



RAILWAY STATISTICS

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1. ORIGIN & GROWTH OF THE SCIENCE OF STATISTICS

The word statistics have been derived from the Latin word STATUS or Italian word STATISTIA meaning political status or statement when statistics or figures were just collected was used as an aid to administration of the states. In fact from the earliest time when a count of male population of a certain age was essential to determine the capacity of the states for war or aggression or defence which was probably the first use of statistics.

The scholars and historians has opined that in an ancient India a well organised system of collection & compilation of data existed in MANUSMRITI and SHUKRANEETI some mention is made on the system an organisation that existed for the collection of data for the purpose of the administration of the state.

During the Mughal period AIN-E-AKBARI that contains statistical data of land distribution, tax collection etc. was compiled during the rein of Akbar. The primary purpose for which the figures were collected was the administration of the state and it is for this reason that during this period the statistics was known as political arithmetic.

The foundation of the modern theory of statistics was laid down by the famous Belgian astronomer L.A.Duellet. He demonstrated the use of statistical methods in the field of astronomy, meteorology, physics, biology etc.

In the 19th century the theory of statistics began its advancement in the field of economics. There has been a tremendous growth in the application of statistical methods in the recent past. The science of statistics has extended its scope to almost every spheres of human activity. It would be difficult to overestimate the importance of statistics in the field of business, industry, labour, govt. administration, life insurance, banking, agriculture and various others fields. Statistical methods and applied wherever a study of large number is involved.

2. DEFINITION OF STATISTICS

The term statistics has been variously defined.

According to-

☞ BOWLEY

Statistics may be called the science of counting.

☞ BODDINGTON

Statistics is a science of estimate probabilities.

☞ PROF.JAGJIT SING

Statistics is a science of deriving facts from the figures.

☞ PROF. W.I.KING

Statistics are the eyes of Administration.

☞ SECREST

Statistics are the aggregates of facts affected to a marked extent by multiplicity of causes numerically expressed, enumerated or estimated according to reasonable standards of accuracy, collected in a systematic way for a pre-determined purpose and place in relation to each other.

3. NECESSITY OF STATISTICS

The Indian Railways are the biggest national concern in the country and have added to a great extent of its prosperity and have knit up the country as well. These railways are much a Govt. concern as a commercial enterprise.

It will be generally admitted that the efficient control of such a commercial body is impossible without a device which may be termed as system of compilation of statistics which reveals the achievement made or deterioration if any.

The comparison of expenses incurred and the work done with the profit made is the important requirement of the commercial body. It is therefore essential that the factors should be expressed in a form, which is convenient for making the comparisons. In these days highest emphasis is given on planning & production. All of us have to realise the importance of correct and timely submission of statistics whether it be the wages that we pay, the fares that we charge, the target date we seek to surpass the efficiency.

We attain these are all worked on essential statistical consideration. It is therefore inescapable that every railway executive has to depend on statistics. In order to ascertain the position in different field of railway working.

4. VALUE OF STATISTICS

Statistics are the arithmetic of welfare. It is only through the acquisition of accurate statistical data that the govt. can successfully implement its plans on the operational and administrative sides that they help in the solution of complicated problems. They are of great importance for exercising proper managerial control and formulation of policy in a big undertaking like Indian Railways. Their timely availability is of crucial importance when major decisions involving crores of rupees and affecting millions of people have to be made.

Statistics are means to and should therefore be presented in a form, which could be understood by technical and non-technical officers who may have to formulate policies on it. Statistics facilitate the study of economic trend on the railway and enable the railways to make the most appropriate use of their assets.

5. IMPORTANCE OF STATISTICS

The importance of Statistics in modern civilised life is great. No social or economic policy can be solved without help of statistical data compiled in a systematic manner. Statistics are the eyes of the administration. No administration can give advice unless it had adequate statistical data before him. Railway budget, a collection of the estimates of revenue and expenditure of efficient running of the railway machinery.

In these days personal relationship between the employer and the employee, supervision is possible only by the medium of statistical data presented before the management. It is an established fact that the farther one gets away from the actual place of working; the greater is the need of statistical data.

Statistics enlarges individual expenditure, without proper statistics most of our ideas are very vague. It is only by continuous study of facts relating to the past and the present that reliable estimates can be obtained for the future.

6. NECESSITY FOR TIMELY & CORRECT COMPILATION OF STATISTICS

Timely Compilation & Submission of Statistics

It is very essential to compile and submit Statistics in time. The delay in submission of Statistics will delay in decision making. The decisions taken without the help of data may be or may not be correct and this will cause trouble for decision-making authority.

Correct Compilation of Statistics

It is better to have no data at all than to have incorrect data will mislead the administration, which will further cause wrong decision making. Hence the required Statistics should be compiled correctly and accurately.

7. METHODS OF COLLECTION OF DATA

Followings are the important methods of collecting data for required information.

(i) Station to station method

The method of working under this system consists of compiling the quantity of traffic, which has passed between each pair of station during the period.

(ii) Density method

This method consists of recording against the name of station of the traffic. (a) Received at the station (b) forwarded from the station (c) passing the station.

(iii) Car method

Under this system the train kms wagon/vehicle kms, net tonne kms, GTKMs are worked out with the help of combined train report engine ticket, guard's journal prepared by the driver and guard of the train.

(iv) Exemption method

Under this method total units arising from the standard running of trains are worked out once for all and only the variation (plus or minus) from the standard are reported every month by the officials concerned. The total for the month is the standard unit. This method can be successfully employed for items such as seat kms, passenger vehicle kms etc.

8. LIMITATION OF STATISTICS

A Railway runs through different parts of the country, some are plain others are hilly, sandy or rainy. It is but natural that the operating cost or the average cost of service will differ from part to part and same would be the position of earning. In such cases the monetary cost factor can not be regarded a fair basis for judging the efficiency of working of the Railway. Statistics lose much of their importance unless the factors influencing the working of the Railway are analysed and these are taken into account for arriving at the correct conclusion. The following limitations of Statistics should not altogether be ignored:-

- (a) Statistical methods are most dangerous tools in the hands of an inexpert.
- (b) When factual data is presented in support of argument it would normally have a convincing effect. But at times the figures are manipulated to suit a planned arrangement or design there it would be the misuse of this power.
- (c) Planning on the basis of inadequate and inaccurate Statistics is worse than no planning at all.
- (d) Statistical laws are true on an average. They are not like the exact laws of physical science which are said to hold true in every individual case that is subjected to them.

Hence, Statistical data should be handled with great care by those who are aware of their limitations & dangers.

9. GROUPS OF RAILWAY STATISTICS

The principal heads under which the railway statistics are generally grouped are indicated below:

1. Economic & Financial Statistics

Under this head are to be included the detailed statistics relating to tri-monthly approximate figures of earnings and traffic handled in shape of pass booked for current information. The position of various funds (DRF,PF,CF,and DF) is also shown under the head. The earnings and expenditure as booked in monthly and yearly accounts are shown under the head. The figures of capital at charge, capital outlay, gross receipts, dividend, gain/loss etc. can be seen with the help of financial statistics.

2. Operating Statistics

Operating Statistics may be broadly divided into two

- a) Traffic

b) Power.

The traffic statistics includes the statistics of wagon load, wagon mobility, wagon uses, train load, train mobility, productive and unproductive services, punctuality, wagon detention statistics etc.

The power statistics includes the engine uses, coal & fuel consumption, rolling stock and engine failure statistics.

3. Commercial Statistics

Under this head are included the statistics of passenger & goods carried, passenger kms, net tonne kms, average rate per passenger or tonne kms and average load of traffic etc. Statistics regarding freights traffic and earnings by commodity, claims paid for compensation of goods and parcels damaged or lost are also included in this category.

4. Rolling stock & Workshop Repair Statistics

Under this head are group statistics dealing with the repair and maintenance of the rolling stock, engine failure, and hot axles as well as out turn and other information relating to workshop repairs such as,

- No. of engines despatched during the month after POH, IOH and special repairs,
- No. of standard unit repair carried out on steam locomotive during the month,
- Average cost of repair during the quarter.
- Average No. of days engine was remain in shop.
- Same information is worked out for carriage & wagon workshop.

5. Administrative Statistics

These statistics relating the staff matters, their numbers, incidences of sickness, pay categories are kept besides the physical statistics like no. of stations, gradients, curvatures of permanent way etc.

10. OBJECT OF STATISTICS IN RAILWAYS

A railway is usually said to manufacture and sell transportation like every other manufacturer requires knowing the cost of what it sells in order to measure its efficiency and to judge the adequacy or otherwise of the rates and fares charged.

It is necessary to run the railways very efficiently and economically. It is also essential to utilise all available resources intensively and judiciously to maximise the output and adopt proper marketing facilities to promote the sales. At the very same time take effective steps to minimise expenses and wastage.

The help of statistics can acquire the knowledge of the above objects. The objects of railway statistics are three folds. These are:

- To Assist in Increasing the Gross Earnings.
- To Assist in Eliminating the Waste.
- To Assist in Enhancing the Efficiency.

1. To Assist In Increasing The Gross Earnings

The first object of increasing the gross earnings is achieved by the compilation of financial & economical statistics. The monthly statement of advance gross earnings and traffic handled enables the authorities to watch the trend of traffic and provide figures for future planning. By the compilation of operating ratio the financial position of the railways can be ascertained. Railway Bd's monthly statement Nos. 6A & 7C furnish the break-up of figures in respect of passenger & goods traffic respectively. The Bd's statement No.7C commodity statistics indicates the increase or decrease in the commodity mentioned therein. Statement of commodity loading shows the increase or decrease in the no. of tonnes originating on the home railways.

From commercial statistics the administration can know whether traffic in passenger and goods is increasing or decreasing and the reasons for any falling of or increase in the traffic and what modification are needed to remedy the situation. All steps taken to increase the gross earnings are possible only when correct statistical figures are available.

2. To Assist In Eliminating The Waste

The object is achieved by the compilation of operating statistics. A railway operating over a large area has numerous sources of possible wasteful expenditure; bad methods of working may involve the railways in loss. The various important statistics such as wagon usage statistics, engine usage statistics, wagon detention statistics, statistics pertaining to unproductive services, fuel & power statistics etc. throw sufficient light on

the economic running of the railways and the wasteful working curtailed to the minimum.

Without operating statistical figures the administration would remain in dark about the unproductive and wasteful working.

3. To Assist in Enhancing the Efficiency

This object is achieved by the preparation and close watch on the repairs & maintenance statistics i.e.,

- a) Locomotive workshop repair statistics
- b) C & W workshop repair statistics
- c) Cost of repair & maintenance of rolling stock

The figures furnished in these statements threw light on the quality of the repair work done, quantity of repair work, time taken in completing the job and the cost of repair work rendered to the rolling stock. Good quality of repair works keeps the rolling stock in good working order, which results enhanced the efficiency of railway operation.

Efficiency of railways also depends upon the quick movement of rolling stock with minimum no. of failures. This can be achieved by the proper repair & maintenance of rolling stock with the help of repair & maintenance statistics. The administration can see that the maximum amount of work is done in minimum time and most economically.

11. STATISTICAL UNITS IN RAILWAY STATISTICS

The main job of the railways is to carry some quantity of passenger and goods traffic to some distance under stipulated condition of time by the medium of service performed by the railways. This can be summarised under four primary conceptions of the quantity, distance, duration and service performed by the railways i.e. that the railway has to carry some quantity of traffic to some distance under stipulated condition of time.

1.Primary Units

The railway statistics are based on these four factors of quantity, distance, duration and service. When these primary conceptions are expressed in the statistical language they are called the primary units. The primary factors denoting these units are expressed as follows:

- i. Quantity - expressed in no. of tonnes and passengers transported and in earnings derived.
- ii. Distance - expressed in kms
- iii. Duration - expressed in hours and days
- iv. Service performed - expressed in trains, vehicles, wagons and engines.

2.Fundamental Units

The primary units do not convey a complete idea about the amount of work done by the railway or the service performed by the operating dept. or the service supplied by the locomotive dept. For instance only the no. of passengers or tonnes of goods carried will not convey the correct idea about the amount of work done by the railway unless it is related with the distance also. And so, when these primary units are linked together to denote joint conceptions and are expressed in composite terms, are called fundamental units.

The fundamental units are the joint expression of two primary units and are arrived at by multiplying one primary unit by another primary unit. The fundamental unit express two primary ideas in their relationship to one another.

For instance:

- i. Tonnes x kms = Tonne kms
- ii. Wagon x kms = Wagon kms
- iii. Engine x Hrs = Engine Hrs
- iv. Wagon x days = Wagon days

These are descriptive fundamental units and are used to arrive at the average kilometerage performed by the wagons and locomotives daily.

3.Compound Or Derivative Units

The fundamental units deal with mass of data and they are so big that they confuse the mind and are not within easy and clear grasp. For instance, if one is told that the Indian Railways during 1981 worked 129,780,266 goods train kilometres in order to move 163,789 million tonne kilometres, one gets confused, because the mind cannot assimilate these figures. But, if he is told that the average train load was 863 tonne in 1981, he immediately grasps the figure.

Finally, the eventual conceptions on which statistics are based, i.e., the relationship that exists between the two sets of primary or fundamental units, and the results thus arrived at are termed 'derivative units'. The final process in arriving at compound or derivative units is by dividing one set of fundamental unit or primary unit by another allied or related set of fundamental or primary unit.

The process by which this relationship is ascertained is illustrated in the following examples:

- i. $\text{Passenger earnings (Primary Unit)} / \text{Passengers carried (Primary Unit)} = \text{Earnings per passenger.}$
- ii. $\text{Passenger earnings (Primary Unit)} / \text{Passenger kms (Fundamental Unit)} = \text{Earnings per passenger per km.}$
- iii. $\text{Passenger kms (Fundamental Unit)} / \text{No. of passengers (Primary Unit)} = \text{Average distance travelled by each passenger.}$
- iv. $\text{Wagon kms (Fundamental Unit)} / \text{Goods train km (Fundamental Unit)} = \text{Average load in wagons per train}$

These derivative units serve to bring out the character of particular aspects of transportation and the railway working.

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1. GENERAL TERMS OF FINANCIAL STATISTICS**a. Gross earnings**

These are the true earnings in an accounting period whether actually realised or not. The earnings include coaching earnings, goods earnings and sundry earnings.

b. Gross receipts

The earnings, which are actually realised in an accounting period, are known as gross receipts. These also include coaching earnings, goods earnings and sundry earnings.

c. Net earning

This is the difference between the gross earnings and the working expenses, excluding suspense but including appropriating to DRF & Pension Fund.

d. Suspense

Difference between true earnings/ working expenses in an accounting period whether or not actually realised/ disbursed and earnings/working expenses actually realised/ disbursed during an accounting period.

e. Working expenses

The total expenditure incurred in a financial year out of railway revenue to work the railways is termed as working expenses. Ordinary working expenses will comprise of revenue expenditure incurred on administration, operation, and maintenance by the Zonal Railway Administration. These will include all expenses under Demand No. 3 to 13. Total working expenses will include ordinary working expenses as well as appropriating

to DRF and Pension Fund i.e. Demand No. 3 to 14. Working expenses can be grouped under five major groups.

Sr.	Name of the Group	Demand No.
1.	General Superintendence of service on Railways	3
2.	Repairs & Maintenance	4,5,6,7
3.	Operation	8,9,10
4.	Staff Welfare, Retirements benefits & misc.	11,12,13
5.	Railway Funds	14

The above expenses are placed to the vote of Parliament under the 12 heads of demands. The actual's of the previous year and revised estimates for the current year are also shown.

Demands for Grants

Head	Demand No	Abstract
Railway Board Expenditure	1	
Misc. expenditure(RDSO & Audit offices)	2	
Working Expenditure of Zonal Rlys		
General Superintendence & Services on Rlys	3	A
Repairs & Maintenance of Permanent Way & Works	4	B
Repairs & Maintenance of motive power	5	C
Repairs & Maintenance of Carriage & Wagons	6	D
Repairs & Maintenance of Plant & Equipment	7	E
Operating expenses Rolling Stock & Equipment	8	F
Operating expenses of Traffic	9	G
Operating expenses of Fuel	10	H
Staff Welfare & Amenities	11	J
Misc. working expenses	12	K
Provident Fund, Pension & other retirement benefits	13	L
Appropriation to funds	14	M
Dividend to general revenues, repayment of loans		
Taken from general revenue and amortisation of over		
Capitalisation	15	
Assets - acquisition, construction & repayment	16	

F. Capital outlay

Expenditure of capital nature incurred during the period with the object of increasing concrete assets of a material character such as purchase of Rolling Stock, Plant & equipment, construction of new lines, residential buildings, workshops, sheds, power houses etc. In other words the additional load taken under capital account from general revenue during the current year is known as capital outlay. At the end of the financial year this amount is added to capital-at-charge.

G. Capital-at-charge

It is the book value of capital assets of the railways. In wider terms this would be called as the total amount of capital advance by the Central Govt. as non-repayable loan from the very start of the railways till date, with the object of increasing concrete assets financial justified to give a maximum return. Every year on capital-at-charge, dividend at a rate recommended by the Rly. Convention Committee from time to time shall be calculated and paid to general revenue after taking into account the exemptions and various other concessions allowed on dividend payment. The present rate of dividend rate is 6.5% per annum.

H. Dividend

This amount paid annually on the capital, which is advanced by the Central Govt. to the Rlys. The Rly recommends the rate of dividend payable to general revenue. Convention Committee w.e.f. 01.04.1980. It has been fixed at 6% of the capital invested in the Rlys. Upto 1979-80 and 6.5% on the capital invested thereafter. While calculating dividend payment some cases are particularly exempted, some are fully exempted and on some dividend it paid at a subsidised rate. Cost of welfare, buildings, hospitals, dispensaries, health units, schools, colleges, hostels etc. are fully exempted from dividend. Payment on the capital cost of residential buildings dividend may be paid at the rate at 3.5% and the existing arrangement under which the cost of construction of staff quarters is charged to capital may continue. No dividend is payable on the capital expenditure on un-remunerative strategic lives.

2.FUNDS OF RAILWAYS

The principal heads under which the funds of railways are furnished hereunder:

1. Depreciation Reserve Fund
2. Development Reserve Fund
3. Pension Fund
4. Capital fund

1. Depreciation Reserve Fund (DRF)

The fund is instituted w.e.f. 01.04.1924 and intends to finance the cost of new assets & replacements of old assets as and when it becomes necessary including the cost of any improved features that such new assets may have. Only the following cases will be debited to DRF.

- a) Assets created out of capital-at-charge
- b) Assets created out of development fund
- c) Assets created out of OLWR, only if the total cost of replacement exceeds to Rs.10 Lakhs, then only shall be debited to DRF.

Appropriation of DRF is made annually i.e. from Rly revenue on the basis of estimates for five-year periods based on the recommendations of the Rly Convention Committee. Interest on the fund balance will be credited to the fund. Disposal value of the released assets which are replaced at the cost of DRF will also be credited to DRF after deductions, incidental charges (freight, auction, supervisory, shifting & handling). Since annual appropriation is from Rly revenue, it will be included in the working expenses of the year.

2. Development Fund

The fund was instituted w.e.f. 01.04.1950. The appropriation to this fund is from the surplus of the Rly. but when the amount of surplus is not adequate to meet the expenditure a temporary loan is obtained from general revenues (which is returned with interest whenever the revenue is surplus) to finance. The expenditure to be met out of this fund i.e., expenditure on amenities for the user of the Railway Transport, staff works and re-remunerative operating improvements beyond certain financial limits namely;

DF-I Cost of Works (construction): Under passenger and other users, amenities like construction waiting room, covers of platforms, drinking water and sanitation facilities, parking facilities, retiring room facilities, bed roll services, construction of Rail Yatri Nivas, computerised reservation facilities etc.

DF-II Cost of Works under labour welfare, each costing over Rs.3 Lakhs like hospitals, schools, hostels, sports grounds, holiday homes, welfare centres, community hall, library, institutions etc. If the cost of work under this head is Rs.3 Lakhs or less then it will be charged to OLWR.

DF-III Cost of works under un-remunerative operating improvements costing over Rs.10 Lakhs like conversion of halt stations into crossing stations, modification of signals, interlocking systems, extension of loop lines at stations etc. If the cost of any work under this head is Rs.10 Lakhs or below it will be charged to OLWR.

DF-IV Cost of safety works.

3. Pension Fund

The fund was instituted w.e.f. 01.04.1964 with the view of meeting expenses on payment of pension, family pensions death-cum-retirement gratuity (DCRG) to those employees who retire/ dies under pension scheme. Every year a sum will be appropriated from Rly. Revenue to this fund keeping in views the financial position of the Rlys. Interest earned on the balance of this fund will also be credited to the fund every year. When an employee under provident fund scheme opts for pension scheme the amount at his credit in his PF account against bonus will be transferred with interest to pension fund. Amount appropriated out of revenues for the fund in a year will be included in the working expenses of the year.

4. Capital Fund

This fund has been introduced from 01.04.1993. Appropriation to this fund is excess of receipts over expenditure remaining after discharging dividend, liability depending upon the actual needs of the fund. The fund is meant to finance part of plan requirement. It is used for works chargeable to capital. The fund finances expenditure on items such as construction of new lines, gauge conversion, doubling of lines, purchase of locomotives, wagons, carriages, electrification projects, staff amenities etc.

3. OPERATING RATIO

Operating ratio is the ratio of working expenses (excl. suspense but incl. Appropriation to DRF and Pension Fund) to gross earnings expressed in percentage and is worked out by the following formula: -

Working exp.(excl.suspense but incl. App.To DRF & pension fund)x100

Gross earning

In other words operating ratio can be expressed as the expenditure incurred in getting every 100 rupees as earnings. The results is exhibited in the annual statistical

statements No 1 Zone-wise and for Indian Railways. It is an important figure in the estimation of Railways efficiency. Low operation ratio will give a good result. The ratio depends on gross earnings as well as on working expenses. The commercial dept., which earns the revenue, is entitled to as much credit for an increase in earnings as the operating dept., which controls expenditure for decrease in working expenses.

Working expenses are defined as the expenditure incurred in connection with the administration, operation, maintenance & repairs of lines open for traffic. This also includes appropriation to pension fund and the contribution made to DRF to meet the cost of replacements & renewals. Gross earnings are defined as the true earnings in an accounting period whether actually realised or not. The earnings include coaching, goods & sundry earnings.

Suspense expenditure is the difference between working expenses in an accounting period whether or not actually paid (disbursed) and working expenses actually paid (disbursed). Very often it is stated that the operating ratio is a measure of the efficiency of operating staff, though it is true that working expenses can be curtailed upto a certain extent by the efficiency of operating staff. But still there are some factors, which are not under the control of operating staff such as: -

- a) Provision of improved standards of amenities for railway users
- b) Adoption of uniform rates & fares without regard to the operating cost over different geographical regions.
- c) Developments policy of the government in financing un-remunerative projects to develop and co-ordinate the previously neglected regions with the rest of the country.
- d) Constant increase in the prices of important materials.
- e) Increase in staff cost.
- f) Public agitation's, bandhs, strikes etc,

The operating ratio is not always a good criterion of the relative efficiency of the different Rlys / Divisions, where the conditions of the working vary considerably. This is particularly so in India where differences in climate, topography, commercial and agricultural activity show very little uniformity. For example the operating ratio of NF Rly is around 185%. It means that for earnings every 100 rupees, 185 rupees are spent. But this does not mean that the administration on that Rly does not have the expertise to work the Rly. The actual reason for having a high operating ratio is the topography and climate of that region, which makes it impossible to run trains with a better load. Increase the cost of repairs & maintenance of track owing to frequent

landslides etc, increase the cost of operation and repairs & maintenance of rolling stock owing to more wear & tear etc.

In comparing the ratio of one year with another, however great care must be taken to see that the term's workings expenses & gross earnings have been clearly defined and that figure are compiled on the same basis. The object of Rly Administration is to keep the 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. This will also fall or rise with variations in the rates charged to the public for movement of passengers & goods.

Suggestions for improvement of operating ratio: -

- a) Punctuality of passenger trains should be maintained.
- b) Transportation of goods traffic from one place to another place should be done quickly and expeditiously.
- c) Fuel economy measures should be adopted.
- d) Unproductive utilisation of rolling stock should be minimised.
- e) Full and better utilisation of rolling stock should be made.
- f) High standard of repair work should be executed to the rolling stock.
- g) Accidents & derailments should be prevented and efforts should be made to check claims.

Distinction between Capital & Revenue

The broad distinction between capital & revenue is that the capital pays for first cost of new works or any improvement or additions to existing works which increase the value of the property and its revenue earnings capacity. Revenue meets the current costs of working the property and of maintaining it upto the standard of its original capital value.

4. ADVANCE STATEMENT OF GROSS EARNING & TRAFFIC HANDLED

This is one of the most important statements and should be prepared carefully. The return is prepared for each tri-monthly period i.e. 1st to 10th, 11th to 20th and 21st to last day of the month. The basic documents for compiling the statement are daily trained cash cum summary book, abstract of outward 'topay' and 'paid' parcel cash book and outward 'topay' and 'paid' goods invoice. The statement is compile on basis i.e. taking into account local & foreign traffic both 'paid' and 'topay', no apportionment of earnings is done.

COMPILATION PROCESS

Stations should submit the return to the traffic accounts office on the day following the close of each period i.e. on 11th, 21st and 1st of the following month through couriers. On receipts of returns from stations the figures of earnings are consolidated. The figures, which are not coming through stations, are added to these figures and earnings for the systems as a whole are worked out. The returns are then sent to the compilation office. After checking the figures they are advised to the Railway Board. There are two ways of sending the information to the Railway Board. One is by the telegraphic report of gross earnings and traffic handled and the other is the detailed statement also known as the express letter.

TELEGRAPHIC REPORT

For the 1st and 2nd periods the telegraphic reports are sent on the 15th and 25th respectively. For the 3rd period the telegraphic report is sent on the 5th of the following the month. The informations that must be contained in the telegram are as follows: -

- 1) The period to which the telegram is related
- 2) Total originating earnings - these will represent earnings on originating basis i.e. without apportionment of earnings derived from through traffic. These will be reported under the following head:-
 - a) Total gross earnings
 - b) Passenger earnings
 - c) Other coaching earnings
 - d) Total coaching earnings
 - e) Goods earnings
 - f) Other Sundry earnings

Difference between gross earnings for the period and the corresponding period of the previous year for the same heads i.e. goods, passenger, other coaching, total coaching, goods & sundry earnings. All figures of earnings must be in thousands of rupees. A post copy of the telegram should also be sent in conformation of the figures advised.

EXPRESS LETTER

This detailed statement is in two parts. Part I dealing with earnings and part II dealing with passengers originating. The statement should be posted so as to reach Railway Board on or before the 9th day after the close of the period to which the figures relate. The informations available in the statement are: -

- i) The period to which the statement relates
- ii) Originating earnings

These figures are sent for the current period and corresponding period of the previous period side by side for comparison cumulative figures from 1st April to end of the period are also shown separately for the same. Figures are shown for

a) Passenger earnings

These figures will be further split up into suburban & non-suburban traffic - Class wise for season ticket traffic and ordinary traffic. Surcharge for sleeper coaches and reservation charges should be shown under the relevant classes.

b) Other coaching earnings

This shall include the earnings from luggage, penalties levied for irregular travelling, parcels to bay traffic, earnings from platform tickets etc.

c) Total coaching earnings (a + b)

d) Goods earning

This shall show the earnings from goods earnings (e.g. siding charges, crane charges, shunting charges, etc)

e) Other sundry earnings

These shall include sundry earnings such as telegraphic earnings, rent on building, excess cash, earnings from sale of time table, retiring rooms earnings (c + d + e)

iii) No of passengers booked

The no. of passengers booked shall be the approximate no. of passengers originating. This is shown separately under season ticket holders, ordinary, 1st class and 2nd class sub-divided into suburban and non-suburban. The figures should be in thousands.

iv) Reasons for the variations

The Railways shall submit the reasons for variations in earnings to the board with the statement of gross earnings and traffic handled at the end of each month and not with the statement for the 1st two ten-day period reports. No reasons need be given in the telegraphic advice's sent to the Board at the end of each ten-day period.

OBJECTS OF COMPILING THE STATEMENT

- 1) To know the trend of traffic & earnings
- 2) To co-relate the speed of expenditure with the flow of earnings and suggest means to restrict expenditure.
- 3) The statement is helpful at the time of preparation of Rly Budget.

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1. AN INTRODUCTION TO COMMERCIAL STATISTICS

The main business of railway is to manufacture and sell transport. The duty of manufacturing of transport is done by the Operating dept. and the duties of selling the transport come under the jurisdiction of commercial dept. Commercial dept. is working under direct supervision of the Chief Commercial Superintendent. This department is known as revenue earning department.

The main function of commercial dept. is to book passenger & goods traffic fixing the rates & fares, collection of revenue earned and to take steps for increasing gross earnings of railways.

Commercial statistics includes the statistics relating to the no. of passenger tonnes carried, passenger kms, tonne kms, average rate per passenger kms or tonne kms and average lead of traffic statistics regarding freight traffic and earnings by commodities are also included in this category.

To be brief commercial statistics cover the commercial aspects of railway working i.e. the volume or quantity of traffic handled which are direct sources of railway revenue such as passenger kms and tonne kms etc.

2. COMMON TERMS

Following terms are commonly used in commercial statistics.

(i) LOCAL TRAFFIC

This refers to the traffic originating and terminating at station within the limit of that railway without passing over any other railway. In other words transportation of such traffic confined to one zonal railway only. Earnings from such traffic will be taken as home railway earnings in case of interchange movement apportionment of earnings will be done gauge wise.

(ii) THROUGH TRAFFIC

It refers to transport of interchange traffic beyond the limit of a single railway only. In other words it is the quantum of traffic, which originates on one zonal railway but terminates on another zonal railway. The transportation of such traffic confined to two or more railways. The earnings from such traffic shall be apportioned between the carrying railway proportionately on the basis of distance covered in each railway. Forwarding railway is responsible to apportion and advise to other concerned railways.

(iii) ORIGINATING TRAFFIC

It is the quantum of traffic booked on the gauge of the railway whether it terminates on the gauge itself or on some other gauge or on another railway. In other words such traffic commencing the booked journey on gauge or a railway for which the report is prepared.

(iv) TERMINATING TRAFFIC

It is the quantum of traffic terminating on the gauge whether originated on the home line or other railway quantity of such traffic is completing the booked journey on a gauge or a railway.

(v) CROSS TRAFFIC

All traffic which neither originates nor terminates on the reporting railway or same section of the gauge but just passes over it for which the return is being prepared is known as cross traffic.

(vi) CARRIED TRAFFIC

It is the quantum of traffic originating on gauge/ railway as well as the traffic received from other gauges/ railway and also the traffic crossing the gauge or railway. The earning for such traffic is apportioned gauge wise between the carrying railways.

(vii) REVENUE EARNING TRAFFIC

The traffic conveyed by rail and for which commercial tariffs are applied i.e. for transportation of which the railway is paid either by the consignor or consignee is known as revenue earning traffic. Railway earnings and consequently the profitability depend on revenue earning traffic only. It should be our constant effort to fetch more and more revenue earning traffic

(viii) NON-REVENUE TRAFFIC

Traffic conveyed by rail for the working of the railway and for which commercial tariffs are not charged is known as non-revenue traffic. No earnings are derived from the transportation of such tariffs. For example transport of railway coal, coke, diesel oil, stores and materials carried for its own requirement. Kit material carried free of service will come under this category.

(ix) SUB-URBAN & NON SUB-URBAN TRAFFIC

Passenger traffic moving in metropolitan areas (at present at Delhi, Bombay, Calcutta, Madras & Secunderabad) where special concessional rates for season tickets are applicable, is termed as sub-urban traffic, whereas other than sub-urban traffic is called as non-suburban traffic.

(x) WHARFAGE:

This is a penalty imposed on a consignee who fails to remove his consignment from the goods shed within the reasonable time. It is the ground rent charged for not removing the goods within the prescribed time. Wharfage returns are prepared on the prescribed forms and submitted to the accounts office monthly.

(xi) DEMURRAGE

This is a penalty for detaining a wagon or vehicle for loading and unloading beyond the prescribed free time. Demurrage return is prepared on the prescribed form giving details of each wagon/vehicle on which demurrage is charged. This return is submitted monthly to the Traffic Accounts Office.

(xii) NON ISSUED TICKET

When a passenger wants to cancel the journey may return the ticket at the booking window. The ticket is collected from the passenger, cancelled and amount refunded as per existing rules, such cancelled ticket will be called as a now issued ticket and shown in the passenger classification.

(xiii) INDEX NUMBER

The Traffic Accounts Office allots index number, for each printed ticket series available at the station. This number is mentioned on the passenger classification as it is used for feeding the data to the computer.

(xiv) STATION CODE LIST

Railway Board has allotted a station code to all the traffic booking stations. Station code is in five digits - the thousandth digit indicates division, the hundred digits are for inter trade block and the last two digits are the station numbers. The station code is used for feeding the data to the computer.

(xv) AVERAGE LEAD OF TRAFFIC

This represents the average distance each passenger or tonne of goods is transported. Longer lead will give better earnings. As such the aim should be to obtain long lead of traffic. The average lead of passenger traffic is worked out by dividing the passenger kms by the no. of passengers carried. For goods traffic it is worked out by dividing net tonne kms by the no. of tonnes carried. It is worked out separately for revenue or non-revenue traffic. The knowledge of average distance is of great importance in the question of rates charged and the cost of working variation in average lead serve as a guide for budgeting earnings. This factor influences every operation of railway then other factor does.

3 . BASIC DOCUMENTS

1. BOOKING OF PASSENGER TRAFFIC

When a passenger desires to travel by rail he has to purchase a ticket. These tickets are of two types-A) Printed card ticket & B) Paper ticket

(A) PRINTED CARD TICKET

Card tickets are issued for single journey as well as return journey and are printed class wise separately for mail/express and ordinary trains. Card tickets may be issued in favour of one, two or four passengers as the case may be. These tickets are mainly of the following kinds.

(i) Single journey ticket

This is issued to one or more passengers and is valid only for single journey. The no. of passengers on such tickets will be counted as indicated on the tickets.

(ii) Return journey ticket

This ticket is issued for outward and inward journey to one or more passengers. The no. of passengers on such tickets will be counted twice the no. of passengers permitted to travel on such tickets.

(iii) Child ticket

This is concessional ticket issued by railways to children above five years upto twelve years of age. The no. of passengers counted on such tickets will be as one passenger per ticket.

(iv) Staff ticket(P.T.O)

Such privileges ticket is issued to railway staff on payment of one third of the fare on the basis of privilege ticket order issued by the railway administration. Staff ticket is included in concessional traffic and the counting of passengers will be as one pass per ticket issued on the PTO

(v) Check soldier ticket

This ticket is issued in exchange of military warrant to one or more passengers as well as or return journey. The number of passenger will be counted as permitted on the tickets on such tickets. The cash is not collected on such tickets but this is sent to cash office as voucher for which the railway gets credit from the defence ministry.

(vi) Rail cum road cum ferry cum air ticket

Such ticket is issued for the combined journey by rail and road, ferry and air. The no. of pass counted on such ticket will be as one pass per ticket. But the fare will be apportioned between rail, road, ferry and air on the basis of distance travelled.

(vii) Group ticket

Such ticket is issued on sub-urban section and is valid for more than one destination station as mentioned on the ticket. The no. of passenger on such tickets will be one pass per ticket.

(viii) Circular tour ticket

Such ticket is issued to a passenger who wants to travel in a circular route on more than one destination station. The pass has to start and terminate the journey at the same station. Circular tour ticket should be counted as single journey ticket.

(ix) Indrail pass

Indrail ticket is issued to foreign tourist in exchange of foreign currency. It is available for unrestricted travel on Indian Railways within stated period. It is taken equivalent to as many passenger as the number of days for which the ticket is available.

(x) Rajdhani Express ticket

The no. of pass on such ticket will be counted as one pass per ticket. Earnings from catering are shown separately in a footnote for each class of accommodation.

(xi) Season ticket

Season tickets are of two types, which are as follows:

(a) *Monthly season ticket* - It is issued to one pass for one month. No. of pass will be counted as 50 passengers per monthly season ticket.

(b) *Quarterly season ticket* - It is issued to one pass for three months. The no. of passengers will be counted as 150 pass per quarterly season ticket.

(B) PAPER TICKET

(i) Blank paper ticket

It is issued only for concession ticket for one passenger only.

(ii) Excess fare ticket

It is issued at stations for extension of journey and also in the train for irregular travelling. Actual no. of passengers booked are taken into account.

(iii) Standard circular journey ticket

Such ticket is prepared for standard circular journey routes. The no. of passengers on such tickets will be taken as two passenger per ticket. Such ticket can be issued for other than the standard route but will be called as circular journey ticket.

(iv) Privilege staff ticket

This is issued in exchange of PTO and will be counted as actual no. of passengers travelling.

(v) Soldier ticket

This ticket has three foils. First the record foil second is for guard and the third foil is for the passenger. It is issued in exchange of military warrant.

(vi) High officer's requisition (HOR)

This is issued to the high officers such as President of India, Prime Minister of India, Cabinet Ministers, Governors, Military Generals etc. A book consisting of 25 pages is given to the official. Each page has two portions - left portion is requisition while right portion is ticket. The right portion is given to the passenger while the left portion is sent to the Traffic Accounts Officer as voucher. On such ticket, the actual no. of passengers travelling will be taken into account.

(vii) Party Ticket

When a group of passenger wants to travel in a coach or train, there a party ticket is issued to the party. Such ticket will not be accounted for calculating number of passengers the booking of special train/coach is taken as other coaching traffic.

(viii) Passengers of railway passes

Railway staff travelling on free passes is not accounted for working out the figure of number of passengers.

I) DAILY TRAIN CASH CUM SUMMARY BOOK

This is a book maintained, at all passenger booking stations, by the booking clerk. In this book the name of all stations having printed card ticket available are written in the geographical order.

Following information is available on the DTC -

- Index Number,
- Name Of Station,
- Rate,
- Commencing Number
- Closing Number Of Ticket (Per Train As Per Shift),
- Non-Used Ticket Numbers,
- Details Of Concession Ticket Issued
- Order and Amount of Fare Collected.

The Sale Of Blank Paper Tickets Including Soldier Ticket, Special Ticket And Excess Fare Tickets Are Recorded In DTC Book, Below The Entries Of Printed Card Tickets, If The Station Does Not Maintain A Separate Parcel Cash Book, Then The Details Regarding Booking Of Parcel, Luggage, Motor Car, HCD And Cash Collected Therefrom Is Included In DTC..

The booking clerk workout the number of tickets issued and the amount of fare collected for each series. The total number of tickets issued and amount collected per shift or per train, as the case may be, is worked out.

Daily at midnight the day's total is closed. A cumulative of no. of tickets issued and amount collected is worked out of for every ten days period, i.e. for 1 to 10, 11 to 20 & 21 to last day of the month.

On completion of the month the total of these three periods are taken and a summary is prepared for the month. With the help of this monthly summary, the passenger classification for the station is prepared and submitted to Traffic Accounts Office.

ii) PASSENGER CLASSIFICATION

This return is prepared by every station monthly is compiled from DTC and sent to the Traffic Accounts Office.

Following information is available on the P.C.Return.

- From Station
- To Station
- Index Number
- Rate
- Class
- Type Of Ticket
- Commencing Number Of Ticket
- Closing Number Of Ticket
- Total No. Of Tickets Issued
- Total No. Of Non-Issued Tickets
- Net Issued Tickets At Full Rate
- Concession Fare
- Total Amount Collected From Full Fare
- Concession Fare
- Total Amount.

This is an important return as it serves as the basic document for statement 6A-Pa Revenue statistics. Separate PC & are prepared local and foreign traffic and sent to Traffic Account Office. After checking & coding in the traffic account office they are sent to the compilation office for further processing for statement 6A. Separate passenger classification is prepared for sub-urban traffic and also for blank paper tickets.

2. BOOKING OF PARCELS:

When a consignor wants to transport his goods by passenger train, there such goods will be booked in parcel and luggage office by producing a forwarding note to the parcel clerk. After checking the parcel is accepted and the parcel clerk prepares a railway receipt on parcel way bill book.

There are separate parcel way bill books for local and foreign traffic as also for paid and *to-pay traffic*. *Paid traffic way bill, which is pink in colour, is prepared in four foils -*

- i. Record*
- ii. Railway receipt*
- iii. Accounts foil
- iv. Destinations way bill.

When a parcel is booked, the parcel way bill is prepared carbon process. For paid traffic, the accounts foil is taken out and sent to the accounts office with the parcel way bill memo.

I) PARCEL CASH BOOK:

There are two types of parcel cash book - Paid parcel cash book & General parcel cash book. The paid parcel cash book is maintained in duplicate, while in the general parcel cash book entries of parcel received to pay, Wharfage, demurrage, HCD etc. are made. The total of these cash book is taken daily and entered in the daily train's cash cum summary book, at the end of the day.

3. BOOKING OF LUGGAGE:

Luggage means passenger's hold effects, which are required by passengers during or after the journey. A limited free allowance is permitted on the luggage, which is carried free of charge. The extra weight than the free allowance will be charged as per existing luggage rates.

The booking of luggage is done on luggage ticket, luggage tickets are separate for local and foreign traffic. The luggage ticket is prepared and sent to the traffic accounts office, which is known as return of luggage booked.

4. BOOKING OF HORSE CARRIAGE AND DOG TRAFFIC

A separate book is maintained at stations on which horse carriage & dogs are booked. It is also prepared in by carbon process of three foils

- i. Record ii. HCD ticket iii. Guard foil.

Separate HCD return is prepared and submitted to the traffic accounts office monthly. Motor cars are also booked on prescribed rates and the returns are submitted as for the parcel traffic.

5. WHARFAGE, DEMURRAGE & ITS RETURN

I) WHARFAGE

This is a penalty imposed on a consignee who fails to remove his consignment from the goods shed within the reasonable time. It is the ground rent charged for not removing the goods within the prescribed time. Wharfage returns are prepared on the prescribed forms and submitted to the accounts office monthly.

II) DEMURRAGE

This is a penalty for detaining a wagon or vehicle for loading and unloading beyond the prescribed free time. Demurrage return is prepared on the prescribed form giving details of each wagon/vehicle on which demurrage is charged. This return is submitted monthly to the Traffic Accounts Office.

6. COACHING BALANCE SHEET

Coaching balance sheet deals with the accountal of the cash transactions arising out of booking of passenger luggage, parcels, HCD etc. Since every railway station is dealing with public money, it is necessary that satisfactory arrangements should exist for the accountal of all transactions involving money, for the proper accounts. railway stations are required to submit the balance sheet to the accounts office monthly, with necessary supporting vouchers so that the accounts office can check the transactions that has taken place and full accountal of the entries.

7. BOOKING OF GOODS TRAFFIC

I) GOODS INVOICE

The acceptance of goods to be carried by the railway will initiate with the presentation of forwarding note by the consignor. After completing the acceptance formalities, the railway receipt is prepared on the invoice book.

There are separate invoice books for local & foreign traffic as also for to pay (Pink colour) and paid (White colour) traffic. The invoice book used for local traffic i.e. destination within the railway comprises of four foils -

- i. Record
- ii. Railway Receipt
- iii. Accounts
- iv. Destination Invoice.

In case of through traffic i.e. traffic booked to other railways each invoice has five foils. The fifth one for accompanying the consignment through to the destination. This is called the Transit Invoice.

It should be checked carefully at the destination station to see that the freight charges etc. is correctly mentioned on it.

Invoice is the copy of railway receipt and is used as a letter advising the despatch of goods with an account of description, quantity and cost of carriage. It contains the following important information :-

- ⇒ Zone & Originating gauge
- ⇒ From station/to station
- ⇒ No. Of wagons and other particulars of wagons
- ⇒ Charged via
- ⇒ Carried via
- ⇒ Sender's/consignee's name & address
- ⇒ Number & description of commodities
- ⇒ Actual weight
- ⇒ Charged weight
- ⇒ Rate
- ⇒ Freight

- ⇒ Total to pay or paid
- ⇒ Date
- ⇒ Forwarding note no.
- ⇒ Invoice no. Etc.

The invoice should be prepared & checked very carefully as it serves as the basic document for railway boards monthly statement 7C - Commodity statistics.

ii) LOADING, UNLOADING & DELIVERY OF GOODS

When a consignor wants to book a wagon load consignment he will submit an indent. A wagon will be supplied as per the tern. When the wagon is placed for loading, it must be loaded within the free time allowed for loading, After loading the wagon, it is seal and revitted and despatched to destination.

On arrival at destination, when the wagon is placed for unloading, the consignee must unload it within the allowed free time. There after, the entry of the wagon contents is made in books i.e. the record is maintained for received goods traffic.

The delivery of these goods will be given on presentation of the railway receipt and after obtaining signature of the consignee on delivery books.

4. COMPUTER

MACHINES

On Indian Railways there was a heavy increase in the volume of passenger & goods traffic. Therefore, to cope up with this heavy requirements of traffic and its data maintenance it became necessary to introduce computer on Indian Railways and as such in the year 1964, the scheme of simplification of account and mechanisation of Statistics was introduced.

SIMPLIFICATION OF ACCOUNTS & MECHANISATION OF STATISTICS

Before 1964, the stations used to submit their returns to accounts office on received basis. But now, as per the simplified procedure the returns are prepared and forward basis.

One additional 'Accounts foil' is also prepared with goods invoice and paid parcel may bill which is detached and sent to accounts office every month instead of preparing the abstract.

The further processing of the accountal is mechanised and is done with the help of computer.

Now this procedure has reduced the monotonous work of preparing abstract by station and has reduced the work load at station and at account's office.

6. PASSENGER REVENUE STATISTICS

Railway Board's monthly statement No. 6-A

This monthly statement is prepared class wise, gauge wise separately for sub-urban & non-sub-urban traffic, season & ordinary traffic. The statement should be submitted so as to reach the Rly. Bd's office within 60 days after the close of the month to which the figure relates.

The basic document for compiling this statement is the passenger classification return, blank paper ticket return, submitted by each station to the local & foreign 'Traffic Accounts Office'.

Compilation Process

At the end of the each month stations prepare passenger classification which becomes the source document for this statement. The Passenger classification has all the information about the type of passenger traffic such as commencing & closing no. of tickets, index no., non-issued tickets, concession tickets, full fare tickets and amount derived there from.

These classification are submitted through commercial couriers separately for local & foreign traffic to local & foreign traffic accounts office. There the classification are checked in respect of :

- a) Name of station from and code
- b) Index no.
- c) Concessional tickets issued
- d) Non-issued tickets
- e) Concessional fare

- f) Full fare
- g) Total amounts

After checking these figures a summary for control sheet of non-issued, concessional issues, and total amount is also prepared. Then these classification are sent to the statistical branch for further procession.

In the statistical office the classifications are tied in bundles of 500 entries each and control sheet for each station is prepared. Then the classification along with the control sheets is sent to the machine section for feeding the following information on the floppy-

- 1) Month
- 2) Station fare
- 3) Index no.
- 4) Closing number of tickets
- 5) Commencing number of tickets
- 6) Non-issues
- 7) Concessional issues
- 8) Concessional fares
- 9) Total amount

The floppies are sent to the EDP Centre, where the informations are transferred on the tape and the tape is run on the computer. In this edit runs following checks are made:

- a) Validity of station from code
- b) Validity of index number
- c) Duplicate index number
- d) Missing classification
- e) Missing entries from classification
- f) Punching mistakes resulting in under charges & over-charges

After this the incorrect & unmatched statement is taken out which is sent to the traffic accounts office after making necessary corrections these statements are sent to the compilation office and then back to machine section for preparation of ARD (Addition, Revision & Deletion floppy). Then these floppies are sent back to EDP Centre.

After the rectification, one tape is created for apportionment. This tape contains foreign traffic records and local multi-gauge records. Apportionment is done on the basis of distance travelled gauge wise on the various railway involved.

Follow on tape, which is created during the apportionment run, is used for printing out tabulation of statement (6-A). Tabulation pertaining to foreign railways is sent to the concerned Rly . on receipt of similar information for home railway from all the foreign railway a consolidated statement no. 6A is prepared after taking into consideration the figures of traffic and earnings derived from blank paper ticket and season tickets which are prepared manually in the compilation office.

This consolidated statement contains the information class wise for sub-urban & non-sub-urban traffic, season ticket traffic and ordinary traffic. All figures are sent for current month and corresponding month of the previous year. Cumulative figures from 1st April are also shown for current month and corresponding month of the previous year.

The following information is available in the statement: -

1. No. of Passenger Originating

Means the no. of passengers booked from each gauge of the railway. A passenger taking a local return ticket on the gauge is to be treated as having originated twice but a passenger taking a return ticket to a station on another railway is to be treated as having originated once each on the booking railway and the railway to which the return ticket is issued. Monthly season tickets are to be taken as 50 single journey tickets. Children tickets are to be treated as adult tickets. Circular journey tour tickets should be counted as single journey tickets irrespective of the distance, halts and no. of break journey in route. In case of Ind-Rail passes which are issued only to foreign tourist in exchange of foreign currency. The no. of passengers on such tickets will be equivalent to the number of days for which the tickets are issued. Passenger travelling in reserved carriages on special trains and also those travelling on passes are not to be included under this head.

2. No. of Season Tickets Issued

The number is shown separately for monthly and quarterly season ticket traffic.

3. Total no. of Passenger Carried

Is to include the no. of passenger originating on its gauge of the home lines as well as the no. of passengers received on the gauge from other railways or from a different gauge of the home line and also those crossing the gauge/railway. Passengers using return tickets are to be treated as having been carried twice.

4. Passenger Kilometres

Are to show the total distance travelled by passengers on the home line, passenger kms are also to be calculated from passengers found travelling without tickets. No. of passenger kms are to be calculated for passengers travelling in special trains, reserved carriages and also for those carried free on passes.

5. Passenger Earning from Passenger Carried

The earnings by classes & surcharge on sleeping accommodation provided in the second class should be shown separately against the head. Surcharge on travelling by certain specified trains should be included in the earnings of the respective classes. The earnings from catering in case of Rajdhani Express train is also to be shown separately in a foot note for each class of accommodation.

6. Number and Earnings from Passenger Carried on the System

Are to be shown the number of passengers carried and the earnings derived there from on the entire system of the railway i.e. for all the gauges together. Passengers passing over two or more gauges are to be counted once only. This information is to be furnished only quarterly on cumulative basis.

OBJECTS OF COMPILING THE STATEMENT

1. The statements help to know the trend of traffic.
2. It is helpful in knowing the trend of earnings.
3. It helps in working out the average load of passenger's traffic.
4. It helps in fixation of fares.

7. PARCEL TRAFFIC STATISTICS

Railway Board's Monthly Statement No. (6-B)

This is monthly statement prepared on originating basis for total all gauges. It should be submitted to board's office within 55 days of the end of the month to which figure relates.

COMPILATION PROCESS

The basic document for compiling this statement is outward 'to play' parcels abstract and paid parcels cash book. These returns are submitted by the stations to traffic accounts office. Here figures are checked and sent to the compilation office.

In the compilation office figures of weight & earnings are consolidated for the entire zonal railways for current month and corresponding month of previous year. The cumulative figures from 1st April of each year are also sent for outward 'to play' and 'Paid' parcels.

8. GOODS REVENUE STATISTICS(Advance Information)

Statement No. 7-A (Advance Information)

This statement deals with the no. of wagons, tonnes originating, tonne kms and earning for deleted commodity heads of revenue carried traffic. The statement is compiled on originating basis (i.e. without any apportionment of earnings) for the railway as a whole (total all gauges).

The statement should be submitted so as to reach the Rly Bd's office on or before 16th of the following month. Great care should be taken in compiling the statement as it is the first monthly advance information for freight traffic. Separate statements are submitted for monthly and cumulative data. The figures for the statement are compiled from the invoices. A summary tape is created with the help of invoices for freight accounting. The statement is to be confined to revenue earning traffic only. Any non-mechanised revenue traffic originating on the railway should be included in this statement and also shown in a separate Annexure.

Following information is available in the statement:

(a) Tonnes Originating

This is to include tonnes of all traffic originating on each gauge whether it terminates on the gauge itself or on such other gauge of the home line or on other railway. This refers to both full wagon load and smalls. Certain commodities, which do not originate on the railways, are specifically watched to see that there is no traffic under such commodities. The tonnage shown in this statement is compared with the similar figures shown in commodity loading statement.

(b) Tonne Kilometres

This represents the net tonne kms of freight carried in goods and mixed trains (goods proportion). This refers to both wagon load & smalls.

(c) Earnings from Revenue earning goods carried

These are to show the earnings for the gauge booked under abstract 'Y' goods earning. Earnings are shown for full wagon load and smalls. These figures are compared with the figures shown in 'Advance statement of gross earnings & traffic handled'.

(d) No. of wagons (4-wheelers)

This represents the number of wagons loaded with commodities charged to full wagon load rates. The number of wagons is reckoned in terms of 4-wheelers and the figures are compared with that shown in commodity loading statement.

The above informations are shown for the following selected plan head commodities.

- i) Coal for Steel Plants
- ii) Coal for Washeries
- iii) Coal for Thermal Power Houses
- iv) Coal for public House
- v) Raw material for steel plants
- vi) Pig Iron and finished Steel for Steel Plants
- vii) Iron ore booked for export
- viii) Cement
- ix) Foodgrain
- x) Fertiliser
- xi) Mineral Oils
- xii) Balance Other Goods
- xiii) Total Revenue Earning Traffic

The figures reported in this statement should agree with those shown in detailed computer

9. GOODS REVENUE STATISTICS on originating basis

STATEMENT (7-B)

This statement is prepared on originating basis - gauge-wise, from the monthly summary tapes created for freight accounting. The monthly & cumulative data should reach the Rly. Bd's on or before the 20th of the following month. The cumulative statement of individual railway need be sent only every quarter, showing the cumulative for the months ending June, September, December & March.

The statement should contain the details of revenue earning traffic only. There is however no objection in giving details of non-revenue traffic to the extent it is mechanised. Any revenue traffic, which is not mechanised, should be included in the statement and shown as a separate Annexure. Following information is available in the statement: -

A) No. of Wagons

This refers to the booking in wagon loaded. The no. of wagons in 4-wheelers is taken from the invoices.

B) Freight in Rupees

This is shown separately for smalls, fulls & total. These are to be given in units of rupees without any decimal.

C) Weight in tonnes

This is shown for smalls, fulls and total in units without any decimal.

D) Tonnes Kms

This is also shown in units for smalls, fulls and total without any decimal.

These information are given for the following detailed commodities :-

- i) Products of Agriculture
- ii) Animals & products of animals
- iii) Products of Mines
- iv) Mineral Oils
- v) Products of forests
- vi) Manufactures
- vii) Miscellaneous revenue traffic
- viii) Total revenue earning traffic

10. COMMODITY STATISTICS

STATEMENT (7-C)

This is a monthly statement and should be sent to Rly Bd's office on or before 45 days after the close of the month to which the statistics relate. This gauge-wise statements are required on the apportioned basis. Separate statements are required to be submitted for monthly & cumulative data.

The source document for the statement is the goods invoice, which is prepared by the stations, at the time of booking goods traffic. The account's foils of invoices are sent by the station to traffic accounts office. Invoices are checked manually for :

- a) Charged distance
- b) Classification of commodities
- c) Charged rate
- d) Charged weight
- e) Other charges

The booking stations stamp numerical code of station from. Coding is done in the Traffic Accounts Office for the following :-

- a) Station `to'
- b) Weight
- c) Commodity
- d) Local or foreign
- e) Paid or to pay
- f) Other charges

After checking and coding, the invoices are sent to the compilation office, where, they are tied in bundles and a lot number is given to each bundle separately for paid and to pay. The, they are sent to the machine section. In the machine section, information from the invoices are taken on the floppies and sent to the EDP centre. At the EDP centre, the information on the floppies are transferred to the tape and run on the computer for taking out incorrect statement.

Incorrect Statement

This statement lists out the no. of RRs present/missing, invalid station from/station to, commodity codes, originating station-wise incorrect information regarding charged

weight, rate, freight, calculated freight etc. Duplicate invoice numbers are also checked and corrected.

The Rate Checkers checks these incorrect statements in the Traffic Accounts Office. Then ARD floppies (addition, revision & deletion) are prepared in the machine section of the compilation office and sent to EDP centre.

After these corrections are made, tape for machine prepared Abstract (MPA) is printed out. The MPAs are destination station wise and sent to the concerned stations. While the MPAs are printed out, a tape is created containing all the records having under charges/over charges, for the entire month. It is prepared destination station-wise and sent to the Traffic Accounts Office of the concerned railway for taking necessary action in raising debits or allowing refund.

After this, a summary tape is created for printing out statistical statements 1 to 6. Statements 1,2 & 3 refer to foreign railway for BG, MG & NG respectively and statements 4,5 & 6 refer to similar information for home railway. Statements 1 to 3 are sent to other zonal railways concerned. Similar statements i.e. 1 to 3 are received from other zonal railways. These along with statement 4 to 6 of home railway are run on the computer to prepare monthly statistical statement (7-C), which gives the information for all traffic dealt with by the railway during the month.

The statement contains the details of revenue & non-revenue traffic. Where-ever non-revenue traffic has not been mechanised, the data has to be compiled manually. The coverage of information in the statement for major commodities is as under :

1) No. of Tonnes Originating

This is to include tonnes of all traffic originating on each gauge, whether it terminates on the gauge itself or on some other gauge of the home line or on other railway.

2) No. of Tonnes Transhipped

This is to include the tonnage received on each gauge from different gauge whether terminating on or crossing the gauge for which figures are reported.

3) No. of Tonnes Terminating

This is to include tonnes of all traffic terminating on the gauge whether it originated on the home line or on other railway.

4) No. of Tonnes Cross-traffic

This is to include tonnes of all goods traffic, which neither originate nor terminate on the home line, but pass over it. Traffic originating on a different gauge of the home line to that for which the return is being prepared is to be treated as traffic from another railway.

5) Total No. of Tonnes Carried

This is to include tonnes originating on each gauge of the home line, as well as the number of tonnes received on the gauge from other railways, or from different gauge of the home line and also, the tonnage of traffic crossing the gauge.

6) Net-Tonne Kilometres

This represents the net or freight tonne kms of freight carried in goods & mixed trains (goods proportion) including net tonne kms of freight carried in departmental trains.

7) Earnings from Revenue earning goods carried

These are to show the earnings for the gauge booked under main heads of goods earnings.

8) Tonnes Carried on the system

This should give the figures of tonnes carried on the railway treating all the gauges as a single system and details are to be given only in the statements for BG.

9) Average Lead

This is worked out by dividing the figure of Net Tonne kms by the No. of Tonnes Carried.

10) Average Rate

Dividing the figure of earnings by the figure of net tonne kms arrives at this result.

COMMODITIES

A) Revenue Earning Traffic

- 1) Products of Agriculture
 - 2) Animals & Products of animals
 - 3) Products of mines
 - 4) Products of forests
 - 5) Manufactures
 - 6) Miscellaneous
 - 7) Total Revenue Earning Commodities
- B) Non-Revenue Traffic
- 1) Railway coal & diesel oil
 - 2) General Stores & materials for railways
 - 3) Total Non-revenue Traffic
- C) Total Revenue Earning & Non-earning traffic

11. STATEMENT OF COMMODITY LOADINGS

This statement is to show the no. of wagons loaded and the weight loaded into them at stations transshipment sheds and repacking points. A register is maintained at all stations, transshipment points & repacking sheds. In this register figures are posted daily and summarised periodically for incorporation in the statement. The statement duly filled is submitted by the stations periodically to the divisional office. Periods are 1st to 10th, 11th to 20th, and 21st to last day of the month.

In divisional office, returns received from all stations transshipment points, repacking sheds of the division are consolidated gauge wise, and submitted to compilation office periodically. In the compilation office figures are further consolidated into monthly figures gauge-wise for the zonal railway and submitted to Rly. Bd.

The monthly statement containing full month's figures in all details and cumulative statement showing figures from 1st April to end of the month should be despatched so as to reach the Rly. Bd's on or before the 12th day after the close of the month. Wagons are to be counted in terms of 4-wheelers. The statement contains following information. Commodity-wise, regarding originating loading & transshipment point loading for the current month & corresponding month of previous year.

- A) In respect of originating station loading
- i) No. of wagons going to destination station on the same gauge.

- ii) No. of wagons going to break of gauge transshipment points.
- iii) Total Originating loading (i+ ii)
- iv) Tonnes loaded
- v) Average load per wagons loaded (iv ÷ iii)

B) In respect of transshipment loading

- i) No. of wagons loaded
- ii) Tonnes loaded
- iii) Average load per wagon loaded (ii ÷ i)

C) Total Originating + Transshipment loading

- i) No. of wagons loaded A) iii + B) i

In addition to this, figures of loaded wagons received from other railways, no. of wagons transhipped or repacked from same gauge to same gauge, public traffic at coaching rates. Kit & other materials booked free also included in the statement. All information regarding no. of wagons loaded are shown for the following Commodities :-

A) Revenue Earning Traffic

- i) Products of Agriculture
- ii) Products of Mines
- iii) Minerals oils
- iv) Products of Forests
- v) Manufactured Articles
- vi) Miscellaneous
- vii) Total Revenue earning traffic

B) Non Revenue Traffic

- 1) Railway Coal, Diesel oil, materials
- 2) Total Non-revenue Traffic

C) Total Loading (A+B)

Following instructions should be taken into consideration while compiling the statement:-

1. Separate statements are prepared for MG, BG, and NG as also for the month and cumulative.
2. Weight charged for should be taken.
3. Only number of wagons should be taken in case of loaded receipts from other Railway & number of wagons in which goods are transshipment as repacked from wagons of same gauge public traffic as coaching rates, and number of wagons for kit and other materials.
4. Wagons are to be counted in terms of wheelers.
5. Following wagons should not be accounted as fresh loading:-
 - a. Infringement loads adjusted on route.
 - b. Seal- cut and seals missing wagons checked en route.
 - c. Un connected loads detained and send on receipt of particulars
 - d. Wagons loads in excess of the permissible load sent after un loading the excess weight enroute
 - e. Wagons loads diverted .
 - f. Wagons loads received from weightment & despatched.
 - g. Road vans received for unloading the articles for the station & send onwards with the remaining articles.
6. Wagons carrying articles from goods shed to transshipment shed for adjustment or delivery.

OBJECT :

- To know the loading position and to take steps to improve it.
- To see that the maximum use of the wagons is being made
- To work out average starting wagon load
- To judge the requirements of stock in relation to the commodities obtained for loading
- To know the number of wagons received from other railway.
- To judge the efficiency of commercial staff.

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1. AN INTRODUCTION TO OPERATING STATISTICS

The term 'Operating Statistics' includes all those figures, which throw adequate light on various aspects of Rly operation. By the term 'Railway Operation', we mean carrying of the traffic from one place to another economically & efficiently. This can only be achieved by making the best and most judicious use of our available resources i.e. wagons, trains, engines etc.

Broadly speaking, Operating Statistics include wagon load & wagon usage statistics, train load and speed of trains, engine use and coal consumption statistics, punctuality statistics, wagon detention statistics and statistics showing the unproductive services in relations to the productive work done by the Rly. Operating Statistics are compiled to judge the efficiency of Rly operation, efficiency of Rly operation lies in the fact that the Rlys should be able to carry more and more traffic with less and less cost. The output of the traffic carried is judged through the train kms. Loaded wagon kms and the net tonne kms and the unit of the cost in the engine hours.

The output of the traffic carried is to be increased by making the most intensive and efficient utilisation of the available resources with the Rly and unit cost is to be decreased by curtailing unproductive engine hours like shunting, light and Assisting not required (ANR) hours and other engine hours. Operating Statistics help the administration to know as to whether maximum use is being made of the vehicles, wagons, trains and engines.

Wagon load statistics would throw light on the proper utilisation of the carrying capacity of the wagon stock and wagon usage statistics would throw light on wagon loads, wagon mobility as also wagon detentions etc. Similarly engine usage statistics would show as to what use we are making of our locomotives. Punctuality statistics would show the standards of services rendered to the public. Unproductive service statistics would help the administration in curtailing the waste and enhancing efficiency on the Railways.

It is for these reasons that the Operating Statistics are compiled on the Rly. All these figures help and guide the Rly. Administration in reducing the working expenses and enhancing the efficiency in Railway Operations.

2. COMMON TERMS

1.ENGINE HOURS

Engine hours are to include all time of steam engines in steam and diesel & electric engines under their own power. Calculated from the time the engines starts from the shed at the commencement of its daily work till it returns to the same or another shed on completion of day's work. In other words total hrs taken by the engine from shed out to shed in. Engine hours are classified into these categories: -

- a) Train Engine Hrs.
- b) Shunting Engine Hrs
- c) A .R. Engine Hrs
- d) ANR Engine Hrs
- e) Light Engine Hours
- f) Other Engine Hrs

a) Train Engine Hrs

Train engine hrs are to show the hrs during which engines are employed on trains counting in each case from time to time engine starts with the train until it reaches the station at which engine terminates its run with the train. The time occupied, in halts at stations is to be included, but that occupied in shunting enroute is to be excluded and shown under shunting hrs.

Note: A Train on changing its classification enroute without changing its engine is to be considered a new train for the purpose of calculating train engine hrs.

b) Shunting Engine Hrs

Shunting Engine hrs are divided into three parts:

- 1) Shunting engine hrs of regular shunting engines are allotted to yards for shunting regularly the total time taken to perform shunting is treated as regular shunting engine hrs.

2) Shunting engine hrs of train engine before and after working a train: - When a train engine performs shunting before the departure of the train as originating station or after the arrival of the train on originating station the total shunting hrs are known as before and after shunting engine hrs. In some Rlys. These hours are also known as originating & terminating shunting engine hrs.

3) Shunting engine hrs of train engine enroute: - When shunting is performed by a train engine during a train run at intermediate stations, the first 15 minutes the train engine is so employed are not to be reckoned as shunting engine hrs. But for work exceeding beyond 15 minutes and not exceeding 30 minutes, a certificate is to be granted by the station master for 15 minutes shunting and every 15 minutes or any portion of 15 minutes in excess of 30 minutes is to be similarly treated. The time calculated by this rule is termed as enroute shunting engine hrs.

C) Assisting Required Engine hrs

An engine, which is attached to a train for banking or assisting purpose, it is known as an AR engine. In case of diesel & electric engines, the time taken by AR engine is included all under train hrs. But for steam engine, the time taken by an AR engine is shown under other engine hrs.

D) Assisting Not required engine hrs

An engine, running under its own power when attached to a train to prevent its running light and to save the path, which is not required for assisting or banking purpose, it is known as ANR engine. In the case of diesel & electric engine the time taken by the ANR engine is shown under train hrs. In case of steam engine, the train taken by an ANR engine is shown under other engine hrs.

E) Light Engine hrs

When an engine with one or more brake vans attached to it is running light from one place to another or from shed to station, if the distance is more than 1.6 kms, it is known as light engine. The time taken by a diesel & electric light engine is shown under train hrs, but for light steam engine, the time is shown under other engine hrs.

F) Other Engine Hrs

Other engine hrs for diesel & electric engine will include the time of availability of engines in traffic dept, other than in train, light, AR, ANR, shunting and siding services. If the engines are not sent to DSL/Electric sheds on completion of the days work for

want of a shed or in exigencies of work and are stabled in the traffic yard or sent to a shed other than a diesel/electric shed, the whole period till they are employed on any service will be treated as idling and reckoned under other engine hrs except when these engines get shed facilities. When such engines which are surplus to traffic requirement but are fit for use and are stabled at specified sheds for a consecutive period of 12 hrs or more. The first 12 hrs in such cases will be treated under other engine hrs. In case of steam engines, other engine hrs are to include all time of steam engines in steam except when occupied on train service shunting or siding.

1) Starting other engine hrs

The time taken by an engine after completion of the journey of the train or completion of the engine run, till the time it is carried upto the shed, it is termed as terminating other engine hrs.

2) Terminating other engine hrs

The time taken by an engine after completion of the journey of the train or completion of the engine run, till the time it is carried upto the shed, it is termed as terminating other engine hrs.

3) Engines ordered for but not utilised

In an engine is lighted up by the order of traffic dept. but not used for less than 3 hrs, a minimum allowance of 3 hrs is to be made to the locomotive dept. and included under other engine hrs.

4) Engine stable for short periods

When diesel or electric engines and steam engines with banked fire are stabled for short periods between trips the time of stabling whether in shed or outside it is to be included under other engine hrs provided the crew are paid for these periods. If however, a steam engine with banked fire & diesel or electric engine is in shed in charge of the shed staff, such time should not be included in other engine hrs.

5) Engines taking more time than allowed time

Regular yard shunting engines taking more time on water column, change of crew or locomotive requirement than the allowed time the rest time is taken as other engine hrs. The Dos & DME fix the allowed time.

6) Detention en-route

If an engine working a passenger train fails en-route and the engine working a goods train carries the passenger train to destination, the time taken by the goods engine from leaving the goods train upto start of the passenger train is known as en-route detention other engine hrs.

2.MAINTENANCE OF BALLAST TRAIN

Ballast Train kms

The kilometrage of ballast train for the engineering dept. for works charged to Capital & Revenue is to be calculated on a uniform rate of 13 kms per hour and for fractions thereof at the rate of 1 km for every 5 minutes or part of minutes, calculated from the time the train is booked to leave or the engine is put on to the train, whichever is later, to the time it is released therefrom. The minimum daily kilometrage is to be reckoned at 64 kms.

Ballast Wagon kms

The wagon kms of a ballast train are to be calculated by multiplying the ballast train kms by the no. of wagons on the ballast train at the time it leaves the starting stations.

Ballast Net Tonne kms

The net tonne kms of ballast trains are to be calculated on the actual kilometrage run and not on the uniform rate of 13 kms per hour. The actual kilometrage for this purpose will be the distance from the station from where the ballast train starts to the further of the two stations between which it works, irrespective of whether the train works to the further station or not. If a train reaches the further station and returns double kilometrage is to be taken. If, however a train makes more than one trip between two stations without reaching the further station, only single kilometrage is to be taken irrespective of the no. of trips performed by it.

3. DISPOSITION OF DIESEL ELECTRIC/ ELECTRIC ENGINES BASED ON HOURLY OUTAGE

1. In the present world, transport plays a very vital role in human life and out of this, land transport carries the major share. In land transport, Rlys and roadways are important means of transport. On roadways, the motive power is generally attached to

every vehicle, but in case of Rlys. a common motive power is used to haul the trains, which is called a locomotive or engine. On Indian Rlys, three types of motive powers are used. Steam, Diesel and Electric. Out of these motive powers, now a days the diesel & electric powers are extensively used, as these are more economical.

2. These engines are the costly assets of Rlys and it is very much essential to keep a constant watch on the utilisation of this valuable machinery. Therefore from 1-4-1981, vide Rly.Bd.Lr.No.81-Stat/IV/7/A dt.18-3-1981 and correction under Lr.No.84/Stat/IV/7/4A dt.12-2-86, the utilisation of diesel electric and electric engine is worked out on hourly basis.

According to these instructions, the control office maintains daily account of all 24 hrs of each engine. But, as we know that average haul of diesel & electric powers are long thereby an engine may cover more than one division of the same zone or different zones within 24 hrs of a calendar day. Hence, the account of 24 hrs of a calendar day of an engine may be distributed between different divisions, which may be even on different zones. Now, for example, if on a calendar day, Indian Rly hold a stock of 100 diesel electric engines on BG, then the total record of hrs of these engines on hourly disposition for all the divisions on Indian Rly must be equal to $100 \times 24 = 2400$ hrs. This is possible only when every division accounts for every minute of each engine during 24 hrs of the calendar day.

3. As per Rly.Bd. instructions, every division will work out hourly disposition of all the diesel electric & electric engines within the territory of the division irrespective of whether it is home Rly. Engine or other Rly engine. The record should be maintained separately for home Rly and foreign Rly engine Rly-wise. The 24 hrs of a calendar day of each engine must be reckoned in these fifteen columns given in the Performa-I.

4. The following are the important guidelines for posting Performa-I.

4.1 In Traffic Use Hrs: - These hrs of engine when the engine comes out of locoshed till it returns to locoshed excluding 9I) hrs of regular shunting engines (2) ineffective hrs in traffic yard or on run (3) when engine is spare for 12 hrs or more at a stretch at nominated points/shed.

4.2 Regular Shunting Engine Hrs: - These hrs of the engines when utilised in regular shunting on different passenger & goods yards. This will not include shunting by train engines on trains before departure, enroute or after arrival.

4.3 On Train Hrs: - Will include (1) train engine hrs (2) shunting hrs by train engine whether before departure of train or enroute shunting or shunting after arrival of the train (3) Hrs of light engine (4) hrs of assisting not required engine (5) assisting required

engine hrs. These hrs will be accounted for service wise i.e. passenger, goods, mixed and departmental, hour of light engine, assisting not required enroute shunting hrs, shunting hrs before and after working of a train by train engine will be included in the service for which the engine is run.

4.4 Idling In Yard: - It includes (1) Hrs from departure from shed *** line to the train (2) Arrival of the train to arrival of the engine in the shed (3) Hrs when engine is utilised on another train without returning shed for getting shed facilities i.e. the time interval from arrival of first train to actual departure with subsequent train. If engine is idling at other than nominated points/shed i.e. Traffic yard than these hrs will be reckoned as idling hrs. These hrs will be reckoned service-wise i.e. passenger, goods, mixed & departmental.

Note: If any fit engine is surplus to traffic requirement and stabled at specified nominated points/shed for consecutive 12 hrs or more, it will be reckoned as spare hrs and not in idling hrs in yards.

4.5 Ineffective Hrs in Traffic Yard or on Run: - Engine hrs (1) in traffic yard or at wayside stations after failure waiting to be picked up (2) engine under or awaiting repairs in yard and at out station (3) engine in transit (on run) to shed and out station i.e. when engine are moving dead (4) engine damaged in accidents lying in traffic yard or at out stations.

Note : The disposition of engine hrs under this item will be reckoned in two groups (a) when locomotive is put under repair in traffic yard or moving dead after failure remain ineffective for full calendar day (b) when ineffective period involved is less than calendar day or part of calendar day.

4.6 Under Repair :- When the locomotive is under or awaiting repairs for the full calendar day.

4.7 Spare :- (a) Hrs when engine awaiting utilisation (traffic demand) i.e. spare hrs of loco after repairs (b) spare being surplus retained for stabling at nominated points/shed over a minimum period of continuous 12 hrs or more. (c) Link spare for passenger trains.

4.8 (a) Under or awaiting service/minor inspections :- (1) when locomotive is effective less than a calendar day (2) Diesel electric engine under servicing schedule upto quarterly schedule (3) electric engine under servicing schedule upto bi-monthly schedule (4) in respect of engine taken under heavy repairs in workshops, shed stables awaiting workshop repairs for part of a day after arrival and before despatch.

(b) Good Repair Store :- Hrs of engine kept under good repair store for the complete calendar month.

Note: Engines, which are merely spare from day to day and are readily available, are not to be included in this item.

5. Some common irregularities and correct procedures of accountal are elaborated below :-

5.01 Difference between the departure time shown by locoshed and control office. Departure shown by locoshed for every engine must be tallied with time shown in disposition statement record maintained in the control office.

5.02 Difference between the handing over time and taking over time between the two divisions or zones. Handing over taking over time must be reconciled for all the engines crossing between the two divisions or zones.

5.03 Idling in yard is not worked out correctly. It should be worked out fully without omitting any period.

5.04 Engine lying idle in yard is shown as spare. An engine when not required by traffic for consecutive period of 12 hrs or more than such engine may be kept spare at nominated point/shed where taking over facilities are available and these hrs should be reckoned under `spare'. If engine is idling at other than nominated point/shed then these hrs will be reckoned as idling in yard under the service concerned.

Note: In some cases, these hrs are shown under the column `Good Repair Store' only those hrs will be reckoned when the engine is stored for a complete calendar month.

5.05 Ineffective hrs of engine due to engine trouble or engine failure at station or between stations are omitted or not counted for fully. These hrs should be reckoned under the column `effective hrs in traffic yard or on run'.

5.06 Hrs of engine moving dead with train or light engine are omitted. These hrs should be included under the column `ineffective hrs in traffic yard or on run'.

5.07 Non-accountal of hrs of engine running on passenger links at terminal station when: - (a) used to work some short trips on passenger or goods trains (b) Used for yard shunting in traffic yard. (c) Kept spare to pick up the linked train. In case of (a) these hrs should be accounted for in the column `on train hrs' under the respective service worked. In case of (b) these hrs should be accounted for under the column `Register shunting engine hrs'. In case of (c) these hrs should be accounted for under the column `link spare on passenger service'.

Hrs when and engine is in servicing in minor repair or minor inspections schedules are not accounted for or shown as spare hrs. These hrs should be shown `under or awaiting servicing/minor inspection column till the engine is under minor repair or under servicing and after completion of repairs the hrs till departure of engine from shed to traffic yard should be shown as `spare'.

3. COMBINED TRAIN REPORT (C T R)

This is the most important document regarding Operating Statistics. It is prepared jointly by the Driver & Guard of the train as per their run.

After completion of the trip it is deposited by the guard in the Loco Forman's Office. L.F.Office collects all the CTRs and submit them to the Statistical Branch daily with the covering memo. The covering memo shows the number of CTRs due on date and also the no. of CTRs being sent with the remaining balance. The complete set of returns is scheduled to be received in the Statistical Office by the 5th of the following month. The non-submissions of the CTRs are called for from the sheds concerned.

The CTRs are divided into two parts – Part-I is the loco portion while the Part-II is the vehicle wagon portion. Part-I gives loco details and Part-II gives wagon & vehicle details.

Part-I Contains following information:-

Engine No., Class of engine, Home Shed, Train No. Service, from station, to station, time when engine left shed or was taken over, time when engine is coupled to train, time when engine uncoupled from train, time of engine arrived at station/shed on completion of duty or was handed over, time engine was employed on shunting at starting & terminating station, booked and actual arrival and departure of train from starting station to destination station, shunting done by train engine during run etc.

Part-II Contains following information:-

Train No., service, gauge, division, from station, to station, distance, home shed, coding vehicle separately under the heads `passenger coaching' - upper class, lower class other coding vehicle, composite brake van (SLR), brake van, misc. van, misc. vehicle total coding vehicle, tare weight of coding vehicle.

Goods wagons separately under the head, loaded, empty, total all types of wagon brake van wise, wagon (empty), total wagon net weight, tare weight of the wagons, total weight of train in No. of wagons and gross weight.

WORK DONE IN STATISTICAL OFFICE

The CTRs when received in the Statistical Office are counted by sheds and tallied with the covering memo prepared by sheds. The following codes are given which are summarised section wise and engine wise:-

- a) Card code
- b) Traction code
- c) Division (loco) code
- d) Home shed code
- e) Class of engine code
- f) Duty code i.e. passenger/goods etc.
- g) Gauge & division (traffic) code
- h) Run code i.e. UP & DN run.
- i) Line code i.e. main/branch/running power section.

After the relevant code numbers are entered up, the work of posting data starts and the particulars regarding the train engine hours, starting engine hours, starting & terminating other engine hours, as furnished in the CTRs are posted on the loco abstract forms. The other informations regarding the coaching vehicles and goods wagons are posted on the abstract forms part.

Both the informations are totalled section-wise and sent to the machine section for punching of floppies. The punched floppies are then sent to the EDP centre for further processing.

The figures of adjustments to be given in respect of missing CTRs are also arrived at by compiling adjusted train kms for passenger & mixed service on the basis of time table train run plus (+) special train run plus (+) extended train run minus (-) train cancelled, plus/minus train diverted for goods services on the basis of section wise goods train kms worked out from the statement of No. of goods train run, which is received from divisional control office monthly.

The adjusted floppies are punched on the basis of coded sheets of adjusted train kms & sent to the EDP centre along with the floppies of actual data.

WORK DONE AT EDP CENTRE

At the EDP centre listing of adjusted floppies are taken out. The lists are checked with manuscript code sheets and corrections are made. These data are taken on the tape. The data on the magnetic tape is sorted and following tabulations of actual data are taken out - (The posting of which was done in compilation office)

1. Duties under division - Locomotive performance
2. Duties under division - Train load performance
3. Duties under sheds & loco division - Locomotive performance
4. Duties by sheds & loco division - Train load performance
5. Trip tabulation - Locomotive performance

The data on the adjusted floppies, which is taken on the tape, is matched with the corresponding data of locomotive performance and train load performance statistics which is calculated on the computer. On the basis of calculated data following tabulation of adjusted data are printed on the computer.

1. Duties under division - Locomotive performance
2. Duties under division - Train load performance
3. Duties under run - Locomotive performance
4. Duties under run - Train load performance

The complete set of tabulation containing the following information for part-I & part-II separately is received in the compilation office. These information are given section-wise direction-wise, service-wise and traction-wise, separately for total main line, total branch line, total running power section and for total UP & total DN duties.

Following are the important statistics worked out on the basis of CTRs part-I & part-II.

LOCOMOTIVE PERFORMANCE

1. Train Engine Hrs
2. Train/Engine Hrs
3. Starting other Hrs

4. Terminating other Hrs
5. Shunting Hrs
6. Tare Tonne Kms of engine
7. Speed of trains

TRAIN LOAD PERFORMANCE

1. Train Kms
2. Loaded wagon Kms/Upper class vehicle Kms
3. Empty wagon Kms/Lower class vehicle Kms
4. Misc. Wagon Kms/Other coaching vehicle Kms
5. Brake van Kms
6. Total wagon Kms/Vehicle Kms
7. Net Tonne Kms of loaded wagons
8. Tare tonne Kms of wagon/Vehicles
9. Gross Tonne Kms of goods wagons
10. Any No. of wagon/Vehicle per train separately for loaded/empty & total
11. Average Net Load per Train
12. Average Gross load per Train
13. Average Wagon load during the run
14. Percentage of loaded to total wagon Kms

T-14 SHED DUTY LIST/ENGINE & DRIVER DUTY STATEMENT

It is prepared daily at the loco Foreman's Office, it shows the working of engines and engine crews under the shed. The information available is as follows: -

1. Name of Drivers, Ist Foreman/Asst. Driver
2. Engine No. & description
3. `Station From' & `Station To' it is working
4. Driver time on duty & off duty & total time
5. Date of which the ticket is received
6. Staff position (I) Sick (ii) Leave (iii) Spare (iv) Periodical rest (v) Available for duty
7. No. & Class of Engine spare
8. No. & class of engine under or awaiting repair
9. No. of goods train run `from' & `to'
10. Board's Summary under the heads :-

i) Passenger ii) Goods iii) Mixed iv) Shunting v) Departmental vi) under or awaiting repairs vii) good repair stored viii) Spare

The copy of the shed duty list is prepared and sent daily with CTR to compilation office. The statement is prepared by Loco Foreman and submitted to D.M.E. of the division and sent to the compilation office every month. The following informations are available :-

1. No. of Engines used on

- i) Passenger service
- ii) Mixed service
- iii) Goods service
- iv) Shunting service
- v) Departmental service
- vi) Total

2. No. of engine under or awaiting repair

- i) in shed
- ii) in workshop

3. No. of engine in good repair stored

4. No. of engine spare

5. No. of engine in transit

6. Total No. of engine on line.

4. PUNCTUALITY STATISTICS

Punctuality statistics reflects the standard service rendered to the public. The general public is more interested in the timely running of public trains than in any other aspect of railway working. Late running of passenger trains causes a lot of inconvenience to the travelling public and is greatly resented upon. Late running of trains results in increased fuel consumption and payment of overtime to the crew. Therefore, it is necessary to keep a close watch on the punctuality figures and to ensure trains are kept to time by cutting out unnecessary delays.

The punctuality statistics are compiled from CTR - Part-I (Guard's journal) on terminating basis. In case of missing journals, details may be obtained from control records. In case of junction stations with other railways where departure timings of through trains are not available in the home railways guard's journals, relevant details should be collected from the adjoining railway.

Compilation Process:

On receipt of CTRs in divisional offices, particulars of running of each passenger train are posted in a register for mail, express, sub-urban, mixed and other passenger trains from the information contained in the CTR Part-I. At the end of the month, figures are summarised and expressed into percentage and sent to the compilation office. In the compilation office, punctuality statistics figures are incorporated in Rly. Bd`s monthly statement No.1-A. Passenger Train Performance for BG & MG and for NG in Rly Bd`s monthly statement No. 9-A Part-I train Performance of NG - Govt. Rlys.

Punctuality statistics are compiled only for those trains, which appear on the public time table. Figures relating to empty stock special which run more or less daily to provide stock for the trains, postal special and similar other coaching trains are not to be included. A train, which runs partly as passenger train and partly as express train, should be included under mail & express trains for purposes of punctuality statistics. When, however, such a through train running on more than one railway runs for the entire distance on a particular railway as passenger train, it is to be classified as other passenger train on that railway. Following statistics is compiled to keep a check on the punctuality of trains.

a) Running of Passenger & Mixed train

This is shown for the following trains-

- i) Mail & Express trains
- ii) Sub-urban trains
- iii) Other passenger trains including mixed trains, non-sub-urban, EMU and Rail Cars.
- iv) All Passenger trains

Following detailed statistics are compiled for the above head (I) to (iv).

(1) Total No. of Trains Run

This is to show the total No. of trains run on a railway during the month.

(2) Booked Train Hrs. according to Time Table

This will show the total time taken by a train from start to finish of the run. This item is worked out for Main & Express trains only.

(3) Trains Not Loosing Time

This will include all Mail & Express trains terminating right time whether received from another railway or originating on the home line and also all trains handed over late from adjacent railway/division provided they are able to make up 75% of the total recovery time (Loco + Traffic) available between the two interchange points or between originating/interchange point to destination. The percentage should be worked out for trains reaching destination right time or handed over right time by the railway. Another percentage account should be worked out of such trains, which are to be treated as NLT. Such trains should be able to make up 75% of loco plus traffic recovery time available for that train between two interchange points. For example, if a train is made over by Eastern Railway at Mughalsarai point by 200 minutes (3'20") late, and if the recovery time available (Loco + Traffic) is 100 minutes (1'40") between Mughalsarai and New Delhi Station, the train for N.Railway will be treated as - `NLT' if it is able to make up 75 minutes (1'15") between Mughalsarai and New Delhi station, otherwise, it will be treated as `lost' on Northern Railway. Similar will be the case for the local trains also on the Zonal Rlys. within their jurisdiction only and the NLT will be calculated on terminating basis. The following examples explain how the rule applies:-

(i) The train 1038 - Punjab-Bombay mail is made over 100" late at Tuglakabad and it reaches Bombay VT 120" late; instead of making up recovery time available between TKD & BBVT i.e. traffic:40" + Loco:21.5" total = 61.5" and 75% thereof is about 46.1" it loses further 20" on Central Railway. It is treated as lost on Central Railway.

(ii) The train 3003 Mail which is handed over by N.Rly at Naini by 95" late and reaches Bombay VT by 90" late. The traffic and loco recovery time (traffic:78" + loco:76") available between Naini & Bombay VT is 154". The train should be treated as NLT if it makes up 75% of 154" i.e. 115.5". The train makes up only 5". As such it has lost on Central Railway.

Statement No. 1-A (Passenger Train performance - Punctuality) w.e.f. 1-4-94 should be compiled taking into account the revised criteria for reckoning `NLT'.

(4) Percentage of Trains Not Loosing Time

This item is worked out by the following formula :

Trains No Loosing Time x 100

Total No. of trains run during the month

(5) Trains Arriving Right Time

This will include all trains terminating right time according to the schedule timings. Trains arriving late will include all trains terminating late according to the scheduled timings, whether received late from other railways or starting on the home line, irrespective of the fact whether a train lost time on home line or was handed over late from another railway or whether it had been waiting for connection with other railway trains.

(6) Total Time Lost in Home Railways Account

This item is worked out for Mail & Express trains only and the net time lost on home railway is to be shown under this head. Percentage of time lost to total booked hours. Thus, it is worked out, by the following formula. This item is worked out for Mail & Express trains only.

$$\frac{\text{Total Net Time Lost on Home Line Rly Account} \times 100}{\text{Booked Train Hrs according to the Time Table}}$$

Causes of Punctuality Lost

These are divided into three main headings as under :

(1) Railway Causes

Such as defective engine/vehicles, late formation of trains, bad fuel, hot boxes, speed restrictions, delay in loading/unloading, signal/engine failure, inefficiency of crew, accidents, derailments etc.

(2) Public Causes

Alarm chain pulling, public agitation, activities of sabotage, fare/festival traffic etc.

(3) Natural Causes

Floods, cyclones, earthquakes, foggy weather etc.

Remedies to maintain Punctuality

Following departments should ensure in maintaining punctuality.

Loco Dept, Traffic Dept, Commercial Dept, Signal Dept, Carriage & Wagon Dept, Electrical Dept and Security Department etc.

In addition to the above, public should be made aware of the importance of punctuality through news papers, radio, television etc.

5. WAGON USAGE STATISTICS

By the term wagon usage we mean the use made of our wagons. Wagons are our costly assets and unit of loading. Rly earns its revenue from the services performed in carrying tonnes of goods. Tonnes of goods can be transported through the medium of wagons. Thus, wagons are the principal source of earning revenue and are rightly called the silver mines of railways. The main function of a wagon is, moving & carrying more & more traffic. The main objects should be to see that :

- a) Wagons are loaded as much as possible (within the maximum permissible load)
- b) Mobility should be higher i.e. wagons should move as much as possible.
- c) Wagons are not detained at any likely places of detention
- d) Wagons remain in good condition

WAGON LOAD STATISTICS

In order to see that wagons are loaded as much as possible wagon load statistics are compiled which throw light on the loading aspect of wagons. The wagons, which a railway carries, either originate on the home line or are received from other zonal railways. For this purpose separate results are worked out which are as follows :

a) Average starting wagon load

Average starting wagon load is the load of wagons starting or originating at each station of the railway. This unit is compiled from the commodity loading statement prepared by all stations and transshipment points. It is worked out by the following formula :

$$\frac{\text{Tonnes loaded}}{\text{No. of Loaded Wagons}}$$

It is worked out separately for –

- I) Coal & Coke
- II) Heavy merchandise
- III) Light merchandise

In calculating the average load, the weight charged should be taken. For this unit wagons and vans into which goods of the same gauge, TR, CRF, JSV, SRF, SSV and departmental wagons counting materials and stores carried on revenue account, other than coal & coke are to be excluded.

Separate statements are compiled for BG, MG and NG as also figures for the month and cumulative from 1st April each year. Wagons are counted in terms of 4 wheelers. Higher figure of this unit will be considered a better result, therefore the aim should be to load the wagons upto their carrying capacity.

The object of this unit is to ensure that the profitable use is being made of the wagons available for use. This unit relates to the loading done on the home railway and therefore each station can control and improve it. The help of this unit can judge the efficiency of the home railway.

If the wagons are loaded upto their carrying capacity, following are the advantages to the railways :

1. Less No. of wagons would be required in the stock
2. Less congestion on the section of the line and marshalling yard and at terminal stations.
3. Less interest paid
4. Less maintenance charges on stock
5. Less depreciation charges on stock
6. Less train kilometrage consequently less fuel consumption

The unit of average starting wagon load is shown in Rly Bd`s monthly statement No.2 `Goods Train Performance`.

b) Average Wagon Load during the run

It is the average wagon load obtained as carried i.e. it includes the loads originating on home railway as also the loads originating on home railway as also the loads received from other zonal Rlys. The formula to work out this unit is as follows :

Net Tonne Kms (Goods Traffic)

Loaded Wagon Kms

Both the units i.e. net tonne kms and loaded wagon kms should be extracted from the tabulation which is prepared by the computer on the basis of train documents. Net tonne kms represent the net or freight tonne kms of freight carried in goods & mixed trains (goods proportion) excluding freight carried in departmental trains. Calculation of net kms of live stock is to be taken on the basis as per the list mentioned in the statement No.3. The unit average wagon load during the run is required for BG, MG as also figures for the month & cumulative from 1st April each year. The statistics relating to steam, diesel & electric (AC, DC) traction are to be reported separately and for all traction. Wagons are counted in terms of 4-wheelers, while compiling this unit.

Higher the figure better is the result. This unit should be read in conjunction with the average starting wagon load figures. If there is any improvement or deterioration in the figure of average wagon load during the run, it may be due to the loads or other zonal railway wagons coming on the home Rly. The unit average wagon load during the run is shown in Rly Bd`s monthly statement No. 3-A `Passenger & Goods Performance`.

WAGON MOBILITY STATISTICS

To judge the mobility aspect of wagons, mobility statistics of wagons are compiled. Higher mobility leads to greater earning capacity of the rolling stock. In order to watch the mobility aspect of wagons, following statistics are compiled:-

a) Wagon kms per Wagon Day

Wagon kms include the kilometrage run during the month of loaded wagons, empty wagons, excluding brake vans & empty departmental wagons. Wagon days are worked out by multiplying the average no. of wagons (pooled & non-pooled) on the line daily (in terms of 4-wheelers) by the No. of days in the month. This unit is arrived at by the following formula:

Wagon kms

Wagon days (on line)

Limitation of the Unit

In this unit total wagon kms (empty & loaded) are shown due to this reason it is not clear how much productive work is done by the railway (total wagon kms include the kilometrage of loaded wagons & empty wagons)

b) Net Tonne kms per Wagon day

This is the most important unit for watching the movement & loading of wagons. NTKMs is the unit of revenue earning, whereas wagon days are the unit of cost. This unit shows the relationship between earnings & cost. It is very essential to improve the figure of NTKMs, which is possible by the combined efforts of both the departments commercial & transportation. Commercial dept. is responsible to give maximum load to the wagons, where as transportation dept. gives the maximum movement. This unit is worked out by the following formula:

Net Tonne kms

Wagon days

To obtain a good result it is very essential to :

- 1) Give wagons a full load
- 2) Move the wagons as quickly as possible by improving the speed of trains and by avoiding undue detention at goods sheds, terminal yards, marshalling yards, transshipment point & sick lines
- 3) In case of deterioration in this unit following statistical results must be examined :-
 - i) Wagon kms per wagon day
 - ii) Percentage of loaded wagon kms to total wagons
 - iii) Average lead of traffic
 - iv) Relative amount of heavy & light merchandise carried

c) Wagon Turn Round

Wagon turn round means the average time that it takes for a wagon to go through one complete cycle of loading movement to destination, unloading and next loading. In other words it is also the interval in days between two successive loading. Wagon turn round is worked out in the following manner

Effective Wagons

Loaded wagons + loaded wagons received

Where effective wagon holding represents wagons owned by a railway less the daily average no. of wagons out of service modified by the daily average wagon balance. Wagon loading in this context include:

- a) average daily loading on home railway
- b) average no. of wagons received loaded from other Rlys. daily
- c) average daily no. of wagons carrying military traffic & transhipped from wagons of the same gauge.

This figure is an index of operating efficiency. It is worked out daily in the divisional control offices. This unit is an indication of wagon movement and utilisation. Lower figure will be considered a better result. Therefore efforts should be made to reduce this figure.

The wagon turn round figure as between two railways can be of general interest. No useful purpose is served in comparing the turn round between different Rlys as a no. of factors influence the figure & these factors differ on different Rlys. The main factors governing wagon turn round are average lead, traffic density, ruling gradients affecting speed, line facilities such as double or single lines and main & branch line connections at junctions, utilisation of traction etc. As between different periods on the same railway, however the figure is a useful indicator of efficiency. The figures of mobility & utility of wagons can be improved by :-

- i) Curtailing delays in loading & unloading
- ii) By giving maximum load to the wagons
- iii) By curtailing delays in marshalling yards, transhipment points & goods terminal stations.
- iv) By improving speed of goods trains
- v) By curtailing no. of wagons under or awaiting repairs.

HOT BOX STATISTICS

DEFINITION : Every journal which runs warm necessitating a vehicle, wagon, or brake van being detached from a load from the commencement of its journey to its booked destination inclusive should be considered a Hot Box. If both the journals of an axle run warm, they are to be counted as two hot boxes.

COMPILATION : The Hot Box return is prepared in the TXR office and sent to DME`s office. In DME`s office the Hot Box statistics is prepared for division and sent to compilation office monthly. In compilation office the figures are compiled gaugewise and

submitted to Rly Bd. In monthly statement No. 4-B. Hot box vehicle is a dangerous vehicle. The main danger is that the Hot Box may cause the journal to break which will result in a serious derailment of train. A vehicle with a hot box may also cause fire and may set fire to the adjacent vehicles. The greater danger exists when an axle runs hot enroute on the non-stop train. Station staff must therefore keep a sharp watch on the running trains. The following are the signs of an axle box running hot :

1. The box commences to warm up and can only be detected in this stage by feeling with the hand, which should be placed on the side of the box facing the rear.
2. A strong smell of heated oil & waste is given out which can be detected at some distance from the vehicle.
3. A waisteing noise may commence at any time during the process of heating.
4. The box becomes sufficiently hot to ignite the waste and oil, flames & smoke can be seen issuing from the box and journal of the box becomes red hot.

CAUSES OF HOT BOX :

- a) Defective packing of Box
- b) Defective fitting of bearing brasses
- c) Defective spring gear maintenance
- d) Overdue repacking
- e) Uneven loading
- f) Excessive heat in the weather temperature
- g) Insufficient oiling
- h) Presence of foreign material in the box like sand etc.

STATISTICS: The following statistics are compiled for Hot Box Statistics :

1. NO. OF HOT BOXES PER 10 MILLION VEHICLE KMS

This unit is arrived at as follows

No. of Hot Boxes x 10 million

Vehicle Kilometres

Coaching Stock is to include the hot boxes of all passenger carriages and other coaching vehicles Hot Boxes of other railway vehicles running on the home line are to be included. But those of home line vehicles on other railways are to be excluded.

2. NO. OF HOT BOXES PER ONE MILLION WAGON KMS.

Goods stock is to include the hot boxes of both home and other Rlys. goods wagons including departmental wagons and brake vans used indiscriminately on passenger, goods or mixed services which are treated as goods rolling stock.

No. of Hot boxes x one million

Wagon Kms

6. VEHICLE USAGE STATISTICS

Operating dept. is required to make the most economic and judicious use of the resources available with them. Vehicle are important resources which should be effectively used. To see the judicious utilisation of vehicles, operating dept. should ensure the following :

1. Vehicles move as much as possible i.e. vehicle mobility should be high.
2. Carrying capacity of the vehicle should be fully utilised.
3. Vehicles remain in good condition.

In order to see that the above objects are achieved, following statistics are compiled.

A) VEHICLE LOAD STATISTICS

To see the full utilisation of the carrying capacity of the vehicles, vehicle load statistics are compiled. Two statistical indices are worked out under this head.

1. Average No. of Pass. Per vehicle

This indices is worked out by dividing the pass kms by vehicle kms.

Passenger Kms

Vehicle Kms

Passenger kms are taken from statement No. 6-A, while vehicle kms are taken from CTR. This unit is worked out separately for upper and lower class accommodation. The result is compared with the average carrying capacity per coach and would denote under/over crowding coaches. Figures are shown separately for BG & MG.

2. Occupation Ratio

Passenger Kms are extracted from monthly statement No. 6-A. Seat kms are worked out by multiplying the figure of no. of seats on line by vehicle kms.

Passenger Kms x 100

Seat Kms

The no. of seats on line would be arithmetic average of the no. of seats/coaches on line. The result is calculated class-wise, gauge-wise and for the entire system. The result shows the ratio of utilising seating capacity in passenger trains.

Limitation

1. The indices do not take into consideration high/low density traffic sections.
2. **These are not worked out separately for UP & DN directions.**
3. **There is no consideration for peak/slack period traffic.**

B) VEHICLE MOBILITY STATISTICS

Higher the mobility, greater is the productivity, in terms of service performed and income generated. Following statistics are compiled to watch the vehicle mobility.

1. Vehicle kms per Vehicle Day

While computing vehicle kms for this unit, rakes run as regular measure with through trains over the Rlys, their vehicle kms should be included by the owning Rly and excluded by the other Rly over which the run through. The vehicle day on line are worked out by multiplying the figure of average no. of coaches on line, by the coaching stock exclusively used for carrying passengers as well as composite carriages of which the whole or any part is allowed for carrying passengers, military cars, ambulance cars and prison vans.

Vehicle kms

Vehicle Days

The average no. of following vehicle is required to be excluded :-

1. Brake Van
2. Departmental Van
3. Vehicles lent to other depts, home line construction or to other Rlys.
4. Vehicles condemned and withdrawn from traffic.
5. Wagons used for coaching stock.

Limitations

The indices vehicle kms per vehicle day would get adversely affected with no fault in operation because of the following :-

1. More no. of coaches being under or awaiting repair owing to overage.
2. Cancellation of branch line trains occasionally resulting in stabling of coaching stock.

7. GOODS TRAIN USAGE STATISTICS

Train usage means, the use made of the trains. Following should be ensured to see the optimum use of trains.

1. Train should be given as much as much load as possible within the maximum permissible limit, keeping in view the hauling capacity of powers, strength of bridges, tracks etc.
2. Trains should move as quickly as possible, so that maximum amount of revenue earning work is done.
3. Trains should not be unduly detained at station or outside signals etc.

TRAIN LOAD STATISTICS

To see the loading aspect of train, following train load statistics are compiled which give an indication about the load of train on an average.

1. Average no. of wagons per train
2. Net load per train
3. Gross load per train

1. Average no. of wagons per train/ Avg. train load

Total Wagon Kms

Goods train Kms

The unit gives the average train load. It is used for checking efficiency of operation. As the main object of operating dept. is to transport traffic efficiently and economically, it is necessary to attach as many no. of wagons as possible on each train. Greater the no. of wagons per train, lesser the no. of trains run. Therefore increased wagon loads means, less train kms, consequently reduced working cost of fewer engines would be required to move a given amount of traffic and this would result in saving of coal, oil, water, wages of the engine crew and the capital invested in the loco.

The no. of wagons per train depends upon the tonnage loaded into them. From the economic point of view, it is better to move concentrated loads by giving better loads to wagons. The unit (average no. of wagons per train) is shown in Rly. Bd. Monthly statement No.2. Goods train performance item No.8.

2. Average Net Load per Train

High figure of net load per train. It is better from operative as well as revenue earnings point of view. As such, empty running and running of wagons partially loaded should be curtailed.

Net Tonne Kms

Goods Train Kms

A decrease in net load per train may be due to the following factors.

1. Less traffic offering
2. A decrease in average starting wagon load.
3. A decrease in average wagon load during the run
4. Un-balanced traffic, necessitating the haulage of empty wagons etc.

The figures of net tonnes per train should always be read in conjunction with the figure of average gross load per train. Closer the two figures, better is the result. The unit is shown in Rly.Bd`s monthly St.No.3-A.

3. Average Gross Load per Train

Gross Tonne Kms

Gross Train Kms

The gross load includes the weight of contents of the wagon and also the rate (empty) weight of the wagon. This unit is very helpful in judging the loads of trains in relation to the hauling capacity of the locomotive. It is also helpful in ascertaining and checking fuel consumption in relation to goods. There are various factors, which should be considered while comparing train loads with other division/Rly. Such as :

- a) Class of traffic dealt with
- b) Whether the traffic is retail or wholesale
- c) Physical characteristics of Rlys, such as gradients, curvatures, strength of bridges/tracks, terminal and marshalling facilities.
- d) Class of rolling stock used, specially the traction capacity and carrying capacity of wagons.

The figure of avg. gross load per train is shown in Rly.Bd`s monthly St.No.3-B.

TRAIN MOBILITY STATISTICS

In order to watch the mobility aspect of trains, train mobility statistics is compiled. Following unit is compiled under this head.

1) Average Speed of Goods Train

The speed of goods train shows the rate at which goods are transported from one place to another and the cost of transportation. It is worked out by the following formula.

Goods Train Kms

Goods Train Engine Hauled - enroute shunting Hrs.

The time occupied at halts in stations and also the time spent in shunting during the run, is included in train engine hrs. The train kms indicate the amount of productive work done and the train engine hrs are the unit of cost for train working. A combination of these two units is a good index of efficiency in train working. Any increase in the speed of trains indicate improvement in train operation as well as improvement in wagon utilisation, engine utilisation, turn-round of engines & wagons and saving in fuel consumption. It is necessary that the speed of trains must be improved by arranging judicious crossings, avoiding late start to goods trains, avoiding detentions etc.

The improvement in the average speed of goods train reflects itself in the saving of engines, wagons, fuel consumption and expenses in respect of train crew etc. It also improves the sectional capacity and consequently the clearance in yard etc. There are certain factors which effect the speed of trains, such as :

a) Beyond the control of Rlys

Statistical drop in speed without any drop in performance, i.e. the sectional speed remains the same but the preponderance of traffic increases on sections obtaining low average speed. Movement of over sized consignments, requiring speed restrictions, floods, breaches, accidents etc.

b) Factors that can be controlled by Rlys.

Intersections of loads and speeds, time tabling of goods trains, yard operation, late starts, detentions to trains for line clearance, failure of communications, engine failures, water difficulty, staff in-discipline etc.

c) Factors in which public can help

Such as public agitation's, activities of sabotages etc.

Various factors taken into consideration while comparing speed of trains on different divisions & Rlys.

- i) The standard of track
- ii) Intersectional running between any two destinations
- iii) The standard of signalling & interlocking arrangement
- iv) Speed restrictions required to be observed while running through
- v) The load of goods train

The unit, speed of goods train is shown in Rly.Bd`s St.No.2. It is worked out traction-wise separately for single line, double line for through goods trains and all goods trains for BG & MG.

8. DENSITY STATISTICS

Density means, the volume of traffic moving between any two points on Rly system. Density statistics are compiled separately for passenger and goods traffic and expressed in terms of train kms, vehicle/wagon kms and net tonne kms passing over each km of route/running track. The following density statistics are compiled :-

- a) Passenger train kms per running/route km per day
- b) Vehicle km per running/route km per day
- c) Goods train kms per running/route km per day
- d) Wagon km per running/route km per day
- e) Net tonne km per running/route km per day

The monthly/annual figures of train kms, wagon/vehicle kms and net tonne kms is divided by the number of days in the month/year and again divided by the length of route/running track kms to arrive at the above results. The above density statistics are also given visual expression in the shape of `density chart' prepared by each year and published in the GM`s annual narrative report by the Zonal Rlys. The factor of traffic density is one of the most important factors in working out the figure of equated track kms. Density is the best measured in different units for different purpose such as :

- 1) Gross Tonne kms per running track kms for deciding on the best weight of rail.
- 2) Net Tonne kms and passenger kms per running track kms for all questions relating to earnings and loads of trains
- 3) Train kms per running track kms per day for the capacity of the section.

The density of traffic has a very great effect on the results obtained in the working of the railway and it is important to know on what section the density is highest. The formula for working out equated track kms is as follows :

$$Q = L \times U (1 + A + B + C)$$

Q = Equated Track kms

L = Running Track kms

U = Traffic Density factor

A = Formation factor

B = Alignment factor

C = Rainfall/climate factor

A = Formation factor, this factor is applicable to nature of soil.

Nature of Soil	Value
I) Stable Soil	0
ii) Ordinary unstable Soil	0.1
iii) Shrinkable/black cotton soil	0.2

B = Alignment factor, this factor is applicable to curves

- I) 1.5' curve or more on BG
- ii) 3' curve or more on MG
- iii) 5' curve or more on NG

If the full length of the section is on curves, the value of 'B' will be 0.25 and prorata in other cases.

C = Rainfall / Climate factor

This factor is applicable to areas where the rainfall is intensive i.e. 200 cm or more per annum and where the climate adversely affect the output of labour. The value of factor 'C' will be 0.1 to 0.2 and will be decided by the Chief Engineer of that particular region.

9. ENGINE USAGE STATISTICS

An engine is an expensive machine. It costs a lot of money to pay and once it is purchased, the Rly becomes responsible for charges on the capital cost and depreciation and these charges go on whether the engine is being used or staying idle. It is therefore

necessary to get as much productive service out of an engine as possible and the aim should be to increase the no. of productive engine hrs and to increase the average daily kilometrage by making the most intensive and judicious proper and regular maintenance of the engine, less no. of engine failures, less engine turn round and improved speed of train. The following are the two statistical units which indicate the use made of the engine.

1. Engine kms per day per engine in use
2. Engine kms per day per engine on line

Engine kms per day per Engine in Use

Engine kms

Engine days in use $\frac{\text{—————}}{\text{—————}}$

This unit is worked out on each individual service that is passenger/mixed/goods etc, as well as for all services combined together. This unit is arrived at by dividing the total engine kms run during the month i.e. train shunting siding, AR & ANR (including dept. in case of all services) kms by the average no. of engines on each services multiplied by the no. of days in the month. This unit indicates the kms run daily by an engine in use. Higher the figure, the better is the mobility. This figure can be improved by making intensive utilisation of the engines in use by improving upon engine kms by giving extended runs to the locomotives etc.

Engine kms per day per Engine on the Line

Engine kms

Engine days on line $\frac{\text{—————}}{\text{—————}}$

The figure of engine kms per day per engine on line represents the average daily kms performed by all the engines on the line, including engines under or awaiting repair, good repair stored and spare daily. This unit is arrived at by dividing the total engine kms during the month by the average no. of engines on the line daily multiplied by the no. of day in a month. This unit indicates whether or not the best use is being made of the engines on the line. This unit should be always used in connection with engine kms per day per engine in use. The closure of these two units means better the result as the difference between two units indicates the no. of engines which have not been used and as such no revenue is earned by them. Every effort should be made to see that the no.

of engine under or quantity repair, good repair stored and spare is brought down to the minimum.

ENGINE FAILURE STATISTICS

An engine is considered to have failed when it is unable to work its booked train within the prescribed load from start to destination or causes delay in arrival at destination of one hour or more in the case of steam locomotive and 30 minutes or more for passenger trains and 60 minutes or more for freight paid trains in the case of diesel & electrical locomotives due to the under-mentioned causes.

- i. Defective design
- ii. Defective material
- iii. Bad workmanship in shop
- iv. Bad workmanship in shed
- v. Mismanagement of crew
- vi. Bad fuel
- vii. Bad water

Note:-

1) In the case of passenger train, the loss of time shall be taken as net i.e. time lost minus time gained where as in the case of good trains the loss of time should be gross as the time gained is not maintained.

2) Engine failure of all trains, AR & light engines, but not those of departmental, regular shunting and siding engines are to be included. Failure of other railway engines are also to be excluded.

3) Failure of AR & ANR and light engine will be included under the respective service to which they are related. In order to obtain a good engine failures are kept to the minimum, of course the ideal would be to have no failure at all but it is not always practicable, as an engine being a complicated machinery is liable to a no. of major & minor elements. The aim should be to get the figure of engine kms as high possible per engine failure. Only the no. of engine failures will not give a correct indication of the maintenance of the engine unless the no. of engine failures are expressed in relation to the work done by the engines. It is for this purpose and also to have a check on the engine failure, the following statistical unit is compiled.

- i) Engine kms per engine failure

Engine kms

No.of engine failure _____

This unit is worked out by dividing the engine kms run during the month by engines working passenger/mixed/goods trains and trains running light and attached to trains by the no. of engine failures.

10. MARSHALLING YARD STATISTICS

1) `Marshalling yard comprises of a set of lines where goods trains from different directions are received stabled, the loads are broken, marshalled and sorted out according to the various directions to which the same are to be despatched. Outward loads are subsequently formed and despatched as trains. The inward loads are kept after receipt pending placement at the various outlying points. Normally goods sheds, transshipment sheds, departmental siding, terminal yards & other sidings are treated outside the marshalling yard'.

2) `Marshalling yards are the clearing houses for goods wagons which are received, stored and despatched'. Every goods yard received goods trains and performs shunting work on them before they are despatched. It is therefore, difficult to distinguish between a marshalling yard and other goods yards by a qualitative measurement of work done, from the point of view if statistics a limit has been laid down that the marshalling yard statistics should be prepared for selected yards generally dealing with 20,000 wagons (4-wheelers) and over per month in respect of BG yards and 10,000 wagons (4-wheelers) and over per month in respect of MG yards, prior approval of the Rly.Bd. should be obtained for addition of deletion of any yard.

The area of each marshalling yard is to be carefully defined, and no extra allowance is to be made for any work done within that area. A diagram showing the marshalling yards for which statistics are required to be compiled by the Rlys for the Board. This diagram should be readily available at the station to enable any inspecting officer to obtain a clear indication to the extent of the marshalling yard.

Necessity of Marshalling Yard

Marshalling yards are the hearts that pump the flow of commerce along the track. The necessity of marshalling yard is obvious as neither goods traffic can be loaded in full train load nor a goods train be despatched from one end of the Rly to the other, to whatever distance. Long distance goods train may be formed, it has to be broken out at some stage.

Kinds of Marshalling Yards

Marshalling yards are classified on the basis of method of shunting - Marshalling yards are classified as under :-

i) Flat Yard

Yards with flat shunting neck are known as flat yards.

ii) Hump Yard

Yards where the shunting neck has the shape of camel hump

iii) Gravity Yard

Gravity yards are with continuous falling grade where the shunting of wagons is done purely through gravity without the assistance of shunting engines.

Objects of Marshalling Yards

These are the big pockets of the Rlys and lot of money has to be spent on their construction and maintenance. The work of sorting out wagons and making them up into train loads is unproductive as no revenue is earned directly for such work but it is essential. The output of the service is the no. of wagons dealt with in the yard and the unit of cost is the shunting engine hrs.

The first object should be to deal with as many wagons as possible per shunting engine hrs and therefore, efforts should be made to reduce the shunting engine hrs.

The second object should be to ensure that the rolling stock is not detained unduly. The wagons should be dealt with as quickly as possible.

The work of the marshalling yard must be supervised properly otherwise they may without internal vigilance become the graveyard of wagons.

In order to keep a watch on the above mentioned objects, following are the important statistical units compiled for marshalling yard by the yard master's office and submitted to the statistical branch monthly where the figures are narrated to the Rly.Bd. in monthly statement No. 14.

1. Wagons Despatched

No. of wagons include loaded wagons, empty wagons (4-wheeler) and brake vans despatched from marshalling yard during the month by the trains excluding wagons on by-passing trains, and also no. of wagons placed from marshalling yard outside the yard by pilots such as goods sheds, transshipment points, repacking points, departmental sidings and military sidings etc. These are treated as the no. of wagons dealt with during the month.

2. Daily Average No. of Wagons Despatched

This unit is arrived at by dividing no. of wagons dealt with during the month by the no. of days in the month.

3. No. of Trains Received

This will show the no. of by passing trains and no. of terminating trains. By passing trains include those trains which neither originate not terminate from the marshalling yard area. Terminating trains include those trains which terminate in the marshalling yard area.

4. Average Detention to by-passing Trains

This unit is worked out by dividing total detention hrs of by-passing trains during the month by the total no. of by-passing trains. The actual figures are compared with the target figures. The average detention of these trains must be minimised because these are more important trains.

5. No. of Trains Despatched

This will show the no. of by-passing trains and originating trains. Originating trains include those trains which originate from the marshalling yard area.

6. No. of Wagons Dealt with per Shunting Engine Hrs

This unit is arrived at by dividing the no. of wagons dealt with during the month by total shunting engine hrs. The no. of wagons dealt with during the month is the actual no. of loaded wagons, empty wagons (4-wheelers) and brake vans despatched from marshalling yard during the month.

Shunting engine hrs are to include the shunting hrs of regular yard shunting engine 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 should only be taken into account and not the time spent outside it limit. Shunting engine hrs are to be reckoned from the time of arrival of the shunting engines in the marshalling yard upto the time of their departure from the yard on the basis of shunting vouchers. The time spent on locomotive duties (i.e. taking water and cleaning fire etc.) change of crew and or fuelling whether in the yard itself or outside the yard is to be included only if it is equal to the allowed time. If it exceeds the allowed time, it will be excluded from shunting engine hrs.

7. Average Detention per Wagon

This unit is arrived at by dividing total detention hrs during the month by the total no. of wagons despatched during the month. This result is worked out separately for through loaded wagons, through empties, outward local, inward local, sick wagons and all wagons.

i) Through Loaded Wagons

This means such loaded wagons which neither originate nor terminate at the station, but which are dealt with in the yard and are not on by-passing trains.

ii) Through Empty Wagons

This means such empty wagons which neither originate not terminate at the station but which are dealt with in the yard and are not on by-passing trains.

iii) Outward Local

This will include detention to local wagons despatched by trains from the marshalling yard i.e. from the time of their entry into the marshalling yard from the outlying sheds and sidings till their despatch by trains.

iv) 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.

v) Sick Wagons

Detention to sick wagons in the marshalling yard will be included under this items as well as under all wagons. In case the sick lines form part of the marshalling yard, the detention in the sick lines will also be included. If the sick lines are outside the yard, such detention will be excluded.

The detention time should have reference only to the detention within the marshalling yard territory and the incoming & outgoing wagons from and to the local outlying sheds, sidings etc. should be counted as many times as they enter this yard. The no. and detention of brake vans are not taken into account for this purpose. The detention of wagons arriving in one month and despatched in the next month will be shown in the month in which they are despatched but the time must be reckoned from the date of arrival. The detention time is to be obtained by recording in the wagon exchange register or similar records which is maintained by the TNC (Trains clerk) after consolidating the figures from inward & outward registers. In these registers the following particulars are filled up by the TNC at the time of receipt & despatch of trains

- (a) Date
- (b) Time
- (c) Wagon No.
- (d) Owing Rly
- (e) from and to station
- (f) Description

In the case of wagons whose detention or despatch particulars are not available, their detention should not be omitted by reckoned on the basis of average detention during the month for similar type of stock while working out average detention per wagons. Actual average detention figures of through loaded and all wagons are compared with the target figures. The target detention hrs will be fixed by the Rly.Bd. from time to time having regards to the past performance of each yard. At the end of the month the hrs of detention to wagons despatched during the month under different types must be totalled, and both detentions and nos. of wagons for each type must be multiplied by the

factor of equivalence to 4-wheelers and then consolidated to workout the average detention per wagon.

11. DETENTION TO WAGONS AT GOODS TERMINAL STATIONS

This statement should be prepared for selected terminal stations and should show the figures separately for the terminal stations situated on BG & MG of a Rly. For terminal stations are the stations situated at the place which are terminals for a large no. of wagons received and loaded and from where bulk loading also take place as originating traffic. The following statistics is compiled to keep a clerk for detention to wagons in goods terminal stations.

1. Traffic dealt with :-

1.01 No. of loaded wagons received into the terminal station area

(a) Fulls (b) Smalls (c) Total

1.02 No. of wagons loaded during the month

(a) Fulls (b) Smalls (c) Total

2. Average total detention per wagon from arrival to despatch

2.01 Wagons received loaded & despatch loaded

(a) Number

(b) Average detention per wagon (Hrs) Target & Actual

2.02 Wagons received loaded and despatched empty

(a) Number

(b) Average detention per wagon (Hrs) Target & Actual

2.03 Wagons received empty and despatched loaded

(a) Number

(b) Average detention per wagon (Hrs) Target & Actual

2.04 Wagons received empty and despatched empty

(a) Number

(b) Average detention per wagon (Hrs) Target & Actual

2.05 All Wagons

(a) Number

(b) Average detention per wagon (Hrs) Target & Actual

To workout the average detention of each group, total detention hrs are divided by the no. of wagons of each group. While compiling the statement the following items should be taken into consideration :-

A) All wagons are counted in terms of 4-wheelers

B) * * *

C) The no. of wagons and total detention to such wagons as have been placed in the terminal yards, for want of room in T/yard should not be treated as detention at terminal yards.

12. DETENTION TO WAGONS AT BREAK-OF-GAUGE TRANSHIPMENT POINTS

ST.16

This statement should be prepared for selected transshipment points between BG & MG on Rlys and should show figures separately for BG to MG and MG to BG transshipment points at each transshipment point. Transshipment points are the junction stations to two different gauges and where goods from wagons of other gauge are unloaded and loaded into wagons of after gauge and vice-versa.

Transshipment points cost lot of money to work and are responsible to delays to wagons if various operations are not properly supervised. It is transfer to watch on the working of transshipment point by assigning that wagons time is not unduly wasted. Target gave fixed for various phases of appointment of the wagons and the aim should be to keep within the target. The following statistics are compiled to keep a check on transshipment points.

1 No. of wagons transhipped (in 4-wheelers)

- 1.01 No. of wagons transhipped (in 4-wheelers)
- 1.02 No. of wagons of other gauge wheelers (in 4-wheelers)
- 1.03 Ratio of Utilisation
- 2 No. of Wagons dealt with and average detention per wagon (Hrs)

a) Loaded to loaded

I) No. of wagons dealt with

ii) Average detention - Target & Actual

b) Loaded to empty

I) No. of wagons dealt with

ii) Average detention - Target & Actual

c) Empty to loaded

I) No. of wagons dealt with

ii) Average detention - Target & Actual

d) Total including empty to empty

I) No. of wagons dealt with

ii) Average detention - Target & Actual

A. The area of transhipment point should be demarcated properly

B. All wagons are to be counted in terms of 4-wheelers

C. The detention time should have reference only to be wagons despatched during the month and should be counted from the arrival of wagon even it occurred in a previous month.

13. ELECTRIC MULTIPLE UNIT - SUB-URBAN TRAINS

The statement is to show the figures of working of electric multiple units - sub-urban trains. The working of the trains handled by electric locomotives on push & pull system as also EMU trains running over non-suburban section shall not be included under this statement. The figures are to be shown in terms of units and are to be compiled on the same basis as worked by other modes or traction.

Train Unit

This means 4-bogie coaches irrespective of the no. of motor coaches used for working the units. If these are only three bogies on a train, it will be counted as 0.75 unit and six-bogie train will be counted as 1.5 unit and so on.

Train Kms

These are worked out separately as trains are run and in terms of single unit train. Since the quantity and cost of electricity consumption per train kms would be different according to the no. of coaches, including motor coaches hauled per train. A longer train would cost more per train KM than a shorter train and in order to render the electricity consumption and cost between different railways, train kms are converted into in terms of single unit train. Train kms in terms of single unit trains are adopted to work out the kilowatt hrs of electricity consumed per train kms. Similarly the hrs are also shown in terms of single unit trains e.g. the hrs of two units would be double and of a half unit halved and so on.

Vehicle kms

Separate figures are worked out for trailer coaches and motor coaches running on trains.

Train Usage

a) Train Unit kms per day per train in use –

Train unit kms

No. of train unit days (in use) _____

i) Train unit kms per day per train unit on line

j) Train unit hrs per day per train unit in use

Vehicle Usage

Motor coach kms per day per coach unit on line –

Motor coach kms

No. of motor coach days on line. _____

a) Trailer coach kms per day per trailer coach unit on line

Trailer coach kms

Trailer coach unit days on line

Motor Coach Failure

To watch the motor coach failures, following statistics is compiled

Motor coach kms per Motor Coach failures

Motor coach kms

Motor Coach failures _____

An EMU on a suburban service should be considered to have failed when through some mechanical or electrical defect in the stock or mismanagement on the part of train crew.

a) Either unit is unable to complete its booked working throughout the day or b) a delay not less than 15 minutes is caused to any train included in booked working for the day. Failure of all motor coaches, whether employed on the traffic or departmental service are to be included.

Power Supply Failure

- a) Failures originating at source of supply
- b) failures originating at sub-stations
- c) failures on account of overhead equipment's.**

Power used

Total power consumed for traction and train lighting in kilowatt hrs. Following results are worked out :

- 1) Kilowatt Hrs per train unit kms.

KWh power consumed

Train unit kms _____

- 2) Kilowatt hrs per 100 GTKMs

Kilowatt hrs power consumed x 100

14. FUEL & POWER STATISTICS

The expenditure of fuel & power is considered to be one of the major expenditure on Indian Rlys. Approximately 14% of the expenditure is on fuel & power. Rly administration is eager to reduce this expenditure. So it is very essential to keep a close watch on this issue. Therefore, fuel & power statistics are compiled and submitted to Rly.Bd. office monthly vide statement No. 5-A.

The actual quantity of fuel & power consumed on loco & non-loco is obtained from sheds, workshops and other fuelling points on the prescribed forms. Quantity of fuel/power consumed by locomotives is shown separately for passenger services, mail & express trains, other passenger, sub-urban, through goods, shunting & van, goods, mixed, departmental and miscellaneous services. Quantity of fuel consumed for other than locomotive purposes is shown separately for water pumping stations, mechanical workshops, running sheds, foundry shops, smithy & repair shops, engineering works and miscellaneous services.

Miscellaneous Services

The fuel consumed by engines exclusively allotted to workshops, store yards and for similar other departmental works should be shown under this head. Similarly fuel consumed by engines run on trial whether from shops or sheds during repairs and also by engines employed on construction works (provided the locos have not been sold or given on hire to such work) should be shown under miscellaneous services.

Miscellaneous Purposes

The fuel consumed by the engines on miscellaneous purposes is to include fuel used for departmental services such as running rooms & cranes, Rly hospital, offices, dining cars, refreshment rooms run by Rlys. The documents showing the quantity of fuel consumed by the above items are received in the compilation office monthly. In the compilation office, figures are consolidated traction-wise, gauge-wise and are submitted to the Rly.Bd by the 20th of the following month. There are several factors which affect the fuel consumption and which should be considered while comparing the results between two divisions/Rlys. Some are mentioned here.

(1) Density of traffic

- (2) Average lead of traffic
- (3) Loads of trains
- (4) Type, design & conditions of locomotive
- (5) Quality of fuel used/calorific value of coal
- (6) Degree of curvature
- (7) Gradients etc
- (8) Factor of train resistance.

While the above mentioned factors may differ from Rly to Rly and division to division, they will not differ so much from month to month on the same Rly/division. The most important factor in operation which affect fuel consumption from month to month on the same railway/division are

- (I) Distance
- (II) Load
- (III) Speed

By common experience, we know that longer the distance or greater the load, higher will be the quantity of fuel consumption and vice-versa. Similarly, better speed or less time on run will mean less consumption. The following two statistical units are compiled to keep a check on the consumption on fuel.

Fuel/Power consumed per Engine kms

Quantity of fuel/power consumed

Engine kms

Engine kms includes train engine kms, light, AR & ANR engine kms. The unit therefore suffers from lack of uniformity. It takes into account only the distance factor and completely ignores load and speed of trains. Therefore, it cannot be efficiently used to judge the relative efficiency of fuel consumed on services, where the loads and speed differ. The relative advantage is that, it is easily available and loco dept. can work out for themselves without having to wait for the figures from the statistical branch. It is commonly used for comparing the working of passenger engines on the same link as

after all the load of a passenger train is more or less the same. This is employed as a check on the working of the engine crew to find out which crews are heavy on fuel. This unit is also employed for measuring the fuel consumption or regular shunting & siding engines and engines employed on departmental services.

Fuel/Power consumed per 1000 Gross Tonne kms

This unit is arrived at by multiplying the quantity of fuel/power consumed by 1000 and dividing the result by the relevant gross tonne kms

Qty. of fuel/power consumed × 1000

G T K M s

The unit gives the idea of load and distance in relation to fuel consumption. Since, load & distance are the most important factors that affect the fuel consumption. It is this unit which is considered the best unit for checking fuel consumption on running services where the loads are not constant. But this unit does not indicate the speed factor. The third unit i.e. quantity of fuel consumed per 1000 GTKMs per engine hour gives the idea of speed also, but it is not worked out due to non-uniform geographical conditions in India.

Instructions :-

- (1) The quantity of fuel consumed should be based on the actual consumption figures. Coal figures are obtained by striking the difference between the quantity of coal in tender at the commencement and at the end of each trip and should include the coal used in shed for lighting up (the engine under the service on which is used) as well as the quantity issued en-route.
- (2) Cinders should be excluded from consumption figures
- (3) Fuel & power used on mixed services is to be divided between passenger and goods on the basis of respective vehicle/wagon kms
- (4) Fuel consumption by train engines during shunting operation en-route or B & A train working should be segregated from train service consumption and separately shown under shunting services.
- (5) The quantum of energy consumed on different services should be worked out on the basis of rate of consumption per 1000 GTKMs fixed by conducting trial units.

FUEL CONSUMPTION

1. A.C. Traction

- a) Non-traction load consists of colour light signals, relay equipment, motor operated points etc. Non-traction energy consumed shall be adopted as 2% of the total energy consumption.
- b) For mail & express trains, energy consumption shall be calculated at 18.8 kWh per 1000 GTKMs.
- c) For passenger train services at 25.7 kWh per 1000 GTKMs
- d) Energy consumption for shunting services at 1.48 per shunting engine kms.
- e) After apportioning the consumption on the above items balance consumption would be treated as on goods service.

II. D.C. Traction

- a) For Non-traction load 2% of the total consumption
- b) For mail & express trains and for passenger trains at 25.7 kWh per 1000 GTKMs
- c) For shunting service at 1.48 per shunting kms
- d) For Goods service at 12.0 kWh per 1000 GTKMs
- e) Energy consumption for Rly quarters and platforms will be done on the basis of actual metre reading.
- f) After apportioning the energy consumed for the above purposes, remaining consumption will be treated as on EMU services.

15. LUBRICATING OIL

Separate statements are required for BG, MG & NG as also for steam, diesel & electric traction. Cumulative figures from 1st April are shown separately. Lubricating oil used on coaches & wagons is to be included in the statement, but figures for EMU sub-urban trains are excluded. The grease or lubricating oil used on engine in sheds during servicing them before the run i.e. making them ready for the run should be included in this statement. Any oil used for the upkeep of locomotives and boilers i.e. during their repair & storage should be excluded. Following information are available in this statement :-

- 1) Lubricating oil used on engines (excluding regular shunting & departmental)

2.1 Total lubricating oil used on passenger & mixed services

This will show the total lubricating oil used by engines employed on passenger and mixed services except regular shunting engines and those run on departmental account.

2.2 Litres per 100 engine kms (passenger & mixed)

This unit is arrived at by the total lubricating oil used on passenger & mixed services, by the engine kms of passenger & mixed service and multiplying the result by 100.

Total lubricating oil x 100

Engine kms

2.3 Total litres used on goods services

2.4 Litre per 100 engine kms (goods)

The result is arrived at by dividing the total litres of oil used on goods service by the engine kms of goods service & multiplying the result by 100.

Total litres of lubricating oil x 100

Engine kms

3. Oil consumption on passenger & goods stock (including departmental)

The total litres of oil used will include all kinds of oil used on passenger & goods stock of all descriptions, whether belonging to home line or other Rlys. But oil used on vehicles while in shops is to be excluded. In case of POH of vehicles in sheds, the oil used in this connection is to be excluded.

3.1 Litres per 1000 vehicle kms (passenger & goods)

The figures obtained by dividing the total litres of oil used on passenger & goods service by vehicle/wagon kms and multiplying the result by 1000. Total litres of oil x 1000

Vehicle kms

Vehicle kms for this item will include the kilometrage of passenger trains, mixed trains (passenger proposition) departmental trains & brake vans. Wagon kms will include the kilometrage of goods & mixed trains (goods proportion), departmental goods and brake

vans. This monthly statement should reach the Rly.Bd`s office on or before the 20th of the following month.

16. PRODUCTIVE/UNPRODUCTIVE SERVICES

In Rly working, the incidence of unproductive services can not altogether be ruled out. However, these services are required to be kept under close watch and supervision so as to ensure that these services are kept to the minimum. The output in terms of revenue earning work done in Rly operations is the net tonne kms and the input in this context is the train engine hrs, which also are productive. Other engine hrs like starting & terminating other engine hrs, assisting not required engine hrs, light engine hrs, idling in yards etc are unproductive since no revenue earning is directly done by these hrs.

Similarly, empty wagon running is unproductive, since no net tonne kms are earned by empty wagons. However, empty wagon running cannot altogether be avoided because unbalanced traffic and requirement of special type of stock at loading points from where the traffic originates in bulk. For example POL, loading is done in bulk at oil loading stations in tank wagons for various destinations and in the return direction, empties are returned to feed the loading points. Similar is the case for the supply of box rakes which run empty to the coal loading points on return journey. Though, such empty running cannot be avoided, yet effective watch is kept on these aspects to reduce the incidence of such empty running. In order to keep a check on such unproductive services the following statistics are compiled :-

a) Percentage of train engine hrs to total engine hrs.

The higher the figure, the better is the result. Of course, an increase in train engine hrs should not be due to a decrease in the speeds of train. The figure is arrived at by multiplying the figure of train engine hrs by 100 and dividing the result by total engine hrs.

b) Percentage of loaded to total Wagon kms

The higher the figure, the better is the result. An improvement in loaded wagon kms would mean more net tonne kms and consequently more yield of revenue. This figure is arrived at by multiplying the figure of loaded wagon kms by 100 and dividing the result by total wagon kms. Shunting engine kms, light engine kms and assisting not required engine kms are also classified as unproductive as no revenue is earned directly from these services. The work of shunting operation though unproductive is an essential operation as in the absence of shunting, no train can be formed. Similarly, light and

assisting not required engine running is unproductive, but because of the unbalanced traffic and other operational reasons, such a running becomes essential. However, a close watch is to be kept on these services and efforts should be made to reduce them as much as possible. In order to keep a check on these unproductive services the following units are compiled.

- i) Shunting kms per 100 train kms
- ii) Light & assisting not required engine kms per 100 train kms
- iii) Shunting done at principal stations.

i) Shunting kms per 100 train kms

This figure is compiled by multiplying the shunting kms by 100 and dividing the result by train kms. This unit indicates the amount of unproductive work performed in relation to productive work. Efforts should be made to reduce the engine kms (shunting), by the economical use of shunting engines. While comparing results between various divisions or Rlys, the factors of the lead of traffic, proportions of branch lines to main lines, distance between the junctions and important yards etc. must be taken into consideration.

ii) Light Engine & ANR engine kms per 100 train kms

This figure is compiled by multiplying light & ANR engine kms by 100 and dividing the result by the train kms. This unit also indicates the amount of unproductive work done in relation to the productive work. Efforts should be made to curtail light & ANR engine running to the minimum. Balance of traffic in both the directions is very important factor which must be considered while comparing the results on the various divisions/railways.

iii) Shunting done at Principal Stations

The shunting hrs of regular shunting engines as well as by train engines are compiled for practically all the important stations on each division. The unit 'No. of vehicles dealt with per shunting hour' is also worked for each such station by dividing the vehicles dealt with by the shunting engine hrs. The higher the figure, the better is the utilisation of the shunting engines.

17. MANAGEMENT STATISTICS

Management statistics are the important statistics of Rly operation closely watched at the highest level of management. These are compiled as 'Monthly Appreciation Report'.

The management statistics include :-

A) The financial statistics of earning & expenses. The earning figures are exhibited separately for passenger traffic, other coaching, goods, traffic and sundry earnings. The figures of working expenses are shown separately under various demands for grants.

B) The commercial statistics of revenue earnings shown separately for passenger & goods traffic on the goods side tonne originating is shown for some important plan head commodities. The actual tonnes originating is compared with the target. On the passenger side, approximate no. of passenger originating for the system as a whole are exhibited separately for suburban & non-suburban traffic. This enabled the management to take immediate steps to remedy the situation.

C) The operating statistics pertaining to the standard of service rendered to the public in terms of punctuality of mail & express trains, safety aspect i.e. the statistics of train accidents exhibited the figures separately under collusion, derailments and other consequential accidents etc. The operating statistics exhibited in the management statistics also include the statistics of the utilisation of various resources at the disposal of the operating dept. These statistics include.

- i) Engine utilisation statistics separately for steam, diesel & electric traction
- ii) Wagon usage statistics viz. Wagon kms per wagon day, net tonne kms per wagon day and wagon turn round.
- iii) Train mobility statistics viz. speed of all goods trains separately for steam, diesel & electric traction
- iv) Marshalling yard performance exhibiting.
 - a) No. of wagons dealt with per day
 - b) No. of wagons dealt with per shunting engine
 - c) Average detention per wagon (all wagon)

All the figures as shown above are exhibited separately for the month and also for the corresponding month of last year and best result achieved in the past is also exhibited to enable the administration to see as to how the present performance compares with the best results achieved in the past.

Appraisal of Management Statistics :-

The management statistics are compiled every month and sent to the concerned head of the departments viz. The financial statistics are critically examined by FA&CAO`s and CCM`s and observations are recorded. The commercial statistics are critically examined by the CCM concerned. The operating statistics are examined by COM, CME, CEE & CTSS etc and their comments are offered on the performance indices concerning their respective departments.

The General Manager of each Zonal Rly holds monthly statistical meeting with all the principal Heads of Departments wherein the management statistics are discussed in details. The comments offered by the various HOD`s are discussed and critically examined. In the light of discussion and detailed examination the remarks are framed for each statistical indices appearing in the management statistics and their detailed comments are sent to HODs for their follow up action.

18. EFFICIENCY STATISTICS

Efficiency statistics are the indices which reflect the efficiency of operation. The efficiency of operation would be considered to be high if the following are fulfilled.

- i) The amount of productive work done is more in relation to the total work done
- ii) The output in terms of revenue earning work done increases in hauling the revenue earning NTKms, measured in terms of engine hrs & engine days in use and on line.
- iii) The total amount of work done viz. The total output in terms of GTKms increases in relation to the input viz. cost measured in terms of engine hrs.

In order to achieve the above objective it has to be ensured that the productive engine hour viz. the train engine hrs are more in relation to total engine hrs. However the increase in train engine hrs should not be due to drop in the speed of goods trains. Similarly empty haulage of wagons should be kept to the minimum so that more revenue earning work is done in terms of loaded wagon km in relation to the total wagon kms. NTKms can be improved by better loading of wagons, better wagon mobility, lesser wagon detention etc.

The unit of cost i.e. engine hrs can be curtailed by checking unproductive engine hrs like ANR, light, other engine hrs etc. Similarly more net tonne kms can be hauled by making the most economic and judicious use of the locomotive which are actively in use and also which are on line. However since the unproductive work cannot be eliminated altogether because it depends upon various factors like topography, gradients proportion of main line to branch line, location of junction station and marshalling yard, lead of traffic etc. The following are the efficiency indices compiled by the Zonal Rlys. :-

1) Percentage of train engine hrs to total engine hrs for Coaching & Goods

train engine hrs x 100

total engine hrs

2) Percentage of loaded to total wagon km for UP & DN direction

Loded wagon kms x 100

Total wagon kms

3) Net tonne kms per engine hrs including departmental

Net tonne kms

Engine hrs

4) Net tonne kms per goods locomotive day on line

Net tonne kms

goods locomotive day on line _____

5) Gross tonne kms (including departmental and weight of engines AR & ANR) per engine hrs.

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REPAIR & MAINTENANCE STATISTICS

1. LOCOMOTIVE WORKSHOP REPAIR STATISTICS

Locomotive is a costly machine. The repair work involved in a loco may be a major or a minor one. The time, money & labour involved in the repair work depend upon the type of repair work given to the locomotive.

Standard Unit Repair:

Looking at the type of steam loco & the nature of repair work, standard unit repairs are worked out, after giving weightage for POH if different classes of locomotives separately for BG, MG & NG. This weightage are based on the ratio of man hrs spent on the POH of the locomotive. In case of BG, the weightage for different classes of steam engines is based on the ratio of man hrs with WG class of engine as 1/0. For MG & NG steam engine it is based on the ratio of man hrs with YG & ZE class of loco as 100 & 80 respectively.

The units of cost per standard unit repair & cost per engine km are the units, which render the cost of repairs given to the locomotives, and are compared from month to month. Following statistics are compiled to keep a check on the working of the workshop, separate details are given for BG & MG workshop. In case of MG only the statement for the gauge as a whole should be submitted.

a) No. of engines despatched during the month after repairs

This shows the total no. of steam, D.H.,D.E., & electric engines despatched during the month after POH, IOH & special repairs. All locomotives despatched from a workshop after repair should be shown in the month in which they are despatched.

b) No. of standard unit repairs carried out on locomotive during the month -

For this item WG/YG/ZE loco will be taken as a standard unit repair for steam loco. This will show standard unit repairs after POH, IOH & Spl. Repairs.

c) Total no. of repairs carried out on engines despatched during the quarter

In case of steam loco this will be shown in terms of standard unit repairs for DSL & Electric loco, total no. of diesel/electric engines despatched will be shown.

d) Total expenditure on repairs & maintenance during the quarter

The total expenditure will refer to the expenditure incurred in respect of repairs carried out in each workshop for the home railway and for other Zonal Railway stock as well. The expenditure will be furnished separately for wages and material.

e) Average cost of repairs during the quarter

Total expenditure on repairs & maintenance during the quarter

Total no. of standard unit repairs carried out during the quarter

f) An engine is considered to be in shop for repair from the day after its arrival to the day before its departure. The day on which the engine is made over to the mechanical workshop is to be reckoned as a day under or awaiting repairs provided it did not work at all during that day and the day on which it is made over by the workshop after repair is not to be counted as under repairs in shop. Sunday and (other) holidays are to be included no. of days except Sundays, for which the workshop remained close during the month should be shown in footnote. A day is reckoned from 0 to 24 hrs for diesel & electric loco, the days in shops are worked out in hrs.

g) Total no. of days for which engines despatched during the month were not available for traffic use :- This item is shown traction-wise for the following heads :-
(I) from shed to workshop & from workshop to shed (ii) under actual repairs in workshop (iii) idling in workshop before & after repairs.

h) Average no. of days engines despatched were not available for traffic use

Total no. of days engines were not available for the use

Total no. of engines despatched

g) Expenditure incurred on locomotive machinery & plant outlay.

2. CARRIAGE & WAGON WORKSHOP REPAIR STATISTICS

Railway administration is entrusted to have a good performance out of the rolling stock, which can be achieved by properly maintaining the stock. The repair & maintenance of rolling stock is done at 2 levels at the sick live depots, where day to day repairs are done and maintenance schedules are attended. The major repairs & periodically overhauling is done at workshop level. The administration is interested to keep a watch on the workshop because a large amount is spending on their construction & maintenance.

The statement regarding the repairs given in the workshop is prepared monthly as well as cumulative from 1st April separate statement are prepared for BG & MG giving the name of the shop. Figures are shown for total all gauges as well compilation office collects the figures monthly from each shop, consolidates the figures gauge-wise and submits it to the Railway Board's office. The statement should reach the Board on or before 20th of the following month. Following units are available in the statement -

a) No. of vehicle/wagons repaired & despatched during the month.

All vehicles & wagons whether of home Railway or other Railways, are to be shown under this item vehicles/wagons are shown in terms of 4-wheelers as well as in terms of units.

b) Total no. of vehicles repaired & despatched during the quarter

c) Total expenditure incurred on repairs & maintenance of vehicles & wagons during the quarter this refers to the total expenditure incurred in respect of repairs carried out in each shop both for the home Rly as well as for other railway vehicles.

d) Total no. of days for which vehicles despatched during the month were ineffective

A vehicle is considered to be in shop for repair from the day, it is received in shop to the date of despatch, both days inclusive. In case of coaching stock, the transit time between marking sick at base station and arrival at shop should be shown separately. Sundays & holidays are also included no. of days except Sundays, for which the shop remained closed during the month should be shown in a footnote.

e) Average no. of days vehicles despatched during the month were ineffective

Total no. of days for which vehicles despatched

Vehicles despatched during the month

f) Total no. of months for which vehicles despatched were in service prior to undergoing repairs

The average period should be calculated from the actual last repair carried out in any shop what so ever & not from the date of last repair is the particular shop for which figures are being reported for this tem figures should be gauge-wise for the entire Rly.

g) Average period in months vehicle despatched were in service prior to undergoing repairs

h) Expenditure incurred on C&W machinery & plant outlay in workshop

This will show the expenditure from capital, DRF, DF & OLWR incurred on additions, improvements, renewals & replacement of workshop machinery & plants (both mechanical & electrical equipment).

i) Total value of outrun of the shop during the quarter, this will be shown under the heads

1) Repairs to vehicles

2) Manufacture of spare parts I) Work done for Govt. Dept. other Rlys and the public
II) Other manufacturing operations III) Total value of stores with the workshop as on the last day of the quarter.

j) Man hrs worked & absentee man hrs this is shown separately for

1) Man hrs worked 2) Absentee man hrs 3) Idle time 4) Total man hrs 5) percentage of absentees and idle man hrs to total man hrs.

Absentee man hrs + idle time x 100

Total man hrs

k) Total payment of incentive in the workshop & payment of OT for the month

Instructions :-

1) Figures regarding cost & value are reported quarterly

- 2) Expenditure is worked out per 4 wheeler for C&W and in units for EMU
- 3) Record of foreign Rly stock, repaired in the workshop is kept separately and advised to the concerned Rly after completion of the month/quarter.
- 4) Information in respect of no. of vehicles despatched after repairs, cost incurred on passenger carriage & goods wagon is worked out type-wise.
- 5) Stock on temporary transfer from other Rlys will be treated as the stock of the using Rly.

Objects :-

1. To keep a watch on the output of the workshop
2. To see that the cost of repairs is as low as possible
3. Time taken for repairs is less
4. To keep a watch on the utilisation & wastage of man power

3. COST OF REPAIRS & MAINTENANCE OF ROLLING STOCK

Object: -

- 1) To know the total cost of R & M of locomotive coaches & wagons
- 2) To know the average cost of R & M of locomotives, coaches & wagons
- 3) To know the average & total cost separately for workshop & shed/sick lines as well as combined cost of workshop, shed, sick lines gauge-wise.

Instructions: -

- 1) This statement is submitted gauge-wise quarterly to board
- 2) Cost of R & M will include the cost in workshop & transportation depot & total of both
- 3) Total cost of R & M will include the locomotives will be worked out traction-wise separately.
- 4) Total cost of coaches is worked out separately for a) coaching vehicles (other than EMU) b) EMU
- 5) Total cost of goods stock is worked out separately
- 6) Average cost is worked out per engine kms a) traction-wise in case of loco R & M b) IOS coaching stock it is worked out for I) coaching vehicles (other than EMU) per 4-wheeler vehicle ii) EMU per unit iii) for goods stock per 4-wheeler wagon owned.

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1. COMMON TERMS USED IN ADMINISTRATIVE STATISTICS**1) Route kilometre**

Distance of each gauge owned by a Rly 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 Rly or by electric power, or is opened for goods traffic, but not for passenger traffic or vice-versa the kilometerage of that of that section is included.

2) Running Track kms

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 kms

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.

Example: - The distance between Ajmer and Kishangarh is 25 kms. There is a double track running between these two stations. Both stations have extra lines for crossings a distance of 2 kms . The route kms of these two stations is 25 kms, while the running track kms will be 50 kms and the total track kms will be 52 kms .

4) Mean route kms

The length of the Railway calculated according to the definition of route kilometrage allowing for changes in the kilometrage during the period covered. Thus, the mean kilometrage worked during the year, which has had an addition/closing during the year, will be as follows: -

Route kilometrage 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 no. Of days in the year)

Example: - The route kms of a Railway are 1000 kms. A new section of 100 kms was opened for three months. Another section of 25 kms was closed from 1st July. So the mean kilometrage will be as follows: -

$$1000 + 100 \times \frac{92}{365} - 25 \times \frac{184}{365} = 1013 \text{ kms}$$

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5) Equated Track Kilometerage

The kilometrage 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: -

$$\text{Where } C = L \times U (1 + A + B + C)$$

C = Equated Track Kms,

L = Running Track Kms

U = Traffic Density

A = Soil Factor

B = Curvature

C = Rainfall Factor

The figures of equated track kms are worked out section-wise and gauge-wise. This formation is utilised by the engineering dept. for the employment of gangman for the maintenance of track. The No. of men required depended mainly on the no. of trains run over the section. More wear & tear of the track; more will be the no. of men required for maintenance.

2. STAFF STATISTICS

An employee paid directly by the railway administrations excluding casual labours are termed as "staff". In order to have the details of number and annual cost of staff employee of the railways, detailed staff statistics are compiled by each Zonal Railway in annual statement No.40. This statement should reach the Railway Board Office by 31st August each year.

GENERAL INSTRUCTIONS

1. An employee is enumerated in the category in which he may be actually working on the last day of the year concerned, irrespective of the category in which he may be holding the lean.
2. The staffs who have no lien on any permanent post on the date of enumeration are included under temporary category.
3. The incidence of cost and not the administrative control is the criteria for determining the classifications of staff by departments.
4. Probationary officers are not included unless they are borne against a sanctioned cadre or they are appointed against vacancies in the cadre of service.
5. Apprentices are also excluded unless they are borne against a sanctioned cadre.
6. Staffs on loan from other departments/railways are included in the category and department in which actually working on that date.

Staff statistics are compiled & submitted to the Rly Board in 8 different forms, which are as follows: -

Form No 1. No. of staff group-wise

Form No 2. No. of staff & their annual cost

Form No 3. No. of staff department-wise

Form No 4. No. of group 'C & D' staff on the revised scales of pay under each Department.

Form No 5. No. of man days lost due to sickness & labour trouble for group & D' staff C

Form No 6. No. of attacks & death under various kinds of diseases.

Form No 7. No. of female employees department-wise.

Form No 8. No. of staff housed on government Rlys.

Objects of the Statement:-

- 1) To judge the No. of staff engaged in different departments
- 2) To judge the expenditure incurred on staff
- 3) To know the No. of female employees working in Indian Railways

