m, he can do so by pressing the twin SOS buttons simultaneously on the driver's console

2. Guard ACD –

Guard ACD is part of the non-signaling network of ACDs called RAKSHA KAVACH which provides a safety shield to prevent or minimize collisions between trains and between trains and road vehicles in Indian railways. Guard ACD is installed in the Guard Van or SLR of the train. The main functionality of Guard ACD is to detect Train Parting, Fouling, and Rear-end collision type situations. Guard ACD sends broadcast to Loco ACD when it perceives emergency situations. If Self Loco ACD fails, Guard ACD will perform some of its functionality.

Each Guard ACD is equipped with Indications and push buttons on its Front Panel. It comprises of LED indications with different colors that operate in blinking or steady mode. Together with a built-in Audio buzzer, they provide the Audio-Visual Warning (AVW) on occurrence of predefined events to alert the Guard. It also consists of several push buttons for acknowledgement of events by the Guard. When the Guard perceives an extremely dangerous situation and would like to stop his train and other trains within 3000m radial distance, twin SOS push buttons are pressed simultaneously in order to generate a Manual SOS from the Guard ACD.

3. Station ACD

Station ACD is part of the network of ACDs called RAKSHA KAVACH which act as a safety shield to prevent or minimize collisions between trains and between trains and road vehicles in Indian railways. Station ACD is installed in stations. The ACD receives information via broadcasts by Loco ACD and Guard ACD that pass through the station. In emergency situations, the Station Master can generate a manual SOS from the Station ACD and stop all ACD-fitted trains within a radius of 3000m. In station area, the Station ACD monitors the movement of Loco ACDs and Guard ACDs. Information such as Main Line Occupation and TID assignment (in stations with dead point zones) will be sent to the Loco ACDs and Guard ACDs.

The Station ACD interfaces with Station Master's Console at the station. This unit is briefly described below:

Each Station consists of a SM's Console which connects to the Station ACD. It contains Audio-Visual warnings to indicate the occurrence of various events and push buttons for user acknowledgement. It also consists of a VFD which displays text messages based on the events.

If the Station Master perceives an emergency situation and would like to stop all trains within a radial range of 3000m, he should press the twin SOS buttons simultaneously on the SM's console.

4. 'MANNED' Level Crossing Gate ACD

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 operations.

Manned Level Crossing Gate ACD is installed at manned level crossing gates. If the gate is open or damaged, Manned Level Crossing Gate ACD warns the oncoming trains which regulate their speeds to minimize collisions at level crossing gates. It is also supported by a Hooter and Flasher to provide an Audio-Visual Warning to road users.

When lit, the Gate Open LED indicates that the Manned LC gate is open. Manned LC Gate ACD keeps sensing the gate continuously for open/close status. When a train is approaching the LC gate and is within 2000m radius, and gate is in open status, the following events occur

- Gate Open LED indication will be lit on in blinking mode.
- The speed of the approaching train(s) is regulated to 30 km/h.

This condition is removed automatically when one of the following happens

- Gate is in closed condition.
- Train is moving away from the gate.

In case of more than one train within 2000m, the condition shall persist until all trains have moved away from the gate or gate is in closed condition.

- Hooter/Flasher will be turned on if the train approaches within 2000 m radius.

5. 'UNMANNED' Level Crossing Gate ACD

Unmanned level crossing gate ACD is part of the "non-vital" network of ACDs called RAKSHA KAVACH which act a safety shield to prevent or minimize collisions between trains and between trains and road vehicles in Indian railways.

Unmanned level crossing gate ACD is installed at unmanned level crossings along with two pairs of Hooters and Flashers to provide an Audio-Visual Warning to road users about approaching trains. Each hooter and flasher pair is installed back to back facing the respective road.

6. ACD 'REPEATER'

ACD REPEATER is part of the network of ACDs called RAKSHA KAVACH which act as a safety shield to prevent or minimize collisions between trains and between trains and road vehicles in Indian railways. ACD REPEATER is installed at locations identified as inter-ACD communication shadow zones where radio communication is weak and packets received from Loco ACD/Guard ACD are stored and forwarded to other ACDs.

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.

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Chapter 23

DERAILMENT INVESTIGATIONS

"Accident investigations - a tool to prevent recurrence". In most of the cases 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 under frame 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 station master. 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.

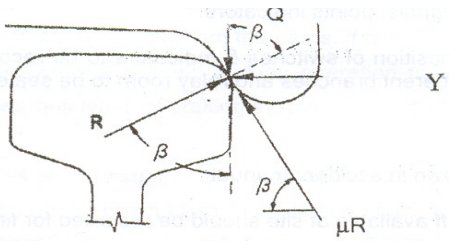
Accidents involving collision, passing signal at danger, rolling back of a train, etc. are generally caused by violation of train operation rules and it is not very difficult to trace the irregularities committed. The most difficult accident from investigation point of view is the ones where wheel leaves the rail such accidents can be categorised in four types:

1. When one or both of the same wheels set fail inside the track.
2. When the wheel derail without any mark on rail table.
3. When the wheel derails with single flange marks on the rail table,
4. When a number of wheels derails with multiple flange marks on the rail table.

Type 1: when one or both wheels of the same wheel set fall inside the rail :

In such derailments the cause of accident is very clear, i.e. spread gauge or may be a remote possibilities of shifting of wheel disc on the axle or breakage of axle or journal. It is generally seen that in such cases of wheel 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, sign 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 loose 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:

$$Y/Q \not> \frac{\tan\beta - \mu}{1 + \mu \tan\beta}$$

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 derail without any mark on rail table:

In such types of derailments, no flange marks are found on the rail table. In majority of such derailments, following reasons may cause 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 vehicle with no break 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 BP, position of zero break power, vehicle and heavy loaded vehicle must be critically done. Additionally loco speedometer chart must be checked for last break 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 if of great importance in establishing the behavior 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 (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 turn outs. 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 1 mm in 3 meters 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 nose 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 guard rails 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 structures 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 $\pm$ 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 mm (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 –2mm
  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 AB in mm divided by Distance between points AB in meters,

Ref.IRPWM-316 (2) (c)

Twist should not be more than 3 mm/mt as per Railway Board letter no. 631W6/TK/10/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 calculates as:

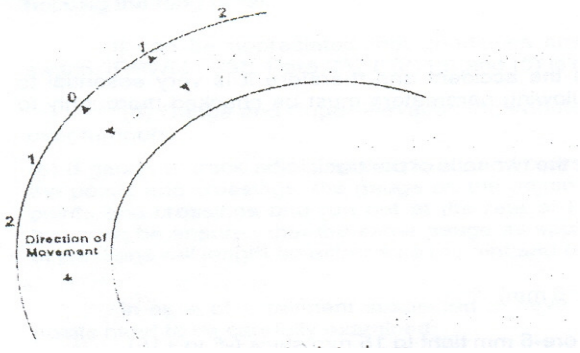
V=125.c2/R

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 Km/h speed, whereas for speeds 100 Km/h or less than 100 km/h It should not exceed 20 mm or 200/0 of the average versine of the circular portion whichever is more.



The super elevati

C=GV2/

C= cant/super elevation in mm.

G= Dynamic gauge in mm

V= Speed in km/h

Para 406 (d) of IRPWM specifies a maximum cant of 165 mm on group A, B and 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 -75mm

(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) IRPWM recommends the minimum depth of ballast below the bottom of the sleeper at rail seat as under:

Groups	Recommended Depth
BG Group A	300mm
BG Group B&C	250mm
BG Group 0	200mm
BG Group E	150mm

(6) **Rail**

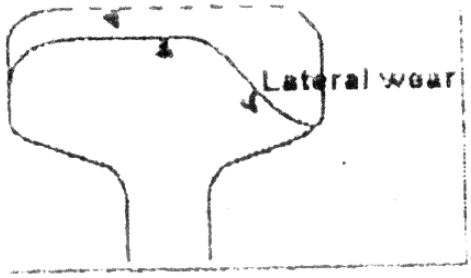
The accident caused by rail fracture does not leave much room for investigation. The fractured rail is to be tested to find out the nature of the failure. The visual inspection can reveal whether the fracture was new or there was some old flow in the rail.

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 rai

Gauge	Rail section	Vertical 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	1O 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. Pre-stressed 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.

A. 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 of Rolling 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.

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Chapter 24

CONCEPTS OF ELECTRIC TRACTION

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 rains.

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 interrupters' usually rated at 600A are provided. The shortest section of the OHE which can be isolated by opening interrupters alone is called a 'sub-sector[1]. Each sub-sector is further sub-divided into smaller 'elementary sections' by provision of of-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 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 is 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 up to 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 interrupters and other similar equipments.

OVERHEAD EQUIPMENT

1. The overhead equipment above the tracks comprises of the following: -

a) A standard cadmium copper wire of about 65 mm2 section or standard aluminum 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 up to 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) Un-insulated 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.

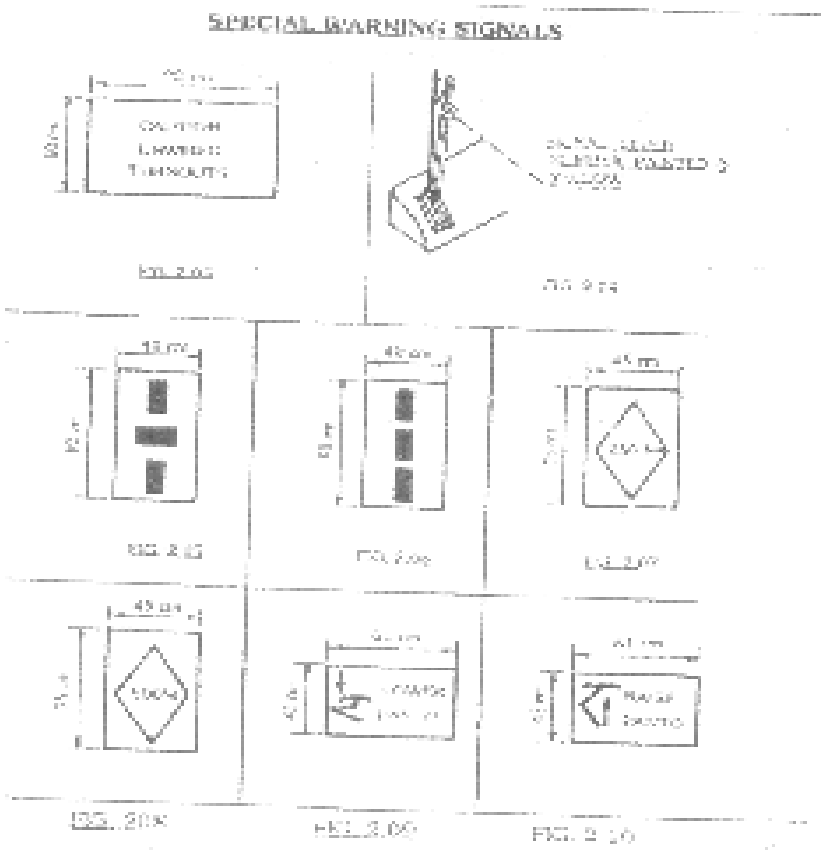
Regulated and Unregulated OHE

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 up to 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.



GENERAL DESCRIPTION OF ELECTRIC ROLLING STOCK

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,WAG9, WAG9M

(b) WAP1.WAP2, WAP3, WAM1.WAM2, WAM3, WAM4, WAP4, WAP 5, YAM1

(C) AC/DC Locos-WCAM1,

(d) ACEMUS-WAU1, WAU2, WAU3, WAU4, YAU.

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 fairly 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 Railways 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 mili-seconds while the same is of the order of 100 mili-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 updated from time to time keeping the overall dimensions unchanged on account of space constraint. The updating has been achieved by using increased copper section of the conductor used, improved insulation scheme and in certain cases adoption of aluminum foil wind 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

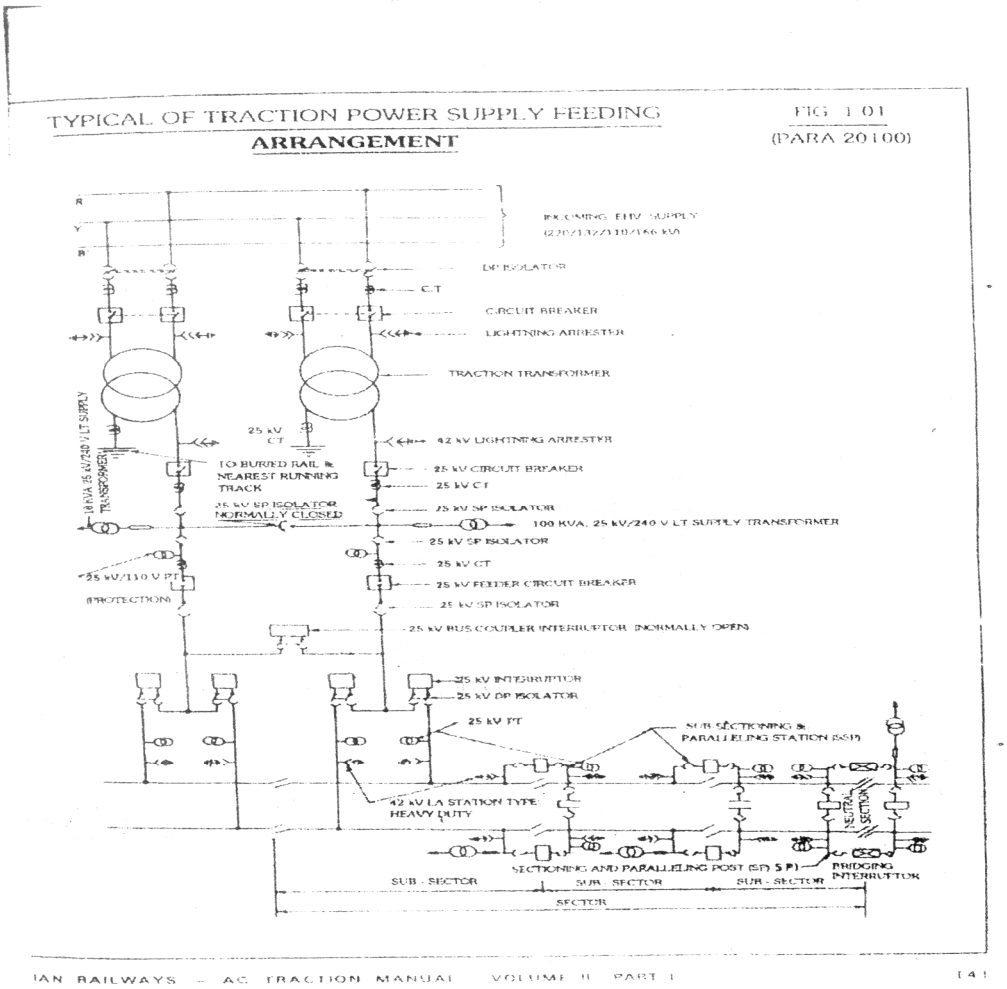
Tap changer is provided on 25 KV (HT) regulating winding of locomotive transformer for controlling the voltage input to main transformer.

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 especially for EMU application.

Arno Convener

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 Arno Converter is to supply 3 phase power required for these auxiliaries.



Power Blocks and Permit to Works:

Maintenance Blocks: - There are generally two types of Blocks required for maintenance work of an electric Traction installations:-

a. Traffic Blocks: - Where a line is blocked against movement of vehicles whether steam, electric or diesel locomotive hauled. This will be required whenever heavy repairs have to be carried out. A traffic block will be granted by the SCOR in consultation with the TPC.

b. Power Block: - Where a section of line is blocked against movement of electric locomotive hauled vehicles or EMUs only i.e. a section where 25 KV electric supply to the OHE is switched of and the section made dead. Power Block is required whenever light repairs to or maintenance of the OHE has to carry out and the nature of the work is such that TFC Block is not necessary. P.B is granted by TPC in consultation with the SCOR. Whenever a Power Block is granted by TPC movement of vehicles hauled by other than electric power i.e. steam or diesel may be permitted, provided a caution order is issued as per GR and SR drawing the attention to the driver to the fact that the OHE staff are working at the kilometer specified and he should exercise caution when passing over the section, obey signals displayed at the place of work.

Power blocks are of three different types.

a. Emergency Power Block
b. Pre-arranged Power Block
c. Locally arranged Power Blocks.

Power Block on the OHE of secondary lines i.e. siding, yards etc. arranged by the SM, YM, shed foreman or Engine Examiner concerned locally come under category (c).

In all cases of Power Block, TPC shall put red warning caps on control switches corresponding to interrupters which are kept open for it. Similarly, warning boards shall be fixed on all manually operated switches opened locally for isolating the section. This shall be done by the operators who open the switches. These red warning caps and warning boards can be removed only when canceling the Power Block. In case SCADA system is in operation instruction issued for the operation of the system shall be followed.

Emergency Power Block:

An "Emergency Power Block" shall be arranged by the TPC and 25 KV supply to the OHE affected shall be switched of by him immediately on receipt of an advice of any break-down of the OHE or injury to persons or damage to property particularly in the following cases.:

(a) the whole or part of the OHE or a feeder or a cable falling down and or persons or animals or falling trees or vehicles coming in contact with or likely to come in contact with live equipment:
(b) A damaged catenary or contact wire fouling the vehicle gauge:
(c) A damaged electric locomotive getting damaged to rectify which the Driver requires the permit-to-work :
(d) Derailment or any other traffic accident on the electrified lines where cutting off 25 KV power supply is considered necessary by TPC or the Section controller, in the interest of safety.

Reporting Abnormalities in OHE:

It is the duty of every railway official to report immediately any abnormalities on the OHE such as are mentioned in or of tracks, masts/structures or pantographs of locomotives as may adversely affect safety of train movements to the TPC either directly or through any Station Master, Section Controller or through the nearest available telephone. If the damage is heavy or the moving dimensions are infringed he should take steps to protect the lines in accordance with General and Subsidiary Rules.

Request for Emergency Power Block:

1. The person who gives the first information of break-down on the OHE shall invariably give all essential information such as his name, designation, kilometrage where the abnormality has been noticed. Its nature and place from where he is reporting. He should leave the place only with the permission of the TPC.
2. The reason for asking for an emergency power block should be brief and to the point, but explicit. Much time and trouble can be saved if the first information given is clear and unambiguous, to enable to TPC to decide upon the course of action to be taken.

Action to be taken by TPC on receiving the information, the TPC shall immediately arrange to switch off power supply to the section affected (the details of defects being obtained after the supply is switched off). He shall at the same time advise the Section Controller on duty where the section made dead by him. The Section Controller in turn should arrange with the Station Masters concerned to take protective measures in accordance with "SWR'.

Precautions after Emergency Power Block is Imposed:

1. Once an emergency power block is imposed, no work on the affected lines shall be commenced until an authorized OHE official arrives at site and earths the OHE at two points or more as per rules. Power supply to the section concerned shall not be restored by TPC until the authorized official at the site issue an message supported by

private number. Procedure for Obtaining Traffic or Power Blocks and Permit to work Officials in the electrified area who require pre-arranged traffic blocks, power blocks or permits-to work in the danger zone of traction equipment, or who require OHE and or bonding staff be present at site for scheduled maintenance works, shall deliver at the office of Sr. DEE (TRD) not later than 10 hours on the first working day of the week statements in the prescribed form showing-

(i) the nature of the work and the date on which it is to be performed:
(ii) by whom the work is to be carried out:
(iii) location of the work and the section of the lines to be blocked:
(iv) the trains between which the block is required: and
(v) Whether the track will be available for steam or diesel traffic.

2. The requirements of all departments will co-ordinate in the office of Sr. DEE (TRD) and a consolidated statement forwarded to the Senior Divisional operating Manager concerned, by 12 hours on every Wednesday, for inclusion in the weekly programme of traffic and power blocks
3. Works of an urgent nature shall be attended to by obtaining emergency blocks and permits-to-works from TPC
4. A weekly program of work involving traffic blocks, power blocks and permit-to-works shall be prepared in the office of SR. DOM and dispatched to all concerned (TPC, TLC, Loco Sheds, Station Masters/Yard Masters concerned and Traffic Controller in addition to the departmental officials who asked for the blocks).
5. All the traction sub-stations have two states of traction power transformers and associated switched gear. Maintenance of equipment of the traction sub-station, therefore, does not necessitate total shut down of 25 kV supply at each sub-station. Whenever any maintenance or breakdown is to be attended in the traction sub-station, the permit to work should be obtained by the Supervisor in charge from the TPC and after completing the work, the permit to work should be returned by the Supervisor in charge to the TPC. Similarly at the switching stations normally the alternative feed is available to the concerned sub-sector and therefore, does not necessitate the per block but only a permit to work should be obtained from the TPC and after completion of the work, the same should be returned to the TPC. In case of attending to the gantry of a switching station complete block of the switching station is required for which power block has to be taken from the TPC.

ISOLATOR OPERATION BY SM/ASM/CABINMAN/SWITCHMAN

i) According to G&SR 17.3-4 every Station Master, Cabin ASM or Switchman shall be fully aware of the Isolator switches provided for Isolator or OHE at station or near cabin and shall be conversant with the correct method of opening and closing the same in an Emergency.

ii) In emergency, Station Master or cabin ASM, Switchman shall operate such switches as per specific direction of the Traction power controller.

iii) If TPC wishes to any isolator switch open or close. He shall ask the SM/CASM/Switchman or any authorized person to carryout the required switching operation. The person concerned shall, after carrying out the order, lock

the switch either in "Open" or "Closed" position as the case may be and inform the TPC of the action taken. He shall not part with the key until receipt of further orders from the TPC. A record of every such operation shall be maintained by the person concerned. Each instruction regarding the parting with the key shall be confirmed by exchange of private number.

iv) The Isolator operation practice must be carried out by each and every SM, ASM, CASM, Switchman along with OHE staff when Isolator/OHE maintenance is carried out by OHE maintenance staff and record should be kept so that there is no problem when operating the Isolator in Emergency.

Movement of other than Electric Trains during Power Block:

Goods or Passenger trains hauled by other than electric locomotives may be allowed to pass through the dead section subject to the following conditions:-

(a) This has not been prohibited specifically in the power block message.
(b) Steam or diesel engine or trains hauled by such engines shall be brought to stand at the station preceding the station/section at which owner block is granted and the Station Master or this station shall satisfy himself by personal inspection that there is not electric locomotive in the train in question.
(c) He shall also give a Caution Order to the Driver of such engine or train warning him of the power block ahead and instructing him to watch for hand signals and observe them
(d) No Station Master shall give line clear or lower signals for a train to run over a section under power block unless he has received an assurance (supported by Private Number from the Station Master of the preceding station that there is no electric locomotive or Inspection Car with pantograph raised in the train.
(e) Whenever a "Red warning collar" has been removed for permitting a movement it shall be replaced back on the signal control lever immediately after the movement is completed.

For purposes of the above rule the term "Electric Rolling-Stock" does not include electric rolling-stock hauled 'dead' as a vehicle or OHE Inspection Car with its pantograph removed or securely locked down.

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Chapter 25

VARIOUS MACHINES USED FOR TRACK MAINTENANCE

Sr 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 (Hours)	Total (Hours)	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	1.6 km	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	0.5 km	-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	0.8 km	-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	0.2 km	20 kmph or 40 kmph if DTS+TTM deployed behind it & stipulated safety instructions followed.

Sr 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 (Hours)	Total (Hours)	Output / Effective hour (new m/c)	Minimum Ty. Speed Restriction if any
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, except 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, longitudinal 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 & 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	0.36km	30 kmph or 40 kmph if DGS deployed and ballasting, rail joints are done as per IRPWM
11.	PQRS	Laying of track	It is a semi mechanized system of track renewal where in pre-fabricated rail panels are laid and existing	25	20	3:15	4:00	0.24km	20 kmph

Sr 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 (Hours)	Total (Hours)	Output / Effective hour (new m/c)	Minimum Ty. Speed Restriction if any
			panels removed with minimum labour						
12.	T-28	Turnout Replacement Machine	It is a fully mechanized system of complete turnout with minimum manual labour	10	10	2:40	4:00	1 Turnout 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, regulation and a profiling	20	20	3:20	4:00	2km	Nil

* As per Board's Joint Circular

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Chapter 26

CREW LINKS, LOCO LINKS AND POWER PLAN

POWER PLAN

PROCEDURE FOR CALCULATING CREW REQUIREMENT OF A DIVISION

1. Running staff (Loco Pilots) review should be carried out every six months; i.e 1st April and 1st October by the Power Officers i.e. Sr.DME/Sr.DEE of the division. After obtaining associate finance vetting and DRM's approval these proposals are sent to HQRs for further scrutiny by the JA Grade Officers Evaluation Committee.
2. **Review of Loco Pilot (Goods):** For calculating the requirement of Loco Pilot (Goods) the total number of working hours logged by Loco Pilot (Goods) is calculated and then the following formula is applied.

2 a) FORMULA FOR GOODS CREW REVIEW BASED ON CREW HOURS

SN	Description	Calculation	Legend
1	Average fortnightly working hours of last six months (working hours on running goods trains)	--	=A
2	Fortnightly duty hours per goods driver =104	-	=B
3	Bare requirement of goods LP	A/B	=C
4	Additional requirement for traffic fluctuation at 10%	0.10 X C	=D
5	Total bare requirement	C + D	=E
6	Leave reserve @ 30%	0.3 X E	=G
7	Bare requirement + LR	E + F	=G
8	Trainee reserve @ as revised divisionwise	As per rev. X G	=H
9	Total crew requirement	G + H	=I

2 b) TRAINEE RESERVE FOR VARIOUS CATEGORIES OF RUNNING STAFF

SN	**Division**	**Trainee reserve %age**
1	Mumbai	6 (Six)
2	Bhusawal	5 (Five)
3	Nagpur	5 (Five)
4	Pune	3 (Three)
5	Solapur	3 (Three)

3. Review of Loco Pilot (Mail/Express/Passenger):

a) Mail/Express, Passenger Loco Pilot requirement is worked out on the basis of crew links.
b) Before preparation of crew links, these links should be vetted by HOER section of the Personnel Branch.
c) 30% Leave Reserve and Trainee Reserve as per table shown in 2 (b) is also added to the requirement.

4. Review of Shunters:

a) Requirement of shunter is calculated on the basis of one for every 8 hours shift.
b) Rest giver is calculated at one for every 6 shunters.
c) 16% Leave reserve and Trainee reserve as per table shown in 2 (b) is also added to the requirement .

5. Review of ALPs:

a) Requirement of ALPs is the same as that of Loco Pilots as detailed above.
b) No ALPs are provided for motormen.
c) 30% Leave reserve and Trainee reserve as per table shown in 2(B) is also added to the requirement.

6. Review of Loco Inspectors:

a) One Loco Inspector for every 25 drivers/50 shunters is included in the crew review.
b) Similarly two Loco Inspectors for every 50 locomotives holding in the diesel sheds are also considered.
c) Separate requirement of Loco Inspectors is worded out for Fuelling installations and for working as safety counselors with the safety department.
d) No Rest-giver or Trainee reserve is given for this category.
e) 16% Leave reserve is included in the requirement.

7. After the evaluation of the proposals by the JA Grade committee as detailed above, these proposals after necessary corrections are sent for the approval of COM, CPO, FA&CAO & then to GM for sanction.

POINTS TO BE KEPT IN VIEW WHILE PRPEARING DRIVER'S LINKS

1. Driver/Crew links are prepared by the divisional Power Officers and got verified by the HOER section of Personnel Branch. Objective of crew links is to ensure optimum utilisation of crews.
2. Train timings to be checked from the latest time-table.

3. Links to be prepared before promulgation of new time table.
4. Max. duty hours in any one trip should not exceed 10 hours.
5. Avg. duty hours in a fortnight should not exceed 104 hours.
6. Minimum number 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. Minimum out 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 hrs. then duty performed plus 1 hr. rest will be sufficient.
9. Minimum home station rest should be

    a) If duty performed in the last trip is less than 8 hours, then 12 hours.
    b) If duty is 8 hours or more, then 16 hrs.
    c) If staff is required to work train with less than stipulated rest then breach of rest allowance is payable to running staff.
10. Link having the max. earning kilometerage should be worked by senior most drivers and so on.

11. Separate links should be prepared for super-fast trains such as Rajdhani/Shatabdi Express. 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 HQRs Office and circulated to the divisions. The objective of power of power links is to ensure optimum utilisation 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. The maximum mileage of each home shed servicing should not exceed 4000-5000 kms.
6. Minimum possible out station halt should be provided.
7. Ensure loco is permitted to run on the sections at the maximum permissible speed of the train.

POWER REQUIREMENT (POWER PLAN)

1. To be prepared once in a year
2. Avg. no. of trains run on each section per day for last year duly signed by the Power Officer and Sr.DOM to be prepared.
3. The power plants are formulated by taking into account the trains actually run section-wise. An additional 5% engine kms. are added for anticipated traffic growth.
4. Loco requirement for ART, ARME and other locos which remain in outage but not added in POL for the purpose of calculation of average kilometers to be added in the bare requirement.

5. Mail/Exp/Passenger Loco requirement to be worked out on the basis of loco link. Add 10% for major repair allowance.
6. For shunting services, work out number of points for 8 hours shunting. Add 10% for major repairs.

10-Hour Rule for Train Crew:

1. Overall duty of running staff from 'sign-on' to 'sign-off' should not generally exceed 12 hours.
2. Running duty at a stretch should not ordinarily exceed 10 hours from the departure of the train. Staff shall be entitled to claim relief thereafter.
3. In operational exigencies, running duty may be extended beyond 10 hours within overall limit of 12 hours provided due notice has been given to the staff by SCOR, before the completion of 8 hours duty
4. If a train doesn't reach its normal crew changing point / destination within a overall limit of 12 hours, and the crew changing point is approximately 1 hours journey, the staff should be required to work the train up to the crew changing point.
5. In exceptional, extreme emergencies like accident, flood, agitation, lightening, equipment failures etc, the staff may be required to work beyond the prescribed limits of working hours and SCOR should advise the staff accordingly.
6. In order to that running staff are aware of their beat, at every crew HQ stations and normal crew changing point, the beat of staff of Mail Express, passenger, goods trains etc should be prominently displayed on the notice board. Such type of notices also be put on lobby, loco shed, where the running staff is required to sign on and sign off.

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. ll, dated 21.12.001)

Maintenance schedule	Periodicity	Duration
Trip Inspection(TI)	After 3000 kms or one trip, whichever is later	2hrs
IA	40 ± 3days.	4hrs
IB	80 ± 3days	6hrs
1C	120 + 3days	8hrs
AOH	12 months $\pm$ 15 days	6 days
IOH	36 months $\pm$ 1 month or 4(6 lakhs for WAP-1/4 loco) lakhs kms. whichever is earlier	9 days
POH	6 years± 3 months or earlier. 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, dtd. 18.01.2001)

Maintenance Schedule	Periodicity	Duration
Trip Inspection (TI)	15 days (fitted with TAO TMs) 120 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	65 months ± 1 monthly or 6 lakh kms whichever is earlier	9 working days
POH	9 years ± 3 months or 12 lakhs kms. whichever is earlier	28 working days

(iii) 3-Ph. ABB Locomotives (Rly. Board Letter No. 97/Elect (TRS) /440/18/44 (3Ph. Dtd. 23.02.2007)

Coaching Locos (WAP5/WAP7 Locos)

Maintenance Schedule	Periodicity	Duration
Trip Inspection (TI)	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 lakhs mks. 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 (TI)	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/V/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	24 months	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

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Chapter 27

DETAILS OF BRAKE POWER CERTIFICATE

Sr No.	Type of train	Validity	Brake Power %age		Conditions for invalid BPC & other instructions
			Originating station	En-route station	
1.	Ordinary End to End rakes vacuum brake rake, Air brake rake other than Premium	Examination-Loading-Unloading-Examination. i.e. 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 if 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 hrs. in examination yard.
2.	Premium Air brake rakes BOXN, BCN, BRN, BOBRN etc.	12 days or 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 hrs. 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 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	100	90	The BPC will become invalid if- i) Rake is not running in nominated circuit. ii) Rake is stabled more than 24 hrs. at examination station. iii) Rake has completed either

Sr No.	Type of train	Validity	Brake Power %age		Conditions for invalid BPC & other instructions
			Originating station	En-route station	
		kms/30 days whichever is earlier (Some Rly's. have CC rakes of 6000 kms/30 days whichever is earlier. C.Rly. does not have such rake)			stipulated kms. Or days. iv) More than 4 wagons are replaced between two Periodical Maintenance Examination i.e. PME **Instructions for Premium CC rakes:** i) Rake shall be offered at its nominate "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/20 days circuits – TKD-JNPT-DADRI/TKD-JNPT/TKD/AQ depot run on free 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 upto 12 months/Of POH/ROH wagons upto 09 months.

BRAKE BINDING/FLAT TYRE:

A) Setting of Empty/Load Device in Wagons-

The Empty/Load device in wagons is not set in correct position thereby causing brake binding and flat tyre.

1. To avoid cases of flat tyre /poor brake power, it should be ensured at the time of loading/unloading that Empty/Load Box lever should be kept in correct position by Operating/Commercial staff i.e.
   On Empty Position - When wagon is empty or slightly loaded.
   On Loaded Position- When wagon is loaded.
2. This should be super checked by Guard at the time of starting train from originating point, and by TXR at the time of train examination.
3. Before movement of loads from loading/unloading terminals, it should be ensured by the Operating staff that, hand brakes are released.
4. While picking up load from Road side stations, the train crew should ensure release of hand brakes.

B) Rolling out/Rolling In Examination of Passenger carrying Trains-

To detect unusual specially brake binding/flat tyre, the C&W department has started rolling out and rolling in examination of passenger carrying trains at nominated points. The rolling out/rolling in Gangs deployed in Divisions are as under –

Mumbai Division	-	CSTM, DR, LTT, IGP
Bhusawal Division	-	BSL
Nagpur Division	-	NGP, BPQ
Pune Division	-	PA
Sholapur Division	-	DD, SUR

- Guards of all trains should look back frequently at the above stations to see that, no danger hand signal is exhibited by Station staff/TXR staff deployed for rolling out examination and whenever any danger signal is shown the train should be brought to a stop immediately by using VHF communication available with the Driver and Guard by using the brakes available in SLR.
- The staff involved in shunting of coaches attached/detached enroute on Passenger carrying trains should ensure complete releasing of coaches before starting shunting in order to avoid any possibility of developing flat tyre on the coaches. Special attention should be paid at the stations, where regular attaching/detaching of sectional coaches is taking place.
- Shunting staff to ensure complete release of coaches/wagons after shunting, to avoid brake binding/flat tyre.

DETECTION OF LOCOMOTIVE AND ROLLING STOCK WITH FLAT TYRE:

Flat tyre have caused extensive damage to track by causing rail fractures and weld joint failures, resulting into serious accidents. To avoid rail fractures/welded joints failures caused by flat tyres, the staff should be counseled to take necessary precautions as under-

MECHANICAL (C & W) STAFF –

As per Railway Board's guidelines, the permissible flat on wheel tread is limited to 60 mm for Goods stock and 50 mm for the Coaching stock/Locomotives. All C&W Train Examination staff should be counseled to adhere to the provision of para 4.22 "Tyre Defects" of Part –IV IRCA Conference Rules for Coaching stock and Para 4.18 of Part-III of IRCA Conference Rules, for Freight Stock. The TXR staff should be counseled not to allow any wagon/coach having length of flatness more than permitted as above under any circumstances. Such wagon/coaches should be detached immediately after being marked sick. The C&W Train Examination staff in C&W depots/sick lines must check the flatness of wheel tread with the help of Tyre Defect Gauge. The flatness of the wheel tread should invariably be checked during intensive examination.

TLC/CPOR/C &W CONTROLLER-

On detection of flat tyre, and after the locomotive/rolling stock involved has been checked by loco shed staff/C&W staff, they should arrange replacement of wheel at site in case of wagon/coach and in case of locomotive, the same should be worked to nearest loco shed having pit wheel lathe for attention and a speed restriction of 20 kmph should be observed till the loco is cleared to the concerned loco shed.

DRIVER AND GUARD OF THE TRAIN-

The train crew and shunting staff should be trained to release brakes whenever DV isolating cock is operated by them. The empty/load box device should be kept in the empty/loaded position depending upon empty/loaded condition of the stock to avoid skidding of wheels, resulting into flatness of tyre during the run. The driver and guard should also be vigilant in detection of hammering blows sounds while on run and on detection of the same should observe a speed restriction of 20 kmph to clear the section upto next station where they should stop the train and advise control office regarding the flat tyre and ask for C&W TXR/Loco shed staff to attend.

OPERATING STAFF-

The station staff should also be counseled to detect the hammering sound if heard on a passing train. They must without fail intimate the approximate position of the wagon/coach to the next station and also to Section Controller to stop the train and get it examined for detecting the locomotive/rolling stock with skidded wheels having flatness of the wheel tread. The train should be inspected by Driver, Guard and ASM and worked

with restricted speed of 20 kmph if possible, till the next TXR/Loco examination station. All TIs and Safety Counsellors should counsel station, Cabinmen, and Switchmen to keep vigilance check on the hammering sound to detect the flat tyre on a passing train and stop the same before it causes extensive damages.

SECTION CONTROLLER-

The Section Controller should take the advise of flat tyre reported by stations seriously and should not allow running of the train for onward journey without ensuring proper examination by C&W/Loco staff. On advice the train should be stopped at the next station and should not be allowed to cause avoidable damage to track.

ENGINEERING STAFF AND GATEMEN-

The Engineering staff and Supervisors at work sites or while doing trolley or foot inspection should also be counseled to be vigilant towards detection of flat tyre on the passing trains. In case of any such defect noticed on any passing train, the approximate position of the culprit wagon/coach should be immediately advised to the next station through emergency control phone or from the nearest level crossing gate. Similarly, the gatemen should also be counseled to be alert and vigilant in detection of hammering sound on any of the passing train and in case of such detection the gatemen should advise the Station Master to stop the train. Gatemen should also show red flag/danger signal to the crew of the train so that, the train be stopped before causing extensive damage.

ENGINEERING CONTROL-

Engineering Control should organize a special check upto 50 kms in the rear from point of detection of flat tyre to ensure the safety of track subsequent to passage of train having flat tyre.

EXTENT OF FLATNESS PERMITTED-

Coaching Stock & Locomotive	-	50 mm
Freight Stock	-	60 mm

The vehicle will be considered to have developed skidded wheel if the extent of flatness has gone beyond above limits as measured by the gauge prescribed for this purpose.

JOINT SAFETY CIRCULAR ON ACTION TO BE TAKEN ON BRAKE BINDING AND PREVENTION OF FLAT TYRE ON PASSENGER CARRYING & GOODS TRAINS (Ref – Safety Circular No. 25/2000 dated 28.11.2000 jointly signed by –CME, CE, CEE, COM & CSO)-

The brake binding and subsequently flat tyre resulting in safety hazard on account of Rail Fracture/Weld failure/Roller bearing failure etc.

1. **Detection of Brake Binding/Flat Tyres on Trains-**
   Train crew/Station staff/Gatemen will be vigilant to detect any abnormality such as brake binding, unusual sound, smoke emission etc. If any such abnormality is noticed, the above staff shall take immediate steps to stop the affected train.

2. *In case of brake binding on a train enroute, the Driver and Guard must take the prescribed remedial action or releasing the brakes and isolate the brakes of the affected coach/wagon, which should be got examined at the next train examination point. This will ensure that, brake binding will not result in flat tyre.*

3. TXR staff available for Rolling In/Rolling Out examination shall detect brake binding/flat tyre in coaches and initiate action.

4. *It is imperative that, all cases of coach detachment on the Division be duly enquired into by Officers concerned with Loco Operation, C & W and Safety and remedial measures taken to prevent enroute detachments.*

5. **Action to be taken by Train Crew after detection of Brake Binding/Flat Tyre-**

   i) **For air brake coaching stock –** Assistant Driver and Guard will find out location of brake binding/flat tyre. At station the assistance should be given by Station staff to train crew. After detecting the culprit coach, the brakes should be released manually and thereafter, brake system should be isolated by closing isolating cocks of brake cylinders, isolating cocks in between FP and auxiliary Reservoir and isolating the DV by rotating DV handle to horizontal position as per detailed instructions given in the working time table.
   ii) **For vacuum brake stock-** Assistant Driver and Guard will find out location of brake binding/flat tyre. At station, the assistance should be given by station staff to train crew. After detecting, the brake should be manually released and thereafter, the brake system should be isolated by disconnecting siphon pipe from release valve and providing wooden plug as dummy with hard grease on

the loose end of siphon pipe. For this, the dummy plug/hard grease will be supplied to driver and guard as personal store, by the lobby incharges for guards and drivers at the time of sign on. The supply of the wooden plug/hard grease would be taken from C & W department.

iii) For Superfast trains or other trains on which TXR staff is accompanying, the Driver and Guard will be assisted by the board TXR staff for activities mentioned in 6(i) & (ii).

6. If as a result of isolation of brake system as per para 6 (i) & (ii) above, the brake power enroute comes down below prescribed 90%, the train should be worked with restricted speed to the next train examination station.

7. **Action to be taken by C&W staff-**

i) The train on which brake binding/flat tyre is reported should be examined by C&W staff at the first opportunity, investigated and certified FIT for further run.

ii) CWI/TXR staff should accompany the train whenever flat tyres are reported. They must ensure proper repair either at the enroute station or at the terminating station as deemed necessary.

8. **Action to be taken by Train Crew at the time of Cattle run over-**

i) After cattle run over, if BP pressure/vacuum drops suddenly, train crew will check the train for the reason of BP pressure/vacuum drop. If any BP/FP/VAC hose pipe is found uncoupled train crew will couple it and ensure release of train brakes. The train crew will manually release the brakes, if there is brake binding. If manual release is not possible, the particular coach will be isolated as mentioned in par 6 (i) & (ii) above.

ii) Guard of the train will give necessary message to Section Controller regarding the affected coach at the next station, who will give details of the coach to C&W Controller.

TXR staff at the first available examination point will check the affected coach for proper functioning of brake equipment.

9. **Action to be taken by Train Crew at the time of ACP-**

i) The train crew will check the train to find out the coach from which alarm chain has been pulled. After detecting the coach, resetting of ACP apparatus should be done.

ii) It should be ensured that there is no leakage after resetting the ACP.

iii) It should also be ensured that, the brakes of the affected coach are in released condition after resetting the ACP.

iv) If brakes are not released after resetting the ACP, then action should be taken as detailed at 6(i) & (ii) above.

10. **Action to be taken by Train Crew after Emergency Brake Application-**

Before starting the train it should be ensured that, prescribed amount of air pressure/vacuum has been obtained in engine and brakes are in fully released position.

A) G D R CHECK LIST:

1. Rake integrity is not disturbed by more than 10 FWUs or 4 Eight-Wheeled wagons. Only intensively examined wagons duly certified by train examining staff are attached.
2. All CBCs and air hoses are properly coupled and locked.
3. All the angle cocks are in open condition.
4. The rearmost angle cock of LV is in closed position.
5. Empty load handle is properly placed as per the empty or loaded condition of the wagons.
6. There is no loose fittings/hanging parts like push rod, pull rod, brake beam, safety brackets, brake blocks, CBC operating handle etc., which may endanger the safe running of train.
7. Hand brake of all the wagons is in released condition i.e., in OFF position.
8. Doors of wagons are closed and locked/secured.
9. Correct position of Twist lock.
10. Any other abnormality noticed and action taken.
11. Guard & Loco Pilot shall prepare a memo jointly on a plain sheet in triplicate indicating the brake power and deficiency, if any, and shall append their signatures and both of them shall retain a copy of the same. Guard should obtain SM/YM endorsement on two copies of joint memo and hand over third copy to SM/YM record. SM/YM will inform the Section Controller after making the endorsement on the joint memo and obtain the clearance for the train to move (GR 4.31).
12. Continuity of the brake pipe pressure is confirmed through VHF/Whistle code i.e. perform the continuity test before starting the train.

B) Post Loading/Post tippling examination of Freight Trains:

Post loading/Post tippling examination to be carried out either by TXR staff or by Guard and Loco Pilot in case of non provision of TXR staff.

Items to be checked by Guard and Loco Pilot:

1. All the CBCs and Air hoses are properly coupled and locked.
2. All the angle cocks are in open condition.
3. The rearmost angle cock of LV is in closed position.
4. Empty load handle is properly placed as per the empty or loaded condition of the wagons.
5. There is no loose fitting/hanging parts like push rod, pull rod, brake beam, safety brackets, brake blocks, CBC operating handle, etc., which may endanger the safe running of train.
6. Hand brake of all the wagons is in released condition i.e. in 'OFF' position.
7. Door of wagons are closed and locked/secured.
8. Check continuity of BP pressure/Vacuum before starting a train (to perform continuity test).

Performa for Joint Check by the Loco Pilot and Guard –

1.	**Date**	**:**
2.	**Train No.**	**:**
3.	**Loco No. & EOL**	**:**
4.	**Load**	**:**
5.	**From**	**:**
6.	**To**	**:**
7.	**BPC issued by**	**:**
8.	**Date of Issue**	**:**
9.	**BPC No.**	**:**
10.	**Loaded at/Tippled at**	**:**

_____ _____

Signature of Loco Pilot Signature of Guard

Loco Pilot's Name: ---------- Guard's Name: ----------

(This memo should be prepared in 03 copies, Loco Pilot and Guard should retain one copy each and the third copy should be handed over to SM/YM).

References - Rly. Bd's letter nos.
1. 2005/M (N) 951/13 Pt. dtd. 07.4.2006
2. 98/M (N)/951/12 Pt. dtd. 17.05.2007
3. 2005/M (N)/951/13 Pt. dtd. 08.02.2006 & 07/17.03.2006

NOMINATED INTENSIVE EXAMINATION POINTS ON CENTRAL RAILWAY

Mumbai Division	**:**	Kalyan/KYN- Premium Examination Point Thal/TVSG - Premium Examination Point Trombay/TMBY- Only Tank Wagon Examination point Jasai/JSLE – CC Rake Re-validation point JNPT- CC Rake Re-validation point Igatpuri/IGP and Lonavala/LNL- are for Brake Power up-gradation points for the trains descending Ghat section
Bhusaval Division	**:**	Bhusaval/BSL- CC and Premium Examination Point.
Nagpur Division	**:**	Ajni/AQ- Premium Examination Point (CC Examination Point for $BLC_A + BLC_B$ rakes) Amla/AMF- Premium Examination Point and for Brake Power upgrading points for the trains descending ghat section.
Sholapur Division	**:**	Daund/DD – Premium Examination Point. Wadi/WD- Premium Examination Point (CC Examination Point for BCC rakes)
Pune Division	**:**	Loni/LNE- Only Tank Wagon Examination Point Miraj/MRJ- Only Tank Wagon Examination Point

WORKING OF CLAMPED WAGON:

1) No empty Oil Tank/BCX/BOX wagon will be permitted to move under any circumstances with a broken spring or broken springs with a clamp and shall be detached at the point of detection or the broken spring will be replaced by a good one.

2) No loaded Oil Tank/BCX &BCX wagons with a broken or clamped broken spring shall be permitted on train from the originating yard nor shall such wagon be permitted through yards specifically nominated for spring changing.

3) Maximum number of broken spring that can be clamped on a loaded Oil Tank/ BOX/BCX wagon will be restricted to one. In case of more than one spring breakage on loaded /Oil Tank/BOX/BCX & Tank wagon the same shall be detached at the point of detection. In case of detection in mid section, the spring shall also be clamped and the train will be permitted to move at cautious speed till the section is cleared.

4) Maximum speed at which a loaded Oil Tank wagons/BOX/BCX wagon with one clamped broken spring is permitted to run is 40 Kmph.

5) After clamping the broken spring of the loaded BOX/BCX/Tank wagons, the Guard of the train will be required to inform the ASM of the station in writing about the clamped broken spring giving details of the individual wagon No./nos. of the wagon/ wagons having clamped broken springs and also the position of such wagons from the locomotive and the brake van.

6) The Guard will obtain the signature of the ASM and the driver on the original copy of the memo and shall retain it in his possession.

7) The ASM on receipt of the said memo shall in turn inform the section controller giving details of the train no. and name, wagon no. with clamped broken spring and the position of these wagon/wagons from the loco and the brake van as given in the memo served to him by Guard. The ASM shall be required to make an entry to this effect in the station diary recording the name of the section controller to whom this information has been given and also the time at which this information was transmitted.

8) If due to any reason, the Guard and Driver were unable to clamp a broken spring in mid section, they will be required to work the train at walking speed up to the next station where the guard will issue a memo to the Station Master to either have the broken spring clamped or if he is unable to clamp then he should have the wagon detached. Under all circumstances, before resuming the journey from

that station, the guard and the driver will both check whether the broken spring is clamped or the wagon detached. The Guard will also ensure that necessary advice about the broken spring has been conveyed to the Yard Master of the nominated yard ahead by the Station Master.

9) Yards on various divisions of C.Rly which are nominated for spring changing work are as under:-

Bhusawal Division	:	MMR, BSL, KNW
Nagpur Division	:	WR, AJNI, BPQ
Mumbai Division	:	IGP, LNL
Solapur Division	:	WD, SUR, DD
Pune Division	:	GIT

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Chapter 28

ENGINEERING

PROCEDURE FOR SANCTION OF WORKS UNDER

PLAN HEAD 16 & 53

A) **GENERAL** Any new work required to be executed in the Railway requires specific sanction of competent authority. Work is sanctioned at different levels as per delegation of power. For sanction of work, there is a laid down procedure to be followed.

Proposal is initiated for all types of new works from divisional level. The concerned branches of the division identify the work, which are to be undertaken in the next year. List of such works, identified by the concerned branch, is forwarded to the Engineering / Electrical / Signal & Telecom branch as the case may be.

After the field survey, site data is collected by the technical Engineers and on the basis of the site data, abstract estimate is prepared and sent to the concerned branch. Then the concerned branch, after getting the Abstract Estimate, prepares Justification, Financial Implication and does the Finance vetting at divisional level after which the proposal, in the prescribed format, is sent to the PHOD of the concerned branch at HQ.

The Calendar for preparation of Preliminary Works Programme is as under:

SN	Description	Target for submission
Proposal for works costing above Rs.5 crores each which require Board's prior approval		
1.	Submission of list of proposed new works with brief justification and approximate cost under various plan heads by the concerned branches of the division to the PHOD concerned for obtaining final vetting of FA & CAO	30.4.2002
2.	Submission of proposals by PHODs concerned duly vetted by FA & CAO to CE for compilation	17.5.2002
Proposal for works costing up to Rs.5 crores each.		
1.	List of proposed new works with brief justification and approximate cost with single order priority under various Plan Heads duly approved by DRM to be submitted by the concerned branches of the division to PHODs concerned for approval	30.4.2002
2.	Approval of PHOD to concerned offices in the division to be	17.5.2002

	communicated for framing detailed proposals	
3.	After obtaining approval, detailed proposals duly vetted by DAO should be submitted to the respective PHODs by concerned branches in the divisions for obtaining final vetting of FA & CAO.	28.6.2002
4.	Above proposals, duly vetted by FA & CAO shall be submitted to CE's office by concerned departments at HQ level for compilation	31.7.2002

For inclusion in Works Programme, Operating and Commercial branches at the division initiate the proposal at divisional level.

B) PREPARATION OF WORKS PROGRAMME

The various stages of Planning and Preparation of Works Programme under PH – 16 & 53 are given below:

1) Formulation of scheme as a part of Advance Planning.

This is done based on the actual requirement, future development, problems faced during day to day working, representations from users & public representatives and works, thus identified, are processed.

2) Preparation of Abstract Estimate and Break-up of Cost

On getting the list of identified work from Operating and Commercial Department, Engineering, Electrical and S&T branches submit their Abstract Estimate along with break-up of cost. As soon as Abstract Estimate is prepared, the approximate cost of the work is known and again works required to be executed are divided in the following groups:

a) Works costing more than Rs.5 Crore
b) Works costing between Rs.50 Lacs to5 Crore
c) Works costing between Rs.5 Lacs to 50 Lacs
d) Works costing less than Rs.5 Lacs

Item No. (a) & (b) are finalised at Railway Board level.

Item No.(c) is finalised at HQ level.

Item No.(d) is dealt and finalised at divisional level.

3) Processing the Proposals

All the proposals costing more than Rs.5 lacs has to be worked out comprehensively at divisional level and, after observing all the formalities as mentioned in Para-A, are sent to CE through the concerned PHODs along with full details of –

i) Technical features
ii) Break-up cost
iii) Benefit expected to accrue
iv) Financial implication
v) Brief justification
vi) A sketch plan in A-4 size *(to be signed by all the concerned BOs)*

4) Preliminary Works Programme

After getting all such proposals from all the divisions and other units, the Preliminary Works Programme meeting is held between GM and PHODs of the Railway to finalise the work costing more than 50 Lacs in Zonal office.

The list of works selected during the Preliminary Works Programme meeting costing more than 50 Lacs is sent to FA & CAO for his concurrence. This PWP for the following year is submitted by Zonal railway to the Railways Board in the first week of September. The Railway Board consolidates all the proposals of the Railways for discussion in Final Works Programme Meeting, to be held between Railway Board Members, GMs and PHODs of the Railways for finalisation of the works.

5) Final Works Programme

The proposals, approved by the Railway Board during the meeting, are consolidated at Zonal railway and submitted to the Railway Board in the form of FWP. The Board consolidates all the proposals and present it in the form of Works, Machinery and Rolling Stock programme of Railway, popularly known as "PINK BOOK" to the Parliament along with Budget Paper. The approved works are published in the PINK BOOK along with demand for grant under different heads for different railways. For the works costing less than Rs.50 lacs, a lump sum provision is made in the PINK BOOK.

6) Sanction of works costing below 50 lacs

Works costing from 5 lacs to 50 lacs are sanctioned at Zonal railway by GM. All the proposals costing between 5 lacs to 50 lacs are discussed by Head of the departments, DRM and GM at HQ level. After discussion, the works are

detailed in a book called List of Approved Works (LAW). Again lump sum provision is made for the works costing less than 5 lacs. For the works costing less than 5 lacs, again it is discussed with Branch Officers and DRM at divisional level and list of works are decided.

7) Out of turn work

The works that are not included in PWP but required urgently by the railways are taken up under the out of turn works. Same procedure, as mentioned above, is followed but with the reduced time frame. Under PH-1600, work is divided into 2 categories viz. line capacity works and other works. These works are executed after administrative approval of GM and Finance Concurrence subject to a ceiling limit of Rs.6 crore in one financial year.

As per SOPGEN, followings are the limits of sanction/approval of GM :

a) For line capacity work : Up to Rs.50 Lacs

b) Other works : Up to Rs.30 Lacs

Under PH-5300, the works are divided into 2 categories:

a) Works costing between Rs.15 lacs to 30 lacs
b) Works costing up to Rs.15 lacs

In category (a), GM has full power to exercise the sanction with Finance concurrence. In category (b), DRM has got full power to sanction with Finance concurrence.

MONSOON PRECAUTIONS & TRACK PATROLLING

Arrangements exist with the Meteorological Department of the Government of India for issuing telegrams of warning, wherever storms, gales, or heavy rainfall are expected. On receipt of such information from the Control, the Section Engineer/P.Way will arrange to advise monsoon patrolmen, watchmen and gang mates to be extra vigilant and be prepared to introduce patrolling, as necessary.

Night Patrolling During Monsoon –

During the monsoon, certain section of the railway line, as may be specified, shall be patrolled to detect damage by flood, e.g.

- Breaches,
- Settlements,
- Slips
- Scours

Immediate action needs to be taken to protect trains, when so warranted.

Security Patrolling During Civil Disturbance and on Special Occasions -

(a) On apprehension of a Civil disturbance, the Divisional authorities should contact the local Civil authority and arrange, as circumstances may warrant for security patrolling of the railway line. This may be arranged on the pattern of the monsoon patrolling with modifications, as deemed necessary, in consultation with Civil authorities.

(b) Security patrolling on special occasions should be carried out according to the special instructions issued by the administration.

(c) The primary duty of the patrolman employed on Security patrolling shall be to protect trains against any condition of danger, such as tampering with track or obstruction placed on line.

Protection of Line In Case of Emergency –

Should any Patrolman / Stationary Watchman / Gang man / Key man deputed for the purpose of patrolling notice any condition likely to affect the safety of trains, he shall at once protect the line and report the carnage to the nearest Station Master

Monsoon Patrolling:

Commencement and Termination –

- The sections, which are normally to be patrolled during monsoon will be identified and notified by the Divisional Engineer.
- For every such section, the Divisional Engineer shall prescribe the period of year, when normal monsoon patrolling is to be done
- Patrolling should be started on these notified sections on the dates specified.

- If the local conditions warrant, the Permanent Way Inspector of the section concerned may introduce or continue night patrolling outside the stipulated dates, duly advising all concerned.

- The patrolman whose beat commences/terminates at a station shall present the patrol-book in his possession to the Station Master/Block hut-in-charge who will enter therein the time of arrival and departure and sign the book. The Station Master/ Block hut-in-charge will also record the time of arrival and departure in his Diary/Train Register Book. The patrolman shall then patrol his length at the end of which, he will exchange his patrol book with that of the next patrolman and retrace his beat. The intermediate patrols do likewise. In this way each patrol-book will be conveyed from one station to the other and back again.
- If a patrolman on arrival at the end of his beat does not find the next patrolman to take over the book, he must proceed ahead, until he meets him. The patrolman should report the absence of any man from his beat to the Mate the next day.
- Station Maters will see that the men come on duty fully equipped and they leave for their patrol duty in time.
- If a patrolman who is due to arrive at a station does not turn in time or does not turn up at all, the Station Master/Block hut-in-charge will advise Station Master/Block hut-in-charge at the other end of the block section of the absence of the patrolman and both Station Masters/Block hut-in-charges will issue caution orders to all trains entering the section until the patrolman from the other end of the "patrol-section" arrives at the station and reports that all is well.

Duties of Patrolmen -

(a) Walk to and fro over the beat in accordance with the chart pertaining to his "patrol-section" looking out for subsidence, slips, signs of erosion, trees blown across the track during storms or any other causes likely to endanger the safety of line. Bridges and their approaches should be especially watched.

(b) Apprehend damage to line when -

- The flood exceeds danger level at any of the bridges.
- When there is damage to the protection work or on approaches even before danger level is reached.
- The water on one side of the embankment is at a much higher level than on the other side.
- When any obstruction such as a fallen tree is blocking the water-way of a bridge.
- The track shows signs of a settlement.

(c) Take immediate steps in accordance with Para 1011 of IRPWM to stop trains when any portion of the line is likely to be rendered unsafe due to abnormal rain or flood or any other cause.

(d) When no danger is apprehended, stand on the cess on the left hand side facing the train and exhibit his number plate, turning the light of his lamp on to it, so that the number can be seen from the passing train. He should also blow the whistle, when the engine and the brake-van of the train pass him.

(e) Obtain the signature of the Station Master / Block Hut-in-charge on duty at the Station / Block Hut concerned for his arrival and departure and exchange patrol books with adjacent patrolmen.
(f) Exchange the reports as to the conditions on their beats with adjacent patrol men and stationary watchmen on the way.
(g) Heed instructions from drivers who may report a condition of danger at a kilometrage and proceed to the place indicated and take necessary measures.

It is of supreme importance that patrolmen and watchmen thoroughly understand what they have to do in the event of emergency.
In the event of an emergency the patrolmen should devote their whole time and energy to the protection of the line and summoning of assistance.
Having protected the line and summoned assistance, they should resume their patrolling.

Action When Damage is observed:
A. In the case where two patrolmen are employed:
(1) Protecting the line -
(a) The second lamp should be lit and danger signals shown at once in both the directions.
(b) The two patrolmen shall then proceed in opposite directions showing the danger signals (red flag by day and red light by night) and when at 600M. on Broad Gauge and 400 M. on Metre Gauge and Narrow Gauge from the point of danger, each should place one detonator on to the rail; they shall then proceed to a distance of 1200 M. on Broad Gauge and 800 M. on Metre Gauge/Narrow Gauge from the point of danger where they should place three detonators on the rail about 10 metres apart.

On the double line the detonators must be placed on the line, in the direction on which the trains will approach. On Metre Gauge sections where trains run at maximum permissible speed of more than 75 kmph. the distances at which the detonators are to be placed shall be specified by the administration.
(c) Should the nature of obstruction be such as to render it impossible for either of patrolmen get across the gap, as for instance a wash away with strong flood, one of the men should show the danger signal and endeavour to stop trains approaching the gap from the other side while the other man should proceed towards the station on his side of the gap, fix the detonators and act as in (b).

(2) Reporting the damage to Station Master and Gang mate -
(a) After protecting the track one of the two patrolmen who is nearest to the station and in case mentioned in (c) the patrolmen who has protected the track will proceed in all haste, showing the danger signal, to the station and inform the station master of the danger. On his way back, if he meets

with any gang quarter, he should inform the Mate of the occurrence and the gang must immediately proceed to the affected kilometre and take necessary action to attend to the repairs.

b) After protecting the track the other patrolman will proceed to the site of obstruction, and remain there showing the danger signal, until the first patrolmen joins him. In case the other patrolman has not been able to locate the gang hut on his way back from the station, one of them should proceed to the gang hut and inform the gang mate.

B. In case where one patrol man is employed -

(1) Protection of Line -

(a) When damage is detected on single line -

(i) Place a red lamp during the night and a red flag during the day in a prominent position to warn a train which may approach from one direction. Then run in the opposite direction from which direction train is likely to come, with a danger signal and place one detonator at 600 M. on Broad Gauge and 400 M. on Metre Gauge & Narrow Gauge and three detonators at 10 metres apart at 1200 M. on Broad Gauge and 800 M. on Metre Gauge / Narrow Gauge from the site of obstruction / damage.

Provided that on those Metre Gauge Section" where trains run at maximum speed of more than 75 kmph, the distances at which the detonators are to be placed shall be specified by the administration

(ii) Return to the site of obstruction/ damage and protect the other side with detonators similarly.

(iii) In the event of it being impossible to get the other side of the obstruction / damage (as in a wash away) place the red lamp so that it can be seen from as great distance as possible by a train approaching from that direction and protect the other side with the detonators etc. as detailed in sub-Para (a) (i).

(b) When damage is detected on double line -

(i) Place the red flag / lamp in prominent position so as to warn an approaching train on one track. Then run along the other track on which train is expected first and place the detonators as in sub-Para (a) (i)

(ii) Run back and protect with detonators the line on which the lamp/flag was prominently placed earlier.

(1) Reporting the damage to the Station Master –
The patrolman will return to the site of obstruction after protecting the line in both the directions and shall remain at the place of obstruction and send word about the danger through the first railway employee or other persons he is able to contact at the spot itself.

Vulnerable Locations -

Vulnerable locations are those, where conditions unsafe for passage of trains are apprehended and there is need for stopping of trains in time in case such conditions develop e.g. -

(a) Bridges, having inadequate water-way, liable to scour in foundations, oblique / parallel flow of water to the approaches, rise of flood above danger level frequently.
(b) Bad banks liable to slips and subsidence.
(c) Bridges located across river courses fed by Railway affecting tanks.
(d) Cuttings and Hill slopes frequently affected by the landslides and boulder-falls.
(e) Water over-flowing over the track.
(f) Any other condition likely to affect the safety of the track.

Duties of Station Master-

(1) Patrolling of line during the monsoon months -
(a) The line is to be patrolled at night from the commencement until the close of the monsoon, ordinarily from June 1'st, until October 31'st, but the exact date of commencement and termination will be decided by the Assistant Engineer of the section.
Patrolling should not be started until the monsoons actually arrive on any section.
(b) Patrol charts, prepared by Divisional Engineers for the different sections, will be distributed to the Assistant Engineers, Permanent Way Inspectors and Controller and a copy of the relevant portion of the chart will be supplied to each Station Master with instructions to -
(i) record timings of arrival and departure of Patrolmen in the patrol books and initial them, and
(ii) record timings of arrival and departure of patrolmen and their names in the station diary.
(2) Copies of the patrol charts shall be sent to the loco shed Foreman by the Divisional Engineer.
(3) (a) The Patrolman, whose beat commences at Station A, will present the patrol book in his possession to the Station Master A, who will enter there-in the

date and time of arrival and departure of the patrolman and sign the book and return it to him. He will then walk over his beat and handover the patrol book to the patrolman of the next beat, and so on, until the book from station A continues its journey to Station 'B'. In a similar manner, a patrol book from Station B will be transmitted to station 'A'. The Station Master at A is to enter the date and time of arrival of patrolman in the book from Station B, sign it and hand it back to the patrolman for re-transmission to Station B. The Station Master at Station B will enter the date and time of arrival of the Patrolman in the book from station A, sign it and hand it back to the patrolman for re-transmission to station A. In this manner, each patrol book makes one journey in each direction per night.

(b) If a Patrolman, on arrival at the end of the beat, does not find the next Patrolman waiting to take over his book, he must not wait, but must walk on until he meets him and should report the absence of any man from his beat, to the Gang mate in the morning.

(c) Where stations are close together, the patrol books may be passed through one or more intermediate stations before it is returned to the original station. The Station Master of each intermediate station will enter the date and actual time of arrival and departure of the Patrolman and sign the book.

(d) In order that the movement of the Patrolman can be checked accurately, it is essential that the Station Master on duty should record in the patrol book, the actual timings of the arrival at and the departure from the station. He should also record in his station diary the name of the Patrolman and the actual time of his arrival and departure from the station.

(4) (a) Station Masters will see that the Patrolmen come on duty sober.

(b) if a Patrolman does not turn up within 15 minutes of his scheduled arrival, the Station Master on duty will take the following action -

(i) He must stop run-through trains proceeding into the block section.

(ii) He must advise the Station Master at the other end of the section to take similar action and also advise the Controller.

(iii) He must issue a Caution Order Form T-409.B to all trains proceeding into the block section advising the Driver to be on the alert and specify a speed restriction of 40 kilometres per hour during the day when the visibility is also clear, and 15 kilometres per hour during the night or during the day when visibility is not clear.

(iv) He shall also initiate action to ascertain the reason for the Patrolman not turning up by either sending a Gang man or a Pointsman, if available, in the concerned section.

The Caution Orders referred to under item (iii) above will be issued until the Patrolman has arrived and reported that the line is safe for passage of trains.

Classification of Level Crossing Gates:

The classification of level crossing gates shall be based on the volume of rail and road traffic and visibility conditions.

The classification of level crossings shall be as under:

S. No.	Class	Criteria
1.	'Special' class … for roads	TVUs greater than 50,000
2.	'A' class … for roads	TVUs between 50,000 and 30,000 or, Line capacity utilization 80% (on single line) and number of road vehicles greater than 1000.
3.	'B' class … for roads 'B' Class is further subdivided as following : 'B1' class … for roads 'B2' class … for roads	TVUs between 30,000 and 20,000 and number of road vehicles greater than 750. TVUs between 30,000 and 25,000 TVUs between 25,000 and 20,000
4.	'C' class … for roads	All other level crossings for road not covered in above classes.
5.	'D' class … for cattle crossings.	

All level crossings in Special, A, and B1 classes will be interlocked and protected by Signals and kept Normally open to Road Traffic; and may only be closed against the road traffic for the passage of train or for any other Railway operation by taking of the signals.

Periodic Census of Level Crossing Gates:

Periodic census of traffic at all level crossings, manned/ un-manned shall be taken once every three years. This shall be carried out for 7 days and total Train Vehicle Units (TVUs)/day (train units x Road vehicle units) are worked out. Train,Road vehicle, Bullock carts and Tongas being considered as one unit, Cycle rickshaw/Auto rickshaw being considered as half unit. The census shall be carried out be a multi-disciplinary inspectorial team consisting of representatives of CE, S&T and Traffic Departments. The mechanism shall be set up by the Divisional Railway Manager to ensure that the representatives are present for the census by laying down advance time table for carrying out of census of level crossings.

(Ref : Adv. Correction Slip No. 100 dated 21/06/2006 to Indian Railways Permanent Way Manual)

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Format for Gate Working Instructions (Appendix 'A' to SWR)

Introduction - The Gate Working Instructions are to be added in Appendix 'A' in the following format for Interlocked/Non-Interlocked Gates (Engg/Tfc)

DATE OF ISSUE:
DATE BROUGHT IN TO FORCE:

WORKING INSTRUCTIONS FOR TRAFFIC/ ENGINEERING LEVEL CROSSING GATE NO. _____ ('___' CLASS)

1. CLASS, LOCATION, NORMAL POSITION & CONTROLLING OF THE LC GATE:

Traffic/Engineering level crossing Gate No. ___ ('___' class) is situated between _____ and _____ stations at Kilometers _____(name of stations). This gate is **interlocked/ Non-interlocked** and provided with Lifting barriers/Leaves (type of lifting barriers should be mentioned). The **normal position** of this gate is **open/close** to road traffic. A telephone communication (Types of communication between gate and station along with its Ring code to be specified) is provided between this gate and Panel room/Station Master's office, _____ (name of station).

2. STRENGTH OF STAFF AND DUTY HOURS :

Whether gate is opened for day shift or day and night. Shift should be mentioned of 8/12 hrs each.

No. of Gateman	Classified as	Duty hours	Shift		
			1st shift	2nd shift	3rd shift
1/2/3	Continuous/EI.	8/12	--	--	--

3. LC GATE EQUIPMENTS :

The following gate equipments are provided at the gate lodge:

Sr. No.	Description	No
1.	Whistle	1
2.	LED based flashing hand signal lamp	3

3.	Hand signal flag - Green (mounted on stick)	1
4.	Hand signal flag - Red (mounted on stick)	3
5.	Chain with pad locks	2
6.	Detonators in a tin case(10 or more if prescribed)	10
7.	Tommy bar	1
8.	Water-pot or bucket	1
9.	Mortar –Pan	1
10.	Rammer	1
11.	Pick – axe	1
12.	Staves suitable for exhibition of red flag or red lamp	2
13.	Phowrah	1
14.	Banner Flags	2
15.	Wall Clock	1
16.	Stop Boards with carex reflectors	2
17.	Sathidar	2

In addition to the above, following register & books should be available and maintained up to date: -

(i) Working instructions of LC Gate,
(ii) Gateman's Rule Book,
(iii) LC Gate Inspection Book,
(iv) Duty Roster & Gate competency certificate.
(v) Public Complaint Book.
(vi) Gate Register and private number sheet.

4. SYSTEM OF WORKING OF THE LC GATE:

Whether Gate is provided with lifting barriers, leaves boom locking arrangements and operated by means of winch or motor operated to be specified.

4.1 Interlocking arrangements at gate: Description of slides and its working should be mentioned. In case of interlocked gate, gate working rule diagram must be provided.

4.2 Arrangement of Power Supply:

4.3 Procedure for opening the LC Gate:

4.4 Procedure for closing the LC Gate:

5. FOLLOWING INSTRUCTIONS SHOULD BE OBSERVED FOR PASSAGE OF TRAINS BETWEEN SECTIONS:

i) Before allowing train to enter in a block section, the gateman must be advised in advance with train no. direction. In case of non-interlocked gate private no. from gateman should be obtained in assurance of gate closure.

ii) The Gateman shall not open the LC Gate unless the UP/DN train(s) & following vehicle if any passed the LC Gate. {SR 16.03-2 (b)(iv) should be mentioned here in case of non-interlocked gate}.

6. POSITION OF GATEMAN WHILE PASSING A TRAIN FROM LC GATE:

i) The Gateman on duty should stand attentively at the gate lodge side facing the track with furled red and green flags in right hand and left hand respectively during day and hold the hand signal lamp with the white light pointing towards the track at night.

ii) He shall watch all passing trains to see any unusual condition like hot axle, chain hanging , any vehicle / wagon caught fire, flat tyres, brake binding, load shifting, etc. and take prompt action to warn the Driver and Guard of the train by showing danger signal and also report the SM/ASM .

7. WHENEVER GATE IS TO BE OPENED FOR PASSAGE OF ROAD TRAFFIC, FOLLOWING INSTRUCTIONS SHOULD BE FOLLOWED:

i) After passage of Up & DN trains and following vehicle if any whenever the gate is to be opened for passage of road traffic, the Gateman shall open the gate as per the procedure laid down in **para 4.3** above.

ii) In case of an **extreme emergency** (e.g. train parting, accident in the section). When the gate is to be opened for road traffic before the passage of the train from the gate, he shall put back the Gate signal to **'ON'** if a train is not approaching to the LC Gate. The Gateman shall also advice the SM/ASM on duty before opening the gate.

8. FAILURE OF GATE TELEPHONE:

i) In the event of failure of gate telephone or if the Gateman fails to attend telephone, the SM/ASM shall issue necessary caution order to the driver and guard of the train and also issue message to the SM at other end.

ii) The SM/ASM shall issue following caution order to Driver and guard of a train –

a) Stop the train short of the Gate signal/Gate, & whistle freely,

b) Ensure closure of the LC Gate.

c) Observe Gate Stop signals/Hand Signal of the Gateman.

iii) In the event of failure of gate telephone, the Gateman shall take action as per SR 16.03-2(b)(v).

9. ACTION IN THE EVENT OF AN ACCIDENT OR ANY OBSTRUCTION AT LEVEL CROSSING GATE:

As per GR 16.07 and SR 16.07-1.

10. PROCEDURE TO BE OBSERVED WHEN GATE BARRIERS ARE DAMAGED / INTERLOCKING/GATE SIGNALS ARE FAILED:

As per SR 16.03-2(c)(vi).

11. OPERATION OF GATE IN CASE OF ELECTRIC FAILURE (for Power operated lifting barriers):

In case of failure of electric operation of lifting barrier of lever crossing Gate, the Gateman can open the gate with the help of Crank handle provided in a sealed glass cover Box. The Gateman will break the seal of the Box, take out the Crank handle and insert it in the Gate motor and then turn it to open the lifting barrier. Now the Gate can be open or, close as per the requirement.

12. CHANNEL FOR FLANGE OF WHEELS:

The Gateman is responsible to see that the channel for flange of wheels is kept clear.

13. MAINTENANCE OF LC GATE REGISTER:

i) The Gate register shall be maintained at station and LC gate during normal and abnormal circumstances.

ii) In the normal circumstance, a train No, time when advice by SM to gateman to close the gate & time when train passed the Gate etc. shall be recorded.

iii) During failure of **Gate Stop signals or interlocking of gate,** a train number, time direction etc and **private No.** issued by the Gateman as an assurance for closure of LC gate, etc. shall be recorded by Gateman and the SM/ASM, on duty in their Gate register as stated in **SR 16.03-2 (b)(1)(VI)**, which is as under-

STATION MASTER'S / GATEMAN'S LC GATE REGISTER

GATE No.	TRAIN NO.	TIME ASM ASKED FOR CLOSURE OF GATE	TIME & PRIVATE NUMBER GIVEN BY GATE MAN		TIME WHEN TRAIN PASSED LC GATE
			TIME	PRIVATE NO	

14. FAILURE REPORT:

i) Failure of the Gateman to acknowledge the calls shall be recorded in the Train Signal Register and matter reported.

ii) In case of failure of magneto telephone, the SM/ASM shall advise immediately by written message to the Telecom Inspector/TCM of the section and enter the defects in S & T failure register.

15. GENERAL INSTRUCTIONS FOR GATEMAN:

i) He should come on duty well in advance and in sober condition wearing proper uniform.

ii) He should take over charge properly from his predecessor and on completion of duty, hand over charge properly to his reliever. He shall not alter his shift duty without permission.

iii) **Do not allow unauthorized person to operate the LC gate**.

iv) Do not open the LC gate once closed for road traffic, unless the train and following vehicle if any passed the LC Gate.

v) He must ensure that the channel for flange of wheels is clear.

vi) Gateman is responsible for watering & ramming of road surface.

vii) If the gateman notices that a train has parted, he shall not show hand danger signal to the Driver but wave up and down **green flag** during day and **white light** during night and endeavour to attract attention of Driver & Guard of a train by shouting, gesticulating or by other means

viii) He should not leave Gate lodge unmanned especially in open condition

ix) Ensure proper maintenance of record and safety equipments / devices in working condition.

x) Any unusual/Failure/public complaint must be reported to SM/ASM.

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Chapter 29

ESTABLISHMENT

The Railway Service (Conduct) Rules 1966

The Railway servants are governed by the Railway Service Conduct Rules 1966, which lays down the standard of conduct expected of every Railway Servants and member of their family.

Rule 3: General

1. Every Railway servants shall at all time
   a. Maintain absolute integrity,
   b. Maintain devotion to duty and
   c. Do nothing which is unbecoming of a Railway or Railway employee

2. Every Railway employee holding a supervisory post shall take all possible steps to ensure the integrity and devotion to duty of Railway servant who are under his control. No Railway servant shall in the performance of his official duties or exercise of powers conferred on him act otherwise than in his best judgment except when he is acting under the direction of his official Superior and shall where he is acting under the such direction, obtain the direction in writing wherever practicable and where it is not possible he shall obtain confirmation.

3. (3)(a) Promptness and courtesy.
   No Railway servant shall
   i. In performance of his official duties act in a discourteous manner.
   ii. In his official dealing with the public or otherwise adopt dilatory tactics or will fully cause delays in disposal of the work assigned to him.

3. (b) Observance of Govt's policies
   Every Railway servant shall at all times.
   i. act in accordance with the Govt's policies regarding age of marriage, preservation of environment protection of wildlife and cultural heritage.
   ii. Observe the Govt's policies regarding prevention of crime against women.

3. (C) Prevention of sexual harassment
   i. No Govt. servant shall involve him self in any activity of sexual harassment of any employee at the work place.

ii. Every Govt. servant holding supervisory post shall take all steps to prevent the commission of such act of sexual harassment of women.
For this purpose it includes such unwelcome sexually determined behavior, whether directly or by other ways i.e.
(a) physical contacts and advances
(b) a demand or request for sexual favors
(c) sexual colored remarks
(d) Showing pornography
(e) any other unwelcome physical, verbal or non verbal conduct of sexual nature.

Rules 4:
No Railway servant shall use his official position or influence directly or indirectly to secure employment for any member of his family in any company or firm having official dealing with him.
No Railway servant shall in the discharge of his official duties deals with the matter or give or sanction any contract to any company or firm or any other person if any member of his family is employed in that company every such type of cases further shall be sent to his supervisor authority.

Rule 5:
No Railway employee shall be a member of or otherwise be associated with any political party or any other organization.
It shall also be duty of every employee to endeavour to prevent any member of his family to association in any way with such movement or activity.

Rule 6:
No Railway servant shall join or to be member of an association or union the object of which are prejudicial to the interest of sovereignty, integrity and security of India.
When any staff is promoted to gazatted rank he shall resign the union of non-gazatted staff but in case joining such union is beneficent he may continue with such association provided he satisfies the GM.

Rule 7:
No Railway servant shall engage himself or participate in any demonstration which is prejudicial to the interest of sovereignty and integrity of India, the security of the state, friendly relation with foreign state or which involves contempt of court, defamation or incitement of an office.

Rule 8:
No Railway servant shall except with the prior sanction of the Govt. connected with press, Radio, TV editing a news paper or publishing a book and other media except in literary, artistic and scientific matter.

Rule 9:
No Railway servant shall in any radio broadcast or in any document published his own name or any other name or any communication to press or any other media make any statement of fact or opinion which has effect of an adverse criticism of any current policy of Central/State Govt. or embarrassing the relation ship between Central and State Govt.

Rule 10:
No Railway employee shall except with the previous sanction of Govt. give evidences in connection with any inquiry conducted by any person, committee or authority or in course of giving such evidence not criticize the policy or any action of a Stage Govt.

Rule 11:
Communication of official information – Every Railway servant shall in performance of his duties in good faith, communication formation to a person in accordance with the right to information Act, 2005 (2) of 2005 and the rules made there under. (RBE No. 22/06)

Rule 12:
No Railway servant shall except with the previous sanction of Govt. ask for or accept contributions to raising of any funds or other collection in case or in kind in pursuance of any object whatsoever.

Rule 13:
No Railway servant shall accept or permit any member of his family or any other person on his behalf to accept any gift. Accepting lavish hospitality or frequent hospitality from any individual having official dealings with him.
On following occasions Railway servant may accept gifts from his near relatives but he shall where he accepts any such gift make a report of such acceptance to the Govt. if the value of any gift exceeds. (PS No. 59/04)

	Group A	Group B	Group C	Group D
Weddings anniversaries functions or religion	7000	4000	2000	1000
Other matter	1500	1500	500	500

Rule 13 (A):
No Railway servant shall give or take or abet the giving or taking of dowry or demand directly or indirectly from the parents or guardian of a bride or bride groom.

Rule 14:
No Railway employee shall except with the previous sanction of Govt. receive any complimentary or valedictory address or accept any testimonial or attend any meetings on entertainment held in his honour.

Rule 15:
No Railway employee shall except with the previous sanction of the Govt. engage directly or indirectly in any trade or business or any other employment.
A Railway employee may under take any honorary work of a social or charitable nature or occasional work of a literary, artistic or scientific work.

Rule 15 (A):
No Railway servant shall sub let, lease or otherwise allow occupation by any other person of Govt. accommodation which has been allotted to him.
A Railway servant shall after the cancellation of his allotment of Govt. accommodation vacate the same within the time limit prescribed by the allotting authority.

Rule 16:
No Railway employee shall speculate in any stock share or other investment.

No Railway employee shall make or permit any member of his family or any other person acting on his behalf to make any investment, which is likely to embarrass or influence him in the discharge of his official duties.

No Railway employee shall have in the ordinary course of business with a bank or public limited company either him self or through any other person.

i. A. Lend or borrow or deposit money as a principal or an agent to or from or with any person or firm, company with whom he is likely to have official dealing or otherwise places himself under primary obligation to such person or firm or private limited company.
   B. Railway employee may give or take from a relative or any personal friend a purely temporary loan free of interest.

Rule 17:
A Railway servant shall so manage his private affairs as to avoid habitual indebtedness or insolvency. A Railway servant against whom any legal proceeding is initiated for the recovery of any debt due from him or for adjudging him as an insolvent shall forth with report the full fact of the legal proceeding to Govt.

Rule 18:
Every Railway employee shall on his first appointment submit a return of his assets and liabilities in prescribed form.

i. Group A and Group B officers shall submit an annual return in such form.
ii. Commercial staff in all grades should besides submitting a property return at the time of their every promotion.
iii. Where a Railway employee enter into a transaction of moveable property either in his name or any other member of his family, shall submit the report with in one month from the date of such transaction, if the value of such property exceeds Rs.20,000/- for Group A and B, and Rs.15,000/- for Group C and D posts. (RB No. 59/04)
iv. No Railway servant shall except with the previous knowledge of the Govt. acquire or dispose of any immovable property by lease, mortgage, purchase, sale, gift either in

his own name or in the name of any member of his family, if the transaction is through reputed firm.

v. Otherwise previous permission of Govt. is required.

vi. A Railway employee can purchase share and debenture, security bond, mutual fund up to Rs.50,000/- for Group A and B, and Rs.25,000/- for Group C & D without permission.

Rule 18 (A):
Prior sanction is required to purchase or sale of immovable property, outside India or with foreigners.

Rule 19:
No Railway servant shall except with the prior sanction of Govt. have recourse to any courts or to the press for vindication of any official act which has been subject matter of adverse criticism or an attack of defamatory character.

Rule 20:
No Railway servant shall bring or attempt to bring any political or other influence to bear upon any superior authority to further his interests in respect of matter pertaining to his service under the Govt.

Rule 21:
No Railway employee shall enter into, or contract a marriage with a person having spouse living and having a living spouse shall enter into or contract a marriage with any person, in other words it means that no Railway servant who has a wife/husband shall contract another marriage without first obtaining the sanction of Govt.

- A Railway servant who has married or marriage a person other than of India shall forthwith intimate the fact to Govt.
- Govt. may permit a railway servant to enter into or contract any such marriage is permissible under the personal law and there are other grounds for so doing.

Rule 22:
A Railway servant shall strictly abide by the law relating to intoxicating drinks or drug in force in any area in which he may happen to be for time being.

- A Railway servant shall not be under the influence of any intoxication drink or drug during the course of his duties and shall also take due care that the performance of his duties at any time is not affected in any way be the influence of such drink or drug.
- A Railway servant if he belongs to the running category (both Loco and Traffic) or is directly connected with train passing duty have taken or used any intoxicating drink/drug within eight hours of the commencement of duty or take such drinks or drug during the course of duty.

Rule 22 (A):
No Railway servant shall employ to work a child below the age of 14 years. (PS No. 11959)

Right sizing:

1. Safety category post shall not be surrendered.
2. All the posts surrendered shall be in the lowest grade
3. Safaiwala posts shall not be surrendered.
4. Post occupied by Physically handicapped persons shall not be surrendered
5. There shall be no supernumerary posts in the division.
6. Vacancies in the division shall be surrendered on a 1:1 basis.

HOER (1961)

CLASIFICATION:

All Rly. Servant governed by the HOER are classified under any one of the following heads:-

(i)Continuous (ii)Intensive (iii)Essentially Intermittent (iv)Excluded

(i) CONTINUOUS:

The employment of all Rly. Servant shall be deemed to be "Continuous" which are not classified as "Intensive or Essentially Intermittent" or "Excluded".

(ii) INTENSIVE:

When it is so declared by Head of the Rly. On the ground that it is a strenuous nature involving continuous concentration or hard manual labour with little or no periods of relaxation. The period of rest, inaction or relaxation do not aggregate 6 hrs. or more in a cycle of 24 hrs. or in any shift of 8 hrs. he does not get period of inaction, rest or relaxation of al least one hour, in the aggregate. [RB No. E (Adj) 8 C-L-1 A, dated 09.07.79]

(iii) ESSENTIALLY INTERMITTENT:

When it is so declared by Head of the Rly. on the ground that his daily duty hrs. include period of inaction aggregating 6 hrs. or more, including at least one period of not less that one hour or two periods of not less than half an hour each, during which the Rly. servant is on duty but there is nothing to display either physical activity or sustained.

Such a staff can not be permitted to leave their place of work during rostered duty hours to have their meal with them during the period of inactivity.

(iv) EXCLUDED:

The supervisory staff holds a position of responsibility, having duties of a supervisory character, from the nature of his work & position comparatively free to adjust his hrs. of duty or work during such hrs., Confidential Capacity, Armed guards, Staff of Rly. school etc. shall be treated as "Excluded".

CLASSIFICATION OF NEW POSTS:

1. In case where no post exists previously at particular stations, the staff should be classified on the basis of classification of similar posts at the adjoining of any other station on the section where conditions of work are similar.
2. In case, such a post already exists at the station and additional post is sanctioned to complete 24 hrs. cycle, the additional Railway servant should be classified in accordance with the hours of duty required of each individual post having regard to the work-load.
3. In case, where no such post exists on the division, the staff should ordinarily be classified as "Continuous" as a tentative measure and the factual job analysis should be conducted immediately to have the final classification determined and fixed.

   "In cases where additional posts are required to be created under quantum of work and are to be allowed provisional "Essentially Intermittent"/"Intensive" classification, according to the work-load of the post, till final sanctions may not be issued or post manned till sanction of the Competent Authority i.e. G.M. personally is obtained for allotment of Provisional sanction on submission of necessary date based on general examination of the work-load.

HOURS OF WORK & REST

Under RLT award the hours of works will consist of

42 hrs a week in case of "Intensive Work"

48 hrs a week in case of "Continuous" & "Essentially Intermittent Worker"

In addition to this time required for P&C work for those categories of workers who are required to do such work.

In case of "EI" additional hours of work which will be as follows:-

Gateman "C", care taker of rest House, saloon attendant "EI" worker posted at road side station who are provided with residential quarters with in 0.5 KM their place of duty.

Rest of "EI" worker - 24 additional hrs. a week.

- 12 additional hrs. a week

Road side station: - The station which is not

- An important junction station.
- A station with marshalling yard.
- An important terminal station.
- A station from which trains are ordered as a regular measure.
- A station where there is separate goods office under a CGC.

So a station having any of the above activity called and classified as "Non road side station".

Duty roster hrs. and rest hrs.

Summary for hrs. of work

Classification of staff	Hrs. of work in case P&C work is less than 15 minutes	Hrs. of work in cases P&C work is assessed to be 15minutes & above	Statutory limit	Period of rest.
"Continuous"	8hrs. a day or 48hrs. a week	(i) 8½hrs. a day or 54 hrs. a week where P&C work is assessed to be minutes & above but less than 45minutes	54 hrs /week or 108 hrs. /Fortnight	Rest shall not be less than 30 consecutive hrs. including a full night for running staff at least four period of not less than 30 or at least five period of not less than 22 consecutive hrs. each including a full night. As above
"Intensive"	6hrs. a day or 42 hrs. a week.		45hrs / week or 90 hrs /Fortnight	Rest shall not be less than 30 consecutive hrs. including a full night
"Essential Intermittent" (a) Gatemen "C", care taker of rest house, saloon attendant, worker posted at road side station who are provided with residential qtr. With in 0.5Km. from there place of duty.	12hrs. a day or 72hrs. a week.	--	75 hrs /week	Rest shall not be less than 24 consecutive hrs. including a full night.
Excluded	No hrs. of work prescribed for Excluded worker	--		Rest of not less than 48 consecutive hrs. each month or a rest not less than 24 consecutive hrs. each fortnight.

JOINING TIME:

It will be granted to Railway Servants on transfer in public interest.

It is not admissible in the case of temp. transfer for a period not exceeding 180 days. Actual transit time is in the case of journey on transfer/tour shall only be allowed.

Joining Time shall be commence from the date of relinquishment of charge of the old post if the charge is made over in the (F/N) or the following date, if the charge is made over in the (AN).

Joining time shall be calculated from old HQ in all cases including where a Railway Servant receives his transfer order or makes over charge of the old post.

Not more than one days joining time shall be allowed to a Railway Servant to join a new pot within the same station or which does not involve change of residence from one station to another station, same station will be interpreted to mean the area falling within the jurisdiction of the municipality of corporation including such of suburban notified area.

In case of involving transfer from one station to another station and also involving change of residence, the Joining time shall be Formula for each payment in lieu of LHAP.

Allowed with reference to the distance between the Old Headquarter to New Headquarter. By direct routes as indicated in the following schedule.

When holidays followed (s) journey time the normal joining time may be deemed to have been extended to cover such holidays.

Upto 1000 Kms.	10 days
More than 1000 Kms but less than 2000 Kms.	12 days
More than 2000 Kms.	15 days

Extension of joining time beyond the limit of indicated above case be granted upto the maximum limit of 30 days by the HOD and on Division by DRM and beyond 30 days by the Railway Board.

The total period of joining time should be approximately equal to 8 days for preparation plus reasonable transit time plus holding if any following the extended joining time.

While computing the transit time allowance could be made for the time unavoidable spent due to duration of transport arrangement caused by strike of natural calamity.

Reading in leave account with unutilized joining time when Railway Servants joins the new post without availing of the full joining time the numbers of days of joining time as admissible under these rules subject to the maximum of 15 days reduced by the number of days actually availed of, shall be credited to his leave account as LAP. It will be credited subject to the usual restriction leave account.

CATEGORISATION OF OPERATING STAFF

(Ref: Rly. Bd's letter no. 2002/Safety-I/18/2 dated 21.2.2002)

Failures of train passing staff cause resulting serious accident and bring down the reputation of Railways. In this connection a proper system of maintaining and up-gradation of staff involved in train passing duties is instituted.
In view of "Human Element" being important role in safe train operation, categorization of Operating staff is required to be done into A, B, C & D category. The detailed guidelines issued by Rly. Board are as under-

I. OBJECTIVE-

- "Better and effective monitoring" of especially inefficient/identified staff.
- Creating awareness of his own safety category for necessary improvement.
- To closely monitor and initiate necessary action particularly in case of C & D category staff for up-gradation.

A) Method of Categorization-

1. Categorization will be based on performance for the last six months. The important parameters to be taken into account while analyzing the performance of the employee along with weightage of each is given below. 100 marks allotted to judge overall performance is as under-

Knowledge of rules	-	25 marks
Alertness and observance of rules	-	25 marks
Safety record	-	15marks
Leadership & Management	-	15 marks
Discipline	-	10 marks
Appearance & neatness	-	10 marks

2. Staff shall be graded on the basis of total marks obtained as under –

Category 'A'	-	80 and above
Category 'B'	-	50 to 79
Category 'C'	-	49 to 26
Category 'D'	-	25 & below

Note- Alcoholic staff must be categorized under 'D' category irrespective of marks obtained by them in other aspect of working.

B) System of Gradation will be as under-

SMs will grade	-	All group 'D' (Pointsmen/Gatemen)
Supervisory SMs/TIs will grade	-	All class III staff including ASMs, AYMs, Shunting Masters, Switchmen, Cabinmen, Levermen.
AOM(G) will grade	-	Supervisory SMs

To ensure that, the system is fair and objective all classifications, categorization done will be checked and countersigned by next higher authority within six months.

C) System of Monitoring-

1. Categorisation –

i) A register shall be maintained at the station indicating category given based on marks obtained and duly acknowledged by concerned staff.

ii) Top sheet should be kept in register indicating staff wise and category wise chart.

iii) Separate pages shall be allotted for the 'C' & 'D' category staff.

iv) Record details regarding appointment, grade, categorization, review of categorization and steps taken regarding counseling/training/refresher/safety camp and DAR action etc. for up-gradation.

v) All out efforts shall be made for up-gradation of staff by initiating all possible steps, record of which must be available in the register.

vi) List of 'C' & 'D' category staff shall be kept under close watch by all Inspecting officials and action taken recorded in the register.

vii) Performance of the employee shall be recorded after every six months and checked by next higher authority once a year.

viii) All lapses brought out during the inspection shall be recorded in the register by SMs, obtaining acknowledgement of staff.

Staff classified as 'D' category shall be monitored on a monthly basis.

Staff classified as 'C' category shall be monitored on quarterly basis.

D) System of up-gradation-

- Input knowledge, counseling, monitoring shall be done by next higher authority.
- Safety Counsellors must make special efforts for up-grading category 'C' & 'D'.
- Attempt shall be made for up-gradation by giving suitable action plan by next higher authority.
- 'C' & 'D' staff must invariably be deputed for safety camp/crash training and Safety Supervisors shall personally ensure this aspect.
- Inputs given in six months shall be indicated in tabular form in the register and reviewed by DSO every year.
- Awareness and lapses of 'C' & 'D' category staff are as of weaken shall be discussed in each meeting with necessary steps taken for up-gradation.
- 'D' category staff may be directed for refresher at frequent intervals with permission from DSO, based on the competence and knowledge seen during the time of analysis.

E) Inspections- During inspections Supervisors/Officers shall comment on the categorization of staff.

F) Advice to Staff- Details of A, B,.C & D classification/categorization/review of staff must be notified to the concerned staff under acknowledgement. A register shall be kept in the personal custody of SS being maintained and handed by SS personally.

G) Awards & Objectives –

1. C & D category staff improving to the level of 'A' category within six months may be issued with appreciation letter.
2. Staff who have constantly maintained themselves in category 'A' should generally be considered for annual safety award.
3. Categorisation of staff needs to be considered while filling up annual confidential report.
4. Staff not improving despite adequate attempts need be viewed seriously and may be considered for retirement as per rules.

General Instructions-

1. Responsibility of Supervisor/Depot Incharge-
   - ❖ It will be the personal responsibility of Depot Incharge , Supervisor/TIs to ensure that, the categorization is done strictly on merits/demerits as per procedure in each case with the view have realistic assessment of the performance.
   - ❖ Categorisation shall be primarily based on field performance and observation of proper procedure.
   - ❖ They will also be responsible for incorrect or unrealistic categorization.
   - ❖ In case, staff under 'C' & 'D' category cannot be up-graded inspite of necessary inputs/steps taken, a detailed report must be submitted for suitable action, indicating steps taken for up-gradation.
2. Staff should be motivated for up-gradation.
3. Categorisation of staff may be considered during transfer, promotion, DAR action/Registration for transfer etc.
4. Staff must be aware of his present categorization. Supervisors/SSs/TIs to ensure this aspect.

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Chapter 30

MISCELLANEOUS

PERIODICAL MEDICAL EXAMINATION

Para 514 (IRMM) Periodical Re-examination of serving Railway employees:-

In order to ensure the continuous ability of Railway employees in class A-1, A-2, A-3, B-1 and B-2 to discharge their duties with safety, they will be required to appear for re-examination at the following stated intervals throughout their service.

(A) Category A-1, A-2, A-3

i) At the time of every period of four years, calculated from the date of appointment, until they attain the age of 45 years and then every two years until the age of 55 years and then there after annually, until the conclusion of their service.

ii) If an employee in medical category A has been periodically medically examined at any time within two years prior to his attaining the age of 45 years, his next medical examination will be held two years from the date of last medical examination and subsequent medical examination every two years until 55 years and then annually thereafter until retirement. If however such an employee has been medically examined at any time earlier than two years to his attaining the age of 45 years his next medical examination should be held on the date he attains the age of 45 years and subsequent medical examinations every two years thereafter.

Age (as on the date PME)	Next PME due
Less than 41Yrs	After 4 Yrs
41 Yrs	After 4 Yrs
More than 41 but less than 43 Yrs	45th D O B
43 Yrs	45th D O B
More than 43 but less than 54 Yrs	After 2 Yrs
54 Yrs	After 2 Yrs
More than 54 Yrs	After 1 Yrs

510. Classification of staff:-

For the purpose of visual acuity and general physical examination of candidates and of serving Railway employees, the non-Gazetted Railway services are divided into the following broad groups and classes.

Groups Classes: - A Vision tests required in the interest of public safety

A-1	Foot plate staff, Rail car drivers and Navigating staff (For foot plate staff see Para 520).
A-2	Other running staff, Other shunting staff, Point lockers, Station masters, and other staff in operative control of signals.
A-3	Loco, signal and transportation Inspectors, staff authorized to work trolleys, Yard supervisory staff, Road motor drivers and gate keepers on level crossings.

Specific fuel consumption:

Any motive power is rated to give optimum special fuel consumption at a particular speed which can be attained by the motive power and load.

The operation of train beyond the speed leads to high rate of fuel consumption. Thus for high speed train services, specific fuel consumption for goods trains with varying speeds are worked out. It is the measure of efficiency.

It is defined as the number of units consumed KWH for AC and Liters for diesel for obtaining traffic through put of 1000 GTKM. The specific fuel consumption depends on the following main factors.

1. Gradient of the section which is to be covered by the train
2. Speed of movement
3. Saturation of section capacity
4. The train resistance
5. Status of signal on approach

Some factors viz. Speed / signals can be controlled whereas other factors cannot be controlled. The higher the speed of the movement, the greater the energy required for. Since train resistance increases with the speed, section capacity and engine utilization can be increased through higher speed.

$$SFC = \frac{\text{Total fuel consumption of a fixed / gross load}}{\text{Time / Kilometer}}$$

Diesel - For goods train speed of 65 to 90, 3.5 to 6.13 liters approximately
For Mail express trains, 4.5 to 6.5 liters approximately

AC - For Mail express train, 17.8 KWH / 1000 GTKM
For Suburban train, 40 KWH / 1000 GTKM

Thus higher speed for making punctuality and make up the time can affect specific fuel consumption adversely.

Precautions for SFC:

1. Avoid unnecessary steps and timely lowering of signal
2. Give precedence to MU compared to SU as it is more for MU
3. Running of trains without brake van to be avoided
4. During accident / unusuals, Loco pilot shall lower pantograph / shut down engine while waiting for more hours. Pre-intimation shall be given 20" before starting the train.
5. Minimum fuel balance shall be maintained as per norms. Loco pilot shall be advised to lower the pantograph / shut down the loco if the detention is likely to exceed 30 minutes.
6. Minimum regulation of trains.
7. Unauthorized halts shall be avoided.

Asset reliability:

Measures to arrest asset failures:

1. Engineering:
    a. Track renewal
    b. Improvement in Alumino Thermit Welding
    c. Rehabilitation of railway bridges
    d. USFD / USRF (Rail fracture)
    e. Modernisation of track relaying system (PQRS)
    f. To detect thermal stresses
2. Mechanical:
    a. Improved freight train examination facilities
    b. Provision of air drier
    c. Provision of microprocessor based speed recorder
    d. Twin beam headlight in loco
    e. Bogie mounted brake system
    f. Modernistaion of sick sidings, IOH depots, and washing sidings
    g. Scaled bearings for diesel loco
    h. Solid tyres in EMU
3. Signal & Telecommunication:
    a. Track circuit – feasibility should be continued as per corporate plan
    b. Interlocking, manning of level crossing gates
    c. Replacement of over aged assets / equipment
    d. Automatic block signaling with continuous track circuit
    e. TAWD
    f. ACD
4. Electrical:
    a. Rehabilitation of 110 KV transmission line in place of 25 KV
    b. Replacement of over aged power supply of overhead equipment
    c. Replacement of electromagnetic relays with static relays
    d. Conversion of cross type termination into overlap terminals
    e. Provision of electronic regulator in AC coaches.
    f. Provision of air spring in secondary suspension for EMU
    g. Provision of air drier in AC locos
    h. Rehabilitation of motors and transformers.

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ELECTRIC LOCOMOTIVE FEATURES

Sr No.	Description	WAM4	WAP1	WAP4	WAP5	WAP6	WAP7	WAG5 A/B	WAG5 HA/HB	WAG6	WAG7	WA G9	WAG 9H	WCA M1	WC AM2	WCA M3	WC AG1	WC M5	WC G2
1.	Supply system – AC (kv)	25	25	25	25	25	25	25	25	25	25	25	25	25/1.5 DC	25/1. 5DC	25/1. 5DC	25/1 .5D C	1.5 DC	1.5 DC
2.	Continuous HP	3640	3800	5000	5440	5060	6120	3850	3850	6000	5000	6120	6120	3640/2 930	4715 /291 6	5000/ 4600	5000 /460 0	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	46.8 9	52	33.84/ 23.2	33.5/ 26.0	40.2/ 26.8	43.5 /30	39.6	35.6
5.	Continuous Tractive Effort (Tonnes)	56	13.8	18.8	22.42	19	23.236	20.6	20.6	32	27	33.1 2	46	16.8/2 2.6	23.8/ 24.6	26.8	31/3 0	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.	Bogie arrangement	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.	Bogie 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	18.634	16.63/ 20.75	16.65	15.7 7/ 21.1 07	21.10 7	16.61/ 21.58	15.6 2/ 21.5 8	18.64	16.6 5	18.6 4	18.7 4
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	TAO659	HS-15250A	ASEA-L3M450 -2	HS-15250A	6FR A-6068	6FRA -6068 HT	TAO6 59	TAO 659	TAO 659	HS-1525 0A	HS-1525 0A	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